SIEMENS

SINUMERIK 840D sl/840Di sl/ 840D/840Di/810D SIMODRIVE 611digital

Detailed Maschine Data Description

Valid for:

Conrols

SINUMERIK 840D sl	1.3
SINUMERIK 840DE sl (export version)	1.3
SINUMERIK 840Di sl	1.1
SINUMERIK 840DiE sl (export version)	1.1
SINUMERIK 840D powerline	7.4
SINUMERIK 840DE (export version) powerline	7.4
SINUMERIK 840Di powerline	3.2
SINUMERIK 840DiE (export version) powerline	3.2
SINUMERIK 810D powerline	7.4
SINUMERIK 810DE (export version) powerline	7.4

Drive

SIMODRIVE 611 digital

03/2006 Edition

SINUMERIK® Documentation

Printing history

Brief details of this edition and previous editions are listed below.

The status of each edition is shown by the code in the "Remarks" column.

Status codes in the "Remarks" column.

- A .... New documentation.
- B .... Unrevised reprint with new Order No.
- C .... Revised edition with new status.

If factual changes have been made on a page since the last edition, this is indicated by a new edition coding in the header on that page.

Edition	**Order-No.**	**Remarks**
05.05	**-**	**A**
03/2006	-	B

Preface

Structure of the documentation

The SINUMERIK documentation is organized in 3 parts:

- General documentation
- User documentation
- Manufacturer/service documentation

An overview of publications (updated monthly) indicating the language versions available can be found on the Internet at:

http://www.siemens.com/motioncontrol
Select "Support" -> "Technical Documentation" ->"Overview of Publications"

The Internet version of the DOConCD (DOConWEB) is available at:
http://www.automation.siemens.com/doconweb

Information about training courses and FAQs (Frequently Asked Questions) can be found at the following web site:

http://www.siemens.com/motioncontrol under menu option "Support"

Target group

This documentation is intended for project engineers, commissioning engineers, machine operators, service and maintenance personnel.

Benefits

The Parameter Manual enables the intended target group to evaluate error and fault indications and to respond accordingly.

With the help of the Parameter Manual, the target group has an overview of the various diagnostic options and diagnostic tools.

Standard version

This Parameter Manual only describes the functionality of the standard version. Extensions or changes made by the machine tool manufacturer are documented by the machine tool manufacturer.

Other functions not described in this documentation might be executable in the control. This does not, however, represent an obligation to supply such functions with a new control or when servicing.

Further, for the sake of simplicity, this documentation does not contain all detailed information about all types of the product and cannot cover every conceivable case of installation, operation or maintenance.

Technical Support

If you have any questions, please get in touch with our Hotline:

Europe and Africa time zone:

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Note

Country telephone numbers for technical support are provided under the following Internet address:

http://www.siemens.com/automation/service&support

Questions about the Manual

If you have any queries (suggestions, corrections) in relation to this documentation, please fax or e-mail us:

Fax: +49 (0) 9131 / 98 - 63315

E-mail: mailto:motioncontrol.docu@siemens.com

Fax form: See the reply form at the end of the document.

SINUMERIK Internet address

http://www.siemens.com/motioncontrol

EC declaration of conformity

The EC Declaration of Conformity for the EMC Directive can be found/obtained

"on the Internet:

http://www.ad.siemens.de/csinfo

under product/order no. 15257461

"at the relevant regional office of the Siemens AG division A&D MC.

Safety Instructions

This Manual contains information which you should carefully observe to ensure your own personal safety and the prevention of material damage. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring to property damage only have no safety alert symbol The warnings appear in decreasing order of risk as given below.

Danger

Indicates an imminently hazardous situation which, if not avoided, **will** result in death or serious injury or in substantial property damage.

Warning

Indicates that death or severe personal injury will result if proper precautions are not taken.

Caution

with a warning triangle indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a warning triangle indicates that property damage **can** result if proper precautions are not taken.

Notice

indicates a potential situation which, if not avoided, **may** result in an undesirable event or state.

If several hazards of different degrees occur, the hazard with the highest degree must always be given priority. A warning notice accompanied by a safety alert symbol indicating a risk of bodily injury can also indicate a risk of property damage.

Qualified Personnel

The associated device/system may only be set up and operated using this documentation. Commissioning and operation of a device/system may only be performed by qualified personnel. Qualified persons are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

Table of Contents

Machine and Setting Data 1

1.1 Explanations

Note

There is also a comprehensive description of the machine data and setting data on the DOCONCD:

You can learn more about the functional contexts of the machine data if you follow the cross-reference.

In addition, the online help available on the controller provides all the detailed information on the machine data.

1.1.1 General information

Tables

There are various kinds of tables for the machine data and setting data.

For following tables are used for the following areas:

- General Machine Data
- Channelspecific Machine Data
- AxisSpecific Machine Data
- Setting Data

MD number	Name of identifier			Display filter	Reference
Unit	Name			Data type	Activation
Attributes					
System	Dimension	Default value	Minimum value	Maximum value	Protection

Expanded tables

Machine data values that differ depending on the system can be found in the additional lines under the table header. In such cases, the fourth row represents the default values and the fifth and remaining rows represent deviating values for the specified systems. A minus symbol in a field indicates: The default value from row 4 applies.

In the "Protection" field, the entry "-1" indicates that the machine data for the specified system is not available.

Example:

10050	SYSCLOCK.CYCLE_TIME			N01, N05, N11	G3
s	Basic system clock cycle			DOUBLE	POWER ON
				SFCO	
-	-	0.004	0.000125	0.031	7/2
710-2a2c	-	0.002	0.001	0.008	-/-
840di-universal	-	0.002	0.001	0.008	-/-

For following table is used for the area:

- Display machine data

MD number	Name of identifier			Display filter	Reference
Unit	Name			Data type	Activation
				SW version	
System		Default value	Minimum value	Maximum value	Protection

For following table is used for the area:

- Drive machine data

MD number	Name of identifier			Display filter	Reference
Unit	Name			Data type	Activation
			Type		Rot/Lin
System		Default value	Minimum value	Maximum value	Protection

For following table is used for the area:

- Machine data of the hydraulic module:

MD number	Name of identifier			Display filter	Reference
Unit	Name			Data type	Activation
			Type	SW version	
System		Default value	Minimum value	Maximum value	Protection

Explanations of the terms specified in the table fields can be found in the following.

Number

In the "Number" field, the number of the machine data (MD) and the setting data (SD) is specified. This number is displayed via HMI in a list on the screen.

Name of identifier

In the field "Identifier", you see the name of the data. This name is displayed via HMI in a list on the screen.

Reference

The "Reference" field designates the document which contains the description of the context in which the machine data is used.

Reference is made to the following documents:

/FB1/	Function Manual of basic machines, supporting manuals: A2, A3, B1, B2, D1, F1, G2, H2, K1, K2, N2, P1, P3pl, P3sl, R1, S1, V1, W1, Z1
/FB2/	Function Manual of expanded functions, supporting manuals: A4, B3, B4, F3, H1, K3, K5, M1. M5, N2, N4, P2, P5, R2, S3, S7, T1, W3, W4
/FB3/	Function Manual of special functions, supporting manuals: F2, G1, G3, K6, M3, S9, T3, TE01, TE02, TE1, TE2, TE3, TE4, TE6, TE7, TE8, V2, W5
/FBA/	Function manual of drive functions, supporting manuals: DB1, DD1, DD2, DE1, DF1, DG1, DL1, DM1, DS1, DÜ1
/FBU/	Description of Functions SIMODRIVE 611 universal
/FBSI/	Description of Functions Safety Integrated
/IAC/	810D Installation & Start-Up Guide
/IAD/	840D/611D Installation & Start-Up Guide
/POS3/	POSMO SI/CD/CA User Manual
/FBHLA/	Description of Functions HLA module
/IAM/	Commissioning CNC Part 2 (HMI), supporting manuals: BE1, HE1, IM2, IM4
/FBO/	Configuring OP 030 Operator Interface
/FBT/	Description of Functions ShopTurn
/FBSP/	Description of Functions ShopMill
/BAS/	Operating/Programming ShopMill
/BAD/	Operator's Guide HMI Advanced
/BEM/	HMI Embedded Operator's Guide

/FBW/	Description of Functions Tool Management
/FBMA/	Description of Functions ManualTurn
/FBFA/	ISO Dialects for SINUMERIK Description of Functions
/FBSY/	Description of Functions Synchronized Actions
/PGA/	Programming Manual Job Planning

Unit

The unit refers to the default setting of the machine data.

If the machine data is not based on a physical unit, then the field is marked with "-".

Note

For machine data of the Performance 2 [P2] control module, the unit(s) (together with a filter) are shown in row 2 column 1.

The following machine data influence the scaling of other machine data:

- MD_$MN_10220_SCALING_USER_DEF_MASK
- MD_$MN_10230_SCALING_FACTORS_USER_DEF
- MD_$MN_10240_SCALING_SYSTEM IS METRIC
- MD_$MN_SCALING_VALUE_INCH
- MD_$MN_IS_ROT_AX

Depending on MD 10240 SCALING_SYSTEM_IS_METRIC, the physical units differ as follows:

MD 10240 = 1	MD 10240 = 2
mm	inch
mm/min	inch/min
m/s2	inch/s2
m/s3	inch/s3
mm/rev.	inch/rev.

Name

The function of the data is described in the "Name" field.

Activation

In the "Activation" field, the following short designator specifies when the data takes effect after a change.

po	POWER ON	"RESET" key on the front plate of the NCU module
cf	NEW_CONF	– The "Activate MD" softkey on the HMI – "RESET" key on the control unit – It is possible to modify block limits during program operation
re	RESET	– at end of program M2/M30 or – "RESET" key on the control unit
so	IMMEDI-ATELY	After entry of value

The levels of effectiveness have been listed above in order of priority.

Protection

The levels of protection 0 to7 are specified in the "Protection" field. The first number specifies the protection level for writing and the second number specifies the protection level for reading.

0 or 10: SIEMENS

1 or 11: OEM HIGH

2 or 12: OEM LOW

3 or 13: End user

4 or 14: Keyswitch setting

5 or 15: Key switch position 2

6 or 16: Key switch position 1

7 or 17: Key switch position 0

In expanded tables, the entry "-1" indicates that the machine data for the specified system is not available.

Complete protection:

The numbers in the range of 0 to 7 establish whether assigned data in the NC program and in MDA mode is writeable or readable.

Conditional protection:

The numbers in the range of 10 to 17 establish (only for user data (GUD)) whether the data in the NC program and in MDA mode is writeable or readable.

The operation and display are always under protection for both types of protection.

The locking for protection levels 0 to 3 can be cleared by setting the password,

and the locking for 4 through 7 can be cleared via a keyswitch position.

The user only has access to information related to the current protection level and the levels below it. The machine data is assigned different protection levels by default.

The user can change the priority of the protection levels. Only protection levels of lower priority can be assigned to the machine data, setting data can also be assigned protection levels of higher priority.

The passwords are required for redefinition by the user.

Specify read access APR (Access protection read) and

write access APW (Access protection write).

The protection level follows the password in the form of a number.

Example: Changing rights in individual machine data

%_N_SGUD_DEFFile for global variables

;$PATH=/_N_DEF_DIR

REDEF $MA_CTRLOUT_SEGMENT_NR APR 2 APW 2

REDEF $MA_ENC_SEGMENT_NR APR 2 APW 2

REDEF $SN_JOG_CONT_MODE_LEVELTRIGGRD APR 2 APW 2

M30

The files become active when the next _N_INITIAL_INI is read in.

Display filter

A short designator for the filter setting is listed in the "Display filter" field. With the aid of this filter setting, it is possible to selectively reduce the number of the displayed machine/setting data of a section.

Display criteria:

EXP Expert mode:

- Active: the MD is assigned to the expert mode (display of MD)

Depending on the machine data section, there are different display filters. These short designations return in the operator interface to activate the filters.

The short designations of the display filter and their meanings are listed below for the individual machine data.

Drive machine data

D01 Controller data

D02 Monitors/Limitations

D03 Message data

D04 Status data

D05 Motor / Power module

D06 Measuring system

D07 Safety Integrated

D08 Standard machine

General machine data

N01 Configuration / Scaling

N02 Memory configuration

N03 PLC machine data

N04 Drive control

N05 Status data/Diagnostics

N06 Monitors/Limitations

N07 Auxiliary functions

N08 Corrections/Compensations

N09 Technological functions

N10 Peripheral configuration

N11 Standard machine

N12 NC language ISO dialect

Channelspecific machine data

C01 Configuration

C02 Memory configuration

C03 Initial settings

C04 Auxiliary functions

C05 Velocities

C06 Monitors/Limitations

C07 Transformations

C08 Corrections/Compensations

C09 Technological functions

C10 Standard machine

C11 NC language ISO dialect

Axis-specific machine data

A01 Configuration (including memory)

A02 Measuring system

A03 Machine geometry

A04 Speeds/Accelerations

A05 Monitors/Limitations

A06 Spindle

A07 Controller data

A08 Status data

A09 Corrections/Compensations

A10 Technological functions

O11 Standard machine

A12 NC language ISO dialect

Display machine data

You will find the following short designators for the machine display data:

H01 ShopMill

H02 ShopTurn

H03 ManualTurn

H04 Access levels

H05 Standard machine

Default value

The machine data is preset using this value. If default values for the channels differ, this is indicated by "/".

Some machine data are preset with different default values depending on the NCU used.

Note

Inputs via HMI are limited to ten digits plus comma and sign.

System

The system is specified in the "System" field if the the machine data only applies to one system:

840D	840D systems
810D	810D system
Adv	HMI Advanced
Emb	HMI Embedded
OP30	OP030
MT	ManualTurn
SM	ShopMill
ST	ShopTurn

If the machine data applies to all systems, the field remains empty.

Other identifiers:

iajc	"i" stands for axes, "j" stands for channels, e.g. 6a2c = 6 axes, 2 channels
7x0- iaja	identifies solution line systems
x	1, 2, 3

Dimension

The number of elements of a machine data field is indicated in the field marked "Dimension".

The machine data can be accessed via the field index [n] or [n,AX<axis number>].

Value range

The input limits are specified in the fields "Minimum value", "Maximum value" and "Data type".

If no range of values is specified, the value in the "Data type" field determines the input limits and the field is marked with "***".

Data type

In the "Data type" field, the short designators indicate the data types. The have the following meanings:

BOOLEAN	Machine data bit (1 or 0)
BYT E	Integer values (from -128 to 127)
DOUBLE	Real and integer values (from ± 4.19 x 10^{-307} to ± 1.67 x 10^{308})

DWORD	Integer values (from ± -2.147 x 10^9 to ± 2.147 x 10^9)
DWORD	Hex values (from 00000000 to FFFFFFFF)
STRING	Character string (max. 16 characters) consisting of capital letters with digits and underscore
UNSIGNED WORD	Integer values (from 0 to 65536)
SIGNED WORD	Integer values (from -32768 to 32767)
UNSIGNED DWORD	Integer values (from 0 to 4294967300)
SIGNED DWORD	Integer values (from -2147483650 to 2147483649)
WORD	Hex values (from 0000 to FFFF)
FLOAT DWORD	Real values (from ± 8.43 x 10^{-37} to ± 3.37 x 10^{38})
UBYTE	Integer values (from 0 to -255)
LONG	Integer values (from 4294967296 to -4294967295)

Rot/Lin

The type of motor to which the machine data applies is indicated in the "Rot/Lin" field.

Rot Rotary motors

Lin Linear motors

Type

The abbreviations of the following drive types are given in the "Type" field:

MSD for Main Spindle Drive

SLM for Synchronous Linear Motor

FD for Feed Drive

SW version

The "SW version" field shows which software version the machine data and setting data apply to.

Attributes

Short designators are listed for some machine data in the "Attributes" field. The have the following meanings:

- NBUP no Back Up: The data is not entered in the data backup
- ODLD only Download: Data can only be loaded from a file
- READ read Only: Data can only be read
- NDLD no Download: Data cannot be loaded from the file

- SFCO safety Configuration: MD for Safety Integrated System
- SCAL scaling Alarm: Alarm regarding design
- LINK Link Description: MD describes NCU link
- CTEQ Container Equal: MD must be identical in all NCUs that are linked
- CTDE Container Description: MD describes axis container

1.1.2 Overview of machine and setting data

The machine data and setting data are divided into the following areas:

Range	Description
from 1000 to 1799	Machine data for SIMODRIVE drives
from 5000 to 6000	Machine data of the hydraulic module
from 9000 to 9999	Display machine data
from 10000 to 18999	General machine data
from 19000 to 19999	Reserved
from 20000 to 28999	Channelspecific machine data
from 29000 to 29999	Reserved
from 30000 to 38999	AxisSpecific Machine Data
From 39000 to 39999	Reserved
from 41000 to 41999	General setting data
from 42000 to 42999	Channel-specific setting data
From 43000 to 43999	Axis-specific setting data
From 51000 to 61999	General machine data for compile cycles
from 62000 to 62999	Channel-specific machine data for compile cycles
From 63000 to 63999	Axis-specific machine data for compile cycles

Data IDs

With HMI, the designation of the machine data is displayed. The internal "designator" of the data requires additional IDs. If machine data is changed by programming or if it is read-in via the serial interface, these IDs must also be specified.

Data areas

$MM_	Display machine data
$MN_/$SN_	General machine data/setting data
$MC_/$SC_	Channel-specific machine data/setting data
$MA_/$SA_	Axis-specific setting data/machine data
$MD_	Drive machine data

The meanings are as follows:

$	System variables
M (GND)	Machine data
S	Setting data
M, N, C, A, D	Subarea (second letter)

Axis data is addressed via the axis name. The axis name can be the internal axis designator (AX1, AX2 ... AX8) or the designator specified by MD 10000: AX-CONF_NAME_TAB.

Example:
$MA_JOG_VELO[Y1]=2000
The JOG speed of axis Y1 is 2000 mm/min.

If the contents of the machine data is a STRING (e.g. X1) or a hexadecimal value (e.g. H41), then the contents must be between " ' " (e.g. 'X1' or 'H41').

Example:
$MN_DRIVE_INVERTER_CO[0]='H14'

FD module 9/18 A on slot 1 of the drive bus.

For addressing different contents of the machine data, the specifications must be in brackets.

Example:
$MA_FIX_POINT_POS**[0,X1]**=500.000

The first fixed point position (0=1, 1=2, 2=3, etc.) of axis X1 is 500

Example:
$MN_AUXFU_GROUP_SPEC[2]='H41'
Output time of the auxiliary functions of the third auxiliary function group.

$MN_AXCONF_MACHAX_NAME_TAB[0]='X1'
The name of the first machine axis is X1.

$MA_REF_SET_POS[0,X1]=100.00000
The first reference point value of axis X1 is 100 mm.

Assignment of channel-specific machine data:

CHANDATA (1)	Assignment of channel 1
$MC_CHAN_NAME='CHAN1'	Channel name for channel 1
$MC_AXCONF_GEOAX_NAME_TAB[1]='Y'	The name of the second geometry axis in channel 1 is Y
R10 = 33.75 ...	R10 from channel 1
CHANDATA (2)	Assignment of channel 2
$MC_CHAN_NAME='CHAN2' ...	Channel name for channel 2
R10 = 96.88 ...	R10 from channel 2

1.2 Display machine data

Number	Identifier			Display filter	Reference
Unit	Name			Data type	Active
Description					
				SW	
System		Default value	Minimal value	Maximum value	Protection

9000	**LCD_CONTRAST**			H05	**QV:** A2
-	Contrast			BYTE	Power On
In this machine data, you can adapt the contrast of LCD operator panels to the environmental conditions. Lower value: darker Higher value: brighter					
				-	
Adv, Emb		Emb: 7	0	15	3/4

9001	**DISPLAY_TYPE**			H05	**QV:** A2
-	Type of operator panel			BYTE	Power On
The relevant monitor type is determined for optimal color adjustment. The MD is set by the system. The following assignment applies: Monitor 0 OP031 slimline operator panel LCD, monochrome display 1 OP031 slimline operator panel LCD, color display 2 OP032 color monitor					
Adv, Emb		Emb: 1	0	2	0/0

9002	**DISPLAY_MODE**				**QV:** A2
-	External monitor			BYTE	Power On
Indicate the external monitor type which is connected to the MMC, for optimum color adjustment. Assignment: 0 no monitor 1 monochrome monitor 2 color monitor					
				1	
			0	2	3/4

9003	**FIRST_LANGUAGE**			H05	**QV:** A2
-	Foreground language			BYTE	Power On
For SINUMERIK 840D/840Di/810D and FM NC two languages are available simultaneously. Via machine data Foreground language you can set the language which is displayed automatically after each system startup. Additionally, you can switchover the language via softkey in the Diagnosis area. After power ON the language defined via MD 9003 FIRST_LANGUAGE will be active again. Further references: /BA/, Operator's Guide, /IM3/ Installation and Startup MMC 103					
				1.1	
Emb		Emb: 1	1	2	3/4

9004	**DISPLAY_RESOLUTION**			H05	**QV:** A2
-	Display resolution			BYTE	Power On
This machine data defines the number of decimal places for position displays on the operator panel.					
				-	
Adv, Emb		Emb: 3	0	5	3/4

9004	**DISPLAY_RESOLUTION**			H05	**QV:** A2
-	Display resolution			BYTE	Immediately
This machine data defines the number of decimal places for position displays on the operator panel.					
				-	
Adv, Emb		Emb: 3	0	5	3/4

9005	**PRG_DEFAULT_DIR**			H05	**QV:** A2
-	Basic setting program directory			BYTE	Immediately
Via this machine data, the basic setting is defined by the program directory. Note: The basic setting Program Directory can only be selected with HMI Embedded.					
				-	
Emb		Emb: 1	1	5	3/4

9006	**DISPLAY_BLACK_TIME**			H05	**QV:** A2
-	Time for screen saver			BYTE	Power On
Via this machine data, the period of time is defined, after the expiry of which the screen automatically switches to dark, provided that no keys are pressed in the meantime. By setting value 0, automatic switching to dark is deactivated. Note: Automatic switching of the screen to dark is only possible via HMI Embedded. It is activated only if the IF Screen dark = 0. Relating to: IS Screen dark (DB19, ... DBX0.1)					
				SW2	
Emb		Emb: 15	0	60	3/4

9007	**TABULATOR_SIZE**			H05	**QV:** A2
-	Tab length			BYTE	Immediately
This machine data defines the tab length. Note: The tab length can only be changed in HMI Embedded.					
				SW2	
Emb		Emb: 4	0	30	3/4

9008	**KEYBOARD_TYPE**			H05	**QV:** A2
-	Type of keyboard			BYTE	Power On
This machine data defines the type of keyboard. Basic configuration for the type of keyboard: 0: OP keyboard 1: MFII/QWERTY Note: (SW 6.1 and higher) The type of keyboard can be set in HMI Embedded .					
				SW3.6	
Adv, Emb		Emb: 0	0	1	3/4

9009	**KEYBOARD_STATE**			H05	**QV:** A2
-	Keyboard shift behavior at booting			BYTE	Power On
This machine data defines the shift response of the keyboard. Basic configuration for the shift response of the keyboard 0: single shift is active after booting 2: CAPSLOCK is active after booting (applies for MFII only) CAPSLOCK in the MMC corresponds to hardware CAPSLOCK CAPSLOCK in the HMI corresponds to software CAPSLOCK Note: (SW 6.1 and higher) The basic configuration for the shift response of the keyboard can be changed in HMI Embedded and in HMI Advanced.					
				SW3.6	
Adv, Emb		Emb: 2	0	2	3/4

9010	**SPIND_DISPLAY_RESOLUTION**			H05	**QV:** A2
-	Display resolution for spindle values			BYTE	Immediately
This machine data defines the number of decimal places for position displays of spindles on the operator panel.					
				SW 4	
Adv			0	5	3/4

9011	**DISPLAY_RESOLUTION_INCH**			H05	**QV:** A2
-	Disp. resolution for INCH meas. system			BYTE	Immediately
This machine data defines the number of decimal places for position displays on the operator panel.					
				SW 5.1	
Adv, Emb		Emb: 4	0	6	3/4

9011	**DISPLAY_RESOLUTION_INCH**			H05	**QV:** A2
-	Disp. resolution for INCH meas. system			BYTE	Power On
This machine data defines the number of decimal places for position displays on the operator panel.					
				SW 5.1	
Adv, Emb		Emb: 4	0	6	3/4

9012	**ACTION_LOG_MODE**			H05	**QV:** IM1, IM3, IM4
-	Set action mode for trip recorder			INTEGER	Power On
With this MD you can switch on/off the trip recorder and determine a selection of data to be recorded. Bit 0 = 1 trip recorder ON (default) = 0 trip recorder OFF Bit 1 = 1 MMC 103: Variable services (writing access to geometry data, e.g. tool offset) are recorded. See the Help function in the operating area Parameter under Variables (default) for the meaning of the variables. = 0 variable services are not recorded Bit 2 = 1 MMC 103: PI services (e.g. program selection) are recorded. See the Help function in the operating area Parameter under Variables (default) for the meaning of the variables. = 0 PI services are not recorded Bit 3 = 1 MMC 103: Domain services (e.g. load/unload program) are recorded (default) = 0 domain services are not recorded Bit 4 = 1 alarm status changes are recorded (default) = 0 alarm status changes are not recorded Bit 5 = 1 key strokes are recorded (default) = 0 key strokes are not recorded Bit 6 = 1 channel status/override is recorded (default) = 0 channel status/override is not recorded Bit 7 = 1 MMC 103: Softkey operations and menu changes are recorded For Siemens-internal use only (default) MMC100.2: ID of the open and closed window is recorded. For Siemens-internal use only (default) = 0 softkey operations and menu changes are recorded					
				5.2	
Adv, Emb		Emb: 254	0	0xFFFF	1/1

9013	**SYS_CLOCK_SYNC_TIME**			H05	**QV:**
-	Synchronization time MMC/HMI time with PLC			REAL	Power On
Emb		Emb: 0	0	199	0/0

9014	**USE_CHANNEL_DISPLAY_DATA**			H05	**QV:** FBT, FBSP, EMB, ADV
-	Use channel-specific display MDs			INTEGER	Immediately
General display MD for changeover of the display to the new channel-specific display MDs for HMI_ADV =6.02.01 and NCK 6.2 and higher.					
				6.3	
Adv, Emb		Emb: 0	0	1	3/4

9015	**DARKTIME_TO_PLC**				**QV:** -
-				BOOL	Power On
				SW 5	
			0	1	3/4

9016	**SWITCH_TO_AREA**			H05	**QV:** IAM, BE1
-	Default ramp-up menu selectable			INTEGER	Power On
Meaning: -1 (default): Machine date is not evaluated 1...16: Number of startup softkeys, 9...16 designating the softkeys on the 1st switching level. 128...135: For HT6: Startup in the operator area assigned to the keys U1..U8 (128 --> U1; ... 135 --> U8). 136...137: For HT6: Startup in the operator area assigned to the keys S1 / S2 (136 --> key S1, 137 --> key S2) In the delivery status, the value 12 is entered in the MD SWITCH_TO_AREA to activate the CUSTOM operator area during startup..					
				SW 5, Erw. 6.3	
Emb		Emb: -1	-1	10000	3/4

9017	**PLC_HOTKEY**				**QV:** FBO
-				STRING	Power On
			0	0	3/4

9020	**TECHNOLOGY**			H05	**QV:** A2, FBT
-	Technology for NC prog. and simulation			BYTE	Power On
Basic configuration for simulation: 0: No specific assignment 1: Turning machine configuration 2: Milling machine configuration					
				SW4.3, ST 6.1 SW5.1 MMC103	
Adv, Emb		Emb: 1	0	2	3/4

9021	**LAYOUT_MODE**			H05	**QV:** IM4
-	HMI design			BYTE	Power On
Meaning: 0 = changed colors and softkeys 1 = user interface design used up to now					
				6.3	
Adv, Emb		Emb: 0	1	1	3/4

9021	**LAYOUT_MODE**			H05	**QV:** IM4
-	HMI design			INTEGER	Power On
Meaning: 0 = changed colors and softkeys 1 = user interface design used up to now					
				6.3	
Adv, Emb		Emb: 0	0	0	3/4

9025	**DISPLAY_BACKLIGHT**				**QV:** IM2
-	Brightness level background lighting			BYTE	Power On
Brightness of the background light (HT6 only). The highest brightness is preset (15). Select lower values for dimming.					
				5.3	
			0	31	3/4

9026	**TEACH_MODE**				**QV:** IM2
-	Teach mode to be activated			REAL	Power On
Teach-in mode which is to be activated via teach-in key (HT6 only): 1 Standard teach-in 2 Standard teach-in with the possibility to block the acceptance of the teach-in set.					
				5.3	
			0	0	3/4

9027	**NUM_AX_SEL**				**QV:** IM2
-	Number of axis groups for traversing keys			REAL	Power On
Number of axis groups on which the traversing keys can have an effect (HT6 only).					
				5.3	
			0	4	3/4

9030	**EXPONENT_LIMIT**			H05	**QV:** A2
-	Digits for represent. without exponent			BYTE	Power On
This machine data defines the number of places which is displayed without exponent.					
				SW 5.1	
Emb		Emb: 6	0	20	3/4

9031	**EXPONENT_SCIENCE**			H05	**QV:** A2
-	Exponent in technical representation			BYTE	Power On
This machine data defines the representation of exponents in steps of three.					
				SW 5.1	
Emb		Emb: 1	0	1	3/4

9032	**HMI_MONITOR**			H05	**QV:** FBT, FBSP, EMB, ADV
-	Define PLC data for HMI screen info			STRING	Power On
Offset-prone pointer to a PLC data block. It is used to report HMI monitor information to the PLC, e.g. active HMI task. Format: PLC-specific format to indicate a data block with byte offset. e.g. DB60.DBB10 for data block 60, Byte 10 The monitor information reported by the HMI is max. 8 Bytes.					
				6.2	
Adv, Emb		Emb: 0	0	0	2/4

9033	**MA_DISPL_INV_DIR_SPIND_M3**			H05	**QV:** ADV
-	Display of spindle direction of rotation			INTEGER	Immediately
Bit-serial coding of the direction of rotation represented in the spindle window The spindle number is the index in the bit list. Bit[spindle index]=0 --> M3 is represented as CW rotation in the bitmap. Bit[spindle index]=1 --> M3 is represented as CCW rotation in the bitmap. The 1st spindle corresponds to bit 0. Note: When using channel-specific display machine date with MD 9014, the MD is in the NC and is thus part of an NC series machine startup. In this case, it allows channel-specific inch/metrisch consideration.					
				6.2	
Adv			0	0x7FFFFFFF	3/4

9034	**MA_NUM_DISPLAYED_CHANNELS**			H05	**QV:** BAD
-	Number of machine channels displayed			REAL	Power On
Setting the no. of channels displayed simultaneously in the Machine operating area					
				6.4	
Adv			0	2	3/4

9050	**STARTUP_LOGO**			H05	**QV:** FBT, FBSP, EMB, ADV
-	Activate OEM boot screen			BYTE	Power On
The OEMs can integrate their own boot screen as WINDOWS BMP file with 256 colors. With this MD, the default screen is replaced by the OEM boot screen.					
				6.2	
Adv, Emb		Emb: 0	0	1	1/4

9052	**SHOW_CHANNEL_SPANNING_STATE**			H05	**QV:** FBT, FBSP
-	Change cross-channel status display			BYTE	Power On
Toggle value for cross-channel status display: 0 = display of the previous [program status left side bottom in the header] 1 = displays the [program status, left side bottom in the header]line according to the configuration in the file Header.ini.					
				6.3	
Adv, Emb		Emb: 0	0	1	2/4

9053	**PLC_SYMBOL_SORT**			H05	**QV:** IM4
-	Sorting algorithm for PLC symbols			INTEGER	Immediately
Sorting algorithm for PLC symbols The following sorting algorithms are made available: 0 : unsorted, i.e. as included in the PLC symbol file 1 : sorted in ascending and alphanumerical order, according to the symbolic address 2 : sorted in descending and alphanumerical order, according to the symbolic address 3 : sorted in ascending and alphanumerical order, according to the absolute address 4 : sorted in descending and alphanumerical order, according to the absolute address					
				6.3	
Adv, Emb		Emb: 0	0	4	3/4

9054	**PLC_SYMBOL_FILTER**			H05	**QV:** BAD, BEM
-	Filter settings for PLC symbols			REAL	Immediately
Filter settings for PLC symbols By means of the Filter function, individual symbol groups (I/Q/M/T/C/DB) can be displayed (Bit = 0) or hidden (Bit = 1) Bit0 : Inputs (I/E) Bit1 : Outputs (Q/A) Bit2 : Flags (M) Bit3 : Timers (T) Bit4 : Counters (C/Z) Bit5 : Data blocks (DB)					
				6.3	
Adv, Emb		Emb: 0	0	0xFFFF	3/4

9054	**PLC_SYMBOL_FILTER**			H05	**QV:** BAD, BEM
-	Filter settings for PLC symbols			REAL	Immediately
Filter settings for PLC symbols By means of the Filter function, individual symbol groups (I/Q/M/T/C/DB) can be displayed (Bit = 0) or hidden (Bit = 1) Bit0 : Inputs (I/E) Bit1 : Outputs (Q/A) Bit2 : Flags (M) Bit3 : Timers (T) Bit4 : Counters (C/Z) Bit5 : Data blocks (DB)					
				6.3	
Adv, Emb		Emb: 0	0	0xFFFF	3/4

9055	**PLC_ALARM_PICTURE**			H05	**QV:** IM4
-	Select acknowledgement symb. of PLC alarms			INTEGER	Power On
Select which picture is displayed as acknowledgement symbol for PLC alarms. -1: Do not display any symbol 0: Display symbol with text PLC 1: Display Cancel (BigMac) symbol					
				6.3	
Adv, Emb		Emb: 1	-1	1	3/4

9056	**ALARM_ROTATION_CYCLE**			H05	**QV:**
-	Rotation cycle time for alarm display			INTEGER	Immediately
Rotation cycle time in the alarm display: <500 : no rotation, i.e. the latest alarm is displayed 500 - 10000 : cycle duration of the alarm rotation in ms If a valid cycle time is set, all alarms (NCK, PLC or MMC) are displayed one after the other in the alarm line. Each alarm is displayed during the time period stated before the next alarm is displayed. If no alarm is pending, cycle alarms or program messages are possibly displayed. These, however, do not rotate.					
				6.4	
Emb		Emb: 0	0	10000	3/4

9180	**USER_CLASS_READ_TCARR**			H04, H05	**QV:** A2
-	Protect. level read tlh offsets			BYTE	Immediately
With this MD you can define who has read-only access to the toolholder offset.					
				6.1	
Emb		Emb: 7	0	7	3/4

9181	**USER_CLASS_WRITE_TCARR**			H04, H05	**QV:** A2
-	Protect. level write tlh offsets			BYTE	Immediately
With this MD you can define who has write access to the toolholder offset.					
				6.1	
Emb		Emb: 7	0	7	3/4

9182	**USER_CLASS_INCH_METRIC**			H04, H05	**QV:** EMB
-	Protect. level inch-metric switchover			BYTE	Immediately
The inch-metric changeover option via softkey is protected via access level in the MACHINE area.					
				6.2	
Emb		Emb: 7	0	7	3/4

9183	**USER_WRITE_TOOLFRAME**			H04, H05	**QV:** A2
-	Write toolholder protection level			BYTE	Immediately
Toolholder frame protection level					
				6.4	
Adv, Emb		Emb: 0	0	7	3/4

9184	**USER_WRITE_PARTFRAME**			H04, H05	**QV:** A2
-	Write tool ref. point protection level			BYTE	Immediately
Tool reference point frame protection level					
				6.4	
Adv, Emb		Emb: 0	0	7	3/4

9185	**USER_WRITE_WPFRAME**			H04, H05	**QV:** A2
-	Write workpiece ref. point protec. level			BYTE	Immediately
Tool reference point frame protection level					
				6.4	
Adv, Emb		Emb: 0	0	7	3/4

9186	**USER_WRITE_CYCFRAME**			H04, H05	**QV:** A2
-	Write cycle frame protection level			BYTE	Immediately
Cycle frame protection level					
				6.4	
Adv, Emb		Emb: 0	0	7	3/4

9187	**USER_WRITE_TRAFRAME**			H04, H05	**QV:** A2
-	Write transformation frame protec. level			BYTE	Immediately
Transformation frame protection level					
				6.4	
Adv, Emb		Emb: 0	0	7	3/4

9188	**USER_WRITE_EXTFRAME**			H04, H05	**QV:** A2
-	Write external WO protection level			BYTE	Immediately
Protection level write external work offset					
				6.4	
Adv, Emb		Emb: 0	0	7	3/4

9200	**USER_CLASS_READ_TOA**			H04, H05	**QV:** A2
-	Protect. level read tool offsets			BYTE	Immediately
The machine date defines the protection level for reading all tool offsets.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9201	**USER_CLASS_WRITE_TOA_GEO**			H04, H05	**QV:** A2
-	Protection level write tool geometry			BYTE	Immediately
This machine date defines the protection level for writing tool geometry data.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9202	**USER_CLASS_WRITE_TOA_WEAR**			H04, H05	**QV:** A2
-	Protection level write tool wear data			BYTE	Immediately
This machine date defines the protection level for writing tool wear data.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9203	**USER_CLASS_WRITE_FINE**			H04, H05	**QV:** A2
-	Protection level fine			BYTE	Immediately
This machine data defines the protection level for write fine in the machine data: MD 9450: MM_WRITE_TOA_FINE_LIMIT MD 9451: MM_WRITE_ZOA_FINE_LIMIT.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9204	**USER_CLASS_WRITE_TOA_SC**			H04, H05	**QV:** A2
-	Change prot.level for tool sum offsets			BYTE	Immediately
This machine data defines the protection level for changing the tool sum offset.					
				SW 5	
Adv			0	7	3/4

9205	**USER_CLASS_WRITE_TOA_EC**			H04, H05	**QV:** A2
-	Prot. level change tool setup offsets			BYTE	Immediately
This machine data defines the protection level for changing the tool setup offset.					
				SW 5	
Adv			0	7	3/4

9206	**USER_CLASS_WRITE_TOA_SUPVIS**			H04, H05	**QV:** A2
-	Prot. level change tool mon. limits			BYTE	Immediately
This machine data defines the protection level for changing the tool monitoring limit values. One authorization is valid for all limit values: Quantity, service life, wear and type of monitoring.					
				SW 5	
Adv, Emb		Emb: 7	0	7	3/4

9207	**USER_CLASS_WRITE_TOA_ASSDNO**			H04, H05	**QV:** A2
-	Modify assigned DNo of a tool cutting edge			BYTE	Immediately
This machine data defines the protection level for changing assigned D numbers of a tool edge.					
				SW 5	
Adv			0	7	3/4

9208	**USER_CLASS_WRITE_MAG_WGROUP**			H04, H05	**QV:** A2
-	Modify wear group mag. pos./magazine			BYTE	Immediately
This machine data defines the protection level for changing the wear group of the magazine location/magazine.					
				SW 5	
Adv			0	7	3/4

9209	**USER_CLASS_WRITE_TOA_ADAPT**			H04, H05	**QV:** A2
-	Protect. level write tool adaptat. data			BYTE	Immediately
This machine data defines the protection level for writing the tool adapter geometrical data.					
				SW5	
Adv, Emb		Emb: 7	0	7	3/4

9210	**USER_CLASS_WRITE_ZOA**			H04, H05	**QV:** A2
-	Write protect. level of sett. zero offs.			BYTE	Immediately
This machine data defines the protection level for writing the settable zero offset.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9211	**USER_CLASS_READ_GUD_LUD**			H04, H05	**QV:** A2
-	Read protection level of user variables			BYTE	Immediately
The MD defines the protection level for reading user variables.					
				SW6.1	
Adv, Emb		Emb: 7	0	7	3/4

9213	**USER_CLASS_OVERSTORE_HIGH**			H04, H05	**QV:** A2
-	Protection level extended overstore			BYTE	Immediately
This machine data defines the protection level for extended overstore.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9214	**USER_CLASS_WRITE_PRG_CONDIT**			H04, H05	**QV:** A2
-	Protection level program control			BYTE	Immediately
This machine data defines the protection level for changing the program control settings.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9215	**USER_CLASS_WRITE_SEA**			H04, H05	**QV:** A2
-	Protection level write setting data			BYTE	Immediately
This machine data defines the protection level for writing the setting data.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9216	**USER_CLASS_READ_PROGRAM**			H04, H05	**QV:** A2
-	Read protection level of part program			BYTE	Immediately
The MD defines the protection level for reading part programs.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9217	**USER_CLASS_WRITE_PROGRAM**			H04, H05	**QV:** A2
-	Write part program protection level			BYTE	Immediately
The MD defines the protection level for entering part programs.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9218	**USER_CLASS_SELECT_PROGRAM**			H04, H05	**QV:** A2
-	Protection level program selection			BYTE	Immediately
This machine data defines the protection level for selecting a program.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9219	**USER_CLASS_TEACH_IN**			H04, H05	**QV:** A2
-	Protection level TEACH IN			BYTE	Immediately
This machine data defines the protection level for performing Wrigth moving information into MDA buffer with TEACH IN.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9220	**USER_CLASS_PRESET**			H04, H05	**QV:** A2
-	Protection level PRESET			BYTE	Immediately
This machine data defines the protection level for entering a new control zero in the machine coordinate system.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9221	**USER_CLASS_CLEAR_RPA**			H04, H05	**QV:** A2
-	Protection level delete R variables			BYTE	Immediately
This machine data defines the protection level for deleting R parameters.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9222	**USER_CLASS_WRITE_RPA**			H04, H05	**QV:** A2
-	Protection level write R variables			BYTE	Immediately
This machine data defines the protection level for writing R parameters.					
				-	
Adv, Emb		Emb: 7	0	7	3/4

9223	**USER_CLASS_SET_V24**			H04, H05	**QV:** A2
-	Prot. level RS-232-C parameterization			BYTE	Immediately
This MD defines the protection level for parameterizing the V24 interface.					
				-	
Emb		Emb: 7	0	7	3/4

9224	**USER_CLASS_READ_IN**			H04, H05	**QV:** A2
-	Protect. level read in data			BYTE	Immediately
The MD defines the protection level for reading in data.					
				-	
Emb		Emb: 7	0	7	3/4

9225	**USER_CLASS_READ_CST**			H04, H05	**QV:** A2
-	Protect. level standard cycles			BYTE	Immediately
The MD defines the protection level for access to standard cycles.					
				SW2	
Emb		Emb: 7	0	7	3/4

9226	**USER_CLASS_READ_CUS**			H04, H05	**QV:** A2
-	Protect. level user cycles			BYTE	Immediately
The MD defines the protection level for access to user cycles.					
				SW2	
Emb		Emb: 7	0	7	3/4

9227	**USER_CLASS_SHOW_SBL2**			H04, H05	**QV:** A2
-	Skip single block2 (SBL2)			BYTE	Immediately
Function SBL2 will only be offered on the interface for selection if the current protection level exceeds or equals the access rights defined in this MD. Special cases, errors: If you select SBL2 and set the protection level to a value which SBL2 cannot display any more, SBL2 will remain selected. You will then have the option to change to SBL1 if required. SBL2 will select it automatically.					
				SW3.5	
Emb		Emb: 7	0	7	3/4

9228	**USER_CLASS_READ_SYF**			H04, H05	**QV:** A2
-	Access level for selecting directory SYF			BYTE	Immediately
The MD defines the access level for selecting the SYF directory.					
				SW4.2	
Emb		Emb: 7	0	7	3/4

9229	**USER_CLASS_READ_DEF**			H04, H05	**QV:** A2
-	Access level for selecting directory DEF			BYTE	Immediately
The MD defines the access level for selecting the DEF directory.					
				SW4.2	
Emb		Emb: 7	0	7	3/4

9230	**USER_CLASS_READ_BD**			H04, H05	**QV:** A2
-	Access level for selecting directory BD			BYTE	Immediately
The MD defines the access level for selecting the BD directory.					
				SW4.2	
Emb		Emb: 3	0	7	3/4

9231	**USER_CLASS_WRITE_RPA_1**			H04, H05	**QV:** A2
-	Protection level for the first RPA area			BYTE	Immediately
This machine data defines the write protection for the first RPA area.					
				SW5.1	
Adv			0	7	3/4

9232	**USER_BEGIN_WRITE_RPA_1**			H04, H05	**QV:** A2
-	Beginning of the first RPA area			WORT	Immediately
This machine data defines the start of the first RPA area.					
				SW5.1	
Adv			0	0	3/4

9233	**USER_END_WRITE_RPA_1**			H04, H05	**QV:** A2
-	End of the first RPA area			WORT	Immediately
This machine data defines the end of the first RPA area.					
				SW5.1	
Adv			0	0	3/4

9234	**USER_CLASS_WRITE_RPA_2**			H04, H05	**QV:** A2
-	Protection level for the second RPA area			BYTE	Immediately
This machine data defines the write protection for the second RPA area.					
				SW5.1	
Adv			0	7	3/4

9235	**USER_BEGIN_WRITE_RPA_2**			H04, H05	**QV:** A2
-	Beginning of the second RPA area			WORT	Immediately
This machine data defines the start of the second RPA area.					
				SW5.1	
Adv			0	0	3/4

9236	**USER_END_WRITE_RPA_2**			H04, H05	**QV:** A2
-	End of the second RPA area			WORT	Immediately
This machine data defines the end of the second RPA area.					
				SW5.1	
Adv			0	0	3/4

9237	**USER_CLASS_WRITE_RPA_3**			H04, H05	**QV:** A2
-	Protection level for the third RPA area			BYTE	Immediately
This machine data defines the write protection for the third RPA area.					
				SW5.1	
Adv			0	7	3/4

9238	**USER_BEGIN_WRITE_RPA_3**			H04, H05	**QV:** A2
-	Beginning of the third RPA area			WORT	Immediately
This machine data defines the start of the third RPA area.					
				SW5.1	
Adv			0	0	3/4

9239	**USER_END_WRITE_RPA_3**			H04, H05	**QV:** A2
-	End of the third RPA area			WORT	Immediately
This machine data defines the end of the third RPA area.					
				SW5.1	
Adv			0	0	3/4

9240	**USER_CLASS_WRITE_TOA_NAME**			H04, H05	**QV:** A2
-	Change tool designation and duplo			BYTE	Immediately
The machine data defines the protection level for changing the tool identifier and duplo.					
				5	
Adv			0	7	3/4

9241	**USER_CLASS_WRITE_TOA_TYPE**			H04, H05	**QV:** A2
-	Change tool type			BYTE	Immediately
The machine data defines the protection level for changing the tool type.					
				5	
Adv			0	7	3/4

9242	**MA_STAT_DISPLAY_BASE**			H05	**QV:** K2
-	Number basis display articul. pos. STAT			WORT	Immediately
This MD defines the number system (bin, dec, hex) for the display of the STAT position of joint locations for special kinematics and robots. Some possible values are listed in the following: 2: Display as binary value with STAT=B00001101 10: Display as decimal value with STAT=13 13: Display as hexadecimal value with STAT='H0D'					
				6.1	
Adv, Emb		Emb: 0	0	16	3/4

9243	**MA_TU_DISPLAY_BASE**			H05	**QV:** K2
-	Number basis display rot. axis pos. TU			WORT	Immediately
The availability in operating mode machine depends on the access level. This MD defines the number system (bin, dec, hex) for the display of the TU position of rotary axes for robots Some possible values are listed in the following: 2: Display as binary value with TU='00001101' 10: Display as decimal value with TU=13 16: Display as hexadecimal value with TU='H0D					
				6.1	
Adv, Emb		Emb: 0	0	16	3/4

9244	**MA_ORIAXES_EULER_ANGLE_NAME**			H05	**QV:** K2
-	Orientation axes as Euler angle			WORT	Immediately
The availability in operating mode machine depends on the access level. This MD defines whether the Euler angle name or the channel geo axis name is the axis identifier of the orientation axis. Some possible values are listed in the following: 0: Orientation axis name from the channel block Geo axis name with index 3 to 5 1: Orientation axis name is the name of the Euler angle from the general machine data					
				6.1	
Adv			0	1	3/4

9245	**MA_PRESET_FRAMEIDX**			H05	**QV:** K2
-	Scratching value storage + preset.act.val.			WORT	Immediately
Index of the basic frame in which the functions 'scratching' and 'preset actual value' enter their values. The index must be within a range defined by the channel-specific machine data: $MC_MM_NUM_BASE_FRAMES (number of required basic frames). The MD will not be relevant if the values for 'scratching' and 'actual value setting' are entered in the system frame when the system frame is activated.					
				6.1	
Adv			1	10	3/4

9246	**USER_CLASS_SYS_ZERO_OFF**			H04, H05	**QV:** A2
-	Access level write system frames			BYTE	Immediately
Access level from which system frames can be written.					
				Adv.: 6.03, Emb.: 6.02	
Adv, Emb		Emb: 7	0	7	2/2

9247	**USER_CLASS_BASE_ZERO_OFF_PA**			H04, H05	**QV:** K2
-	Access level basic offset PA			BYTE	Immediately
Via MD 9247 MM_USER_CLASS_BASE_ZERO_OFF_PA you can set from which access level the softkey Basic ZO is offered in the zero offset window in the Parameters operating area. At the same time, the basic frames are also displayed or skipped in the zero offset window and in the Active ZO + offsets window.					
				5.3	
Adv, Emb		Emb: 7	0	7	2/2

9248	**USER_CLASS_BASE_ZERO_OFF_MA**			H04, H05	**QV:** IAM, IM1
-	Access level basic offset MA			BYTE	Immediately
Via MD 9248 MM_USER_CLASS_BASE_ZERO_OFF_MA you can set from which access level in the Machine operating area the softkey Basic ZO is offered in the Scratch function or the entry G500 is possible in the zero offset array. The Set actual value function is also offered depending on this MD. As a result, the user cannot change the basic zero offset values any more without having the corresponding access rights.					
				5.3	
Adv, Emb		Emb: 7	0	7	2/2

9249	**USER_CLASS_VERT_MODE_SK**			H04, H05	**QV:** K2
-	Protect. level vertical SKs of area SKs			DOUBLE	Immediately
Via MD 9249 USER_CLASS_VERT_MODE_SK you can protect vertical softkeys of the area softkeys as required. Note: (SW 6.1 and higher) This functionality is only available in HMI Embedded.					
				SW6.1	
Emb		Emb: 2004318071	0	0x77777777	3/4

9251	**USER_CLASS_TM_SKTLLIST**			H04, H05	**QV:** FBW
-	Display of tool list			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9252	**USER_CLASS_TM_SKTOOLLOAD**			H04, H05	**QV:** FBW
-	Protection level for loading tools			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9253	**USER_CLASS_TM_SKTOOLUNLOAD**			H04, H05	**QV:** FBW
-	Prot. level for unloading tools			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9254	**USER_CLASS_TM_SKTOOLMOVE**			H04, H05	**QV:** FBW
-	Protection level for tool relocation			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9256	**USER_CLASS_TM_SKMGLREPR2**			H04, H05	**QV:** FBW
-	Prot. level for display of 2nd mag. list			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9257	**USER_CLASS_TM_SKMGLREPR3**			H04, H05	**QV:** FBW
-	Prot. level for display of 3rd mag. list			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9258	**USER_CLASS_TM_SKNCNEWTOOLE**			H04, H05	**QV:** FBW
-	Prot.level for creating new cuttinng edges			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9259	**USER_CLASS_TM_SKNCDELTOOL**			H04, H05	**QV:** FBW
-	Protection level for deleting tools			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9260	**USER_CLASS_TM_SKMGBUFFER**			H04, H05	**QV:** FBW
-	Prot. level for buffer on/off			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9261	**USER_CLASS_TM_SKMGFIND**			H04, H05	**QV:** FBW
-	Protection level for search			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9262	**USER_CLASS_TM_SKMGLISTPOS**			H04, H05	**QV:** FBW
-	Protection level for positioning			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9263	**USER_CLASS_TM_SKMGNEXT**			H04, H05	**QV:** FBW
-	Prot. level f. paging to next magazine			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9264	**USER_CLASS_TM_SKTLNEWTOOL**			H04, H05	**QV:** FBW
-	Protection level for creating tools			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9265	**USER_CLASS_TM_SKTLLREPR1**			H04, H05	**QV:** FBW
-	Prot. level for display of 1st mag. list			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9266	**USER_CLASS_TM_SKTLLREPR2**			H04, H05	**QV:** FBW
-	Prot. level for display of 2nd tool list			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9267	**USER_CLASS_TM_SKTLLREPR3**			H04, H05	**QV:** FBW
-	Prot. level for display of 3rd tool list			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9269	**USER_CLASS_TM_SKFINDPLACE**			H04, H05	**QV:** FBW
-	Empty softkey loc., display tool list			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9270	**USER_CLASS_TM_SKACTPLACE**			H04, H05	**QV:** FBW
-	Prot. level f. load. to current location			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9271	**USER_CLASS_TM_SKLDTOOLDAT**			H04, H05	**QV:** FBW
-	Check and edit the tool data			BYTE	Power On
				SW4.1	
Emb		Emb: 7	0	7	3/4

9272	**USER_CLASS_APPLICATION**			H04, H05	**QV:** A2
-	Protec. level for operating area selection			BYTE	Immediately
This MD defines the access level for the individual operating areas. The array index refers to the softkey on which the corresponding operating area was defined, i.e. index 1 for the operating range configured on the first softkey. Index 0 is reserved for future extensions.					
				6.4	
Emb		Emb: 0	0	7	3/4

9273	**USER_CLASS_APP_PARAMETER**			H04, H05	**QV:**
-	Protection level for softkeys in parameter			BYTE	Immediately
This MD defines the access level for the individual softkeys in the Parameter operating area. The array index represents the corresponding softkey, that means, e.g. Index 1 stands for the first softkey. Index 0 is reserved for later extensions.					
				7.1	
Emb		Emb: 0	0	7	3/4

9300	**V24_USER_XON**			H05	**QV:** K4
-	User: X on character			REAL	Immediately
XON character: This is the character which starts a transmission: It applies for device type XON/XOFF only. With the special function Start with XON active, the program waits for an XON character from the connected device during read-in before it starts. Device control character 1 (DEVICE CONTROL 1 (X-ON) or DC 1 follow standard 11H. This standard value is set as default. Input: via digital input in the Parameter screen under XON (hex)					
				-	
Emb		Emb: 17	0	0xFF	3/4

9301	**V24_USER_XOFF**			H05	**QV:** K4
-	User: X off character			REAL	Immediately
XOFF character: This is the character which stops a transmission: It applies for device type XON/XOFF only. Device control character 3 (DEVICE CONTROL 3 (X-OFF) or DC 3 follow standard 13H. This standard value is set as default. Input: via digital input in the Parameter screen under XOFF (hex)					
				-	
Emb		Emb: 19	0	0xFF	3/4

9302	**V24_USER_EOF**			H05	**QV:** K4
-	User: end-of-transmission character			REAL	Immediately
This is the character which stops a transmission. Value 1A is set as default. DOS character for file end in text files. Input: via digital input in the Parameter screen under end of transmission The character is active when Stop with end of transmission character is checked.					
				-	
Emb		Emb: 26	0	0xFF	3/4

9303	**V24_USER_CONTROLS**			H05	**QV:** K4
-	User: special bits			REAL	Immediately
These special bits store the special functions which can be activated in the Parameter screen. Set bit means: special function is active. Stored in the MD as bit with the following assignment: Bit 0 Start with XON 1: The transmission is started as soon as the character defined for XON appears in the data stream. It only applies when XON/XOFF is set as device type. 0: start is independent of an XON character Bit 1 program start with LF currently without any effect Bit 2 Block end with CR LF 1: When output in punched tape format, the CR characters (carriage return, hexadecimal 0D) are inserted. When input in punched tape format, the CR characters are removed. 0: no additional characters are inserted. Bit 3 Stop with end of transmission character 1: end of transmission character is analyzed 0: end of transmission character is not analyzed (required for binary data analysis). Bit 4 Analyze the DSR signal 1: The transmission is interrupted when the DSR signal is missing (port 6 of the X6 or X7 connector; with MMC 101/103 only). 0: The DSR signal has no effect. Bit 5 Leader and trailer 1: Skip leader during input Output 120x0 (hex) during output (feed in front of and after the data) 0: leader and trailer are read in also No 0(hex) leader during output Bit 6 Punched tape format 1: Read-in of programs accord. to DIN 66025, e.g. programs of SINUMERIK 3/8: start with % file name, %MPFxxx or %SPFxxx. 0: read-in of archives in SINUMERIK 840D/810D archive format Bit 7 Time monitoring 1: if transmission problems occur, the transmission will be aborted after 10 seconds Time monitoring is controlled via timer, which is reset after each transmitted character. 0: no transmission abort					
				-	
Emb		Emb: 76	0	0x3FF	3/4

<table>
<tr><td>9303</td><td colspan="3">V24_USER_CONTROLS</td><td>H05</td><td>QV: K4</td></tr>
<tr><td>-</td><td colspan="3">User: special bits</td><td>REAL</td><td>Immediately</td></tr>
<tr><td colspan="6">These special bits store the special functions which can be activated in the Parameter screen. Set bit means: special function is active.
Stored in the MD as bit with the following assignment:
Bit 0 Start with XON
1: The transmission is started as soon as the character defined for XON appears in
the data stream. It only applies when XON/XOFF is set as device type.
0: start is independent of an XON character
Bit 1 program start with LF
currently without any effect
Bit 2 Block end with CR LF
1: When output in punched tape format, the CR characters (carriage return, hexadecimal 0D) are inserted.
When input in punched tape format, the CR characters are removed.
0: no additional characters are inserted.
Bit 3 Stop with end of transmission character
1: end of transmission character is analyzed
0: end of transmission character is not analyzed
(required for binary data analysis).
Bit 4 Analyze the DSR signal
1: The transmission is interrupted when the DSR signal is missing (port 6 of the X6 or
X7 connector; with MMC 101/103 only).
0: The DSR signal has no effect.
Bit 5 Leader and trailer
1: Skip leader during input
Output 120x0 (hex) during output
(feed in front of and after the data)
0: leader and trailer are read in also
No 0(hex) leader during output
Bit 6 Punched tape format
1: Read-in of programs accord. to DIN 66025, e.g. programs of SINUMERIK 3/8:
start with % file name, %MPFxxx or %SPFxxx.
0: read-in of archives in SINUMERIK 840D/810D archive format
Bit 7 Time monitoring
1: if transmission problems occur, the transmission will be aborted after 10 seconds
Time monitoring is controlled via timer, which is reset after each transmitted
character.
0: no transmission abort</td></tr>
<tr><td></td><td colspan="3"></td><td>-</td><td></td></tr>
<tr><td>Emb</td><td></td><td>Emb: 76</td><td>0</td><td>0x3FF</td><td>3/4</td></tr>
</table>

9304	**V24_USER_RTS**			H05	**QV:** K4
-	User: line-controlled			BYTE	Immediately

Two device types are supported for transmission control: XON/XOFF and RTS/CTS.

1: XON/XOFF
One of the options to control the transmission is the use of the control characters XON (DC1, DEVICE CONTROL 1) and XOFF (DC3). When the buffer of the I/O device is full, it will send XOFF. When it is ready to receive data, it will send XON.

0: RTS/CTS
The signal RTS (request to send) controls the transmission mode of the data communications equipment. Active: data shall be transmitted. Passive: do not exit the transmission mode until all transferred data are transmitted.
The signal CTS (clear to send) shows as acknowledgement signal for RTS that the data communications equipment is ready for transmission.
Input: via selection in the Parameter screen under device type

				-	
Emb		Emb: 0	0	1	3/4

9305	**V24_USER_BAUD**			H05	**QV:** K4
-	User: baud rate			BYTE	Immediately

This is the stepping rate in baud, a unit for the data transmission rate.
Input: via selection in the Parameter screen under baud rate

0: 300 baud
1: 600 baud
2: 1200 baud
3: 2400 baud
4: 4800 baud
5: 9600 baud
6: 19200 baud for SW 3.1 and higher

				-	
Emb		Emb: 5	0	8	3/4

9306	**V24_USER_DATABITS**			H05	**QV:** K4
-	User: data bits			BYTE	Immediately

Number of data bits for asynchronous transmission.
Input: via selection in the Parameter screen under data bits

0: 7 data bits
1: 8 data bits

				-	
Emb		Emb: 1	0	1	3/4

9307	**V24_USER_PARITY**			H05	**QV:** K4
-	User: parity bits			BYTE	Immediately
Parity bits are used for troubleshooting: parity bits are added to the coded signs to make the number of digit positions set to 1” to an odd number (odd parity) or an even number (even parity). Input: via selection in the Parameter screen under parity 0: no parity 1: even parity 2: odd parity					
				-	
Emb		Emb: 0	0	2	3/4

9308	**V24_USER_STOPBIT**			H05	**QV:** K4
-	User: stop bits			BYTE	Immediately
Number of stop bits for asynchronous data transmission. Input: via selection in the Parameter screen under stop bits 0: 1 stop bit 1: 2 stop bits					
				-	
Emb		Emb: 0	0	1	3/4

9309	**V24_USER_LINE**			H05	**QV:** K4
-	User: RS-232 interface (COM1/COM2)			BYTE	Immediately
Defines via which V24 interface a file transfer shall be initiated. Input: via selection in the Parameter screen under V24 interface 1: COM1 2: COM2					
				SW5	
Emb		Emb: 1	1	2	3/4

9310	**V24_PRINTER_XON**			H05	**QV:** K4
-	Printer: X on character			REAL	Immediately
XON character: This is the character which starts a transmission: It applies for device type XON/XOFF only. With the special function Start with XON active, the program waits for an XON character of the connected device during read-in before it starts. Device control character 1 (DEVICE CONTROL 1 (X-ON) or DC 1 follow standard 11H. This standard value is set as default. Input: via digital input in the Parameter screen under XON (hex)					
				-	
Emb		Emb: 17	0	0xFF	3/4

9311	**V24_PRINTER_XOFF**			H05	**QV:** K4
-	Printer: X off character			REAL	Immediately
XOFF character: This is the character which stops a transmission: It applies for device type XON/XOFF only. Device control character 3 (DEVICE CONTROL 3 (X-OFF) or DC 3 follow standard 13H. This standard value is set as default. Input: via digital input in the Parameter screen under XOFF (hex)					
				-	
Emb		Emb: 19	0	0xFF	3/4

9312	**V24_PRINTER_EOF**			H05	**QV:** K4
-	Printer: end-of-transmission character			REAL	Immediately
This is the character which stops a transmission. Value 1A is set as default. DOS character for file end in text files. Input: via digital input in the Parameter screen under end of transmission The character is active when Stop with end of transmission character is checked.					
				-	
Emb		Emb: 12	0	0xFF	3/4

9313	**V24_PRINTER_CONTROLS**			H05	**QV:** K4
-	Printer: special bits			REAL	Immediately
These special bits store the special functions which can be activated in the Parameter screen. Set bit means: special function is active. Stored in the MD as bit with the following assignment: Bit 0 Start with XON 1: The transmission is started as soon as the character defined for XON appears in the data stream. It only applies when XON/XOFF is set as device type. 0: start is independent of an XON character Bit 1 program start with LF currently without any effect Bit 2 Block end with CR LF 1: When output in punched tape format, the CR signs (carriage return, hexadecimal 0D) are inserted. When input in punched tape format, the CR signs are removed. 0: no additional signs are inserted. Bit 3 Stop with end of transmission character 1: end of transmission character is analyzed 0: end of transmission character is not analyzed (required for binary data analysis). Bit 4 Analyze the DSR signal 1: The transmission is interrupted when the DSR signal is missing (port 6 of the X6 or X7 connector; with MMC 101/103 only). 0: The DSR signal has no effect. Bit 5 Leader and trailer 1: Skip leader during input Output 120x0 (hex) during output (feed in front of and after the data) 0: leader and trailer are read in, too No 0(hex) leader during output Bit 6 Punched tape format 1: Read-in of programs accord. to DIN 66025, e.g. programs of SINUMERIK 3/8: start with % file name, %MPFxxx or %SPFxxx. 0: read-in of archives in SINUMERIK 840D/810D archive format Bit 7 Time monitoring 1: if transmission problems occur, the transmission will be aborted after 10 seconds Time monitoring is controlled via timer, which is reset after each transmitted character. 0: no transmission abort					
				-	
Emb		Emb: 76	0	0x3FF	3/4

9313	V24_PRINTER_CONTROLS			H05	QV: K4
-	Printer: special bits			REAL	Immediately
These special bits store the special functions which can be activated in the Parameter screen. Set bit means: special function is active. Stored in the MD as bit with the following assignment: Bit 0 Start with XON 1: The transmission is started as soon as the character defined for XON appears in the data stream. It only applies when XON/XOFF is set as device type. 0: start is independent of an XON character Bit 1 program start with LF currently without any effect Bit 2 Block end with CR LF 1: When output in punched tape format, the CR signs (carriage return, hexadecimal 0D) are inserted. When input in punched tape format, the CR signs are removed. 0: no additional signs are inserted. Bit 3 Stop with end of transmission character 1: end of transmission character is analyzed 0: end of transmission character is not analyzed (required for binary data analysis). Bit 4 Analyze the DSR signal 1: The transmission is interrupted when the DSR signal is missing (port 6 of the X6 or X7 connector; with MMC 101/103 only). 0: The DSR signal has no effect. Bit 5 Leader and trailer 1: Skip leader during input Output 120x0 (hex) during output (feed in front of and after the data) 0: leader and trailer are read in, too No 0(hex) leader during output Bit 6 Punched tape format 1: Read-in of programs accord. to DIN 66025, e.g. programs of SINUMERIK 3/8: start with % file name, %MPFxxx or %SPFxxx. 0: read-in of archives in SINUMERIK 840D/810D archive format Bit 7 Time monitoring 1: if transmission problems occur, the transmission will be aborted after 10 seconds Time monitoring is controlled via timer, which is reset after each transmitted character. 0: no transmission abort					
				-	
Emb		Emb: 76	0	0x3FF	3/4

9314	**V24_PRINTER_RTS**			H05	**QV:** K4
-	Printer: line-controlled			BYTE	Immediately

Two device types are supported for transmission control: XON/XOFF and RTS/CTS.

1: XON/XOFF
One of the options to control the transmission is the use of the control characters XON (DC1, DEVICE CONTROL 1) and XOFF (DC3). When the buffer of the I/O device is full, it will send XOFF. When it is ready to receive data, it will send XON.

0: RTS/CTS
The signal RTS (request to send) controls the transmission mode of the data communications equipment. Active:
data shall be transmitted. Passive: do not exit the transmission mode before all transferred data are transmitted.
The signal CTS (clear to send) shows as acknowledgement signal for RTS that the data communications equipment is ready for transmission.
Input: via selection in the Parameter screen under device type

				-	
Emb		Emb: 0	0	1	3/4

9315	**V24_PRINTER_BAUD**			H05	**QV:** K4
-	Printer: baud rate			BYTE	Immediately

This is the stepping rate in baud, a unit for the data transmission rate.
Input: via selection in the Parameter screen under baud rate

0: 300 baud
1: 600 baud
2: 1200 baud
3: 2400 baud
4: 4800 baud
5: 9600 baud
6: 19200 baud for SW 3.1 and higher

				-	
Emb		Emb: 5	0	8	3/4

9316	**V24_PRINTER_DATABITS**			H05	**QV:** K4
-	Printer: data bits			BYTE	Immediately

Number of data bits for asynchronous transmission.
Input: via selection in the Parameter screen under data bits

0: 7 data bits
1: 8 data bits

				-	
Emb		Emb: 1	0	1	3/4

9317	**V24_PRINTER_PARITY**			H05	**QV:** K4
-	Printer: parity bits			BYTE	Immediately
Parity bits are used for troubleshooting: parity bits are assigned to the coded signs to make the number of the digit positions set to 1” to an odd number (odd parity) or an even number (even parity). Input: via selection in the Parameter screen under parity 0: no parity 1: even parity 2: odd parity					
				-	
Emb		Emb: 0	0	2	3/4

9318	**V24_PRINTER_STOPBIT**			H05	**QV:** K4
-	Printer: stop bits			BYTE	Immediately
Number of stop bits for asynchronous data transmission. Input: via selection in the Parameter screen under stop bits 0: 1 stop bits 1: 2 stop bits					
				-	
Emb		Emb: 0	0	1	3/4

9319	**V24_PRINTER_LINE**			H05	**QV:** K4
-	Printer: RS-232 interface (COM1/COM2)			BYTE	Immediately
Defines via which V24 interface a file transfer shall be initiated. Input: via selection in the Parameter screen under V24 interface 1: COM1 2: COM2					
				-	
Emb		Emb: 1	1	2	3/4

9320	**V24_PG_PC_XON**			H05	**QV:** K4
-	PG: X on character			REAL	Immediately
XON character: This is the character which starts a transmission: It applies for device type XON/XOFF only. With the special function Start with XON active, the program waits for an XON character of the connected device during read-in before it starts. Device control character 1 (DEVICE CONTROL 1 (X-ON) or DC 1 follow standard 11H. This standard value is set as default. Input: via digital input in the Parameter screen under XON (hex)					
				-	
Emb		Emb: 17	0	0xFF	3/4

9321	**V24_PG_PC_XOFF**			H05	**QV:** K4
-	PG: X off character			REAL	Immediately
XOFF character: This is the character which stops a transmission: It applies for device type XON/XOFF only. Device control character 3 (DEVICE CONTROL 3 (X-OFF) or DC 3 follow standard 13H. This standard value is set as default. Input: via digital input in the Parameter screen under XOFF (hex)					
				-	
Emb		Emb: 19	0	0xFF	3/4

9322	**V24_PG_PC_EOF**			H05	**QV:** K4
-	PG: end-of-transmission character			REAL	Immediately
This is the character which stops a transmission. Value 1A is set as default. DOS character for file end in text files. Input: via digital input in the Parameter screen under end of transmission The character is active when Stop with end of transmission character is checked.					
				-	
Emb		Emb: 26	0	0xFF	3/4

9323	**V24_PG_PC_CONTROLS**			H05	**QV:** K4
-	PG: special bits			REAL	Immediately

These special bits store the special functions which can be activated in the Parameter screen. Set bit means: special function is active.

Stored in the MD as bit with the following assignment:

Bit 0 Start with XON
- 1: The transmission is started as soon as the character defined for XON appears in the data stream. It only applies when XON/XOFF is set as device type.
- 0: start is independent of an XON character

Bit 1 program start with LF
- currently without any effect

Bit 2 Block end with CR LF
- 1: When output in punched tape format, the CR signs (carriage return, hexadecimal 0D) are inserted.
  When input in punched tape format, the CR signs are removed.
- 0: no additional signs are inserted.

Bit 3 Stop with end of transmission character
- 1: end of transmission character is analyzed
- 0: end of transmission character is not analyzed (required for binary data analysis).

Bit 4 Analyze the DSR signal
- 1: The transmission is interrupted when the DSR signal is missing (port 6 of the X6 or X7 connector; with MMC 101/103 only).
- 0: The DSR signal has no effect.

Bit 5 Leader and trailer
- 1: Skip leader during input
  Output 120x0 (hex) during output
  (feed in front of and after the data)
- 0: leader and trailer are read in also
  No 0(hex) leader during output

Bit 6 Punched tape format
- 1: Read-in of programs accord. to DIN 66025, e.g. programs of SINUMERIK 3/8: start with % file name, %MPFxxx or %SPFxxx.
- 0: read-in of archives in SINUMERIK 840D/810D archive format

Bit 7 Time monitoring
- 1: if transmission problems occur, the transmission will be aborted after 10 seconds
  Time monitoring is controlled via timer, which is reset after each transmitted character.
- 0: no transmission abort

				-	
Emb		Emb: 144	0	0x3FF	3/4

9323	**V24_PG_PC_CONTROLS**			H05	**QV:** K4
-	PG: special bits			REAL	Immediately

These special bits store the special functions which can be activated in the Parameter screen. Set bit means: special function is active.

Stored in the MD as bit with the following assignment:

Bit 0 Start with XON

1: The transmission is started as soon as the character defined for XON appears in the data stream. It only applies when XON/XOFF is set as device type.

0: start is independent of an XON character

Bit 1 program start with LF

currently without any effect

Bit 2 Block end with CR LF

1: When output in punched tape format, the CR signs (carriage return, hexadecimal 0D) are inserted.
When input in punched tape format, the CR signs are removed.

0: no additional signs are inserted.

Bit 3 Stop with end of transmission character

1: end of transmission character is analyzed

0: end of transmission character is not analyzed
(required for binary data analysis).

Bit 4 Analyze the DSR signal

1: The transmission is interrupted when the DSR signal is missing (port 6 of the X6 or X7 connector; with MMC 101/103 only).

0: The DSR signal has no effect.

Bit 5 Leader and trailer

1: Skip leader during input
Output 120x0 (hex) during output
(feed in front of and after the data)

0: leader and trailer are read in also
No 0(hex) leader during output

Bit 6 Punched tape format

1: Read-in of programs accord. to DIN 66025, e.g. programs of SINUMERIK 3/8:
start with % file name, %MPFxxx or %SPFxxx.

0: read-in of archives in SINUMERIK 840D/810D archive format

Bit 7 Time monitoring

1: if transmission problems occur, the transmission will be aborted after 10 seconds
Time monitoring is controlled via timer, which is reset after each transmitted character.

0: no transmission abort

				-	
Emb		Emb: 144	0	0x3FF	3/4

9324	V24_PG_PC_RTS			H05	QV: K4
-	PG: line-controlled			BYTE	Immediately
Two device types are supported for transmission control: XON/XOFF and RTS/CTS. 1: XON/XOFF One of the options to control the transmission is the use of the control characters XON (DC1, DEVICE CONTROL 1) and XOFF (DC3). When the buffer of the I/O device is full, it will send XOFF. When it is ready to receive data, it will send XON. 0: RTS/CTS The signal RTS (request to send) controls the transmission mode of the data communications equipment. Active: data shall be transmitted. Passive: do not exit the transmission mode before all transferred data are transmitted. The signal CTS (clear to send) shows as acknowledgement signal for RTS that the data communications equipment is ready for transmission. Input: via selection in the Parameter screen under device type					
				-	
Emb		Emb: 0	0	1	3/4

9325	V24_PG_PC_BAUD			H05	QV: K4
-	PG: baud rate			BYTE	Immediately
This is the stepping rate in baud, a unit for the data transmission rate. Input: via selection in the Parameter screen under baud rate 0: 300 baud 1: 600 baud 2: 1200 baud 3: 2400 baud 4: 4800 baud 5: 9600 baud 6: 19200 baud for SW 3.1 and higher					
				-	
Emb		Emb: 5	0	8	3/4

9326	V24_PG_PC_DATABITS			H05	QV: K4
-	PG: data bits			BYTE	Immediately
Number of data bits for asynchronous transmission. Input: via selection in the Parameter screen under data bits 0: 7 data bits 1: 8 data bits					
				-	
Emb		Emb: 1	0	1	3/4

9327	**V24_PG_PC_PARITY**			H05	**QV:** K4
-	PG: parity bits			BYTE	Immediately

Parity bits are used for troubleshooting: parity bits are assigned to the coded signs to make the number of the digit positions set to 1” an odd number (odd parity) or an even number (even parity).

Input: via selection in the Parameter screen under parity

0: no parity

1: even parity

2: odd parity

				-	
Emb		Emb: 0	0	2	3/4

9328	**V24_PG_PC_STOPBIT**			H05	**QV:** K4
-	PG: stop bits			BYTE	Immediately

Number of stop bits in asynchronous data transmission.

Input: by selecting in the Parameter screen under stop bits

0: 1 stop bit

1: 2 stop bits

				-	
Emb		Emb: 0	0	1	3/4

9329	**V24_PG_PC_LINE**			H05	**QV:** K4
-	PG: RS-232 interface (COM1/COM2)			BYTE	Immediately

Selects the V24 interface for file transfer initiation.

Input: by selecting in the Parameter screen under V24 interface

1: COM1

2: COM2

				-	
Emb		Emb: 1	1	2	3/4

9400	**TOOL_REF_GEO_AXIS1**			H05	**QV:** BA
-	Abs.dim.f.tool length offset f.geoaxis 1			DOUBLE	Immediately

Via machine data MD 9400 TOOL_REF_GEO_AXIS1 you can set the absolute dimension in the operating area Parameter, Tool offsets or Determine compensation for the geometry axis.

The corresponding geometry axis no. 1 is selected via Toggle key. The reference value can be changed via the numerical keyboard.

After pressing the OK softkey, the current position and this reference value are considered for calculating the selected tool parameter.

The following applies: position - reference value = input value.

				-	
Emb		Emb: 0	0	0	3/4

9401	**TOOL_REF_GEO_AXIS2**			H05	**QV:** BA
-	Abs.dim.f.tool length offset f.geoaxis 2			DOUBLE	Immediately
Via machine data MD 9400 TOOL_REF_GEO_AXIS2 you can set the absolute dimension in the operating area Parameter, Tool offsets or Determine compensation for the geometry axis. The corresponding geometry axis no. 1 is selected via Toggle key. The reference value can be changed via the numerical keyboard. After pressing the OK softkey, the current position and this reference value are considered for calculating the selected tool parameter. It applies: position - reference value = input value.					
				-	
Emb		Emb: 0	0	0	3/4

9402	**TOOL_REF_GEO_AXIS3**			H05	**QV:** BA
-	Abs.dim.f.tool length offset f.geoaxis 3			DOUBLE	Immediately
Via machine data MD 9400 TOOL_REF_GEO_AXIS3 you can set the absolute dimension in the operating area Parameter, Tool offsets or Determine compensation for the geometry axis. The corresponding geometry axis no. 1 is selected via Toggle key. The reference value can be changed via the numerical keyboard. After pressing the OK softkey, the current position and this reference value are considered for calculating the selected tool parameter. It applies: position - reference value = input value.					
				-	
Emb		Emb: 0	0	0	3/4

9410	**TM_LOAD_PLACE**			H05	**QV:** BA
-	Number of load location			INTEGER	Power On
				-	
Emb		Emb: 0	0	0	3/4

9411	**TM_NUM_MAG**			H05	**QV:** BA
-	Number of work magazine			INTEGER	Power On
				-	
Emb		Emb: 0	0	0	3/4

9412	**TM_DEFAULT_TOOLSIZE**			H05	**QV:** FBW
-	Preset value for tool size			REAL	Immediately
				SW4.1	
Emb		Emb: 1111	1111	7777	3/4

9414	**TM_KIND_OF_TOOLMANAGEMENT**			H01, H02, H05	**QV:** FBW
-	Type of tool management representation			BYTE	Power On
Mode of representing the tool management 0: old, 1: new (SW 5.2 and higher)					
				SW5	
SM, ST, Emb		Emb: 0, SM: 0, ST: 0	0	1	3/4

9415	**TM_DEFAULT_TOOLPLACESPEC**			H05	**QV:** FBW
-	Default value for location type			BYTE	Immediately
				SW4.2	
Emb		Emb: 1	1	99	3/4

9416	**TM_DEFAULT_TOOLTYPE**			H05	**QV:** FBW
-	Preset value for type of location			REAL	Immediately
				SW4.1	
Emb		Emb: 120	100	900	3/4

9417	**TM_DEFAULT_TOOLSTATE**			H05	**QV:** FBW
-	Preset value for tool status loading			INTEGER	Immediately
				SW4.1	
Emb		Emb: 2	0	255	3/4

9419	**TM_DEFAULT_DELETE_TOOL**			H05	**QV:** FBW
-	Preset tool data for automatic deletion			BYTE	Immediately
				SW4.1	
Emb		Emb: 0	0	1	3/4

9420	**MA_ONLY_MKS_DIST_TO_GO**			H05	**QV:** FBW
-	Distance-to-go display in work window			BYTE	Immediately
				SW4.1	
Emb		Emb: 0	0	1	3/4

9421	**MA_AXES_SHOW_GEO_FIRST**			H05	**QV:** K1
-	Actual value display with leading axes			BYTE	Immediately
If the machine data has a value of 1, the geo axes of the channel are displayed first.					
				SW2	
Adv, Emb		Emb: 1	0	1	3/4

9422	**MA_PRESET_MODE**			H05	**QV:** K1
-	Select PRESET/Basic offset in JOG			BYTE	Immediately
0 = no preset, no actual-value setting 1 = Preset 2 = Actual-value setting NCK without system frame: Setting only possible with active G500 in basis offset 1, otherwise error message. NCK with system frame: Setting always possible in the system frame. Basis no more used. 3 = Actual-value setting NCK with/without system frame: Setting possible in the currently active frame.					
				SW5	
Adv, Emb		Emb: 1	0	3	3/4

9423	**MA_MAX_SKP_LEVEL**			H05	**QV:** K1
-	Max. skip levels in NC program			BYTE	Power On
This machine data defines how many skip levels are used in the operation.					
				SW5	
Adv, Emb		Emb: 1	1	10	3/4

9424	**MA_COORDINATE_SYSTEM**			H05	**QV:** K2
-	Coord.syst. for act.val. display			BYTE	Power On
Coordinate system for actual-value display 0 WCS 1 SZS (settable zero system)					
				SW5	
Adv, Emb		Emb: 0	0	1	3/4

9424	**MA_COORDINATE_SYSTEM**			H05	**QV:** K2
-	Coord.syst. for act.val. display			BYTE	Immediately
Coordinate system for actual-value display 0 WCS 1 SZS (settable zero system)					
				SW5	
Adv, Emb		Emb: 0	0	1	3/4

9425	**MA_SCRATCH_DEFAULT_MODE**			H05	**QV:** K2
-	Tool offset calculation Scratching			DOUBLE	Immediately
In MD 9425 MA_SCRATCH_DEFAULT_MODE you can preset the tool offset directions for scratching in the Machine area. The calculation directions can be set as follows: 3-digit basis		3-digit geo+wear for geo axis 1/2/3 Axis 1	2	3		1	2	3	 ----------------------------		------------------
		||		| HEX values: 0: without 1: + direction 2: - direction Note: (SW 6.1 and higher) This functionality is only available in HMI Embedded.					
				5.3	
Emb		Emb: 0	0	2236962	3/4

9426	**MA_AX_DRIVELOAD_FROM_PLC1**			H01, H02, H05	**QV:**
-	Mach.axis ind. analog spindle power displ.			BYTE	Power On
Machine axis index of a spindle (analog) fetching the performance data from the PLC DB19.DBB6					
				Emb: 6.5 Adv: 6.4	
SM, ST, Adv, Emb		Emb: 0, SM: , ST:	0	31	3/4

9427	**MA_AX_DRIVELOAD_FROM_PLC2**			H01, H02, H05	**QV:**
-	Mach.axis ind. analog spindle power displ.			BYTE	Power On
Machine axis index of a spindle (analog) fetching the performance data from the PLC DB19.DBB7					
				Emb: 6.5 Adv: 6.4	
SM, ST, Adv, Emb		Emb: 0, SM: , ST:	0	31	3/4

9428	**MA_SPIND_MAX_POWER**			H01, H02, H05	**QV:** IM4
%	Maximum value of spindle power rating disp			REAL	Power On
Maximum value of the spindle performance display in percent					
				Emb: 6.5 Adv: 6.4	
SM, ST, Adv, Emb		Emb: 100, SM: , ST:	100	0xFFFF	3/4

9429	**MA_SPIND_POWER_RANGE**			H01, H02, H05	**QV:** IM4
%	Display range of spindle power rating disp			REAL	Power On
Display range of the utilization bar of the spindle performance display in percent					
				Emb: 6.5 Adv: 6.4	
SM, ST, Adv, Emb		Emb: 100, SM: , ST:	100	0xFFFF	3/4

9430	**TM_UNLOAD_AND_DELETE**				**QV:** FBO
-				BOOL	Power On
Comma-separated list of auxiliary function groups displayed in the auxiliary functions window . Max. 15 auxiliary functions can be displayed.					
				SW5	
			0	1	3/4

9431	**TM_LOAD_TOOL_NEW**				**QV:** FBO
-				BOOL	Power On
				SW5	
			0	1	3/4

9432	**TM_TOOL_STATE_DEF_VAL**				**QV:** FBO
-				BYTE	Power On
			2	78	3/4

9433	**TM_ACT_SEARCH_AND_POS**				**QV:** FBO
-				BOOL	Power On
			0	1	3/4

9434	**TM_LOAD_LOC1**				**QV:** FBW
-				INTEGER	Power On
				4.2	
			0	600	3/7

9435	**TM_LOAD_LOC2**				**QV:** FBW
-				INTEGER	Power On
				4.2	
			0	600	3/7

9436	**TM_LOAD_LOC3**				**QV:** FBW
-				INTEGER	Power On
				4.2	
			0	600	3/7

9437	**TM_LOAD_LOC4**				**QV:** FBW
-				INTEGER	Power On
				4.2	
			0	600	3/7

9438	**TM_LOAD_LOC5**				**QV:** FBW
-				INTEGER	Power On
				4.2	
			0	600	3/7

9440	**ACTIVATE_SEL_USER_DATA**			H05	**QV:** K2
-	Activate active offset immediately			BYTE	Immediately
Active data (frames) are immediately effective after a change.					
				SW4.3	
Adv, Emb		Emb: 0	0	1	3/4

9442	**MA_AUXFU_GROUPS**			H01, H02, H05	**QV:**
-	Auxiliary function groups displayed			STRING	Power On
Comma-separated list of auxiliary function groups displayed in the auxiliary functions window . Max. 15 auxiliary functions can be displayed.					
				7.1	
SM, ST, Adv, Emb		Emb: 0, SM: , ST:	0	0	3/4

9449	**WRITE_TOA_LIMIT_MASK**			H05	**QV:** K2
-	MD9449 appl. to wear (bit0) SC(1) EC(2)			BYTE	Immediately
Bit 0: Application to cutting edge data, wear values Bit 1: Application to SC data (location-dependent offsets, wear values) Bit 2: Application to EC data (location-dependent offsets, setup values) Default value 7: Application to all data					
				5.2	
Adv			0	7	3/4

9450	**WRITE_TOA_FINE_LIMIT**			H05	**QV:** K2
mm	Limit value for wear fine			DOUBLE	Immediately
When the tool offsets are entered, the maximum value of the change between the existing value and the new value is the value set here. With WRITE_TOA_FINE_LIMIT, the change of a tool wear is limited by increments, when the current protection level is equal to or higher than the value set in USER_CLASS_WRITE_FINE. No incremental limiting is performed, if the protection level is equal to or higher than USER_CLASS_WRITE_TOA_WEAR. Absolute and incremental wear limiting can be combined, i.e. the wear can be changed in increments up to the absolute limit. S. MD 9639. Note When channel-specific display machine data with MD 9014 are used, the MD is in the NC and is then part of NC series commissioning. It then allows channel-specific inch/metric consideration.					
				SW4.2	
Adv, Emb		Emb: 0.999	0	0	3/4

9451	**WRITE_ZOA_FINE_LIMIT**			H05	**QV:** K2
mm	Limit value for offset fine			DOUBLE	Immediately
When the zero offsets are entered, the maximum value of the change between the existing value and the new value is the value set here. Note When channel-specific display machine data with MD 9014 are used, the MD is in the NC and is then part of NC series commissioning. It then allows channel-specific inch/metric consideration.					
				SW4.2	
Adv, Emb		Emb: 0.999	0	0	3/4

9459	**PA_ZOA_MODE**			H05	**QV:** K2, IM2
-	Display mode zero offset			BYTE	Immediately
Display mode of the zero offset: 0 screen mode same as for SW 5 and lower 1 screen mode for HMI-Embedded (SW 6.1 and higher) Note: (SW 6.1 and higher) This functionality is only available in HMI Embedded.					
				SW 6.1	
Emb		Emb: 1	0	1	3/4

9460	**PROGRAM_SETTINGS**			H05	**QV:** A2
-	Settings in Program area			INTEGER	Immediately
Data storage for settings in the PROGRAM range. The settings are maintained via RESET. Bit 0, Bit 1 internall used Bit 2: 1 Autom. Release for program 0 No automatic release for programs, presetting for SW 5.1 Bit 3: 1 SK labeling contour calculator with icons 0 SK labeling contour calculator as text, presetting for SW 5.1 Bit 4: 1 The LF sign is hidden in the editor, SW 6.1 and higher 0 The LF sign is displayed in the editor, SW 6.1 and higher					
				SW5.1	
Adv, Emb		Emb: 128	0	0	3/4

9461	**CONTOUR_END_TEXT**			H05	**QV:** A2
-	String to be added to end of contour			STRING	Immediately
After a contour entry, this string is added to the end of the contour. Example(s) for application M30					
				SW5.1	
Emb		Emb: """"	0	0	3/4

9464	**MAX_PROGRAMM_SIZE_CHECK**			H05	**QV:**
-	File size from which no test is performed			INTEGER	Immediately
If the corresponding bit in MM_PROGRAM_SETTINGS is set, the contents define the limit as from which no checks are performed. Smaller programs are still checked. The file size is indicated in KByte (mold making programs exceeding approx. 300KByte)					
				6.4	
Emb		Emb: 102400	51200	0x7FFFFFFF	3/4

9477	**TO_TRACE**			H01, H02, H05	**QV:**
-	For internal test purposes			REAL	Power On
Internal					
SM, ST, Emb		Emb: 0, SM: 0, ST: 0	0	0xFFFF	3/4

9477	**TO_TRACE**			H01, H02, H05	**QV:**
-	For internal test purposes			REAL	Power On
Internal					
SM, ST, Emb		Emb: 0, SM: 0, ST: 0	0	0xFFFF	3/4

9478	**TO_OPTION_MASK**			H01, H02, H05	**QV:**
-	For internal purposes			INTEGER	Power On
Internal					
SM, ST, Emb		Emb: 0, SM: 0, ST: 0	0	0	2/2

9479	**TO_MAG_PLACE_DISTANCE**			H02, H05	**QV:** FBSP
mm	Distance betw. indiv. magazine locations			DOUBLE	Power On
Distance of the individual magazine locations. Used for the graphical representation of the magazine and the tools in the JobShop tool management.					
				6.3	
ST, Emb		Emb: 0, ST:	0	10000	3/4

9480	**MA_SIMULATION_MODE**			H05	**QV:** BAD
-	Simulation type			BYTE	Immediately
Type of simulation: -1: only HMI standard simulation/Shopmill simulation 0 : always selection menu HMI standard simulation or quick view (not with Shopmill) 1 : always quick view for HMI standard and Shopmill 2 : depending on the size of the program to be displayed (can be set via the machine data) automatically quick view or HMI standard simulation/Shopmill simulation					
				6.4	
Adv			-1	2	3/4

9481	**MA_STAND_SIMULATION_LIMIT**			H05	**QV:** BAD
-	Standard simulation limit in KB			INTEGER	Immediately
Part program limit in kByte up to which the HMI standard simulation/Shopmill simulation is started					
				6.4	
Adv			200	2000000	3/4

9500	**NC_PROPERTIES**			H05	**QV:** A2
-	NC properties			BYTE	Immediately
Basic configuration of the NC properties: Bit0 = 1 digital drives Bit1 = 1 software start-up switch Bit2...4: reserved					
				SW2	
Emb		Emb: 255	0	0xFF	3/4

9500	**NC_PROPERTIES**			H05	**QV:** A2
-	NC properties			BYTE	Immediately
Basic configuration of the NC properties: Bit0 = 1 digital drives Bit1 = 1 software start-up switch Bit2...4: reserved					
				SW2	
Emb		Emb: 255	0	0xFF	3/4

9509	**USER_CLASS_DIRECTORY_CHG**			H04, H05	**QV:** FBT, FBSP, EMB
-	Protect. level for network configuration			BYTE	Immediately
The setting screen form for network configuration can be protected via access level.					
				6.2	
Emb		Emb: 1	0	7	3/4

9510	**USER_CLASS_DIRECTORY1_P**			H04, H05	**QV:** A2
-	Protection level for network drive1 progr.			BYTE	Immediately
The MD defines the protection level of network drive 1 for the Program and Services area. (HMI Advanced)					
				6.1	
Adv, Emb		Emb: 1	0	7	3/4

9511	**USER_CLASS_DIRECTORY2_P**			H04, H05	**QV:** A2
-	Protection level for network drive2 progr.			BYTE	Immediately
The MD defines the protection level of network drive 2 for the Program and Services area. (HMI Advanced)					
				6.1	
Adv, Emb		Emb: 1	0	7	3/4

9512	**USER_CLASS_DIRECTORY3_P**			H04, H05	**QV:** A2
-	Protection level for network drive3 progr.			BYTE	Immediately
The MD defines the protection level of network drive 3 for the Program and Services area. (HMI Advanced)					
				6.1	
Adv, Emb		Emb: 1	0	7	3/4

9513	**USER_CLASS_DIRECTORY4_P**			H04, H05	**QV:** A2
-	Protection level for network drive4 progr.			BYTE	Immediately
The MD defines the protection level of network drive 4 for the Program and Services area. (HMI Advanced)					
				6.1	
Adv, Emb		Emb: 1	0	7	3/4

9516	**USER_CLASS_DIRECTORY1_M**			H04, H05	**QV:** A2
-	Protection level for network drive1 mach.			BYTE	Immediately
The MD defines the protection level of network drive 1 for the Machine area. (HMI Advanced)					
				6.1	
Adv, Emb		Emb: 0	0	7	3/4

9517	**USER_CLASS_DIRECTORY2_M**			H04, H05	**QV:** A2
-	Protection level for network drive2 mach.			BYTE	Immediately
The MD defines the protection level of network drive 2 for the Machine area. (HMI Advanced)					
				6.1	
Adv, Emb		Emb: 0	0	7	3/4

9518	**USER_CLASS_DIRECTORY3_M**			H04, H05	**QV:** A2
-	Protection level for network drive3 mach.			BYTE	Immediately
The MD defines the protection level of network drive 3 for the Machine area. (HMI Advanced)					
				6.1	
Adv, Emb		Emb: 0	0	7	3/4

9519	**USER_CLASS_DIRECTORY4_M**			H04, H05	**QV:** A2
-	Protection level for network drive4 mach.			BYTE	Immediately
The MD defines the protection level of network drive 4 for the Machine area. (HMI Advanced)					
				6.1	
Adv, Emb		Emb: 0	0	7	3/4

9550	**CTM_CYC_ROUGH_RELEASE_DIST**			H02, H03	**QV:** FBMA
mm	Return distance for contour roughing			DOUBLE	Immediately
This MD specifies the amount of retraction in both axes during roughing.					
				5.2 (840D), 3.2 (810D)	
ST, MT		MT: , ST:	0.001	10.0	3/4

9551	**CTM_CYC_ROUGH_RELEASE_ANGLE**			H02, H03	**QV:** FBMA
degrees	Return angle for contour roughing			DOUBLE	Immediately
This MD specifies the angle of retraction from the contour during roughing.					
				5.2 (840D), 3.2 (810D)	
ST, MT		MT: , ST:	0.0	90.0	3/4

9552	**CTM_CYC_ROUGH_BLANC_OFFS**			H02, H03	**QV:** FBMA
mm	Blank allowance for contour roughing			DOUBLE	Immediately
This MD specifies the distance from the blank part from which onwards a changeover from G0 to G1 is performed to compensate potential blank oversizes.					
				5.2 (840D), 3.2 (810D)	
ST, MT		MT: , ST:	0.0	100.0	3/4

9553	**CTM_CYC_ROUGH_TRACE_ANGLE**			H02, H03	**QV:** FBMA
degrees	Rounding angle for contour cutting			DOUBLE	Immediately
This MD determines the angle between the tool nose and the contour. From this angle, the contour is retraced to remove residual material.					
				5.2 (840D), 3.2 (810D)	
ST, MT		MT: , ST:	0.0	90.0	3/4

9554	**CTM_CYC_ROUGH_MIN_REST_MAT1**			H02, H03	**QV:** FBMA
%	Diff. dimension resid. mat. machin. axis 1			DOUBLE	Immediately
This MD specifies the limit value for removing residual material in the direction of axis 1. Example: If the MD is set to 50 % and if the final machining allowance is 0.5 mm, residual material which is thinner than 0.25 mm is not removed in a separate machining step, but is removed during finishing.					
				5.2 (840D), 3.2 (810D)	
ST, MT		MT: , ST:	0.0	1000.0	3/4

9555	**CTM_CYC_ROUGH_MIN_REST_MAT2**			H02, H03	**QV:** FBMA
%	Diff. dimension resid. mat. machin. axis 2			DOUBLE	Immediately
This MD specifies the limit value for removing residual material in the direction of axis 2. Example: If the MD is set to 50 % and if the final machining allowance is 0.5 mm, residual material which is thinner than 0.25 mm is not removed in a separate machining step, but is removed during finishing.					
				5.2 (840D), 3.2 (810D)	
ST, MT		MT: , ST:	0.0	1000.0	3/4

9556	**CTM_CYC_ROUGH_VAR_DEPTH**			H02, H03	**QV:** FBT
%	Percentage variable cutt. depth cont. rot.			BYTE	Immediately
Percentage of variable cutting depth in contour turning					
				6.3	
ST, MT		MT: , ST:	0	50	3/4

9557	**CTM_CYC_ROUGH_FEED_INT_TIME**			H02, H03	**QV:** FBMA
	Feed interrupt time contour turning			DOUBLE	Immediately
				6.4	
ST, MT		MT: , ST:	0	0	3/4

9558	**CTM_CYC_ROUGH_INT_REL_DIST**			H02, H03	**QV:** FBMA
mm	Retr. path feed interrupt contour turning			DOUBLE	Immediately
Feed interruption return path with contour turning, contour-grooving and plunge-turning: >0: return path with feed interruption (MD 9557 is here no longer active !) =0: w/o return path					
				6.4	
ST, MT		MT: , ST:	0	10	3/4

9560	**CTM_TURN_GROOV_TOOL_BEND**			H02, H03	**QV:** FBT
mm	Retr. due to tool bending plunge-turning			DOUBLE	Immediately
Retraction due to tool bending in plunge turning					
				6.3	
ST, MT		MT: , ST:	0.0	1.0	3/4

9561	**CTM_TURN_GROOV_FREE_CUT_VAL**			H02, H03	**QV:** FBT
mm	Retr. depth prior to plunge turning oper.			DOUBLE	Immediately
Retraction depth prior to plunge turning					
				6.3	
ST, MT		MT: , ST:	0.0	1.0	3/4

9599	**CTM_OPTION_MASK**			H03	**QV:** FBMA
-	ManualTurn settings			INTEGER	Immediately
Bit 0: Do not return automatically to the spindle mode after processing hole circles Bit 1 to 7: reserved Bit 8: Hide Teach In softkey					
				6.3	
MT		MT:	0	0	2/2

9600	**CTM_SIMULATION_DEF_X**			H01, H02, H03, H05	**QV:** FBMA, FBSP
-	Simulation of default value X			INTEGER	Power On
This MD specifies the X coordinate of the displayed area. During simulation, the value pre-specified here is reached when actuating the TO ORIGIN softkey.					
				SW2.1 (810D), 4.3 (840D)	
SM, ST, MT, Emb		Emb: 0, MT: 0, SM: 0, ST: 0	-10000	10000	3/4

9601	**CTM_SIMULATION_DEF_Y**			H01, H02, H03, H05	**QV:** FBMA, FBSP
-	Simulation default value Z			INTEGER	Power On
This MD specifies the Z coordinate of the displayed area. During simulation, the value pre-specified here is reached when actuating the TO ORIGIN softkey.					
				SW2.1 (810D), 4.3 (840D)	
SM, ST, MT, Emb		Emb: 0, MT: 0, SM: 0, ST: 0	-10000	10000	3/4

9602	**CTM_SIMULATION_DEF_VIS_AREA**			H01, H02, H03, H05	**QV:** FBMA, FBSP
-	Simulation of display area default value			INTEGER	Power On
This MD is used to specify the size of the displayed area by means of the X coordinate. The Z coordinate is determined automatically from this value.					
				SW2.1 (810D), 4.3 (840D)	
SM, ST, MT, Emb		Emb: 100, MT: 100, SM: 100, ST: 100	-10000	10000	3/4

9603	**CTM_SIMULATION_MAX_X**			H01, H02, H03, H05	**QV:** FBMA, FBSP
-	Simulation of maximum display X			INTEGER	Power On
This MD defines the size of the X coordinate of a second display range (e.g. for larger workpieces). In the simulation, you reach the value preset here after actuating the Softkey MAX. Related to: MD 9604: CTM_SIMULATION_MAX_Z MD 9605: CTM_SIMULATION_MAX_VIS_AREA					
				SW2.1 (810D), 4.3 (840D)	
SM, ST, MT, Emb		Emb: 0, MT: 0, SM: 0, ST: 0	-10000	10000	3/4

9604	**CTM_SIMULATION_MAX_Y**			H01, H02, H03, H05	**QV:** FBMA, FBSP
-	Simulation maximum display Z			INTEGER	Power On
This MD defines the size of the Z coordinate of a second display range (e.g. for larger workpieces). In the simulation, you reach the value preset here after actuating the Softkey MAX. Related to: MD 9603: CTM_SIMULATION_MAX_X MD 9605: CTM_SIMULATION_MAX_VIS_AREA					
				840D SW 4.3, 810D SW 2.1	
SM, ST, MT, Emb		Emb: 0, MT: 0, SM: 0, ST: 0	-10000	10000	3/4

9605	**CTM_SIMULATION_MAX_VIS_AREA**			H01, H02, H03, H05	**QV:** FBMA, FBSP
-	Simulation of maximum display area			INTEGER	Power On
This MD defines the second display range via the X coordinate. The Z coordinate is calculated automatically from this value. Related to: MD 9603: CTM_SIMULATION_MAX_X MD 9604: CTM_SIMULATION_MAX_Z					
				840D SW 4.3, 810D SW 2.1	
SM, ST, MT, Emb		Emb: 1000, MT: 1000, SM: 1000, ST: 1000	-10000	10000	3/4

9606	**CTM_SIMULATION_TIME_NEW_POS**			H01, H02, H03, H05	**QV:** FBMA, FBT
-	Simulation of actual value update rate			INTEGER	Power On
This MD specifies the intervals of time at which the simulation graphics is updated to the current machining operating on the machine tool. Value = 9 means no update.					
				840D SW 4.3, 810D SW 2.1, ST 6.1	
SM, ST, MT, Emb		Emb: 100, MT: 100, SM: 100, ST: 100	0	4000	3/4

9607	**CTM_ENABLE_RAPID_FEED**			H03	**QV:** FBMA
-	Enable selection option rapid traverse			BYTE	Immediately
0 = RAPID TRAVERSE cannot be selected in parameter field F (feed). 1 = RAPID TRAVERSE can be selected in parameter field F (feed).					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	1	3/4

9608	**CTM_ENABLE_FEED_P_MIN**			H03	**QV:** FBMA
-	Enable selection option feed in mm/min			BYTE	Immediately
0 = feed mm/min cannot be selected in parameter field F (feed). 1 = feed mm/min can be selected in parameter field F (feed).					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	1	3/4

9609	**CTM_SPEED_FIELD_DISPLAY_RES**			H03	**QV:** FBMA
-	Decimal places in speed entry field			BYTE	Immediately
This MD specifies the number of decimal points in parameter field S (speed).					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	4	3/4

9610	**CTM_POS_COORDINATE_SYSTEM**			H03, H05	**QV:** FBMA
-	Position of coord. system for turning			BYTE	Immediately
Position of the coordinate system for turning (MD 9020 = 1) In the ManualTurn user interface - the help displays - the sequence diagram - and the input fields with rotation direction specifications change automatically according to the selected position. Note: When using channel-specific display machine data with MD 9014, the MD is in the NC and is thus part of an NC series startup. Consequently, it allows channel-specific inch/metric consideration.					
				840D SW 4.3, 810D SW 2.1	
MT, Adv, Emb		Emb: 2, MT: 2	0	7	3/4

9611	**CTM_CROSS_AX_DIAMETER_ON**			H02, H03, H05	**QV:** FBMA, FBT
-	Diameter display active for transv. axes			BYTE	Immediately
= 0: Inputs as radius value for absolute values Zero offsets always in radius Tool lengths always in radius Tool wear always in radius = 1: Position display in diameter Residual distance in diameter Absolute distances in diameter					
				840D SW 4.3, 810D SW 2.1, ST 6.1	
ST, MT, Emb		Emb: 1, MT: 1, ST: 1	0	1	3/4

9612	**CTM_TEACH_STORE_MANUAL_ABS**			H03	**QV:** FBMA
-	Save setup motions as absolute values			BYTE	Immediately
If the TEACH-IN function is activated, setup movements are stored as incremental/absolute values. 0 = incremental 1 = absolute					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	1	3/4

9613	CTM_TEACH_STORE_START_ABS			H03	QV: FBMA
-	Save starting position as absolute value			BYTE	Immediately
If the TEACH-IN function is activated, the start position is stored as incremental/absolute value. 0 = incremental 1 = absolute					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	1	3/4

9614	CTM_TEACH_STORE_MANUAL_AUTO			H03	QV: FBMA
-	Save setup motions automatically			BYTE	Immediately
For each direction change or stop, the traverse path is 0 = not saved 1 = saved					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	1	3/4

9615	CTM_TEACH_HANDW_FEED			H03	QV: FBMA
-	Handwheel feedrate			BYTE	Immediately
Handwheel displacements are saved with the following feed type: 0 = mm/rev 1 = mm/min 2 = as set for MANUAL operating mode					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	2	3/4

9616	CTM_TEACH_HANDW_FEED_P_MIN			H03	QV: FBMA
mm/min	Path feed			DOUBLE	Immediately
Path feed for handwheel movements which is saved if CTM_TEACH_HANDW_FEED = 0 is set.					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	1	3000	3/4

9617	CTM_TEACH_HANDW_FEED_P_REV			H03	QV: FBMA
	Revolutional feedrate			DOUBLE	Immediately
Revolutional feed for handwheel movements which becomes effective if CTM_TEACH_HANDW_FEED = 1.					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0.01	10000	3/4

9618	**CTM_ENABLE_C_AXIS**			H03	**QV:** FBMA
-	Enable C axis for interface			BYTE	Power On
0 = The C axis is not displayed in the user interface. 1 = The C axis is displayed in the user interface.					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	2	3/4

9619	**CTM_G91_DIAMETER_ON**			H02, H03, H05	**QV:** FBMA, FBT
-	Incremental infeed			BYTE	Immediately
0 = Input in radius 1 = Input in diameter					
				840D SW 4.3, 810D SW 2.1, ST 6.1	
ST, MT, Emb		Emb: 1, MT: 1, ST: 1	0	1	3/4

9620	**CTM_CYCLE_SAFETY_CLEARANCE**			H03	**QV:** FBMA
mm	Safety clearance ManualTurn cycles			DOUBLE	Immediately
This MD specifies the safety distance for all variants of the grooving and undercut cycles of the ManualTurn cycles.					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0.0	1000	3/4

9621	**CTM_CYCLE_DWELL_TIME**			H03	**QV:** FBMA
	Tool clearance time for cycles			DOUBLE	Immediately
If the tool clearance time occurs during a cycle, e.g during deep hole drilling or grooving, this MD is used. The tool clearance time is suppressed in case of a: - negative value of the spindle revolutions - positive value in seconds					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	-100	100	3/4

9622	**CTM_ENABLE_REFPOINT**			H03	**QV:** FBMA
-	Enable ref. pt. approach for ManualTurn			REAL	Immediately
Reference point approach for ManualTurn: 0 = not selected 1 = selected					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	1	3/4

9623	CTM_START_WITHOUT_REFPOINT			H03	QV: FBMA
-	Enable NC start without referenced axes			BYTE	Power On
Release NC Start 0 = NC Start release only if all axes are referenced. Exception: Ref. point approach with NC Start MANUAL operating mode 1 = NC Start release without referenced axes					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	1	3/4

9624	CTM_MODE_SELECT_BY_SOFTKEY			H03	QV: FBMA
-	Mode switchover via vertical softkeys			BYTE	Power On
Operating mode changeover if 0 = select via operating mode selector 1 = select via vertical softkeys of the operator panel					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	1	3/4

9625	CTM_CUSTOMER_START_PICTURE			H03	QV: FBMA
-	Customer start-up screen			BYTE	Power On
Boot screen is activated if 0 = Siemens boot screen 1 = Customer boot screen					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	1	3/4

9626	CTM_TRACE			H01, H02, H03	QV: FBMA
-	Testflags f. intern ManualTurn diagnosis			INTEGER	Immediately
Used for internal diagnostics and cannot be modified.					
				840D SW 4.3, 810D SW 2.1	
SM, ST, MT		MT: , SM: , ST:	0	0x7FFFFFFF	3/4

9626	CTM_TRACE			H01, H02, H03	QV: FBMA
-	Testflags f. intern ManualTurn diagnosis			INTEGER	Immediately
Used for internal diagnostics and cannot be modified.					
				840D SW 4.3, 810D SW 2.1	
SM, ST, MT		MT: , SM: , ST:	0	0x7FFFFFFF	3/4

9627	CTM_COUNT_GEAR_STEPS			H03	QV: FBMA
-	Number of gear stages			BYTE	Immediately
This MD is used to specify the number of gear stages which can be selected through the user interface.					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	5	3/4

9628	**CTM_TOOL_INPUT_DIAM_ON**			H03	**QV:** FBMA
-	Display tool data X as diameter			BYTE	Immediately
This MD is used to specify how the tool correction data X is displayed: 0 = Radius 1 = Diameter					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	1	3/4

9629	**CTM_WEAR_INPUT_DIAM_ON**			H03	**QV:** FBMA
-	Display tool wear data X diameter			BYTE	Immediately
This MD is used to specify how the tool wear data X is displayed: 0 = Radius 1 = Diameter					
				840D SW 4.3, 810D SW 2.1	
MT		MT:	0	1	3/4

9630	**CTM_FIN_FEED_PERCENT**			H02, H03	**QV:** FBMA, FBT
%	Roughing feedrate in percent			REAL	Immediately
This MD is used to enter a feedrate for the finishing procedure when selecting complete machining roughing and finishing. This feedrate corresponds to the percentage of the value entered at parameter F (feed).					
				840D SW 4.3, 810D SW 2.3, ST 6.1	
ST, MT		MT: , ST:	1	100	3/4

9631	**CTM_CYCLE_DWELL_TIME_SEC**			H03	**QV:** FBMA
	Dwell time for cycles in seconds			DOUBLE	Immediately
Indicates the dwell time for cycles (during deep hole drilling) in seconds.					
				840D SW 4.4, 810D SW 2.4	
MT		MT:	0	100	3/4

9632	**CTM_ANGLE_REFERENCE_AXIS**			H03, H05	**QV:** FBMA
-	Angle reference axis			REAL	Immediately
The reference axis of an angle can be changed in the INCLINED, CIRCULAR and CONTOUR operating modes. The direction of rotation changes, too. In the contour calculator of the CONTOUR operating mode, circular angles are dimensioned like for CAD systems.					
				840D SW 4.4, 810D SW 2.4	
MT, Emb		Emb: 1, MT: 1	0	1	3/4

9633	**CTM_INC_DEC_FEED_PER_MIN**			H03	**QV:** FBMA
mm/min	Increments for feedrate in mm/min			DOUBLE	Immediately
With this MD, you can specify the increment in mm/min which can be incremented or decremented in the feedrate input field F by actuating the plus or minus key.					
				840D SW 4.4, 810D SW 2.4	
MT		MT:	0.001	1000	3/4

9634	**CTM_INC_DEC_FEED_PER_ROT**			H03	**QV:** FBMA
mm	Increments for feedrate in mm/rev			DOUBLE	Immediately
This MD specifies the increment in mm/revolutions which can be incremented or decremented in the feedrate input field F by actuating the plus or minus key.					
				840D SW 4.4, 810D SW 2.4	
MT		MT:	0.001	10	3/4

9636	**CTM_ENABLE_S_TOOL_TABLE**			H03	**QV:** FBMA
-	Enable cutting speed from tool table			BYTE	Immediately
With this MD, you can assign a constant cutting rate to each tool in the tool table. 0=Column constant cutting rate is not available in the tool table 1=Column constant cutting rate is available in the tool table					
				840D SW 4.4, 810D SW 2.4	
MT		MT:	0	1	3/4

9637	**CTM_MAX_INP_FEED_P_MIN**			H03	**QV:** FBMA
mm/min	Upper input limit for feedrate in mm/min			DOUBLE	Immediately
This MD is used to specify the upper feedrate input limit for mm/min.					
				840D SW 4.4, 810D SW 2.4	
MT		MT:	0	100000	3/4

9638	**CTM_MAX_INP_FEED_P_ROT**			H03	**QV:** FBMA
mm	Upper input limit for feedrate in mm/rev			DOUBLE	Immediately
This MD is used to enter the upper feedrate input limit for mm/rev.					
				840D SW 4.4, 810D SW 2.4	
MT		MT:	0	10000	3/4

9639	**CTM_MAX_TOOL_WEAR**			H03, H05	**QV:** FBMA
mm	Upper limit tool wear input			DOUBLE	Power On
CTM_MAX_TOOL_WEAR specifies an abolute limit of the max. possible value of a tool wear, independently of the current protection level (keyswitch position), i.e. also independently of USER_CLASS_WRITE_TOA_WEAR. Absolute and incremental wear limiting can be combined, i.e. the wear can be changed in increments up to the absolute limit. S. MD 9450. Note: When using channel-specific display machine data with MD 9014, the MD is in the NC and is thus part of an NC series startup. Consequently, it allows channel-specific inch/metric consideration.					
				840D SW 4.4, 810D SW 2.4	
MT, Adv		MT:	0	10	3/4

9640	**CTM_ENABLE_CALC_THREAD_PITC**			H01, H02, H03	**QV:** FBMA
-	Automatic calculation of thread depth			BYTE	Immediately
This MD is used to calculate the thread depth K of an ISO thread in relation to the pitch P (mm/rev.) and the thread type (external/internal thread). 0=No calculation of the thread depth K 1= thread depth K is calculated					
				840D SW 4.4, 810D SW 2.4	
SM, ST, MT		MT: , SM: , ST:	0	1	3/4

9641	**CTM_ENABLE_G_CODE_INPUT**			H03	**QV:** FBMA
-	Enable of G code input			BYTE	Immediately
This MD serves to specify if the G code input via the ManualTurn user interface is released (Softkey G_CODE is displayed). 0=Input G code is not supported via the ManualTurn user interface. 1=Input G code is supported via the ManualTurn user interface.					
				840D SW 4.4, 810D SW 2.4	
MT		MT:	0	1	3/4

9642	**CTM_ENABLE_CIRCLE_HOLE_CYCL**			H03	**QV:** FBMA
-	Enable drilling of hole circle			BYTE	Immediately
With this MD, the user can specify if the hole circle drilling function via the ManualTurn user interface is supported (softkey HOLE CIRCLE DRILLING is displayed). 0=Hole circle drilling function is not released 1=Hole circle drilling function is released					
				840D SW 4.4, 810D SW 2.4	
MT		MT:	0	1	3/4

9643	**CTM_ENABLE_DRIVEN_TOOL**			H03	**QV:** FBMA
-	Enable support of driven tools			BYTE	Immediately
With this MD, you can define how a driven tool shall be supported. 0=No support of the driven tool (2nd spindle not controlled) 1= Support of a driven tool via PLC (2nd spindle controlled) 2= Support of a driven tool via NC ((2nd spindle closed-loop controlled)					
				840D SW 4.4, 810D SW 2.4	
MT		MT:	0	2	3/4

9644	**CTM_CIRC_TAP_DWELL_TIME_1**			H03	**QV:** FBMA
	Dwell time bottom, tapping on hole circle			DOUBLE	Immediately
The MD is required for tapping to hole circle using a controlled spindle. It serves to specify the dwell time (in s) of the tap in the final thread drilling depth.					
				840D SW 4.4, 810D SW 2.4	
MT		MT:	0	100	3/4

9645	**CTM_CIRC_TAP_DWELL_TIME_2**			H03	**QV:** FBMA
	Dwell time top, tapping on hole circle			DOUBLE	Immediately
The MD is required for tapping to hole circle using a controlled spindle. It serves to specify the dwell time (in s) of the tap in the return plane of the workpiece.					
				840D SW 4.4, 810D SW 2.4	
MT		MT:	0	100	3/4

9646	**CTM_FACTOR_O_CALC_THR_PITCH**			H01, H02, H03	**QV:** FBMA, FBT
-	Mode for retraction distance external mach			DOUBLE	Immediately
This MD specifies the conversion factor of the thread pitch in the thread depth for metric DIN external threads.					
				6.3	
SM, ST, MT		MT: , SM: , ST:	0	0	3/4

9647	**CTM_FACTOR_I_CALC_THR_PITCH**			H01, H02, H03	**QV:** FBMA, FBT
-	Mode for return dist. stock rem. int.mach.			DOUBLE	Immediately
This MD specifies the conversion factor for the pitch in the thread depth in case of metric DIN inside threads.					
				6.3	
SM, ST, MT		MT: , SM: , ST:	0	0	3/4

9648	**CTM_ROUGH_O_RELEASE_DIST**			H02, H03	**QV:** FBMA, FBT
mm	Return dist. stock rem. for ext.machining			DOUBLE	Immediately
This MD is used to enter the distance by which the tool is retracted from the outside contour with removing external machining. This does not apply for stock removal of a contour. -1= the distance is specified internally.					
				840D SW 4.4, 810D SW 2.4, ST 6.1	
ST, MT		MT: , ST:	-1	100	3/4

9649	**CTM_ROUGH_I_RELEASE_DIST**			H02, H03	**QV:** FBMA, FBT
mm	Return dist. stock rem. for int.machining			DOUBLE	Immediately
This MD is used to enter the distance by which the tool is retracted from the inside contour with removing internal machining. This does not apply to stock removal of a contour. -1= the distance is specified internally.					
				840D SW 4.4, 810D SW 2.4, ST 6.1	
ST, MT		MT: , ST:	-1	100	3/4

9650	**CMM_POS_COORDINATE_SYSTEM**			H01, H02, H05	**QV:** FBSP, FBT
-	Coordinate system position			BYTE	Immediately
Position of the coordinate system for non-turning (MD 9020 <> 1) In the ShopMill user interface - the help displays - the sequence diagram - the simulation - and the input fields with rotation direction specifications change automatically according to the selected position. Note: When using channel-specific display machine data with MD 9014, the MD is in the NC and is thus part of an NC series startup. Consequently, it allows channel-specific inch/metric consideration.					
				SW4.3 , ST 6.1	
SM, ST, Adv, Emb		Emb: 0, SM: 0, ST: 0	0	47	3/4

9651	**CMM_TOOL_MANAGEMENT**			H01, H02, H05	**QV:** FBSP, FBT
-	Tool management concept			BYTE	Power On
Selects from two tool management versions (see section Tool Management): 2: Tool management without loading/unloading 4: Tool management with loading/unloading					
				6.1, ST 6.1	
SM, ST, Adv, Emb		Emb: 4, SM: 4, ST: 4	1	4	3/4

9652	**CMM_TOOL_LIFE_CONTROL**			H01, H02, H05	**QV:** FBSP, FBT
-	Tool monitoring			BYTE	Power On
With this MD you can enable the tool monitoring. Tool monitoring consists of tool life monitoring and tool loading monitoring: 0 = tool monitoring is not displayed 1 = tool monitoring is displayed					
				6.1	
SM, ST, Adv, Emb		Emb: 1, SM: 1, ST: 1	0	1	3/4

9653	**CMM_ENABLE_A_AXIS**			H01	**QV:** FBSP
-	Enable 4th axis for user interface			BYTE	Immediately
Release 4th axis (e.g. A axis) for user interface: 0 = 4th axis is not displayed in the user interface 1 = 4th axis is displayed in the user interface 2 = 4th axis is displayed in the user interface and can be programmed 3 = 4th axis is displayed in the user interface only during reference point approach					
				840D SW 4.3, 810D SW 2.3	
SM		SM:	0	3	3/4

9654	**CMM_SPEED_FIELD_DISPLAY_RES**			H01, H02	**QV:** FBSP, FBT
-	Decimal places in speed entry field			BYTE	Immediately
This MD specifies the number of decimal places in parameter field S (speed).					
				840D SW 4.3, 810D SW 2.3, ST 6.1	
SM, ST		SM: , ST:	0	4	3/4

9655	**CMM_CYC_PECKING_DIST**			H01	**QV:** FBSP
mm	Amount of retract.for deep hole drilling			DOUBLE	Immediately
This MD specifies the amount of retraction during deep hole drilling with chip breakage.					
				840D SW 4.3, 810D SW 2.3	
SM		SM:	-1.0	100.0	3/4

9656	**CMM_CYC_DRILL_RELEASE_DIST**			H01, H02	**QV:** FBSP
mm	Amount of retraction for boring			DOUBLE	Immediately
This MD determines the amount by which the tool retracts in the X direction while a hole is drilled. Note: -1 means that the value of the amount of retraction D can be entered into the user interface.					
				840D SW 4.3, 810D SW 2.3	
SM, ST		SM: , ST:	-1.0	10.0	3/4

9657	**CMM_CYC_MIN_CONT_PO_TO_RAD**			H01, H02	**QV:** FBSP, FBT
%	Deviation from minimum cutter radius			REAL	Immediately
This MD is required for contour pocket milling. This parameter specifies by which percentage the radius of a milling tool in operation may be smaller than the radius used for generation.					
				840D SW 4.3, 810D SW 2.3, ST 6.1	
SM, ST		SM: , ST:	0	50	3/4

9658	**CMM_CYC_MAX_CONT_PO_TO_RAD**			H01, H02	**QV:** FBSP, FBT
mm	Deviation from maximum cutter radius			DOUBLE	Immediately
This MD is required for contour pocket milling. This parameter specifies by which amount the radius of a milling tool in operation may be greater than the radius used for generation.					
				840D SW 4.3, 810D SW 2.3, ST 6.1	
SM, ST		SM: , ST:	0.0	10	3/4

9659	**CMM_CYC_DRILL_RELEASE_ANGLE**			H01	**QV:** FBSP
degrees	Retraction angle for boring			DOUBLE	Immediately
This MD specifies at which spindle position (0...360 0) the tool, e.g. a turning tool, comes to standstill in a bore hole. Note: -1 means that the value of the tool orientation angle can be entered in the user interface.					
				840D SW 4.3, 810D SW 2.3	
SM		SM:	-1.0	360.0	3/4

9660	**CMM_ENABLE_PLANE_CHANGE**			H01	**QV:** FBSP
-	Switch to machining plane			BYTE	Immediately
Release switching to machining level (G17, G18, G19): 0 = Changeover to machining level (G17, G18, G19) not possible 1 = Changeover to machining level (G17, G18, G19) possible					
				840D SW 4.3, 810D SW 2.3	
SM		SM:	0	1	3/4

9662	**CMM_COUNT_GEAR_STEPS**			H01	**QV:** FBSP
-	Number of gear stages			BYTE	Immediately
This MD is used to specify the number of gear levels (0 to 5) for the spindle. The input options via the user interface are restricted in this way.					
				840D SW 4.3, 810D SW 2.3	
SM		SM:	0	5	3/4

9663	**CMM_TOOL_DISPLAY_IN_DIAM**			H01, H02, H05	**QV:** FBSP, FBT
-	Display of radius/diameter for tool			BYTE	Power On
This MD specifies how the tool is displayed or entered: 0 = Radius 1 = Diameter					
				840D SW 4.3, 810D SW 2.3, ST 6.1	
SM, ST, Adv, Emb		Emb: 1, SM: 1, ST: 1	0	1	3/4

9664	**CMM_MAX_INP_FEED_P_MIN**			H01, H02	**QV:** FBSP, FBT
mm/min	Feedrate in mm/min			DOUBLE	Immediately
This MD specifies the upper feedrate input limit for mm/min.					
				840D SW 4.3, 810D SW 2.3, ST 6.1	
SM, ST		SM: , ST:	0	100000	3/4

9665	**CMM_MAX_INP_FEED_P_ROT**			H01, H02	**QV:** FBSP, FBT
	Feedrate in mm/rev			DOUBLE	Immediately
This MD specifies the upper feedrate input limit for mm/revolutions.					
				840D SW 4.3, 810D SW 2.3, ST 6.1	
SM, ST		SM: , ST:	0	10	3/4

9666	**CMM_MAX_INP_FEED_P_TOOTH**			H01, H02	**QV:** FBSP, FBT
	Feedrate in mm/tooth			DOUBLE	Immediately
This MD specifies the upper feedrate input limit for mm/tooth.					
				840D SW 4.3, 810D SW 2.3, ST 6.1	
SM, ST		SM: , ST:	0	5	3/4

9667	**CMM_FOLLOW_ON_TOOL_ACTIVE**			H01, H02	**QV:** FBSP, FBT
-	Tool preselection active			BYTE	Immediately
This machine data is used to specify if a tool preselection is active in a magazine (e.g. chain magazine), i.e. before a tool change, the follow-on tool is already taken to the loading station. 0 = tool preselection not active 1 = tool preselection active Note ST: No tool preselection is possible for a turret, i.e. the MD must be set to 0.					
				840D SW 4.3, 810D SW 2.3, ST 6.1	
SM, ST		SM: , ST:	0	1	3/4

9668	**CMM_M_CODE_COOLANT_I_AND_II**			H01, H02	**QV:** FBSP, FBT
-	M code coolants I and II			INTEGER	Immediately
This machine data specifies the M code if coolant I and II are selected simultaneously in the tool list. Value: -1 = no M code xy = Mxy for coolant I and II (xy = value of MD 9668)					
				840D SW 4.4, 810D SW 2.4, ST 6.1	
SM, ST		SM: , ST:	-1	32767	3/4

9669	**CMM_FACE_MILL_EFF_TOOL_DIAM**			H01, H02	**QV:** FBSP
%	Effective mill diameter for face milling			DOUBLE	Immediately
For face milling, this MD specifies the actual miller diameter. Via the d/D > MD 9669 ratio (d = cut diameter, D = greater than miller diameter), you can determine to what extent the miller travels beyond the workpiece during face milling.					
				840D SW 4.4, 810D SW 2.4	
SM, ST		SM: , ST:	50.0	100.0	3/4

9670	**CMM_START_RAD_CONTOUR_POCKE**			H01, H02	**QV:** FBSP, FBT
mm	Approach circle rad. finish. cont. pock.			DOUBLE	Immediately
This MD influences the radius of the approach circle during finishing of contour pockets. -1 = The specified radius must ensure that the safety distance to the finishing allowance is obeyed in the start point. >0 = The specified radius must ensure that the value of this MD to the finishing allowance is obeyed in the start point.					
				840D SW 4.4, 810D SW 2.4, ST 6.1	
SM, ST		SM: , ST:	-1.0	100.0	3/4

9671	**CMM_TOOL_LOAD_DEFAULT_MAG**			H01, H02	**QV:** FBSP
-	Load default magazine tool			BYTE	Power On
Default magazine for loading tools 0 = w/o default magazine					
				6.4	
SM, ST		SM: , ST:	0	30	3/4

9672	**CMM_FIXED_TOOL_PLACE**			H01, H02, H05	**QV:** FBSP, FBT
-	Fixed location coding			BYTE	Power On
This MD specifies the status of the tools: 0 = Tools with variable location coding in the magazine 1 = Tools with fixed location coding in the magazine Note ST: If a turret is used, the tools are always assigned to a fixed position, i.e. the MD must be set to 1. Note: If channel-specific machine data is used with MD 9014, the MD is in the NC and thus part of an NC series startup. Consequently, it allows channel-specific inch/metric consideration.					
				840D SW 4.4, 810D SW 2.4, ST 6.1	
SM, ST, Adv, Emb		Emb: 0, SM: 0, ST: 0	0	1	3/4

9673	**CMM_TOOL_LOAD_STATION**			H01, H02, H05	**QV:** FBSP, FBT
-	Number of load station			BYTE	Power On
This MD specifies at which loading station the magazine shall be loaded and unloaded. 1 = loading station 1 2 = loading station 2 Note: If channel-specific display machine data are used with MD 9014, the MD is in the NC and thus part of an NC series startup. Consequently, it allows channel-specific inch/metric consideration.					
				840D SW 4.4, 810D SW 2.4, ST 6.1	
SM, ST, Adv, Emb		Emb: 1, SM: 1, ST: 1	1	2	3/4

9674	**CMM_ENABLE_TOOL_MAGAZINE**			H01, H02, H05	**QV:** FBSP, FBT
-	Display of magazine list			BYTE	Power On
0 = Magazine list is not displayed 1 = Magazine list is displayed					
				840D SW 4.4, 810D SW 2.4, ST 6.1	
SM, ST, Adv, Emb		Emb: 1, SM: 1, ST: 1	0	1	3/4

9675	**CMM_CUSTOMER_START_PICTURE**			H01, H02	**QV:** FBSP, FBT
-	Customer start-up screen			BYTE	Immediately
The customer boot screen is activated if 0 = Siemens customer boot screen 1 = customer boot screen of the customer					
				840D SW 4.4, 810D SW 2.4 mit SM	
SM, ST		SM: , ST:	0	1	3/4

9676	**CMM_DIRECTORY_SOFTKEY_PATH1**			H01, H02, H05	**QV:** FBSP, FBT
-	Path to drive names in directory manag.			STRING	Power On
With this machine data you define the path for the drive name of the second softkey (horizontal softkey bar) in the directory management with hard disk network link. This softkey is not implemented if an empty string is entered in the machine data display.					
				840D SW 4.4, 810D SW 2.4 mit SM	
SM, ST, Adv, Emb		Emb: 0, SM: , ST:	0	0	3/4

9677	**CMM_DIRECTORY_SOFTKEY_PATH2**			H01, H02, H05	**QV:** FBSP, FBT
-	Path to drive names in directory manag.			STRING	Power On
With this machine data you define the path for the drive name of the third softkey (horizontal softkey bar) in the directory management with hard disk network link. If an empty string is entered in the machine data display the softkey is not implemented.					
				840D SW 4.4, 810D SW 2.4 mit SM	
SM, ST, Adv, Emb		Emb: 0, SM: , ST:	0	0	3/4

9678	**CMM_DIRECTORY_SOFTKEY_PATH3**			H01, H02, H05	**QV:** FBSP, FBT
-	Path to drive names in directory manag.			STRING	Power On
With this machine data you define the path for the drive name of the fourth softkey (horizontal softkey bar) in the directory management with hard disk network link. If an empty string is entered in the machine data display the softkey is not implemented.					
				840D SW 4.4, 810D SW 2.4 mit SM	
SM, ST, Adv, Emb		Emb: 0, SM: , ST:	0	0	3/4

9679	**CMM_DIRECTORY_SOFTKEY_PATH4**			H01, H02, H05	**QV:** FBSP, FBT
-	Path to drive names in directory manag.			STRING	Power On
With this machine data you define the path for the drive name of the fifth softkey (horizontal softkey bar) in the directory management with hard disk network link. If an empty string is entered in the machine data display the softkey is not implemented.					
				840D SW 4.4, 810D SW 2.4 mit SM	
SM, ST, Adv, Emb		Emb: 0, SM: , ST:	0	0	3/4

9680	**CMM_M_CODE_COOLANT_I**			H01, H02	**QV:** FBSP
-	M code coolant I			INTEGER	Immediately
This MD specifies the M code of coolant I. This code is output during tool change.					
				840D SW 4.4, 810D SW 2.4 mit SM	
SM, ST		SM: , ST:	0	32767	3/4

9681	**CMM_M_CODE_COOLANT_II**			H01, H02	**QV:** FBSP
-	M code coolant II			INTEGER	Immediately
This MD specifies the M code of coolant II. This code is output during tool change.					
				840D SW 4.4, 810D SW 2.4 mit SM	
SM, ST		SM: , ST:	0	32767	3/4

9682	**CMM_CYC_BGF_BORE_DIST**			H01	**QV:** FBSP
mm	Mode for return value boring			DOUBLE	Immediately
This MD specifies the preboring depth for drill and thread milling.					
				6.3	
SM		SM:	0.0	100.0	3/4

9686	**CMM_M_CODE_COOLANT_OFF**			H01, H02	**QV:** BAS
-	M code for coolant OFF			INTEGER	Immediately
M code for coolant off					
				6.3	
SM, ST		SM: , ST:	0	32767	3/4

9687	**CMM_TOOL_MOVE_DEFAULT_MAG**			H01, H02	**QV:** FBSP
-	Relocate default magazine tool			BYTE	Power On
Default magazine for relocating tools 0 = w/o default magazine					
				6.4	
SM, ST		SM: , ST:	0	30	3/4

9688	**CMM_COUNT_GEAR_STEPS_S2**			H01	**QV:**
-	Number of gear stages for 2nd spindle			BYTE	Immediately
Number of gear stages for the 2nd spindle (spindle attachment)					
SM		SM:	0	5	3/4

9690	**CMM_OEM_FUNCTION_MASK_1**			H01	**QV:** BAS
-	OEM display machine data 1			INTEGER	Immediately
OEM display machine data 1					
				6.2	
SM		SM:	0	0	6/6

9691	**CMM_OEM_FUNCTION_MASK_2**			H01	**QV:** BAS
-	OEM display machine data 2			INTEGER	Immediately
OEM display machine data 2					
				6.2	
SM		SM:	0	0	6/6

9703	**CMM_INDEX_AXIS_4**			H01	**QV:** FBSP
-	Axis index for 4th axis			BYTE	Immediately
This MD is used to enter the number of the channel axis.					
				840D SW 5.3, 810D SW 3.3	
SM		SM:	0	127	3/4

9704	**CMM_INDEX_AXIS_5**			H01	**QV:** FBSP
-	Axis index for 5th axis			BYTE	Immediately
This MD is used to enter the number of the channel axis.					
				840D SW 5.3, 810D SW 3.3	
SM		SM:	0	127	3/4

9705	**CMM_INDEX_SPINDLE**			H01	**QV:** FBSP
-	Axis index for spindle			BYTE	Immediately
This MD is used to enter the number of the channel axis.					
				840D SW 5.3, 810D SW 3.3	
SM		SM:	1	127	3/4

9706	**CMM_GEOAX_ASSIGN_AXIS_4**			H01	**QV:** FBSP
-	Fourth axis assigned to geometry axis			BYTE	Immediately
Assignment of the 4th axis to a geometry axis: 0 = w/o assignment 1 = 4th axis in the direction of the first geometry axis (X) -> A axis 2 = 4th axis in the direction of the second geometry axis (Y) -> B axis 3 = 4th axis in the direction of the third geometry axis (Z) -> C axis					
				6.4	
SM		SM:	0	6	3/4

9707	**CMM_GEOAX_ASSIGN_AXIS_5**			H01	**QV:** FBSP
-	Fifth axis assigned to geometry axis			BYTE	Immediately
Assignment of the 5th axis to a geometry axis: 0 = w/o assignment 1 = 5th axis in the direction of the first geometry axis (X) -> A axis 2 = 5th axis in the direction of the second geometry axis (Y) -> B axis 3 = 5th axis in the direction of the third geometry axis (Z) -> C axis					
				6.4	
SM		SM:	0	6	3/4

9708	**CMM_INDEX_SPINDLE_2**			H01	**QV:**
-	Axis index for 2nd spindle			BYTE	Immediately
Axis index for a 2nd spindle (spindle attachment)					
SM		SM:	1	127	3/4

9718	**CMM_OPTION_MASK_2**			H01, H02	**QV:** FBSP, FBT
-	Settings for ShopMill 2			INTEGER	Immediately
Bit 0: Do not jump to the Automatic mode, when a program is selected externally (i.e. via PLC) for processing.					
				6.3	
SM, ST		SM: , ST:	0	0	2/2

9719	**CMM_OPTION_MASK**			H01, H02	**QV:** FBSP
-	Settings for ShopMill			INTEGER	Immediately
Bit 0: display softkey ShopMill when creating new programs. Bit 1: reserved Bit 2: MDA buffer is not deleted automatically. Bit 3: reserved Bit 4: reserved Bit 5: reserved Bit 6: reserved Bit 7: reserved Bit 8: reserved Bit 12: Swivel: Display parameter Hold tool tip. Bit 13: Swivel: Display swivel variant Solid angle. Bit 14: Swivel: Display swivel variant Projection angle.					
				840D SW 5.3, 810D SW 3.3	
SM, ST		SM: , ST:	0	0	2/2

9720	**CMM_ENABLE_B_AXIS**			H01	**QV:** FBSP
-	Enable B axis			BYTE	Immediately
Release 5th axis (e.g. B axis) for user interface: 0 = 5th axis is not displayed in the user interface 1 = 5th axis is displayed in the user interface 2 = 5th axis is displayed in the user interface and can be programmed 3 = 5th axis is displayed in the user interface only during reference point approach					
				840D SW 4.4, 810D SW 2.4 mit SM	
SM		SM:	0	3	3/4

9721	**CMM_ENABLE_TRACYL**			H01	**QV:** FBSP
-	Enable cylinder periph. transformation			BYTE	Immediately
Proceed as follows to activate the cylinder surface transformation function via the user interface: 0 = The cylinder surface transformation function is not displayed in the user interface 1 = The cylinder surface transformation function is displayed in the user interface The cylinder surface transformation function can only be used if the function has been set up in the standard. Reference: /FB2/, M1, Kinematic Transformation					
				840D SW 4.4, 810D SW 2.4 mit SM	
SM		SM:	0	1	3/4

9723	**CMM_ENABLE_SWIVELLING_HEAD**			H01, H02	**QV:** FBSP
-	Enable inclinable heads			BYTE	Immediately
This MD specifies if inclinable heads can be used with the machine. 0= No screens are offered for supporting inclinable heads. 1= Screens supporting inclinable heads are offered.					
				840D SW 4.4, 810D SW 2.4 mit SM	
SM, ST		SM: , ST:	0	1	3/4

9724	**CMM_CIRCLE_RAPID_FEED**			H01, H02	**QV:** FBT
mm/min	Rap. trav. feed positioning on circle path			DOUBLE	Immediately
This MD specifies the rapid feed in mm/min for positioning on the circular path.					
				840D SW 6.1, 810D SW 4.1	
SM, ST		SM: , ST:	0	100000	3/4

9725	**CMM_ENABLE_QUICK_M_CODES**			H01, H02	**QV:** FBSP
-	Enable fast M functions			BYTE	Immediately
Enable quick M functions: Bit 0: coolant 1 on Bit 1: coolant 2 on Bit 2: coolants 1 and 2 on Bit 3: coolant off					
				6.4	
SM, ST		SM: , ST:	0	0	3/4

9725	**CMM_ENABLE_QUICK_M_CODES**			H01, H02	**QV:** FBSP
-	Enable fast M functions			BYTE	Immediately
Enable quick M functions: Bit 0: coolant 1 on Bit 1: coolant 2 on Bit 2: coolants 1 and 2 on Bit 3: coolant off					
				6.4	
SM, ST		SM: , ST:	0	0	3/4

9726	**CMM_DISPLAY_MD_IS_METRIC**			H01, H02	**QV:** FBSP
-	Display machine data unit (inch/mm)			BYTE	Immediately
Current unit of display machine data: (automatically adapted with inch/metric changeover) 0 = inch 1 = mm					
				6.4	
SM, ST		SM: , ST:	0	0	3/4

9727	**CMM_ENABLE_POS_A_B_AXIS**			H01	**QV:** FBSP
-	A/B axis support enable			BYTE	Immediately
Enable support for A/B axis with angular values for position patterns: 0 = Function not activated >0 = Function activated (amount = number of channel axis A) <0 = Function activated (amount = number of channel axis B)					
				6.4	
SM		SM:	0	0	3/4

9728	**CMM_DISPL_DIR_A_B_AXIS_INV**			H01	**QV:** FBSP
-	Direction of rotation of A/B axis adjusted			BYTE	Immediately
Inversion of the rotational direction to display the A/B axis on the interface					
				6.4	
SM		SM:	0	1	3/4

9729	**CMM_G_CODE_TOOL_CHANGE_PROG**			H01, H02	**QV:** FBSP
-	Tool change program in G code			STRING	Immediately
Program called up with tool change in the G code					
				6.4	
SM, ST		SM: , ST:	0	0	3/4

9739	**CMM_M_CODE_TOOL_FUNC_1_ON**			H01	**QV:** FBST
-	M code for tool-specific function 1 ON			INTEGER	Immediately
M code for tool-specific function 1 ON The value -1 means that the M function is not output. If both M functions of a function are -1, the relevant interface array is not displayed.					
SM		SM:	-1	32767	3/4

9740	**CMM_M_CODE_TOOL_FUNC_1_OFF**			H01	**QV:** FBST
-	M code for tool-specific function 1 OFF			INTEGER	Immediately
M code for tool-specific function 1 OFF The value -1 means that the M function is not output. If both M functions of a function are -1, the relevant interface array is not displayed.					
SM		SM:	-1	32767	3/4

9741	**CMM_M_CODE_TOOL_FUNC_2_ON**			H01	**QV:** FBSP
-	M code for tool-specific function 2 ON			INTEGER	Immediately
M code for tool-specific function 2 ON The value -1 means that the M function is not output. If both M functions of a function are -1, the relevant interface array is not displayed.					
SM		SM:	-1	32767	3/4

9742	**CMM_M_CODE_TOOL_FUNC_2_OFF**			H01	**QV:** FBSP
-	M code for tool-specific function 2 OFF			INTEGER	Immediately
M code for tool-specific function 2 OFF The value -1 means that the M function is not output. If both M functions of a function are -1, the relevant interface array is not displayed.					
SM		SM:	-1	32767	3/4

9743	**CMM_M_CODE_TOOL_FUNC_3_ON**			H01	**QV:** FBST
-	M code for tool-specific function 3 ON			INTEGER	Immediately
M code for tool-specific function 3 ON The value -1 means that the M function is not output. If both M functions of a function are -1, the relevant interface array is not displayed.					
SM		SM:	-1	32767	3/4

9744	**CMM_M_CODE_TOOL_FUNC_3_OFF**			H01	**QV:** FBST
-	M code for tool-specific function 3 OFF			INTEGER	Immediately
M code for tool-specific function 3 OFF The value -1 means that the M function is not output. If both M functions of a function are -1, the relevant interface array is not displayed.					
SM		SM:	-1	32767	3/4

9745	**CMM_M_CODE_TOOL_FUNC_4_ON**			H01	**QV:** FBST
-	M code for tool-specific function 4 ON			INTEGER	Immediately
M code for tool-specific function 4 ON The value -1 means that the M function is not output. If both M functions of a function are -1, the relevant interface array is not displayed.					
SM		SM:	-1	32767	3/4

9746	**CMM_M_CODE_TOOL_FUNC_4_OFF**			H01	**QV:** FBST
-	M code for tool-specific function 4 OFF			INTEGER	Immediately
M code for tool-specific function 4 OFF The value -1 means that the M function is not output. If both M functions of a function are -1, the relevant interface array is not displayed.					
SM		SM:	-1	32767	3/4

9747	**CMM_ENABLE_MEAS_AUTO**			H01	**QV:**
-	Automatic workpiece measurement enable			BYTE	Immediately
Automatic workpiece measurement enabled					
				7.1	
SM		SM:	0	1	3/4

9748	**CMM_MKS_POSITION_MAN_MEAS**			H01	**QV:** FBSP
mm	Posit. of man. tool meas. with fixed point			DOUBLE	Immediately
Machine position for manual tool measurement with fixed point (MD can also be preset by adjustment of fixed point)					
				6.4	
SM		SM:	0	0	3/4

9749	**CMM_ENABLE_MEAS_T_AUTO**			H01, H02	**QV:** FBSP, FBT
-	Enable automatic tool measuring			INTEGER	Immediately
With this MD you release the Automatic tool measurement function.					
				6.3	
SM, ST		SM: , ST:	0	1	3/4

9750	**CMM_MEAS_PROBE_INPUT**			H01, H02	**QV:** FBSP, FBT
-	Measuring input for workpiece probe			REAL	Immediately
This MD specifies the measuring input for a workpiece probe. 0 = Measuring input 1 activated 1 = Measuring input 2 activated					
				6.3	
SM, ST		SM: , ST:	0	1	3/4

9751	**CMM_MEAS_T_PROBE_INPUT**			H01, H02	**QV:** FBSP, FBT
-	Measuring input for tool probe			REAL	Immediately
This MD specifies the measuring input for a tool probe. 0 = Measuring input 1 activated 1 = Measuring input 2 activated					
				6.3	
SM, ST		SM: , ST:	0	1	3/4

9752	**CMM_MEASURING_DISTANCE**			H01, H02	**QV:** FBSP, FBT
mm	Max. meas. dist. f. workp. meas. in progr.			DOUBLE	Immediately
This MD specifies the max. measurement path before and after the switching position to be expected (workpiece edge) during workpiece measurement in the program. If no switching signal is transmitted within the range, the error message Probe does not respond is displayed.					
				6.3	
SM, ST		SM: , ST:	1	1000	3/4

9753	**CMM_MEAS_DIST_MAN**			H01, H02	**QV:** FBSP, FBT
mm	Max. meas. dist. f. manual workp. meas.			DOUBLE	Immediately
This MD specifies the max. measurement path before and after the switching position to be expected (workpiece edge) during workpiece measurement in the manual mode. If no switching signal is transmitted within the range, the error message Probe does nor respond is displayed.					
				6.3	
SM, ST		SM: , ST:	0.01	1000	3/4

9754	**CMM_MEAS_DIST_TOOL_LENGTH**			H01, H02	**QV:** FBSP, FBT
mm	Max. meas. dist. f. tool lgth rotat. spin.			DOUBLE	Immediately
This MD specifies the max. measurement path before and after the switching position to be expected (tool length) during tool length measurement with a rotating spindle. If no switching signal is transmitted within the range, the error message Probe does not respond is displayed.					
				6.3	
SM, ST		SM: , ST:	0.001	1000	3/4

9755	**CMM_MEAS_DIST_TOOL_RADIUS**			H01, H02	**QV:** FBSP, FBT
mm	Max. meas. dist. f. tool rad. rotat. spin.			DOUBLE	Immediately
This MD specifies the max. measurement path before and after the switching position to be expected (tool radius) during tool radius measurement in the program. If no switching signal is transmitted within the range, the error message Probe does not respond is displayed.					
				6.3	
SM, ST		SM: , ST:	0.001	1000	3/4

9756	**CMM_MEASURING_FEED**			H01, H02	**QV:** FBSP, FBT
mm/min	Meas. feedrate f. workpiece meas.			DOUBLE	Immediately
This MD specifies the measuring feed during workpiece measurement.					
				6.3	
SM, ST		SM: , ST:	10	5000	3/4

9757	**CMM_FEED_WITH_COLL_CTRL**			H01, H02	**QV:** FBSP, FBT
mm/min	Plane feed with collision detection			DOUBLE	Immediately
To protect the measuring probe, intermediate positionings in the plane are traversed as measuring sets for collision detection with this feed. This feed must be selected to ensure that the max. deflection of the measuring probe is not exceeded in case of a collision.					
				6.3	
SM, ST		SM: , ST:	10	5000	3/4

9758	**CMM_POS_FEED_WITH_COLL_CTRL**			H01, H02	**QV:** FBSP, FBT
mm/min	Infeed rate with collision detection			DOUBLE	Immediately
To protect the measuring probe, intermediate positionings in the tool axis are traversed as measuring sets for collision detection with this feed. This feed must be selected to ensure that the max. deflection of the measuring probe is not exceeded in case of a collision.					
				6.3	
SM, ST		SM: , ST:	10	5000	3/4

9759	**CMM_MAX_CIRC_SPEED_ROT_SP**			H01, H02	**QV:** FBSP, FBT
	Max.periph.speed f.tool meas.w.rot.spin.			DOUBLE	Immediately
This MD specifies the max. permissible grinding wheel surface speed of the tools to be measured during tool measuring with a rotating spindle. Depending on the MD, the admissible spindle speed is calculated during tool measuring. The measurement is then performed with this speed.					
				6.3	
SM, ST		SM: , ST:	1	200	3/4

9760	**CMM_MAX_SPIND_SPEED_ROT_SP**			H01, H02	**QV:** FBSP, FBT
	Max. speed f. tool meas. w. rot. spindle			DOUBLE	Immediately
This MD specifies the max. permissible speed of the tools to be measured during tool measurement with a rotating spindle.					
				6.3	
SM, ST		SM: , ST:	100	25000	3/4

9761	**CMM_MIN_FEED_ROT_SP**			H01, H02	**QV:** FBSP, FBT
mm/min	Min. feedr. f. tool meas. w. rot.spindle			DOUBLE	Immediately
This MD specifies the minimum feed during tool measurement with a rotating spindle. Otherwise, a very small feed results for tools with a very large radius and a high measuring accuracy requested.					
				6.3	
SM, ST		SM: , ST:	1	1000	3/4

9762	**CMM_MEAS_TOL_ROT_SP**			H01, H02	**QV:** FBSP, FBT
mm	Meas. acc. f. tool meas. w. rot. spindle			DOUBLE	Immediately
This MD specifies the measuring accuracy desired during tool measurement with a rotating spindle.					
				6.3	
SM, ST		SM: , ST:	0.001	1	3/4

9763	**CMM_TOOL_PROBE_TYPE**			H01, H02	**QV:** FBSP, FBT
-	Type of tool probe			REAL	Immediately
This MD specifies the type of the tool probe. 0 = Measuring cube 101 = measuring disk in XY (1st and 2nd geometry axis) 201 = measuring disk in ZX (3rd and 1st geometry axis) 301 = measuring disk in YZ (2nd and 3rd geometry axis)					
				6.3	
SM, ST		SM: , ST:	0	999	3/4

9764	**CMM_TOOL_PROBE_ALLOW_AXIS**			H01, H02	**QV:** FBSP, FBT
-	Permiss. axis direct. tool probe			REAL	Immediately
This MD specifies the permissible axes and axis directions in which measurements can be performed on the tool probe. The value to be indicated is composed of ZYX. On of the following attributes can be indicated for each axis: 0 = not possible 1 = in negative direction only 2 = in positive direction only 3 = in both directions Application example: Default setting 133 means: 1st number (1): Measuring in Z only possible in negative direction 2nd number (3): Measuring in Y in both directions possible 3rd number (3): Measuring in X in both directions possible					
				6.3	
SM, ST		SM: , ST:	0	333	3/4

9765	**CMM_T_PROBE_DIAM_LENGTH_MEA**			H01, H02	**QV:** FBSP, FBT
mm	Dia. of tool probe f. length measurement			DOUBLE	Immediately
This MD specifies the effective diameter or the effective edge of the tool probe for tool length measurement.					
				6.3	
SM, ST		SM: , ST:	0	100000	3/4

9766	**CMM_T_PROBE_DIAM_RAD_MEAS**			H01, H02	**QV:** FBSP, FBT
mm	Dia. of tool probe f. radius measurement			DOUBLE	Immediately
This MD specifies the effective diameter or the effective edge of the tool probe for radius measurement.					
				6.3	
SM, ST		SM: , ST:	0	100000	3/4

9767	**CMM_T_PROBE_DIST_RAD_MEAS**			H01, H02	**QV:** FBSP, FBT
mm	Infeed f.top edge of t-probe f.rad.meas.			DOUBLE	Immediately
This MD specifies the distance between the tool measurement probe upper edge and the tool lower edge for radius measurement.					
				6.3	
SM, ST		SM: , ST:	0	100000	3/4

9768	**CMM_T_PROBE_APPROACH_DIR**			H01, H02	**QV:** FBSP, FBT
-	Plane approach dir. tool probe			BYTE	Immediately
This MD specifies the direction of approach in the plane, in which the tool approaches the tool probe. -1 = 1st plane axis in negative direction +1 = 1st plane axis in positive direction -2 = 2nd plane axis in negative direction +2 = 2nd plane axis in positive direction					
				6.3	
SM, ST		SM: , ST:	-2	2	3/4

9769	**CMM_FEED_FACTOR_1_ROT_SP**			H01, H02	**QV:** FBSP
-	Feedrate fact. 1 tool meas. w. rot. spin.			DOUBLE	Immediately
Feedrate factor for 1st measuring procedure during tool measuring with rotating spindle 0: Only measured once >0: 1st measuring procedure with measuring feedrate * factor 1 2nd measuring procedure with measuring feedrate					
				6.3	
SM, ST		SM: , ST:	0	100	3/4

9770	**CMM_FEED_FACTOR_2_ROT_SP**			H01, H02	**QV:** FBSP
-	Feedrate fact. 2 tool meas. w. rot. spin.			DOUBLE	Immediately
Feedrate factor for 2nd measuring procedure during tool measuring with rotating spindle This factor is only effective if CMM_FEED_FACTOR_1_ROT_SP > 0. It should be smaller than CMM_FEED_FACTOR_1_ROT_SP. 0: It should be measured only twice (see CMM_FEED_FACTOR_1_ROT_SP) >0: 1st measuring procedure with measuring feed * factor 1 2nd measuring procedure with measuring feed * factor 2 3rd measuring procedure with measuring feed					
				6.3	
SM, ST		SM: , ST:	0	50	3/4

9771	**CMM_MAX_FEED_ROT_SP**			H01, H02	**QV:** FBSP
mm/min	Max. feedr. f. tool meas. w. rot. spindle			DOUBLE	Immediately
Maximum feed during tool measuring with rotating spindle [mm/min]					
				6.3	
SM, ST		SM: , ST:	1	1000	3/4

9772	**CMM_T_PROBE_MEASURING_DIST**			H01, H02	**QV:** FBSP
mm	Meas.dist. f. tool meas. w. non-rot. spin.			DOUBLE	Immediately
Measuring path during tool measuring and calibration Tool probe with stationary spindle					
				6.3	
SM, ST		SM: , ST:	0.01	1000	3/4

9773	**CMM_T_PROBE_MEASURING_FEED**			H01, H02	**QV:** FBSP
mm/min	Feedrate f. tool meas. w. non-rot. spindle			DOUBLE	Immediately
Feed during tool measurement and calibration Tool probe with stationary spindle [mm/min]					
				6.3	
SM, ST		SM: , ST:	10	5000	3/4

9774	**CMM_T_PROBE_MANUFACTURER**			H01, H02	**QV:** FBSP
-	Tool probe manufacturer			INTEGER	Immediately
Tool probe manufacturer 0 no information 1 Heidenhain 2 Renishaw					
				6.3	
SM, ST		SM: , ST:	0	2	3/4

9775	**CMM_T_PROBE_OFFSET**			H01, H02	**QV:** FBSP
-	Tool meas. offset w. rot. spindle			INTEGER	Immediately
Correction during tool measurement with rotating spindle 0 no correction 1 automatic correction (internal correction in case of Heidenhain and Renishaw) 2 Correction via user-defined correction data (also when Heidenhain or Renishaw indicated)					
				6.3	
SM, ST		SM: , ST:	0	2	3/4

9776	**CMM_MEAS_SETTINGS**			H01, H02	**QV:** FBSP
-	Settings for measuring cycles			INTEGER	Immediately
Settings for measuring cycles: Bit 0: 0 = probe rotated to a defined initial position via SPOS in the cycle with tool measurement 1 = user specifies the spindle position e.g. via CYCLE198; the spindle is not positioned in the shell cycle except when calibrating with E_MS_CAL where the probe is rotated only through 180 related to the spindle position found.					
				6.4	
SM, ST		SM: , ST:	0	0	3/4

9777	**CMM_ENABLE_TIME_DISPLAY**			H01	**QV:** FBSP
-	Time display enable			BYTE	Immediately
Release of the displays in the timers status display. Bit coding MD9777 - CMM_ENABLE_TIME_DISPLAY: Bit 0 = 1 - Display estimated remaining program execution time Bit 1 = 1 - Display time Bit 2 = 1 - Display date Bit 3 = 1 - Display machine runtime Bit 4 = 1 - Display machining time Bit 5 = 1 - Display utilization					
				6.4	
SM		SM:	0	0	3/4

9778	**CMM_MEAS_PROBE_SOUTH_POLE**			H01	**QV:** FBST
-	Probe length in relation to the lower edge			BYTE	Immediately
Reference point for tool probe length: 0 = Ball center 1 = Bottom edge of ball (South Pole)					
SM		SM:	0	1	3/4

9779	**CMM_MEAS_PROBE_IS_MONO**			H01	**QV:** FBST
-	Workpiece probe is mono probe			BYTE	Immediately
The tool probe is a monoprobe: 0 = No 1 = Yes A monoprobe can be rotated to any angle via SPOS. It is positioned such that always the same edge is applied to the workpiece.					
SM		SM:	0	1	3/4

9803	**ST_INDEX_AXIS_4**			H02	**QV:** FBT
-	Axis index for 4th axis			BYTE	Immediately
Enter the axis number of the 4th axis to be displayed (e.g. Y axis) in this MD.					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	127	3/4

9804	**ST_INDEX_SPINDLE_MAIN**			H02, H03	**QV:** FBT
-	Axis index for main spindle			BYTE	Immediately
Enter the axis number of the main spindle into this MD.					
				840D SW 6.1, 810D SW 4.1	
ST, MT		MT: , ST:	1	127	3/4

9805	**ST_INDEX_SPINDLE_TOOL**			H02, H03	**QV:** FBT
-	Axis index for tool spindle			BYTE	Immediately
Enter the axis number of the tool spindle in this MD.					
				840D SW 6.1, 810D SW 4.1	
ST, MT		MT: , ST:	0	127	3/4

9806	**ST_INDEX_SPINDLE_SUB**			H02	**QV:** FBT
-	Axis index for counterspindle			BYTE	Immediately
Enter the axis number of the counterspindle in this MD.					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	127	3/4

9807	**ST_INDEX_AXIS_C**			H02	**QV:** FBT
-	Axis index for C axis			BYTE	Immediately
Enter the axis number of the C axis in this MD.					
				6.3	
ST		ST:	0	127	3/4

9810	**ST_GEAR_STEPS_SPINDLE_MAIN**			H02	**QV:** FBT
-	Number of main spindle threads			BYTE	Immediately
This MD specifies the number of gear stages of the main spindle.					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	5	3/4

9811	**ST_GEAR_STEPS_SPINDLE_TOOL**			H02	**QV:** FBT
-	Number of tool spindle threads			BYTE	Immediately
This MD specifies the number of gear stages of the tool spindle.					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	5	3/4

9812	**ST_GEAR_STEPS_SPINDLE_SUB**			H02	**QV:** FBT
-	Number of counter spindle threads			BYTE	Immediately
This MD specifies the number of gear stages of the counterspindle.					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	5	3/4

9820	**ST_MAGN_GLASS_POS_1**			H02	**QV:** FBT
mm	Measure zoom-in pos. to tool, 1st axis			DOUBLE	Immediately
This MD specifies the X coordinate of the magnifier.					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	0	3/4

9821	**ST_MAGN_GLASS_POS_2**			H02	**QV:** FBT
mm	Measure zoom-in pos. to tool, 2nd axis			DOUBLE	Immediately
Enter the Z coordinate of the magnifier in this MD.					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	0	3/4

9822	**ST_DISPL_DIR_MAIN_SPIND_M3**			H02	**QV:** FBT
-	Displ. direction of rot. main spindle M3			BYTE	Immediately
This machine data specifies which direction of rotation of the main spindle is indicated in the user interface for the M function M3. 0 = right 1 = left					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	1	3/4

9823	**ST_DISPL_DIR_SUB_SPIND_M3**			H02	**QV:** FBT
-	Displ. direction of rot. counterspindle M3			BYTE	Immediately
This machine data specifies which direction of rotation of the counterspindle is displayed in the user interface for the M function M3. 0 = right 1 = left					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	1	3/4

9824	**ST_DISPL_DIR_MAIN_C_AX_INV**			H02	**QV:** FBT
-	Direction of rotation of C axis main spind			BYTE	Immediately
This machine data specifies which direction of rotation of the C axis (main spindle) is displayed in the user interface for the M function M3. 0 = right 1 = left					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	1	3/4

9825	**ST_DISPL_DIR_SUB_C_AX_INV**			H02	**QV:** FBT
-	Direction of rotation of C axis counterspi			BYTE	Immediately
This machine data specifies which direction of rotation of the C axis (counterspindle) is displayed in the user interface for the M function M3. 0 = right 1 = left					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	1	3/4

9826	**ST_DEFAULT_DIR_TURN_TOOLS**			H02	**QV:** FBT
-	Main dir. of rot. for all turning tools			BYTE	Power On
This machine date specifies the main direction of rotation of all rotatable tools. 3 = M3 4 = M4					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	3	4	3/4

9827	ST_DEFAULT_MACHINING_SENSE			H02	QV: FBT
-	Basic sett. f. machining direction milling			BYTE	Immediately
This machine data specifies the basic setting for the machining direction of rotation during millling, except path milling. 0 = reverse rotation 1 = synchronism					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	1	3/4

9828	ST_MEAS_T_PROBE_INPUT_SUB			H02	QV: FBT
-	Meas. input f. tool probe counterspindle			REAL	Immediately
With this MD you specify the number of the input for the tool probe for the counterspindle. 0 = Probe 1 is effective for tool measurement counterspindle 1 = Probe 2 is effective for tool measurement counterspindle					
				6.3	
ST		ST:	0	1	3/4

9829	ST_SPINDLE_CHUCK_TYPES			H02	QV: FBT
-	Spindle chuck selection			BYTE	Immediately
Selection of the spindle chuck: Bit 0: Types of jaws GSP (0 = w/o jaw dimension, 1 = with jaw dimension)					
				6.4	
ST		ST:	0	0	3/4

9829	ST_SPINDLE_CHUCK_TYPES			H02	QV: FBT
-	Spindle chuck selection			BYTE	Immediately
Selection of the spindle chuck: Bit 0: Types of jaws GSP (0 = w/o jaw dimension, 1 = with jaw dimension)					
				6.4	
ST		ST:	0	0	3/4

9830	ST_SPINDLE_PARA_ZL0			H02	QV: FBT
mm	Main spindle chuck dimension			DOUBLE	Immediately
Main spindle chuck dimension					
				6.4	
ST		ST:	0	0	3/4

9831	ST_SPINDLE_PARA_ZL1			H02	QV: FBT
mm	Counterspindle chuck dimension			DOUBLE	Immediately
Counterspindle chuck dimension					
				6.4	
ST		ST:	0	0	3/4

9832	**ST_SPINDLE_PARA_ZL2**			H02	**QV:** FBT
mm	Counterspindle stop dimension			DOUBLE	Immediately
Counterspindle stop dimension					
				6.4	
ST		ST:	0	0	3/4

9833	**ST_SPINDLE_PARA_ZL3**			H02	**QV:** FBT
mm	Counterspindle jaw dimension			DOUBLE	Immediately
Counterspindle jaw dimension					
				6.4	
ST		ST:	0	0	3/4

9836	**ST_TAILSTOCK_DIAM**			H02	**QV:** FBT
mm	Tailstock diameter			DOUBLE	Immediately
Tailstock diameter					
				7.1	
ST		ST:	0	0	3/4

9837	**ST_TAILSTOCK_LENGTH**			H02	**QV:** FBT
mm	Tailstock length			DOUBLE	Immediately
Tailstock length					
				7.1	
ST		ST:	0	0	3/4

9838	**ST_BORDER_TOOL_LEN_X_REV_2**			H02	**QV:**
mm	Limit value of tool lengh X for 2nd turret			DOUBLE	Immediately
Limit value of tool lengh X for the 2nd turret: Limit value = 0: There is only one turret. Tool length < limit value: The tool belongs to the 1st turret/Multifix Tool length >= limit value: The tool belongs to the 2nd turret/Multifix					
ST		ST:	0	0	3/4

9840	**ST_ENABLE_MAGN_GLASS**			H02	**QV:** FBT
-	Zoom-in under manual: tool meas.			BYTE	Immediately
This machine data can be used to activate the function Measure tool by means of magnifier. 0 = Function not available 1 = Function available					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	1	3/4

9841	**ST_ENABLE_PART_OFF_RECEPT**			H02	**QV:** FBT
-	Enable receptacle function for cut-off			BYTE	Immediately
This machine data is used to release the drawer function in the user interface during cutting off. During cutting off, you can extract a drawer to collect the separated part.					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	1	3/4

9842	**ST_ENABLE_TAILSTOCK**			H02	**QV:** FBT
-	Enable tailstock			BYTE	Immediately
This MD activates the Tailstock parameter in the Program header screen.					
				6.2	
ST		ST:	0	1	3/4

9843	**ST_ENABLE_SPINDLE_CLAMPING**			H02	**QV:** FBT
-	Spindle clamping enable (C axis)			BYTE	Immediately
Parameter CP for Enable face Y					
				6.3	
ST		ST:	0	1	3/4

9850	**ST_CYCLE_THREAD_RETURN_DIST**			H02	**QV:** FBT
mm	Return distance f. thread turning			DOUBLE	Immediately
With this machine data, you can specify the distance to the workpiece to which retraction is performed between the infeeds during thread cutting.					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0.001	1000	3/4

9851	**ST_CYCLE_SUB_SP_WORK_POS**			H02	**QV:** FBT
mm	Retract position Z for counterspindle			DOUBLE	Immediately
This machine data specifies the position in the Z direction of the counterspindle during machining.					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	0	3/4

9852	**ST_CYCLE_SUB_SP_DIST**			H02	**QV:** FBT
mm	Counterspindle: travel path to fixed stop			DOUBLE	Immediately
This machine data specifies the distance to the programmed target position. From this distance onwards, the counterspindle travels at a special feedrate during travel to fixed stop. Specify the feed in MD 9853 ST_CYCLE_SUB_SP_FEED.					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0.001	1000	3/4

9853	**ST_CYCLE_SUB_SP_FEED**			H02	**QV:** FBT
mm/min	Counterspindle: travel feed to fixed stop			DOUBLE	Immediately
This machine data specifies the feedrate at which the counterspindle travels to fixed stop. In MD 9852 ST_CYCLE_SUB_SP_DIST, you can specify the distance from which onwards this feedrate is used for travelling.					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	0	0	3/4

9854	**ST_CYCLE_SUB_SP_FORCE**			H02	**QV:** FBT
	Counterspin.: travel force to fixed stop			BYTE	Immediately
This machine data is used to specify the percentage from which onwards the drive force of the counterspindle shall stop during traveling to fixed stop.					
				840D SW 6.1, 810D SW 4.1	
ST		ST:	1	100	3/4

9855	**ST_CYCLE_TAP_SETTINGS**			H02	**QV:** FBT
-	Tapping settings			INTEGER	Immediately
Settings for tapping xxx0 ==> same exact stop response active as prior to cycle call xxx1 ==> exact stop G601 xxx2 ==> exact stop G602 xxx3 ==> exact stop G603 xx0x ==> with/without feedforward control active, same as prior to cycle call xx1x ==> with feedforward control FFWON xx2x ==> without feedforward control FFWOF x0xx ==> SOFT/BRISK/DRIVE active, same as prior to cycle call x1xx ==> with jerk limitation SOFT x2xx ==> without jerk limitation BRISK x3xx ==> reduced acceleration DRIVE 0xxx ==> reactivate spindle mode at MCALL 1xxx ==> remain in position control at MCALL					
				6.3	
ST		ST:	0	0	3/4

9856	**ST_CYCLE_TAP_MID_SETTINGS**			H02	**QV:** FBT
-	Centric tapping settings			INTEGER	Immediately
Settings for centric tapping xxx0 ==> same exact stop response active as before cycle call xxx1 ==> exact stop G601 xxx2 ==> exact stop G602 xxx3 ==> exact stop G603 xx0x ==> with/without feedforward control active, same as prior to cycle call xx1x ==> with feedforward control FFWON xx2x ==> without feedforward control FFWOF x0xx ==> SOFT/BRISK/DRIVE active, same as prior to cycle call x1xx ==> with jerk limitation SOFT x2xx ==> without jerk limitation BRISK x3xx ==> reduced acceleration DRIVE 0xxx ==> reactivate spindle mode at MCALL 1xxx ==> remain in position control at MCALL					
ST		ST:	0	0	3/4

9857	**ST_CYCLE_RET_DIST_FIXEDSTOP**			H02	**QV:** FBT
mm	Retr.path prior to chuck. after fixed stop			DOUBLE	Immediately
Retraction path prior to clamping after travel to fixed stop					
				6.3	
ST		ST:	0	10	3/4

9858	**ST_CYCLE_RET_DIST_PART_OFF**			H02	**QV:** FBT
mm	Retr. path prior to cut-off w. count.sp.			DOUBLE	Immediately
Retraction path prior to cut-off with counterspindle					
				6.3	
ST		ST:	0	1	3/4

9859	**ST_CYCLE_PART_OFF_CTRL_DIST**			H02	**QV:** FBT
mm	Path for cut-off check			DOUBLE	Immediately
Path for cut-off control					
				6.3	
ST		ST:	0	10	3/4

9860	**ST_CYCLE_PART_OFF_CTRL_FEED**			H02	**QV:** FBT
mm/min	Feedrate for cut-off check			DOUBLE	Immediately
Feed for cut-off control					
ST		ST:	0	0	3/4

9861	**ST_CYCLE_PART_OFF_CTRL_FORC**			H02	**QV:** FBT
%	Force in percent for cut-off check			BYTE	Immediately
Force in percent for cut-off control					
				6.3	
ST		ST:	1	100	3/4

9862	**ST_CYC_DRILL_MID_MAX_ECCENT**			H02	**QV:** FBT
mm	Max. center offset f. center boring			DOUBLE	Immediately
Maximum center offset with center boring					
				6.4	
ST		ST:	0.0	10.0	3/4

9890	**ST_USER_CLASS_MEAS_T_CAL**			H02	**QV:**
-	Protection level for calibration of tool p			BYTE	Immediately
Calibration of tool probe protection level					
				7.1	
ST		ST:	0	7	3/4

9897	**ST_OPTION_MASK_MAN_FUNC**			H02	**QV:** FBT
-	Settings for ShopTurn manual functions			INTEGER	Immediately
Settings for manual ShopTurn functions: Bit 0: Main spindle control (0 = machine control panel; 1 = user interface) Bit 1: Tool spindle control (0 = machine control panel; 1 = user interface) Bit 2: Reserved (counterspindle control) Bit 3: 0 = Multifix; 1 = tool turret					
				7.1	
ST		ST:	0	0	3/4

9898	**ST_OPTION_MASK**			H02	**QV:** FBT
-	ShopTurn settings			INTEGER	Immediately
Bit 0: Processing inside/backside released in the screens which specify the machining level autonomously Bit 1 to Bit 5: reserved Bit 6: Accept simultaneous recording despite program start Bit 7 and Bit 8: reserved Bit 9: Block input of an offset in X in the zero point offset list Bit 10: Display program view during simultaneous recording Bit 11: reserved Bit 12: Release functions Parting-off cutting and Parting-off cutting residual material Bit 13: Release functions Plunge-cutting and Plunge-cutting residual material Bit 14: Accept negative final machining allowance during contour turning Bit 15: Counterspindle: Accept clamping internal/external Bit 16: Additional measuring probe available on the counterspindle Bit 17: Tool measuring for rotating tools with rotating spindle Bit 18: Display the Rotation column in the zero-point offset list					
				6.3	
ST		ST:	0	0	2/2

9899	**ST_TRACE**			H02	**QV:** FBT
-	Test flags internal ShopTurn diagnosis			REAL	Immediately
reserved					
				6.3	
ST		ST:	0	0xFFFF	3/4

9899	**ST_TRACE**			H02	**QV:** FBT
-	Test flags internal ShopTurn diagnosis			REAL	Immediately
reserved					
				6.3	
ST		ST:	0	0xFFFF	3/4

9900	**MD_TEXT_SWITCH**			H05	**QV:** -
-	Plaintexts instead of MD identifier			BOOL	Immediately
If the machine data has been set to 1, plaintexts are displayed on the operator panel instead of machine data identifiers.					
				SW2	
Adv, Emb		Emb: 0	0	0	3/4

9950	**MD_NC_TEA_FILTER**			H05	**QV:**
-	General machine data display options			INTEGER	Power On
Internal					
Emb		Emb: 67108865	0	0	0/0

9950	**MD_NC_TEA_FILTER**			H05	**QV:**
-	General machine data display options			INTEGER	Power On
Internal					
Emb		Emb: 67108865	0	0	0/0

9951	**MD_NC_TEA_IDX_LIMIT**			H05	**QV:**
-	Index filter for general machine data			INTEGER	Power On
Internal					
Emb		Emb: 0	0	0	0/0

9952	**MD_AX_TEA_FILTER**			H05	**QV:**
-	Axis machine data display options			INTEGER	Power On
Internal					
Emb		Emb: 67108865	0	0	0/0

9952	**MD_AX_TEA_FILTER**			H05	**QV:**
-	Axis machine data display options			INTEGER	Power On
Internal					
Emb		Emb: 67108865	0	0	0/0

9953	**MD_AX_TEA_IDX_LIMIT**			H05	**QV:**
-	Index filter for axis machine data			INTEGER	Power On
Internal					
Emb		Emb: 0	0	0	0/0

9954	**MD_CH_TEA_FILTER**			H05	**QV:**
-	Channel machine data display options			INTEGER	Power On
Internal					
Emb		Emb: 33554433	0	0	0/0

9954	**MD_CH_TEA_FILTER**			H05	**QV:**
-	Channel machine data display options			INTEGER	Power On
Internal					
Emb		Emb: 33554433	0	0	0/0

9955	**MD_CH_TEA_IDX_LIMIT**			H05	**QV:**
-	Index filter for channel machine data			INTEGER	Power On
Internal					
Emb		Emb: 0	0	0	0/0

9956	**MD_DRV_TEA_FILTER**			H05	**QV:**
-	Drive machine data display options			INTEGER	Power On
Internal					
Emb		Emb: 8388609	0	0	0/0

9956	**MD_DRV_TEA_FILTER**			H05	**QV:**
-	Drive machine data display options			INTEGER	Power On
Internal					
Emb		Emb: 8388609	0	0	0/0

9957	**MD_DRV_TEA_IDX_LIMIT**			H05	**QV:**
-	Index filter for drive machine data			INTEGER	Power On
Internal					
Emb		Emb: 0	0	0	0/0

9958	**MD_SNX_FILTER**			H05	**QV:**
-	Display options Sinamics parameters			INTEGER	Power On
Emb		Emb: 0	0	0	0/0

9958	**MD_SNX_FILTER**			H05	**QV:**
-	Display options Sinamics parameters			INTEGER	Power On
Emb		Emb: 0	0	0	0/0

9959	**MD_SNX_IDX_LIMIT**			H05	**QV:**
-	Index filter for Sinamics parameters			INTEGER	Power On
Emb		Emb: 0	0	0	0/0

9980	**LANGUAGE_SETTINGS**			H05	**QV:**
-	Internal language settings			INTEGER	Power On
Emb		Emb: 513	0	0	0/0

9990	**SW_OPTIONS**			H05	**QV:** FBSP, FBT
-	Enable MMC/HMI software options			INTEGER	Power On
MMC software options can be activated here					
				5.3	
Adv, Emb		Emb: 0	0	0	2/2

9991	**HMI_HELP_SYSTEMS**			H05	**QV:** FBSP, FBT
-	Enable MMC/HMI auxiliary systems			INTEGER	Power On
HMI help system can be switched on/off bit by bit Bit 0: 0 help displays for pocket calculator off Bit 0: 1 help displays for pocket calculator active (default value)					
				6.1	
Emb		Emb: 1	0	0	2/2

9992	**HMI_TESTAUTOMAT_OPTION**			H05	**QV:** FBT, FBSP, EMB
-	Options for autom. HMI test machine			INTEGER	Power On
Options for the automatic HMI testing machine Bit 0 = 0: automatic HMI testing machine cannot be activated Bit 0 = 1: automatic HMI testing machine can be activated via PLC					
				6.3	
Emb		Emb: 0	0	0	2/2

9993	**HMI_WIZARD_OPTION**			H05	**QV:** FBT, FBSP, EMB
-	Options for wizard			INTEGER	Power On
Options for the wizard: Bit 0 = 1: wizard displays configuring lines which were recognized as faulty on the dialog line Bit 8 = 1: wizard cannot be started via PLC					
				6.3	
Emb		Emb: 0	0	0	2/2

9999	**TRACE**			H05	**QV:** -
-	Test flags for internal diagnosis			INTEGER	Power On
Not intended for user.					
				-	
Adv, Emb		Emb: 0	0	0xFFFF	2/2

1.3 General machine data

Number	**Identifier**			Display filters	Reference
Unit	Name			Data type	Active
Description					
Attributes					
System	Dimension	Default value	Minimum value	Maximum value	Protection

1.3.1 System settings

10000	AXCONF_MACHAX_NAME_TAB		N01, N11	K2	
-	Machine axis name		STRING	POWER ON	

```
List of the machine axis identifiers.
The name of the machine axis is entered in this MD.
In addition to the fixed, defined machine axis identifiers "AX1", "AX2" ...,
    user-defined identifiers for the machine axes can also be assigned in this
    data.
The identifiers defined here can be used parallel to the fixed, defined iden-
    tifiers for addressing axial data (e.g. MD) and machine axis-related NC
    functions (reference point approach, axial measurement, travel to fixed
    stop).

Special cases:
- The input machine axis name must not conflict with the designation and
    assignment of the geometry axes (MD 20060: AXCONF_GEOAX_NAME_TAB, MD
    20050: AX-CONF_GEOAX_ASSIGN_TAB) or channel axes (MD 20080: AXCONF_CHA-
    NAX_NAME_TAB, MD 20070: AXCONF_MACHAX_USED).

- The input machine axis name must not be the same as the names for Euler
    angles (MD 10620: EULER_ANGLE_NAME_TAB), names for path-relevant orienta-
    tion (MD 10624: ORIPATH_LIFT_VECTOR_TAB), names for normal vectors (MD
    10630: NORMAL_VECTOR_NAME_TAB), names for directional vectors (MD 10640:
    DIR_VECTOR_NAME_TAB), names for rotator vectors (MD 10642:
    ROT_VECTOR_NAME_TAB), names for intermediate vector component (MD 10644:
    INTER_VECTOR_NAME_TAB), names for intermediate circle point coordinates
    with CIP (MD 10660: INTERMEDIATE_POINT_NAME_TAB) and the names for inter-
    polation parameters (MD 10650: IPO_PARAM_NAME_TAB).

- The input machine axis name must not include any of the following reserved
    address letters:
D Tool offset            (D function)      E Reserved
F Feedrate               (F function)      G Preparatory function
H Auxiliary function     (H function)      L Subroutine call
M Miscellaneous function (M function)      N Subblock
P Subroutine number of passes              R Arithmetic parameters
S Spindle speed          (S function)      T Tool (T function)

The name must not include any keywords (e.g. DEF, SPOS etc.) or pre-defined
    identifiers (e.g. ASPLINE, SOFT).

The use of an axis identifier consisting of a valid address letter (A, B, C,
    I, J, K, Q, U, V, W, X, Y, Z), followed by an optional numerical exten-
    sion (1-99) gives slightly better block cycle times than a general identi-
    fier.

If no identifier is assigned to a machine axis then the predefined name
    ("AXn") shall apply to the nth machine axis.

Related to:
    MD 20060: AXCONF_GEOAX_NAME_TAB (geometry axis name in the channel [GEOAx-
    isno.]
    MD 20080 :AXCONF_CHANAX_NAME_TAB (channel axis name in the channel [Chan-
    nelaxisno.]
```

-					
-	31	"X1","Y1","Z1","A1", "B1","C1","U1"...	-	-	7/2

710-2a2c	2	"X1","Y1"	-	-	-/-
710-6a2c	-	"X1","Y1","Z1","A1", "B1","C1"	-	-	-/-
840d-2a2c	2	"X1","Y1"	-	-	-/-
840d-4a1cg	4	"X1","Y1","Z1","A1"	-	-	-/-
840d-6a2c	-	"X1","Y1","Z1","A1", "B1","C1"	-	-	-/-
840di-basic	-	"X1","Y1","Z1","A1", "B1","C1"	-	-	-/-

10002	AXCONF_LOGIC_MACHAX_TAB		N01	B3
-	Logical NCK machine axis image		STRING	POWER ON

```
List of machine axes available on an NCU. (Logical NCK machine axis image)

The MD $MN_AXCONF_LOGIC_MACHAX_TAB creates another NCK global, logical layer
    between the channel axis layer and the machine axes in an NCU or
    NCU_Verband. This layer is called the Logic NckMachineAxImage, abbrevia-
    tion: LAI ).

Axes can only be assigned between different NCUs via this new intermediate
layer!
The entry $MN_AXCONF_LOGIC_MACHAX_TAB[ n] = NCj_AXi assigns the machine axis i
    on the NCU j to the axis index "n" in the LAI.

This makes the following assignments possible:
1. Local axes (default setting: AX1, AX2 ... AX31)
   The entry $MN_AXCONF_LOGIC_MACHAX_TAB[n] = AX3 assigns the local axis AX3
to axis index n. (Default setting AX3 is present for n = 3 . Thus there is
compatibility in software version 5 for MD blocks for software versions up to
4).

2. Link axes (axes that are physically connected to another NCU). The entry
$MN_AXCONF_LOGIC_MACHAX_TAB[n] = NCj_AXi  assigns axis AXi on NCU j to axis
index n (link axis).
Limits:
    n   Machine axis address (of the local NCU)            1 ... 31
   j     NCU number1 ... 16
   i     Machine axis address (of the local/remote NCU)1 ... 31

3. Axis container in which there are once again either local or link axes. The
entry $MN_AXCONF_LOGIC_MACHAX_TAB[n] = CTr_SLs assigns container r and slot s
to axis index n.
Limits:
   n     Machine axis address (of the local NCU)1 ... 31
   r     Container number1 ... 16
   s     Slot number (location) in the container1 ... 32

The channel layer is formed via the related machine data
    $MC_AXCONF_MACHAX_USED and no longer points (small P5) directly to the
    machine axes but to the new LAI layer.

$MC_AXCONF_MACHAX_USED [k]=n assigns the LAI axis number "n" to the axis index
"k" in the channel layer.

The machine axis and the corresponding NCK can then be determined from the LAI
    axis number.

If a number of NCUs point to the same machine axis in the cluster as a result
    of $MN_AXCONF_LOGIC_MACHAX_TAB, then the axial machine data
    $MA_AXCONF_ASSIGN_MASTER_NCU must define which NCU generates the master
    NCU and the setpoint values for the position controller after startup.

Related to:
   AXCT_AXCONF_ASSIGN_TABi (make entries in containers i)
```

-					
-	31	"AX1","AX2","AX3","AX4","AX5","AX6"...	-	-	3/2

710-2a2c	2	-	-	-	-/-
840d-2a2c	2	-	-	-	-/-
840d-4a1cg	4	-	-	-	-/-

10010	**ASSIGN_CHAN_TO_MODE_GROUP**			N01, N02, N11	K1,IAD
-	Channel valid in mode group			DWORD	POWER ON

```
This MD assigns the channel to a mode group
Entry value 1 => Assigned to 1st mode group
Entry value 2 => Assigned to 2nd mode group
etc.
From software version 4, it is permissible not to assign a mode group number
to individual channels.
Channel gaps are allowed, in order to favor uniform configuration in similar
types of machines. In this case, the number 0 is assigned to the channel
instead of assigning a mode group number equal to or greater than 1. The chan-
nel is not activated, however it is handled like an active channel when count-
ing the channels.
E.g.
ASSIGN_CHAN_TO_MODE_GROUP[0] = 1
ASSIGN_CHAN_TO_MODE_GROUP[1] = 1
ASSIGN_CHAN_TO_MODE_GROUP[2] = 0   ; gap
ASSIGN_CHAN_TO_MODE_GROUP[3] = 1

Application example:
Select desired channel via HMI and enter with ASSIGN_CHAN_TO_MODE_GROUP = 1.

Note:
This MD must still be entered even when only one mode group is present.
```

-					
-	10	1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10	7/2
710-2a2c	2	-	-	2	-/-
710-6a2c	-	-	-	2	-/-
710-12a2c	-	-	-	4	-/-
840d-2a2c	2	-	-	-	-/-
840d-4a1cg	1	-	-	-	-/-
840di-basic	-	-	-	2	-/-
840di-universal	-	-	-	2	-/-
840di-plus	-	-	-	6	-/-

10050	SYSCLOCK_CYCLE_TIME		N01, N05, N11, -	G3
s	System clock cycle		DOUBLE	POWER ON

```
Basic cycle time of the system software

The cycle times settings of cyclical tasks (position controller/IPO ) are mul-
    tiples of this basic cycle. Apart from special applications in which
    POSCTRL_SYSCLOCK_TIME_RATIO is set greater than 1, the  basic cycle corre-
    sponds to the position controller cycle.

When using a digital drive the basic cycle time and
POSCTRL_SYSCLOCK_TIME_RATIO must be set so that the position controller cycle
time is not longer than 16 ms (otherwise there will be a drive alarm). The set
value may be changed by automatic corrections during startup (alarm).

In the case of systems with a PROFIBUS DP connection, this MD corresponds to
    the PROFIBUS DP cycle time. This time is read from the configuration file
    (SDB-Type-2000) during startup and written to the MD.
This MD can only be changed via the configuration file.
Note:
   Reducing this MD can result in an automatic correction of
POSCTRL_CYCLE_DELAY that cannot be undone by a subsequent increase!

Details:
   The basic cycle is incremented in multiples ( SYSCLOCK_SAMPL_TIME_RATIO )
of units of the measured value sampling cycle. During system startup, the
entered value is automatically rounded up to a multiple of this incrementa-
tion.

Note:
   Discrete timer division ratios can give rise to the entered value produc-
ing a value that is not an integer after a Power OFF/ON.
E.g.:
Input                           = 0.005s
                                after Power OFF/ON  =0.00499840
                     or
Input                           = 0.006s
                                after Power OFF/ON  =0.0060032
```

SFCO					
-	-	0.004	0.000125	0.031	7/2
710-2a2c	-	0.002	0.001	0.008	-/-
710-6a2c	-	0.002	0.001	0.008	-/-
710-12a2c	-	0.002	0.001	0.008	-/-
710-31a10c	-	0.002	0.001	0.008	-/-
840di-basic	-	0.002	0.001	0.008	-/-
840di-universal	-	0.002	0.001	0.008	-/-
840di-plus	-	0.002	0.001	0.008	-/-

10059	PROFIBUS_ALARM_MARKER		N05	G3	
-	Profibus alarm flag (internal only)		BYTE	POWER ON	
Profibus alarm flag: In this machine data, alarm requests for the Profibus layer are stored beyond a reboot. If conflicts arise between machine data 10050, 10060, 10070 and the data in SDB-Type-2000 on startup, the machine data are matched according to SDB and an alarm is output on the next start up. These alarm requests are stored here. Related to: SYSCLOCK_CYCLE_TIME, SYSCLOCK_SAMPL_TIME_RATIO					
NBUP, NDLD					
-	-	0	-	-	0/0

10060	POSCTRL_SYSCLOCK_TIME_RATIO		N01, N05	G3	
-	Factor for position control cycle		DWORD	POWER ON	
The position-control cycle is stated as a multiple of the time units of the system basic cycle SYSCLOCK_CYCLE_TIME. The regular setting is 1. The position-control cycle then corresponds to the system basic cycle SYSCLOCK_CYCLE_TIME. Setting values > 1 costs computing time for the operating system to calculate the additional timer interrupts, and should therefore only be used in those cases in which there is a task in the system that is to run faster than the position-control cycle. When using a digital drive, the set value of the position-control cycle can be changed by automatic corrections during startup. Alarm 4101 "position-control cycle for digital drives reduced to [ ] ms" is then issued. In the case of systems with a PROFIBUS DP connection, this MD represents the ratio between the PROFIBUS DP cycle and the position controller cycle.					
SFCO					
-	-	1	1	31	7/2
840di-basic	-	-	-	-	0/0
840di-universal	-	-	-	-	0/0
840di-plus	-	-	-	-	0/0

10061	POSCTRL_CYCLE_TIME		N01, N05	G3	
-	Position control cycle		DOUBLE	POWER ON	
Position controller cycle time: Display of the position controller cycle time (not modifiable !). It is compiled internally from the machine data SYSCLOCK_CYCLE_TIME and POSCTRL_SYSCLOCK_TIME_RATIO.					
READ					
-	-	0.0	-	-	7/0

10062	POSCTRL_CYCLE_DELAY		N01, N05		G3
s	Position control cycle offset		DOUBLE		POWER ON
NCK position controller cycle shifting in relation to the PROFIBUS DP cycle. This is only relevant when operating with PROFIBUS drives. Note: Reducing SYSCLOCK_CYCLE_TIME can result in an automatic correction of this MD that cannot be undone by a subsequent increase! Recommendation: In this case set the original value or default value once again.					
-					
-	-	0.003	0.000	0.008	7/2
710-2a2c	-	0.001550	-	-	-/-
710-6a2c	-	0.001550	-	-	-/-
710-12a2c	-	0.001550	-	-	-/-
710-31a10c	-	0.001550	-	-	-/-
840di-basic	-	0.001550	-	-	-/-
840di-universal	-	0.001550	-	-	-/-
840di-plus	-	0.001550	-	-	-/-

10065	POSCTRL_DESVAL_DELAY		N01		B3
s	Position setpoint delay		DOUBLE		POWER ON
This MD can parameterize a delay of the setpoints in the position contoller. The area of application is NCU-link when different position control cycles are parameterized on the NCUs and if the axes should nevertheless interpolate with one another. (Used for example for non-circular turning.) This MD is used to optimize the automatic setting. Related to: $MA_POSCTRL_DESVAL_DELAY_INFO					
-					
-	-	0.0	-0.1	0.1	7/2

10070	IPO_SYSCLOCK_TIME_RATIO		N01, N05, N11, -	G3
-	Factor for interpolation cycle		DWORD	POWER ON

The interpolator cycle is stated as a multiple of the time units of the system basic cycle SYSCLOCK_CYCLE_TIME.
Only integer multiples of the position control cycle can be set (set in POSCTRL_SYSCLOCK_TIME_RATIO). Values that are not an integer multiple of the position control cycle are automatically increased to the next integer multiple of the position control cycle before they become active (on next power up).
This is accompanied by alarm 4102 "IPO cycle increased to [ ] ms".

SFCO					
-	-	4	1	100	7/2
840d-2a2c	-	3	-	-	-/-
840d-4a1cg	-	3	-	-	-/-
840d-6a2c	-	3	-	-	-/-
840d-12a2c	-	3	-	-	-/-

10071	IPO_CYCLE_TIME		N01, N05, N11, -	G3
-	Interpolator cycle		DOUBLE	POWER ON

Interpolation time
Display of the interpolator cycle time (not modifiable !).
It is compiled internally from the machine data SYSCLOCK_CYCLE_TIME and IPO_SYSCLOCK_TIME_RATIO.

READ					
-	-	0.0	-	-	7/0

10072	COM_IPO_TIME_RATIO		N01, N05	-
-	Division ratio between IPO and communication task		DOUBLE	POWER ON

Division ratio between IPO and communication tasks. A value of 2 means, e.g., that the communication task is only processed in every second IPO cycle. This makes more time available for the other tasks. Overlarge values slow down the communication between the HMI and NCK.

Numerical values less than 1 downscale the IPO cycle. This value is adjusted so that only runtimes that are a multiple of the position controller time are possible for the communication task. A call period of about 10 ms is practical for the communication task.

-					
-	-	1.0	0.0	100.0	7/2

10073	COM_IPO_STRATEGY	EXP	-
-	Strategy for activation of communication.	DWORD	POWER ON

The call frequency of the communication task can be controlled by machine data COM_IPO_TIME_RATIO.

The communication tasks are activated cyclically. That has some advantages and disadvantages:

Advantages:
- The communication behavior of the NCK is deterministic in relation to the communication task.

Disadvantages:
- The communication task can lead to level overflows.
- In an unloaded NCK system, the speed of communication is determined by machine data COM_IPO_TIME_RATIO. As this machine data is power on it cannot adapt to the current NCK operating mode. A typical problem is that uploading a part program can take a very long time on an unloaded NCK. In this case, the bottleneck is the communication task that only progresses in the relation defined by machine data COM_IPO_TIME_RATIO.

This machine data has been introduced to eliminate the above-mentioned disadvantages. It enables control of the times at which the communication software is activated. The machine data is bit-coded. The bits have the following meanings:

Bit 0:
The communication software is calculated cyclically

Bit 1:
The level time overflow monitoring is switched off for the cyclical communication task. This bit is only useful if bit is set to zero. The task is implemented in a non-cyclical level that has a higher priority than the preparation/communication level. The communication task makes a delay of the time defined in COM_IPO_TIME_RATIO after each cycle.

Bit 2:
The communication software is calculated at the start of the task which the domain services accept.

Bit 3:
The communication software is calculated at the end of the task which the domain services accept.

Bit 4:
The communication software is calculated at the start of the task which the domain services accept if a PDU upload has arrived. This bit is only useful if bit 2 is set.

Bit 5:
The communication software is calculated at the end of the task which the domain services accept if a PDU upload has arrived. This bit is only useful if bit 3 is set.

This machine data is only active in systems containing the Softbus communication software. This is in P6 the 840Di with MCI2 software and the Solutionline systems for P7.

The default value is 0x2B (bit 0,1,3,5). This means that the communication software is calculated cyclically, the level time overflow monitoring is switched off. The communication software is also calculated when a PDU upload arrives. That currently gives the best possible setting. The value 1 would be compatible with the previous versions.

-					
-	-	0x2B	1	0x7F	0/0

10074	**PLC_IPO_TIME_RATIO**			N01, N05	-
-	Factor of PLC task for the main run.			DWORD	POWER ON
Division ratio between IPO and PLC tasks. A value of 2 means, e.g. that the PLC task is only processed in every second IPO cycle. This makes more runtime available for the other tasks.					
-					
-	-	1	1	50	0/0

10075	**PLC_CYCLE_TIME**			N01, N05	-
-	PLC cycle time			DOUBLE	POWER ON
Display of the PLC cycle time (not modifiable !) It is compiled internally from the machine data IPO_CYCLE_TIME and PLC_IPO_TIME_RATIO.					
READ					
-	-	0.0	-	-	1/1

10080	**SYSCLOCK_SAMPL_TIME_RATIO**	EXP, N01	G3
-	Division ratio for actual value recording cycle time	DWORD	POWER ON

```
SYSCLOCK_SAMPL_TIME_RATIO sets the division factor of a cycle divider
that is arranged as hardware between the cycle of the measured value sampling
and the interrupt controller.
- The sampler cycle (upstream of the divider) taps the actual value inputs and
    triggers the digital analog converter.
- The output of the divider generates a timer interrupt as the basic cycle of
    the
operating system ( SYSCLOCK_CYCLE_TIME ).
A value greater than 1 may only be entered in SYSCLOCK_SAMPL_TIME_RATIO in
    exceptional cases:
Values > 1 increase the size of the increments in which the basic cycle can be
set. ( see SYSCLOCK_CYCLE_TIME )

Special cases:
1. When using the conventional drive interface ( analog speed interface ), the
divider is set according to the following criteria:
    It is advantageous for the control to keep the dead time between reading
    in the current axis actual positions and outputting the corresponding set-
    point values as short as possible. The delay time of the position control-
    ler output can be set in fractions of the position control cycle time by
    setting SYSCLOCK_SAMPL_TIME_RATIO to values > 1. The difficulty with this
    is reliably determining the time after which the position controller
    delivers valid results. Multiple triggering of the input/output hardware
    during one position controller cycle could also be achieved by setting
    POSCTRL_SYSCLOCK_TIME_RATIO to values > 1. However, the disdvantage with
    this is the unnecessarily high rate of generating timer interrupts for the
    operating system. This procedure is not recommended.
2. When using the digital drive controller the division factor is set automat-
ically. The sample cycle time is then set as the 1, 2, 3, ... 8-fold of 125µs.

The 611D drive can synchronize its own clock generation with these values.
```

-					
-	-	5	1	31	0/0
840d-2a2c	-	4	-	-	-/-
840d-4a1cg	-	4	-	-	-/-
840d-6a2c	-	4	-	-	-/-
840d-12a2c	-	4	-	-	-/-

10082	CTRLOUT_LEAD_TIME		EXP, N01, -	K3
%	Shift of setpoint transfer time		DOUBLE	POWER ON

```
Lead time for outputting speed setpoints.
The larger the value entered, the sooner the drive accepts the speed set-
    points.
-  0 % Setpoints are accepted at the beginning of the next position control
    cycle.
-  50 % Setpoints are already accepted after execution of half of the posi-
    tion control cycle.
A lead time that is useful for practical purposes can be determined only by
    measuring the maximum position control calculating time.
MD 10083: CTRLOUT_LEAD_TIME_MAX suggests a value measured by the control. As
    this is a net value, it is advisable for the user to make a reduction for
    safety of, for example, 5 %.

If lead times that are too high are input, this can cause output of drive
    alarm 300506.
The input value is rounded down to the next speed controller cycle in the
    drive.
If the speed controller cycle settings of the drives are different, changing
    the value will not necessarily lead to the same degree of  improvement of
    closed-loop control properties for all configured drives.

Note:
   This MD is relevant only to axes with digital drives.

Related to:
    MD 10083: CTRLOUT_LEAD_TIME_MAX
```

-					
-	-	0.0	0.0	100.0	7/2

10083	CTRLOUT_LEAD_TIME_MAX		EXP, N01	K3
%	Max. settable offset of setpoint transfer time		DOUBLE	NEW CONF

```
Maximum permissible lead time for outputting speed setpoints on the SIMODRIVE
611D.
MD 10083 is a setting aid for MD 10082.
The displayed value can be accepted, with a reduction for safety, directly
    into MD 10082.
The permissible lead time is determined from the maximum measured CPU time
    requirement of the position controller. It reduces as the CPU time
    requirement of the position controller increases.
Reducing the position controller sampling rate via MD 10060 or 10050 also
leads to a reduction of the permissible lead time.
The lead time is measured during the entire period of operation. The dis-
    played value can only be increased by manual input.
If the entered lead time is greater than the permissible value (e.g. 100 %) a
    new determination is made automatically.
Note:
   This MD is relevant only to axes with digital drives.

Related to:
    MD 10050: SYSCLOCK_CYCLE_TIME (system clock cycle)
    MD 10060: POSCTRL_SYSCLOCK_TIME_RATIO (factor for position control cycle)
    MD 10082: CTRLOUT_LEAD_TIME
```

-					
-	-	100.0	0.0	100.0	7/2

10088	REBOOT_DELAY_TIME	EXP	-
s	Reboot delay	DOUBLE	SOFORT

```
The reboot following PI "_N_IBN_SS" is delayed by the time
    $MN_REBOOT_DELAY_TIME.

The suppressable NOREADY alarm 2900 is activated immediately with PI
    "_N_IBN_SS".

If $MN_REBOOT_DELAY_TIME falls below the $MA_SERVO_DISABLE_DELAY_TIME value of
    an axis, the axis is decelerated during $MN_REBOOT_DELAY_TIME. The servo
    enable is disabled afterwards, i.e. the full  $MA_SERVO_DISABLE_DELAY_TIME
    is NOT waited.

Alarm 2900 does not become active with $MN_REBOOT_DELAY_TIME = 0.0 and there
is no reboot delay.

The NCK waits beyond the stated delay time until the PI has been able to be
    acknowledged to the HMI. The delay time may total up to 2 s.
```

-					
-	-	0.2	0.0	1.0	2/2

10089	**SAFE_PULSE_DIS_TIME_BUSFAIL**			N01, N06, -	FBSI
s	Delay time pulse suppr. for bus failure			DOUBLE	POWER ON

Time after the failure of the drive bus at which safe pulse disable takes place. The drive can still respond autonomously to the bus failure during this time (see extended stop and retract)

This time is not waited before disabling pulses in the following cases:

- On selection of an external Stop A, a test stop or a test stop external switch off
- If SBH is active or on selection of SBH
- A pulse disable is parameterized immediately if an SG stage is active or on selection of an SG stage for which an immediate pulse disable is parameterized in $MA_SAFE_VELO_STOP_MODE or $MA_SAFE_VELO_STOP_REACTION.

Note:

$MN_SAFE_PULSE_DIS_TIME_BUSFAIL is transferred to the drive MD 1380 with the copy function of the SI-MD and compared in the data cross-check. This general machine data is contained in the axial checksum calculation of the safety relevant machine data ($MA_SAFE_ACT_CHECKSUM, $MA_SAFE_DES_CHECKSUM).

-					
-	-	0.0	0	0.8	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10090	SAFETY_SYSCLOCK_TIME_RATIO		N01, N06, -	FBSI
-	Factor for monitoring cycle		DWORD	POWER ON

```
Ratio between the monitoring cycle and the system clock cycle. The monitoring
cycle is the product of this data and $MN_SYSCLOCK_CYCLE_TIME.

Special cases:
The monitoring cycle is checked during power on:
-  It must be an integer multiple of the position-control cycle
-  It must be < 25 ms

The factor is rounded down to the next possible value if the conditions are
    not fulfilled. The actual set monitoring cycle is displayed by
    $MN_INFO_SAFETY_CYCLE_TIME.

A new value is also generated for the cross-check cycle, which is displayed by
    data $MN_INFO_CROSSCHECK_CYCLE_TIME.

Note:
   The monitoring cycle defines the monitoring response time. It must be noted
that the CPU load increases as the monitoring cycle becomes shorter.

Related to:
    MD 10050: $MN_SYSCLOCK_CYCLE_TIME
    MD 10091: $MN_INFO_SAFETY_CYCLE_TIME
    MD 10092: $MN_INFO_CROSSCHECK_CYCLE_TIME
```

SFCO					
-	-	3	1	50	7/1
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10091	INFO_SAFETY_CYCLE_TIME		N01, N06, N05, -	FBSI
s	Display of monitoring cycle time		DOUBLE	POWER ON

```
Display data: Displays the actually active monitoring cycle. The data cannot
be written.

The data value is recalculated as soon as one of the following data are
    changed:
SAFETY_SYSCLOCK_TIME_RATIO,
POSCTRL_SYSCLOCK_TIME_RATIO
SYSCLOCK_CYCLE_TIME
The new value does not become active until after the next Power On.

Related to:
    MD 10090: $MN_SAFETY_SYSCLOCK_TIME_RATIO
```

READ					
-	-	0.0	-	-	7/0
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10092	INFO_CROSSCHECK_CYCLE_TIME		N01, N06, N05, -	FBSI
s	Display of cycle time for cross-checking		DOUBLE	POWER ON

Display data: Maximum cross-checking cycle in seconds.
Derived from INFO_SAFETY_CYCLE_TIME and the number of data to be cross-checked (this may vary according to the type of drive used for the individual axes).

The data value is recalculated as soon as one of the following data are changed:
SAFETY_SYSCLOCK_TIME_RATIO,
POSCTRL_SYSCLOCK_TIME_RATIO
SYSCLOCK_CYCLE_TIME
The new value does not become active until after the next Power On.

Related to:
MD 10090: $MN_SAFETY_SYSCLOCK_TIME_RATIO
MD 36992: $MA_SAFE_CROSSCHECK_CYCLE

READ					
-	-	0.0	-	-	7/0
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10093	INFO_NUM_SAFE_FILE_ACCESS		EXP, N06, N05, -	FBSI
-	Number of SPL file accesses		DWORD	POWER ON

Display data: SPL file /_N_CST_DIR/_N_SAFE_SPF has been accessed n-times in a protected state. This MD is intended for service purposes only. The MD can only take the values 0 and 1. The value cannot be changed.

READ					
-	-	0	-	-	0/0
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10094	**SAFE_ALARM_SUPPRESS_LEVEL**	EXP, N06, N05, -	FBSI
-	Alarm suppress level	BYTE	POWER ON

```
Affects the display of safety alarms. The monitoring channels NCK and 611D or
NCK and PLC display alarms with the same meaning in several situations.
To reduce the volume of the alarm display, this MD is set to define whether
    safety alarms with the same meaning are to be hidden or not. This does
    affect the dual-channel stop response.
0 =
   Dual-channel triggered alarms are displayed in full
- Dual-channel display of all axial safety alarms
- Alarm 27001, error code 0 is displayed
- Alarms 27090, 27091, 27092, 27093 and 27095 are dual-channel and displayed
    several times.
1 =
   Alarms with the same meaning are only displayed once
   This includes the following alarms:
   27010 = 300907
   27011 = 300914
   27012 = 300915
   27013 = 300906
   27020 = 300910
   27021 = 300909
   27022 = 300908
   27023 = 300901
   27024 = 300900
    In the case of these alarms, only one of the alarms listed (270xx or
    3009xx) is displayed. The alarm of the monitoring channel that later trig-
    gers the alarm with the same meaning is no longer displayed.
   Furthermore, alarm 27001 with error code 0 is suppressed.
   This alarm is triggered as a result of drive alarm 300911. In this case,
drive MDs 1391, 1392, 1393, 1394 give further explanations of the cause of the
error.
2 =
   Default: In addition to the functionality with MD value = 1, the alarms
from the SPL processing (27090, 27091, 27092, 27093 and 27095) are displayed
in one channel and only once.
   This also applies to the alarms for PROFIsafe communication (27250 and sub-
sequent). This machine data must be set to 0 to create an acceptance log, so
that the triggering of all alarms can be logged.
3 =
   Axial alarms 27000 and 300950 are replaced by alarm message 27100 for all
axes/drives.
12 =
   The alarms are prioritized beyond the functionality with MD value = 2.
Obvious subsequent alarms are no longer displayed or automatically deleted
from the display.
   The following alarms can be affected by this:
   27001, 27004, 27020, 27021, 27022, 27023, 27024, 27091,
   27101, 27102, 27103, 27104, 27105, 27106, 27107
13 =
   The alarms are prioritized beyond the functionality with MD value =  3 as
for MD value 12.
The machine data must be set to 0 to create an acceptance log, so that the
    triggering of all alarms can be logged.
```

-					
-	-	2	0	13	7/2

840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10095	**SAFE_MODE_MASK**			EXP, N05, -	FBSI
-	'Safety Integrated' operating modes			DWORD	POWER ON
Bit 0 = 0: the system variables $A_INSI[1...64] have the default "0". Bit 0 = 1: the system variables $A_INSI[1...64] have the default "1". The default is made in 32 bit groups, and only if an axial SGA has been parameterized on at least one of the system variables in this group. (Compatibility mode for older PLC software versions) These functions are only supported on one channel by the NCK. This data is not included in the calculation of the axial MD check sum SAFE_ACT_CHECKSUM.					
-					
-	-	0	0	0x0001	7/2
710-2a2c	-	-	-	-	-1/-
710-6a2c	-	-	-	-	-1/-
710-12a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10096	**SAFE_DIAGNOSIS_MASK**	EXP, N06, N05, -	FBSI
-	'Safety Integrated' diagnosis functions	DWORD	NEW CONF

```
Bit 0 = 0:
   SGE differences between NCK and 611D digital monitoring channel are not
displayed
Bit 0 = 1:
   Default: SGE differences between NCK and drive monitoring channel are dis-
played. Differences between the following SGEs are displayed (the bit numbers
stated refer to the axial map of the SGEs, they correspond to the assignment
of the axial VDI interface):

Bit  0:  SBH/SG deselection  = DB3<x>.DBX22.0
Bit  1:  SBH deselection  = DB3<x>.DBX22.1
Bit  3:  SG selection, bit 0 = DB3<x>.DBX22.3
Bit  4:  SG selection, bit 1 = DB3<x>.DBX22.4
Bit 12:  SE selection  = DB3<x>.DBX23.4
Bit 28:  SG override, bit 0 = DB3<x>.DBX33.4
Bit 29:  SG override, bit 1 = DB3<x>.DBX33.5
Bit 30:  SG override, bit 2 = DB3<x>.DBX33.6
Bit 31:  SG override, bit 3 = DB3<x>.DBX33.7

The differences are displayed by message alarm 27004.

Bit 1 = 0: Default: Display of a non-executed SPL start after expiry of the
    timer defined in MD SAFE_SPL_START_TIMEOUT
          with alarm 27097
Bit 1 = 1: Display of alarm 27097 is suppressed

   Alarm 27097 indicates, that despite the SPL configuration an SPL start has
not been executed after expiration of the time specified in MD
   SAFE_SPL_START_TIMEOUT. For reasons, see alarm description 27097
```

-					
-	-	1	0	0x0003	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10097	**SAFE_SPL_STOP_MODE**			N01, N06, -	FBSI
-	Stop reaction for SPL errors			BYTE	POWER ON
Selection of the stop response when the NCK / PLC SPL cross-check detects errors. 3: Stop D 4: Stop E Entering the value 4 in this MD (Stop E) leads to alarm 27033, "Axis %1 Parameterization of MD MN_SAFE SPL STOP MODE is invalid" unles external Stop E is enabled in all axes with SI function enable ($_MA_SAFE_FUNCTION_ENABLE is not equal to 0). As a remedy, either Stop D must be parameterized, or bits 4 and 6 must be set in $MA_SAFE_FUNKTION_ENABLE for all affected axes. If this MD is set to 4, DBX36.1 must also be set to 1 in DB18 to make this parameterization known to the PLC. A different parameterization leads to alarm 27909, "Error in NCK / PLC data cross check"					
-					
-	-	3	3	4	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10098	**PROFISAFE_IPO_TIME_RATIO**			N01, N06, -	FBSI
-	Factor for PROFIsafe communication			DWORD	POWER ON
Ratio between PROFIsafe communication and interpolator cycle. The actual PROFIsafe communication cycle is the product of this data and IPO_CYCLE_TIME, and is displayed in MD INFO_PROFISAFE_CYCLE_TIME. The OB40 on the PLC side is triggered from the NCK side in this cycle to run the communication between F master and F slaves. The PROFIsafe communication must not exceed 25 ms.					
SFCO					
-	-	1	1	25	7/1
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10099	**INFO_PROFISAFE_CYCLE_TIME**			N01, N06, N05, -	FBSI
s	PROFIsafe communication cycle time			DOUBLE	POWER ON
Display data: Time frame in which F master and F slave communicate with one another. The value results from the interpolator cycle and $MN_PROFISAFE_IPO_TIME_RATIO. The value cannot be changed. The PROFIsafe communication via the OB40 on the PLC runs in this time frame.					
READ					
-	-	0.0	-	-	7/0
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10100	**PLC_CYCLIC_TIMEOUT**			EXP, N01, N06	P3
s	Maximum PLC cycle time			DOUBLE	POWER ON
Cyclical PLC monitoring time. This machine data specifies the maximum monitoring time after which the PLC must have incremented its sign of life. Incrementing takes place within the interpolation cycles.					
-					
-	-	0.1	-	-	7/2

10110	**PLC_CYCLE_TIME_AVERAGE**			N01, N07	B1
s	Average PLC acknowledgement time			DOUBLE	POWER ON
Time information for the CNC about the OB1 cycle time. During this cycle time, it is guaranteed that the auxiliary functions will be acknowledged. By means of the MD, the status transitions: "channel operates/ channel in RESET/ channel failure --> channel interrupted" can be delayed for the PLC in case of a RESET. With the output "channel interrupted", the NCK waits at least the time indicated in the MD + 1 IPO cycle. With the time indication, the path feedrate during path control operation in case of an auxiliary function output during motion is controlled in a way to ensure that the minimum travel time corresponds to the time information. This ensures a uniform velocity behavior which is not disturbed by waiting for the PLC acknowledgement. The internal incrementation is performed in the interpolation cycle. For the auxiliary function output in the continuous-path mode, the MD is also relevant for the FM357 and 802/802s systems. With SW 5.1 and higher, the other systems are parameterized directly via the PLC.					
-					
-	-	0.05	-	-	7/2

10120	**PLC_RUNNINGUP_TIMEOUT**			EXP, N01, N06	H2
s	Monitoring time for PLC power up			DOUBLE	POWER ON
Power up PLC monitoring time This machine data specifies the maximum monitoring time within which the PLC must report its first sign of life to the NCK. During the power up routine, the monitoring function has the task of verifying that the PLC has properly assumed cyclic operation. If the PLC does not issue a message within this time, the NC issues an alarm message when it powers up; NC-READY is not set. The incrementing takes place within the interpolation cycles.					
-					
-	-	50.0	-	-	7/2

10130	TIME_LIMIT_NETTO_COM_TASK			EXP, N01	OEM
s	Runtime limitation of communication to HMI			DOUBLE	POWER ON
Net runtime limit of the communication sub-task Preprocessing and the communications task share the time that is not used up by the cyclical tasks. Of this remaining time, communication uses the set time at the expense of preprocessing time; in other words, the net block cycle time is increased by the set value. This machine data serves the purpose of optimizing the block cycle time with the function "Reloading part programs block-by-block".					
-					
-	-	0.005	.001	0.100	7/1

10131	SUPPRESS_SCREEN_REFRESH			EXP	A2
-	Screen refresh response under overload			BYTE	POWER ON
There are part programs in which the main run (HL) has to wait until the preprocessing (VL) makes new blocks available. The pre-processing and display update compete for NC computing time. The MD defines how the NC is to respond when the pre-processing is too slow. 0: When the VL of a channel is too slow, the updating of the display is suppressed in all channels. 1: When the VL of a channel is too slow, the updating of the display is suppressed only in the time-critical channels in order to gain time for the preprocessing. 2: The updating of the display is never suppressed.					
-					
-	-	0	0	2	7/2

10132	MMC_CMD_TIMEOUT			EXP, N01, N06	PA,M4
s	Monitoring time for HMI command in the part program			DOUBLE	POWER ON
Monitoring time in seconds until the HMI acknowledges a command from the part program. The following times are monitored: - In the case of an HMI command without acknowledgement: time from triggering the transfer of the command string until successful transmission to the HMI - In the case of an HMI command with synchronous and asynchronous acknowledgement time from triggering the transfer of the command strings until receipt of the acceptance acknowledgement from the HMI					
-					
-	-	3.0	0.0	100.0	7/2

10134	MM_NUM_MMC_UNITS		EXP, N01, N02	B3
-	Possible number of simultaneous HMI communication partners		DWORD	POWER ON

Possible number of simultaneous HMI communication partners with which the NCU can exchange data.
This value affects then number of communication orders that the NCK can manage. The higher the value, the more HMIs that can be simultaneously connected to the NCK without leading to communication problems.

DRAM is made available for this function in the NCU corresponding to the input in the machine data. The inputs for changing the memory areas have to be taken into account.
The unit of MD 10134 is a "resource unit".
A standard OP030 needs 1 resource unit, an HMI100/103 needs 2. OEM variants may need more or less resources.

- If the value is set lower than would be needed for the number of connected HMIs, this is not inevitably problematical. Actions may not function sporadically during multiple, simultaneous, communication-intensive operations (e.g. loading a program): Alarm 5000 is displayed. The operation then has to be repeated.

- If the value is et higher, more dynamic memory is occupied than necessary. The value should be reduced appropriately if the memory is required for other purposes.

References: /FB/, S7, "Memory Configuration"

-					
-	-	6	1	10	2/2

10136	DISPLAY_MODE_POSITION		N01	-
-	Display mode for actual position in the WCS		DWORD	RESET

Defines how the position and the distance to go are displayed in the WCS.
0: Display as in software version 5 and earlier
1: At end of block, the actual value display is in principle the same as the programmed end point, irrespective of where the machine actually is (e.g. as a result of the tool radius compensation). The distance to go is the same as the actual distance to be traversed. This means that the displayed actual postion has to be the same as the displayed end position minus the distance to go, irrespective of the actual machine position. If the block end points are changed by chamfers, radii, contour definitions, splines or SAR in comparison to the NC programm, then these changes are reflected in the display as if thay had been programmed. This does not apply to changes resulting from tool radius compensation or smoothing.

-					
-	-	0	0	1	7/1

10140	**TIME_LIMIT_NETTO_DRIVE_TASK**			EXP, N01	ECO
s	Runtime limit of drive communications sub-task			DOUBLE	POWER ON
Net runtime limit of the drive communication sub-task The preprocessing and the communications tasks (drive communication and domain service) share the time that is not used up by the cyclical tasks.					
-					
-	-	0.02	.001	.5	7/1

10150	**PREP_DRIVE_TASK_CYCLE_RATIO**			EXP, N01	ECO
-	Factor for communication with drive			DWORD	POWER ON
This machine data specifies the division ratio used for activation of the drive communication task in the non-cyclic time level. This allows the time share of preparation in the non-cyclic time level to be increased, which reduces block cycle times. Communication with the digital drives is slowed down in particular during program execution.					
-					
-	-	2	1	50	7/1

10160	**PREP_COM_TASK_CYCLE_RATIO**			EXP, N01	ECO
-	Factor for communication with HMI			DWORD	POWER ON
This machine data specifies the division ratio used for activating the communication task in the non-cyclic time level. This allows the time share of preparation in the non-cyclic time level to be increased, which reduces block cycle times. External communication (file transfer) is slowed down in particular during program execution (block reload).					
-					
-	-	3	1	50	7/1

10161	**COM_CONFIGURATION**			EXP, N01	-
-	Configuration of communication			DWORD	POWER ON
Values 1-3 define the maximum number of PDUs that are accepted in one pass. Value 0 stands for infinite, i.e. all present jobs are executed immediately. These three values become active after PowerOn. 1stvalue: max. number of variable job PDUs executed per pass. 2ndvalue: max. number of PI job PDUs executed per pass. 3rdvalue: max. number of domain job PDUs executed per pass. Values 4-8 define the credit assignment for optimized download. 4thvalue: number of PDUs that are assigned as credit at the begin of acknowledgement under opt. domain service (here, the file header and therefore the file on NCK are still unknown) 5thvalue: number of PDUs that will be requested by default under opt. domain service, if there is no explicit memory limit for the file 6thvalue: min. number of PDUs that are requested with the data request message (so that data request messages are not displayed again and again) 7thvalue: max. number of PDUs that are requested with the data request message (max. value is 255, as the log cannot handle more than that!) 8thvalue: max. number of PDUs that may be present in total					
-					
-	8	5, 5,18, 1,16, 8,18,18	-	-	0/0

10185	**NCK_PCOS_TIME_RATIO**			EXP, N01	-
-	Processing time share NCK			DWORD	POWER ON
This machine data defines the maximum proportion of CPU time given to the NCK in a PC-based system. The division specified by the user is implemented as well as possible. When implementing the specification, the system takes into account limiting values for the absolute proportion of CPU time that must not be over or undershot. Adaptations are made without generating an alarm.					
-					
-	-	100	0	100	0/0
710-2a2c	-	65	10	90	7/2
710-6a2c	-	65	10	90	7/2
710-12a2c	-	65	10	90	7/2
710-31a10c	-	65	10	90	7/2
840di-basic	-	50	10	75	7/2
840di-universal	-	50	10	75	7/2
840di-plus	-	50	10	75	7/2

10190	**TOOL_CHANGE_TIME**			N01	BA
-	Tool changing time for simulation			DOUBLE	POWER ON
This data defines how much time is estimated for a tool change (only relevant for a simulation).					
-					
-	-	0.	-	-	7/2

10192	**GEAR_CHANGE_WAIT_TIME**		N01	S1
s	Gear stage change waiting time		DOUBLE	POWER ON

```
External events which trigger reorganization, wait for the end of a gear stage
change. GEAR_CHANGE_WAIT_TIME now determines the waiting time for the gear
stage change. Time unit in seconds.
When this time expires without the gear stage change having been terminated,
the NCK reacts with an alarm.

Among others, the following events will cause reorganization:
User ASUB
Mode change
Delete distance-to-go
Axis replacement
Activate user data
```

-					
-	-	10.0	0.0	1.0e5	7/2

10200	**INT_INCR_PER_MM**		N01	G2
-	Calculation resolution for linear positions		DOUBLE	POWER ON

```
MD: INT_INCR_PER_MM defines the number of internal increments per millimeter.
    Internal calculation accuracy for linear positions.
The internal representation of linear positions and their time derivation is
    scaled in "internal calculation accuracies" and IPO cycles.

The accuracy of the input of linear positions is limited to the calculation
    accuracy by rounding the product of the programmed value and the calcula-
    tion accuracy to an integer. In order to keep the executed rounding eas-
    ily understandable it is useful to use powers of 10 for the calculation
    accuracy.
```

-					
-	-	1000.	1.0	1.0e9	7/2

10210	**INT_INCR_PER_DEG**		N01	G2
-	Calculation resolution for angular positions		DOUBLE	POWER ON

```
INT_INCR_PER_DEG defines the number of internal increments per degree. The
internal calculation accuracy for angular positions. The internal representa-
tion of angular positions and their time derivation is scaled in "internal
calculation accuracies" and IPO cycles. The accuracy of the input of angular
positions is limited to the calculation accuracy by rounding the product of
the programmed value and the calculation accuracy to an integer.
In order to keep the executed rounding easily understandable it is useful to
    use powers of 10 for the calculation accuracy.

Application example: The calculation accuracy can be changed to >1000 incr./
degree for a  high-resolution rotary axis.
```

-					
-	-	1000.0	1.0	1.0e9	7/2

10220	SCALING_USER_DEF_MASK	EXP, N01	G2
-	Activation of scaling factors	DWORD	POWER ON

```
Bit mask for selecting the base values for the data (e.g. machine and setting
    data) that have a physical unit, they are interpreted in the default units
    shown below according to the basic system (metric/inch). If other input/
    output units are to be selected for individual physical units then these
    are activated with the scale factors associated with this machine data
    (entered in MD 10230: SCALING_FACTORS_USER_DEF[n]).
This does not affect the programming of geometry and feed values.

Bit set:
Data of the assigned physical variable (see list) are scaled to the unit
    defined by MD: SCALING_FACTORS_USER_DEF[n].

Bit not set:
Data of the assigned physical variable are scaled to the default unit shown
    below.
   Assigned physical variable    Default units for:
                                 MD 10240: SCALING_SYSTEM_IS_METRIC
Bit no.                            1 = METRIC          0 = INCH
(Stated as hex value)
0 Linear position                    1 mm                1 inch
1 Angular position                   1 degree            1 degree
2 Linear velocity                    1 mm/min            1 inch/min
3 Angular speed                      1 rpm               1 rpm
4 Linear acceleration                1 m/s²              1 inch/s²
5 Angular acceleration               1 rev/s²            1 rev/s²
6 Linear jerk                        1 m/s³              1 inch/s³
7 Angular jerk                       1 rev/s³            1 rev/s³
8 Time                               1 s                 1 s
9 Position-controller servo gain     1/s                 1/s
10 Revolutional feedrate             1 mm/rev            1 mm/rev
11 Compensation value linear pos.    1 mm                1 mm
12 Compensation value angular pos.   1 degree            1 degree
13 Cutting rate                      1 m/min             1 feet/min
Example:
SCALING_USER_DEF_MASK =?H3?; (Bit nos. 0 and 1 as hex values)
The scale factor defined in the associated MD: SCALING_FACTORS_USER_DEF[n] is
    activated for linear and angular positions.
If this machine data is changed, a startup is required as otherwise the asso-
    ciated machine data that have physical units would be incorrectly scaled.
Proceed as follows:
- MD changed manually
    First start up and then enter the associated machine data with physical
    units.
```

```
- MD changed via machine data file
    First start up and then reload the machine data file so that the new phys-
    ical units are taken into account.
If the machine data are altered, alarm 4070 "Scaling machine data altered" is
    output.

Application example: Input/output of linear velocities is to be in cm/min:
SCALING_USER_DEF_MASK = 0x4 (bit no. 2 as hex value)
SCALING_FACTORS_USER_DEF[2] = 0.1666666667 (10/60)

[Related to:
    MD 10230: SCALING_FACTORS_USER_DEF[n] (scaling factors of the physical
    variables)
```

SCAL					
-	-	0x200	0	0x3FFF	7/2

10230	**SCALING_FACTORS_USER_DEF**		EXP, N01	G2
-	Scaling factors of physical variables		DOUBLE	POWER ON

```
The scale factor of a physical variable that has a unit other than the default
    unit setting (set bit in MD 10220: SCALING_FACTORS_USER_DEF_MASK) is
    entered in this MD. The factor must refer to the unit used internally for
    the physical variable in question.

Index [n]     Assigned physical variable              Internal unit
0               Linear  position                      1 mm
1               Angular position                      1 degree
2               Linear velocity                       1 mm/s
3               Angular speed                         1 degree/s
4               Linear acceleration                   1 mm/s²
5               Angular acceleration                  1 degree/s²
6               Linear jerk                           1 mm/s³
7               Angular jerk                          1 degree/s³
8               Time                                  1 s
9               Position-controller servo gain        1/s
10              Revolutional feedrate                 1 mm/degree
11              Compensation value linear position    1 mm
12              Compensation value angular position   1 degree
13              Cutting rate                          1 mm/s
The scaling factor is assigned to the physical variable using the index
    [0...12]. If this machine data is changed, a startup is required because
    otherwise the associated machine data that have physical units would be
    incorrectly scaled.

Proceed as follows:
- MD changed manually
   First start up and then enter the associated machine data with physical
units.
- MD changed via machine data file
   First start up and then reload the machine data file so that the new physi-
cal units are  taken into consideration.
If the machine data are altered, alarm 4070 "Scaling machine data altered" is
    output.

Application example(s):
Input/output of angular speeds is to be in new degree/min:
SCALING_FACTORS_USER_DEF_MASK = 'H8'; (bit no. 3 as hex value)
SCALING_FACTORS_USER_DEF[3] = 0.01851852; (400/360/60)
[3]: Index for angular speed.

Related to:
    MD 10220: SCALING_USER_DEF_MASK (activation of scaling factors).
```

SCAL					
-	15	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	1e-9	-	7/2

10240	SCALING_SYSTEM_IS_METRIC		N01		G2
-	Basic system metric		BOOLEAN		POWER ON

```
The MD defines the basic system used by the control for scaling length-depen-
    dent physical variables for data input/output.
All corresponding data are stored internally in the basic units of 1 mm, 1
    degree and 1 sec.
In the case of access from the interpreter ( part program and download ), from
    the operator panel ( variable service ) or through external communica-
    tion, scaling takes place in the following units:
SCALING_SYSTEM_IS_METRIC = 1: scaled in:
                                          mm,
                                          mm/min,
                                          m/s ² ,
                                          m/s ³,
                                          mm/rev.
SCALING_SYSTEM_IS_METRIC = 0: scaled in:
                                          inch,
                                          inch/min,
                                          inch/s ²,
                                          inch/s ³,
                                          inch/rev.
The selection of the basic system also defines the interpretation of the pro-
    grammed F value for linear axes:
                   metric                 inch
G94                mm/min                 inch/min
G95                mm/rev.                inch/rev.
If this machine data is changed, a startup is required because otherwise the
    associated machine data that have physical units would be incorrectly
    scaled.
Proceed as follows:
- MD changed manually
   First start up and then enter the associated machine data with physical
units.
- MD changed via machine data file
   First start up and then reload the machine data file so that the new physi-
cal units are  taken into consideration.
If the machine data are altered, alarm 4070 "Scaling machine data altered" is
    output.

Application example(s):
Startup in the metric system and then change to inch system.

Special cases, errors:
The factor used for changing from 1 mm to 1 inch can be changed with MD 10250:
    SCALING_VALUE_INCH.
```

SCAL					
-	-	TRUE	-	-	7/2

10250	SCALING_VALUE_INCH		EXP	G2
-	Conversion factor for INCH		DOUBLE	POWER ON

```
The MD contains the conversion factor from metric to inch.
This factor is only active with the selection of the non-metric basic system
(MD 10240: SCALING_SYSTEM_IS_METRIC = 0) in the following conversions:
- Programmed F values for linear axes
- Input/output of lengths and length-dependent data (e.g. when uploading
    machine data, work offsets)
Programmed geometry axis positions are converted by this factor when the mea-
suring system programmed with G70/G71 is different from the selected basic
system (SCAL-ING_ SYSTEM_IS_METRIC).

Programmed synchronous axis positions are converted by the corresponding axial
factors (MD 31200: SCALING_FAKTOR_G70_G71) when the measuring system pro-
grammed with G70/G71 is different from the selected basic system (SCALING_SYS-
TEM_ IS_METRIC). Settings other than the default 25.4 should only be made in
exceptional cases as the correct display of the unit on the operator inter-
face depends on this value.
If this machine data is changed, a startup is required because otherwise the
    associated machine data that have physical units would be incorrectly
    scaled.
Proceed as follows:
- MD changed manually
   --> Start up and then enter the associated machine data with physical
units.
- MD changed via machine data file
   -->Start up and then reload the machine data file so that the new physical
units are  taken into consideration.
If the machine data are altered, alarm 4070 "Scaling machine data altered" is
    output.

Application example(s):
This conversion factor is used if a changeover is made from metric to inch or
a customized measuring system after startup. Then all the input machine data,
among other things, are converted by this factor. The converted values are
then given at the next read out and on the operator panel.

Related to:
    MD 10240: SCALING_SYSTEM_IS_METRIC
```

SCAL					
-	-	25.4	1e-9	-	0/0

10260	CONVERT_SCALING_SYSTEM		EXP		A3,G2
-	Enable basic system conversion		BOOLEAN		POWER ON

```
Determines the handling of MD10240 $MN_SCALING_SYSTEM_IS_METRIC.

0: Inch/metric behavior conforms to SW1-SW4
1: Inch/metric behavior from SW5

Inch/metric functionality of SW5:
1. Switch over the systems of units with HMI softkey
2. New G codes G700/G710
3. Data backup with system of unit recognition INCH/METRIC
4. Automatic data conversion on change of system of units
- All zero point offsets
- Compensation data (EEC, QEC)
- Tool offsets
- etc.
The change from $MN_CONVERT_SCALING_SYSTEM leads to alarm 4070!
This alarm is designed to indicate that data which remain active after a  POW-
ERON are not subjected to automatic conversion from SW1-SW4 and SW5 formats.
```

LINK					
-	-	FALSE	-	-	1/1

<table>
<tr><td>10270</td><td colspan="2">POS_TAB_SCALING_SYSTEM</td><td>N01, N09</td><td colspan="2">T1</td></tr>
<tr><td>-</td><td colspan="2">System of units of position tables</td><td>BYTE</td><td colspan="2">RESET</td></tr>
<tr><td colspan="6">Defines the measuring system for the positional data for the following machine data
MD10910 INDEX_AX_POS_TAB_1
MD10930 INDEX_AX_POS_TAB_2
MD41500 SW_CAM_MINUS_POS_TAB_1
MD41501 SW_CAM_PLUS_POS_TAB_1
MD41502 SW_CAM_MINUS_POS_TAB_2
MD41503 SW_CAM_PLUS_POS_TAB_2
MD41504 SW_CAM_MINUS_POS_TAB_3
MD41505 SW_CAM_PLUS_POS_TAB_3
MD41506 SW_CAM_MINUS_POS_TAB_4
MD41507 SW_CAM_PLUS_POS_TAB_4

0: metric
1: inch
This machine data is only evaluated for MD10260 CONVERT_SCALING_SYSTEM = 1.

Related to:
MD10260: CONVERT_SCALING_SYSTEM
MD10910: INDEX_AX_POS_TAB_1
MD10930: INDEX_AX_POS_TAB_2
MD41500: SW_CAM_MINUS_POS_TAB_1
MD41501 SW_CAM_PLUS_POS_TAB_1
MD41502: SW_CAM_MINUS_POS_TAB_2
MD41503: SW_CAM_PLUS_POS_TAB_2
MD41504: SW_CAM_MINUS_POS_TAB_3
MD41505: SW_CAM_PLUS_POS_TAB_3
MD41506: SW_CAM_MINUS_POS_TAB_4
MD41507: SW_CAM_PLUS_POS_TAB_4</td></tr>
<tr><td>-</td><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td>-</td><td>-</td><td>0</td><td>0</td><td>1</td><td>7/2</td></tr>
</table>

<table>
<tr><td>10280</td><td colspan="2">PROG_FUNCTION_MASK</td><td>EXP, N01</td><td colspan="2">K1</td></tr>
<tr><td>-</td><td colspan="2">Comparing (> and <) compatible with SW6.3</td><td>DWORD</td><td colspan="2">POWER ON</td></tr>
<tr><td colspan="6">Bit mask for parameterizing various sub-program commands
Bit no.   Hexadec.   Meaning with bit set
Value
Bit0:   0x1   Comparison commands ">" and "<" are processed as for SW 6.3 and earlier:
Sub-program data of the type REAL are mapped internally in the IEEE 64 bit format. This mode maps decimal numbers inaccurately if this format's 52-bit wide mantissa is inadequate to map the number in binary notation. To solve this problem, all comparison commands (==, <>, >=, <=, > and <) are checked for a relative equality of 1E-12.

This procedure is switched off for greater than (>) and lesser than (<) comparisons by setting bit 0. (Compatibility setting for software releases earlier than SW 6.4)</td></tr>
<tr><td>-</td><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td>-</td><td>-</td><td>0x0</td><td>0</td><td>0x1</td><td>7/2</td></tr>
</table>

10284	DISPLAY_FUNCTION_MASK			EXP, N01	-
-	BTSS-variable lastBlockNoStr active			DWORD	POWER ON
Bit mask for parameterizing various display variables: BitNo. Hexadec. value Meaning with bit set Bit0: 0x1 Parameters are assigned to the OPI variable lastBlockNoStr in the SPARP and SPARPP blocks. Bit1: 0x2 Concerns the OPI variable cmdSpeed in the SPARPP block. If the bit is set, the variable returns the programmed speed even if the spindle is at a standstill or in another mode (positioning mode, axis mode). Bit2 0x4 Concerns the OPI variable cmdSpeed in the SPARPP block. (reserved for constant cutting speed) Bit8: 0x100 Servotrace manages larger numerical values internally. Overruns in data format are avoided. The accuracy may be reduced with large numerical values.					
-					
-	-	0x0	-	-	7/2

10290	CC_TDA_PARAM_UNIT			N09	G2
-	Physical units of tool data for compile cycles			DWORD	POWER ON
Physical units for the user-defined tool-specific data: 0 ;No unit 1 ;Linear position [mm ; inch] 2 ;Angular position [degree ; degree] 3 ;Linear velocity [mm/min ; inch/min] 4 ;Angular speed [rpm ; rpm] 5 ;Linear acceleration [m/s² ; inch/s²] 6 ;Angular acceleration. [rev/s ² ; rev/s ²] 7 ;Linear jerk [m/s ³ ; inch/s ³] 8 ;Angular jerk [rev/s ³ ; rev/s ³] 9 ;Revolutional feedrate [mm/rev ; inch/rev] Only available if bit 2 (0x4) is set in MD 18080: MM_TOOL_MANAGEMENT_MASK					
-					
-	10	0,0,0,0,0,0,0,0,0,0	0	9	2/2

10291	**CCS_TDA_PARAM_UNIT**			N09	-
-	physical units of SIEMENS-OEM tool data			DWORD	POWER ON
-					
-	10	0,0,0,0,0,0,0,0,0,0	0	9	2/2

```
Physical units for application-specific tool-specific data:

0: No unit
1: Linear position              [ mm; inch ]
2: Angular position             [ degree ; degree ]
3: Linear velocity              [ mm/min ; inch/min ]
4: Angular speed                [ rev/min ; rev/min ]
5: Linear acceleration          [ m/s² ; inch/s² ]
6: Angular acceleration         [ rev/s² ; rev/s² ]
7: Linear jerk                  [ m/s³ ; inch/s³ ]
8: Angular jerk                 [ rev/s³ ; rev/s³ ]
9: Feedrate per revolution      [ mm/rev; inch/rev]

Only available if Bit 2 (0x4) is set in MD MM_TOOL_MANAGEMENT_MASK.
Related to: MM_NUM_CCS_TDA_PARAM
```

10292	**CC_TOA_PARAM_UNIT**			N09	G2
-	Physical units of cutting edge data for compile cycles			DWORD	POWER ON
-					
-	10	0,0,0,0,0,0,0,0,0,0	0	9	2/2

```
Physical units for the user-defined cutting edge data:

0  ;No unit
1  ;Linear position        [ mm ; inch ]
2  ;Angular position       [ degree ; degree ]
3  ;Linear velocity        [ mm/min ; inch/min ]
4  ;Angular speed          [ rpm ; rpm ]
5  ;Linear acceleration    [ m/s²  ; inch/s² ]
6  ;Angular acceleration.  [ rev/s ² ; rev/s ² ]
7  ;Linear jerk            [ m/s ³ ; inch/s ³  ]
8  ;Angular jerk           [ rev/s ³ ; rev/s ³ ]
9  ;Revolutional feedrate  [ mm/rev ; inch/rev ]

Only available if bit 2 (0x4) is set in MD 18080: MM_TOOL_MANAGEMENT_MASK
```

10293	**CCS_TOA_PARAM_UNIT**		N09	-	
-	Physical units of SIEMENS-OEM cutting edge data		DWORD	POWER ON	

```
Physical units for application-specific cutting data:

0 :  No unit
1 :  Linear position              [ mm ; inch ]
2 :  Angular position             [ degree ; degree ]
3 :  Linear velocity              [ mm/min ; inch/min ]
4 :  Angular speed                [ rev/min ; rev/min ]
5 :  Linear acceleration          [ m/s² ; inch/s² ]
6 :  Angular acceleration         [ rev/s² ; rev/s² ]
7 :  Linear jerk                  [ m/s³ ; inch/s³ ]
8 :  Angular jerk                 [ rev/s³ ; rev/s³ ]
9 :  Feedrate per revolution      [ mm/rev; inch/rev]

Only available if Bit 2 (0x4) is set in MD MM_TOOL_MANAGEMENT_MASK.
Related to: MM_NUM_CCS_TOA_PARAM
```

-					
-	10	0,0,0,0,0,0,0,0,0,0	0	9	2/2

10300	**FASTIO_ANA_NUM_INPUTS**		N10	A4	
-	Number of active analog NCK inputs		BYTE	POWER ON	

```
This machine data defines the number of usable analog NCK inputs on the con-
trol.

Only these analog NCK inputs can be addressed by the NC part program or
assigned by NC functions.

If more analog NCK inputs are defined with the machine data than are avail-
    able in the hardware of the control, the binary analog actual value is set
    to zero in the control for the inputs that do not exist in the hardware.
    The NCK value can be altered by the PLC.

Note:
   CPU computing time on the interpolation level is required for processing
the digital and analog NCK I/Os. The number of active NCK I/Os should there-
fore be limited to the demands of the machine so that the interpolation cycle
time is not unnecessarily loaded.
```

-					
-	-	0	0	8	7/2

10310	**FASTIO_ANA_NUM_OUTPUTS**			N10	A4
-	Number of active analog NCK outputs			BYTE	POWER ON
This machine data defines the number of usable analog NCK outputs on the control. Only these analog NCK outputs can be addressed by the NC part program or assigned by NC functions. If more analog NCK outputs are defined with the machine data than are available in the hardware of the control, no alarm is triggered. The analog values specified by the part program can be read by the PLC. Note: CPU computing time on the interpolation level is required for processing the digital and analog NCK I/Os. The number of active NCK I/Os should therefore be limited to the demands of the machine so that the interpolation cycle time is not unnecessarily loaded.					
-					
-	-	0	0	8	7/2

10320	FASTIO_ANA_INPUT_WEIGHT		N10	A4	
-	Weighting factor for analog NCK inputs		DWORD	POWER ON	

A weighting factor can be defined with this MD for each analog NCK input [n] to enable adaptation to the various analog-to-digital converters (depending on the I/O module).

The value to be entered in this machine data is the value that is to be read in the part program with the command x = $A_INA[n] if the associated analog input [n] is set to the maximum value or the value +32767 is defined for this input via the PLC interface.

The value read from the analog-to-digital converter or the PLC interface is multiplied by the factor (FASTIO_ANA_INPUT_WEIGHT / 32767) before it can be read in the part program with the system variable $A_INA[n].

An internal value of - 32767 is formed when the maximum input voltage is at the analog-to-digital converter.

Use of the weighting factor for "Analog NCK inputs without hardware": With a weighting factor of 32767, the values defined by the part program and the PLC are numerically identical (1:1 communication between part program and PLC). This is advantageous when the analog NCK inputs/outputs are used purely as PLC inputs/outputs without analog hardware.

Note:

The comparator threshold values MD 41600: COMPAR_THRESHOLD_1 and MD 41601: COMPAR_THRESHOLD_2 are also normalized to FASTIO_ANA_INPUT_WEIGHT corresponding to their assignment to an analog input.

The CC access to analog values is not affected by FASTIO_ANA_INPUT_WEIGHT.

Related to:

IS "PLC setting value for analog NCK inputs" (DB10, DBB148 - 163)
IS "PLC setting value for analog NCK outputs" (DB10, DBB170 - 185)
IS "Setpoint for analog NCK outputs" (DB10, DBB210 - 225)

-					
-	8	10000,10000,10000,10000,10000,10000...	1	10000000	7/2

10330	FASTIO_ANA_OUTPUT_WEIGHT		N10	A4
-	Weighting factor for analog NCK outputs		DWORD	POWER ON

A weighting factor can be defined with this MD for each analog NCK output [n] to enable adaptation to the various analog-to-digital converters (depending on the I/O module used).

[hw] = Index (0 to 7) for addressing the external analog outputs

The value x to be entered in this machine data is the value that is to effect the maximum set value of the associated analog output [n] when programming $A_OUTA[n] = x in the part program or is to generate the value +32767 in the PLC interface for this output. Thus an internal value of -32767 generates the maximal output voltage at the digital-to-analog converter.

Use of the weighting factor for "Analog NCK outputs without hardware": With a weighting factor of 32767, the values defined by the part program and the PLC are numerically identical (1:1 communication between part program and PLC). This is advantageous when the analog NCK outputs are used purely as PLC outputs without analog hardware.

Related to:
IS "PLC setting value for analog NCK inputs" (DB10, DBB148 - 163)
IS "PLC setting value for analog NCK outputs" (DB10, DBB170 - 185)
IS "Setpoint for analog NCK outputs" (DB10, DBB210 - 225)

-					
-	8	10000,10000,10000,10000,10000,10000...	1	10000000	7/2

10350	FASTIO_DIG_NUM_INPUTS		N10	A4
-	Number of active digital NCK input bytes		BYTE	POWER ON

The number of bytes of the digital NCK inputs that can be used on the control are defined in this machine data.

These digital NCK inputs can be read directly by the part program. Moreover, the signal state at the HW inputs can also be changed by the PLC.

If more digital NCK inputs are defined in the machine data than are available in the control hardware, a signal status of 0 is set in the control for the inputs that do not exist in the hardware. The NCK value can be altered by the PLC.

Related to:
IS "Disable the digital NCK inputs" (DB10, DBB0, DBB122 ...)
IS "PLC setting for digital NCK inputs" (DB10, DBB1, DBB123 ...)
IS "Actual value for digital NCK inputs" (DB10, DBB60, DBB186 ...)

-					
-	-	1	0	5	7/2

10360	FASTIO_DIG_NUM_OUTPUTS		N10	A4	
-	Number of active digital NCK output bytes		BYTE	POWER ON	
The number of bytes for digital NCK outputs that can be used on the control are defined in this machine data. These digital NCK outputs can be set directly by the part program. The PLC is able to - set the digital outputs to "0" in a defined way with IS "Disable the digital NCK outputs". - alter the NCK value with IS "Overwrite mask for digital NCK outputs". - specify a PLC value with IS "Setting mask for digital NCK outputs". If more digital NCK outputs are defined in the machine data than are available in the control hardware, no alarm is triggered. The signal states specified by the part program can be read by the PLC. Special cases: Digital NCK outputs 5 to 8 can be processed only by the PLC (no hardware outputs). Related to: IS "Disable the digital NCK outputs" (DB10, DBB4, DBB130 ...) IS "Overwrite mask for digital NCK outputs" (DB10, DBB5, DBB131 ...) IS "PLC setting for digital NCK outputs" (DB10, DBB6, DBB132 ...) IS "Setting mask for digital NCK outputs" (DB10, DBB7, DBB133 ...) IS "Setpoint for digital NCK outputs" (DB10, DBB64, DBB190 ...)					
-					
-	-	0	0	5	7/2

10361	FASTIO_DIG_SHORT_CIRCUIT		N10	A2	
-	Short circuit of digital inputs and outputs		DWORD	POWER ON	

```
Defined short circuits between digital output and input signals of the high-
speed NCK I/Os are realized by linking the signals read in from the high-speed
NCK I/Os or the PLC interface to defined output signals.

The output signals always remain unchanged by the link, the inputs that have
    to be taken into account internally arise from the read inputs and the
    link. If a plurality of output bits are specified for one input bit in
    overwrite mode, the last defined assignment in the list determines the
    result.

The definition of non-existent or non-activated inputs/outputs is ignored
    without an alarm.


Bits 0-7:Number of the input byte to be written ( 1 - 5 )
Bits 8-15:Bit number within the input byte ( 1 - 8 )

Link:
The type of link is selected by adding a hexadecimal number to the input bit
    number:
    00   Overwrite input identically to output
    A0   Input is AND-gated to the read input with the status of the stated
    output
    B0   Input is OR-gated to the read input with the status of the stated
    output

Bits 16-23:Number of the output byte to be used ( 1 - 5 )
Bits 24-31:Bit number within the output byte ( 1 - 8 )


Example:
$MN_FASTIO_DIG_SHORT_CIRCUIT[ 0 ] = 0x04010302
   Input:  3rd bit of the 2nd byte
   Output:  4th bit of the 1st byte ( = 4th onboard NCU output )
   The input status is overwritten by the specified output

$MN_FASTIO_DIG_SHORT_CIRCUIT[ 1 ] = 0x0705A201
   Input:  2nd bit of the 1st byte ( = 2nd onboard NCU input )
   Output:  7th bit of the 5th byte
   The input status is AND-gated with the specified output

$MN_FASTIO_DIG_SHORT_CIRCUIT[ 2 ] = 0x0103B502
   Input:  5th bit of the 2nd byte
   Output:  1st bit of the 3rd byte
   The input status is OR-gated with the specified output

Related to:
    MD 10350: FASTIO_DIG_NUM_INPUTS,
    MD 10360: FASTIO_DIG_NUM_OUTPUTS.

References:         /FB/, A4, "Digital and Analog NCK I/Os"
```

-					
-	10	0,0,0,0,0,0,0,0,0,0	-	-	7/2

10362	HW_ASSIGN_ANA_FASTIN			N10	A4
-	Hardware assignment of the fast analog NCK inputs			DWORD	POWER ON

```
The following 4 bytes assign the external analog NCK inputs to the hardware:

   1st byte:      I/O no.
   2nd byte:      Submodule no.
   3rd byte:      Module no.
   4th byte:      Segment no.

As soon as value 0 is entered in byte 3 (module no.), external I/Os are no
    longer processed by the control.

The hardware assignment is control specific and therefore different on the
    SINUMERIK 840D/810D and FM-NC.

The individual bytes are explained in MD 10366: HW_ASSIGN_DIG_FASTIN.

[hw] = Index (0 to 7) for addressing the external analog inputs

Related to:
    MD 10366: HW_ASSIGN_DIG_FASTIN
    MD 10368: HW_ASSIGN_DIG_FASTOUT
    MD 10364: HW_ASSIGN_ANA_FASTOUT
```

-					
-	8	0x01000000,0x01000000,0x01000000...	0x01000000	0x060003FF	7/2

10364	HW_ASSIGN_ANA_FASTOUT			N10	A4
-	Hardware assignment of external analog NCK outputs			DWORD	POWER ON

```
The following 4 bytes assign the external analog NCK outputs to the hardware:
     1st byte:      I/O no.
     2nd byte:      Submodule no.
     3rd byte:      Module no.
     4th byte:      Segment no.

As soon as value 0 is entered in byte 3 (module no.), external I/Os are no
    longer processed by the control.

The individual bytes are explained in MD 10366: HW_ASSIGN_DIG_FASTIN.

Related to:
    MD 10366: HW_ASSIGN_DIG_FASTIN
    MD 10368: HW_ASSIGN_DIG_FASTOUT
    MD 10362: HW_ASSIGN_ANA_FASTIN
```

-					
-	8	0x01000000,0x01000000,0x01000000...	0x01000000	0x060003FF	7/2

10366	HW_ASSIGN_DIG_FASTIN	N10	A4
-	Hardware assignment of external digital NCK inputs	DWORD	POWER ON

```
The following 4 bytes assign the external digital NCK I/Os to the hardware:

      1st byte:     I/O no.
      2nd byte:     Submodule no.
      3rd byte:     Module no.
      4th byte:     Segment no.

As soon as value 0 is entered in byte 3 (module no.), the output byte con-
    cerned is not processed by the control.

 I/O no.:
    Number of the I/O byte on the DP compact module (range: 1 to 2; always 1
    with analog inputs/outputs)
Submodule no.:
    Submodule slot on the terminal block into which the DP compact module is
    inserted (range: 1 to 8)
Module no.:
    Number of the logical slot into which the terminal block with the exter-
    nal I/Os is inserted. The  logical slot is assigned to a physical slot by
    MD 13010: DRIVE_LOGIC_NR (logical drive number). Each module occupies a
    physical slot. The first 6 slots are permanently occupied on the 810D.
Segment no.:
    Always 1 for 840D/810D (ID for 611D bus)

       Example:
               HW_ASSIGN_DIGITAL_FASTIN[3] = 01 04 03 02
   1st byte: 02 =     2nd input byte of a 16 bit input module
   2nd byte: 03 =     Input module inserted in slot 3 of the terminal block
   3rd byte: 04 =     Terminal block inserted at logical drive number 4
   4th byte: 01 =     ID for 611D bus
PROFIBUS DP:
Segment no.: 5 = PROFIBUS DP
             6 = PROFIBUS DP link module

Module no.:   1 ... MD_MAXNUM_SIMO611D_AXES:
    Number of the logical slot in which the terminal block with the external
    I/Os is inserted. The logical slot is assigned to a physical slot by
    $MN_DRIVE_LOGIC_NR, it is activated by $MN_DRIVE_IS_ACTIVE.
1st + 2nd bytes give the logical start address of the I/O slot on the PROFIBUS
1st byte = low byte
2nd byte = high byte
Value 0000 means NO active slots
Values 0001..007F  are reserved for the PLC (NCK can also read the value for
    input slots without error, but output slots are forbidden in this range
    and lead to an alarm during startup)
Values 0080..02FF  are valid
Values > 02FF  are invalid
```

```
Example:
HW_ASSIGN_DIGITAL_FASTIN[3] = '05000302'
1st + 2nd byte:   0302 (hex) = logical start address 770 (decimal)
3rd byte:   00 = no significance
4th byte:   05 = ID for PROFIBUS DP

Related to:
    MD 10368: HW_ASSIGN_DIG_FASTOUT
    MD 10362: HW_ASSIGN_ANA_FASTIN
    MD 10364: HW_ASSIGN_ANA_FASTOUT
```

-					
-	10	0x01000000,0x01000000,0x01000000...	0x01000000	0x060003FF	7/2

10368	**HW_ASSIGN_DIG_FASTOUT**	N10	A4
-	Hardware assignment of external digital NCK outputs	DWORD	POWER ON

```
The following 4 bytes assign the external digital NCK outputs to the hardware:

                1st byte:     I/O no.
                2nd byte:     Submodule no.
                3rd byte:     Module no.
                4th byte:     Segment no.

As soon as value 0 is entered in byte 3 (module no.), the output byte con-
    cerned is not processed by the control.
The hardware assignment is control specific and therefore different on the
    SINUMERIK 840D/810D and FM-NC.

The individual bytes are explained under MD: HW_ASSIGN_DIG_FASTIN.

[hw] = Index (0 to 3) for addressing the external digital output bytes

Related to:
    MD 10366: HW_ASSIGN_DIG_FASTIN
    MD 10362: HW_ASSIGN_ANA_FASTIN
    MD 10364: HW_ASSIGN_ANA_FASTOUT
```

-					
-	4	0x01000000,0x01000000,0x01000000...	0x01000000	0x060003FF	7/2

10380	**HW_UPDATE_RATE_FASTIO**	EXP, N10	A4
-	Updating rate of clocked external NCK I/Os	BYTE	POWER ON

For more detailed information see
References: /FB/, G2, "Velocities, Setpoint/Actual Value Systems, Cycle Times"

Note:
Please consider the hardware response times of the external I/O modules used.

References: /PHD/, SINUMERIK 840D, NCU Manual

MD irrelevant for: SINUMERIK FM-NC

Related to:
MD 10382: HW_LEAD_TIME_FASTIO
MD 10384: HW_CLOCKED_MODULE_MASK
POSCTR_SYSCLOCK_TIME_RATIO
IPO_SYSCLOCK_TIME_RATIO
SYSCLOCK_SAMPL_TIME_RATIO
DRIVE_LOGIC_NR
-
The cycle frequency is selected for the clock-synchronous input and output of the external NCK I/Os with this machine data (840D only).

The cycle time applies to all I/O modules on a terminal block that are operated in synchronization with the clock (MD 10384: HW_CLOCKED_MODULE_MASK[tb]=1).

The selection can be made from the following cycle frequencies:

Value =
1: Synchronous input/outputs in hardware cycles (not in software release 2)
(SYSCLOCK_CYCLE_TIME / SYSCLOCK_SAMPL_TIME_RATIO)

2: Synchronous input/outputs in the position control cycle (default setting)
(MD: POSCTR_SYSCLOCK_TIME_RATIO)

3: Synchronous inputs/outputs in the interpolation cycle (MD: IPO_SYSCLOCK_TIME_RATIO)

Note on index [tb] (tb = 0 to 1):
Index [tb] identifies the connected NCU terminal blocks in ascending order of the defined logical module numbers (parameterization with MD: DRIVE_LOGIC_NR "logical drive number").

```
Example:
   An additional 2 terminal blocks which are parameterized with the logical
drive numbers 6 and 7 are connected to the drive bus.

   The following assignments are made for the terminal blocks in the control:

- HW_UPDATE_RATE_FASTIO[0] parameterizes terminal block 1 with no. 6
- HW_UPDATE_RATE_FASTIO[1] parameterizes terminal block 2 with no. 7

   This assignment applies analogously to:
   MD 10380: HW_UPDATE_RATE_FASTIO[tb] and
    MD 10384: HW_CLOCKED_MODULE_MASK [tb]
```

-	5	2,2,2,2,3	2	3	7/2

10382	**HW_LEAD_TIME_FASTIO**	EXP, N10	A4
-	Lead time of clocked external NCK I/Os	DWORD	POWER ON

```
A lead time can be defined for digital and analog NCK I/Os (MD 10384:
    HW_CLOCKED_MODULE_MASK = 1) operated in synchronization with the clock.

The input signal is stored this length of time before the defined cycle. The
    output signal is sent to the hardware this same length of time before the
    defined cycle.
With analog NCK inputs, for example, this makes it possible to consider the
hardware-specific conversion time of the analog-to-digital converter so that
the digitized analog value is available at the cycle time point.

If the value set in this machine data exceeds the set cycle time (MD 10380:
    HW_UPDATE_RATIO_FASTIO), it is limited internally to the largest possible
    offset (i.e. to the parameterized cycle time).

The lead time applies to all NCK inputs/outputs of the terminal block
    addressed with index [tb] which are operated in synchronization with the
    clock.

Note on index [tb] see MD 10380: HW_UPDATE_RATE_FASTIO.

MD irrelevant for: SINUMERIK FM-NC

Related to:
    MD 10380: HW_UPDATE_RATIO_FASTIO
    MD 10384: HW_CLOCKED_MODULE_MASK
```

-					
-	5	100,100,100,100,100	-	-	7/2

10384	HW_CLOCKED_MODULE_MASK		N10		A4
-	Synchronous processing of external NCK I/Os		BYTE		POWER ON

```
The I/O modules of the external NCK I/Os can be operated in the following ways
    with SINUMERIK 840D:

- Asynchronously, i.e. the input and output values are made available in
    cycles set by the terminal block which are asynchronous to the internal NC
    processing cycles.

- Synchronously, i.e. the input and output values are made available synchro-
    nously to a settable internal NC processing cycle.

These modes of operation can be set via a bit mask (bits 0 to 7) for each
individual I/O module of the terminal block addressed with index [tb] (bit 0
for I/O module on slot 1 ... bit 7 for I/O module on slot 8).

Each bit has the following meaning:

Bit n = 0: I/O module on slot n+1 is operated asynchronously
Bit n = 1: I/O module on slot n+1 is operated synchronously

The value is of no significance for the unassigned slots of a terminal block.

Example:
   HW_CLOCKED_MODULE_MASK[0] = 30 (bit mask: 0011 0000)
   The I/O modules on slots 5 and 6 of terminal block 1 are operated in syn-
chronization with the clock.

Note:
Digital NCK inputs/outputs are generally always operated asynchronously. When
analog NCK inputs/outputs are used in closed control loops, values often have
to be read in and out in synchronization with the clock.

Note on index [tb] see MD 10380: HW_UPDATE_RATE_FASTIO.

MD irrelevant for: SINUMERIK FM-NC (always operated asynchronously)

Related to:
    MD 10382: HW_LEAD_TIME_FASTIO
    MD 10380: HW_UPDATE_RATIO_FASTIO
```

-					
-	5	0,0,0,0,0	-	-	7/2

10385	**PROFISAFE_MASTER_ADDRESS**			N01, N06, -	FBSI
-	PROFIsafe address PROFIsafe master module			DWORD	POWER ON
Definition of the PROFIsafe address of the F master NCK/PLC. Used for unique assignment between F master and F slave. This parameter must be entered corresponding to the parameter "F_source_address" set in S7-ES for the F slaves. Communication is only attempted to be set up with F slaves which have this address entered.					
-					
-	-	0	0	0x0500FA7D	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10386	**PROFISAFE_IN_ADDRESS**			N01, N06, -	FBSI
-	PROFIsafe address input module			DWORD	POWER ON
PROFIsafe destination address of an input module Format: 0s 0x aaaa s: Bus segment (5 = DP connection on the PLC side) x: Sub-slot address Value range: 0...1 x = 0 addresses the F user data signals 1...32 x = 1 adresses the F user data signals 33...64 aaaa: Hexadecimal PROFIsafe address of the F module					
-					
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0x0501FFFF	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10387	**PROFISAFE_OUT_ADDRESS**			N01, N06, -	FBSI
-	PROFIsafe-address output module			DWORD	POWER ON
PROFIsafe destination address of an output module Format: 0s 0x aaaa s: Bus segment (5 = DP connection on the PLC side) x: Sub-slot address Value range: 0...1 x = 0 addresses the F user data signals 1...32 x = 1 adresses the F user data signals 33...64 aaaa: Hexadecimal PROFIsafe address of the F module					
-					
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0x0501FFFF	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10388	**PROFISAFE_IN_ASSIGN**			N01, N06, -	FBSI
-	Input.assignment $A_INSE to PROFIsafe module			DWORD	POWER ON
Assignment between external SPL interface $A_INSE and PROFIsafe input module The three lower digits indicate the least significant $A_INSE variable to be fed. The three higher digits indicate the most significant $A_INSE variable to be fed. Example: PROFISAFE_IN_ASSIGN[0] = 4001: The system variables $A_INSE[1...4] are fed with the state of the input terminals of the PROFIsafe module specified by MD PROFISAFE_IN_ADDRESS[0].					
-					
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	64064	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10389	**PROFISAFE_OUT_ASSIGN**			N01, N06, -	FBSI
-	Outp.assignment $A_OUTSE to PROFIsafe module			DWORD	POWER ON
Assignment between external SPL interface $A_OUTSE and PROFIsafe output module The three lower digits indicate the least significant $A_OUTSE variable to be connected. The three higher digits indicate the most significant $A_OUTSE variable to be connected. Example: PROFISAFE_OUT_ASSIGN[0] = 64011: The system variables $A_OUTSE[61...64] are fed to the output terminals of the PROFIsafe module specified by MD PROFISAFE_OUT_ADDRESS[0].					
-					
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	64064	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10390	SAFE_IN_HW_ASSIGN		N01, N06, -	FBSI
-	Input assignment of external SPL interface		DWORD	POWER ON

```
An input byte of the NCK I/Os can be assigned byte by byte to the system vari-
    ables $A_INSE[x] with this machine data.

n   System variables  Comment
=0  $A_INSE[1...8]    Assignment for 1st byte
=1  $A_INSE[9..16]    Assignment for 2nd byte
=2  $A_INSE[17..24]   Assignment for 3rd byte
=3  $A_INSE[25..32]   Assignment for 4th byte
=4  $A_INSE[33..40]   Assignment for 5th byte
=5  $A_INSE[41..48]   Assignment for 6th byte
=6  $A_INSE[49..56]   Assignment for 7th byte
=7  $A_INSE[57..64]   Assignment for 8th byte

Related to:
    MD 10392: §MN_SAFE_OUT_HW_ASSIGN

See MD 10366:$MN_HW_ASSIGN_DIG_FASTIN for structure.
This involves the restriction that an I/O module has to be addressed via this
MD. Assignment to another system variable is not possible.
```

-					
-	8	0,0,0,0,0,0,0,0	-	-	7/2
710-2a2c	-	-	-	-	-1/-
710-6a2c	-	-	-	-	-1/-
710-12a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10392	SAFE_OUT_HW_ASSIGN			N01, N06, -	FBSI
-	Output assignment ext. interface SPL			DWORD	POWER ON

```
An output byte of the NCK I/Os can be assigned byte by byte to the system
    variables $A_OUTSE[x] with this machine data.

n    System variables   Comment
=0   $A_OUTSE[1..8]     Assignment for 1st byte
=1   $A_OUTSE[9..16]    Assignment for 2nd byte
=2   $A_OUTSE[17..24]   Assignment for 3rd byte
=3   $A_OUTSE[25..32]   Assignment for 4th byte
=4   $A_OUTSE[33..40]   Assignment for 5th byte
=5   $A_OUTSE[41..48]   Assignment for 6th byte
=6   $A_OUTSE[49..56]   Assignment for 7th byte
=7   $A_OUTSE[57..64]   Assignment for 8th byte

Related to:
    MD 10390: $MN_SAFE_IN_HW_ASSIGN
```

-					
-	8	0,0,0,0,0,0,0,0	-	-	7/2
710-2a2c	-	-	-	-	-1/-
710-6a2c	-	-	-	-	-1/-
710-12a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10393	SAFE_DRIVE_LOGIC_ADDRESS			N01, N06, -	-
-	Logical drive addresses SI			DWORD	POWER ON

```
Logical I/O addresses of the SI message frames of the drives on the PROFIBUS.
One address is assigned to one drive.
```

-					
-	31	6700,6724,6748,6772,6796,6820,6844...	258	8191	7/2
840d-2a2c	-	-	-	-	-1/-
840d-6a2c	-	-	-	-	-1/-
840d-12a2c	-	-	-	-	-1/-
840d-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

10394	**PLCIO_NUM_BYTES_IN**		N10	A2	
-	Number of directly readable input bytes of the PLC I/Os		BYTE	POWER ON	

```
The number of PLC I/O input bytes that can be read directly by the NC.

These bytes are not transmitted by the PLC user program but via an interrupt
of the PLC operating system.
The access delay is less than 0.5 ms.
The bytes can be read by the part program and from synchronized actions with
    the system variables:
$A_PBB_IN,
$A_PBW_IN,
$A_PBD_IN,
$A_PBR_IN
.

Attention:
   The machine data MD 10394: PLCIO_NUM_BYTES_IN and MD 10395:
PLCIO_LOGIC_ADDRESS_IN must be consistent with the configuration by the PLC.

Related to:
    MD 10395: PLCIO_LOGIC_ADDRESS_IN
```

-					
-	-	0	0	32	7/2

10395	**PLCIO_LOGIC_ADDRESS_IN**		N10	A2	
-	Start addr. of the directly readable input bytes of the PLC I/Os		DWORD	POWER ON	

```
The PLC hardware must configure a number of  MD 10394: PLCIO_NUM_BYTES_IN for
    direct use by the NC starting from this address. These bytes are not
    transmitted by the PLC user program but directly via an interrupt of the
    PLC operating system. The access delay is less than 0.5 ms. The bytes can
    be read by the part program and from synchronized actions with the system
    variables:

$A_PBB_IN,
$A_PBW_IN,
$A_PBD_IN,
$A_PBR_IN
.

Attention:
   The machine data MD 10394: PLCIO_NUM_BYTES_IN and MD 10395:
PLCIO_LOGIC_ADDRESS_IN must be consistent with the configuration by the PLC.

Related to:
    MD 10394: PLCIO_NUM_BYTES_IN
```

-					
-	-	0	-	-	7/2

10396	PLCIO_NUM_BYTES_OUT		N10	A2
-	Number of directly writable output bytes of the PLC I/Os		BYTE	POWER ON

```
The number of PLC I/O output bytes that can be written directly by the NC.
These bytes are not transmitted by the PLC user program but via an interrupt
of the PLC operating system.
The access delay is less than 0.5 ms.
The bytes can be written by the part program and from synchronized actions
    with the system variables:
$A_PBB_OUT,
$A_PBW_OUT,
$A_PBD_OUT,
$A_PBR_OUT
on the NC side.

Attention:
   The machine data MD 10396: PLCIO_NUM_BYTES_OUT and MD 10397:
PLCIO_LOGIC_ADDRESS_OUT must be consistent with the configuration by the PLC,
otherwise other PLC output signals will be overwritten.
```

-					
-	-	0	0	32	7/2

10397	PLCIO_LOGIC_ADDRESS_OUT		N10	A2
-	Start addr. of the directly writable output bytes of PLC I/O		DWORD	POWER ON

```
The PLC hardware must configure a number of MD 10396: PLCIO_NUM_BYTES_OUT for
    direct use by the NC starting from this address.
These bytes are not transmitted by the PLC user program but directly via an
interrupt of the PLC operating system.
The access delay is less than 0.5 ms.
The bytes can be written by the part program and from synchronized actions
    with the system variables:
$A_PBB_OUT,
$A_PBW_OUT,
$A_PBD_OUT,
$A_PBR_OUT
.

Attention:
   The machine data MD 10396: PLCIO_NUM_BYTES_OUT and MD 10397:
PLCIO_LOGIC_ADDRESS_OUT must be consistent with the configuration by the PLC.

Related to:
    MD 10396: PLClO_NUM_BYTES_OUT
```

-					
-	-	0	-	-	7/2

10398	**PLCIO_IN_UPDATE_TIME**			N10	A4
s	Update time for PLCIO input cycle			DOUBLE	POWER ON
Specification of the time span during which the data of the PLC I/Os directly readable via $A_PBx_IN system variables are updated. This time span is rounded up internally to the next-higher multiple of the time predefined by the IPO cycle.					
-					
-	-	0.0	0	10000	7/2

10399	**PLCIO_TYPE_REPRESENTATION**			N10	A4
-	Little/Big Endian for PLCIO			BYTE	POWER ON
Little/big-Endian format representation of the $A_PBx_OUT, $A_PBx_IN system variable for PLC I/Os directly controllable by NCK. Value = 0 ; the system variable is represented in the little-Endian format Value = 1 ; the system variable is represented in the big-Endian format As a rule, the PLC I/Os must always be controlled in the big-Endian format (value = 1). For compatibility reasons, however, the default setting is the little-Endian format (value = 0).					
-					
-	-	0	0	1	7/2

10400	**CC_VDI_IN_DATA**			EXP, N02	OEM
-	Number of input bytes for compile cycles			DWORD	POWER ON
The compile cycle user can freely define data within a data block on the PLC user interface. As the user, he determines the size of the interface from PLC to NCK. This machine data describes the length of the area on the VDI interface in bytes which defines the NCK input interface. The sum of this MD and the machine data CC_VDI_OUT_DATA must not exceed 400 for software version 1.					
-					
-	-	0	0	1024	7/1

10410	**CC_VDI_OUT_DATA**			EXP, N02	OEM
-	Number of output bytes for compile cycles			DWORD	POWER ON
The compile cycle user can freely define data within a data block on the PLC user interface. As the user, he determines the size of the interface from PLC to NCK. This machine data describes the length of the area on the VDI interface in bytes which defines the NCK output interface. The sum of this MD and the machine data CC_VDI_IN_DATA must not exceed 400.					
-					
-	-	0	0	1024	7/1

10420	CC_ASSIGN_FASTOUT_MASK		EXP, N10	OEM
-	Reservation of external outputs for compile cycles		DWORD	POWER ON

```
Reservation of high-speed hardware outputs for CC applications
Bit 0(LSB)-14:  Mask of the digital output bytes reserved for the CC applica-
    tion

Bits 16-30:         Mask of the analog outputs reserved for the CC application

The hardware outputs reserved here are included in the multiple assignment
    monitoring routine when the system is powered up. It is recommended to
    register all the hardware outputs used by CC applications here.

Bit 15: Suppresses power-up alarm 4275 (multiple assignment of digital output)
Bit 31: Suppresses power-up alarm 4275 (multiple assignment of analog output)
```

-					
-	-	0	-	-	7/2

10430	**CC_HW_DEBUG_MASK**		EXP	OEM	
-	Hardware debug mask for compile cycles		DWORD	POWER ON	

```
Setting of special responses to peripheral HW interfaces for NCK debug

For practical debugging of NCK software, among other things, the response of
    peripheral units to the loss of the NCK sign of life must be suppressed
    when the NCK software has run to a breakpoint.

Bit 0(LSB)-3:
   For practical debugging of NCK software, among other things, the response
of peripheral units to the loss of the NCK sign of life must be suppressed
when the NCK software has run to a breakpoint.

Meaning of set bits:
Bit 0:
   Drive modules ignore the loss of the NCK sign of life
Bit 1:
   Terminal blocks ignore the loss of the NCK sign of life
Bit 3:
   PLC ignores the loss of the NCK sign of life
Bit 4:
   Recording of internal and external control commands. Recording the control
sequences and storing them in a file in the passive file system. One can trace
the exact sequence between the incoming harware signals of the PLC interface
and the internal sequences with the aid of the recording file.
Bit 5:
   Servotrace: Enable physical addresses without access control
Bit10:
   Test for measuring function. If this bit is set, one can use the GUD Vari-
ables CHAN INT MEA_TASK and CHAN INT MEA_COUNTER to transfer the inverse
transformation of the measured values into cyclical and non-cyclical tasks.
Bit11:
    No EMERGENCY STOP alarm on loss of PLC sign of life. If the PLC sign of
    life is not obtained within the time defined in MD PLC_CYCLIC_TIMEOUT, an
    alarm is not issued, merely the axis release withdrawn. (Application case:
    debugging the PLC user program)

Bit15:
   Reserved for gantry startup help.
```

NBUP, NDLD					
-	-	0	-	-	7/1

10450	SW_CAM_ASSIGN_TAB		N09	N3	
-	Assignment of software cams to machine axes		BYTE	POWER ON	
This machine data allows one machine axis to be assigned to each of the 16 possible cam pairs (each is comprised of one minus and one plus cam). If a "0" is entered, the corresponding cam is not processed. The cam signal output is activated via the axial IS "Cam activation" (DB31-48, DBX2.0). Index [n] of the machine data addresses the cam pair: n = 0, 1, ... , 15 correspond to cam pairs 1, 2, ... , 16 Related to IS "Cam activation" (DB31-48, DBX2.0) Example: Cam pair 1 is to be assigned to machine axis 3 and cam pair 3 to machine axis 4. Cam pair 2 is not to be assigned to an axis. MD: SW_CAM_ASSIGN_TAB[0]= 3 MD: SW_CAM_ASSIGN_TAB[1]= 0 MD: SW_CAM_ASSIGN_TAB[2]= 4					
-					
-	32	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	31	7/2

10460	SW_CAM_MINUS_LEAD_TIME		N09	N3	
s	Lead or delay time at minus cams 1-16		DOUBLE	POWER ON	
A lead or delay time can be assigned in this machine data to each minus cam 1-16 to compensate for delay times. The switching edge of the associated cam signal is advanced or delayed by the time value entered. Positive value: --> Lead time Negative value: --> Delay time Serves to compensate for the constant proportion of the internal delay time between actual value acquisition and signal output. Index [n] of the machine data addresses the cam pair: n = 0, 1, ... , 15 correspond to cam pairs 1, 2, ... , 16 This machine data is added to the setting data SW_CAM_MINUS_TIME_TAB_1[n] and SW_CAM_MINUS_TIME_TAB_2[n]. Related to: SD: SW_CAM_MINUS_TIME_TAB_1[n] (lead or delay time on minus cams 1 - 8) SD: SW_CAM_MINUS_TIME_TAB_2[n] (lead or delay time on minus cams 9 - 16)					
-					
-	32	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

10461	**SW_CAM_PLUS_LEAD_TIME**			N09	N3
s	Lead or delay time at plus cams 1-16			DOUBLE	POWER ON

```
A lead or delay time can be assigned in this machine data to each plus cam 1-
    16 to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the
    time value entered.

Positive value:       -->         Lead time
Negative value:       -->         Delay time

Serves to compensate for the constant proportion of the internal delay time
between actual value acquisition and signal output.

Index [n] of the machine data addresses the cam pair:
n = 0, 1, ... , 15 correspond to cam pairs 1, 2, ... , 16
This machine data is added to the setting data SW_CAM_PLUS_TIME_TAB_1[n] and
SW_CAM_PLUS_TIME_TAB_2[n].

Related to:
   SD: SW_CAM_PLUS_TIME_TAB_1[n] (lead or delay time on plus cams 1 - 8)
   SD: SW_CAM_PLUS_TIME_TAB_2[n] (lead or delay time on plus cams 9 - 16)
```

-					
-	32	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

10470	**SW_CAM_ASSIGN_FASTOUT_1**			N09	N3
-	Hardware assignment for output of cams 1-8 to NCK I/Os			DWORD	POWER ON

```
The cam signal status can be output to the NCK I/Os as well as to the PLC.

The hardware assignment of the minus and plus cam signals to the digital out-
    put bytes used for the NCK I/Os is made in this machine data for cam pairs
    1 - 8.

The assigned output signals can also be inverted with this machine data.

The MD is coded as follows:
Bits 0-7:      No. of 1st HW byte used with digital outputs
Bits 8-15:     No. of 2nd HW byte used with digital outputs
Bits 16-23:    Inversion mask for writing 1st HW byte used
Bits 24-31:    Inversion mask for writing 2nd HW byte used
               Bit=0:             Do not invert
               Bit=1:             Invert

If both HW bytes are specified, the 1st byte contains the minus cam signals
    and the 2nd byte the plus cam signals.

If the 2nd byte is not specified (= "0"), then the 8 cams are output as an AND
    operation of the minus and plus cam signals via the 1st HW byte using the
    1st inversion mask.
The status of the non-inverted output signal for linear axes and for rotary
    axes with "plus cam - minus cam < 180 degrees" is:
             "1" between minus and plus cams
             "0" outside this range

The status of the non-inverted output signal for rotary axes with "plus cam -
    minus cam >= 180 degrees" is:
             "0" between minus and plus cams
             "1" outside this range

The following must be specified as the byte address for the digital outputs:
1:                for on-board byte
2 - 5:            for external bytes
```

-					
-	-	0	-	-	7/2

10471	SW_CAM_ASSIGN_FASTOUT_2		N09	N3
-	Hardware assignment for the output of cams 9-16 to NCK I/Os		DWORD	POWER ON

```
The cam signal status can be output to the NCK I/Os as well as to the PLC.

The hardware assignment of the minus and plus cam signals to the digital out-
    put bytes used for the NCK I/Os can be made in this machine data for cam
    pairs 9 - 16.

The assigned output signals can also be inverted with this machine data.

The MD is coded as follows:

Bits 0-7:     No. of 1st HW byte used with digital outputs
Bits 8-15:    No. of 2nd HW byte used with digital outputs
Bits 16-23:   Inversion mask for writing 1st HW byte used
Bits 24-31:   Inversion mask for writing 2nd HW byte used
                Bit=0:           Do not invert
                Bit=1:           Invert

If both HW bytes are specified, the 1st byte contains the minus cam signals
    and the 2nd byte the plus cam signals.

If the 2nd byte is not specified (= "0"), then the 8 cams are output as an AND
    operation of the minus and plus cam signals via the 1st HW byte using the
    1st inversion mask.
The status of the non-inverted output signal for linear axes and for rotary
    axes with "plus cam - minus cam < 180 degrees" is:
                     "1" between minus and plus cams
                     "0" outside this range

The status of the non-inverted output signal for rotary axes with "plus cam -
    minus cam >= 180 degrees" is:
                      "0" between minus and plus cams
                      "1" outside this range
The following must be specified as the byte address for the digital outputs:
1:         for on-board byte
2 - 5:     for external bytes
```

-					
-	-	0	-	-	7/2

10472	SW_CAM_ASSIGN_FASTOUT_3		N09	N3
-	Configuration cams 17 - 24 to I/Os		DWORD	POWER ON

```
The cam signal status can be output to the NCK I/Os as well as to the PLC.

The hardware assignment of the minus and plus cam signals to the digital out-
    put bytes of the NCK I/Os used can be made in this machine data for cam
    pairs 17 - 24.

The assigned output signals can also be inverted with this machine data.

The MD is coded as follows:
Bits 0-7:     Number of 1st HW byte used with digital outputs
Bits 8-15:    Number of 2nd HW byte used with digital outputs
Bits 16-23:   Inversion mask for writing 1st HW byte used
Bits 24-31:   Inversion mask for writing 2nd HW byte used
                 Bit=0:          Do not invert
                 Bit=1:          Invert

If both HW bytes are specified, the 1st byte contains the minus cam signals
    and the 2nd byte the plus cam signals.

If the 2nd byte is not specified (= "0"), then the 8 cams are output as an AND
    operation of the minus and plus cam signals via the 1st HW byte using the
    1st inversion mask.
The status of the non-inverted output signal for linear axes and for rotary
    axes with "plus cam - minus cam < 180 degrees" is:
                "1" between minus and plus cams
                "0" outside this range

The status of the non-inverted output signal for rotary axes with "plus cam -
    minus cam >= 180 degrees" is:
                "0" between minus and plus cams
                "1" outside this range

The following must be specified as the byte address for the digital outputs:
1:      for on-board byte
2 - 5:  for external bytes
```

-					
-	-	0	-	-	7/2

10473	**SW_CAM_ASSIGN_FASTOUT_4**			N09	N3
-	Configuration cams 25 - 32 to I/Os			DWORD	POWER ON

```
The cam signal status can be output to the NCK I/Os as well as to the PLC

The hardware assignment of the minus and plus cam signals to the digital out-
    put bytes of the NCK I/Os used can be made in this machine data for cam
    pairs 25 - 32.

The assigned output signals can also be inverted with this machine data.

The MD is coded as follows:
Bits 0-7:     Number of 1st HW byte used with digital outputs
Bits 8-15:    Number of 2nd HW byte used with digital outputs

Bits 16-23:   Inversion mask for writing 1st HW byte used
Bits 24-31:   Inversion mask for writing 2nd HW byte used
               Bit=0:            Do not invert
               Bit=1:            Invert

If both HW bytes are specified, the 1st byte contains the minus cam signals
    and the 2nd byte the plus cam signals.

If the 2nd byte is not specified (= "0"), then the 8 cams are output as an AND
    operation of the minus and plus cam signals via the 1st HW byte using the
    1st inversion mask.
The status of the non-inverted output signal for linear axes and for rotary
    axes with "plus cam - minus cam < 180 degrees" is:
                "1" between minus and plus cams
                "0" outside this range

The status of the non-inverted output signal for rotary axes with "plus cam -
    minus cam >= 180 degrees" is:
                "0" between minus and plus cams
                "1" outside this range

The following must be specified as the byte address for the digital outputs:
1:      for on-board byte
2 - 5:  for external bytes
```

-					
-	-	0	-	-	7/2

10480	SW_CAM_TIMER_FASTOUT_MASK		N09	N3
-	Mask for output of cam signals via timer interr. to NCU		DWORD	POWER ON

```
A timer-controlled output to the 4 on-board outputs of the NCK I/Os can be
    selected in this machine data for 4 cam pairs.

In this case, the minus and plus signals of a cam pair are EXCLUSIVE OR'd for
    output as one signal.

Meaning for set bit:
Associated cam (minus and plus cam signals EXCLUSIVE OR'd) is output via a
timer interrupt at one of the 4 on-board outputs of the NCU.

The on-board outputs are assigned in order of increasing machine axis numbers
    (with assigned cam pairs).

Example:
Machine axis 3  = cam pair 1  -->   on-board output 3
Machine axis 1  = cam pair 2  -->   on-board output 1
Machine axis 7  = cam pair 3  -->   on-board output 4
Machine axis 2  = cam pair 4  -->   on-board output 2

If a plurality of cam pairs are set for one machine axis, then this axis is
    assigned in ascending order of the cam pairs.
Example:
Machine axis 3  = cam pair 1  -->   on-board output 2
Machine axis 3  = cam pair 2  -->   on-board output 3
Machine axis 7  = cam pair 3  -->   on-board output 4
Machine axis 2  = cam pair 4  -->   on-board output 1

This function works independently of the assignment set in MD:
SW_CAM_ASSIGN_FASTOUT_1 or MD: SW_CAM_ASSIGN_FASTOUT_2.

Note:
   The on-board byte must not be used more than once.

If there is more than one signal change in the IPO cycle for the cam pairs
    specified in the MD, then the cam pair with the lowest number determines
    the instant of output. The other signal changes take place at the same
    time.
```

-					
-	-	0	-	-	7/2

10485	SW_CAM_MODE		N09	N3
-	Behavior of SW cams		DWORD	POWER ON

```
Meaning of the individual bits:
Bit 0(LSB) = 0:
    If more than 1 signal change per interpolation cycle is due for the cams
    specified in MD SW_CAM_TIMER_FASTOUT_MASK, the cam having the lowest num-
    ber will determine the output instant. The other signals change at the
    same instant. That is, a maximum of one interrupt-controlled output is
    effected per interpolation cycle.

Bit 0(LSB) = 1:
    Each cam specified in MD SW_CAM_TIMER_FASTOUT_MASK will be output pre-
    cisely at the time of the interpolation cycle. There is no output prior-
    ity of the cams. A maximum of 8 interrupt-controlled outputs can be
    performed per interpolation cycle.

Bit 1 = 0:
    Inversion of signal behavior from plus cam where plus cam - minus cam >=
    180 degr .

Bit 1 = 1:
    No inversion of signal behavior from plus cam where plus cam - minus cam
    >= 180 degr.
    Signal behavior on-board output:
    Overtravelling:
    Minus cam plus cam
    Traversing direction:
    positive   0->1          1->0
    negative   1->0          0->1

Bit 2 = 0:
    No path-time cam

Bit 2 = 1:
   Path-time cam for cams where minus position = plus position. The lead/delay
time applied is independent of:
- velocity of the axis
- position of the axis
- reversal of traversing direction
   The cam is only activated on overtravelling of the cam position. A lead/
delay time applied to the minus cam is active and leads to a shift of the
whole cam.

Bit 3 = 0:
    No alignment signal in case of measurement area selection.

Bit 3 = 1:
   Output of an alignment signal for measurement area selection (FM only). On-
board output 8 is used permanently.
   On-board output 8 = 1: Measurement possible (active range enabled)
   On-board output 8 = 0: Measurement not possible

Bit 4 = 0:
   and following free
```

-					
-	-	0	-	-	7/2

10530	**COMPAR_ASSIGN_ANA_INPUT_1**			N10	A4
-	Hardware assignment of analog inputs for comparator byte 1			BYTE	POWER ON

```
This MD assigns analog inputs 1 to 8 to a bit number of comparator byte 1.
This input bit of the comparator is set to "1" if the comparison between the
applied analog value and the associated threshold value (MD 41600:
COMPAR_THRESHOLD_1 fulfills the condition parameterized in (MD 10540:
COMPAR_TYPE_1).

An analog input can be assigned to a plurality of comparator input bits.

The following generally applies to comparator byte 1:

   COMPAR_ASSIGN_ANA_INPUT_1 [b] = n
   with index:  b = number of comparator input bit (0 to 7)
                n = number of analog input (1 to 8)

Example:
           COMPAR_ASSIGN_ANA_INPUT_1[0] = 1
           COMPAR_ASSIGN_ANA_INPUT_1[1] = 2
           COMPAR_ASSIGN_ANA_INPUT_1[2] = 1
           COMPAR_ASSIGN_ANA_INPUT_1[3] = 3
           COMPAR_ASSIGN_ANA_INPUT_1[4] = 3
           COMPAR_ASSIGN_ANA_INPUT_1[5] = 1
           COMPAR_ASSIGN_ANA_INPUT_1[6] = 1
           COMPAR_ASSIGN_ANA_INPUT_1[7] = 1

Analog input 1 affects input bits 0, 2 , 5, 6 and 7 of comparator byte 1
Analog input 2 affects input bit 1 of comparator byte 1
Analog input 3 affects input bits 3 and 4 of comparator byte 1

Related to:
    MD 10540: COMPAR_TYPE_1
    MD 10541: COMPAR_TYPE_2
```

-					
-	8	0,0,0,0,0,0,0,0	-	-	7/2

10531	COMPAR_ASSIGN_ANA_INPUT_2		N10	A4	
-	Hardware assignment of analog inputs for comparator byte 2		BYTE	POWER ON	

```
This MD assigns analog inputs 1 to 8 to a bit number of comparator byte 2.
This input bit of the comparator is set to "1" if the comparison between the
applied analog value and the associated threshold value (MD 41601:
COMPAR_THRESHOLD_2 fulfills the condition parameterized in (MD 10541:
COMPAR_TYPE_2).

An analog input can be assigned to a plurality of comparator input bits.

The following generally applies to comparator byte 2:
            COMPAR_ASSIGN_ANA_INPUT_2 [b] = n
            with index:b = number of comparator input bit (0 to 7)
                       n = number of analog input (1 to 8)

Example:
   COMPAR_ASSIGN_ANA_INPUT_2[0] = 1
   COMPAR_ASSIGN_ANA_INPUT_2[1] = 2
   COMPAR_ASSIGN_ANA_INPUT_2[2] = 1
   COMPAR_ASSIGN_ANA_INPUT_2[3] = 3
   COMPAR_ASSIGN_ANA_INPUT_2[4] = 3
   COMPAR_ASSIGN_ANA_INPUT_2[5] = 1
   COMPAR_ASSIGN_ANA_INPUT_2[6] = 1
   COMPAR_ASSIGN_ANA_INPUT_2[7] = 1

Analog input 1 affects input bits 0, 2 , 5, 6 and 7 of comparator byte 2
Analog input 2 affects input bit 1 of comparator byte 2
Analog input 3 affects input bits 3 and 4 of comparator byte 2

Related to:
    MD 10540: COMPAR_TYPE_1
    MD 10541: COMPAR_TYPE_2
```

-					
-	8	0,0,0,0,0,0,0,0	-	-	7/2

10540	**COMPAR_TYPE_1**	N10	A4
-	Parameterization for comparator byte 1	DWORD	POWER ON

```
This MD can be used to make the following settings for the individual output
bits (0 to 7) of comparator byte 1:

- Bits 0 to 7: Comparison type mask (for comparator output bits 0 to 7)
          Bit = 1: output bit = 1 if analog value >= threshold value
          Bit = 0: output bit = 1 if analog value < threshold value
          (Threshold value defined by MD 41600: COMPAR_THRESHOLD_1)

- Bits 8 to 15:      Not used (defined to be set to 0)

- Bits 16 to 23:     Assignment of a HW output byte for outputting
          the comparator states (statement of the byte address)
          Byte = 0:  No output via digital NCK outputs
          Byte = 1:  Output via digital onboard NCK outputs (1 to 4)
          Byte = 2:  Output via external digital NCK outputs 9 to 16
          Byte = 3:  Output via external digital NCK outputs 17 to 24
          Byte = 4:  Output via external digital NCK outputs 25 to 32
          Byte = 5:  Output via external digital NCK outputs 33 to 40

- Bits 24 to 31:     Inversion mask for the output of the comparator states
    (bits 0 to 7)
          Bit = 0:   Output bit is not inverted
          Bit = 1:   Output bit is inverted

Related to:
    MD 10530: COMPAR_ASSIGN_ANA_INPUT_1
    MD 10531: COMPAR_ASSIGN_ANA_INPUT_2
    MD 41600: COMPAR_THRESHOLD_1
    MD 41601: COMPAR_THRESHOLD_2
    MD 10360: FASTIO_DIG_NUM_OUTPUTS
```

-					
-	-	0	-	-	7/2

10541	COMPAR_TYPE_2		N10	A4
-	Parameterization of comparator byte 2		DWORD	POWER ON

```
This MD can be used to make the following settings for the individual output
bits (0 to 7) of comparator byte 2:

- Bits 0 to 7:  Comparison type mask (for comparator output bits 0 to 7)
    Bit = 1: output bit = 1 if analog value >= threshold value
    Bit = 0: output bit = 1 if analog value < threshold value
    (Threshold value defined by MD 41601: COMPAR_THRESHOLD_2)

- Bits 8 to 15:       not used (defined to be set to 0)

- Bits 16 to 23: Assignment of a HW output byte for outputting the comparator
    states (statement of the byte address)

- Byte = 0:  no output via digital NCK outputs
    Byte = 1:  output via digital onboard NCK outputs (1 to 4)
    Byte = 2:  output via external digital NCK outputs 9 to 16
    Byte = 3:  output via external digital NCK outputs 17 to 24
    Byte = 4:  output via external digital NCK outputs 25 to 32
    Byte = 5:  output via external digital NCK outputs 33 to 40

- Bits 24 to 31:     Inversion mask for the output of the comparator states
    (bits 0 to 7)
    Bit = 0:         Output bit is not inverted
    Bit = 1:         Output bit is inverted

Related to:
    MD 10530: COMPAR_ASSIGN_ANA_INPUT_1
    MD 10531: COMPAR_ASSIGN_ANA_INPUT_2
    MD 41600: COMPAR_THRESHOLD_1
    MD 41601: COMPAR_THRESHOLD_2
    MD 10360: FASTIO_DIG_NUM_OUTPUTS
```

-					
-	-	0	-	-	7/2

10600	FRAME_ANGLE_INPUT_MODE		EXP, N01, N09	K2
-	Sequence of rotation in FRAME		BYTE	POWER ON

```
FRAME_ANGLE_INPUT_MODE sets how the rotations (ROT and AROT) around the three
geometry axes are defined if more than one rotation is programmed in a block.
The order in which these rotations are programmed within the block is irrele-
vant.

The rotations can be set to be calculated according to:

-  Euler angle with FRAME_ANGLE_INPUT_MODE = 2
    The rotations are calculated according to the euler angle in the following
    order:
    1. Rotation around Z
    2. Rotation around X
    3. Rotation around Y

-  RPY with FRAME_ANGLE_INPUT_MODE = 1
    The rotations are calculated according to the euler angle in the follow-
    ing order:
    1. Rotation around Z
    2. Rotation around Y
    3. Rotation around X
```

-					
-	-	1	1	2	7/2

10602	FRAME_GEOAX_CHANGE_MODE		EXP, N01, N09	K2
-	Frames when changing geometry axes		BYTE	POWER ON

```
Geometry axes can be switched over in the following states:
- Selection and deselection of transformations
- Switchable geometry axes GEOAX()

The current total frame is then defined as follows:
0: The current total frame is canceled.

1: The current total frame is recalculated when geometry axes are switched
over. Translations, scaling and mirroring for the new geometry axes become
active. The rotations of the old geometry axes still apply.

2: The current total frame is recalculated when geometry axes are switched
over. Translations, scaling and mirroring for the new geometry axes become
active. If rotations were active before switching over to the current base
frames, current settable frame or programmable frame, switchover is aborted
with an alarm.

3: The current total frame is deleted when selecting and deselecting transfor-
mations.When the GEOAX() command is entered, the frame is recalculated and
transaction, scaling and mirroring for the new geometry axes become active.
The rotations of the old geometry axes still apply.
```

-					
-	-	0	0	5	7/2

10604	WALIM_GEOAX_CHANGE_MODE		EXP, N01, N09	A3	
-	Working area limitation by changing geometry axes		BYTE	POWER ON	
This machine data specifies whether a potentially active working area limitation will remain active after geo axis replacement, or whether it will be deactivated. Meaning of the MD values: = 0 Working area limitation will be deactivated when replacing geo axis. = 1 Working area limitation will remain activated when replacing geo axis.					
-					
-	-	0	0	1	7/2

10610	MIRROR_REF_AX		EXP, N01, N09	K2	
-	Reference axis for mirroring		BYTE	POWER ON	
0: Mirroring always takes place in the stated axis, without scaling. The mirroring of a geometry axis can always be related to a defined reference axis. 1: x is the reference axis Mirroring of the x axis is unique. Mirroring of the y axis is mapped on: a mirroring of the x axis and a rotation of the z axis through 180 degrees. Mirroring of the z axis is mapped on: a mirroring of the x axis and a rotation of the x axis through 180 degrees and a rotation of the z axis through 180 degrees 2: y is the reference axis Mirroring of the x axis is mapped on: a mirroring of the y axis and a rotation of the z axis through 180 degrees. Mirroring of the y axis is unique. Mirroring of the z axis is mapped on: a mirroring of the y axis and a rotation of the x axis through 180 degrees 3: z is the reference axis Mirroring of the x axis is mapped on: a mirroring of the z axis and a rotation of the z axis through 180 degrees and a rotation of the x axis through 180 degrees Mirroring of the y axis is mapped on: a mirroring of the z axis and a rotation of the x axis through 180 degrees. Mirroring of the z axis is unique.					
-					
-	-	0	0	3	7/2

10612	**MIRROR_TOGGLE**			EXP, N01, N09	K2
-	Mirror toggle			BYTE	POWER ON
Mirror toggle function. 1: Programmed axis values are not evaluated. Toggle switching behavior. 0: Programmed axis values are evaluated. The axes are mirrored in the case of values not equal to 0 if they are not already mirrored. Mirroring is disabled if the value is 0.					
-					
-	-	1	0	1	7/2

10613	**NCBFRAME_RESET_MASK**			EXP	K2
-	Active NCU global base frames after reset			DWORD	RESET
Bit mask for the reset setting of the NCU global base frames which are included in the channel. The following applies: In the case of $MC_RESET_MODE_MASK bit0 = 1 and bit14 = 1 The entire base frame on reset is created from the linking of the NCU global base frame field elements whose bit in the bit mask is 1. In the case of $MC_RESET_MODE_MASK bit0 = 1 and bit14 = 0 The entire base frame is deselected on reset.					
-					
-	-	0xFFFF	0	0xFFFF	7/2

10615	**NCBFRAME_POWERON_MASK**			EXP, N12	K2
-	Reset global base frames after power on			DWORD	POWER ON
This machine data defines whether global base frames are reset in the data management on Power On. That is - Offsets are set to 0, - Scalings are set to 1. - Mirroring is disabled. The individual base frames can be selected separately. Bit 0 means base frame 0, bit 1 base frame 1 etc. Value=0: Base frame is retained on Power On Value=1: Base frame is reset in the data management on Power On. Related to: $MC_CHBFRAME_POWERON_MASK					
-					
-	-	0	0	0xFFFF	7/2

10617	FRAME_SAVE_MASK			EXP	K1,PGA
-	Behavior of frames in SAVE subroutines			DWORD	POWER ON

```
This machine data is used to define which frames are restored with SAVE
attribute at return from a subprogram.

Bit 0: Settable frames G54 through G599

Value = 0:
If the same G code is active at subprogram return and subprogram call, the
    active settable frame is maintained. If not, the settable frame is reacti-
    vated when the subprogram is called.

Value = 1:
At subprogram return, the settable frame is reactivated when the subprogram is
    called.

Bit 1: Basic frame

Value = 0:
The active basic frame is not changed at subprogram return. This is also the
    case, if a basic frame change is carried out in the subprogram by an oper-
    ation or by an implicit frame deselection (possibly through TRAFOOF).

Value = 1:
At subprogram return, the basic frame is reactivated when the subprogram is
    called.
```

-					
-	-	0	0	0x3	7/2

10618	PROTAREA_GEOAX_CHANGE_MODE			EXP, N01, N09	A3
-	Protection range on change of geometry axes			BYTE	POWER ON

```
This machine data is used to define whether any active protection zones will
remain active after a transformation change or geo axis replacement, or
whether they will be deactivated.

The machine data is bit-coded with the following meanings:

Bit 0 = 0  Protection zones deactivated on transformation change.
      = 1  Active protection zones remain active after transformation change.

Bit 1 = 0  Protection zones deactivated on geo axis replacement.
      = 1  Active protection zones remain active after geo axis replacement.
```

-					
-	-	0	0	3	7/2

10619	COLLISION_TOLERANCE			EXP	-
mm	Tolerance for collision check			DOUBLE	NEW CONF

```
This parameter is used to set the required collision check accuracy. This
means: If the distance between two protection zones is smaller than this
value, a collision of those two protection zones may be signalled. But: Two
protection zones that overlap by less than this value cannot be classified as
colliding.
```

-					
-	-	1	0.001	1000.0	7/2

10620	**EULER_ANGLE_NAME_TAB**			N01, N09	F2
-	Name of Euler angle			STRING	POWER ON

- The name entered must not conflict with the designation and assignment of machine and geometry axis names.
- The name entered must not conflict with channel axis names in the channel (MD 20080: AXCONF_CHANAX_NAME_TAB), names for directional vectors (MD 10640: DIR_VECTOR_NAME_TAB), names for intermediate point coordinates for CIP (MD 10660: INTERMEDIATE_POINT_NAME_TAB) or the names for interpolation parameters (MD 10650: IPO_PARAM_NAME_TAB).
- The name entered must not contain the following reserved address letters:

```
 - D          Tool offset (D function)
 - E          Reserved
 - F          Feedrate (F function)
 - G          Preparatory function
 - H          Auxiliary function (H function)
 - L          Subprogram call
 - M          Special function (M function)
 - N          Subblock
 - P          Number of subroutine repetitions
 - R          Arithmetic parameter
 - S          Spindle speed (S function)
 - T          Tool (T function)
```

- Nor are keywords (e.g. DEF, SPOS etc.) and predefined identifiers (e.g. ASPLINE, SOFT) allowed.
- An angle identifier consists of a valid address letter (A, B, C, I, J, K, Q, U, V, W, X, Y, Z), followed by an optional numerical extension (1-99).

-					
-	3	"A2","B2","C2"	-	-	7/2

10624	**ORIPATH_LIFT_VECTOR_TAB**			N01, N09	-
-	Name of retraction vector for path-relative orientation.			STRING	POWER ON

List of identifiers for components of the retraction vector during reorientations for path relative interpolation of the tool orientation.

The rules for axis identifiers as described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, normal vectors, direction vectors, conical interpolation vectors, interpolation parameters, intermediate point coordinates).

-					
-	3	"A8","B8","C8"	-	-	7/2

10626	**ORIPATH_LIFT_FACTOR_NAME**			N01, N09	-
-	Name of relative safety clearance with ORIPATH			STRING	POWER ON
Identifier for relative factor for determining a safety clearance for the retracting movement during reorientations for path relative interpolation of the tool orientation. The rules for axis identifiers as described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, normal vectors, direction vectors, conical interpolation vectors, interpolation parameters, intermediate point coordinates).					
-					
-	-	"ORIPLF"	-	-	7/2

10630	**NORMAL_VECTOR_NAME_TAB**			N01, N09	F2
-	Name of normal vectors			STRING	POWER ON
Normal vector programming from software version 3.2 List of identifiers for the normal vector components at the beginning and end of the block. The rules for axis identifiers described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, direction vectors, interpolation parameters, intermediate point coordinates).					
-					
-	6	"A4","B4","C4","A5", "B5","C5"	-	-	7/2

10640	**DIR_VECTOR_NAME_TAB**			N01, N09	F2
-	Name of direction vectors			STRING	POWER ON
List of identifiers for the direction vector components. (A3 to C3) List of identifiers for the vector components perpendicular to the direction vector (AN3 to CN3) The rules for axis identifiers described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, interpolation parameters, intermediate point coordinates).					
-					
-	6	"A3","B3","C3","AN3 ","BN3","CN3"	-	-	7/2

10642	**ROT_VECTOR_NAME_TAB**			N01, N09	F2
-	Name of rotation vectors			STRING	POWER ON
List of identifiers for the rotation vector components in taper direction The rules for axis identifiers as described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, interpolation parameters, intermediate point coordinates).					
-					
-	3	"A6","B6","C6"	-	-	7/2

10644	**INTER_VECTOR_NAME_TAB**			N01, N09	F2
-	Name of intermediate vector components			STRING	POWER ON
List of identifiers for the intermediate vector components The rules for axis identifiers described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, interpolation parameters, intermediate point coordinates).					
-					
-	3	"A7","B7","C7"	-	-	7/2

10646	**ORIENTATION_NAME_TAB**			N01, N09	F2
-	Identifiers for programming a second orientation path			STRING	POWER ON
List of identifiers for programming of the 2nd space curve for tool orientation The rules for axis identifiers as described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, interpolation parameters, intermediate point coordinates).					
-					
-	3	"XH","YH","ZH"	-	-	7/2

10648	**NUTATION_ANGLE_NAME**			N01, N09	F2
-	Name of aperture angle			STRING	POWER ON
Identifier for the opening angle for orientation interpolation The rules for axis identifiers as described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).					
-					
-	-	"NUT"	-	-	7/2

10650	**IPO_PARAM_NAME_TAB**			EXP, N01	K2
-	Name of interpolation parameters			STRING	POWER ON
List of identifiers for the interpolation parameters The rules for axis identifiers described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates). Related to: INTERMEDIATE_POINT_NAME_TAB References: /PA/, Programming Guide: Fundamentals					
-					
-	3	"I","J","K"	-	-	7/2

10652	**CONTOUR_DEF_ANGLE_NAME**			EXP, N01, N12	FBFA
-	Name of angle for contour definitions			STRING	POWER ON
Identifier for contour angle The identifier must be selected so that no conflict arises with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, interpolation point coordinates).					
-					
-	-	"ANG"	-	-	0/0

10654	**RADIUS_NAME**			EXP, N01, N12	FBFA
-	Name of radius for contour definitions			STRING	POWER ON
Identifier for contour radius The identifier must be selected so that no conflict arises with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).					
-					
-	-	"RND"	-	-	0/0

10656	**CHAMFER_NAME**			EXP, N01, N12	FBFA
-	Name of chamfer for contour definitions			STRING	POWER ON
Identifier for contour chamfer The identifier must be selected so that no conflict arises with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).					
-					
-	-	"CHR"	-	-	0/0

10660	**INTERMEDIATE_POINT_NAME_TAB**			EXP, N01	K2
-	Name of interpolation point coordinates for G2/G3			STRING	POWER ON
List of identifiers for the intermediate point coordinates The rules for axis identifiers described in $MC_AXCONF_CHANAX_NAME_TAB apply to the selection of identifiers. The identifiers must be selected so that they do not cause any conflicts with other identifiers (axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates). Related to: IPO_PARAM_NAME_TAB References: /PA/, Programming Guide: Fundamentals					
-					
-	3	"I1","J1","K1"	-	-	7/2

10670	**STAT_NAME**			N01, N09	F2
-	Name of state information			STRING	POWER ON
Identifier for position information for solving ambiguities in Cartesian PTP travel. An identifier must be chosen that does not conflict with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).					
-					
-	-	"STAT"	-	-	7/2

10672	**TU_NAME**			N01, N09	F2
-	Name of state information of axes			STRING	POWER ON
Identifier for position information of axes for solving ambiguities in Cartesian PTP travel. An identifier must be chosen that does not conflict with other identifiers (e.g. axes, Euler angles, normal vectors, direction vectors, intermediate point coordinates).					
-					
-	-	"TU"	-	-	7/2

10674	**PO_WITHOUT_POLY**			N01	F2
-	Polynomial programming programmable without G function POLY			BOOLEAN	POWER ON
Until now, the G function POLY has always had to be active during polynomial programming with PO[xx] = (xx), otherwise an alarm was output. If machine data PO_WITHOUT_POLY is set to TRUE, no alarm is output with POLY inactive during polynomial programming. The end point of the polynomial is then approached with the linear interpolation G1. There is no polynomial interpolation if POLY is inactive.					
-					
-	-	FALSE	-	-	7/2

10700	PREPROCESSING_LEVEL		N01, N02		V2
-	Program preprocessing level		BYTE		POWER ON

```
Bit 0= 0:
    No preprocessing

Bit 0= 1:
   The call description of the cycles is formed during control power on. All
the programs in the directories _N_CUS_DIR, _N_CMA_DIR and _N_CST_DIR can be
called in the part program without EXTERNAL declaration. If the parameter
interface of a cycle is changed in the control, then this change does not
become active until after Power On.

Bit 1=1:
   During control power on, all cycles in the directories _N_CUS_DIR,
_N_CMA_DIR and _N_CST_DIR are preprocessed to form a process-optimizing compi-
lation. These cycles are then processed more quickly. Changes to the cycle
programs do not become active until after the next Power On.

Bit 2=1:
   During control power on, the Siemens cycles in the directory _N_CST_DIR are
preprocessed to form a process-optimizing compilation (from SW 3.5).

Bit 3=1:
   During control power on, the user cycles in the directory _N_CUS_DIR  are
preprocessed to form a process-optimizing compilation (from SW 3.5).

Bit 4=1:
   Preprocessing the user cycles in the directory _N_CMA_DIR

Bit 5=1:
   All files marked with PREPRO in the PROG statement line are preprocessed
(from SW 6.4)
Bit 5=0:
   During control power on, all cycles in the directories activated by bits 1
to 4 are preprocessed. This also applies to programs that are not marked with
PREPRO.
Bit 6=1:
   The compilation is stored in SRAM if there is inadequate space in DRAM
(from SW 7.1).
 Memory space is required for preprocessing cycles. Better utilization of mem-
    ory can be achieved by selective setting of the preprocessing:
   The runtime-critical cycles are brought together in one directory. The
remaining cycles are in the other directory.

References:
   /PG/, "Programming Guide Fundamentals" (EXTERNAL declaration)
```

-					
-	-	1	-	-	2/2

10702	IGNORE_SINGLEBLOCK_MASK	N01	K1
-	Prevents stopping at specific blocks in single block mode	DWORD	POWER ON

```
This machine data prevents stopping at certain blocks with
single block.

Single block stop can be prevented with the following bits of the mask:

Bit0 = 1
    Means that there is no stop in any internal ASUB block. Exception: the
    single block stop has been explicitly activated by the SBLON command.

    There are three different internal ASUBs that are triggered by different
    events.
    - Repos: In the case of the events: change of operating mode to a manual
    mode (JOG, JOGREF,...) unless MODESWITCH_MASK is not set, switch skip
    block on and off, activate machine data, switch-on overstore, axis
    replacement, subroutine level abort, switch-on single block, switch dry
    run feedrate on and off, alarm with compensation block.

    - Return: Delete distance-to-go, switchover after TEACH-IN, or deselec-
    tion of MDI with corrsponding MODESWITCH_MASK.

    - _N_PROG_EVENT_SPF: Parameterizing MD 20108 $MC_PROG_EVENT_MASK parame-
    terizes the events whereby _N_PROG_EVENT_SPF is executed.

Bit1 = 1
    Means that there is no stop in any user ASUB block. Exception: The single
    block stop has been explicitly activated via the SBLON command.
    User ASUBs are linked to an interrupt channel by the part program command
    SETINT or via the PI- _N_ASUP__. The interrupt channel is then activated
    via PLC or the high-speed inputs, and the user ASUBs are retracted.

    This disables machine data IGNORE_SINGLEBLOCK_ASUP. The NCK behavior cor-
    responds to the machine data assignment IGNORE_SINGLEBLOCK_ASUP= FFFFFFFF.

Bit2 = 1
    Means that there is no stop in any intermediate block. Intermediate blocks
    are generated at, among other events, tool change, ADIS und complicated
    geometry.
```

Bit3 = 1
Means that there is no stop in the block search pickup block. The block search pickup block is the 1st block that is loaded into the main run at the start after search target has been found in the program.

Bit4 = 1
Means that there is no stop in the INIT blocks. INIT blocks are generated from reset immediately after a part program start.

Bit5 = 1
Means that there is no stop in any subprogram block with the parameter DISPLOF.

Bit6 = 1
Means that there is no stop in any block in which the NCK cannot reorganize.

Reorganize is an internal procedure that is needed for mode change after JOG/JOGREF..., switch skip block on and off, activate machine data, axis replacement, switch on overstore, switch on single block, switch dry run feedrate on and off, subroutine level abort, user ASUBs delete distance-to-go, switchover after TEACH-IN. Reorganize is never needed in Reset state.

Example blocks in which reorganize is impossible:
- Tool change
- 1st block after the Repos procedure
- Block after an ASUB from Jog/aborted

Bit7 = 1
Means that there cannot be a stop in any block in which repositioning is impossible.

Reposition is an internal procedure that is needed for mode change after JOG/JOGREF..., switch skip block on and off, activate machine data, axis replacement, switch on overstore, switch on single block, switch dry run feedrate on and off, subroutine level abort and possibly user ASUBs. Reposition is never needed in Reset state.

Example blocks in which reposition is impossible:

- G33 + blocks in which reorganize is impossible.

```
Bit8 = 1
   Means that there is no stop in a residual block that does not contain tra-
versing information.


Bit9 = 1
   Means that there is no stop in a run in/main run synchronization block
(e.g.STOPRE, $Variable) that is repeated because of an interruption with Reorg
(e.g. mode change).

Bit10= 1
   Means that there is no stop in a "tool selection block". "Tool selection
block" only occurs with tool management (magazine management or TMMG) active.
This block gives the corresponding tool change command to the PLC.
   This block is generally generated by T programming from the part program.
   Example block "N1010 T="Drill" M6 D1"

   Depending on machine data, the "tool selection block" can be held in the
interpolator until the PLC has acknowledged the corresponding tool change (see
$MC_TOOL_MANAGEMENT_MASK). However the program status remains in "run".

Bit11= 1
   The control has to automatically generate implicit GET blocks for the axis
replacement function (axis replacement: 2 or more channels control one axis
alternately) if no explicit GET(D) has been programmed and the following block
wants to traverse the axis. (The other channel had previously used this axis).

    An explicitly programmed GET may appear as follows "getd(x1,y1,z1) oder
    get(x1,y1,z1)".

   There is no stop at explicit or implicit GET blocks in the single block
with this bit 11.

Bit12= 1
   There is no stop in the single block type 2 in the SBLON block.

Bit13= 1
    If an axis is pulled out in the middle of a block and possibly assigned to
    another channel, then there is no stop at  p_r_e_m_a_t_u_r_e_ _  end of
    this block. This block follows a REPOSA in order to traverse it to the
    end, there is no stop until this end has been reached.

Related to:
   IGNORE_SINGLEBLOCK_ASUP
```

-					
-	-	0	0	0xFFFF	7/2

10704	DRYRUN_MASK		N01	V1
-	Dry run feedrate activation		BYTE	POWER ON

```
DRYRUN_MASK == 0

Dryrun can only be switched on or off at the end of the block.

When DRYRUN_MASK = 1 is set, the dry run feedrate can also be activated dur-
ing program execution (in the part program block).

NOTICE!
   After activating dry run feedrate, the axes are stopped for the duration of
the reorganization process.

DRYRUN_MASK == 2

Dryrun can be switched on or off in every phase and the axes are not stopped.

NOTICE:
   However, the function does not become active until a "later" block in the
program execution and this is with the next (implicit) StopRe block.

Related to:
     SD 42100: DRY_RUN_FEED
```

-					
-	-	0	0	2	7/2

10706	SLASH_MASK		N01	PG,A2
-	Activation of block skip		BYTE	POWER ON

```
If SLASH_MASK = 0, skip block can only be activated when stopped at the end of
    the block

If SLASH_MASK = 1, skip block can also be activated during program execution.

NOTICE!
   After activating skip block, the axes are stopped for the duration of the
reorganization process.

If SLASH_MASK = 2 ,skip block can be activated in every phase.

Notice!
   However, the function does not become active until a "later" block in the
program execution, and this is with the next (implicit) StopRe block.
```

-					
-	-	0	0	2	7/2

10707	**PROG_TEST_MASK**			N01	K1
-	Program test mode			DWORD	POWER ON
Bit-coded mask for program test Bit 0 == 1 Program test cannot be deselected in 'Stopped' program status. Bits 1..31 Still unused.					
-					
-	-	1	0	1	7/2

10708	**SERUPRO_MASK**			N01	K1
-	Seach run modes			DWORD	POWER ON
Bit-coded mask for block search via program test (abbr. SERUPRO). SERUPRO block search is activated by the PI service _N_FINDBL mode paramter == 5. SERUPRO means SEarchRUn by PROgram test, that is proceed under program test from start of program to search target. Note: Program test does not move any axis. Bit 0 == 0 There is a stop at M0 during the search phase Bit 0 == 1 There is no stop at M0 during the search phase Bit 1 == 0 Alarm 16942 aborts the search phase upon the part programm command START. Bit 1 == 1 Alarm 16942 is switched off. NOTICE: A start program command may really start the other channel! Bit 2 == 0 Switches the function "Group Serupro" off Bit 2 == 1 Switches the function "Group Serupro" on. "Group-Serupro" enables a search routine in which the start part program command is changed into a search routine for the other channel. Bit 3 == 0 Compels all channels that have started Serupro to end Serupro simultaneously unless they are aborted via Reset or the channel reaches M30 without finding the search taget. In other words, all channels that find the search target (including self-acting Serupro) terminate SERUPRO simultaneously. Bit 3 == 1 Switches this function off Bits 4 .. 31 Still unused.					
-					
-	-	0	0	15	7/2

10710	PROG_SD_RESET_SAVE_TAB		EXP, N01	K1	
-	Setting data to be updated		DWORD	POWER ON	

```
Setting data to be backed up
The values of the SDs listed in this table are stored in non-volatile memory,
    i.e. remain valid after power ON. The setting data whose HMI numbers were
    entered in the backup list are written into the (buffered) active file
    system after the description of the part program on RESET.

Programmable setting data are:
                                                    (GCODE)
SD 42000   $SC_THREAD_START_ANGLE                   SF
SD 42400   $SC_PUNCH_DWELLTIME                      PDELAYON
SD 42800   $SC_SPIND_ASSIGN_TAB                     SETMS
SD 43210   $SA_SPIND_MIN_VELO_G25                   G25
SD 43220   $SA_SPIND_MAX_VELO_G26                   G26
SD 43230   $SA_SPIND_MAX_VELO_LIMS                  LIMS
SD 43300   $SA_ASSIGN_FEED_PER_REV_SOURCE           FPRAON
SD 43420   $SA_WORKAREA_LIMIT_PLUS                  WALIMOF
SD 43430   $SA_WORKAREA_LIMIT_MINUS                 WALIMON
SD 43510   $SA_FIXED_STOP_TORQUE                    FXST
SD 43520   $SA_FIXED_STOP_WINDOW                    FXSW
SD 43700   $SA_OSCILL_REVERSE_POS1                  OSP1
SD 43710   $SA_OSCILL_REVERSE_POS2                  OSP2
SD 43720   $SA_OSCILL_DWELL_TIME1                   OST1
SD 43730   $SA_OSCILL_DWELL_TIME2                   OST2
SD 43740   $SA_OSCILL_VELO                          FA
SD 43750   $SA_OSCILL_NUM_SPARK_CYCLES              OSNSC
SD 43760   $SA_OSCILL_END_POS                       OSE
SD 43770   $SA_OSCILL_CTRL_MASK                     OSCTRL
SD 43780   $SA_OSCILL_IS_ACTIVE                     OS

The values of SD 43420: WORKAREA_LIMIT_PLUS (working area limitation plus) and
    SD 43430: WORKAREA_LIMIT_MINUS (working area limitation minus) are to be
    stored in the buffered RAM after every RESET, M02, M30 or M17.
   -->  PROG_SD_RESET_SAVE_TAB[0] = 43420
   -->  PROG_SD_RESET_SAVE_TAB[1] = 43430
```

-					
-	30	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	7/2

10711	**NC_LANGUAGE_CONFIGURATION**			EXP, N01	-
-	NC language commands of inactive functions			DWORD	POWER ON

Manner of handling language commands whose associated function has not been activated.
All programmable commands in an NC program, cycle program are language commands.

Value Meaning

0: NCK knows all language commands - especially those whose function has not been activated. That means that all language commands are programmable. Whether the required function is active is not detected until execution. If not, then an alarm is generated. For example, NC cycle programs that use language commands of inactive NCK functions can be precompiled with this setting.

1: NCK knows all names of the NC language but does not know the meaning of the names whose option has not been released. That means that an alarm of the type 'Function for the command 'name' is not active' is generated at the start of program interpretation. For example, a precompiled program cannot be generated with this setting if language commands of non-activated NCK functions are programmed.

2: NCK knows only those language elements corresponding to the current scope of released options of the NCK software. That means that commands for non-released options are rejected with an alarm 'Identifier 'name' is unknown'. However, this does not differentiate whether or not the stated command is generally unknown in the Siemens NC language or if it is merely missing from this system.

3: NCK knows all names in the NC language, but does not know the meaning of names whose function has not been activated. That means that an alarm of the type 'Function for the command 'name' is not active' is generated at the start of program interpretation. For example, a precompiled program cannot be generated with this setting if language commands of non-activated NCK functions are programmed.

4: NCK knows only those language elements corresponding to the current scope of functions of the NCK software. That means that commands for inactive NCK functions are rejected with an alarm 'Identifier 'name' is unknown'. However, this does not differentiate whether or not the stated command is generally unknown in the Siemens NC language or if it is merely missing from this system.

-					
-	-	0	0	4	0/0

10712	**NC_USER_CODE_CONF_NAME_TAB**			EXP, N01, N12	PA
-	List of reconfigured NC codes			STRING	POWER ON
List of identifiers of the NC codes reconfigured by the user. The list is to be structured as follows: Even address: Identifier to be changed Subsequent odd address: New identifier The following three types of NC codes can reconfigured: 1. G codes e.g.: G02, G64, ASPLINE... 2. NC addresses e.g.: RND, CHF, ... 3. Pre-defined subprograms e.g.: CONTPRON, ...					
-					
-	200	...	-	-	2/2

10713	**M_NO_FCT_STOPRE**			EXP, N12, N07	-
-	M function with preprocessing stop			DWORD	POWER ON
The M functions defined by machine data $MN_M_NO_FCT_STOPRE perform an implicit preprocessing stop. That is, the interpretation of the next part program line will be stopped until the block with the M function defined in that way has been processed completely (PLC acknowledgement, motion, etc.).					
-					
-	15	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/2

10714	**M_NO_FCT_EOP**			EXP, N07	S1
-	M function for spindle active after reset			DWORD	POWER ON

For spindles where a '2' is configured in $MA_SPIND_ACTIVE_AFTER_RESET, no spindle reset is enabled with this M function when the part program is terminated. The spindle therefore remains active after the end of the part program.

Proposal: M32
Restrictions: see machine data 10715: $MN_M_NO_FCT_CYCLE

Related to:
$MA_SPIND_ACTIVE_AFTER_RESET
$MN_M_NO_FCT_EOP,
$MN_M_NO_FCT_CYCLE,
$MC_SPIND_RIGID_TAPPING_M_NR,
$MC_AUXFU_ASSOC_M0_VALUE

For external language mode:
$MN_EXTERN_M_NO_MAC_CYCLE,
$MN_EXTERN_M_NO_SET_INT
$MN_EXTERN_M_NO_DISABLE_INT,
$MN_EXTERN_CHAN_SYNC_M_NO_MIN,
$MN_EXTERN_CHAN_SYNC_M_NO_MAX
$MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:
$MC_NIBBLE_PUNCH_CODE

-					
-	-	-1	-	-	7/2

10715	**M_NO_FCT_CYCLE**	EXP, N12, N07	FBFA,K1
-	M function to be replaced by a subroutine	DWORD	POWER ON

```
M number with which a subprogram is called.
The name of the subprogram is stated in $MN_M_NO_FCT_CYCLE_NAME[n]. If the M
    function defined with $MN_M_NO_FCT_CYCLE[n] is programmed in a part pro-
    gram block, the subprogram defined in M_NO_FCT_CYCLE_NAME[n] is started at
    the end of the block. If the M function is programmed again in the subpro-
    gram, substitution by a subprogram call is then not carried out.
    $MN_M_NO_FCT_CYCLE[n] acts both in Siemens mode G290 and in external lan-
    guage mode G291.

The subprograms configured with $MN_M_NO_FCT_CYCLE_NAME[n] and
    $MN_T_NO_FCT_CYCLE_NAME must not be active simultaneously in one block
    (line of a part program). That means no more than one M/T function
    replacement can be active in any one block. Neither an M98 nor a modal
    subprogram call can be programmed in a block with the M function replace-
    ment.
Subprogram return and end of part program are also not permitted. Alarm 14016
    is output in the event of a conflict.

Restrictions:
M functions with a fixed meaning and configurable M functions are checked for
    conflicting settings. A conflict is reported with an alarm.

The following M functions are checked:
- M0 to M5,
- M17,M30,
- M19,
- M40 to M45,
- M function for 'Spindle active after part program end' according to machine
    data $MN_M_NO_FCT_EOP
- M function for subprogram calls according to machine data $MN_M_NO_FCT_CYCLE
- M function for spindle/axis mode switchover according to machine data
    $MC_SPIND_RIGID_TAPPING_M_NR
- Additional M function for program stop according to machine data
    $MC_AUXFU_ASSOC_M0_VALUE
- Additional M function for conditional program stop according to machine data
    $MC_AUXFU_ASSOC_M1_VALUE
For external language mode only:
- M function for 'Macro call via M function' according to machine data
    $MN_EXTERN_M_NO_MAC_CYCLE
- M functions for interrupt programming according to configuration by
    $MN_EXTERN_M_NO_SET_INT and $MN_EXTERN_M_NO_DISABLE_INT
- M functions for channel synchronisation according to configuration by
    $MN_EXTERN_CHAN_SYNC_M_NO_MIN und $MN_EXTERN_CHAN_SYNC_M_NO_MAX
- M function for spindle/axis mode switchover with external language applied
    according to machine data $MC_EXTERN_RIGID_TAPPING_M_NR
- Additionally M98 and M99 with external language applied
    ($MN_MM_EXTERN_LANGUAGE).

For nibbling:
- M functions for nibbling/punching according to configuration by
    $MC_NIBBLE_PUNCH_CODE provided that they have been activated by
    $MC_PUNCHNIB_ACTIVATION.

Exception:
The M function for the tool change defined by $MC_TOOL_CHANGE_M_CODE must not
    be used in $MN_M_NO_FCT_CYCLE.
```

```
Related to:
   $MN_M_NO_FCT_EOP,
   $MN_M_NO_FCT_CYCLE,
   $MC_SPIND_RIGID_TAPPING_M_NR,
   $MC_AUXFU_ASSOC_M0_VALUE,


With external language mode:
   $MN_EXTERN_M_NO_MAC_CYCLE,
   $MN_EXTERN_M_NO_SET_INT
   $MN_EXTERN_M_NO_DISABLE_INT,
   $MN_EXTERN_CHAN_SYNC_M_NO_MIN,
   $MN_EXTERN_CHAN_SYNC_M_NO_MAX
   MC_EXTERN_RIGID_TAPPING_M_NR

With nibbling:
   $MC_NIBBLE_PUNCH_CODE
```

-					
-	10	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1	-	-	7/2

10716	**M_NO_FCT_CYCLE_NAME**	EXP, N12, N07	FBFA,K1
-	Subroutine name for M function replacement	STRING	POWER ON

```
The machine data contains the name of the cycle. This cycle is called if the M
    function has been programmed from machine data $MN_M_NO_FCT_CYCLE.
If the M function is programmed in a motion block, the cycle is executed after
    the motion.

$MN_M_NO_FCT_CYCLE is active in both Siemens mode G290 and in external lan-
guage mode G291.
If a T number is programmed in the call block, then the programmed T number
    can be polled in the cycle under the variable $P_TOOL.

M and T function replacements must not be programmed simultaneously in one
    block. That means  not more than one M or T function replacement may be
    active in any one block.
Neither an M98 nor a modal subprogram call may be programmed in a block with M
function replacement.
Moreover, neither subprogram return nor part program end are allowed.
Alarm 14016 is issued if there is a conflict.

Related to:
   $MN_M_NO_FCT_CYCLE,
   $MN_T_NO_FCT_CYCLE_NAME
```

-					
-	10		-	-	7/2

10717	T_NO_FCT_CYCLE_NAME			EXP, N12, N07	FBFA,K1
-	Name of tool-changing cycle for T function replacement			STRING	POWER ON
Cycle name for tool change routine on call-up with a T function. If a T function is programmed in a part program block, the subprogram defined in T_NO_FCT_CYCLE_NAME is called at the end of the block. The T number programmed can be polled in the cycle via system variables $C_T / $C_T_PROG as a decimal value and via $C_TS / $C_TS_PROG as a string (only with tool management). $MN_T_NO_FCT_CYCLE_NAME is active both in Siemens mode G290 and in external language mode G291. $MN_M_NO_FCT_CYCLE_NAME and $MN_T_NO_FCT_CYCLE_NAME must not be active in one block at the same time, i.e. no more than one M/T function replacement can be active per block. In the block with the T function replacement, neither an M98 nor a modal subprogram call can be programmed. Furthermore, neither subprogram return nor part program end are allowed. In the event of a conflict alarm 14016 is output. Related to: $MN_M_NO_FCT_CYCLE, $MN_M_NO_FCT_CYCLE_NAME					
-					
-	-		-	-	7/2

10718	M_NO_FCT_CYCLE_PAR			EXP, N12, N07	-
-	M function replacement with parameters			DWORD	POWER ON
If an M function replacement was configured with $MN_M_NO_FCT_CYCLE[n] / $MN_M_NO_FCT_CYCLE_NAME[n], a parameter transfer via system variable can be specified for one of these M functions using $MN_M_NO_FCT_CYCLE_PAR, in the same way as T function replacement. The parameters stored in the system variables always refer to the part program line where the M function to be replaced was programmed. The following system variables are available: $C_ME : Address extension of the replaced M function $C_T_PROG : TRUE if address T was programmed $C_T : Value of address T (Integer) $C_TE : Address extension of address T $C_TS_PROG : TRUE if address TS was programmed $C_TS : Value of address TS (string, only with tool management) $C_D_PROG : TRUE if address D was programmed $C_D : Value of address D $C_DL_PROG : TRUE if address DL was programmed $C_DL : Value of address DL					
-					
-	-	-1	-	-	7/2

10719	**T_NO_FCT_CYCLE_MODE**		EXP, N12, N07	K1
-	Setting of T function substitution		DWORD	POWER ON

```
This machine data parameterizes the execution of the replacement subprogram
for the tool and tool offset selection.

Bit 0 = 0:
     D or DL number is transferred to the replacement subprogram (default
    value)

Bit 0 = 1:
   The D or DL number is not transferred to the replacement subprogram if the
following conditions are fulfilled: $MC_TOOL_CHANGE_MODE = 1   Programming D/
DL with T or M function with which the tool change cycle is called, in a part
program line.

Bit 1 = 0
   Execution of the replacement subprogram at end of block (default value)
Bit 1 = 1
   Execution of the replacement subprogram at block start

Bit 2 = 0:
   Execution of the replacement subprogram according to the settin of bit 1
Bit 2 = 1:
   Execution of the replacement subprogram at block start and at end of block.
```

-					
-	-	0	0	7	7/2

10720	**OPERATING_MODE_DEFAULT**		N01	H2
-	Setting of mode after power ON		BYTE	POWER ON

```
Default modes of the mode groups after power ON.
If no mode is selected by the PLC, all the channels associated with mode group
    n are in the mode preset by OPERATING_MODE_DEFAULT[ n -1 ] after power ON:
0 = Automatic mode
1 = Automatic mode, submode REPOS
2 = MDI mode
3 = MDI mode, submode REPOS
4 = MDI mode, submode Teach In
5 = MDI mode, submode Reference point approach
6 = JOG mode
7 = JOG mode, submode Reference point approach
8 = AUTO mode, submode Teach In
9 = AUTO mode, submode Teach In, submode Reference point approach
10 = AUTO mode, submode Teach In, submode  Repos
11 = MDI mode, submode Teach In, submode  Reference point approach
12 = MDI mode, submode Teach In, submode Repos
```

-					
-	10	7,7,7,7,7,7,7,7,7,7	0	12	7/2

10722	AXCHANGE_MASK		EXP, N01	K5
-	Paramamaters for axis replacement behavior		DWORD	POWER ON

```
The axis replacement behavior can be changed with this
machine data.

Bit0 = 1
   Means that there is an automatic axis replacement via channels even if the
axis has been brought into a neutral state by Waitp.

Bit1 = 1
   Means that an AXCTSWE fetches all the axis container axes that can be
assigned to the channel by means of implicit GET or GETD, and an axis replace-
ment is not permitted again until after the axis container rotation.

Bit2 = 1
   Means that, in the case of a GET, an intermediate block without  prepro-
cessing stop is generated, and whether a reorganization is needed is not
checked until main run.

Bit3 = 1 means, that the NC carries out an axis replacement request for the
VDI interface only for:
         - an axis exclusively controlled by the PLC ($MA_BASE_FUNCTION_MASK
    Bit 4 == 1)
         - a permanently assigned PLC axis ($MA_BASE_FUNCTION_MASK Bit 5 == 1)
         For such axes, the VDI interface signal 'Axis replacement possible'
    is always 1.
         For all other axes, the VDI interface signal 'Axis replacement possi-
    ble' is always 0.
         For permanently assigned PLC axes, an axis replacement is possible
    only from neutral axis to PLC axis
         or from PLC axis to neutral axis.
Bit3 = 0 means that an axis replacement can be requested by the PLC for each
axis.
         For permanently assigned PLC axes, an axis replacement is only possi-
    ble from neutral axis to PLC axis
         or from PLC axis to neutral axis.
```

-					
-	-	0	0	0xFFFF	7/2

10731	JOG_MODE_KEYS_EDGETRIGGRD		EXP, N01	IAF
-	Functioning of the JOG keys		BOOLEAN	POWER ON

```
This data determines whether the signals of the VDI interface, which set the
JOG mode (progressive INC10000, ... INC1), work as switches (level triggered)
or as push buttons (edge triggered). In the latter case, a setting is made in
the NCK to retain the function of the key last pressed.
```

-					
-	-	TRUE	-	-	0/0

10735	**JOG_MODE_MASK**			EXP, N01	-
-	Enable JOG in automatic			DWORD	POWER ON

Bit 0:
Enables JOG in automatic.

JOG is enabled in automatic when all channels in the mode group are in the RESET state and no channel of the DRF mode group has been selected. The mode group changes internally to JOG with the +/- key and the handwheel, and the axis moves. After the JOG motion has ended, a change back to AUTO is also made internally.

Bits 1-31:
Currently unassigned.

-					
-	-	0	0	0x1	7/2

10760	**G53_TOOLCORR**			N12	FBFA
-	Method of operation of G53, G153 and SUPA			BOOLEAN	POWER ON

With this MD you define whether tool length offset and tool radius offset are also to be suppressed with language commands G53, G153 and SUPA
0: G53,G153 and SUPA cause block-by-block suppression of zero offsets. The active tool length offset and tool radius offset remain active.

1: G53,G153 and SUPA cause block-by-block suppression of zero offsets, active tool length offset and tool radius offset.

-					
-	-	FALSE	-	-	7/2

10780	**UNLOCK_EDIT_MODESWITCH**			EXP, N01	-
-	Cancel start disable when editing a part program			BOOLEAN	POWER ON

To avoid inconsistent states, a start disable is forced in Teach In mode when a part program is edited.
This start disable during editing can be canceled together with the operating algorithms of the individual MMCs by an NC reset or a mode group change.

0: Start disable when editing is also canceled with NC Reset

1: Start disable when editing is also canceled on a mode group change.

-					
-	-	FALSE	-	-	0/0

10800	**EXTERN_CHAN_SYNC_M_NO_MIN**			EXP, N12	FBFA
-	1st M function for channel synchronization			DWORD	POWER ON

M number of the first M function which can be used to perform a channel (program) synchronization in ISO2/3 mode.
To avoid conflicts with standard M functions the lowest permissible value is 100. If you enter a value between 0 and 99, alarm 4170 will be issued.

-					
-	-	-1	-	-	7/2

10802	**EXTERN_CHAN_SYNC_M_NO_MAX**			EXP, N12	FBFA
-	Last M function for channel synchronization			DWORD	POWER ON
M number of the last M function which can be used to perform a channel (program) synchronization in ISO2/3 mode. In combination with $MN_EXTERN_CHAN_SYNC_M_NO_MIN, the machine data defines an M number range reserved for channel synchronization. This range may be a maximum of 10 times the amount of channels since only 10 WAIT marks may be set for each channel. If you enter a value between 0 and 99 or less than $MN_EXTERN_CHAN_SYNC_M_NO_MIN, alarm 4170 is issued.					
-					
-	-	-1	-	-	7/2

10804	**EXTERN_M_NO_SET_INT**			EXP, N12	FBFA
-	M function to activate ASUB			DWORD	POWER ON
M function number used to activate an interrupt program (ASUB) in ISO2/3 mode. The interrupt program is always started by the 1st high-speed input of the numerical control. The M number defined in the machine data replaces M96 in external language mode. Restrictions: Refer to machine data 10715: $MN_M_NO_FCT_CYCLE Related to: $MN_M_NO_FCT_EOP, $MN_M_NO_FCT_CYCLE, $MC_SPIND_RIGID_TAPPING_M_NR, $MC_AUXFU_ASSOC_M0_VALUE For external language mode: $MN_EXTERN_M_NO_MAC_CYCLE, $MN_EXTERN_M_NO_SET_INT $MN_EXTERN_M_NO_DISABLE_INT, $MN_EXTERN_CHAN_SYNC_M_NO_MIN, $MN_EXTERN_CHAN_SYNC_M_NO_MAX $MC_EXTERN_RIGID_TAPPING_M_NR For nibbling: $MC_NIBBLE_PUNCH_CODE					
-					
-	-	96	-	-	7/2

10806	EXTERN_M_NO_DISABLE_INT		EXP, N12		FBFA
-	M function to deactivate ASUB		DWORD		POWER ON
M function number used to deactivate an interrupt program (ASUB) in ISO2/3 mode. The M number defined in the machine data replaces M97 in external language mode. Restrictions: refer to machine data 10715 $MN_M_NO_FCT_CYCLE $MN_M_NO_FCT_EOP, $MN_M_NO_FCT_CYCLE, $MC_SPIND_RIGID_TAPPING_M_NR, $MC_AUXFU_ASSOC_M0_VALUE For external language mode: $MN_EXTERN_M_NO_MAC_CYCLE, $MN_EXTERN_M_NO_SET_INT $MN_EXTERN_M_NO_DISABLE_INT, $MN_EXTERN_CHAN_SYNC_M_NO_MIN, $MN_EXTERN_CHAN_SYNC_M_NO_MAX $MC_EXTERN_RIGID_TAPPING_M_NR For nibbling: $MC_NIBBLE_PUNCH_CODE					
-					
-	-	97	-	-	7/2

10808	EXTERN_INTERRUPT_BITS_M96		EXP, N12		FBFA
-	Activate interrupt program (ASUB)		DWORD		POWER ON
Setting the various bits can influence the processing of the interrupt routine activated by M96 P... Bit 0 = 0, No interrupt program possible, M96/M97 are normal M functions Bit 0 = 1, Using M96/M97 to activate an interrupt program is allowed Bit 1 = 0, Continue processing part program at the final position of the next block after the interrupt block Bit 1 = 1, Continue processing part program from interrupt position Bit 2 = 0, The interrupt signal immediately interrupts the current block and starts the interrupt routine Bit 2 = 1, The interrupt routine will not be started until the end of the block Bit 3 = 0, Interrupt machining cycle at an interupt signal Bit 3 = 1, Do not start interrupt program until the end of a machining cycle.					
-					
-	-	0	-	-	7/2

10810	**EXTERN_MEAS_G31_P_SIGNAL**			EXP, N12	FBFA
-	Config. of measuring inputs for G31 P..			BYTE	POWER ON
This machine data defines the assignment of measurement inputs 1 and 2 to the P numbers programmed with G31 P1 (- P4). The machine data is bit-coded. Only bits 0 and 1 are evaluated. For example, if bit 0 = 1 in $MN_EXTERN_MEAS_G31_P_SIGNAL[1] the 1st measurement input is activated with G31 P2. If $MN_EXTERN_MEAS_G31_P_SIGNAL[3]=2, the 2nd measurement input is activated with G31 P4. Bit 0: = 0, Do not evaluate measurement input 1 with G31 P1 (- P4) Bit 0: = 1, Activate measurement input 1 with G31 P1 (- P4) Bit 1: = 0, Do not evaluate measurement input 2 with G31 P1 (- P4) Bit 1: = 1, Activate measurement input 2 with G31 P1 (- P4)					
-					
-	4	1,1,1,1	0	3	7/2

10812	**EXTERN_DOUBLE_TURRET_ON**			EXP, N12	FBFA
-	Double turret with G68			BOOLEAN	POWER ON
This machine data is used to determine whether double-slide machining (channel synchronization for 1st and 2nd channel) is to be started using G68 or whether the second tool of a double turret (= two closely-linked tools at a distance defined in the setting data $SC_EXTERN_DOUBLE_TURRET_DIST) is to be activated. FALSE: Channel synchronization for double-slide machining TRUE: Load 2nd tool of a double turret (that is, activate $SC_EXTERN_DOUBLE_TURRET_DISTANCE as additive zero offset and mirroring around Z axis)					
-					
-	-	FALSE	-	-	7/2

10814	EXTERN_M_NO_MAC_CYCLE		EXP, N12	FBFA	
-	Macro call via M function		DWORD	POWER ON	

A macro is called with this M number.

The name of the subprogram is stated in $MN_EXTERN_M_NO_MAC_CYCLE_NAME[n].

If the M function specified with $MN_EXTERN_M_NO_MAC_CYCLE[n] is programmed in a part program block, the subprogram defined in EXTERN_M_NO_MAC_CYCLE_NAME[n] is started. All addresses programmed in the block are written into the corresponding variables.

If the M function is programmed again in the subprogram, the replacement by a subprogram call does not take place any more.

$MN_EXTERN_M_NO_MAC_CYCLE[n] is only active in the external language mode G291.

The subprograms configured with $MN_EXTERN_M_NO_MAC_CYCLE_NAME[n] must not be active simultaneously in a block (part program line), i.e. maximally one M function replacement can become active in a block. Neither an M98 nor a modal subprogram call may be programmed in the block with the M function replacement.

Subprogram return and the part program end arealso not permitted. Alarm 14016 is issued in case of a conflict. Restrictions: see machine data 10715: $MN_M_NO_FCT_CYCLE

Related to:
$MN_M_NO_FCT_EOP,
$MN_M_NO_FCT_CYCLE,
$MC_SPIND_RIGID_TAPPING_M_NR,
$MC_AUXFU_ASSOC_M0_VALUE

For external language mode:
$MN_EXTERN_M_NO_MAC_CYCLE,
$MN_EXTERN_M_NO_SET_INT
$MN_EXTERN_M_NO_DISABLE_INT,
$MN_EXTERN_CHAN_SYNC_M_NO_MIN,
$MN_EXTERN_CHAN_SYNC_M_NO_MAX
$MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:
$MC_NIBBLE_PUNCH_CODE

-					
-	10	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1	-	-	7/2

10815	EXTERN_M_NO_MAC_CYCLE_NAME		EXP, N12	FBFA	
-	Name of subroutine for M function macro call		STRING	POWER ON	

Name of the subprogram started by a call via the M function defined by $MN_EXTERN_M_NO_MAC_CYCLE[n].

-					
-	10		-	-	7/2

10816	**EXTERN_G_NO_MAC_CYCLE**			EXP, N12	FBFA
-	Macro call via G function			DOUBLE	POWER ON
G number for calling a macro. The name of the subprogram is stated in $MN_EXTERN_G_NO_MAC_CYCLE_NAME[n]. If the G function specified with $MN_EXTERN_G_NO_MAC_CYCLE[n] is programmed in a part program block, the subprogram defined in EXTERN_M_NO_MAC_CYCLE_NAME[n] is started. All addresses programmed in the block are written in the corresponding $C_xx variables. No subprogram call is executed if a subprogram call is already active via an M/G macro or an M replacement. If a standard G function is programmed in this case, this code is executed. Otherwise, alarm 12470 is issued. $MN_EXTERN_G_NO_MAC_CYCLE[n] is only active in the external language mode G291. Only a single subprogram call may be included in a block. This means that only a single M/G function replacement may be programmed in a block and no additional subprogram (M98) or cycle call may be included in the block. Furthermore, a subprogram return and a part program end are not permitted in the same block. Alarm 14016 is issued in case of a conflict.					
-					
-	50	-1.,-1.,-1.,-1.,-1.,-1.,-1.,-1.,-1....	-	-	7/2

10817	**EXTERN_G_NO_MAC_CYCLE_NAME**			EXP, N12	FBFA
-	Name of subroutine for G function macro call			STRING	POWER ON
Name of the subprogram started by call via the G function defined by $MN_EXTERN_G_NO_MAC_CYCLE[n].					
-					
-	50		-	-	7/2

10818	**EXTERN_INTERRUPT_NUM_ASUP**			EXP, N12	FBFA
-	Interrupt number for ASUP start (M96)			BYTE	POWER ON
Number of the interrupt input starting an asynchronous subprogram activated in ISO mode. (M96 <program number>)					
-					
-	-	1	1	8	7/2

10820	**EXTERN_INTERRUPT_NUM_RETRAC**			EXP, N12	FBFA
-	Interrupt number for rapid retraction (G10.6)			BYTE	POWER ON
Number of the interrupt input triggering rapid retraction to the position programmed with G10.6 in ISO mode.					
-					
-	-	2	1	8	7/2

10850	**MM_EXTERN_MAXNUM_OEM_GCODES**			EXP, N01, N12	-
-	Maximum number of OEM G codes			DWORD	POWER ON
This machine data is used to define the number of G codes implemented for an external language via an OEM application.					
-					
-	-	0	0	1000	1/1

10880	**MM_EXTERN_CNC_SYSTEM**			N01, N12	FBFA
-	Definition of the control system to be adapted			DWORD	POWER ON
Definition of the external CNC system whose part programs are to be executed on the SINUMERIK control in addition to SINUMERIK code (ISO_1): 1: ISO_2: System Fanuc0 milling (from software version 5.1) 2: ISO_3: System Fanuc0 turning (from P5.2) 3: External language via OEM application (from software version 6.2)					
-					
-	-	1	1	3	7/2

10881	**MM_EXTERN_GCODE_SYSTEM**			N01, N12	FBFA
-	ISO_3 Mode: GCodeSystem			DWORD	POWER ON
Definition of the GCodeSystem to be actively executed in ISO_3 Mod (turning): Value = 0 : ISO_3: Code system B Value = 1 : ISO_3: Code system A Value = 2 : ISO_3: Code system C					
-					
-	-	0	0	2	7/2

10882	**NC_USER_EXTERN_GCODES_TAB**			N12	FBFA
-	List of user-specific G commands of an external NC language			STRING	POWER ON
List of G commands of external NC languages which have been reconfigured by the user. The implemented G commands are to be taken from the current Siemens documentation for this programming language. The list is structured as follows: Even address: G command to be changed Subsequent odd address: New G command Only G codes can be reconfigured, e.g.: G20, G71.					
-					
-	60		-	-	2/2

10884	EXTERN_FLOATINGPOINT_PROG			N12	FBFA
-	Evaluation of programmed values without decimal point			BOOLEAN	POWER ON
This MD defines how programmed values without a decimal point are evaluated: 0: Values without a decimal point are interpreted in internal units. For example, X1000 = 1 mm (for 0.001 mm input resolution) X1000.0 = 1000 mm 1: Values without decimal point are interpreted as mm, inch or degrees. For example, X1000 = 1000 mm X1000.0 = 1000 mm Related to: EXTERN_INCREMENT_SYSTEM					
-					
-	-	TRUE	-	-	7/2

10886	EXTERN_INCREMENT_SYSTEM			N12	FBFA
-	Incremental system in external language mode			BOOLEAN	POWER ON
This machine data is active for external programming languages, that is if MD 18800: MM_EXTERN_LANGUAGE = 1. This machine data specifies which incremental system is active: 0: Incremental system IS-B = 0.001 mm/degree = 0.0001 inch 1: Incremental system IS-C = 0.0001 mm/degree = 0.00001 inch Related to: EXTERN_FLOATINGPOINT_PROG					
-					
-	-	FALSE	-	-	7/2

10888	EXTERN_DIGITS_TOOL_NO			N12	FBFA
-	Digits for T number in ISO mode			BYTE	POWER ON
This machine data is only active when $MN_MM_EXTERN_CNC_SYSTEM = 2. Number of digits of the tool number in the programmed T word. From the programmed T word, the number of leading digits specified in $MN_EXTERN_DIGITS_TOOL_NO are interpreted as the tool number. The following digits address the offset memory.					
-					
-	-	2	0	8	7/2

10890	EXTERN_TOOLPROG_MODE	N12	FBFA
-	Tool change programming for external language	DWORD	POWER ON

```
Configuration for programming the tool change in an external programming lan-
    guage:
Bit0=0:
    Only active if $MN_MM_EXTERN_CNC_SYSTEM =2: The tool number and offset
    number are programmed in the T word. $MN_DIGITS_TOOLNO defines the number
    of leading digits that the tool number generates.
    Example:
    $MN_DIGITS_TOOLNO = 2
    T=1234    ; Tool number 12,
              ; Offset number 34

 Bit0=1:
    Only active if $MN_MM_EXTERN_CNC_SYSTEM =2: Only the tool number is pro-
    grammed in the T word. Offset number = Tool number. $MN_DIGITS_TOOLNO is
    irrelevant.
    Example:
    T=12      ; Tool number 12
              ; Offset number 12
 Bit1=0:
    Only active if $MN_MM_EXTERN_CNC_SYSTEM =2: A leading 0 is added if the
    number of digits programmed in the T word is the same as that in
    $MN_EXTERN_DIGITS_TOOL_NO.
 Bit1=1:
    Only active if $MN_MM_EXTERN_CNC_SYSTEM =2: If the number of digits pro-
    grammed in the T word is equal to the number of digits defined in
    $MN_EXTERN_DIGITS_TOOL_NO, the programmed number is both the offset num-
    ber and the tool number

 Bit2=0:
    Only active if $MN_MM_EXTERN_CNC_LANGUAGE =2: ISO T offset selection only
    with D (Siemens cutting edge number)
 Bit2=1:
    Only active if $MN_MM_EXTERN_CNC_LANGUAGE =2: ISO T offset selection only
    with H ($TC_DPH[t,d])

 Bit3=0:
    Only active if $MN_MM_EXTERN_CNC_SYSTEM =2: Each H number is only allowed
    once in each TOA, except H=0. If bit3 1 -> 0 is set, no H number may occur
    more than once in a TO unit. Otherwise an alarm will be issued at the next
    restart.

 Bit3=1:
    Only active if $MN_MM_EXTERN_CNC_SYSTEM =2: Each H number is only allowed
    more than once in each TOA.

 Bit6=0:
    Only active if MN_MM_EXTERN_CNC_SYSTEM =1: Tool length cannot be selected
    under address H
```

```
 Bit6=1:
   Only active if MN_MM_EXTERN_CNC_SYSTEM =1: Tool length selected under
address H

 Bit7=0:
   Only active if MN_MM_EXTERN_CNC_SYSTEM =1: Tool length cannot be selected
under address D
 Bit7=1:
   Only active if MN_MM_EXTERN_CNC_SYSTEM =1: Tool length selected under
address D.

Selection under address D or H is possible if bits 6 and 7 have been set.
```

-					
-	-	0	-	-	7/2

10900	**INDEX_AX_LENGTH_POS_TAB_1**	N09	T1
-	Number of positions for indexing axis table 1	DWORD	RESET

```
The indexing position table is used to assign the axis positions in the valid
    unit of measurement (mm, inches or degrees) to the indexing positions [n]
    on the indexing axis. The number of indexing positions used in table 1 is
    defined by the MD: INDEX_AX_LENGTH_POS_TAB_1.

These indexing positions must contain valid values in table 1. Any indexing
positions in the table above the number specified in the machine data are
ignored. Up to 60 indexing positions (0 to 59) can be entered in the table.
Table length = 0 means that the table is not evaluated. If the length is not
equal to 0, then the table must be assigned to an axis with the MD:
INDEX_AX_ASSIGN_POS_TAB.

If the indexing axis is defined as a rotary axis (MD: IS_ROT_AX = "1") with
    modulo 360° (MD: ROT_IS_MODULO = "1"), the machine data defines the last
    indexing position after which, with a further traversing movement in the
    positive direction, the indexing positions begin again at 1 .

Special cases:
   Alarm 17090 "Value violates upper limit" if values over 60 are entered in
the MD: INDEX_AX_LENGTH_POS_TAB_1.

Related to:
   MD: INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)
   MD: INDEX_AX_POS_TAB_1 (indexing position table 1)
   MD: IS_ROT_AX (rotary axis)
   MD: ROT_IS_MODULO (modulo conversion for rotary axis)
```

-					
-	-	0	0	60	7/2

10910	INDEX_AX_POS_TAB_1			N09	T1
mm/inch, degrees	Indexing position table 1			DOUBLE	RESET

The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis.
[n] = indexing for the entry of the indexing positions in the indexing position table.
Range: 0 y n x 59, where 0 is the 1st indexing position and 59 corresponds to the 60th indexing position.

Note.
Programming with the absolute indexing position (e.g. CAC) starts with indexing position 1. This corresponds to the indexing position with indexing n = 0 in the indexing position table.

The following should be noted when entering the indexing positions:
- Up to 60 different indexing positions can be stored in the table.
- The 1st entry in the table corresponds to indexing position 1; the nth entry corresponds to indexing position n.
- The indexing positions must be entered in the table in ascending order (starting with the negative to the positive traversing range) with no gaps between the entries. Consecutive position values must not be identical.
- If the indexing axis is defined as a rotary axis (MD: IS_ROT_AX = "1") with modulo 360° (MD: ROT_IS_MODULO = "1"), then the position values are limited to a range of 0° x pos. < 360°.

The number of indexing positions used in the table is defined by the MD: INDEX_AX_LENGTH_POS_TAB_1.
Entering the value 1 in the axial machine data: INDEX_AX_ASSIGN_POS_TAB assigns indexing position table 1 to the current axis.

Special cases:
Alarm 17020 "illegal array index" if over 60 positions are entered in the table.

Related to:
MD: INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)
MD: INDEX_AX_LENGTH_POS_TAB_1 (no. of indexing positions used in table 1)
MD: IS_ROT_AX (rotary axis)
MD: ROT_IS_MODULO (modulo conversion for rotary axis)

-					
-	60	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/2

10920	**INDEX_AX_LENGTH_POS_TAB_2**		N09	T1
-	Number of positions for indexing axis table 2		DWORD	RESET

The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis. The number of indexing positions used in table 2 is defined by the MD: INDEX_AX_LENGTH_POS_TAB_2.

These indexing positions in table 2 must contain valid values. Any indexing positions in the table above the number specified in the machine data are ignored.
Up to 60 indexing positions (0 to 59) can be entered in the table.
Table length = 0 means that the table is not evaluated. If the length is not equal to 0, the table must be assigned to an axis with the MD: INDEX_AX_ASSIGN_POS_TAB.
If the indexing axis is defined as a rotary axis (MD: IS_ROT_AX = "1") with modulo 360° (MD: ROT_IS_MODULO = "1"), the machine data defines the last indexing position after which, with a further traversing movement in the positive direction, the indexing positions begin again at 1.

Not relevant for tool magazines (revolvers, chain magazines)

Special cases:
Alarm 17090 "Value violates upper limit" if a value over 60 is entered in the MD:INDEX_AX_LENGTH_POS_TAB_2.

Related to:
MD: INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)
MD: INDEX_AX_POS_TAB_2 (indexing position table 2)
MD: IS_ROT_AX (rotary axis)
MD: ROT_IS_MODULO (modulo conversion for rotary axis)

-					
-	-	0	0	60	7/2

10930	INDEX_AX_POS_TAB_2			N09	T1
mm/inch, degrees	Indexing position table 2			DOUBLE	RESET

The indexing position table is used to assign the axis positions in the valid unit of measurement (mm, inches or degrees) to the indexing positions [n] on the indexing axis.
[n] = indexing for the entry of the indexing positions in the indexing position table.
Range: 0 y n x 59, where 0 is the 1st indexing position and 59 corresponds to the 60th indexing position.

Note:
Programming with the absolute indexing position (e.g. CAC) starts with indexing position 1. This corresponds to the indexing position with indexing n = 0 in the table.

The following should be noted when entering the indexing positions:
- Up to 60 different indexing positions can be stored in the table.
- The 1st entry in the table corresponds to indexing position 1; the nth entry corresponds to indexing position n.
- The indexing positions should be entered in the table in ascending order (starting with the negative to the positive traversing range) with no gaps between the entries. Consecutive position values must not be identical.
- If the indexing axis is defined as a rotary axis (MD: IS_ROT_AX = "1") with modulo 360° (MD: ROT_IS_MODULO = "1"), then the position values are limited to a range of 0° x pos. < 360°.

The number of indexing positions used in the table is defined by the MD: INDEX_AX_LENGTH_POS_TAB_2.
Entering the value 1 in the axial machine data: INDEX_AX_ASSIGN_POS_TAB assigns indexing position table 1 to the current axis.

Special cases:
Alarm 17020 "illegal array index" if over 60 positions are entered in the table.

Related to:
MD: INDEX_AX_ASSIGN_POS_TAB (axis is an indexing axis)
MD: INDEX_AX_LENGTH_POS_TAB_2 (no. of indexing positions used in table 2)
MD: IS_ROT_AX (rotary axis)
MD: ROT_IS_MODULO (modulo conversion for rotary axis)

-					
-	60	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/2

10940	**INDEX_AX_MODE**			EXP	-
-	Settings for indexing position			DWORD	POWER ON
Affects the display of indexing positions (AA_ACT_INDEX_AX_POS_NO and aaActIndexAxPosNo). Bit 0 = 0: Indexing position display changes on reaching/passing the indexing position (indexing range lies between the indexing positions, compatible behavior). Bit 0 = 1: Indexing position display changes on passing the half indexing axis position (indexing range lies quasi symmetrically round the indexing position)					
-					
-	-	0	0	1	7/2

11100	**AUXFU_MAXNUM_GROUP_ASSIGN**			N01, N07, N02	H2
-	Number of auxiliary functions distr. amongst aux. fct. groups			DWORD	POWER ON
The maximum number of auxiliary functions that can be assigned to a group by AUXFU_ASSIGN_TYPE, AUXFU_ASSIGN_EXTENTION, AUXFU_ASSIGN_VALUE and AUXFU_ASSIGN_GROUP. This number includes only the user-defined auxiliary functions, not the predefined auxiliary functions. Related to: MD 22010: AUXFU_ASSIGN_TYPE[n]					
-					
-	-	1	1	255	7/2

11110	**AUXFU_GROUP_SPEC**	N07	H2
-	Auxiliary function group specification	DWORD	POWER ON

```
Defines the output options for the auxiliary functions belonging to a group.

Bit 0=1
   Output duration 1 OB1 pass (normal auxiliary function)
Bit 1=1
   Output duration 1 OB40 pass, alarm-controlled (high-speed auxiliary func-
tion)
Bit 2         Reserved
Bit 3=1
    No output to PLC (may only be set as single bit)
Bit 4=1
   Spindle response after acknowledgement by the PLC
Bit 5=1
   Output prior to motion
Bit 6=1
   Output during motion
Bit 7=1
   Output at end of block
Bit 8=1
    No output after block search

The MD must be defined for each existing auxiliary function group.
The index [n] indicates the number of the auxiliary function group: 0...14
[0]  = 1st auxiliary function group, [1]  = 2nd auxiliary function group ...

The assignment of individual auxiliary functions to specific groups is defined
    in channel-specific machine data ( AUXFU_ASSIGN_TYPE,
    AUXFU_ASSIGN_EXTENTION, AUXFU_ASSIGN_VALUE,  AUXFU_ASSIGN_GROUP ). M0, M1,
    M2, M17 and M30 are assigned to group 1 by default.
The specification of this group ( 0x81: output duration 1 OB1 pass, output at
    end of block ) must not be changed.
All spindle-specific auxiliary functions ( M3, M4, M5, M19, M70 ) are assigned
    to group 2 by default.
If several auxiliary functions with different output types ( before / during /
    at end of motion ) are programmed in one motion block, then the output of
    the individual auxiliary functions occurs in accordance with their output
    types.
All auxiliary functions are output simultaneously in a block without motion.

Default setting:
   AUXFU_GROUP_SPEC[0]=81H
   AUXFU_GROUP_SPEC[1]=21H
   AUXFU_GROUP_SPEC[2]=41H
...
   AUXFU_GROUP_SPEC[n]=41H
```

-					
-	64	0x81,0x21,0x41,0x41,0x41,0x41,0x41...	-	-	7/2

11120	**LUD_EXTENDED_SCOPE**			N01	PG
-	Function "program global user data (PUD)" is active			BOOLEAN	POWER ON
Activate function "Program-global user data (PUD)": MD = 0: User data of the main program level are only active on this level. MD = 1: User data of the main program level are also visible in the subprogram levels.					
-					
-	-	FALSE	-	-	7/2

11140	**GUD_AREA_SAVE_TAB**			N01	-
-	Additional saving for GUD modules			DWORD	SOFORT
This data indicates with which additional area the contents of the GUD module are saved. $MN_GUD_AREA_SAVE_TAB[0] : SGUD_DEF $MN_GUD_AREA_SAVE_TAB[1] : MGUD_DEF $MN_GUD_AREA_SAVE_TAB[2] : UGUD_DEF $MN_GUD_AREA_SAVE_TAB[3] : GUD4_DEF $MN_GUD_AREA_SAVE_TAB[4] : GUD5_DEF $MN_GUD_AREA_SAVE_TAB[5] : GUD6_DEF $MN_GUD_AREA_SAVE_TAB[6] : GUD7_DEF $MN_GUD_AREA_SAVE_TAB[7] : GUD8_DEF $MN_GUD_AREA_SAVE_TAB[8] : GUD9_DEF BitNo. Hexadec Meaning when bit is set Value 0 (LSB) 0x00000001 Area TOA					
-					
-	9	0,0,0,0,0,0,0,0,0	-	-	7/2

11160	**ACCESS_EXEC_CST**			N01	-
-	Execution right for /_N_CST_DIR			BYTE	POWER ON
Execution right assigned to the program stored in directory /_N_CST_DIR : Value 0: Siemens password Value 1: Machine OEM password Value 2: Password of startup engineer, service Value 3: End user password Value 4: Keyswitch position 3 Value 5: Keyswitch position 2 Value 6: Keyswitch position 1 Value 7: Keyswitch position 0 Machine data can only be written with values 0 and 1, and with the corresponding password also active.					
-					
-	-	7	-	-	7/2

11161	**ACCESS_EXEC_CMA**			N01	-
-	Execution right for /_N_CMA_DIR			BYTE	POWER ON

```
Execution right assigned to the programs stored in directory /_N_CMA_DIR :
 Value  0: Siemens password
 Value  1: Machine OEM password
 Value  2: Password of startup engineer, service
 Value  3: End user password
 Value  4: Keyswitch position 3
 Value  5: Keyswitch position 2
 Value  6: Keyswitch position 1
 Value  7: Keyswitch position 0
 Machine data can only be written with values 0 and 1, and with the corre-
    sponding password also active.
```

-					
-	-	7	-	-	7/2

11162	**ACCESS_EXEC_CUS**			N01	-
-	Execution right for /_N_CUS_DIR			BYTE	POWER ON

```
Execution right assigned to the programs stored in directory /_N_CUS_DIR :
 Value  0: Siemens password
 Value  1: Machine OEM password
 Value  2: Password of startup engineer, service
 Value  3: End user password
 Value  4: Keyswitch position 3
 Value  5: Keyswitch position 2
 Value  6: Keyswitch position 1
 Value  7: Keyswitch position 0
 Machine data can only be written with values 0, 1 and 2, and with the corre-
    sponding password also active.
```

-					
-	-	7	-	-	7/3

11165	**ACCESS_WRITE_CST**			N01	-
-	Write protection for directory /_N_CST_DIR			DWORD	POWER ON

```
 Set write protection for cycle directory /_N_CST_DIR:
 Assigned to the programs:
 Value -1: Keep the value currently set
 Value  0: Siemens password
 Value  1: Machine OEM password
 Value  2: Password of startup engineer, service
 Value  3: End user password
 Value  4: Keyswitch position 3
 Value  5: Keyswitch position 2
 Value  6: Keyswitch position 1
 Value  7: Keyswitch position 0
 The machine data can only be written with values 0 and 1, and with the corre-
    sponding password also active.
```

-					
-	-	-1	-	-	7/2

11166	**ACCESS_WRITE_CMA**			N01	-
-	Write protection for directory /_N_CMA_DIR			DWORD	POWER ON
Set write protection for cycle directory /_N_CMA_DIR: Assigned to the programs: Value -1: Keep the value currently set Value 0: Siemens password Value 1: Machine OEM password Value 2: Password of startup engineer, service Value 3: End user password Value 4: Keyswitch position 3 Value 5: Keyswitch position 2 Value 6: Keyswitch position 1 Value 7: Keyswitch position 0 The machine data can only be written with values 0 and 1, and with the corre-sponding password also active.					
-					
-	-	-1	-	-	7/2

11167	**ACCESS_WRITE_CUS**			N01	-
-	Write protection for directory /_N_CUS_DIR			DWORD	POWER ON
Set write protection for cycle directory /_N_CUS_DIR: Assigned to the programs: Value -1: Keep the value currently set Value 0: Siemens password Value 1: Machine OEM password Value 2: Password of startup engineer, service Value 3: End user password Value 4: Keyswitch position 3 Value 5: Keyswitch position 2 Value 6: Keyswitch position 1 Value 7: Keyswitch position 0 The machine data can only be written with values 0, 1 and 2, and with the corresponding password also active.					
-					
-	-	-1	-	-	7/3

11170	**ACCESS_WRITE_SACCESS**			N01	-
-	Write protection for _N_SACCESS_DEF			BYTE	POWER ON
Set write protection for definition file /_N_DEF_DIR/_N_SACCESS_DEF: Value 0: Siemens password Value 1: Machine OEM password Value 2: Password of startup engineer, service Value 3: End user password Value 4: Keyswitch position 3 Value 5: Keyswitch position 2 Value 6: Keyswitch position 1 Value 7: Keyswitch position 0 The machine data can only be written with values 0 and 1, and with the corre-sponding password also active.					
-					
-	-	7	-	-	7/2

11171	**ACCESS_WRITE_MACCESS**			N01	-
-	Write protection for _N_MACCESS_DEF			BYTE	POWER ON

```
Set write protection for definition file /_N_DEF_DIR/_N_SACCESS_DEF:
Value  0: Siemens password
Value  1: Machine OEM password
Value  2: Password of startup engineer, service
Value  3: End user password
Value  4: Keyswitch position 3
Value  5: Keyswitch position 2
Value  6: Keyswitch position 1
Value  7: Keyswitch position 0
The machine data can only be written with values 0 and 1, and with the corre-
   sponding password also active.
```

-					
-	-	7	-	-	7/2

11172	**ACCESS_WRITE_UACCESS**			N01	-
-	Write protection for _N_UACCESS_DEF			BYTE	POWER ON

```
Set write protection for definition file /_N_DEF_DIR/_N_UACCESS_DEF:
Value  0: Siemens password
Value  1: Machine OEM password
Value  2: Password of startup engineer, service
Value  3: End user password
Value  4: Keyswitch position 3
Value  5: Keyswitch position 2
Value  6: Keyswitch position 1
Value  7: Keyswitch position 0
The machine data can only be written with values 0, 1 and 2, and with the
   corresponding password also active.
```

-					
-	-	7	-	-	7/3

11200	**INIT_MD**			EXP, N01	IAF,IAD,IA
-	Standard machine data loaded at next Power On			BYTE	POWER ON

```
A power on must be triggered after setting MD: INIT_MD. The function is exe-
    cuted and the MD reset to "0" at power on.

Meaning of the input:
Bit 0 set:
   All machine data (with the exception of the memory-configuring data) will
be overwritten with the compiled values at the next NCK power on.

Bit 1 set:
   All memory-configuring machine data will be overwritten with the compiled
values at the next NCK power on.

Bit 2 set:
   The OEM machine data brought in by compile cycles will be deleted from the
buffered memory at the next power on.

Bit 3 set:
   All setting data will be overwritten with the compiled values at the next
power on.

Bit 4 set:       All option data will be overwritten with the compiled
                      values at the next power on.

INIT_MD is automatically set to 0 at power on.

Memory configuring MDs are described in:
References: /IAD/, Installation and Startup Guide, Memory Configuration
- MD 10010: ASSIGN_CHAN_TO_MODE_GROUP
- All machine data starting with "MM_"
    MD 18000 - 18999 (general MD)
    MD 28000 - 28999 (channel-specific MD)
    MD 38000 - 38999 (axis-specific MD)
```

-					
-	-	0	-	-	7/2

11210	**UPLOAD_MD_CHANGES_ONLY**			N01, N05	IAD
-	Machine data backup of changed machine data only			BYTE	SOFORT

```
This MD can be set so that only changed MD and setting data are backed up.
It can be set to output either all data or only data which deviates from the
    default setting via the RS232C.

If a value is changed in a data which is stored as an array, then the com-
    plete MD array will always be output (e.g. MD 10000: AXCONF_MA-CHAX_
    NAME_TAB).

Select differential MD upload:

Bit0(LSB)  Effectiveness of the differential upload with TEA files
0: All data is output
1: Only MDs which have changed in comparison to the compiled value are output

Bit1           As bit 0

Bit2 Change to a field element
0: Complete array is output
1: Only changed field elements of an array are output

Bit3 R parameters (only for INI files)
0: All R parameters are output
1: Only R parameters not equal to '0' are output

Bit4 Frames (only for INI files)
0: All frames are output
1: Only frames which are not zero frames are output.

Bit5 Tool data (cutting edge parameters) (only for INI files)
0: All tool data is output
1: Only tool data not equal to '0' is output.

Bit6 Buffered system variables ($AC_MARKER[], $AC_PARAM[] only for INI files)
0: All system variables are output
1: Only  system variables not equal to '0' are output

Bit7 Synchronized actions GUD (for INI files only)
0: All Syna GUD are output
1: Only Syna GUD  not equal to '0' are output

Active: The change in the data becomes active on the start of the upload for
the next area.
```

-					
-	-	0xFF	-	-	7/3

11220	**INI_FILE_MODE**			N01, N05	IAD
-	Error response to INI file errors			BYTE	RESET
If, while reading machine data files (INI files) into controls, data are read in - that are faulty or - do not agree with the check sum then alarms are generated and the reading in may be aborted. The following control behaviors can be selected via machine data settings: 0: Output of an alarm, abort on detection of 1st error. (As SW versions 1 and 2). 1: Output of an alarm, continuation of execution. An alarm with the number of errors is output at the end of execution. 2: Execution continues despite possible errors. An alarm with the number of errors is output at the end of execution.					
-					
-	-	1	0	2	7/2

11230	**MD_FILE_STYLE**			N01, N05	IAD
-	Structure of machine data backup files			BYTE	SOFORT
Appearance of a machine data file at 'upload' Bit 0 (LSB): Line check sum is generated Bit 1: MD numbers are generated Bit 2: Channel axis name as field index with axis-MD in the TEA file Bit 3: With an NCU-link, the MDs of the LINK axes are also output. Bit 4: All local axes are output (even when they are not activated by $MC_AXCONF_MACHAX_USED) Active: The change in the data becomes active on the start of the upload for the next area. Default setting: The line check sums and MD numbers are generated, but not channel names as field index with axis-MD.					
-					
-	-	3	-	-	7/3

11240	PROFIBUS_SDB_NUMBER			N01, N05	K4,FBU
-	SDB number			DWORD	POWER ON
Number of the system data block (SDB-Type-2000) used for configuring the Profibus I/Os.					
-					
-	4	-1,-1,-1,-1	-1	7	2/2
710-2a2c	-	-	-	-	-1/-
710-6a2c	-	-	-	-	-1/-
710-12a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
840d-2a2c	-	-	-	-	-1/-
840d-4a1cg	-	-	-	-	-1/-
840d-6a2c	-	-	-	-	-1/-
840d-12a2c	-	-	-	-	-1/-
840d-31a10c	-	-	-	-	-1/-

11250	PROFIBUS_SHUTDOWN_TYPE			EXP, N01	G3,FBU
-	Profibus shutdown handling			BYTE	POWER ON
Handling of PROFIBUS when shutting down NCK (NCK reset) Value 0: The bus is shut down directly from cyclic operation, without 'prewarning' Value 1: When shutting down NCK, the PROFIBUS is changed to the CLEAR state for at least 20 cycles. Then, it is shut down. If this is not possible on the hardware side, the procedure described for value 2 is used instead. Value 2: When shutting down NCK, the PROFIBUS is changed to a state where all drives are sent a zero word as control word1 and control word2 (pseudoclear) for at least 20 cycles. The bus itself remains in the Operate status.					
-					
-	-	0	0	2	7/2

11270	DEFAULT_VALUES_MEM_MASK		N01		PGA
-	Activation of default values for NC language elements		DWORD		POWER ON

```
Activation of the function 'Memory for initialization values of
NC language elements'
Bit   Hex.    Meaning
       value
-------------------------------
0: (LSB)   0x1 default values GUD

Meaning of the individual bits:
Bit 0 = 0:
   The default values stated for the definition are not stored

Bit 0 = 1:
   The default values stated for the definition are stored persistently. The
memory reserved via MD $MN_MM_GUD_VALUES_MEM is used for this purpose.

The memory reserved via $MN_MM_GUD_VALUES_MEM should be increased by the size
    required for default values.
If this size cannot be determined, the memory should be doubled and adapta-
    tions should be made later if required.
The stored default values can be restored, provided that the corresponding
    programming (REDEF) has been performed.
```

-					
-	-	0	-	-	7/2

11280	WPD_INI_MODE		N01		IAD
-	Handling of INI files in workpiece directory		BYTE		POWER ON

```
Processing mode of INI files in the workpiece directory:

Value = 0:
    An INI file,  _N_werkstück_INI, stored in the workpiece directory is exe-
    cuted on the first NC start after workpiece selection.
Value = 1:
   INI files with the names of the selected part program and extensions are
executed on the first NC start after workpiece selection

SEA,
GUD,
RPA,
UFR,
PRO,
TOA,
TMA and
CEC
.
```

-					
-	-	0	0	1	7/2

11290	**DRAM_FILESYSTEM_MASK**		N01	IAD	
-	Select directories in DRAM		DWORD	POWER ON	

```
Bit0-n =  0:
   The files of the corresponding directory should be stored in SRAM
          1:
   The files of the corresponding directory should be stored in DRAM.

Bit0      CST directory (Siemens cycles)
Bit1      CMA directory (machine manufacturer's cycles)
Bit2      CUS directory (user cycles)
Bit3      MPF directory (main programs)
Bit4      SPF directory (subprograms)
Bit5      WPD directory (workpieces)
```

-					
-	-	0	-	-	2/2
710-2a2c	-	0x3f	-	-	0/0
710-6a2c	-	0x3f	-	-	0/0
710-12a2c	-	0x3f	-	-	0/0
710-31a10c	-	0x3f	-	-	0/0

11291	**DRAM_FILESYST_SAVE_MASK**		N01	IAD	
-	Selection of directories in DRAM		DWORD	POWER ON	

```
Bit0-n =  0:
    No backup is performed. The files stored on NCK are lost if the control is
    switched off.
          1:
   Backup in the FFS of the NC card takes place if the files are located in
DRAM.

Bit0      CST directory (Siemens cycles)
Bit1      CMA directory (machine manufacturer cycles)
Bit2      CUS directory (user cycles)
Bit3      MPF directory (main programs)
Bit4      SPF directory (subprograms)
Bit5      WPD directory (workpieces)
```

-					
-	-	0x07	-	-	2/2
710-2a2c	-	0x3f	-	-	0/0
710-6a2c	-	0x3f	-	-	0/0
710-12a2c	-	0x3f	-	-	0/0
710-31a10c	-	0x3f	-	-	0/0

11292	**DRAM_FILESYST_CONFIG**		EXP	-	
-	Configuration of the DRAM file system		BYTE	POWER ON	
Configuration of the DRAM file system. It is not permitted to change the default value! Bit0/1: Background memory for the DRAM file system Bit4/5: Memory for a fast backup during editing of DRAM files.					
-					
-	-	0x01	-	-	0/0
710-2a2c	-	0x22	-	-	-/-
710-6a2c	-	0x22	-	-	-/-
710-12a2c	-	0x22	-	-	-/-
710-31a10c	-	0x22	-	-	-/-

11294	**SIEM_TRACEFILES_CONFIG**		EXP	-	
-	Configuration of the SIEM* trace file		DWORD	POWER ON	
Configuration of the tracefiles SIEM* Bit0: Additional information about the PDUs sent is to be entered in _N_SIEMDOMAINSEQ_MPF for download Bit1: Additional information about the PDUs received is to be entered in _N_SIEMDOMAINSEQ_MPF for download					
-					
-	-	0	-	-	2/2

11295	**PROTOC_FILE_MEM**		N01	-	
-	Memory type for log files		BYTE	POWER ON	
Type of memory in which the contents of log files are stored. 0: SRAM 1: DRAM area TMP With Powerline, a DRAM file system must be configured with $MM_DRAM_FILE_MEM_SIZE if files are to be stored in DRAM.					
-					
-	10	0,0,0,0,0,0,0,0,0,0	0	1	1/1
710-6a2c	-	1,1,1,1,1,0,0,1,1,1	-	-	-/-
710-12a2c	-	1,1,1,1,1,0,0,1,1,1	-	-	-/-

11297	**PROTOC_IPOCYCLE_CONTROL**			N01	-
-	Prevent overrun of IPO time level			BYTE	POWER ON
Setting whether an overflow of the time level is to be prevented during the recording of data in the time level of the IPO. If applicable, data sets are discarded when the function is active, and are not entered in the log file in order to prevent an impending overflow of the IPO time level. This may mean that data sets are also then lost if a level overflow would not yet have occurred with the function inactive.					
-					
-	10	1,1,1,1,1,1,1,1,1,1	0	1	1/1

11298	**PROTOC_PREPTIME_CONTROL**			N01	-
-	Interruption time prep time level in seconds.			DOUBLE	POWER ON
Time in seconds, for which the prep time level may be blocked. If the PREP does not manage to pass through within the set time, the cyclic events are not logged. It is thus ensured that operation cannot be completely blocked by data recording.					
-					
-	10	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	1/1

11300	**JOG_INC_MODE_LEVELTRIGGRD**			N01	H1
-	INC and REF in jog mode			BOOLEAN	POWER ON
1: Jog mode for JOG-INC and reference point approach JOG-INC: When the traversing key is pressed in the required direction (e.g. +), the axis begins to traverse the set increment. If the key is released before the increment has been completely the traversed, the movement is interrupted and the axis stops. If the same key is pressed again, the axis completes the remaining distance-to-go until this is 0. 0: Continuous operation for JOG-INC and reference point approach JOG-INC: When the traversing key is pressed (first rising edge) the axis travels the whole set increment. If the same key is pressed again (second rising edge) before the axis has completed traversing the increment, the movement is aborted, i.e. not completed. The differences in axis travel behavior between the jog mode and continuous operation in incremental traversing are described in detail in the relevant chapters. For travel behavior in reference point approach see References: /FB/, R1, "Reference Point Approach" MD irrelevant for: Continuous traversing (JOG continuous)					
-					
-	-	TRUE	-	-	7/2

11310	HANDWH_REVERSE		N09	H1	
-	Threshold for direction change handwheel		BYTE	POWER ON	
Handwheel travel: Value = 0: No immediate travel in the opposite direction Value > 0: Immediate travel in the opposite direction if the handwheel is turned at least the stated number of pulses in the opposite direction. Whether this machine data is also active for handwheel travel with DRF depends on bit10 of machine data 29624: $MC_HANDWH_CHAN_STOP_COND.					
-					
-	-	2	-	-	7/2

11320	HANDWH_IMP_PER_LATCH		N09	H1	
-	Handwheel pulses per detent position		DOUBLE	POWER ON	
The connected handwheels are adapted to the control in MD: HANDW_IMP_PER_LATCH. The number of pulses generated by the handwheel for each handwheel detent position is to be entered. The handwheel pulse weighting must be defined separately for each connected handwheel (1 to 3). With this adaptation, each handwheel detent position has the same effect as one press of the traversing key in incremental traversal. If a negative value is entered, the direction of rotation of the handwheel is reversed. Related to: MD: JOG_INCR_WEIGHT (weighting of an increment of a machine axis for INC/manual).					
-					
-	6	1.,1.,1.,1.,1.,1.	-	-	7/2

11322	CONTOURHANDWH_IMP_PER_LATCH		N09	H1	
-	Contour handwheel pulses per detent position		DOUBLE	POWER ON	
Adaptation factor to the hardware of the contour handwheel: Enter the number of pulses issued per detent position by the contour handwheel. Because of this normalization, a detent position of the contour handwheel corresponds to one press of a key with incremental jog processes. Sign reversal reverses the direction of evaluation.					
-					
-	6	1.,1.,1.,1.,1.,1.	-	-	7/2

11324	**HANDWH_VDI_REPRESENTATION**		N01	OEM	
-	Display of handwheel number in VDI Interface		DWORD	POWER ON	
The number of the handwheel is displayed in the channel/axis-specific signals of the VDI interface: Value = 0 : Bit coded (1 of 3, only 3 handwheels can be displayed) Value = 1 : Binary coded (6 handwheels can be displayed)					
-					
-	-	0	0	1	7/2

11330	**JOG_INCR_SIZE_TAB**		EXP, N09	H1	
-	Increment size for INC/handwheel		DOUBLE	POWER ON	
In incremental traversal or handwheel travel, the number of increments to be traversed by the axis can be defined by the user, e.g. via the machine control panel. In addition to the variable increment sizes (INCvar), 5 fixed increment sizes (INC...) can also be set. The increment size for each of these 5 fixed increments is defined collectively for all axes by entering values in JOG_INCR_SIZE_TAB [n]. The default setting is INC1, INC10, INC100, INC1000 and INC10000. The entered increment sizes are also active for DRF. The size of the variable increment is defined in SD: JOG_VAR_INCR_SIZE. Related to: MD: JOG_INCR_WEIGHT(weighting of an increment for INC/manual) IS "Active machine function: INC1; ...; INC10000" (DB21-28, DBB41 ff) IS "Active machine function: INC1; ...; INC10000" (DB31-48, DBB69).					
-					
-	5	1.,10.,100.,1000.,10000.	-	-	7/2

11340	**ENC_HANDWHEEL_SEGMENT_NR**		EXP, N01	FBMA	
-	3rd handwheel: type of drive		BYTE	POWER ON	
Number of the bus segment over which the 3rd handwheel (encoder connection) is addressed: Related to: $MN_ENC_HANDWHEEL_MODULE_NR $MN_ENC_HANDWHEEL_INPUT_NR					
-					
-	-	1	1	1	0/0

11342	ENC_HANDWHEEL_MODULE_NR			N01	FBMA
-	3rd handwheel: drive number / measuring circuit number			BYTE	POWER ON
Number of the module within a segment ($MN_ENC_HANDWHEEL_SEG-MENT_ NR) by which the 3rd handwheel is addressed. On the 611D, the logical drive number must be entered here (see MD 13010: DRIVE_LOGIC_NR). For axes on the local bus, the module number must be entered here (counting from left to right). = 0: The configuration of a 3rd handwheel is deactivated, the settings of $MN_ENC_HANDWHEEL_SEGMENT_NR and $MN_ENC_HANDWHEEL_INPUT_NR are irrelevant in this case. Related to MD 13010: DRIVE_LOGIC_NR $MN_ENC_HANDWHEEL_SEGMENT_NR $MN_ENC_HANDWHEEL_INPUT_NR					
-					
-	-	0	0	31	7/2

11344	ENC_HANDWHEEL_INPUT_NR			N01	FBMA
-	3rd handwheel: Input to module/meas. circ. Board			BYTE	POWER ON
Name of the input on a module over which the 3rd handwheel is addressed. 840D: 1/2 = upper/lower actual value input 810D: always 1 Related to $MN_ENC_HANDWHEEL_SEGMENT_NR $MN_ENC_HANDWHEEL_MODULE_NR					
-					
-	-	1	1	2	7/2

11346	**HANDWH_TRUE_DISTANCE**			N01	FBMA
-	Handwheel default path or velocity			BYTE	POWER ON

Setting the behavior for traversing with the handwheel, contour handwheel and with FDA=0:

Value = 1: (default value)
The default settings of the handwheel are path defaults. No pulses are lost. Residual axes motions occur as a result of the limitation to a maximal permissible velocity.

Value = 0:
The default settings of the handwheel are velocity defaults. The axes stop as soon as the handwheel stops. The motion is immediately braked if no pulses come from the handwheel in an interpolation cycle. Therefore, only a short residual motion of the axes can
occur as a result of the braking ramp. The handwheel pulses supply no path default.

Value = 2:
The default settings of the handwheel are velocity defaults. The axes are to stop as soon as the handwheel stops. The motion is immediately braked if no pulses come from the handwheel in an interpolation cycle.
However in contrast to
value = 0 braking is not along the shortest possible path but
on the next possible point of a notional incrementation.
In each case this incrementation corresponds to a displacement which the selected
axis travels per handwheel detent position (see $MA_JOG_INCR_WEIGHT and $MN_JOG_INCR_SIZE_TAB, $MC_HANDWH_GEOAX_MAX_INCR_SIZE, $MA_HANDWH_MAX_INCR_SIZE). The start of the traversing is taken as the zero point
of the incrementation.

Value = 3:
The default settings of the handwheel are path defaults. If premature braking is required
on account of settings in other machine data ($MN_HANDWH_REVERSE != 0, $MC_HANDWH_CHAN_STOP_COND,
$MA_HANDWH_STOP_COND), then in
contrast to value = 1 braking is not along the shortest possible path,
but on the next possible point of a notional incrementation (see value = 2).

-					
-	-	1	0	3	7/2

11350	**HANDWHEEL_SEGMENT**			N09	-
-	Handwheel segment			BYTE	POWER ON
Machine data defines which hardware segment the handwheel is connected to: 0 = SEGMENT_EMPTY ;no handwheel 1 = SEGMENT_840D_HW ;handwheel at 840D HW 2 = SEGMENT_802DSL_HW ;handwheel at 802DSL HW 5 = SEGMENT_PROFIBUS ;handwheel at PROFIBUS 7 = SEGMENT_ETHERNET ;handwheel at Ethernet					
-					
-	6	0,0,0,0,0,0	-	-	7/2
840d-2a2c	-	1,1,1,0,0,0	-	-	-/-
840d-4a1cg	-	1,1,1,0,0,0	-	-	-/-
840d-6a2c	-	1,1,1,0,0,0	-	-	-/-
840d-12a2c	-	1,1,1,0,0,0	-	-	-/-
840d-31a10c	-	1,1,1,0,0,0	-	-	-/-
840di-basic	-	1,1,0,0,0,0	-	-	-/-
840di-universal	-	1,1,0,0,0,0	-	-	-/-
840di-plus	-	1,1,0,0,0,0	-	-	-/-

11351	**HANDWHEEL_MODULE**			N09	-
-	Handwheel module			BYTE	POWER ON
Machine data specifies the hardware module to which the handwheel is connected. (Content dependent on $MN_HANDWHEEL_MODUL): 0 = no handwheel configured $MN_HANDWHEEL_MODUL = 1 ;SEGMENT_840D_HW 1 ;SEGMENT_802DSL_HW 1..6;SEGMENT_PROFIBUS ;Index for $MN_HANDWHEEL_LOGIC_ADDRESS[(x-1)]					
-					
-	6	0,0,0,0,0,0	0	6	7/2
840d-2a2c	-	1,1,1,0,0,0	-	-	-/-
840d-4a1cg	-	1,1,1,0,0,0	-	-	-/-
840d-6a2c	-	1,1,1,0,0,0	-	-	-/-
840d-12a2c	-	1,1,1,0,0,0	-	-	-/-
840d-31a10c	-	1,1,1,0,0,0	-	-	-/-
840di-basic	-	1,1,0,0,0,0	-	-	-/-
840di-universal	-	1,1,0,0,0,0	-	-	-/-
840di-plus	-	1,1,0,0,0,0	-	-	-/-

11352	HANDWHEEL_INPUT			N09	-
-	Handwheel connection			BYTE	POWER ON

Machine data which is intended to select
the handwheels connected to
a hardware module:
  0 = No handwheel configured
  1..6 = Handwheel connection to HW module					

-					
-	6	0,0,0,0,0,0	0	6	7/2
840d-2a2c	-	1,2,3,0,0,0	-	-	-/-
840d-4a1cg	-	1,2,3,0,0,0	-	-	-/-
840d-6a2c	-	1,2,3,0,0,0	-	-	-/-
840d-12a2c	-	1,2,3,0,0,0	-	-	-/-
840d-31a10c	-	1,2,3,0,0,0	-	-	-/-
840di-basic	-	1,2,0,0,0,0	-	-	-/-
840di-universal	-	1,2,0,0,0,0	-	-	-/-
840di-plus	-	1,2,0,0,0,0	-	-	-/-

11353	HANDWHEEL_LOGIC_ADDRESS			N04, N10	-
-	Logical handwheel slot addresses			DWORD	POWER ON
Logical start address of the hand wheel slots if handwheels are connected by PROFIBUS ($MN_HANDWHEEL_SEGMENT = 5)					
-					
-	6	0,0,0,0,0,0	0	8191	7/2

11380	MONITOR_ADDRESS			EXP, N06	STZ
-	Test MD for changing the NCK code or data for Safety Integrated			DWORD	SOFORT
Address of an NCU memory location whose content is displayed in the MDs MONITOR_DISPLAY_INT and MONITOR_DISPLAY_REAL. There are no protective measures incorporated to prevent unauthorized access. That is the input address points to a memory area protected by the system or unoccupied, so refreshing the MD values MONITOR_DISPLAY_INT and MONITOR_DISPLAY_REAL causes a time-out and the NCU remains at a standstill (watchdog LED lights up)! There is a list of permisible addresses for the test, which depends on the software version. A restart resets the address to its starting value. It then points to any writable and readable memory location that is not used by any other system function.					
NBUP, NDLD					
-	-	0	-	-	0/0

11382	**MONITOR_DISPLAY_INT**		EXP, N06		STZ
-	INTEGER display of the addressed location		DWORD		SOFORT

```
INTEGER display of the addressed location SW3.2
This MD displays the content of the NCU memory location that is defined in MD
MONITOR_ADDRESS. The displayed values contains the four consecutive bytes from
the stated address, whereby the first byte is on the extreme right and the
fourth on the extreme left.

This MD is a display MD whose content is read anew on every display refresh.
Writing to this MD is ignored (without alarm).
```

NBUP, NDLD					
-	-	0	-	-	0/0

11384	**MONITOR_DISPLAY_REAL**		EXP, N06		STZ
-	REAL display of the addressed location		DOUBLE		SOFORT

```
REAL display of the addressed location SW3.2

This MD displays the content of the NCU memory location that is defined in MD
MONITOR_ADDRESS. The displayed value interprets the eight consecutive memory
locations from the stated address as a floating point number with double accu-
racy (64 bit IEEE format). 0.0 is displayed if this value does not correspond
to a valid floating point number.

This MD is a display MD whose content is read anew on every display refresh.
Writing to this MD is ignored (without alarm).
```

NBUP, NDLD					
-	-	0.0	-	-	0/0

11386	**MONITOR_INPUT_INT**		EXP, N06		STZ
-	INTEGER input for the addressed location		DWORD		SOFORT

```
INTEGER input for addressed location, SW3.2
The value is written with the aid of MD MONITOR_INPUT_STROBE into the address
    selected with MD MONITOR_ADDRESS. The 4 bytes from the stated address are
    taken over by writing the value 1 in the MD MONITOR_INPUT_STROBE.
In so doing, the byte moves to the extreme right of the memory location
    MONITOR_ADDRESS, the byte to its left into the memory location
    MONITOR_ADDRESS+1, etc.
```

NBUP, NDLD					
-	-	0	-	-	0/0

11388	MONITOR_INPUT_REAL		EXP, N06	STZ
-	REAL input for addressed location		DOUBLE	SOFORT

```
REAL input for addressed location, SW3.2
The value is written with the aid of MD MONITOR_INPUT_STROBE into the address
    selected with MD MONITOR_ADDRESS. The 8 bytes from the stated address are
    taken over by writing the value 2 in the MD MONITOR_INPUT_STROBE.
In so doing, the input floating point number is converted into 64 bit IEEE
    format.
```

NBUP, NDLD					
-	-	0.0	-	-	0/0

11390	MONITOR_INPUT_STROBE		EXP, N06	STZ
-	Overwrite the addressed location with MONITOR_INT/REAL		BYTE	SOFORT

```
Overwriting the addressed location with MONITOR_INPUT_INT/REAL, SW3.2
An input into this MD takes over the content of the MD MONITOR_INPUT_INT or
    the MD MONITOR_INPUT_REAL. The input value decides which data is taken
    over:

0: No action
1: Content of MD MONITOR_INPUT_INT is written in four NCU bytes from MD
    MONITOR_ADDRESS.
2: Content of MD MONITOR_INPUT_REAL is written in eight NCU bytes from MD
    MONITOR_ADDRESS.

The content of MONITOR_INPUT_STROBE is reset to 0 after the takeover (no
    action). A new input can therefore be made immediately.

In order to familiarize oneself with this function, one should first leave MD
    MONITOR_ADDRESS at its default value. One can then write data without
    causing damage.
Examples:
   MONITOR_INPUT_INT = 55AA
   MONITOR_INPUT_STROBE = 1
    => in MONITOR_DISPLAY_INT appears 55AA

   MONITOR_INPUT_REAL = 1.234
   MONITOR_INPUT_STROBE = 2
    => in MONITOR_DISPLAY_REAL appears 1.234

Caution!!!
   Writing data to unknown addresses can even destroy the NCK system program!
That may have unforeseen consequences (danger to machine and people!). If the
machine and those present survive such an action undamaged, the system pro-
gram can usually be restored by power off/on.
```

NBUP, NDLD					
-	-	0	0	2	0/0

11398	**AXIS_VAR_SERVER_SENSITIVE**			EXP	B3
-	Axis-Var server response			BYTE	POWER ON
The axis-variable server supplies the data for the OPI blocks SMA/SEMA, SGA/SEGA and SSP. If no value can be supplied for an axis (e.g. because the axis is a link axis) then a default value (usually 0) is returned. For debugging purposes, this machine data can be used to set the axis-var-server to sensitive so that an error message is returned instead of a default value. 0: default value 1: error message					
-					
-	-	0	-	-	7/2

11400	**TRACE_SELECT**			EXP	-
-	Activation of internal trace functions			DWORD	POWER ON
Bit string for activating internal trace functions for NCK time measurements, analog output of variables etc.					
-					
-	-	0	-	-	0/0

11405	**TCI_TRACE_ACTIVE**			EXP	-
-	Activation of internal task trace functions			BOOLEAN	POWER ON
to be defined					
-					
-	-	FALSE	-	-	0/0

11410	SUPPRESS_ALARM_MASK	EXP, N06	D1
-	Mask for support of special alarm outputs	DWORD	POWER ON

```
Mask for suppressing special alarm outputs
Bit set: The corresponding alarm (warning) is NOT generated.

Bit 0:
    Alarm 15110 "Channel %1 block %2 REORG not possible"
Bit 1:
    Alarm 10763 "Channel %1 block %2. The path component of the block in the
    contour plane is zero"
Bit 2:
    Alarm 16924 "Channel %1 Caution: program testing can modify tool/magazine
    data"
    --> Note: The alarm is only a message alarm
Bit 3:
    Alarm 22010 "Channel %1 spindle %2 block %3.  Actual gear stage does not
    correspond to the set gear stage"
Bit 4:
    Alarm 17188 "Channel %1 D number %2 with tool T nos. %3 and %4 defined"
    Alarm 17189 "Channel %1 D number %2 of the tools at magazine/ magazine
    locations %3 and %4 defined". The two alarms are of equal status and only
    message alarms.
Bit 5:
    Alarm 22071  "TO unit %1 tool %2 duplo no. %3 is active but not in the
    active wear grouping." The alarm is only a message alarm.
Bit 6:
    Alarm 4027 "NOTICE! MD %1 was also changed for the other axes of the axis
    container %2 "
    Alarm 4028 "NOTICE! The axial MDs in the axis container will be aligned on
    the next runup "

Bit 7:
    Alarm 22070 "TO unit %1 please change tool T= %2 into magazine. Repeat
    data backup". The alarm is only a message alarm.
Bit 8:
    Alarm 6411 "Channel %1 tool %2 with duplo no. %3 has reached tool prewarn-
    ing limit"
    Alarm 6413 "Channel %1 tool %2 with duplo no. %3 has reached tool monitor-
    ing limit."
    The two alarms are only message alarms. They occur during the program exe-
    cution.
Bit 9:
    Alarm 6410  "TO unit %1 tool %2 with duplo no. %3 has reached tool pre-
    warning limit ."
    Alarm 6412 "TO unit %1 tool %2 with duplo no. %3 has reached tool monitor-
    ing limit ".
    The two alarms are only message alarms. They occur as a result of an oper-
    ator action.

Bit10:
    Alarm 10604 "channel %1 block %2 "Thread lead increase too high"
    Alarm 10605 "channel %1 block %2 "Thread lead decrease too high"
Bit 11:
    Alarm 14088 "Channel 51 block %2 axis %3 doubtful position".
Bit 12:
    Alarm 10607 "Channel %1 block %2 tapping cannot be executed with frame."
```

Bit13:
Alarm 10704 " channel %1 block %2 Protection area monitoring is not guaranteed."
Bit14:
Alarm 21701 "Measuring reactivated too soon (<2 IPO cycles)"
Bit15:
Alarm 5000 "Communication order cannot be executed"
Bit16:
Alarm 21600 "Monitoring active for ESR"
Bit17:
Alarm 16945 "Channel %1 action %2<ALNX> is delayed until block end"
Note: The alarm is a only message alarm.
Bit18:
Alarm 10750 "Channel %1 block %2 Activation of the tool radius compensation without tool number"
Bit19: Alarm 17193 "Channel %1 block %2 The active tool ist no longer at tool holder no./spindle no. %3, program %4"
Bit20:
Alarm 2900 "Reboot is delayed"
Bit21:
Alarm 22012 "Channel %1 block %2. Leading axis %3 is in simulation mode"
Alarm 22013 "Channel %1 block %2. Following axis %3 is in simulation mode"
Alarm 22014 "Channel %1 block %2. The dynamics of leading axis %3 and following axis %4 are very different"
Bit22:
Alarm 26080 "Channel %1 retraction position of axis %2 not programmed or invalid"
Alarm 26081 "Channel %1 single axis trigger axis %2 is triggered, but axis is not PLC controlled"
Bit23:
Alarm 16949 "Correspondence between marks of channel %1 and channel %2 is invalid"
Bit24:
Alarm 16950 "Channel %1 search run with holding block"
Bit25:
Alarm 22016 "Channel %1 block %2 following spindle %3 in range of reduced acceleration capacity"
Bit26:
Alarm 22015 "Channel %1 block %2 following spindle %3 no dynamic for additional motion"
Bit27:
Alarms 16112 and 22030 "Channel %1 block %2 following spindle %3 impermissible programming"
Bit28:
Alarm 26083 "Channel %1 ESR for PLC controlled axis %2 was triggered"
Bit29:
Alarm 16772 "Channel %1 block %2 axis %3 is following axis, coupling is opened"
Bit30:
Alarm 16600 "Channel %1 block %2 spindle %3 gear stage change not possible"
Bit31:
Alarm 16774 "Channel %1 axis %2 synchronizsation aborted"

-					
-	-	0x108000	-	-	7/2

11411	**ENABLE_ALARM_MASK**		EXP	-
-	Activation of warnings		DWORD	RESET

```
Mask for generating alarms that are normally suppressed

Bit set:        Alarms of this alarm group are output
Bit not set:    Alarms of this alarm group are not output

BitHex. AlarmMeaning
   value
============================================================================
0: 0x1
     ...   Alarms that have SHOWALARMAUTO as the alarm response are output
1: 0x2
     ...   Alarms that have SHOWWARNING as the alarm response are output
2: 0x4
   22280 'Thread starting path too short' is output.
3: 0x8
     ...   Alarms that are triggered by the NCU LINK MODULE are switched on.
4: 0x10
   10883 'Chamfer or rounding must be shortened' allowed
5: 0x20
   20096 'Brake test aborted' is output
6: 0x40
   16956 'Program cannot be started because of global start disable' is output
   14005 'Program cannot be started because of program-specific start dis-
able' is output. Alarm can only be switched on in channel status RESET, in all
other channel states it is output without conditions.
7: 0x80
   16957 'Stop delay range is suppressed' is output
8: 0x100
   Alarm 1011 fine coding150019 or 150020 'Incorrect axis number in the LINK'
9: 0x200
   22033 Diagnostics for 'track synchronism' (synchronous spindle)
10:0x40015122 alarm 'PowerOn after Powerfail: %1 data were restored, thereof
%2 machine data, %3 errors' is output
```

-					
-	-	0	-	-	7/2

11412	**ALARM_REACTION_CHAN_NOREADY**	EXP, N01	D1
-	Alarm response CHAN_NOREADY permitted	BOOLEAN	POWER ON

```
If this MD is not set, then BAG_NOREADY is executed instead of CHAN_NOREADY.
With SW version 4.1 and higher, it is possible to set CHANNEL_NOREADY on the
PLC in response to alarms.
If this MD is not set, then the alarm handler internally re-configures
    CHAN_NOREADY into BAG_NOREADY.
The purpose of this MD is solely to provide compatibility with PLC systems
    with versions earlier than SW4.1.
```

-					
-	-	FALSE	-	-	7/2

11413	**ALARM_PAR_DISPLAY_TEXT**			EXP, N01	D1
-	Alarm parameter as text output			BOOLEAN	POWER ON
If the MD is set, texts can be output as alarm parameters instead of numbers.					
-					
-	-	FALSE	-	-	0/0

11414	**ALARM_CLR_NCSTART_W_CANCEL**			EXP, N01	D1
-	Deleting of NCSTARTalarms with CANCEL			BOOLEAN	POWER ON
Still to be defined					
-					
-	-	FALSE	-	-	7/2

11415	**SUPPRESS_ALARM_MASK_2**			EXP, N06	-
-	Masking of alarm outputs			DWORD	POWER ON

```
Mask for suppressing special alarm outputs

Bit set: Corresponding alarm ( warning ) is NOT triggered.

BitHex. AlarmMeaning
   value
==============================================================================
======
0:   0x116773  "Channel %1 axis %3 is following axis. The axis/spindle dis-
    ables of the leading axes are different"
1:   0x22100  "NCK battery warning level reached"
                              2101  "NCK battery alarm"
                              2102  "NCK battery alarm"
2:   0x4            2120 "NCK fan alarm"
3:   0x8            15120 "PowerFail: Display buffer overflow"
4:   0x10           15187 "Error during execution of PROGEVENT file"
5:   0x20           15188 "Error during execution of ASUB file"
6:   0x40          26120 &AA_ESR_ENABLE = 1 and axis is to become neutral
                         26121 axis is neutral and $AA_ESR_ENABLE =1 is to be
    set
                         26123 $AA_ESR_ENABLE = 1 is to be set, but
    $MA_ESR_REACTION is not set
                         26124 $AC_TRIGGER triggered, but axis is neutral, ESR
    ignores this axis
```

-					
-	-	0x0	-	-	7/2

11420	**LEN_PROTOCOL_FILE**			N01	PGA
-	Size of protocol files (kB)			DWORD	POWER ON
Blocks from the part program can be stored in a file with the WRITE command. The length of the log file is limited. If this maximum length is exceeded, the WRITE command produces an error.					
-					
-	-	1	1	1000000	7/2

11450	**SEARCH_RUN_MODE**	EXP, N01	K1
-	Parameterization for search run	DWORD	POWER ON

```
The behavior during the action blocks after search run can be affected by the
    following bits:

Bit0 == 0:
   Machining is stopped with the loading of the last action block after search
run, the VDI signal "last action block active" is set (DBB32.6) and alarm
10208 is output.
Bit0 == 1:
   Machining is stopped with the loading of the last action block after search
run, and the VDI signal "last action block active" is set. Alarm 10208 is not
output until the PLC requests it by setting the VDI signal "PLC action fin-
ished".

Usage:
   Starting an ASUB from the PLC after search run.
   The message to the operator that another NC start is required in order to
continue with the program is not to be displayed until after the end of the
ASUB.

Bit1 == 1
   Automatic ASUB start after output of the action blocks (see also
$MN_PROG_EVENT_NAME). Alarm 10208 is not output unitl the ASUB has finished.

Bit2 == 0:
   Spindle: The auxiliary functions are output in the action blocks
Bit2 == 1:
   The output of the auxiliary functions in the action blocks is suppresed.
The spindle programming collected by search run can be output at a later point
in time (e.g. in an ASUB).
   The program data for this are stored in the system variables:
        $P_SEARCH_S,
        $P_SEARCH_SDIR,
        $P_SEARCH_SGEAR,
        $P_SEARCH_SPOS,
        $P_SEARCH_SPOSMODE.


Bit3 == 1:
   The cascaded search run is disabled (default setting: release).
   Cascaded search run means that the search run is restarted immediately
after finding a search taget.

Bit4     : Reserved
```

-					
-	-	0	0	0x1F	7/2

11460	OSCILL_MODE_MASK		N09	P5
-	Mode mask for asynchronous oscillation		DWORD	POWER ON

```
Bit 0
Value 1
    In the case of block search, the oscillation movement is started immedi-
    ately after NC start, i.e. during approach to approach position, provided
    it has been activated in the program section being processed.

Value 0
   (default value)
   The oscillation movement is not started until the approach position is
reached.
```

-					
-	-	0x0	0	0xFFFF	7/2

11470	REPOS_MODE_MASK		EXP, N01	K1
-	Repositioning properties		DWORD	POWER ON

```
This bit mask can be used to set the behavior of the control during reposi-
tioning.

Bit no.      Meaning when bit set
-----------------------------------------------------------------------------
0 (LSB)
   The dwell time is continued in the residual block from where it was inter-
rupted. (If the bit is not set, the dwell time is repeated completely).
1  Reserved
2  When the bit is set, the repositioning of individual axes can be prevented
or delayed via the VDI interface.
3  When the bit is set, positioning axes are repositioned in the approach
block during search run via program test.
4  As 3, but after every Repos, not only during search run.
5  When the bit is set, changed feeds and spindle speeds already become valid
in the residual block, otherwise not until the following block.
6  When the bit is set, neutral axes and positioning spindles are reposi-
tioned after SERUPRO as command axes in the approach block.
7  The bit changes the behavior of the VDI-AXIN interface signal "Repos
Delay". The level of "Repos Delay" is read if REPOSA is interpreted. Axes that
are neither geo nor orientation axes are then excluded from the REPOS, that is
REPOS does _n_o_t_ move these axes.
```

-					
-	-	0x8	0	0xFFFF	7/2

11480	**PLC_OB1_TRACE_DEPTH**	EXP, N03, N09	-
-	Buffer depth of PLC trace data in OB1	DWORD	POWER ON

Memory depth of PLC trace data in OB1.

Multiple values of PLC data are stored between their acquisition in the PLC and and the time when they are checked in the NCK.
Variables recorded in "OB1" are combined once in each completed PLC scan, but can be checked only once per IPO cycle.

The memory must include a value that is at least more than the total number of memory values to be checked. It shall prevent the NCK from checking a value that the PLC currently accepts.

A suitable initial value is one higher than that in machine data PLC_IPO_TIME_RATIO.

The greater the memory depth, the smaller the number of PLC variables that can be recorded, as there is only one single, small, defined data slot pool for sending sample data from the PLC to the NCK (64 data slots). Each PLC variable recorded is assigned the relevant number of data slots from the pool, depending on the memory depth value.

This data slot pool is also used for data that are combined in OB1, OB35 and OB40 (even though the memory depths of OB1, OB35 and OB40 can be configured to distinguish them from one another). It is also used by all parallel trace users, even though they may not even know each other.

-					
-	-	2	2	8	2/2

11481	**PLC_OB35_TRACE_DEPTH**		EXP, N03, N09	-	
-	Buffer depth of PLC trace data in OB35		DWORD	POWER ON	
Memory depth of PLC trace data in OB35. Multiple values of PLC data are stored between their acquisition in the PLC and and the time when they are checked in the NCK. Variables recorded in "OB35" are combined at each PLC timer interrupt, but can be checked only once per IPO cycle. The memory must include a value that is at least more than the total number of memory values to be checked. It shall prevent the NCK from checking a value that the PLC currently accepts. A suitable initial value is one more than the number of PLC timer interrupts expected in each IPO cycle. The greater the memory depth, the smaller the number of PLC variables that can be recorded, as there is only one single, small, defined data slot pool for sending sample data from the PLC to the NCK (64 data slots). Each PLC variable recorded is assigned the relevant number of data slots from the pool, depending on the memory depth value. This data slot pool is also used for data that are combined in OB1, OB35 and OB40 (even though the memory depths of OB1, OB35 and OB40 can be configured to distinguish them from one another). It is also used by all parallel trace users, even though they may not even know each other.					
-					
-	-	2	2	8	2/2

11482	**PLC_OB40_TRACE_DEPTH**			EXP, N03, N09	-
-	Buffer depth of PLC trace data in OB40			DWORD	POWER ON

```
Memory depth of PLC trace data in OB40.

Multiple values of PLC data are stored between their acquisition in the PLC
and and the time when they are checked in the NCK.
Variables recorded in "OB40" are only combined when the PLC has received the
explicit OB40 program interrupt from the NCK, and they can only be checked
once per IPO cycle.

The memory must include a value that is at least more than the total number of
    memory values to be checked. It shall prevent the NCK from checking a
    value that the PLC currently accepts.

If OB40 interrupt is output less than once per IPO cycle, its buffer depth
    should be 2. Otherwise it should be one more than the number of inter-
    rupts to be expected in an IPO cycle.

The greater the memory depth, the smaller the number of PLC variables that can
    be recorded, as there is only one single, small, defined data slot pool
    for sending sample data from the PLC to the NCK (64 data slots).
Each recorded PLC variable is assigned the relevant number of data slots from
the pool, depending on the memory depth value.

This data slot pool is also used for data that are combined in OB1, OB35 and
OB40 (even though the memory depths of OB1, OB35 and OB40 can be configured to
distinguish them from one another). It is also used by all parallel trace
users, even though they may not even know each other.
```

-					
-	-	2	2	8	2/2

11500	**PREVENT_SYNACT_LOCK**			N01, N09	S5,FBSY
-	Protected synchronized actions			DWORD	POWER ON

```
First and last IDs of a protected synchronized action area.

Synchronized actions with ID numbers in the protected area can no longer be
- overwritten
- disabled (CANCEL)
- locked (LOCK)
once they have been defined. Furthermore, protected synchronized actions can-
not be locked by the PLC (LOCK). They are shown at the interface to the PLC as
non-lockable.

Note:
   The protection should be suspended while creating the synchronized actions
to be protected, as otherwise a Power On will be necessary after every change
in order to be able to redefine the logic. There is no area of protected syn-
chronized actions with 0.0. The function is disabled. The values are read as
absolute values, and over and under values can be given in any order.
```

-					
-	2	0,0	0	255	7/2

11510	**IPO_MAX_LOAD**			N01, N05	-
%	Max. permitted IPO load			DOUBLE	POWER ON
Enable utilization analysis via synchronized actions. This $MN_IPO_MAX_LOAD sets the IPO computing time (in % of the IPO cycle) after which the variable $AN_IPO_LOAD_LIMIT is to be set to TRUE. The variable is reset to FALSE if the value falls below this after having once exceeded it. This diagnostics function is disabled if the machine data is 0.					
-					
-	-	0.00	0.0	100.0	7/2

11550	**STOP_MODE_MASK**			N01	-
-	Defines the stop behavior.			DWORD	POWER ON
This MD describes the stop behavior of the NCK under certain conditions: Bit no. Meaning Bit 0 == 0 := No stop if G codes G331/G332 are active and a path motion or G4 has also been programmed. Bit 0 == 1 := Same behavior as until SW version 6.4, i.e. a stop is possible during G331/G332. Bits 1.....15 Not assigned					
-					
-	-	0	0	0x1	7/2

11600	**BAG_MASK**			N01	K1
-	Defines the mode group behavior			DWORD	POWER ON
This MD describes the effect of the VDI signals on the channels of a mode group in respect of ASUBs and interrupt routines. Bit no. Hexadec. value Meaning when bit set Bit0: 0x0 Normal response to mode group signals in all channels of the mode group (as SW 3) All channels switch into a program operating mode on interrupt. Bit0: 0x1 No response to other mode group VDI signale in the channel in which an interrupt handling (ASUB) is running. (BAG-RESET, BAG-STOP. individual types A and B, mode selection) Bit1: 0x1 There is an operating mode changeover only in those channels which have received an interrupt request. (Only when bit 0 is set!)					
-					
-	-	0	0	0x3	7/2

11602	ASUP_START_MASK		N01, -	K1
-	Ignore stop conditions for ASUP		DWORD	POWER ON

```
This machine data defines which stop conditions are to be ignored at an ASUB
start. The ASUB is started, or the following stop conditions are ignored:

Bit 0 :
   STOP reason: Stop key , M0 or M01
    An ASUB is started immediately if NCK is in RESET state (or JOG mode)(no
    ASUB can be started in RESET/JOG without this bit).
   NOTICE: This bit is set implicitly if $MC_PROG_EVENT_MASK deviates from
zero in a channel!
   NOTICE: This bit is set implicitly if BIT 1 is set in $MN_SEARCH_RUN_MODE!
Bit 1 :
   Start allowed even if not all axes have yet been referenced.
 Bit 2:
   Start allowed even if a read-in disable is active,
   That is the blocks of the ASUB program are loaded and executed immedi-
ately. This disables machine data IGNORE_INHIBIT_ASUP. The NCK behavior corre-
sponds to the machine data contents of IGNORE_INHIBIT_ASUP== FFFFFFFF.
    If the bit is not set, then the ASUB is internally selected, but not pro-
    cessed until the read-in disable is canceled.

    If the bit is NOT set,
   then the contents of machine data IGNORE_INHIBIT_ASUP are evaluated.
    If IGNORE_INHIBIT_ASUP = 0 also applies, then an ASUB is triggered inter-
    nally, but the blocks of the ASUB program are not loaded until the read-in
    disable is canceled.
   The path is immediately decelerated when the ASUB is triggered (except with
option BLSYNC).
   The read-in disable is set once more in the ASUB program.

Bits 3 to 15:
   Further bits: Reserved.

Related to:
   ASUP_START_PRIO_LEVEL
```

-					
-	-	0	0	0x7	7/2

11604	ASUP_START_PRIO_LEVEL		N01, -	K1
-	Priorities from which 'ASUP_START_MASK' is effective		DWORD	POWER ON

```
This machine data defines the ASUB priority from which machine data
ASUP_START_MASK is to be applied. MD ASUP_START_MASK is applied from the level
specified here up to the highest ASUB priority level 1.

Related to:
   ASUP_START_MASK
```

-					
-	-	0	0	128	7/2

11610	**ASUP_EDITABLE**			N01	K1
-	Activation of a user-specific ASUP program			DWORD	POWER ON
This MD determines whether user-specific routine: _N_ASUP_SPF stored in directory _N_CUS_DIR is to be used to process RET and REPOS instead of routines provided by the system. Value: Meaning: 0 Routine _N_ASUP_SPF is not activated for either RET or REPOS. 1 User-specific routine _N_ASUP_SPF is executed for RET, the routine supplied by the system is executed for REPOS. 2 User-specific routine _N_ASUP_SPF is executed for REPOS, the routine supplied by the system is executed for RET 3 User-specific routine _N_ASUP_SPF is executed for both RET and REPOS Related to: MD 11612: ASUP_EDIT_PROTECTION_LEVEL References: /IAD/ "Installation and Start-Up Guide"					
-					
-	-	0	0	3	7/2

11612	**ASUP_EDIT_PROTECTION_LEVEL**			N01	K1
-	Protection level of the user-specific ASUP program			DWORD	POWER ON
Protection level of the user-specific ASUB program for RET and/or REPOS The data is active only if MD 11610: ASUP_EDITABLE is set to a value other than 0. This machine data defines the protection level of the program _N_ASU_CUS. MD irrelevant for: ASUP_EDITABLE set to 0 Related to: ASUP_EDITABLE					
-					
-	-	2	0	7	7/2

11620	PROG_EVENT_NAME		EXP, N12	-
-	Program name for PROG_EVENT		STRING	POWER ON

```
Name of the user program called by the functions "Event-controlled program
calls" and "Automatic ASUB start after block search" ($MN_SEARCH_RUN_MODE
Bit1). _N_PROG_EVENT_SPF is preset.
The presetting becomes active if $MN_PROG_EVENT_NAME includes a blank string.
If the machine data does not contain a blank string, then the syntax of the
    string is checked as in the case of a subprogram identifier. This means
    that the first two characters must be letters or underscores (not num-
    bers). If this is not the case, alarm 4010 is output during power on.
The program must be located in a cycle directory. The following search path is
    run through when it is called:

    1. /_N_CUS_DIR/_N_PROG_EVENT_SPF
    2. /_N_CMA_DIR/_N_PROG_EVENT_SPF
    3. /_N_CST_DIR/_N_PROG_EVENT_SPF

The prefix (_N_) and the suffix (_SPF) of the program name are added automati-
    cally if they have not been declared.
```

-					
-	-		-	-	7/2

11640	ENABLE_CHAN_AX_GAP		N01, N11	K2
-	Allow channel axis gaps in AXCONF_MACHAX_USED		DWORD	POWER ON

```
Bit0 = 1
Machine data allows configuration of channel axis gaps in the machine data
$MC_AXCONF_MACHAX_USED.
Permits following MD assignment:
$AXCONF_MACHAX_USED[0] = 1     ; 1st  MA is 1st axis in channel
$AXCONF_MACHAX_USED[1] = 2     ; 2nd MA is 2nd axis in channel
$AXCONF_MACHAX_USED[2] = 0     ; Channel axis gap
$AXCONF_MACHAX_USED[3] = 3     ; 3rd MA is 3rd axis in channel
$AXCONF_MACHAX_USED[4] = 0

C A U T I O N:
(BIT0 set with $MC_AXCONF_MACHAX_USED):
    If a geo axis is placed in a channel axis gap with
    $MC_AXCONF_GEOAX_ASSIGN_TAB[1]= 3, the control responds as with
    $MC_AXCONF_GEOAX_ASSIGN_TAB[1]= 0. This eliminates the geo axis!

Transformation machine data must not be assigned a channel axis number speci-
fied as a gap.

BIT1 - BIT31:  not used.

Related to:
   AXCONF_CHANAX_NAME_TAB,
   AXCONF_GEOAX_ASSIGN_TAB,
   AXCONF_GEOAX_NAME_TAB
   AXCONF_MACHAX_USED
   TRAFO_AXES_IN_X
   TRAFO_GEOAX_ASSIGN_TAB_X
```

-					
-	-	0x0	0	0x1	2/2

11660	**NUM_EG**			N09	M3
-	Number of possible 'electronic gear units'			BYTE	POWER ON
The size of memory space specified here is reserved in DRAM for implementing the function "Electronic Gear". The number of EG axis groupings stated here is the maximum number that can be defined simultaneously with EGDEF.					
-					
-	-	0	-	-	1/1

11700	**PERMISSIVE_FLASH_TAB**			EXP, N01	IAD
-	Codes for NC card			DWORD	POWER ON
Normally, the NCK knows the program algorithms for writing on the flash of the PCMCIA card, however, if "new" cards with another ManufactorCode and/or DeviceCode are used, then these values can be entered here. Whereby, the ManufactorCode must be entered in the first line, and the DeviceCode in the following line.					
-					
-	6	0,0,0,0,0,0,0,0	-	-	1/1

11717	**D_NO_FCT_CYCLE_NAME**			EXP, N12, N07	-
-	Subroutine name for D function replacement			STRING	POWER ON
Cycle name for replacement routine of the T function. If a D function is programmed in a part program block, then, depending on machine data $MN_T_NO_FCT_CYCLE_NAME, $MN_T_NO_FCT_CYCLE_MODE and $MN_M_NO_FCT_CYCLE_PAR, the subprogram defined in D_NO_FCT_CYCLE_NAME is called. The programmed D number can be polled in the cycle via system variable $C_D / $C_D_PROG. $MN_D_NO_FCT_CYCLE_NAME is only active in Siemens mode (G290). No more than one M/T/D function replacement can be active per part program line. A modal subprogram call must not be programmed in the block with the D function replacement. Furthermore, neither subprogram return nor part program end are allowed. In the event of a conflict alarm 14016 is output.					
-					
-	-		-	-	7/2

11750	NCK_LEAD_FUNCTION_MASK			N09	-
-	Functions for master value coupling			DWORD	NEW CONF
Special functions of the master value coupling are set with this MD. The MD is bit-coded, the following bits are assigned: Bits 0-3: reserved Bit 4 == 0: the following axis of a master value coupling decelerates independently on NC or mode group stop or channel-specific feed disable Bit 4 == 1: the following axis of a master value coupling does not decelerate independently on NC or mode group stop or channel-specific feed disable Bits 5-31: reserved					
-					
-	-	0x00	0	0x10	1/1

11752	NCK_TRAIL_FUNCTION_MASK			N09	-
-	Functions for coupled motion			DWORD	NEW CONF
Special functions for coupled motions are set with this MD. The MD is bit-coded; the following bits are assigned: Bits 0-3: reserved Bit 4 = 0: the following axis of a coupled axis grouping activated by a synchronized action decelerates independently on NC or mode group stop or channel-specific feed disable Bit 4 = 1: the following axis of a coupled axis grouping activated by a synchronized action does not decelerate independently on NC or mode group stop or channel-specific feed disable Bit 5-31: reserved					
-					
-	-	0x200	0	0x210	1/1

1.3.2 Override switch settings

12000	**OVR_AX_IS_GRAY_CODE**			EXP, N10	V1
-	Axis feedrate override switch Gray-coded			BOOLEAN	POWER ON
This machine data is used to adapt the axis feed override switch to the interface coding of the PLC interface. 1: The 5 least significant bits of the "feed override" PLC interface signal (DB31, ... DBB0) are interpreted as a Gray code. The value which is read corresponds to a switch setting. It is used as an index for selecting the correct override factor from the table of MD 12010: OVR_FACTOR_AX_SPEED [n]. 0: The feed override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent). Related to: IS " Feed override" (DB31, ... DBB0), (axis-specific) MD 12010: OVR_FACTOR_AX_SPEED [n] (Evaluation of the axis feed override switch)					
-					
-	-	TRUE	-	-	7/2

12010	**OVR_FACTOR_AX_SPEED**			EXP, N10	V1
-	Evaluation of axis feedrate override switch			DOUBLE	POWER ON
Evaluation of the axis velocity override switch with Gray-coded interface. Not relevant with: MD 12000: OVR_AX_IS_GRAY_CODE = 0 Related to: IS "Feedrate override" (DB31, ... DBB0), (axis specific)					
-					
-	31	0.00,0.01,0.02,0.04, 0.06,0.08,0.10...	0.00	2.00	7/2

12020	**OVR_FEED_IS_GRAY_CODE**			EXP, N10	V1
-	Path feedrate override switch Gray-coded			BOOLEAN	POWER ON
This machine data is used to adapt the path feed override switch to the interface coding of the PLC interface. 1: The 5 least significant bits of the "feed override" PLC interface signal are interpreted as a Gray code. The value which is read corresponds to a switch setting. It is used as an index for selecting the correct override factor from the table of MD 12030: OVR_FACTOR_FEEDRATE [n]. 0: The feed override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent). Related to: IS " Feed override" (DB21, ... DBB4) MD 12030: OVR_FACTOR_FEEDRATE [n] (Evaluation of the path feed override switch)					
-					
-	-	TRUE	-	-	7/2

12030	**OVR_FACTOR_FEEDRATE**			EXP, N10	V1
-	Evaluation of path feedrate override switch			DOUBLE	POWER ON
Evaluation of the feedrate override switch with Gray-coded interface. Special function of the 31st value for the velocity control: The setting of the 31st override value defines the dynamic reserves which take the velocity control to be an excessive increase in the path feed. The setting should correspond to the highest override factor actually used. Thus, the function of the 31st value is identical to the effect of the MD OVR_FACTOR_LIMIT_BIN when using the binary-coded interface. Not relevant with: MD 12020: OVR_FEED_IS_GRAY_CODE = 0 Related to: IS "Feedrate override" (DB21, ... DBB4)					
-					
-	31	0.00,0.01,0.02,0.04, 0.06,0.08,0.10...	0.00	2.00	7/2

12040	**OVR_RAPID_IS_GRAY_CODE**			EXP, N10	V1
-	Rapid traverse override switch Gray-coded			BOOLEAN	POWER ON
This machine data is used to adapt the rapid traverse override switch to the interface coding of the PLC interface. 1: The 5 least significant bits of the "rapid traverse override" PLC interface signal are interpreted as a Gray code. The value which is read corresponds to a switch setting. It is used as an index for selecting the correct override factor from the table of MD 12050: OVR_FACTOR_RAPID_TRA. [n]. 0: The rapid traverse override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent). Related to: IS " Rapid traverse override" (DB21, ... DBB5) MD 12050: OVR_FACTOR_RAPID_TRA[n] (Evaluation of the rapid traverse override switch)					
-					
-	-	TRUE	-	-	7/2

12050	**OVR_FACTOR_RAPID_TRA**			EXP, N10	V1
-	Evaluation of rapid traverse override switch			DOUBLE	POWER ON
Evaluation of the rapid traverse override switch with Gray-coded interface. Not relevant with: MD 12040: OVR_RAPID_IS_GRAY_CODE = 0 Related to: IS "Rapid traverse override" (DB21, ... DBB5)					
-					
-	31	0.00,0.01,0.02,0.04, 0.06,0.08,0.10...	0.00	1.00	7/2

12060	**OVR_SPIND_IS_GRAY_CODE**			EXP, N10	V1
-	Spindle override switch Gray-coded			BOOLEAN	POWER ON
This machine data is used to adapt the spindle speed override switch to the interface coding of the PLC interface. 1: The 5 least significant bits of the "spindle speed override" PLC interface signal are interpreted as a Gray code. The value which is read corresponds to a switch setting. It is used as an index for selecting the correct override factor from the table of MD 12070: OVR_FACTOR_SPIND_ SPEED [n]. 0: The spindle speed override byte of the PLC interface is interpreted as a binary representation of the override value in percent (limit 200 percent). Related to: IS "Spindle speed override" (DB31, ... DBB0) MD 12070: OVR_FACTOR_SPIND_SPEED[n] (Evaluation of the spindle speed override switch)					
-					
-	-	TRUE	-	-	7/2

12070	**OVR_FACTOR_SPIND_SPEED**			EXP, N10	V1
-	Evaluation of spindle override switch			DOUBLE	POWER ON

```
Evaluation of the spindle-specific override switch with Gray-coded interface.
Special function of the 31st value for the velocity control:
The setting of the 31st override value defines the dynamic reserves which take
    the velocity control to be an excessive increase in the spindle feed. The
    setting should correspond to the highest override factor actually used.
Thus, the function of the 31st value is thus identical to the effect of the MD
OVR_FACTOR_LIMIT_BIN when using the binary-coded interface.

Not relevant for:
    MD 12060: OVR_SPIND_IS_GRAY_CODE = 0

Related to:
    IS "Spindle override" (DB31, ... DBB0)
```

-					
-	31	0.5,0.55,0.60,0.65,0.70,0.75,0.80...	0.00	2.00	7/2

12080	**OVR_REFERENCE_IS_PROG_FEED**			N10, N09	V1
-	Override reference speed			BOOLEAN	POWER ON

```
The entry in this MD specifies whether the spindle override given by the IS
    refers to the speed limited by MD/SD or to the programmed speed.
1: Spindle override acts with reference to the programmed speed
   (programmed speed _ spindle override 100%)
0: Spindle override acts on the speed limited by MD or SD
   (speed limited by MD/SD _ spindle override 100%)

Related machine data:
    A speed limitation is effected by the following MDs or SDs:
    MD 35100: SPIND_VELO_LIMIT          Maximum spindle speed
    MD 35130: GEAR_STEP_MAX_VELO_LIMIT  Maximum speed of gear stage
    MD 35160: SPIND_EXTERN_VELO_LIMIT   Spindle speed limitation by PLC
    SD 43220: SPIND_MAX_VELO_G26        Maximum spindle speed
    SD 43230: SPIND_MAX_VELO_LIMS       Spindle speed limitation with G96
```

-					
-	-	TRUE	-	-	7/2

12082	**OVR_REFERENCE_IS_MIN_FEED**			N10, N09	V1
-	Specification of the reference of the path override			BOOLEAN	POWER ON

```
The reference speed for the path feed override specified via the machine con-
    trol panel can be set differently from the standard.
0: Standard:
   The override is relative to the programmed feed.

1: Special case:
   The override is relative to the programmed feed or to the path feed limit,
depending on which resulting value is lower. In this way, even for a great
feed reduction (due to the permissible axis dynamics), the effect of the over-
ride value (in the range 0 to 100%) is always visible.
```

-					
-	-	FALSE	-	-	7/2

12090	**OVR_FUNCTION_MASK**			N01, N10, N09	-
-	Selection of override specifications			DWORD	RESET

```
The functionality of the override switches can be affected by the bits.
Bit 0: = 0,
   Standard: Spindle override active with G331/G332
        = 1,
   Path override is active instead of spindle override with G331/G332
   (Tapping without compensating chuck)
```

-					
-	-	0	0	0x01	7/2

12100	**OVR_FACTOR_LIMIT_BIN**			EXP, N10	V1
-	Limitation for binary-coded override switch			DOUBLE	POWER ON

```
This machine data can be used as an additional limit for the override factor
when using the binary-coded interface for path, axis and spindle feeds.
In this case, the maximum values

- 200% for channel-specific feed override
- 100% for channel-specific rapid traverse override
- 200% for axis-specific feed override
- 200% for spindle override

are replaced with the limit value entered in MD: OVR_FACTOR_LIMIT_BIN when
    this value is lower.

Example: OVR_FACTOR_LIMIT_BIN = 1.20
 -->  maximum override factor for
- channel-specific feed override                =120%
- channel-specific rapid traverse override      =100%
- axis-specific feed override                   =120%
- spindle override                              =120%

This value also defines the dynamic reserves maintained by the speed control
for increasing the path and spindle feedrates.

References:
   /FB/, B1, "Continuous Path Mode, Exact Stop and Look Ahead"
```

-					
-	-	1.2	0.0	2.0	7/2

<table>
<tr><td>12200</td><td colspan="2">RUN_OVERRIDE_0</td><td></td><td>N01, N09</td><td>FBMA,V1</td></tr>
<tr><td>-</td><td colspan="3">Traversing response with override 0</td><td>BOOLEAN</td><td>POWER ON</td></tr>
<tr><td colspan="6">= 0
Override 0 is active and means deceleration (JOG mode, safety function). Bits 0 and 1 in $MA_HANDWH_STOP_COND for hand wheels and in $MC_HANDW_CHAN_STOP_COND for machine axes define whether the pulses are collected for geometry axes and contour handwheel.

= 1
Traversing with handwheels and in JOG mode with fixed feedrates is also possible with a 0 % override.

Related to:
$MA_HANDWH_STOP_COND
$MC_HANDW_CHAN_STOP_COND</td></tr>
<tr><td>-</td><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td>-</td><td>-</td><td>FALSE</td><td>-</td><td>-</td><td>7/2</td></tr>
</table>

<table>
<tr><td>12202</td><td colspan="2">PERMANENT_FEED</td><td></td><td>N01, N09</td><td>FBMA,V1</td></tr>
<tr><td>mm/min</td><td colspan="3">Fixed feedrates for linear axes</td><td>DOUBLE</td><td>RESET</td></tr>
<tr><td colspan="6">In AUTOMATIC mode:
After activating a fixed feedrate via an interface signal, traversing is done with a fixed feedrate instead of the programmed feedrate.
Note:
The fixed feedrate is also evaluated in continuous-path mode in order to optimize the overhead for the Look Ahead calculation. Unnecessarily high values should therefore be avoided. Enter zero if a fixed feedrate is not wanted

In JOG mode:
After activating a fixed feedrate via an interface signal, and traversing the linear axis with a traversing key, traversing proceeds in the selected direction with the fixed feedrate.

n = 0, 1, 2, 3 mean fixed feedrates 1, 2, 3, 4. The values must be entered in ascending order.

Special cases, errors, ...
The maximum velocity defined by $MA_MAX_AX_VELO is active. An override setting of 100 % is assumed. $MN_RUN_OVERRIDE_0 is active if the override is 0.

Related to:
$MN_RUN_OVERRIDE_0</td></tr>
<tr><td>-</td><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td>-</td><td>4</td><td>0.,0.,0.,0.</td><td>-</td><td>-</td><td>7/2</td></tr>
</table>

12204	**PERMANENT_ROT_AX_FEED**			N01, N09	FBMA
rev/min	Fixed feedrates for rotary axes			DOUBLE	RESET

Fixed feedrate values:
In AUTOMATIC mode:
After activating a fixed feedrate via an interface signal, traversing is done with a fixed feedrate instead of the programmed feedrate.

Note: PERMANENT_ROT_AX_FEED is used instead of PERMANENT_FEED for the path motion if all synchronously traversed axes in the current block are rotary axes. PERMANENT_FEED applies if linear and rotary axes are to be synchronously traversed together.
The fixed feedrate is also evaluated in continuous-path mode in order to optimize the overhead for the Look Ahead calculation. Unnecessarily high values should therefore be avoided. Enter zero if a fixed feedrate is not wanted

In JOG mode:
After activating a fixed feedrate via an interface signal, and traversing the rotary axis with a traversing key, traversing proceeds in the selected direction with the fixed feedrate.

n = 0, 1, 2, 3 mean fixed feedrates 1, 2, 3, 4.

Special cases, errors, ...
The maximum velocity defined by $MA_MAX_AX_VELO is active. An override setting of 100 % is assumed. $MN_RUN_OVERRIDE_0 is active if the override is 0.

Related to:
$MN_RUN_OVERRIDE_0

-					
-	4	0.,0.,0.,0.	-	-	7/2

12205	**PERMANENT_SPINDLE_FEED**			N01, N09	FBMA
rev/min	Fixed feedrates for spindles			DOUBLE	RESET

Fixed feedrate values:
JOG: A spindle is traversed with a fixed feedrate by activating the traversing keys and activating the appropriate signals in the PLC interface.

The override is not active.
Depending upon MD $MN_RUN_OVERRIDE_0, traversing also takes place with override 0.
The value defined by $MA_MAX_AX_VELO is taken as the upper limit. If the fixed feedrate has a larger value, the aforementioned limiting value applies.

-					
-	4	0.,0.,0.,0.	-	-	7/2

12300	**CENTRAL_LUBRICATION**			N01, N09	-
-	Central lubrication active			BOOLEAN	POWER ON
When a settable axial path has been exceeded, the axial VDI signals request a lubrication pulse from the PLC (compare $MA_LUBRICATION_DIST). These axial pulses act (by default) independently of each other. If the machine construction requires a central lubrication, i.e. the lubrication pulse of any axis is acting on all axes, the corresponding path monitoring of all axes must be restarted after lubrication pulse output. This start synchronization of the monitoring is executed via $MN_CENTRAL_LUBRICATION=TRUE.					
-					
-	-	FALSE	-	-	7/2

12510	**NCU_LINKNO**			N01	B3
-	NCU number in an NCU cluster			DWORD	POWER ON
Number or name for identifying an NCU within an NCU grouping. In an NCU grouping (NCU cluster), the NCUs are connected to one another by a link bus. Related to: MM_NCU_LINK_MASK					
-					
-	-	1	1	16	7/2

12520	**LINK_TERMINATION**			N01	B3
-	NCU numbers for which bus termination resistances are activated			BYTE	POWER ON
LINK_TERMINATION defines with which NCUs the bus termination resistances for the timing circuit must be switched in through the link module. Related to: MM_NCU_LINK_MASK					
LINK					
-	2	0,1	0	15	3/2

12540	**LINK_BAUDRATE_SWITCH**			N01	B3
-	Link bus baud rate			DWORD	POWER ON
The assigned baud rate for the link communication is defined by the values entered: Set value Rate 0 9,600 kBd 1 19,200 kBd 2 45,450 kBd 3 93,750 kBd 4 187,000 kBd 5 500,000 kBd 6 1,500 MBd 7 3,000 MBd 8 6,000 MBd 9 12,000 MBd Not relevant for: Systems without link modules Related to: MM_NCU_LINK_MASK					
LINK					
-	-	9	0	9	3/2

12550	**LINK_RETRY_CTR**			N01	B3
-	maximum number of message frame transmission retries			DWORD	POWER ON
Maximum retry limit in cases of error. Not relevant for: Systems without link modules Related to: MM_NCU_LINK_MASK					
LINK					
-	-	4	1	15	3/2

12701	AXCT_AXCONF_ASSIGN_TAB1		N01		B3
-	Assignment of an axis container location		STRING		POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Structure of entries:
NCm_AXn              with NCU number m: 1..16
                     and machine axis address n: 1... 31

Example:
NC2_AX1            ; The axis is on the NCU2 and is the
                   ; 1st machine axis there.
AX5                ; local axis 5 only with one NCU
                   ; the axis container mechanism is only used by
                   ; several channels of one NCU.

The reference to an axis container location of a channel is defined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and  MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The actually assigned axis at a specific time is dependent upon the  con-
    tainer rotation status. All channels that access an axis container use the
    same axis entries stored there. If channels of various NCUs access this
    container, then inter-NCU consistency must be ensured.
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9 $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed via NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12702	AXCT_AXCONF_ASSIGN_TAB2		N01		B3
-	Assignment of an axis container location		STRING		POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Structure of entries:
NCm_AXn              with NCU number m: 1..16
                     and machine axis address n: 1... 31
Example:
NC2_AX1            ; The axis is on the NCU2 and is the
                   ; 1st machine axis there.
AX5                ; local axis 5 only with one NCU
                   ; the axis container mechanism is only used by
                   ; several channels of one NCU.
The reference to an axis container location of a channel is defined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and  MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The actually assigned axis at a specific time is dependent upon the  con-
    tainer rotation status. All channels that access an axis container use the
    same axis entries stored there. If channels of various NCUs access this
    container, then inter-NCU consistency must be ensured.
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9
$MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed via NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12703	**AXCT_AXCONF_ASSIGN_TAB3**	N01	B3
-	Assignment of an axis container location	STRING	POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn            with NCU number m: 1..16
                   and machine axis address n: 1... 31
Example:
NC2_AX1 ; The axis is on the NCU2 and is the
                 ; 1st machine axis there
AX5              ; local axis 5, with only one NCU
                 ; the axis container mechanism is only used by
                 ; several channels of one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in
MD $MC_AXCONF_MACHAX_USED and MD $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!

Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12704	AXCT_AXCONF_ASSIGN_TAB4		N01		B3
-	Assignment of an axis container location		STRING		POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn            with NCU number m: 1..16
                   and machine axis address n: 1... 31
Example:
NC2_AX1 ; The axis is on the NCU2 and is the
                 ; 1st machine axis there
AX5              ; local axis 5, with only one NCU
                 ; the axis container mechanism is only used by
                 ; several channels from one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12705	**AXCT_AXCONF_ASSIGN_TAB5**		N01	B3	
-	Assignment of an axis container location		STRING	POWER ON	

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn           with NCU number m: 1..16
                  and machine axis address n: 1... 31
Example:
NC2_AX1         ; The axis is on the NCU2 and is the
                ; 1st machine axis there
AX5             ; local axis 5, with only one NCU
                ; the axis container mechanism is only used by
                ; several channels of one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9
$MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12706	AXCT_AXCONF_ASSIGN_TAB6			N01	B3
-	Assignment of an axis container location			STRING	POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn              with NCU number m: 1..16
                     and machine axis address n: 1... 31
Example:
NC2_AX1            ; The axis is on the NCU2 and is the
                   ; 1st machine axis there
AX5                ; local axis 5, with only one NCU
                   ; the axis container mechanism is only used by
                   ; several channels from one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
  AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12707	AXCT_AXCONF_ASSIGN_TAB7	N01	B3
-	Assignment of an axis container location	STRING	POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
Example:
NC2_AX1        ; The axis is on the NCU2 and is the
               ; 1st machine axis there
AX5            ; local axis 5, with only one NCU
               ; the axis container mechanism is only used by
               ; several channels from one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12708	**AXCT_AXCONF_ASSIGN_TAB8**	N01	B3
-	Assignment of an axis container location	STRING	POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn            with NCU number m: 1..16
                   and machine axis address n: 1... 31
Example:
NC2_AX1          ; The axis is on the NCU2 and is the
                 ; 1st machine axis there
AX5              ; local axis 5, with only one NCU
                 ; the axis container mechanism is only used by
                 ; several channels from one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12709	**AXCT_AXCONF_ASSIGN_TAB9**	N01	B3
-	Assignment of an axis container location	STRING	POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn         with NCU number m: 1..16
                and machine axis address n: 1... 31
Example:
NC2_AX1       ; The axis is on the NCU2 and is the
              ; 1st machine axis there
AX5           ; local axis 5, with only one NCU
              ; the axis container mechanism is only used by
              ; several channels from one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12710	**AXCT_AXCONF_ASSIGN_TAB10**			N01	B3
-	Assignment of an axis container location			STRING	POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn        with NCU number m: 1..16
               and machine axis address n: 1... 31
Example:
NC2_AX1      ; The axis is on the NCU2 and is the
             ; 1st machine axis there
AX5          ; local axis 5, with only one NCU
             ; the axis container mechanism is only used by
             ; several channels from one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12711	**AXCT_AXCONF_ASSIGN_TAB11**			N01	B3
-	Assignment of an axis container location			STRING	POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn         with NCU number m: 1..16
                and machine axis address n: 1... 31
Example:
NC2_AX1       ; The axis is on the NCU2 and is the
              ; 1st machine axis there
AX5           ; local axis 5, with only one NCU
              ; the axis container mechanism is only used by
              ; several channels from one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12712	AXCT_AXCONF_ASSIGN_TAB12		N01		B3
-	Assignment of an axis container location		STRING		POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
Example:
NC2_AX1        ; The axis is on the NCU2 and is the
               ; 1st machine axis there
AX5            ; local axis 5, with only one NCU
               ; the axis container mechanism is only used by
               ; several channels from one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12713	**AXCT_AXCONF_ASSIGN_TAB13**			N01	B3
-	Assignment of an axis container location			STRING	POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn         with NCU number m: 1..16
                and machine axis address n: 1... 31
Example:
NC2_AX1       ; The axis is on the NCU2 and is the
              ; 1st machine axis there
AX5           ; local axis 5, with only one NCU
              ; the axis container mechanism is only used by
              ; several channels from one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in
MD $MC_AXCONF_MACHAX_USED and MD $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12714	**AXCT_AXCONF_ASSIGN_TAB14**	N01	B3
-	Assignment of an axis container location	STRING	POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn          with NCU number m: 1..16
                 and machine axis address n: 1... 31
Example:
NC2_AX1        ; The axis is on the NCU2 and is the
               ; 1st machine axis there
AX5            ; local axis 5, with only one NCU
               ; the axis container mechanism is only used by
               ; several channels from one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12715	AXCT_AXCONF_ASSIGN_TAB15		N01		B3
-	Assignment of an axis container location		STRING		POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn           with NCU number m: 1..16
                  and machine axis address n: 1... 31
Example:
NC2_AX1         ; The axis is on the NCU2 and is the
                ; 1st machine axis there
AX5             ; local axis 5, with only one NCU
                ; the axis container mechanism is only used by
                ; several channels from one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12716	**AXCT_AXCONF_ASSIGN_TAB16**	N01	B3
-	Assignment of an axis container location	STRING	POWER ON

```
Assignment of an axis container location (slot s) to a machine axis or link
axis. A maximum of 32 locations can be assigned axes in an axis container.
Method of writing entries:
NCm_AXn           with NCU number m: 1..16
                  and machine axis address n: 1... 31
Example:
NC2_AX1         ; The axis is on the NCU2 and is the
                ; 1st machine axis there
AX5             ; local axis 5, with only one NCU
                ; the axis container mechanism is only used by
                ; several channels from one NCU.
The reference to an axis container location of a channel is determined by the
    definitions in MD $MC_AXCONF_MACHAX_USED and MD
    $MN_AXCONF_AXCONF_LOGIC_MACHAX_TAB.
The axis actually assigned at a given time is dependent upon the container
    rotation status. All channels that access an axis container use the same
    axis entries stored there. If channels from various NCUs access this con-
    tainer, ensure that there is consistency between the NCUs!
Example:
CHANDATA(1)
$MC_MACHAX_USED[4]=9    $MN_AXCONF_LOGIC_MACHAX_TAB[8]=CL1_SL1
$MN_AXCT_AXCONF_ASSIGN_TAB1[0]="NC1_AX1"
$MN_AXCT_AXCONF_ASSIGN_TAB1[1]="NC2_AX1"
This machine data is distributed over the NCU-link.

Related to:
   AXCONF_LOGIC_MACHAX_TAB
```

CTDE					
-	32		-	-	3/2

12750	**AXCT_NAME_TAB**	N01	B3
-	Axis container identifier	STRING	POWER ON

```
List of axis container identifiers
In addition to the channel identifier of an axis, the axis container identi-
    fier, which can be defined by the user here, can also be used as an axis
    container name for e.g. a rotation of an axis container (AXCTSWE(CT1)).
```

CTDE					
-	16	"CT1","CT2","CT3","CT4","CT5","CT6"...	-	-	1/1

12970	**PLC_DIG_IN_LOGIC_ADDRESS**	N10	-
-	Logical start address of the digital PLC input address	DWORD	POWER ON

```
Logical start address of the digital input addresses of the PLC

Related to:
   PLC_DIG_IN_NUM
```

-					
-	-	0	0	1023	0/0

12971	**PLC_DIG_IN_NUM**			N10	-
-	Number of digital input addresses			DWORD	POWER ON
Number of digital input addresses as from the start address Related to: PLC_DIG_IN_LOGIC_ADDRESS					
-					
-	-	64	1	1023	0/0

12974	**PLC_DIG_OUT_LOGIC_ADDRESS**			N10	-
-	Logical start address of the digital PLC output addresses			DWORD	POWER ON
Logical start address of the digital output addresses of the PLC Related to: PLC_DIG_OUT_NUM					
-					
-	-	0	0	1023	0/0

12975	**PLC_DIG_OUT_NUM**			N10	-
-	Number of digital output addresses			DWORD	POWER ON
Number of digital output addresses as from the start address					
-					
-	-	48	1	1023	0/0

12978	**PLC_ANA_IN_LOGIC_ADDRESS**			N10	-
-	Logical start address of the analog PLC input addresses			DWORD	POWER ON
Logical start address of the analog input addresses of the PLC Related to: PLC_ANA_IN_NUM					
-					
-	-	0	0	1023	0/0

12979	**PLC_ANA_IN_NUM**			N10	-
-	Number of analog input addresses			DWORD	POWER ON
Number of analog input addresses as from the start address Related to: PLC_ANA_IN_LOGIC_ADDRESS					
-					
-	-	0	0	1023	0/0

12982	**PLC_ANA_OUT_LOGIC_ADDRESS**			N10	-
-	Logical start address of the analog PLC output addresses			DWORD	POWER ON
Logical start address of the analog output addresses of the PLC Related to: PLC_ANA_OUT_NUM					
-					
-	-	0	0	1023	0/0

12983	**PLC_ANA_OUT_NUM**			N10	-
-	Number of analog output addresses			DWORD	POWER ON
Number of analog output addresses as from the start address Related to: PLC_ANA_OUT_LOGIC_ADDRESS					
-					
-	-	0	0	1023	0/0

1.3.3 Central drive data

13000	**DRIVE_IS_ACTIVE**			EXP	G2
-	Drive activation (611D)			BOOLEAN	POWER ON
Only applies to drives with SIMODRIVE 611D! A drive is activated/deactivated with this MD. 1: Drive is active 0: Drive is not active. The drive is not supplied with setpoints and is not monitored. No input [actual value] or output [setpoint] can be configured on this module. This module is only taken into account during basic initialization of the drive bus. The machine data MD 13020: DRIVE_INVERTER_CODE, MD 13010: DRIVE_LOGIC_NR, MD 13030: DRIVE_MODULE_TYPE and MD 13040: DRIVE_TYPE must be parameterized. The slot number of a real available drive is used as the index [n]. [Slot nos.] : 0-14 The index is numbered from the beginning of the drive bus starting with "0" (corresponds to 1st real drive available) and continues in ascending order to the end. 810D is assigned the slot nos. 0-5. Example(s) for application: deactivating an available drive for testing purposes.					
-					
-	31	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

13010	**DRIVE_LOGIC_NR**			EXP	G2
-	Logical drive number			BYTE	POWER ON

```
Only applies to drives with SIMODRIVE 611D!
A "logical drive number" must be assigned to each real drive. This parameter-
    ization defines how the actual order of the modules connected to one drive
    bus relate to the logical drive numbers.
A non-existing drive module is assigned the logical drive number "0". In this
    way it is possible to create positions for modules that do not yet exist
    but are to be inserted at this point in the drive bus at a later time.

The logical drive number is used in assigning actual values and setpoints (MD
    30220: ENC_MODULE_NR[n], MD 30110: CTRLOUT_MODULE_NR[n]).
The slot number of a real available drive is used as the index [n]. [Slot no.]
    : 0-14
The index is numbered from the beginning of the drive bus starting with "0" (=
    _ 1st real drive available) and continues in ascending order to the end.
    810D is assigned the slot nos.  0-5.

Each drive must only be assigned one logical drive number.

The following alarms may be output if an input error occurs:
- Alarm 300001 "Drive number not possible"
- Alarm 300002 "Drive number defined several times"
- Alarm 300005 "At least 1 module too many on drive bus"
- Alarm 300006 "At least 1 module too few on drive bus"
```

-					
-	31	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	31	7/2

13020	DRIVE_INVERTER_CODE		EXP	G2
-	Power section code of drive module		DWORD	POWER ON

```
Only applies to drives with SIMODRIVE 611D or SINUMERIK 810D!
The power section code of the MSD or FDD module being used is entered (as hex
    value) in the MD.

Power section code for FDD modules:
Code number (hex)          Power section MLFB                Current

            00              no power section specified       -----
            11              6SN1130-1Dx1x-0HA0                 3/6 A
            12              6SN1130-1Dx1x-0AA0                5/10 A
            13              6FC5447-1Dx1x-0AA0                6/12 A (810D)
            14              6SN1130-1Dx1x-0BA0                9/18 A
            16              6SN1130-1Dx1x-0CA0               18/36 A
            17              6SN1130-1Dx1x-0DA0               28/56 A
            19              6SN1130-1Dx1x-0EA0              56/112 A
            1A              6SN1130-1Dx1x-0FA0              70/140 A
            1E              6FC5447-1Dx1x-0AA0              18/36 A (810D)

Power section code for MSD modules:
Code number (hex)          Power section MLFB                  Current

            06             6SN1135-1DA1x-0CA0              24/32/36 A
            07             6SN1135-1DA1x-0DA0              30/40/56 A
            08             6SN1135-1DA1x-0GA0              45/60/80 A
            09             6SN1135-1DA1x-0EA0             60/80/106 A
            0A             6SN1135-1DA1x-0FA0            85/110/140 A
            0E             6FC5447-1DA1x-0AA0                24/32 A (810D)

The slot number of a real available drive is used as the index [n]. [Slot no.]
    : 0-14
The index is numbered from the beginning of the drive bus starting with "0" (=
    1st real drive available) and continues in ascending order to the end.
```

-					
-	31	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	7/2

13030	DRIVE_MODULE_TYPE		EXP	G2
-	Module ID		BYTE	POWER ON

Only applies to drives with SIMODRIVE 611D!
An identifier for the module type used is entered in this MD.
0: No module or module has been removed (SW 6.3 and higher)
1: 1-axis module
2: 2-axis module
6: SINUMERIK 810D 6 axis controls / 3 power sections
9: Terminal block for digital/analog I/Os
The slot number of a real available drive is used as the index [n]. [Slot no.] : 0-14
The index is numbered from the beginning of the drive bus starting with "0" (= 1st real drive available) and continues in ascending order to the end.
If the wrong module type is assigned to an axis module, alarm 300003 "Wrong module type (1-/2-axis)" is output.

-					
-	31	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1...	0	10	7/2

13040	DRIVE_TYPE		EXP	G2,FBHY
-	ID for drive type (1: FDD, 2: MSD, 3: LIN)		BYTE	POWER ON

Only applies to drives with SIMODRIVE 611D!
An identifier for the drive type is entered in this MD:
0: No drive
1: FDD
2: MSD
3: Linear drive
4: Analog drive (spec. hydraulic)
5: Hydraulic drive

The slot number of a real available drive is used as the index [n]. [Slot no.] : 0-14
The index is numbered from the beginning of the drive bus starting with "0" (= 1st real drive available) and continues in ascending order to the end. If the wrong drive type is assigned to a drive, alarm 300004, "Incorrect drive type (FDD, MSD, linear drive)" is output.

-					
-	31	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1...	0	5	7/2

13050	**DRIVE_LOGIC_ADDRESS**	N04, N10	G2
-	Logical drive addresses	DWORD	POWER ON

Logical I/O addresses of the drives on the PROFIBUS. An address is assigned to a drive.
This applies only to the PROFIBUS-DP!
This MD is the link to the description of the PROFIBUS configuration in PROFIBUS SDB.
The MD value is the address index of the logical I/O drive address assigned with HW-Config (SIMATIC Manager S7).
Example:
DRIVE_LOGIC_ADDRESS[1] = 272 (The start address 272 is assigned to drive 1.)

The PROFIBUS SDB defines the logical I/O address of the drives on the PROFIBUS. An address is assigned to a drive or to a slave.
The address index is used for actual-value and setpoint-value assignment
(MD 30220: ENC_MODULE_NR[n], MD 30110: CTRLOUT_MODULE_NR[n]).
Note:
The same drive (I/O address) must be assigned to the MD 30220: ENC_MODULE_NR[0] and MD 30110: CTRLOUT_MODULE_NR[0]
of a machine axis.
Each drive or slave must be assigned to a single logical address index.
The index [n] of the machine data has the following coding: [Drive index]:
Drive 1 -->n-=0
Drive 2 -->n-=1,

-					
-	31	272,292,312,332,352,372,392,412,432...	258	8191	7/2
710-6a2c	-	4100,4140,4180,4220,4260,4300,4340...	-	-	-/-
710-12a2c	-	4100,4140,4180,4220,4260,4300,4340...	-	-	-/-
710-31a10c	-	4100,4140,4180,4220,4260,4300,4340...	-	-	-/-

13060	DRIVE_TELEGRAM_TYPE			N04, N10	G2
-	Standard message frame type for Profibus DP			DWORD	POWER ON

```
Standard message frame type for PROFIBUS axes:
            0 = No standard type, user-defined
                (Message frame type 103 is then used inside the NCK,
                whereby other PZDs are permissible.)
        1...  6 = PROFIdrive type
      101...107 = 611U type
               116 = 611U type 106 plus trace data
      201...203 = internal type

Note: Alarm 26015 is issued with reference to this machine data:
a. If less data has been configured on the bus (message length) than required
for the message frame type selected here.

b. If the message frame configuration contains inconsistencies, that is the
message frame type selected here of the NCK side does not correspond to the
message frame type set on the drive (see parameter P922), and the PZD configu-
ration does not match (see parameters P923, P915, P916). The check for mes-
sage frame configuring errors can be disabled by MD DRIVE_FUNCTION_MASK bit15.
```

-					
-	31	102,102,102,102,102,102,102,102,102...	-	-	7/2
710-2a2c	-	116,116,116,116,116,116,116,116,116...	-	-	-/-
710-6a2c	-	116,116,116,116,116,116,116,116,116...	-	-	-/-
710-12a2c	-	116,116,116,116,116,116,116,116,116...	-	-	-/-
710-31a10c	-	116,116,116,116,116,116,116,116,116...	-	-	-/-

13070	**DRIVE_FUNCTION_MASK**		N04, N10		G2
-	DP functions used		DWORD		POWER ON

Bit-coded mask for skipping the scope of available functions for PROFIBUS axes expected from NCK.
Significance of set bits:
Bit 0: Deactivation of axial drive alarm display
Bit 1: Deactivation of 611U description file intermediate storage in the NCK
Bit 2: Deactivation of axial encoder driver parameter accesses
Bit 3: Deactivation of axial output driver parameter accesses
Bit 4: reserved (previously activation of DSC bits)
Bit 5: Deactivation of the 611U-specific drive parking (STW2.7/STA2.7)
Bit 6: Deactivation of the 611U-specific travel to fixed stop (STW2.8/STA2.8)
Bit 7: Deactivation of the 611U-specific motor switching int. (STW2.9 to 2.11)
Bit 8: Deactivation of the 611U-specific ramp block (STW1.11+13)
Bit 9: Deactivation of the 611U-specific function generator bits (STW1.8/ STA1.13)
Bit 10: Deactivation of the control of the holding brake (STW1.12 / STA2.5)
Bit 14: Selection of non-cyclical communication 0 = DPT 1 = DPV1
Bit 15: Deactivation of the consistency check of the PROFIBUS telegram configuration

The configuration of bits 4-8 which are new for SW 6.3 and higher allows an adaptation of certain PROFIdrive profiles of non-standardized PROFIBUS control or status bits of SIMODRIVE 611 universal. Bits 4 to 8 may have a different significance in the default setting of external drives.

-					
-	31	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	7/2
710-6a2c	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2...	-	-	-/-
710-12a2c	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2...	-	-	-/-
710-31a10c	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2...	-	-	-/-

13080	**DRIVE_TYPE_DP**			EXP	G2
-	Drive type Profibus			BYTE	POWER ON
MD is relevant for drives at the PROFIBUS: Drive type: 0: No drive or drive type unknown (default), software-internally treated as: 1: FDD drive (SRM: Synchronous rotary drive) 2: MSD drive (ARM: Asynchronous rotary drive) 3: Linear drive 4: Analog drive (no automatic entry) Note: In general, the drive type is entered automatically with Siemens drives as soon as the drives start operating. With non-Siemens drives (at least with linear drives) the value must be entered manually if automatic drive recognition is not possible.					
-					
-	31	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	4	7/2

13100	**DRIVE_DIAGNOSIS**			EXP, N05	IAD,Kap.3
-	Diagnosis drive link			DWORD	POWER ON

```
Relevant to Simodrive 611D diagnostics:
1. General output of drive message frames for test purposes
DRIVE_DIAGNOSIS[0]    Activation of message frame simulation (!=0 active on
PowerOn)
DRIVE_DIAGNOSIS[1]    Message frame number (!=0)
DRIVE_DIAGNOSIS[2]    NC number of the 611D axis (1-8)
DRIVE_DIAGNOSIS[3]    Additional parameter (not currently used)

A message frame is issued by changing the message frame number.

2. Special function of DRIVE_DIAGNOSIS[6]
2.1.Standard preassignment
Content = 1:
   Initiates the output of
     1. current setpoint
     2. speed setpoint
     3. actual speed value
    to the 3 digital-to-analog converter outputs of all active drive modules.
   These outputs are made for the 1st axis for 2-axis modules.

Content = 2:
   Initiates the output of the values for the 2nd axis of 2-axis modules.
2.2.Expansion reset-resistant digital-to-analog converters
Content = 0:
    No reset-resistant digital-to-analog converters
Content = 1:
   Default value 1 is activated, every further change is retained.
Content = 2:
   Default value 2  is activated, every further change is retained.

If a change in the content is detected during NCK restart, the information
    stored up to this point is deleted.

3. Transport trace
DRIVE_DIAGNOSIS[7]   Activation of transport trace (!=0, active on PowerOn)

4. If MD13100 DRIVE_DIAGNOSIS[8] contains a value other than zero, then the
control has found at least one closed-loop control module that does not sup-
port the measuring. The machine axis affected is entered bit-coded in the
machine data.
1st example:
Only axis 1 is affected --> DRIVE_DIAGNOSIS[8] = 0x0001
2nd example:
Axis 3 and axis 4 are affected ---> DRIVE_DIAGNOSIS[8] = 0x000C
```

-					
-	9	0,0,0,0,0,0,1,0,0	-	-	7/2

13110	**PROFIBUS_TRACE_ADDRESS**			EXP	-
-	PROFIBUS trace of I/O slots			DWORD	NEW CONF

Logical I/O address that is to be recorded.

-					
-	14	0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8191	2/2

13111	**PROFIBUS_TRACE_TYPE**			EXP	-
-	PROFIBUS trace settings			DWORD	NEW CONF
0: Recording into the part program memory /_N_MPF_DIR/_N_SIEMDPTRC_MPF 1: Recording into the mass storage /user/sinumerik/data/temp/siemdptrc.trc 2: Recording into the part program memory with runtime measurement					
-					
-	-	0	0	2	2/2
840d-2a2c	-	-	-	0	-/-
840d-4a1cg	-	-	-	0	-/-
840d-6a2c	-	-	-	0	-/-
840d-12a2c	-	-	-	0	-/-
840d-31a10c	-	-	-	0	-/-
840di-basic	-	-	-	0	-/-
840di-universal	-	-	-	0	-/-
840di-plus	-	-	-	0	-/-

13112	**PROFIBUS_TRACE_FILE_SIZE**			EXP	-
-	Maximum trace file size in kbytes			DWORD	NEW CONF
0: Trace without file size limitation >0: Trace with file size limitation					
-					
-	-	40	-	-	2/2

13113	**PROFIBUS_TRACE_START**			EXP	-
-	Activation of PROFIBUS trace			DWORD	SOFORT
0: Trace off 1: Trace on MD13112 > 0: Trace is automatically disabled when the file size is reached.					
-					
-	-	0	0	1	2/2

13114	**PROFIBUS_TRACE_START_EVENT**			EXP	-
-	Trigger conditions for PROFIBUS trace			DWORD	NEW CONF
The trigger frequency is configured bit-by-bit Bits 0-15: 0x0001-0xffff: bit mask Bits 16-23: 0x01-0x14: PZD number (a maximum of 20 words are permissible) Bits 24-27:0x01: status change 0->1 0x00: status change 1->0 Bits 28-31:0x10: send slot 0x00: receive slot The trigger is not active if the PZD number=0 The trigger is immediately active if MD13114=1 and MD13114=0x0					
-					
-	-	0x00000000	0x00000000	0x111fffff	2/2

13120	**CONTROL_UNIT_LOGIC_ADDRESS**			N04, N10	-
-	Logical address of SINAMICS CU			DWORD	POWER ON
Logical I/O address of a SINAMICS-CU (Control Unit) on the PROFIBUS-DP. The cyclic DP communication with SINAMICS-CU is activated by taking over the associated slot address from the STEP7 project. The onboard I/Os cannot be accessed until after configuration.					
-					
-	7	0,0,0,0,0,0,0	0	8191	7/2
710-2a2c	-	6500,0,0,0,0,0,0	-	-	-/-
710-6a2c	-	6500,0,0,0,0,0,0	-	-	-/-
710-12a2c	-	6500,0,0,0,0,0,0	-	-	-/-
710-31a10c	-	6500,0,0,0,0,0,0	-	-	-/-
840d-2a2c	-	-	-	-	-1/-
840d-4a1cg	-	-	-	-	-1/-
840d-6a2c	-	-	-	-	-1/-
840d-12a2c	-	-	-	-	-1/-
840d-31a10c	-	-	-	-	-1/-

13150	**SINAMICS_ALARM_MASK**			N04, N05	-
-	Activate fault and warning buffer output for Sinamics			DWORD	POWER ON

```
Relevant to SINAMICS diagnostics:


Mask for displaying the SINAMICS DOS fault and warning buffers

Bit set:       Alarms in this DO group are output
Bit not set:   Alarms in this DO group are not output

BitHex.  Meaning
   value
==============================================================================
======
0:  0x1  Output faults of the Control Units
1:  0x2  Reserved
2:  0x4  Output faults of the Drive Controls
3:  0x8  Output faults of the Line Modules
4:  0x10 Output faults of the Terminal Boards
5:  0x20 Output faults of the Terminal Modules

8:  0x100 Output warnings of the Control Units
9:  0x200 Reserved
10: 0x400 Output warnings of the Drive Controls
11: 0x800 Output warnings of the Line Modules
12: 0x1000 Ouptut warnings of the Terminal Boards
13: 0x2000 Output warnings of the Terminal Modules
```

-					
-	-	0x0	-	-	7/2
840d-2a2c	-	-	-	-	-1/-
840d-4a1cg	-	-	-	-	-1/-
840d-6a2c	-	-	-	-	-1/-
840d-12a2c	-	-	-	-	-1/-
840d-31a10c	-	-	-	-	-1/-

13200	**MEAS_PROBE_LOW_ACTIVE**			N10, N09	M5
-	Polarity reversal of sensor			BOOLEAN	POWER ON

```
The electrical polarity of each connected sensor is defined by this MD.
Value 0:
   (default setting)
   Non-deflected state        0 V
   Deflected state           24 V
Value 1:
   Non-deflected state       24 V
   Deflected state            0 V

The programmed edges of the sensor are independent of the electrical polarity
    and are to be regarded as purely mechanical. The programming of a posi-
    tive edge always means the transition from the non-deflected into the
    deflected state. The programming of a negative edge always means the tran-
    sition from the deflected into the non-deflected state.
```

-					
-	2	FALSE,FALSE	-	-	7/2

13210	MEAS_TYPE			N10, N09	M5
-	Meas. type with decentralized drives			BYTE	POWER ON
This MD sets the measuring function of decentralized drives. The MD currently only functions for PROFIBUS drives. MEAS_TYPE = 0 defines: A probe is used that is connected centrally to the NC. However, as the encoders only provide actual position values in cycles, the actual measuring position is found by interpolation. MEAS_TYPE = 1 defines: The probe must be wired decentralized to ALL drives. The measuring functionality of the drive is then used, saving the actual encoder values in the hardware at the time of the measuring edge. This method is more accurate than that with MEAS_TYPE = 0, but it requires a more complex wiring and drives that support this measuring functionality (e.g. 611U).					
-					
-	-	1	0	1	7/2
710-2a2c	-	0	-	-	-/-
710-6a2c	-	0	-	-	-/-
710-12a2c	-	0	-	-	-/-
710-31a10c	-	0	-	-	-/-
840d-2a2c	-	0	-	-	-/-
840d-4a1cg	-	0	-	-	-/-
840d-6a2c	-	0	-	-	-/-
840d-12a2c	-	0	-	-	-/-
840d-31a10c	-	0	-	-	-/-
840di-basic	-	0	-	-	-/-
840di-universal	-	0	-	-	-/-
840di-plus	-	0	-	-	-/-

13211	**MEAS_CENTRAL_SOURCE**			N10, N09	-
-	Data source for central measurement with Profibus drives			BYTE	POWER ON

```
This MD is used to set the method used to obtain the time stamps for central
measurement with Profibus drives.

The following applies if MEAS_CENTRAL_SOURCE = 1:
  NRK accesses are used to access the onboard measuring registers.
  For this purpose, the appropriate hardware which allows this must be
  available, e.g. 840Di with MCI extension board.

The following applies if MEAS_CENTRAL_SOURCE = 2:
  The SINAMICS DO1 telegram is used (telegram type 391),
  variant "Cyclic measurement" without
  handshake.
  For this purpose, an integrated SINAMICS must be available, e.g. NCU 710.
  (Not available until supported by SINAMICS).

The following applies if MEAS_CENTRAL_SOURCE = 3:
  The SINAMICS DO1 telegram is used (telegram type 391),
  in the variant with handshake. This procedure is
  fault-tolerant, however, allows a measuring edge only every 4 Profibus
  cycles, i.e. it is considerably slower.
  For this purpose, an integrated SINAMICS must be available, e.g. NCU 710.

  This MD is only relevant, if MD 13210 MEAS_TYPE == 0.
```

-					
-	-	3	1	3	0/0
840di-basic	-	1	-	-	-/-
840di-universal	-	1	-	-	-/-
840di-plus	-	1	-	-	-/-

13220	**MEAS_PROBE_DELAY_TIME**			N10, N09	FBA/IAD
s	Delay time between probe deflection and recognition			DOUBLE	POWER ON

```
For probes with e.g. radio transmission, the probe deflection can be detected
    in the NC only with delay.
With this MD, the transmission link delay between the probe deflection and its
detection is set in the control.
The measured value is corrected internally by the control by the distance that
    corresponds to the traversing motion during this time before measuring
    (modeling).
It is practicable to set values only up to a maximum of 15 position control-
    ler cycles.
Anyhow, the modeling could not work with the expected accuracy with values
greater than that. In this case, the input value is therefore limited inter-
nally by the software to 15 position controller cycles (without any further
feedback).
```

-					
-	2	0.0,0.0	0	0.1	7/2

13300	**PROFISAFE_IN_FILTER**	N01, N06, -	-
-	Useful F data filter IN	DWORD	POWER ON

```
Filter between F user data and $INSE variables

Machine data $MN_PROFISAFE_IN_FILTER defines which F user data bits of the
PROFIsafe module are accepted from the F user data interface of the PROFIsafe
module into the NCK for further processing.

The filtered F user data bits are compressed internally in the NCK to form a
    contiguous bit field.

Machine data $MN_PROFISAFE_IN_ASSIGN then also defines the $INSE variables to
which the filtered F user data bits are transferred.

Example:

Note:
   Only 16 bits are shown for the sake of simplicity.

Parameterization:
   $MN_PROFISAFE_IN_FILTER = 1010100101000100
   $MN_PROFISAFE_IN_ASSIGN = 011006

 n = 16        11         6         1
      |x|x|x|x|x|1|1|1|0|0|1|x|x|x|x|x|
   $INSE[n], x = irrelevant

      |0|0|0|0|0|0|0|0|0|0|1|1|1|0|0|1|
   NCK-internal image of F user data

      |1|0|1|0|1|0|0|1|0|1|0|0|0|1|0|0|
   $MN_PROFISAFE_IN_FILTER

      |1|0|1|0|1|0|0|0|0|0|0|0|0|1|0|0|
   Exemplary value present at F user data interface of the PROFIsafe module
```

-					
-	16	0xFFFFFFFF,0xFFFFFFFF,0xFFFFFFFF...	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

13301	PROFISAFE_OUT_FILTER			N01, N06, -	-
-	Useful F data filter OUT			DWORD	POWER ON

```
Filter between $OUTSE variables and F user data

Machine data $MN_PROFISAFE_OUT_ASSIGN defines which $OUTSE[n] variables are
transferred to the F user data bits of the PROFIsafe module.

Machine data $MN_PROFISAFE_OUT_FILTER defines the F user data bit to which the
relevant $OUTSE[n] variable is transferred.

Example:

Note: Only 16 bits are shown for the sake of simplicity.

Parameterization:
   $MN_PROFISAFE_OUT_FILTER = 1010100101000100
   $MN_PROFISAFE_OUT_ASSIGN = 011006

n = 16        11         6         1
     |x|x|x|x|x|1|1|1|1|1|1|x|x|x|x|x|
   Exemplary value present in the $OUTSE variables, x = irrelevant

     |0|0|0|0|0|0|0|0|0|0|1|1|1|1|1|1|
   NCK-internal image of F user data

     |1|0|1|0|1|0|0|1|0|1|0|0|0|1|0|0|
   $MN_PROFISAFE_OUT_FILTER

     |1|0|1|0|1|0|0|1|0|1|0|0|0|1|0|0|
    F user data of the PROFIsafe module
```

-					
-	16	0xFFFFFFFF,0xFFFFFFFF,0xFFFFFFFF...	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

13310	SAFE_SPL_START_TIMEOUT			N01, N05, -	FBSI
-	Delay in display of alarm 27097			DOUBLE	POWER ON

```
After powerup of the control, alarm 27097 is displayed after the time if the
SPL start is not carried out.
```

-					
-	-	20.	1.	60.	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

14504	**MAXNUM_USER_DATA_INT**			N03	P3
-	Number of user data (INT)			DWORD	POWER ON
Number of NC/PLC user data of type INT					
-					
-	-	0	0	256	7/2

14506	**MAXNUM_USER_DATA_HEX**			N03	A2,P3
-	Number of user data (HEX)			DWORD	POWER ON
Number of NC/PLC user data (HEX)					
-					
-	-	0	0	256	7/2

14508	**MAXNUM_USER_DATA_FLOAT**			N03	A2,P3
-	Number of user data (FLOAT)			DWORD	POWER ON
Number of NC/PLC user data of type FLOAT					
-					
-	-	0	0	32	7/2

14510	**USER_DATA_INT**			N03	A2,P3
-	User data (INT)			DWORD	POWER ON
User data is stored in the NCK-PLC interface and can be read by the PLC user from the DB20 during the runup.					
-					
-	256	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-32768	32767	7/2

14512	**USER_DATA_HEX**			N03	A2,P3
-	User data (HEX)			DWORD	POWER ON
User data is stored in the NCK-PLC interface and can be read by the PLC user from the DB20 during the runup.					
-					
-	256	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	0x0FF	7/2

14514	**USER_DATA_FLOAT**			N03	A2,P3
-	User data (FLOAT)			DOUBLE	POWER ON
User data is stored in the NCK-PLC interface and can be read by the PLC user from the DB20 during the runup.					
-					
-	32	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-3.40e38	3.40e38	7/2

14516	**USER_DATA_PLC_ALARM**			N03	A2,P3
-	User data (HEX)			BYTE	POWER ON
User data is stored in the NCK-PLC interface and can be evaluated by the PLC basic system (currently 802S/D only).					
-					
-	64	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	-	-	0/0

15700	**LANG_SUB_NAME**			N01	-
-	Name for substitution subroutine			STRING	POWER ON
Name of the user program called on the basis of a substitution configured by $MN_AXIS_LANG_SUB_MASK. The user program is called with the path configured by $MN_LANG_SUB_PATH.					
-					
-	-		-	-	7/2

15702	**LANG_SUB_PATH**			N01	-
-	Call path for substitution subroutine			BYTE	POWER ON
Path with which the user program set by $MN_LANG_SUB_NAME is called on the basis of a substitution configured by $MN_AXIS_LANG_SUB_MASK: Value 0: /_N_CMA_DIR (default) Value 1: /_N_CUS_DIR Value 2: /_N_CST_DIR					
-					
-	-	0	0	2	7/2

17200	**GMMC_INFO_NO_UNIT**			EXP	K1
-	Global HMI information (without physical unit)			DOUBLE	POWER ON
The HMI stores the global display machine data - $MM_DISPLAY_RESOLTION - $MM_DISPLAY_RESOLTION_INCH - $MM_SPIND_DISPLAY_RESOLUTION - $MM_MA_COORDINATE_SYSTEM in the NCK machine data from $MN_GMMC_INFO_NO_UNIT[0] to $MN_GMMC_INFO_NO_UNIT[3]. This enables these display machine data to be accessed from the NCK.					
-					
-	16	3.,4.,3.,1.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	0/7

17201	**GMMC_INFO_NO_UNIT_STATUS**			EXP	K1
-	Global HMI status info (without physical unit)			BYTE	POWER ON
Value 0: input not assigned Value 1: input assigned					
-					
-	16	1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,0	-	-	0/7

17400	OEM_GLOBAL_INFO			A01, A11	-
-	OEM version information			STRING	POWER ON
A version information freely available to the user (is indicated in the version screen)					
-					
-	5		-	-	7/2

17500	MAXNUM_REPLACEMENT_TOOLS			N09	FBW
-	Maximal number of replacement tools.			DWORD	POWER ON
Only relevant if the tool management function is active. Maximum number of replacement tools. Value = 0 means that the number of replacement tools is not monitored. (compatible to prior versions) Value = 1 means that exactly one tool may be given to an identifier. The data does not influence the memory requirement. It is solely for monitoring purposes. See also MM_TOOL_MANAGEMENT_MASK, TOOL_MANAGEMENT_MASK					
-					
-	-	0	0	32	7/2

17510	TOOL_UNLOAD_MASK			N09	FBW
-	Behavior of tool data when unloading			DWORD	POWER ON
When unloading a tool, certain tool data can be set to store fixed values. Bit no.Bit valueHEX Meaning 0 0 Tool status 'active' remains unchanged. 1 0x1Tool status 'active' is deleted ($TC_TP8, Bit 0). 1 0 Tool status 'was in use' remains unchanged. 1 0x2Tool status 'was in use' is deleted ($TC_TP8, Bit 7). 2 0 Tool parameter $TC_TP10 remains unchanged. 1 0x4Tool parameter $TC_TP10 is set to zero. That is, the tool replacement change strategy is reset. 3 0 Tool parameter $TC_TP11 remains unchanged. 1 0x8Tool parameter $TC_TP11 is set to zero. That is, the assignment to the tool subgroup is resolved.					
-					
-	-	0	0	0xF	7/2

17515	**TOOL_RESETMON_MASK**	N09	-
-	Tool data behavior with RESETMON	DWORD	POWER ON

```
The 5th parameter of the RESETMON command defines which tool status is to be
    reset. If the 5th parameter is omitted, it is replaced by the value in
    this MD. With the PI service "_N_TRESMON", work is always done with this
    value.
In that case the bits are always assigned as the bits in the tool status
    $TC_TP8[i].

Bit no.  Bit value  HEX   Meaning
 0        0               Tool status "active" remains unchanged
          1          'H1'  Tool status "active" is deleted
 1        0               Tool status "released" remains unchanged
          1          'H2'  Tool status "released" is set
 2        0               Tool status "locked" remains unchanged
          1          'H4'  Tool status "locked" is deleted
                          if this is permitted by the monitoring data and
                          the 4th parameter is set correspondingly.
 3        0               Tool status "measure" remains unchanged
          1         'H8'   Tool status "measure" is set
 4        0               Tool status "prewarning limit" remains unchanged
          1        'H10'   Tool status "prewarning limit" is deleted
                          if this is permitted by the monitoring data and
                          the 4th parameter is set correspondingly.
 5                        Not permitted (tool status "tool is being changed")
 6                        Not permitted (tool status "tool is fixed-location-
    coded")
 7        0               Tool status "was in use" remains unchanged
          1        'H80'   Tool status "was in use" is deleted
 8                        Not permitted (tool status "is in retract")
 9        0               Tool status "locked is ignored" remains unchanged
          1       'H200'   Tool status "locked is ignored" is deleted
10        0               Tool status "to unload" remains unchanged
          1       'H400'   Tool status "to unload" is deleted
11                        Not permitted (tool status "to load")
12                        Not permitted (tool status "master tool")
13,ff                     Not permitted (reserved)
The default setting corresponds to the previous behavior.
The non-permissible bits are filtered out, hidden by the limit mask.
```

-					
-	-	0x14	0	0x69F	7/2

17520	TOOL_DEFAULT_DATA_MASK		N09	FBW	
-	Create new tool: default settings		DWORD	POWER ON	

```
When defining a tool for the first time, certain data of the tool can be set
to fixed default values. This can prevent simple applications from dealing
with data which do not necessarily have to be assigned individual values.

Bit no.Bit valueHEX                                       Meaning
-------------------------------------------------------------------------------
------------------------------------------
0  0     Default value of tool status ($TC_TP8), Bit1=0 = 'not released'
   1     0x1Default value of tool status ($TC_TP8), Bit1=1 = 'released'
1  0     Default value of tool status ($TC_TP8), Bit6=0 = 'not fixed-location-
coded'
   1     0x2Default value of tool status ($TC_TP8), Bit6=1 = 'fixed-location-
coded'
2  0     Only when the explicit write command for the tool name is used, is the
tool accepted in the tool group. Only then can it be loaded via programming.
   1     0x4The tool is automatically accepted in the tool group corresponding
to the tool name when it is defined for the first time. The tool can then be
changed using the default name ("t" = t-No.). The term 'tool name' ($TC_TP2)
can be hidden from the user. (This only makes sense if you do not use replace-
ment tools or if the tool name is not written explicitly. As this may give
rise to data consistency problems.)
3  0     Only with TMMG: Default value of location type ($TC_TP7) = 9999 = 'not
defined'
   1     0x8Only with TMMG: Default value of location type ($TC_TP7) = 1 and
consequently, default value of magazine location type ($TC_MPP2) = 1. This
means that all magazine locations can accept all tools.
4  0     Only with TMMG + active consider adjacent location: With SET/RESET of
the magazine location status 'disabled', the magazine location status 'Over-
lapping allowed' remains unchanged.
   1     0x10Only with TMMG + active consider adjacent location: With SET/RESET
of the magazine location status 'disabled' the magazine location status 'Over-
lapping allowed' occurs automatically with SET/RESET.
```

-					
-	-	0	0	0x1F	7/2

17530	**TOOL_DATA_CHANGE_COUNTER**			EXP, N01	FBW
-	Mark tool data change for HMI			DWORD	POWER ON

```
HMI display support. This data enables individual data to be explicitly taken
    into account or not taken into account in the OPI variables (block C/S)
    toolCounter, toolCounterC, toolCounterM.

Bit no.  Bit value   HEX   Meaning
------------------------------------------------------------------------------
-
0         0                Changes to the value of the tool status ($TC_TP8)
                           are not taken into account in toolCounterC
          1         'H1'   Changes to the value of the tool status ($TC_TP8)
                           are taken into account in toolCounterC
1         0                Changes to the remaining number of tools ($TC_MOP4)
                           are not taken into account in toolCounterC
          1         'H2'   Changes to the remaining number of tools ($TC_MOP4)
                           are taken into account in toolCounterC
2         0                Changes to the value of the tool data
                           are not taken into account in the tool data update
    service
          1         'H4'   Changes to the value of the tool data
                           are taken into account in the tool data update ser-
    vice
3         0                Changes to the value of the magazine data
                           are not taken into account in the tool data update
    service
          1         'H8'   Changes to the value of the magazine data
                           are taken into account in the tool data update ser-
    vice.
```

-					
-	-	0	0	0xF	7/2

17540	**TOOLTYPES_ALLOWED**			N09	-
-	Permitted tool types			DWORD	POWER ON

```
Definition of the tool types permitted in NCK (see $TC_DP1) with the tool off-
set selection, i.e. tools of any type may be loaded in the NCK; but only the
tools types defined here may be defined in the offset defining tool.

A bit value = 1 means that the named tool type range is permitted for the off-
    set selection.
A bit value = 0 means that the named tool type range is refused with a compen-
    sation block capable alarm in the case of an attempted offset selection of
    a cutting edge of this type.

The special value = 0, 9999 for the tool type means 'undefined'. Tool offsets
    with this tool type value generally cannot be selected

Bit no.        ValueMeaning

0                0x1Tool types   1 to  99 permitted

1                0x2Tool types 100 to 199 permitted
                         (milling tools typically have these types)

2                0x4Tool types 200 to 299 permitted
                         (drilling tools typically have these types)

3                0x8Tool types 300 to 399 permitted

4               0x10Tool types 400 to 499 permitted
                         (grinding tools have these types)

5               0x20Tool types 500 to 599 permitted
                         (turning tools typically have these types)

6               0x40Tool types 600 to 699 permitted

7               0x80Tool types 700 to 799 permitted
                         (the slotting saw has the fixed type 700)

8              0x100Tool types 800 to 899 permitted

9              0x200Tool types 900 to 999 permitted
                         (special tools have the fixed type 999)

See also
   $MN_MM_NUM_CUTTING_EDGES_IN_TOA
```

-					
-	-	0x3FF	0	0x3FF	7/2
840d-4a1cg	-	0x10	-	-	-1/-

17600	DEPTH_OF_LOGFILE_OPT	EXP, N01	-
-	Depth of log memory optimization in REORG	DWORD	RESET

The depth of memory optimization in the REORG log file
(=search depth to determine if a parameter to be written is already included in the REORG log file).
The value of the machine data can be increased if alarm 15110 occurs during program execution and if this alarm is to be avoided.
(Alternatively, the size of the REORG log file can be increased with $MC_MM_REORG_LOG_FILE_MEM, provided that the operator has the access rights required. This procedure should generally be preferred.)

Value
0 = No optimization,
That is each write operation creates an input into the REORG log file. Writing a variable value is therefore very time-efficient, but requires more memory.
0< n <= Maximum value
When a new variable value is written, the n previously entered write operations (but maximally up to the previous indicatable block) are checked to determine if the parameter now to be written has already been written in the past. If this is the case, a new entry is not made in the REORG log file.
If this is not the case, an entry is made. A variable value can therefore be written in a very memory-efficient way, but requires more time.

Example:
$MN_DEPTH_OF_LOGFILE_OPT is assumed to be 5 and the following would be a typical program sequence:

```
x10     ; Executable NC block
r1=1    ; The first write command since x10
        ; -> Save old value in log file. 1st entry
r2=1    ; Determine that r2 is not yet included
        ; -> Save old value in log file. 2nd entry
r3=1    ; Determine that r3 is not yet included
        ; -> Save old value in log file. 3rd entry
r4=1    ; Determine that r4 is not yet included
        ; -> Save old value in log file. 4th entry
r5=1    ; Determine that r5 is not yet included
        ; -> Save old value in log file. 5th entry
r6=1    ; Determine that r6 is not yet included
        ; -> Save old value in log file. 6th entry
r2=1    ; Determine that r2 is already included
        ; (5th oldest entry) -> no renewed saving
r3=1    ; Determine that r3 is already included
        ; (4th oldest entry) -> no renewed saving
r1=2    ; As $MN_DEPTH_OF_LOGFILE_OPT = 5 it is not detected that
        ; r1 is already included
        ; (6th oldest entry) -> save old value in log file.
        ; 7th entry
```

```
x20     ; Executable NC block
r1=3    ; The first write command since x20
        ; -> Save old value in log file. 1st entry
r1=4    ; Determine that r1 is already included
        ; (Only one entry) -> no renewed saving

The setting of the MD is particularly useful if a small number of verious
    parameters
are written frequently (e.g. in a loop) and if alarm 15110 occurs for this
    reason.
```

-					
-	-	5	0	300	3/3

17610	DEPTH_OF_LOGFILE_OPT_PF		EXP, N01	-	
-	Depth of the PowerFail log memory optimization		DWORD	RESET	

```
Depth of the memory optimization in the PowerFail log file (=search depth, to
find out
whether a parameter to be written is already included in the PowerFail log
file).
It is possible to increase the value of the machine data if
alarm 15120 occurs during program processing and if you wish to avoid it.

(Alternatively, you can increase the size of the PowerFail log file itself
by means of $MC_MM_ACTFILESYS_LOG_FILE_MEM, if you have the necessary access
    right
and if the required memory is available.

Value
0       = No optimization. This means that every write operation leads to an
    entry in the
          PowerFail log file.
          Writing of a variable value is therefore very time-efficient at the
          cost of the required memory.

0< n <= Maximum value
        = Writing of a new variable value leads, prior to saving of the new
          variable value in the PowerFail log file, to the last n write
          operations which have been being checked to see whether
          the new parameter to be written has already been written once.
          If yes, the new value is not entered again in the PowerFail log
          file, but the old value is overwritten with the new one.
          If no, the new value is entered.
          At the cost of the required time, writing of a variable value
          can therefore be designed very memory-efficiently.

Changing of the data can shorten/increase the time requirement of the present
application.
Changing of the data can fill the available log buffers faster/more slowly.
Frequent occuring of alarm 15120 -> Increase values for index=0,1,2.
The value indicating the index to be changed can be deducted from the parame-
    ter of alarm 15120:
if it is the value for $MC_MM_ACTFILESYS_LOG_FILE_MEM[0], then increase the
    value for index 0;
or increase $MC_MM_ACTFILESYS_LOG_FILE_MEM[0] itself.
Index Meaning
0     Search depth in preprocessing buffer
1     Search depth in buffer for data changes within the range of tool change
2     Search depth in buffer for data changes of main processing (especially
    synchronized actions)
```

-					
-	3	10,0,4	0	300	0/0

17900	VDI_FUNCTION_MASK			EXP, N09	-
-	Setting to VDI signals			DWORD	POWER ON
Settings for VDI signals: Bit 0 == 0: The VDI signals motion command + / motion command - are already issued if there is a travel request (default). Bit 0 == 1: The VDI signals motion command + / motion command - are issued only if the axis actually moves.					
-					
-	-	0x0	0	0x1	7/2

1.3.4 System specific memory settings

18000	VDI_UPDATE_IN_ONE_IPO_CYCLE			EXP, N01	P3
-	PLC interface update			BOOLEAN	POWER ON
1: Complete reading/writing of the VDI interface in one IPO cycle 0: Complete reading/writing of the VDI interface in two IPO cycles					
-					
-	-	FALSE	-	-	0/0

18030	HW_SERIAL_NUMBER			N05	-
-	Hardware series number			STRING	POWER ON
During power on of the control, a unique hardware serial number is stored in this MD: - For Powerline series modules this is the serial number of the NCU module - For Solutionline series modules this is the serial number of the CF card, or the unique number of the MCI module in the case of PC-based systems This data cannot be written.					
READ					
-	1		-	-	7/2

18040	VERSION_INFO			N05	IAD
-	Version and possibly data of the PCMCIA card, not FM-NC			STRING	POWER ON
Version identifiers of the system software The identifiers of the PCMCIA card (assigned by the configuration management) and the 'system_date_time' from the NCK are stored in this MD during control power on. A unique assignment can always be made with this data from the MD block (startup file or INITIAL_INI) to a software release.					
READ					

18050	INFO_FREE_MEM_DYNAMIC		N01, N02, N05	S7	
-	Display data of free dynamic memory		DWORD	POWER ON	

```
The data is used for
a) manufacturer's presetting of the memory size [ bytes ] available to the
user for each channel after cold restart.
b) Displaying the available dynamic memory [ bytes ]
   The data cannot be written.

The contents of the data states how much unbuffered memory is available per
    channel for the increase of unbuffered user data storage area via MD.
One should check whether the available memory is sufficient before increas-
    ing, for example, the number of LUDs, number of functional parameters or
    the size of the IPO buffer.
If necessary, proceed step by step:
- increase by 1, note (old) value
- NCK startup (= 'warm start' or NCK reset), read off new value
- memory requirement = new value - old value

On the first NCK startup or cold restart of the control (=deletion of user
    data) the data $MN_MM_USER_MEM_DYNAMIC is set by the NCK software so that
    at least the preset value results for $MN_INFO_FREE_MEM_DYNAMIC.
That is the value is automatically increased if the initial value of
$MN_MM_USER_MEM_DYNAMIC is too low.
The following also applies to multichannel systems:
- The preset value applies to each possible channel. That is, if there are ten
    possible channels the data $MN_MM_USER_MEM_DYNAMIC is set by the NCK SW so
    that at least the 'preset value* ten' results for
    $MN_INFO_FREE_MEM_DYNAMIC.
- On activation of a channel, the data $MN_MM_USER_MEM_DYNAMIC will, if neces-
    sary, also be increased so that the memory free at the time of activation
    will continue to be free (provided that the memory structure permits this)
    after the channel has become active.
- The activation of the maximum possible number of axes is ensured by increas-
    ing the data $MN_MM_USER_MEM_DYNAMIC if necessary so that memory free at
    the time of activation will continue to be free (provided that the memory
    structure permits this) after the axis has become active.

'If necessary' in the previous sentences means that the adjustment is auto-
    matic if the channel/axis could not be activated with the current values
    of $MN_MM_USER_MEM_DYNAMIC/$MN_INFO_FREE_MEM_DYNAMIC.
```

READ					
-	-	430080	-	-	7/2
710-2a2c	-	1048576	-	-	-/-
710-6a2c	-	1048576	-	-	-/-
710-12a2c	-	1048576	-	-	-/-
710-31a10c	-	1048576	-	-	-/-
840di-basic	-	1048576	-	-	-/-
840di-universal	-	1048576	-	-	-/-
840di-plus	-	1048576	-	-	-/-

18060	**INFO_FREE_MEM_STATIC**		N01, N02, N05		S7
-	Display data of free static memory		DWORD		POWER ON
The following applies to PowerLine control models: Output of the buffered memory available in the passive file system [bytes]. The data cannot be written. The preset value states the minimum number of bytes available to the user when the NCK starts up with a cold restart. The contents of the data state how much battery-backed memory is available for the passive file system at the time of startup. After a non-buffered startup, the maximum memory available in the file system can be read. If MDs that affect the requirement for buffered memory (e.g. MM_NUM_GUD_VALUES_MEM, MM_ENC_COMP_MAX_POINTS) are changed then this changes the amount of memory available for the passive file system, as the amount of memory allocated to the passive file system consists of MM_USER_MEM_BUFFERED minus all other buffered user data. (See also the document on MM_USER_FILE_MEM_MINIMUM) At the first NCK startup or cold restart of the control (=deletion of user data) the data $MN_MM_USER_MEM_BUFFERED is set by the NCK software so that at least the default value results for $MN_INFO_FREE_MEM_STATIC. That is $MN_MM_USER_MEM_BUFFERED is automatically increased if its initial value is too low. The following applies to SolutionLine control models: The data reserves the available memory for the data that are not the passive file system. (The data $MN_MM_USER_FILE_MEM_MINIMUM[0] dimensions the passive file system.) Machine data for setting the active file system (tools, GUDs, ...) can be increased until this memory has all been allocated.					
READ					
-	-	1048576	-	-	7/2
840d-2a2c	-	3145728	-	-	-/-
840d-4a1cg	-	3145728	-	-	-/-
840d-6a2c	-	3145728	-	-	-/-
840d-12a2c	-	3145728	-	-	-/-
840d-31a10c	-	3145728	-	-	-/-
840di-basic	-	1048576	-	-	-/-
840di-universal	-	1048576	-	-	-/-
840di-plus	-	1048576	-	-	-/-

18070	**INFO_FREE_MEM_DPR**		EXP, N01, N02, N05		S7
-	Display data of free memory in DUAL PORT RAM		DWORD		POWER ON
Output of the available memory in the Dual Port RAM (Bytes). The data cannot be written.					
READ					
-	-	0	-	-	7/2

18072	**INFO_FREE_MEM_CC_MD**			EXP, N01, N05	-
-	Display of free memory in CC-MD memory			DWORD	POWER ON
Output of the available memory for compile cycle MDs (bytes). The data cannot be written.					
READ					
-	-	0	-	-	0/0

18078	**MM_MAX_NUM_OF_HIERARCHIES**			N02, N09	/FBW/, "Description of Functions, Tool Management"
-	Max. number of definable hierarchies for magazine location types			DWORD	POWER ON
The machine data is active only if the Tool Magazine Management function (TMMG) is active - See $MN_MM_TOOL_MANAGEMENT_MASK, $MC_TOOL_MANAGEMENT_MASK. Max. number of definable hierarchies for magazine location types. '$MN_MM_MAX_NUM_OF_HIERARCHIES - 1' specifies the maximum possible value of index n of system parameter $TC_MPTH[n,m]. (The maximum of index m can be defined with machine data $MN_MM_MAX_HIERARCHY_ENTRIES.) Value = 0 means that the 'Magazine location type hierarchy' function is not available.					
-					
-	-	8	0	32	7/2

18079	**MM_MAX_HIERARCHY_ENTRIES**			N02, N09	/FBW/, "Description of Functions, Tool Management"
-	Max. permiss. no. of entries in a magazine loc. type hierarchy			DWORD	POWER ON
The machine data is active only if the Tool Magazine Management function (TMMG) is active - See $MN_MM_TOOL_MANAGEMENT_MASK, $MC_TOOL_MANAGEMENT_MASK - and if $MN_MM_MAX_NUM_OF_HIERARCHIES is greater than zero. Maximum number of entries in a magazine location type hierarchy. '$MN_MM_MAX_HIERARCHY_ENTRIES - 1' specifies the maximum possible value of index m of system parameter $TC_MPTH[n,m]. (The maximum of index n can be defined with machine data $MN_MM_MAX_NUM_OF_HIERARCHIES.)					
-					
-	-	8	1	32	7/2

18080	MM_TOOL_MANAGEMENT_MASK	N02, N09	FBW
-	Step-by-step memory reservation for tool management (SRAM)	DWORD	POWER ON

```
Step-by-step memory reservation for the tool management (TOOLMAN)
Bit-coded activation data. That is the memory for the TOOLMAN can be acti-
    vated in various versions.
The data is evaluated only during startup of the software.
The TOOLMAN data are battery-backed.
The TOOLMAN-specific memory reservation that is defined in detail by the
    machine data
 MD 18086:   $MN_MM_NUM_MAGAZINE_LOCATION
 MD 18084:   $MN_MM_NUM_MAGAZINE
 MD 18096:   $MN_MM_NUM_CC_TOA_PARAM
 MD 18094:   $MN_MM_NUM_CC_TDA_PARAM
 MD 18098:   $MN_MM_NUM_CC_MON_PARAM
 MD 18092:   $MN_MM_NUM_CC_MAGLOC_PARAM
 MD 18090:   $MN_MM_NUM_CC_MAGAZINE_PARAM
is made as a function of this data.
(Further TOOLMAN-specific memory is determined by other machine data, see
    below.)
Value = 0 ->None of the above memory is reserved: That is TOOLMAN is not
    available, only the basic functionality can be programmed.

Bit no.HexaMeaning when bit set
       value
------------------------------------------------------------------------------
    -
0 (LSB)0x1Tool management data (TMMG) are made available; the memory-reserv-
    ing MDs must be set correspondingly ($MN_MM_NUM_MAGAZINE_LOCATION,
    $MN_MM_NUM_MAGAZINE). The machine data $MN_MM_NUM_TOOL,
    $MN_MM_NUM_CUTTING_EDGES_IN_TOA, which make the memory available for the
    basic functionality with and without TOOLMAN, must be set correspond-
    ingly. The TOOLMAN-specific memory is added to the memory determined by
    $MN_MM_NUM_TOOL.

1   0x2 Monitoring data (TMMO) are made available; the memory-reserving MDs
    must be set correspondingly ($MN_MM_NUM_MAGAZINE_LOCATION,
    $MN_MM_NUM_MAGAZINE). The memory for the monitoring data is added to the
    cutting edges (-> $MN_MM_NUM_CUTTING_EDGES_IN_TOA ).

2   0x4 OEM, CC data (individually determined by $MN_MM_NUM_CC_...) are made
    available, the memory-reserving MDs must be set correspondingly.

3   0x8 Memory reserved for consider adjacent location

4   0x10Memory and function release for the PI service  _N_TSEARC = 'Complex
    search for tools in magazines'. Depending on the function characteristic,
    the function requires memory of the order of 10KB.

5   0x20Reserve memory and function release for wear monitoring

6   0x40The classification of the magazine in wear groups is released
```

```
7  0x80  Reserve memory for the adapter of the magazine locations according to
the information in MM_NUM_TOOL_ADAPTER

8  0x100 Reserve memory for sum offsets and/or setup offsets according to the
information in MM_NUM_SUMCORR, MM_KIND_OF_SUMCORR

9  0x200 Value 1 = Tools in a revolver are handled in OPI variable blocks so
that they are not 'shown' on toolholder locations, but always in the revolver
location. That means that, in particular, tools in a revolver no longer leave
their revolver locations when there is a tool change (as far as the display is
concerned).
        Value 0 = Default behavior; Tools in a revolver are 'displayed' on the
OPI according to their actual location (as far as the data is concerned).

Example 1:
MM_TOOL_MANAGEMENT_MASK =  1  -> Memory is made available for tool management
data
                                 (TMMG).
MM_TOOL_MANAGEMENT_MASK =  2  -> Memory is made available for monitoring data
                                 (TMMO).
MM_TOOL_MANAGEMENT_MASK =  3  -> Memory is made available for TMMG and TMMO.

MM_TOOL_MANAGEMENT_MASK =  4  -> Memory available for OEM/CC data
MM_TOOL_MANAGEMENT_MASK =  9  -> Memory available for TMMG and
                                 consider adjacent location
MM_TOOL_MANAGEMENT_MASK = 17  -> Memory is made available for TMMG data
                                 and the PI service  _N_TSEARC can be used
                                 (decimal 17 = 0x11 = bits 0 and 4)

Example 2:
The complete TOA area has 20 tools and 60 cutting edges. All other above-men-
    tioned memory-reserving MDs =0. The TOOLMAN is not active.
Bit 0 (LSB) is now assigned.
The battery-backed memory is deleted after a renewed start of the software
    because now additional memory has been reserved for the TOOLMAN. Addi-
    tional memory is reserved for each of the 20 tools.

References:
   /FBW/, "Description of Functions, Tool Management"
```

-					
-	-	0x0	0	0xFFFF	7/1

18082	**MM_NUM_TOOL**		N02, N09	FBW,S7
-	Number of tools the NCK can manage (SRAM)		DWORD	POWER ON

```
The NC cannot manage more tools than the number entered in the MD. A tool has
    at least one cutting edge.

Buffered user memory is used.

The maximum possible number of tools is equal to the number of cutting edges!
The MD must also be set when TOOLMAN is not used!
The battery-backed data are lost when the machine data is changed!

Note:
The data did not exist in product version 1. It must be set as from product
    version 2.
Related to:
    MD 18100: MM_NUM_CUTTING_EDGES_IN_TOA
   (Number of tool offsets in the NCK)
```

-					
-	-	30	0	600	7/2

18084	**MM_NUM_MAGAZINE**		N02, N09	FBW
-	Number of magazines the NCK can manage (SRAM)		DWORD	POWER ON

```
Number of magazines which the NCK can manage.

Buffered user memory is used.

The MDs for TOOLMAN MD 20310: TOOL_MANAGEMENT_MASK, MD 18080:
    MM_TOOL_MANAGEMENT_MASK and the optional TOOLMAN $ON_TECHNO_FUNCTION_MASK
    must be set.

Irrelevant:
    MD is irrelevant if TOOLMAN is not in use.

Special cases:
   Only tool management version 2:
   Value = 0 -> TOOLMAN version 2 cannot be activated because no memory area
has been set up for the data.
   The battery-backed data are lost if this machine data is altered!

Related to:
    MD 18080: MM_TOOL_MANAGEMENT_MASK
   (Mask for reserving memory for TOOLMAN)
    MD 20310: TOOL_MANAGEMENT_MASK
   (Activation of different versions of tool management)
   $ON_TECHNO_FUNCTION_MASK

References:
   /FBW/, "Description of Functions, Tool Management"
```

-					
-	-	3	0	32	7/2

18086	MM_NUM_MAGAZINE_LOCATION		N02, N09	FBW
-	Number of magazine locations the NCK can manage (SRAM)		DWORD	POWER ON

```
Number of magazine locations which the NCK can manage.

Buffered user memory is used.

The MDs for TOOLMAN MD 20310: TOOL_MANAGEMENT_MASK, MD 18080:
    MM_TOOL_MANAGEMENT_MASK and the optional TOOLMAN $ON_TECHNO_FUNCTION_MASK
    must be set.

Irrelevant:
    MD is irrelevant if TOOLMAN is not in use.

Special cases:
   Only tool management version 2:
   Value = 0 -> tool management version 2 cannot be activated because no mem-
ory area has been set up for the data.
   The battey-backed data are lost if this machine data is altered!

Related to:
    MD 18080: MM_TOOL_MANAGEMENT_MASK
   (Mask for reserving memory for TOOLMAN)
    MD 20310: TOOL_MANAGEMENT_MASK
   (Activation of different versions of tool management)
   $ON_TECHNO_FUNCTION_MASK

References:
   /FBW/, "Description of Functions, Tool Management"
```

-					
-	-	30	0	600	7/2

18088	MM_NUM_TOOL_CARRIER		N02, N09	W1
-	Maximum number of definable tool holders		DWORD	POWER ON

```
Maximum number of definable toolholders for orientable tools in the TO area.
The value is divided by the number of active TO units. The integer result
states how many toolholders can be defined for each TO unit. The data for
defining a toolholder are set with the system variables $TC_CARR1, ...
$TC_CARR14.
The data are stored in battery-backed memory.

Application example(s):
2 channels are active, there is one TO on each channel  (=default setting). 3
    holders are to be defined in channel 1, one holder in channel 2. The value
    to be set is 6. Because 6 / 2 = 3. That is a maximum of 3 holder defini-
    tions in each TO unit.
```

-					
-	-	0	0	99999999	7/2

18090	**MM_NUM_CC_MAGAZINE_PARAM**			N02, N09	FBW
-	Number of magazine data generated and evaluated by the CC (SRAM)			DWORD	POWER ON
Only if MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 (0x1) and bit 2=1 (0x4), is set for TMMG (and option is set): Number of magazine data (format IN_Int.) which are created and can be evaluated by compile cycles. See also: MM_NUM_MAGAZINE Buffered user memory is used. Warning: The battery-backed data are lost if this machine data is altered! Related to: MD 18080: MM_TOOL_MANAGEMENT_MASK (Mask for reserving memory for TOOLMAN) MD 18084: MM_NUM_MAGAZINE (Number of magazines managed by the NC) References: /FBW/, "Description of Functions, Tool Management"					
-					
-	-	0	0	10	2/2

18091	**MM_TYPE_CC_MAGAZINE_PARAM**			N02, N09	-
-	Type of OEM magazine data (SRAM)			DWORD	POWER ON
Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 (0x1) and bit2=1 (0x4), is set for TMMG (and option is set): Type of magazine-specific user data configured by MM_NUM_CC_MAGAZINE_PARAM. Each parameter can be assigned its own type. Permissible types are: Type (See types of the NC language) — Value of machine data -- BOOL 1 CHAR 2 INT 3 REAL 4 STRING 5 (identifier may be up to 31 characters long) AXIS 6 FRAME not defined See also: MM_NUM_CC_MAGAZINE_PARAM, MM_NUM_MAGAZINE Buffered user memory is used.					
-					
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2

18092	MM_NUM_CC_MAGLOC_PARAM		N02, N09	FBW
-	Number of OEM magazine location data (SRAM)		DWORD	POWER ON

```
Only if MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 (0x1) and bit 2=1 (0x4), is
set for TMMG  (and option is set):

Number of magazine location data (format IN_int.) which are created for the
memory area and can be evaluated by compile cycles.

Buffered user memory is used.

Irrelevant:
    MD is irrelevant if TOOLMAN is not activated

Warning:
   The battery-backed data are lost if this machine data is altered!

Related to:
    MD 18080: MM_TOOL_MANAGEMENT_MASK
   (Mask for reserving memory for TOOLMAN)
    MD 18086: MM_NUM_MAGAZINE_LOCATION

References:
   /FBW/, "Description of Functions, Tool Management"
```

-					
-	-	0	0	10	2/2

18093	MM_TYPE_CC_MAGLOC_PARAM		N02, N09	-
-	Type of OEM magazine location data (SRAM)		DWORD	POWER ON

```
Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 (0x1) and bit 2=1 (0x4), is
set for TMMG (and option is set):

Individual types can be assigned to the parameters in this way. The array
index n can accept values from 0 to the value of MD 18090: MM_NUM_CC_MAGA-
ZINE_PARAM.
The possible values of the MD = 1, 2, 3, 4 and 6 represent the NC language
    types
1       BOOL,
2       CHAR,
3       INT,
4       REAL and
6       AXIS
The value 5, type STRING, is here explicitly not possible. The value 5 is
    treated like 2. The type FRAME cannot be defined here.
Example:
MD 18090: MM_NUM_CC_MAGAZINE_PARAM=1
MD 18091: MM_TYPE_CC_MAGAZINE_PARAM=2
"A" can then be programmed for the parameter $TC_MPPC1.
Battery-backed working memory is used. A value change can - but need not -
lead to reconfiguration of the battery-backed memory.
```

-					
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2

18094	**MM_NUM_CC_TDA_PARAM**			N02, N09	FBW
-	Number of OEM tool data (SRAM)			DWORD	POWER ON

```
Only if MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 (0x4), is set:
User or OEM tool data
Number of tool-specific data (format IN_int.) which are created for the mem-
ory area and can be evaluated by compile cycles.

Buffered user memory is used.

Irrelevant:
    MD is irrelevant if TOOLMAN is not activated

Warning:
   The battery-backed data are lost if this machine data is altered!

Related to:
    MD 18080: MM_TOOL_MANAGEMENT_MASK
   (Mask for reserving memory for TOOLMAN)
    MD 18082:  MM_NUM_TOOL
   (Number of tools managed by the NCK)

References:
   /FBW/, "Description of Functions, Tool Management"
```

-					
-	-	0	0	10	2/2

18095	**MM_TYPE_CC_TDA_PARAM**			N02, N09	-
-	Type of OEM tool data (SRAM)			DWORD	POWER ON

```
Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 (0x4), is set:
User or OEM data in the tool management.

Individual types can be assigned to the parameters in this way. The array
index n can accept values from 0 to the value of MD 18094:
MM_NUM_CC_TDA_PARAM.
The possible values of the MD = 1, 2, 3, 4, 5 and 6 represent the NC language
    types
1   BOOL,
2   CHAR,
3   INT,
4   REAL,
5   STRING and
6   AXIS.
The type FRAME cannot be defined here. The type STRING can be up to 31 charac-
    ters long.
Example:
MD 18094: MM_NUM_CC_TDA_PARAM=1
MD 18095: MM_TYPE_CC_TDA_PARAM=5
"UserCuttingEdge" can then be programmed for parameter $TC_TPC1.
Battery-backed working memory is used. A value change can - need not - lead to
reconfiguration of the battery-backed memory.
```

-					
-	10	4,4,4,4,4,4,4,4,4,4	1	6	2/2

18096	**MM_NUM_CC_TOA_PARAM**			N02, N09	FBW
-	Number of data per tool edge for compile cycles (SRAM)			DWORD	POWER ON

```
Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 (0x4), is set:
Number of tool-specific data per tool edge (format real) which are created for
the memory area and can be evaluated by compile cycles.

Buffered user memory is used.

Irrelevant:
    MD is irrelevant if TOOLMAN versions 1 and 2 are not activated.

Special cases:
   The battery-backed data are lost if this machine data is altered!

Related to:
    MD 18080: MM_TOOL_MANAGEMENT_MASK
   (Mask for reserving memory for TOOLMAN)
    MD 18100: MM_NUM_CUTTING_EDGES_IN_TOA
   (Number of tool offsets in the NCK)

References:
   /FBW/, "Description of Functions, Tool Management"
```

-					
-	-	0	0	10	2/2

18097	**MM_TYPE_CC_TOA_PARAM**			N02, N09	-
-	Type of OEM data per cutting edge (SRAM)			DWORD	POWER ON

```
Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 (0x4), is set:
User or OEM data in the tools.
Type of the cutting-edge-specific user data configured via
MM_NUM_CC_TOA_PARAM. Only the default setting may be used.
Individual types can be assigned to the parameters in this way. The array
index n can accept values from 0 to the value of MD 18096:
MM_NUM_CC_TOA_PARAM.
The possible values of the MD = 1, 2, 3, 4 and 6 represent the NC language
    types
1   BOOL,
2   CHAR,
3   INT,
4   REAL and
6   AXIS.
The type FRAME cannot be defined here. (5   STRING is not explicitly possible
    here; the value 5 is treated like value 2).

Example:
MD 18096: MM_NUM_CC_TOA_PARAM=1
MD 18097: MM_TYPE_CC_TOA_PARAM=2

"A" can then be programmed for parameter $TC_DPC1
Battery-backed working memory is used. A value change can - but need not -
lead to reconfiguration of the battery-backed memory.
```

-					
-	10	4,4,4,4,4,4,4,4,4,4	1	6	2/2

18098	**MM_NUM_CC_MON_PARAM**			N02, N09	FBW
-	Number of monitoring data per tool for compile cycles			DWORD	POWER ON

```
Only when $MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 or bit 1=1 and bit 2=1
0x4), is set:

For TOOLMAN compile cycles:

Number of monitor data which are created for each tool and which can be evalu-
ated by compile cycles.

Buffered user memory is used.

Irrelevant:
    MD is irrelevant if TOOLMAN is not activated.

Special cases:
   The battery-backed data are lost if this machine data is altered!

Related to:
    MD 18080: MM_TOOL_MANAGEMENT_MASK
   (Mask for reserving memory for TOOLMAN)
    MD 18100: MM_NUM_CUTTING_EDGES_IN_TOA
   (Number of tool offsets in the NCK)

References:
   /FBW/, "Description of Functions, Tool Management"
```

-					
-	-	0	0	10	2/2

18099	**MM_TYPE_CC_MON_PARAM**			N02, N09	FBW
-	Type of OEM monitor data (SRAM)			DWORD	POWER ON

```
Individual types can be assigned to the parameters in this way. The array
index n can accept values from 0 to the value of MD 18098: MM_NUM_CC_MON_PA-
RAM
Possible values of the MD = 1, 2, 3, 4 and 6 represent the NC language types
1   BOOL,
2   CHAR,
3   INT,
4   REAL and
6   AXIS.
The FRAME type cannot be defined here.
(5   STRING is not possible explicitly here; the value 5 is treated like value
    2).
Example:
MD 18098: MM_NUM_CC_MON_PARAM=1
MD 18099: MM_TYPE_CC_MON_PARAM=2

"A" can then be programmed for the parameter $TC_MOPC1
A battery-backed working memory is used. A value change can - but need not -
    lead to reconfiguration of the battery-backed memory.
```

-					
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2

18100	**MM_NUM_CUTTING_EDGES_IN_TOA**			N02, N09	S7
-	Tool offsets in the TO range (SRAM)			DWORD	POWER ON

```
Defines the number of tool cutting edges in a TO area. This machine data
reserves approximately 250 bytes of battery-backed memory per TOA block for
each tool cutting edge, irrespective of the tool type.

Tools with cutting edges of type 400-499 (= grinding tools) also occupy the
location of a cutting edge.
Example:
Defining 10 grinding tools each of which has one cutting edge. Then at least:
MM_NUM_TOOL = 10
MM_NUM_CUTTING_EDGES_IN_TOA = 20 must apply.
See also MM_NUM_TOOL

Buffered user memory is used.

Special cases:
   The battery-backed data are lost if this machine data is altered.

References:
   /FBW/, "Description of Functions, Tool Management"
```

-					
-	-	30	0	1500	7/2

18102	MM_TYPE_OF_CUTTING_EDGE		N02, N09	W1
-	Type of D No. programming (SRAM)		DWORD	POWER ON

```
This MD activates the 'flat D number management'.
The type of D programming can be determined by individual values:
- direct or
- indirect programming.

The default value is zero. This means that the NCK manages the T and D num-
    bers.

The NCK only accepts a value > 0 if bit 0 is not set in MD
    $MN_MM_TOOL_MANAGEMENT_MASK. That means the tool managment function can-
    not be active simultaneously.

Value:   Meaning
------------------------------------------------------------------------------
-----
0: No 'flat D number management' active
1: D numbers are programmed directly and absolutely
2: D numbers are programmed indirectly and relatively.
   That means the programmed D number is the index to a table in the VDI. The
PLC writes the absolute D number in this table. The NCK reads this number and
selects the corresponding offset.
   The NCK and PLC are synchronized while doing so. The NCK may have to wait
until the PLC has made the D number(s) available.
   The PLC receives the trigger for this by evaluating the T no.
   The NC block containing the change command triggers the synchronization and
the waiting for the D numbers.

3  As 2, with simulation of the D numbers by the PLC. Only for testing the NCK
functionality.
    In this case, the D numbers are placed by the NCK itself. They can be
    assigned via the R parameters R1,...R9. In which case the value of R1 is
    mapped onto D1 etc.
   Activation (value changed from 0 to > 0) and deactivation (value changed
from > 0 to 0) reconfigure the battery-backed memory, that is delete the data!
```

-					
-	-	0	0	1	7/2

18104	**MM_NUM_TOOL_ADAPTER**	N02, N09	FBW
-	Tool adapters in TO area (SRAM)	DWORD	POWER ON

Number of tool adapters in the TO area.
The function can only be used if there are magazine locations in the NCK.
The tool management function must be active.
Bit 7 (=0x80) must also be set in MD $MN_MM_TOOL_MANAGEMENT_MASK to enable the setting to become active.

Number of tool adapter data blocks available in the NCK.
Battery-backed memory is used.

Changing the data reorganizes the battery-backed memory in the NCK. The data can only be used properly if magazine locations are defined.
Adapter data blocks and the cutting edge-specific basic/adapter dimensions are mutually exclusive. This means that if adapter data are defined, then the parameters $TC_DP21, $TC_DP22, $TC_DP23 and their values are generally not available in the NCK. However, provided that a tool is assigned to a magazine location, then via the cutting edge-specific parameters
$TC_DP21,
$TC_DP22,
$TC_DP23
the magazine location-specific adapter parameters
$TC_ADPT[n, 1], $TC_ADPT[n, 2], $TC_ADPT[n, 3]
can be read and written.

Value: Meaning
-1 An adapter is automatically assigned to each magazine location.
This means that internally the same number of adapters are provided as magazine locations are provided by machine data $MN_MM_NUM_MAGAZINE_LOCATION.

0 No adapter data definitions possible. The cutting edge-specific parameters $TC_DP21, $TC_DP22, $TC_DP23 are available provided that adapters are used outside the active TMMG.

> 0 Number of adapter data blocks. This enables adapters to be defined irrespective of magazine locations. An additional step after defining the data assigns the adapters to the magazine locations. This enables one adapter, for example, to be assigned to several magazine locations.
(Saves memory, simplifies the handling of identical adapters)
See the machine data:
$MN_MM_TOOL_MANAGEMENT_MASK,
$MC_TOOL_MANAGEMENT_MASK,
$MN_MM_NUM_MAGAZINE,
$MN_MM_NUM_MAGAZINE_LOCATION

-					
-	-	-1	-1	600	7/2

18105	**MM_MAX_CUTTING_EDGE_NO**			N02, N09	W1
-	maximum value of D number (DRAM)			DWORD	POWER ON
Maximum value of the D number. This does not affect the maximum number of D numbers per cutting edge. The monitoring of the D number assignment associated with this value is only active when the D numbers are redefined. This means that existing data blocks are not subsequently checked if the MD is changed. Extra memory is required if MM_MAX_CUTTING_EDGE_NO > MM_MAX_CUTTING_EDGE_PERTOOL is valid. Work can then be done with the function 'unique D numbers'. The machine data is not evaluated with the function 'flat D number' and therefore has no significance there. The data can affect the memory requirement.					
-					
-	-	9	1	32000	7/2

18106	**MM_MAX_CUTTING_EDGE_PERTOOL**			N02, N09	W1
-	maximum number of D numbers per tool (DRAM)			DWORD	POWER ON
Maximum number of cutting edges (D offsets) per tool (per T number). This enables more safety to be achieved in the data definition. The value can be set to one if only tools with one cutting edge are used. That prevents more than one cutting edge being assigned to a tool in the data definition. Extra memory is required if MM_MAX_CUTTING_EDGE_NO > MM_MAX_CUTTING_EDGE_PERTOOL is valid. Work can then be done with the function 'unique D numbers'. The machine data is not evaluated with the function 'flat D number' and therefore has no significance there. The data can affect the memory requirement.					
-					
-	-	9	1	12	7/2

18108	**MM_NUM_SUMCORR**			N02, N09	W1
-	Resulting offsets in TO area (SRAM)			DWORD	POWER ON
Total number of resulting offsets in the NCK. The value = -1 means that the number of resulting offsets is equal to the number of cutting edges multiplied by the number of resulting offsets per cutting edge. See also cutting edge offset, insert offsets. Battery-backed data is reserved. See also: MM_NUM_CUTTING_EDGES_IN_TOA, MM_MAX_SUMCORR_PER_CUTTEDGE					
-					
-	-	-1	-1	9000	7/2

18110	**MM_MAX_SUMCORR_PER_CUTTEDGE**			N02, N09	S7
-	Max. number of additive offsets per edge			DWORD	POWER ON
Maximum number of resulting offsets per cutting edge. If MM_NUM_SUMCORR > 0 then: The data is not memory defining, but is only used for monitoring. If MM_NUM_SUMCORR = -1 then: The data is memory defining. See also MM_NUM_SUMCORR, MM_NUM_CUTTING_EDGES_IN_TOA.					
-					
-	-	1	1	6	7/2

18112	MM_KIND_OF_SUMCORR		N02, N09	W1
-	Properties of resulting offsets in TO area (SRAM)		DWORD	POWER ON

```
Properties of the resulting offsets in NCK.
Bit no.        Value   Significance
0                0     Resulting offsets are backed up when the tool
                       data are backed up.
0                1     Resulting offsets are not  backed up when the
                       tool data are backed up.

1                0     Set-up offsets are backed up when the tool
                       data are backed up.
1                1     Set-up offsets are not backed up when the
                       tool data are backed up.

2                0     If work is done with the function 'tool management':
                       Existing resulting offsets are not affected
                       when the tool status is
                       set to 'active'.
2                1     Existing resulting offsets are set to zero when the
                       tool status is set to 'active'.

3               0      If work is done with the function 'tool management'
                       and adapter:
                       Transformation of the resulting offsets
3               1      No transformation of the resulting offsets

4               0      No set-up offset data blocks
4               1      Set-up offset data blocks are additionally created.
                       Whereby the resulting offset is composed of the
                       sum of the set-up offset + 'resulting offset fine'

Changing the status of bits 0, 1, 2, 3 does not change the memory structure.
Changing the status of bit 4 triggers restructuring of the battery-backed mem-
ory after the next PowerOn.

See also
$MN_MM_NUM_CUTTING_EDGES_IN_TOA
$MN_MM_NUM_SUMCORR
$MN_MM_MAX_SUMCORR_PER_CUTTEDGE
$MN_MM_TOOL_MANAGEMENT_MASK,
$MC_TOOL_MANAGEMENT_MASK,
$MN_MM_NUM_MAGAZINE_LOCATION,
$MN_MM_NUM_TOOL_ADAPTER
```

-					
-	-	0	0	0x1F	7/2

18114	MM_ENABLE_TOOL_ORIENT			N02, N09	W1
-	Assign tool cutting edge orientation			DWORD	POWER ON

```
The function allows an orientation deviating from the default value to be
    assigned to each tool cutting edge.

Value = 0:
   The tool orientation function is inactive.

Value = 1:
   The system parameter $TC_DPV[n, m] is assigned to each tool cutting edge
D=m of the tool T=n, with the aid of which one of 6 possible tool orienta-
tions in positive or negative coordinate direction can be defined.

Value = 2:
   Not only the system parameter $TC_DPV[n, m] but also the additional three
system parameters $TC_DPV3[n, m], $TC_DPV4[n, m] and $TC_DPV5[n, m] are
assigned to each tool cutting edge D=m of the tool T=n, with the aid of which
any spatial tool orientation can be defined

T, D are the NC addresses T and D with which the tool change or the tool
    selection and the offset selection are programmed.
Value = 3:
   Not only the system parameters $TC_DPV[n, m] and $TC_DPV3 - $TC_DPV5  but
also the additional three system parameters $TC_DPVN3[n, m], $TC_DPVN4[n, m]
and $TC_DPVN5[n, m] are assigned to each tool cutting edge D=m of the tool
T=n, with the aid of which a vector (normal vector) can be defined that is
preferably perpendicular to the tool orientation. The normal vector may be
modified so that it lies in the plane formed by the orientation and the pro-
grammed normal vector but perpendicular to the orientation
   The orientation and the possibly modified normal vector together define a
complete orientation coordinate system. The machine data affects the require-
ment for battery-backed memory.
```

-					
-	-	0	0	3	7/2

18116	MM_NUM_TOOL_ENV			N02, N09	S7
-	Number of tool environments in the TO area (SRAM)			DWORD	POWER ON

```
Total number of tool environments in the NCK.
Battery-backed memory is reserved.
```

-					
-	-	0	-	-	7/2

18118	**MM_NUM_GUD_MODULES**		N02	S7	
-	Number of GUD files in active file system (SRAM)		DWORD	POWER ON	

```
A GUD block corresponds to a file in which user-defined data can be stored. 9
    GUD blocks are available of which 3 are already assigned to specific
    users/applications.
UGUD_DEF_USER (block for user)
SGUD_DEF_USER (block for SIEMENS)
MGUD_DEF_USER (block for machine manufacturer)

Special cases:
   The number of GUD modules is determined by the GUD module with the highest
number entered.
   Example:
    If the following GUD modules are defined,
      UGUD
      MGUD
      GUD5
      GUD8
   then the machine data must be set to a value of 8, signifying a memory
requirement of 8 x 120 bytes = 960 bytes.

It is therefore advisable to selected the "lowest" possible GUD module. If GUD
    modules UGUD and MGUD have not been assigned elsewhere, then they may be
    used for this purpose.

Related to:
    MD 18150: MM_GUD_VALUES_MEM
   (Memory space for user variables)
```

-					
-	-	7	1	9	7/2

18120	**MM_NUM_GUD_NAMES_NCK**			N02	S7
-	Number of global user variable names (SRAM)			DWORD	POWER ON

Defines the number of user variables for NCK global user data (GUD). Approximately 80 bytes of memory per variable are reserved in the SRAM for the names of the variables. The additional memory required for the value of the variable depends on the data type of the variable. The number of available NCK global user data is exhausted on reaching the limit value set in MM_NUM_GUD_NAMES_NCK or MD 18150: MM_GUD_VALUES_MEM (memory space for user variables).

Buffered user memory is used.

Special cases:
The battery-backed data are lost if this machine data is altered.

Related to:
MD 18150: MM_GUD_VALUES_MEM
(Memory space for user variables)

-					
-	-	50	-	-	7/2
840d-2a2c	-	10	-	-	-/-
840d-4a1cg	-	10	-	-	-/-
840d-6a2c	-	10	-	-	-/-
840d-12a2c	-	10	-	-	-/-
840d-31a10c	-	10	-	-	-/-

18130	**MM_NUM_GUD_NAMES_CHAN**			N02	S7
-	Number of channel-specific user variable names (SRAM)			DWORD	POWER ON

Defines the number of user variable names for channel-specific global user data (GUD). Approximately 80 bytes of memory are reserved in the SRAM for each variable name. The additional memory required for the value of the variable is equal to the size of the data type of the variable multiplied by the number of channels. This means that each channel has its own memory available for the variable values. The number of available channel-specific global user data is exhausted on reaching the limit value set in MD 18130: MM_NUM_GUD_NAMES_CHAN or MD 18150: MM_GUD_VALUES_MEM (memory space for user variables).

The name created with the DEF statement is valid for all channels.
The memory requirement for the variable value is equal to the size of the data type multiplied by the number of channels.

Buffered user memory is used.

Special cases:
The battery-backed data are lost if this machine data is altered.

Related to:
MD 18150: MM_GUD_VALUES_MEM
(Memory space for user variables)

-					
-	-	150	-	-	7/2

18150	**MM_GUD_VALUES_MEM**			N02	S7
-	Memory location for global user variable values (SRAM)			DWORD	POWER ON

```
The specified value reserves memory space for the variable values of the glo-
    bal user data (GUD). The dimensioning of the memory depends to a large
    extent on the data types used for the variables.
Overview of the memory requirements of the data types:

Data type          Memory requirement
REAL                8 bytes
INT                 4 bytes
BOOL                1 byte
CHAR                1 byte
STRING              1 byte per character, 100 characters permitted per string
AXIS                4 bytes
FRAME               up to 1KB depending on control model

The total memory required by a channel or axis-specific global user variable
    is the memory requirement of the variables multiplied by the number of
    channels or axes. The number of global user variables available is given
    when the limit defined in the MD: MM_NUM_GUD_NAMES_xxxx or
    MM_GUD_VALUES_MEM is reached.
Buffered user memory is used.

Special cases:
   The battery-backed data are lost if this machine data is altered!

Relating to:
    MD 18118: MM_NUM_GUD_MODULES:
   (Number of GUD blocks)
    MD 18120: MM_NUM_GUD_NAMES_NCK
   (Number of global user variables)
    MD 18130: MM_NUM_GUD_NAMES_CHAN
   (Number of channel-specific user variables)
```

-					
-	-	32	-	-	7/2
840d-2a2c	-	16	-	-	-/-
840d-4a1cg	-	16	-	-	-/-
840d-6a2c	-	16	-	-	-/-
840d-12a2c	-	16	-	-	-/-
840d-31a10c	-	16	-	-	-/-

18160	**MM_NUM_USER_MACROS**			N02	S7
-	Number of macros (DRAM)			DWORD	POWER ON
Defines the number of macros that can be stored in the files _N_SMAC_DEF, _N_MMAC_DEF und _N_UMAC_DEF. Each of these files which is opened occupies at least one kbyte memory space for the file code in the part program memory. Another kbyte of memory is reserved for the file when the one kbyte file code limit is exceeded. The dynamic user memory is used. For the stated number of macros, approximately 375 bytes are reserved per macro for management tasks.					
-					
-	-	50	-	-	7/2
840d-2a2c	-	10	-	-	-/-
840d-4a1cg	-	10	-	-	-/-
840d-6a2c	-	10	-	-	-/-
840d-12a2c	-	10	-	-	-/-
840d-31a10c	-	10	-	-	-/-

18170	**MM_NUM_MAX_FUNC_NAMES**			N02	S7
-	Number of miscellaneous functions (cycles, DRAM)			DWORD	POWER ON
The data limits the maximum number of special functions over and above the predefined functions (such as sine, cosine, etc.) which can be used in - cycle programs - compile cycle software. The function names are entered in the global NCK dictionary and must not conflict with the names that already exist. The SIEMENS cycle package contains special functions that are taken into account by the default setting of the MD. The data are stored in unbuffered memory. Approximately 150 bytes are required for each special function for management purposes. Related to: MD 18180: MM_NUM_MAX_FUNC_PARAM (Number. of additional parameters)					
-					
-	-	100	-	-	7/2
840d-2a2c	-	40	-	-	-/-
840d-4a1cg	-	40	-	-	-/-
840d-6a2c	-	40	-	-	-/-
840d-12a2c	-	40	-	-	-/-
840d-31a10c	-	40	-	-	-/-

18180	**MM_NUM_MAX_FUNC_PARAM**			N02	S7
-	Number of additional parameters for cycles according to MD 18170			DWORD	POWER ON
Defines the maximum number of parameters required for the special functions in - cycle programs - compile cycle software. 50 parameters are required for the special functions of the SIEMENS cycle package, software version 1. The data are stored in unbuffered memory. 72 bytes of memory are reserved for each parameter. Related to: MD 18170: MM_NUM_MAX_FUNC_NAMES (Number of special functions)					
-					
-	-	1000	-	-	7/2

18190	**MM_NUM_PROTECT_AREA_NCK**			N12, N02, N06, N09	S7
-	Number of files for machine-related protection zones (SRAM)			DWORD	POWER ON
This machine data defines how many blocks are created for the protection zones available in the NCK. Buffered memory is used. Special cases: The battery-backed data are lost if this machine data is altered. References: /FB/, A3, "Axis Monitoring, Protection Zones"					
-					
-	-	0	0	10	7/2

18200	**MM_NUM_CCS_MAGAZINE_PARAM**			N02, N09	FBW
-	Number of Siemens OEM magazine data (SRAM)			DWORD	POWER ON
Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 ('H1') and bit 2=1 ('H4'), is set for TMMG (and option is set): User or OEM data in the tool management (TMMG). Number of Siemens OEM magazine data (standard format IN_Int). See also: MM_NUM_CC_MAGAZINE_PARAM, MM_NUM_MAGAZINE Buffered user memory is used					
-					
-	-	0	0	10	2/2

18201	MM_TYPE_CCS_MAGAZINE_PARAM		N02, N09	FBW
-	Type of Siemens OEM magazine data (SRAM)		DWORD	POWER ON

```
Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 ('H1') and bit 2=1 ('H4'),
is set for TMMG (and option is set):

User or OEM data in the tool management.
Type of magazine-specific Siemens user data configured by
MM_NUM_CCS_MAGAZINE_PARAM.
Each parameter can be assigned its own type. The permissible types are:
Type                              Value of the machine data
(See types
of the NC language)
----------------------------------------------------------------
BOOL                                  1
CHAR                                  2
INT                                   3
REAL                                  4
STRING                                5 (permits identifier up to 31 charac-
ters long)
AXIS                                  6
FRAME                                 not defined
See also: MM_NUM_CCS_MAGAZINE_PARAM, MM_NUM_MAGAZINE
Buffered user memory is used
```

-					
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2

18202	MM_NUM_CCS_MAGLOC_PARAM	N02, N09	FBW
-	No. of Siemens OEM magazine location data (SRAM)	DWORD	POWER ON

```
Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 ('H1') and bit 2=1 ('H4'),
is set for TMMG (and option is set):
User or OEM data in the tool management.
Number of Siemens OEM magazine location data (standard format IN_Int).
See also: MM_NUM_CC_MAGLOC_PARAM,  MM_NUM_MAGAZINE_LOCATION
Buffered user memory is used
```

-					
-	-	0	0	10	2/2

18203	MM_TYPE_CCS_MAGLOC_PARAM		N02, N09	FBW	
-	Type of Siemens OEM magazine location data (SRAM)		DWORD	POWER ON	

```
Only when MD $MN_MM_TOOL_MANAGEMENT_MASK, bit 0=1 ('H1') and bit 2=1 ('H4'),
is set for TMMG (and option is set)
User or OEM data in the tool management.
Type of magazine-specific Siemens user data configured by
MM_NUM_CCS_MAGLOC_PARAM.
Each parameter can be assigned its own type. The permissible types are:
Type                         Value of the machine data
(See types of the NC language)
----------------------------------------------------------------
BOOL                           1
CHAR                           2
INT                            3
REAL                           4
-       (STRING is explicitly impossible here; value 5 is treated like value
    2)
AXIS                           6
FRAME                          not defined
See also: MM_NUM_CCS_MAGLOC_PARAM, MM_NUM_MAGLOC
Buffered user memory is used
```

-					
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2

18204	MM_NUM_CCS_TDA_PARAM		N02, N09	FBW	
-	Number of Siemens OEM tool data (SRAM)		DWORD	POWER ON	

```
Only when $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:
User or OEM data of the tools.
Number of Siemens OEM TDA (=tool-specific) data (standard format Int).
See also: MM_NUM_CC_TDA_PARAM, MM_NUM_TOOL
Buffered user memory is used
```

-					
-	-	0	0	10	2/2

18205	**MM_TYPE_CCS_TDA_PARAM**			N02, N09	FBW
-	Type of Siemens OEM tool data (SRAM)			DWORD	POWER ON
Only when $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set: User or OEM data in the tool management. Type of tool-specific Siemens user data configured by MM_NUM_CCS_TDA_PARAM. Each parameter can be assigned its own type. The permissible types are Type Value of the machine data (See types of the NC language) -- BOOL 1 CHAR 2 INT 3 REAL 4 STRING 5 (permits identifiers up to 31 charac- ters long) AXIS 6 FRAME not defined See also: MM_NUM_CCS_TDA_PARAM, MM_NUM_TOOL Buffered user memory is used					
-					
-	10	4,4,4,4,4,4,4,4,4,4	1	6	2/2

18206	**MM_NUM_CCS_TOA_PARAM**			N02, N09	FBW
-	No. of Siemens OEM data per cutting edge (SRAM)			DWORD	POWER ON
Only when $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set: User or OEM data of the tools. Number of Siemens OEM TOA data (standard format IN_Real). See also: MM_NUM_CC_TOA_PARAM, MM_NUM_CUTTING_EDGES_IN_TOA Buffered user memory is used					
-					
-	-	0	0	10	2/2

18207	**MM_TYPE_CCS_TOA_PARAM**		N02, N09	FBW	
-	Type of Siemens OEM data per cutting edge (SRAM)		DWORD	POWER ON	

```
Only when $MN_MM_TOOL_MANAGEMENT_MASK, bit 2=1 ('H4'), is set:
User or OEM data in the tool management.
Type of cutting-edge-specific Siemens user data configured by
MM_NUM_CCS_TOA_PARAM.
Each parameter can be assigned its own type. The permissible types are
Type                                   Value of the machine data
(See types of the NC language)
----------------------------------------------------------------
BOOL                                    1
CHAR                                    2
INT                                     3
REAL                                    4
-       (STRING is explicitly impossible here; value 5 is treated like value
    2)
AXIS                                    6
FRAME                                   not defined
See also: MM_NUM_CCS_TOA_PARAM, MM_NUM_CUTTING_EDGES_IN_TOA
Buffered user memory is used
```

-					
-	10	4,4,4,4,4,4,4,4,4,4	1	6	2/2

18208	**MM_NUM_CCS_MON_PARAM**		N02, N09	FBW	
-	No. of Siemens OEM monitor data (SRAM)		DWORD	POWER ON	

```
Only when $MN_MM_TOOL_MANAGEMENT_MASK, bit 0 = 1 or bit 1 = 1 and bit 2=1
('H4'), is set:

User or OEM data in the tool management.
Number of Siemens OEM monitoring data; standard format IN_Int).
See also: MM_NUM_CC_MON_PARAM, MM_NUM_CUTTING_EDGES_IN_TOA
Buffered user memory is used
```

-					
-	-	0	0	10	2/2

18209	**MM_TYPE_CCS_MON_PARAM**	N02, N09	FBW
-	Type of Siemens OEM monitor data (SRAM)	DWORD	POWER ON

```
Only when $MN_MM_TOOL_MANAGEMENT_MASK, bit 0 = 1 or bit 1 = 1 and bit 2=1
('H4'), is set:
User or OEM data in the tool management.
Type of monitoring-specific Siemens user data configured by
MM_NUM_CCS_MON_PARAM.
Each parameter can be assigned its own type. The permissible types are
Type                               Value of the machine data
(See types of the NC language)
----------------------------------------------------------------
BOOL                                1
CHAR                                2
INT                                 3
REAL                                4
-       (STRING is explicitly impossible here; value 5 is treated like value
    2)
AXIS                                6
FRAME                               not defined

See also: MM_NUM_CCS_MON_PARAM, MM_NUM_CUTTING_EDGES_IN_TOA
Buffered user memory is used
```

-					
-	10	3,3,3,3,3,3,3,3,3,3	1	6	2/2

18210	MM_USER_MEM_DYNAMIC	EXP, N02	S7
-	User memory in DRAM [KB]	DWORD	POWER ON

The DRAM in the NC is used jointly by the system and the user.
MM_USER_MEM_DYNAMIC defines the size of the DRAM available to the user. The input limits depend upon the hardware and software configurations of the CNC.
There are various types of user data in this memory area, for example.
- Local user data
- IPO block buffers
- User macros
- Diagnostics functions such as trace recording of times,.....
- Tool management trace
- Communication with 1-n HMIs; Value of n: See data $MN_MM_NUM_MMC_UNITS.
- Reorg Log file (required for internal purposes of the NC program sequence)
- ...

Each additionally active channel occupies a substantial amount of memory here.
Each activated axis requires part of this memory.
Exactly how much that is depends largely on the control model and the software version.

The settable values depend on the hardware and software configurations.

The value of NCK is automatically set after unbuffered startup of the NCK or deletion of the memory. The value is then such that the free memory defined in $MN_INFO_FREE_MEM_DYNAMIC is available to the user.
(See the description of $MN_INFO_FREE_MEM_DYNAMIC).

If the value is set too high (in the sense that the memory required is
more than that available on the memory module), the NCK responds at the next NCK reset/power on by automatically reducing the machine data value to the maximum possible value that the hardware permits.
Message alarm 6030 advises of this process. This corresponds to a legal response of the NCK and is not an incorrect response.

The essential significance of the machine data is not to release the entire memory to the user because the memory is shared between the system and the user. A part of the physically existing memory is reserved for future develoments of the NCK.
The maximum amount of memory available on the hardware can be found by selecting a value for the data that is so large that, after the subsequent restart, message alarm 6030 indicates the maximum available memory. Applications that use the maximum available memory will in all probability have memory problems with a software conversion to a newer NCK version.

Upper and lower limits are not necessary. The software rejects values outside the permissible range and then automatically sets suitable values.
(See also message alarm 6030.)

The data in the dynamic memory are not battery-backed.

Note:
During power on, the system software compares the sum of all requests for dynamic memory with the value in MD: MM_USER_MEM_DYNAMIC. Alarm 6000 "Memory allocated with standard machine data" is output if the memory required exceeds the memory capacity set with the MD. Alarm 6030 "User memory limit has been adapted" is output if the control detects during the power on that the memory capacity required by MM_USER_MEM_DYNAMIC is larger than the physical memory.

Related to:
The available dynamic memory can be taken from MD 18050: INFO_FREE_MEM_DYNAMIC (display data of the free dynamic memory).

-					
-	-	3000	0	2147483647	7/2
710-2a2c	-	-	-	15000	-/-
710-6a2c	-	-	-	15000	-/-
710-12a2c	-	-	-	24000	-/-
710-31a10c	-	-	-	52000	-/-

18220	**MM_USER_MEM_DPR**			EXP, N02	-
-	User memory in DUAL PORT RAM (DPR)			DWORD	POWER ON
The functionality is not available in previous software versions.					
-					
-	-	0	-	-	0/0

18230	MM_USER_MEM_BUFFERED			N02	S7
-	User memory in SRAM			DWORD	POWER ON

```
Battery-backed user memory (in kbyte).
Various types of user data are stored in this memory area.
For example:
- NC part programs
- R parameters
- Global user data (GUD)
- Definitions of the protection zones
- Correction tables EEC, CEC, QEC
- Tool / magazine data
        ...
This data is retained after control power off.
(Provided the data backup (battery,...) is in good working order and the Init
switch is correctly set on the control).
This means that they are available unchanged after restart.

In the case of control models without a backup battery (e.g. 802S,...) there
    is, as a rule, an option of , specifically backing up the data by opera-
    tion, so that they are available again after the next power on process.

The settable values depend on the hardware and software configurations.
The set values are designed for the minimum memory configuration of the par-
    ticular control model.

256, 512 and 2000, 4000KB of battery-backed memory are available on the hard-
ware.
Approximately 30KB of this physically present memory is used for internal pur-
poses. This means that approximately 226, 482, 1970, 3970KB of user memory can
be set.

After all the NCK functions have taken 'their' memory corresponding to the
relevant machine data values, the rest of the memory is added to the part pro-
gram memory. As a rule, the user will thus have more part program memory
available than that guaranteed in the sales brochure. This 'more' may however
vary from version to version.

If there are various memory configuration options for a control model then the
    data may have to be increased correspondingly when using the larger mem-
    ory variants.
In this respect, see the meaning of $MN_INFO_FREE_MEM_STATIC
Special cases:
   The battery-backed data are lost if this machine data is altered.
```

-					
-	-	0	0	2147483647	7/1
710-2a2c	-	-	-	12288	-/-
710-6a2c	-	-	-	12288	-/-
710-12a2c	-	-	-	12288	-/-
710-31a10c	-	-	-	12288	-/-

18231	**MM_USER_MEM_BUFFERED_TYPEOF**		N02	-	
-	Technology for data buffering		DWORD	POWER ON	
Type of technology used for data back-up Value = 0 SRAM memory only Value = 1 SRAM and flash/disk memory If the value = 1 then see also $MN_MM_ACTFILESYS_LOG_FILE_MEM Index 0 = Reserved Index 1 = Definition for the battery-backed data of the active file system (incl. machine data). Index 2 = Definition for the battery-backed data of the passive file system (part programs, cycles, ...). This value is in each case automatically derived during power on from $MN_DRAM_FILESYST_CONFIG.					
-					
-	3	0,0,0	0	1	0/0
710-2a2c	-	1,1,1	-	-	-/-
710-6a2c	-	1,1,1	-	-	-/-
710-12a2c	-	1,1,1	-	-	-/-
710-31a10c	-	1,1,1	-	-	-/-

18232	**MM_ACTFILESYS_LOG_FILE_MEM**		N02	-	
-	System: logfile size in SRAM [KB]		DWORD	POWER ON	
Battery-backed log file for battery-backed data of the active file system (in kbyte) Systems with slow data buffer media store changed battery-backed data in the internal system SRAM. After a power failure (spontaneous voltage loss), data that had not yet been made persistent at the time of the power failure can be restored from this buffer. The log file serves to minimize or totally avoid data loss in the event of power failure. 1000 entries require approximately 50KB. A value greater than 0 is only practicable if $MN_MM_USER_MEM_BUFFERED_TYPEOF = 1. Index Meaning 0 Preprocessing buffer 1 Buffer for data changes within the range of tool change 2 Buffer for data changes of main processing (especially synchronized actions)					
-					
-	3	0,0,0	-	-	0/0
710-2a2c	-	200,5,30	-	-	-/-
710-6a2c	-	200,5,30	-	-	-/-
710-12a2c	-	200,5,30	-	-	-/-
710-31a10c	-	200,5,30	-	-	-/-

18233	**IS_CONTINOUS_DATA_SAVE_ON**		EXP, N02	-	
-	System: Automatic saving of persistent data		BOOLEAN	POWER ON	
The machine data is relevant only if $MN_MM_USER_MEM_BUFFERED_TYPEOF = 1. The default value should be changed only if the system is operated in an environment, Value = 0 : Continuous saving of persistent data on disk/flash/etc. is deactivated. The dynamic response of the software on systems of the Solution-Line range can thus be improved. Value = 1 : Continuous automatic saving of persistent data on disk/flash/etc. is active. Index 0 = Reserved Index 1 = Definition for the buffered data of the active file system (incl. machine data). Index 2 = Definition for the buffered data of the passive file system (part programs, cycles, ...). The default value should be changed only for diagnostic purposes or for optimizing the dynamic response. The default value should be changed only if the system is operated in an environment, where no spontaneous shutdown of the system / spontaneous power failure occurs. Otherwise, persistent data can be lost.					
-					
-	3	FALSE,FALSE,FALSE	-	-	7/2
710-2a2c	-	TRUE,TRUE,TRUE	-	-	-/-
710-6a2c	-	TRUE,TRUE,TRUE	-	-	-/-
710-12a2c	-	TRUE,TRUE,TRUE	-	-	-/-
710-31a10c	-	TRUE,TRUE,TRUE	-	-	-/-

18238	**MM_CC_MD_MEM_SIZE**		N02	-	
-	Compile cycle machine data in SRAM [kB]		DWORD	POWER ON	
Battery-backed user memory for compile cycles (in kbyte)					
-					
-	-	1	1	-	7/1

18240	MM_LUD_HASH_TABLE_SIZE		EXP, N02	S7	
-	Hash table size for LUD (DRAM)		DWORD	POWER ON	

Defines the size of the hash table for local user data (LUD). The value entered must be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirements (low value = less memory).

A larger table requires a smaller number of decoding operations for internally decoding the variables and consequently a shorter interpreter execution time. The value of this machine data affects the amount of dynamic memory required for managing the blocks for local user variables with REORG, see MD 28010: MM_NUM_REORG_LUD_MODULES (Number of blocks for local user variables with REORG (DRAM)).

Note:
This machine data is assigned internally by the control and must not be altered by the user.

-					
-	-	37	11	107	0/0
840d-2a2c	-	11	-	-	-/-
840d-4a1cg	-	11	-	-	-/-
840d-6a2c	-	11	-	-	-/-
840d-12a2c	-	11	-	-	-/-
840d-31a10c	-	11	-	-	-/-

18242	**MM_MAX_SIZE_OF_LUD_VALUE**	N02	S7
-	Maximum memory block size for LUD/GUD values	DWORD	POWER ON

```
Defines the net memory array size for LUD/GUD variables. Each NC program that
defines at least one LUD/GUD variable or has call parameters then occupies at
least one memory array of this size.
The LUD/GUD variables of a program may occupy the complete LUD/GUD value mem-
    ory set for the channel. However, then there is no memory available for
    other programms.
The memory for the LUD/GUD variables (that is defined for LUD by the channel-
    specific MD MM_LUD_VALUES_MEM and for GUD by the NCK-specific MD
    MM_GUD_VALUES_MEM) is divided into equally sized arrays of the size
    MM_MAX_SIZE_OF_LUD_VALUE.

Example:
MM_LUD_VALUES_MEM = 12 (kbytes gross)
MM_MAX_SIZE_OF_LUD_VALUE = 660 (bytes net)
                          + 16 (bytes management data per array)
                          --------------------------------------
                           676 (bytes gross)
One then obtains 12*1024 / 676 = 18 memory arrays each of 660 bytes.
This means that 12 NC programs can either each occupy one array or one NC pro-
gram can define, for example, 18 variables of type Frame (whose size is
approximately 660 bytes.

Data type            Memory requirement
REAL                        8 bytes
INT                         4 bytes
BOOL                        1 byte
CHAR                        1 byte
STRING                      1 byte per character,
                                   100 characters are possible per string
AXIS                        4 bytes
FRAME                up to 1 kbyte (depending on control model)

Related to:
    MD 28040: MM_LUD_VALUES_MEM
   (Memory size for local user variables (DRAM))

Warning:
   The battery-backed data are lost when this machine data is changed!
   The size of the NC language type Frame depends on the maximum number of
channel axes generated by the NCK.
   There are NCK systems with a maximum number of channel axes from 4 to 20.
In the case of 20 axes, the type Frame then has a size of 660 bytes.
```

-					
-	-	920	920	SLMAXVARBYTES	0/0

18250	**MM_CHAN_HASH_TABLE_SIZE**			EXP, N02	S7
-	Hash table size for channel-specific data (DRAM)			DWORD	POWER ON

Defines the size of the hash table for channel-specific names. The value entered must be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirements (low value = less dynamic memory).

A larger table requires a smaller number of decoding operations for internally decoding the variables and consequently a shorter interpreter execution time. The value of this machine data affects the amount of dynamic memory required.
The memory required per channel in bytes is equal to the value entered multiplied by 68.

Note:
This machine data is assigned internally by the control and must not be altered by the user.

Warning:
The battery-backed data are lost if this machine data is altered!

-					
-	-	23	3	193	0/0

18260	**MM_NCK_HASH_TABLE_SIZE**			EXP, N02	S7
-	Hash table size for global data (DRAM)			DWORD	POWER ON

Defines the size of the NCK-specific names. The value entered must be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirements (low value = less dynamic memory).

A larger table requires a smaller number of decoding operations for internally decoding the variables and consequently a shorter interpreter execution time. The value of this machine data affects the amount of dynamic memory required. The memory required in bytes is equal to the value entered multiplied by 68.

Note:
This machine data is assigned internally by the control and must not be altered by the user.

-					
-	-	4001	537	4327	0/0

18270	**MM_NUM_SUBDIR_PER_DIR**			N02	S7
-	Number of subdirectories (DRAM)			DWORD	POWER ON
Defines the maximum number of subdirectories that a directory in the passive file system can have. The number of directories is limited by MD 18310: MM_NUM_DIR_IN_FILESYSTEM (number of directories in the passive file system). The memory requirement for the number of files per directory is contained in the memory (see MD 18260: MM_NUM_FILES_PER_DIR). Related to: MD 18310: MM_NUM_DIR_IN_FILESYSTEM (Number of directories in the passive file system)					
-					
-	-	30	24	250	7/1

18280	**MM_NUM_FILES_PER_DIR**			N02	S7
-	Number of files per directory (DRAM)			DWORD	POWER ON
Specifies the maximum number of files which can be created in a directory or subdirectory of the passive file system. The total number of files is limited by MD 18320: MM_NUM_FILES_IN_FILESYSTEM (number of files in the passive file system). The memory space in bytes required for the management of files in the directory is the value entered multiplied by 40. The highest value of MD 18280: MM_NUM_FILES_PER_DIR (number of files per directory) and MD 18270: MM_NUM_SUBDIR_PER_DIR (number of subdirectories) must be entered as the MD setting. The memory required to manage files in the passive file system is reserved by MD 18320: MM_NUM_FILES_IN_FILESYSTEM (number of files in the passive file system). Special cases: The battery-backed data are lost if this machine data is altered. Note An alteration of the MD has an effect on directories created after this. This means that if the number of files in an existing directory is to be altered, the existing directory must first be deleted and then a new directory created (but only after first saving the files)! Related to: MD 18320: MM_NUM_FILES_IN_FILESYSTEM (Number of files in the passive file system)					
-					
-	-	100	64	512	7/1

18290	**MM_FILE_HASH_TABLE_SIZE**			EXP, N02	S7
-	Hash table size for files of a directory (SRAM)			DWORD	POWER ON

```
Defines the size for the files of a directory. The value entered must be a
primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirements (low value = less memory).

The value of this machine data affects the amount of static memory required
    for the management of directories, see MD 18310: MM_NUM_DIR_IN_FILESYSTEM
    (number of directories in the passive file system)

Buffered user memory is used.

Note:
   This machine data is assigned internally by the control and must not be
altered by the user.

Special cases:
   The battery-backed data are lost if this machine data is altered!
```

-					
-	-	47	3	299	0/0

18300	**MM_DIR_HASH_TABLE_SIZE**			EXP, N02	S7
-	Hash table size for subdirectories (SRAM)			DWORD	POWER ON

```
Defines the size of the subdirectories of a directory. The value entered must
be a primary number. The setting allows the optimization of

- the interpreter execution time (low value = longer execution time) and
- memory requirement (low value = less memory).

The value of this machine data affects the amount of static memory required
    for the management of directories, see MD 18310: MM_NUM_DIR_IN_FILESYSTEM
    (number of directories in the passive file system).

Buffered user memory is used.

Note:
   This machine data is assigned internally by the control and must not be
altered by the user.

Special cases:
   The battery-backed data are lost if this machine data is altered!
```

-					
-	-	11	3	349	0/0

18310	**MM_NUM_DIR_IN_FILESYSTEM**			N02	S7
-	Number of directories in passive file system (SRAM)			DWORD	POWER ON
This machine data limits the number of directories in the passive file system. It can be used to reserve memory in the SRAM for the management of the directories. The directories and subdirectories of the passive file system set up by the system are included in this machine data. The memory required for the management of the directories can be calculated as follows: Memory required = a (440+28 (b+c)) bytes a = Input value of MD 18310: MM_NUM_DIR_IN_FILESYSTEM (no. of directories in passive file system) b = Input value of MD 19300: MM_DIR_HASH_TABLE_SIZE (HASH table size for subdirectories) c = Input value of MD 18290: MM_FILE_HASH_TABLE_SIZE (hash table size for the files of a directory) Buffered user memory is used. Special cases: The battery-backed data are lost if this machine data is altered. Related to: MD 18270: MM_NUM_SUBDIR_PER_DIR (Number of subdirectories)					
-					
-	-	30	30	256	7/2

18320	**MM_NUM_FILES_IN_FILESYSTEM**			N02	S7
-	Number of files in passive file system (SRAM)			DWORD	POWER ON
Defines the number of files available in the part program memory. This machine data is used to reserve memory in SRAM - approximately 320 bytes per file - for managing the file memory. Each file created requires a minimum of one kbyte of memory for the file code. If the one kbyte limit for the file code is exceeded another kbyte is reserved for the file. Buffered user memory is used. Special cases: The battery-backed data are lost if this machine data is altered. Related to: MD 18280: MM_NUM_FILES_PER_DIR (Number of files in directories)					
-					
-	-	150	64	512	7/2

18331	**MM_FLASHFILESYS_MEM**			N01, N02	-
-	Reserved for FFS (DRAM)			BYTE	POWER ON
Reserved for FFS					
-					
-	8	0,0,0,0,0,0,0,0	-	-	0/0

18332	**MM_FLASH_FILE_SYSTEM_SIZE**			N01, N02	IAD
-	Size of FFS			DWORD	POWER ON
Size of the flash file system on the PCNC (in kbyte) Entries have to be made in steps of 128KB. Apart from 0, the smallest possible value is 512KB. If the flash file system is used as a backup memory for the DRAM file system, then $MN_MM_FLASH_FILE_SYSTEM_SIZE must be at least 3 times the size of the largest file in the DRAM file system larger than $MN_MM_DRAM_FILE_MEM_SIZE. Additional memory space is needed in the DRAM file system for log files if this has been configured by $PROTOC_FILE_MEM.					
-					
-	-	0	0	4096	7/1

18342	**MM_CEC_MAX_POINTS**			N01, N02	K3
-	max. number of interpolation points on sag compensation (SRAM)			DWORD	POWER ON
The MD defines the memory space available for the compensation tables. When MM_CEC_MAX_POINTS = 0, no memory is set up for the table. The sag compensation function cannot then be used. Caution! If MD 18342: MM_CEC_MAX_POINTS[t] is changed, when the system is powered up the battery-backed NC user memory is automatically newly set. Whereby all user data in the battery-backed user memory (e.g. drive and HMI machine data, tool offsets, part programs etc.) is deleted. Related to: SD 41300: CEC_TABLE_ENABLE[t] release Evaluation of the sag compensation table (t). References: /FB/, S7, "Memory Configuration"					
-					
-	62	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0...	0	2000	7/2

18350	**MM_USER_FILE_MEM_MINIMUM**			EXP, N02	S7
-	minimum part program memory (SRAM)			DWORD	POWER ON

Valid only for PowerLine control models.
Minimum user memory for files in the passive file system (in kbyte)

There are various types of user data in this memory area.
Defines the minimum remaining battery-backed memory area for the files of the passive file system (in kbyte). The settable value depends on the hardware and software configurations (memory allocation SRAM) and on MD 18230: MM_USER_MEM_BUFFERED (user memory in the SRAM). During the memory allocation of the SRAM, the files of the passive file system are assigned to the end of the remaining memory.

The remaining memory must have at least the memory space stated in MM_USER_FILE_MEM_MINIMUM available for the file system to be able to work. If this is not ensured, the control assigns the pre-assigned data to the memory during power on, as a consequence of which all the battery-backed data entered by the user is lost. Alarm 6000 "Memory allocation with standard machine data" is also output.

The available part program memory can be taken from the MD 18060: INFO_FREE_MEM_STATIC (display data of the free static memory).

Special cases:
The battery-backed data are lost if this machine data is changed and the remaining memory is less than the value of MM_USER_FILE_MEM_MINIMUM.

-					
-	-	20	0	100	0/0
710-2a2c	-	0	-	0	-/-
710-6a2c	-	0	-	0	-/-
710-12a2c	-	0	-	0	-/-
710-31a10c	-	0	-	0	-/-

18351	**MM_DRAM_FILE_MEM_SIZE**			EXP, N02	IAD
-	Size of part program memory (DRAM)			DWORD	POWER ON

Size of memory for files in the DRAM of the passive file system (in kbyte).

If the flash file system is used as a background memory for the DRAM file system then $MN_MM_FLASH_FILE_SYSTEM_SIZE must be at least 3 times the size of the largest file in the DRAM file system and be larger than $MN_MM_DRAM_FILE_MEM_SIZE.

-					
-	-	0	0	32768	7/1
710-2a2c	-	-	-	-	0/0
710-6a2c	-	-	-	-	0/0
710-12a2c	-	-	-	-	0/0
710-31a10c	-	-	-	-	0/0

18352	**MM_U_FILE_MEM_SIZE**			EXP, N02	-
-	End user memory for part programs/ cycles/files			DWORD	POWER ON
The machine data is not available or not defined for PowerLine control models. End user memory for files in the passive file system (in kbyte). There are various types of user data in this memory area. E.g.: NC part programs, cycle programs of the end user, diagnostic files, ... The settable values depend on the hardware and software configurations. The settable size of the part program memory is, apart from the upper limit value, determined by the MD $MN_MM_USER_MEM_BUFFERED and can also be determined by a software option. Index 0 = Size of the battery-backed part program / cycle program memory Index 1 = Reserved Index 2 = Reserved					
-					
-	3	0,0,0	0	0	2/2
710-2a2c	-	2560,0,0	-	9216	-/-
710-6a2c	-	2560,0,0	-	9216	-/-
710-12a2c	-	2560,0,0	-	15360	-/-
710-31a10c	-	2560,0,0	-	15360	-/-

18353	**MM_M_FILE_MEM_SIZE**			EXP, N02	-
-	Memory capacity for machine manufacturer's cycles/ files			DWORD	POWER ON
The machine data is not available or not defined for PowerLine control models. Memory for machine manufacturer files in the passive file system (in kbyte). The machine manufacturer's files are in this memory area of the passive file system. E.g.: cycle programs The settable values depend on the hardware and software configurations. The settable size of the memory is, apart from the upper limit value, determined by the MD $MN_MM_USER_MEM_BUFFERED. Index 0 = Minimum size of the battery-backed (persistent) part program / cycle program memory Index 1 = Reserved Index 2 = Reserved					
-					
-	3	0,0,0	0	0	1/1
710-2a2c	-	512,0,0	-	9216	-/-
710-6a2c	-	512,0,0	-	9216	-/-
710-12a2c	-	512,0,0	-	15360	-/-
710-31a10c	-	512,0,0	-	15360	-/-

18354	**MM_S_FILE_MEM_SIZE**			EXP, N02	-
-	Memory capacity for NC manufacturer's cycles/files			DWORD	POWER ON

```
The machine data is not available or not defined for PowerLine control models.

Memory for the control manufacturer's files in the passive file system ( in
kbyte ).

The control manufacturer's files are in this memory area of the passive file
    system.
E.g.: cycle programs, system files

The settable values depend on the hardware and software configurations.
The settable size of the memory is, apart from the upper limit value,
for index = 0 determined by MD $MN_MM_USER_MEM_BUFFERED.
For index 1 = Reserved.
For index 2 = limited by the size of the internally availble battery-backed
    memory (SRAM).

Index 0 = Size of the battery-backed cycle program memory
Index 1 = Reserved
Index 2 = Size of the battery-backed memory for system files
```

-					
-	3	0,0,0	0	0	0/0
710-2a2c	-	2048,0,100	-	3072	-/-
710-6a2c	-	2048,0,100	-	3072	-/-
710-12a2c	-	2048,0,100	-	3072	-/-
710-31a10c	-	2048,0,100	-	3072	-/-

18355	**MM_T_FILE_MEM_SIZE**			EXP, N02	-
-	Memory size for temporary files			DWORD	POWER ON

```
The machine data is not available or not defined for PowerLine control models.

Memory for temporary files in the passive file system ( in kbyte )
For example: Compilate of cycles (preprocessing), system traces
```

-					
-	-	1000	-	-	7/2

18360	**MM_EXT_PROG_BUFFER_SIZE**			N01	A2
-	FIFO buffer size for processing from external source (DRAM)			DWORD	POWER ON

A FIFO buffer is needed on the NCK for each program level (main program or subprogram) that is processed externally (reload mode).

The size of the FIFO buffer is defined in kbyte by $MN_MM_EXT_PROG_BUFFER_SIZE.

$MN_MM_EXTPROG_NUM sets the number of FIFO buffers which are simultaneously available.

During startup, the memory size determined by multiplying $MN_MM_EXT_PROG_BUFFER_SIZE by $MN_MM_EXTPROG_NUM is reserved in the DRAM.

If the stated value exceeds the available memory space, alarm 4077 is output when writing the machine data.

References:
/PGA/Programming Guide Advanced, Section 2

-					
-	-	50	30	1000000	7/2
840d-2a2c	-	30	-	-	-/-
840d-4a1cg	-	30	-	-	-/-
840d-6a2c	-	30	-	-	-/-
840d-12a2c	-	30	-	-	-/-
840d-31a10c	-	30	-	-	-/-

18362	**MM_EXT_PROG_NUM**			N01	A2
-	Number of program levels which can be simultaneously processed			BYTE	POWER ON

Number of program levels that can simultaneously be in "Processing from external source" mode NCK-wide.
System resources are reserved for the HMI <-> NCK communication during "Processing from external source". Machine data EXT_PROG_NUM defines the number of possible program levels.
The memory space is reserved during power on by MD 18360 + MD 18362. If it is found during program execution that all system resources are occupied, this is reported by alarm 14600.

-					
-	-	1	0	13	7/2

18370	**MM_PROTOC_NUM_FILES**			N02	D1,OEM
-	Max.no. of log files in passive file system			DWORD	POWER ON

Maximum number of log files in the passive file system.

-					
-	10	2,0,0,0,0,2,2,0,0,1	0	10	1/1

18371	**MM_PROTOC_NUM_ETPD_STD_LIST**			N02	D1,OEM
-	Number of standard data lists ETPD.			DWORD	POWER ON
Number of standard data lists in the OPI module ETPD (user-specific)					
-					
-	10	25,0,0,0,0,25,25,0,0,3	0	25	1/1

18372	**MM_PROTOC_NUM_ETPD_OEM_LIST**			N02	D1,OEM
-	Number of OEM data lists ETPD.			DWORD	POWER ON
Number of OEM data lists in the OPI module ETPD (user-specific).					
-					
-	10	0,0,0,0,0,0,0,0,0,0	0	20	1/1

18373	**MM_PROTOC_NUM_SERVO_DATA**			N02	D1
-	Number of servo data for log			DWORD	POWER ON
Number of servo data which must be recordable at the same time (user-specific).					
-					
-	10	0,0,0,0,0,10,10,0,0,0	0	20	1/1

18374	**MM_PROTOC_FILE_BUFFER_SIZE**			N02	-
-	Size of log file buffer			DWORD	POWER ON
Size of the data buffer between the IPO and preprocessing time levels of a log file.					
-					
-	10	8000,8000,8000,8000,8000,8000,8000...	5000	-	1/1

18375	**MM_PROTOC_SESS_ENAB_USER**			N02	-
-	Users enabled for sessions			BYTE	POWER ON
Users that are available for session management.					
-					
-	10	0,0,0,0,0,1,1,0,0,0	0	1	1/1

18390	**MM_COM_COMPRESS_METHOD**			EXP, N01, N02	-
-	Supported compression methods.			DWORD	POWER ON
Setting for the compression methods to be supported.					
-					
-	-	0x01	-	-	2/2

18400	**MM_NUM_CURVE_TABS**			N02, N09	M3
-	Number of curve tables (SRAM)			DWORD	POWER ON
Defines the maximum number of curve tables that can be stored in the SRAM of the entire system. A curve table consists of a number of curve segments. Related to MD 18402: MM_NUM_CURVE_SEGMENTS					
-					
-	-	0	-	-	1/1

<table>
<tr><td>18402</td><td colspan="3">MM_NUM_CURVE_SEGMENTS</td><td>N02, N09</td><td>M3</td></tr>
<tr><td>-</td><td colspan="3">Number of curve segments (SRAM)</td><td>DWORD</td><td>POWER ON</td></tr>
<tr><td colspan="6">Defines the maximum number of curve segments that can be stored in the SRAM of the entire system. The curve segments are a component of a curve table.
Related to
MD 18400: MM_NUM_CURVE_TABS</td></tr>
<tr><td>-</td><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td>-</td><td>-</td><td>0</td><td>-</td><td>-</td><td>1/1</td></tr>
</table>

<table>
<tr><td>18403</td><td colspan="3">MM_NUM_CURVE_SEG_LIN</td><td>N02, N09</td><td>-</td></tr>
<tr><td>-</td><td colspan="3">Number of linear curve segments (SRAM)</td><td>DWORD</td><td>POWER ON</td></tr>
<tr><td colspan="6">Number of linear curve segments in the SRAM available throughout the NCK.
A curve table may consist of "normal" curve segments and linear segments. The number of "normal" curve segments in the SRAM is defined by MD MM_NUM_CURVE_SEGMENTS, these curve segments can accommodate polynomials.
Linear curve segments can only accommodate straight lines.

These linear curve segments are stored in battery-backed memory.</td></tr>
<tr><td>-</td><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td>-</td><td>-</td><td>0</td><td>-</td><td>-</td><td>1/1</td></tr>
</table>

<table>
<tr><td>18404</td><td colspan="3">MM_NUM_CURVE_POLYNOMS</td><td>N02, N09</td><td>M3</td></tr>
<tr><td>-</td><td colspan="3">Number of curve table polynomials (SRAM)</td><td>DWORD</td><td>POWER ON</td></tr>
<tr><td colspan="6">Defines the maximum total number of polynomials for curve tables that can be stored in the SRAM of the entire system. The polynomials are a component of a curve segment. A maximum of 3 polynomials are required for a curve segment. As a rule, only 2 polynomials are used for each curve segment.
Related to
MD 18400: MM_NUM_CURVE_TABS
MD 18402: MM_NUM_CURVE_SEGMENTS</td></tr>
<tr><td>-</td><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td>-</td><td>-</td><td>0</td><td>-</td><td>-</td><td>1/1</td></tr>
</table>

<table>
<tr><td>18406</td><td colspan="3">MM_NUM_CURVE_TABS_DRAM</td><td>N02, N09</td><td>M3</td></tr>
<tr><td>-</td><td colspan="3">Number of curve tables (DRAM)</td><td>DWORD</td><td>POWER ON</td></tr>
<tr><td colspan="6">Number of curve tables in the DRAM available throughout the NCK.
The curve tables are stored either in the buffer memory or in the dynamic memory.

This MD is used to set the number of curve tables in the dynamic memory (DRAM).</td></tr>
<tr><td>-</td><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td>-</td><td>-</td><td>0</td><td>-</td><td>-</td><td>1/1</td></tr>
</table>

18408	**MM_NUM_CURVE_SEGMENTS_DRAM**			N02, N09	M3
-	Number of curve segments (DRAM)			DWORD	POWER ON
Number of polynomial curve segments in the DRAM available throughout the NCK. The curve segments are stored either in the buffer memory or in the dynamic memory. This MD is used to set the number of segments in the dynamic memory (DRAM).					
-					
-	-	0	-	-	1/1

18409	**MM_NUM_CURVE_SEG_LIN_DRAM**			N02, N09	-
-	Number of linear curve segments (DRAM)			DWORD	POWER ON
Number of linear curve segments in the DRAM available throughout the NCK. A curve table may consist of "normal" curve segments and linear segments. The number of "normal" curve segments in the DRAM is defined by MD MM_NUM_CURVE_SEGMENTS_DRAM, these curve segments can accommodate polynomials. Linear curve segments can only accommodate straight lines. The curve segments are stored either in the buffer memory or in the dynamic memory. This MD defines the number of curve segments in the dynamic memory (DRAM).					
-					
-	-	0	-	-	1/1

18410	**MM_NUM_CURVE_POLYNOMS_DRAM**			N02, N09	M3
-	Number of curve table polynomials (DRAM)			DWORD	POWER ON
Number of polynomials for curve tables in the DRAM available throughout the NCK. The polynomials for curve tables are stored in the buffer memory or in the dynamic memory. This MD is used to set the number of polynomials for curve tables in the dynamic memory (DRAM).					
-					
-	-	0	-	-	1/1

18450	**MM_NUM_CP_MODULES**			N02, N09	-
-	Max. number of CP modules			DWORD	POWER ON
Number of CP coupling modules available within the NCK The MD defines the max. permissible number of CP couplings and reserves the required dynamic memory (DRAM).					
-					
-	5	0,0,0,0,0	-	-	1/1

18452	**MM_NUM_CP_MODUL_LEAD**			N02, N09	-
-	Max. number of master values for each CP coupling module			DWORD	POWER ON
Number of master values that can be activated for one coupling module. The MD defines the max. permissible number of master values for each CP coupling module and reserves the required dynamic memory (DRAM).					
-					
-	5	1,1,1,1,1	1	5	1/1

18500	**MM_EXTCOM_TASK_STACK_SIZE**			EXP, N02	S7
-	Stack size for external communications task (DRAM)			DWORD	POWER ON
Defines the size (KB) of the stack for external communication. The dynamic memory area is used. Note: This machine data is assigned internally by the control and must not be altered by the user.					
-					
-	-	19	10	60	0/0

18502	**MM_COM_TASK_STACK_SIZE**			EXP, N02	-
-	Stack size in KB for communication task (DRAM)			DWORD	POWER ON
Size of the stacks of the communication task in kbyte. The dynamic memory is used.					
-					
-	-	20	4	40	0/0

18510	**MM_SERVO_TASK_STACK_SIZE**			EXP, N02	S7
-	Stack size of servo task (DRAM)			DWORD	POWER ON
Defines the stack size for the SERVO task. The dynamic memory is used for this purpose. Note: This machine data is assigned internally by the control and must not be altered by the user.					
-					
-	-	20	4	40	0/0

18512	**MM_IPO_TASK_STACK_SIZE**			EXP, C02	-
-	Stack size of IPO task (DRAM)			DWORD	POWER ON
Size of the IPO task stack in kbyte. The dynamic memory is used.					
-					
-	-	30	12	40	0/0

18520	**MM_DRIVE_TASK_STACK_SIZE**			EXP, N02	S7,ECO
-	Stack size of drive task (DRAM)			DWORD	POWER ON
The size of the stack (KB) for the SIMODRIVE task is defined with this machine data. The stack is stored in the dynamic memory area. Note: This machine data is assigned internally by the control and must not be altered by the user.					
-					
-	-	20	6	40	0/0

18540	**MM_PLC_TASK_STACK_SIZE**			EXP, N02	-
-	Stack size of the PLC task (DRAM)			DWORD	POWER ON
Size of the stack of the PLC task in kbyte. Dynamic memory is used.					
-					
-	-	30	20	40	0/0

18600	**MM_FRAME_FINE_TRANS**			N02	K2
-	Fine offset with FRAME (SRAM)			DWORD	POWER ON
0: The fine offset cannot be entered or programmed. Disabling fine offset saves a maximum of 10KB SRAM, (depending on MD 28080: MM_NUM_USER_FRAMES). 1: The fine offset is possible for settable frames, the basic frame and the programmable frame by operator input or via program.					
-					
-	-	1	0	1	7/2

18601	**MM_NUM_GLOBAL_USER_FRAMES**			N02	K2
-	Number of global predefined user frames (SRAM).			DWORD	POWER ON
Number of global predefined user frames. The value corresponds to the number of field elements for the predefined field $P_UIFR[]. If the value of the data is greater than 0, then all settable fields are only global. The MD $MC_MM_NUM_USER_FRAMES is then ignored.					
-					
-	-	0	0	100	7/2

18602	**MM_NUM_GLOBAL_BASE_FRAMES**			N02	K2
-	Number of global base frames (SRAM).			DWORD	POWER ON
Number of NCU basic frames. The value corresponds to the number for the predefined field $P_NCBFR[].					
-					
-	-	0	0	16	7/2

18660	MM_NUM_SYNACT_GUD_REAL			N02	-
-	Number of configurable GUD variables of type REAL			DWORD	POWER ON

```
The machine data $MN_MM_NUM_SYNACT_GUD_REAL[ ] can be used to extend individ-
    ual GUD blocks by additional channel-specific parameter areas of type
    REAL. The GUD blocks are differentiated by the field index:
$MN_MM_NUM_SYNACT_GUD_REAL[0] = <value> -> extension of the SGUD block
$MN_MM_NUM_SYNACT_GUD_REAL[1] =  <value> -> extension of the MGUD block
$MN_MM_NUM_SYNACT_GUD_REAL[2] =  <value> -> extension of the UGUD block
$MN_MM_NUM_SYNACT_GUD_REAL[3] =  <value> -> extension of the GUD4 block
$MN_MM_NUM_SYNACT_GUD_REAL[8] =  <value> -> extension of the GUD9 block
In each case, fields with the following properties are created:
Data type REAL
Field size corresponding to <value> of the relevant machine data
Predefined names:
   SYG_RS[ ] -> Synact parameter of type REAL in the SGUD block
   SYG_RM[ ] -> Synact parameter of type REAL in the MGUD block
   SYG_RU[ ] -> Synact parameter of type REAL in the UGUD block
   SYG_R4[ ] -> Synact parameter of type REAL in the GUD4 block
   ....
   SYG_R9[ ] -> Synact parameter of type REAL in the GUD9 block
The parameters can be read and written both by the part program and also via
    synchronous actions.
```

-					
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2

18661	MM_NUM_SYNACT_GUD_INT			N02	-
-	Number of configurable GUD variables of type integer			DWORD	POWER ON

```
The machine data $MN_MM_NUM_SYNACT_GUD_INT[ ] can be used to extend individ-
    ual GUD blocks by additional channel-specific parameter areas of type
    INTEGER. The GUD blocks are differentiated by the field index:
$MN_MM_NUM_SYNACT_GUD_INT[0] = <value> -> extension of the SGUD block
$MN_MM_NUM_SYNACT_GUD_INT[1] =  <value> -> extension of the MGUD block
$MN_MM_NUM_SYNACT_GUD_INT[2] =  <value> -> extension of the UGUD block
$MN_MM_NUM_SYNACT_GUD_INT[3] =  <value> -> extension of the GUD4 block
$MN_MM_NUM_SYNACT_GUD_INT[8] =  <value> -> extension of the GUD9 block
In each case, fields with the following properties are created:
Data type BOOL
Field size corresponding to <value> of the relevant machine data
Predefined names:
   SYG_IS[ ] -> Synact parameter of type INT in the SGUD block
   SYG_IM[ ] -> Synact parameter of type INT in the MGUD block
   SYG_IU[ ] -> Synact parameter of type INT in the UGUD block
   SYG_I4[ ] -> Synact parameter of type INT in the GUD4 block
   ....
   SYG_I9[ ] -> Synact parameter of type INT in the GUD9 block
The parameters can be read and written both by the part program and also via
    synchronous actions.
```

-					
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2

18662	**MM_NUM_SYNACT_GUD_BOOL**	N02	-
-	Number of configurable GUD variables of type Boolean	DWORD	POWER ON

The machine data $MN_MM_NUM_SYNACT_GUD_BOOL[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type Boolean. The GUD blocks are differentiated by the field index:
$MN_MM_NUM_SYNACT_GUD_BOOL[0] = <value> -> extension of the SGUD block
$MN_MM_NUM_SYNACT_GUD_BOOL[1] = <value> -> extension of the MGUD block
$MN_MM_NUM_SYNACT_GUD_BOOL[2] = <value> -> extension of the UGUD block
$MN_MM_NUM_SYNACT_GUD_BOOL[3] = <value> -> extension of the GUD4 block
$MN_MM_NUM_SYNACT_GUD_BOOL[8] = <value> -> extension of the GUD9 block
In each case, fields with the following properties are created:
Data type BOOL
Field size corresponding to <value> of the relevant machine data
Predefined names:
SYG_BS[ ] -> Synact parameter of type Boolean in the SGUD block
SYG_BM[ ] -> Synact parameter of type Boolean in the MGUD block
SYG_BU[ ] -> Synact parameter of type Boolean in the UGUD block
SYG_B4[ ] -> Synact parameter of type Boolean in the GUD4 block
....
SYG_B9[ ] -> Synact parameter of type Boolean in the GUD9 block
The parameters can be read and written both by the part program and also via synchronous actions.

-					
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2

18663	**MM_NUM_SYNACT_GUD_AXIS**	N02	-
-	Number of configurable GUD variables of type Axis	DWORD	POWER ON

The machine data $MN_MM_NUM_SYNACT_GUD_AXIS[ ] can be used to extend individual GUD blocks by additional channel-specific parameter areas of type AXIS. The GUD blocks are differentiated by the field index:
$MN_MM_NUM_SYNACT_GUD_AXIS[0] = <value> -> extension of the SGUD block
$MN_MM_NUM_SYNACT_GUD_AXIS[1] = <value> -> extension of the MGUD block
$MN_MM_NUM_SYNACT_GUD_AXIS[2] = <value> -> extension of the UGUD block
$MN_MM_NUM_SYNACT_GUD_AXIS[3] = <value> -> extension of the GUD4 block
$MN_MM_NUM_SYNACT_GUD_AXIS[8] = <value> -> extension of the GUD9 block
In each case, fields with the following properties are created:
Data type AXIS
Field size corresponding to <value> of the relevant machine data
Predefined names:
SYG_AS[ ] -> Synact parameter of type AXIS in the SGUD block
SYG_AM[ ] -> Synact parameter of type AXIS in the MGUD block
SYG_AU[ ] -> Synact parameter of type AXIS in the UGUD block
SYG_A4[ ] -> Synact parameter of type AXIS in the GUD4 block
....
SYG_A9[ ] -> Synact parameter of type AXIS in the GUD9 block
The parameters can be read and written both by the part program and also via synchronous actions.

-					
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2

18664	MM_NUM_SYNACT_GUD_CHAR	N02	-
-	Configurable GUD variable of type Char	DWORD	POWER ON

```
The machine data $MN_MM_NUM_SYNACT_GUD_CHAR[ ]
can be used to extend individual GUD blocks by additional
channel-specific parameter areas of type CHAR.
The GUD blocks are differentiated by the field index:
$MN_MM_NUM_SYNACT_GUD_CHAR[0] =  <value> -> extension of the SGUD block
$MN_MM_NUM_SYNACT_GUD_CHAR[1] =  <value> -> extension of the MGUD block
$MN_MM_NUM_SYNACT_GUD_CHAR[2] =  <value> -> extension of the UGUD block
$MN_MM_NUM_SYNACT_GUD_CHAR[3] =  <value> -> extension of the GUD4 block
$MN_MM_NUM_SYNACT_GUD_CHAR[8] =  <value> -> extension of the GUD9 block
In each case, fields with the following properties are created:
Data type CHAR
Field size corresponding to <value> of the relevant machine data
Predefined names:
   SYG_CS[ ] -> Synact parameter of type CHAR in the SGUD block
   SYG_CM[ ] -> Synact parameter of type CHAR in the MGUD block
   SYG_CU[ ] -> Synact parameter of type CHAR in the UGUD block
   SYG_C4[ ] -> Synact parameter of type CHAR in the GUD4 block
   ....
   SYG_C9[ ] -> Synact parameter of type CHAR in the GUD9 block
The parameters can be read and written both by the part program
and also via synchronous actions.
```

-					
-	9	0,0,0,0,0,0,0,0,0	0	32767	7/2

18665	MM_NUM_SYNACT_GUD_STRING	N02	-
-	Configurable GUD variable of type STRING	DWORD	POWER ON

```
The machine data $MN_MM_NUM_SYNACT_GUD_STRING[ ] can be
used to extend individual GUD blocks by additional channel-specific
parameter areas of type STRING.
The GUD blocks are differentiated by the field index:
$MN_MM_NUM_SYNACT_GUD_STRING[0] =  <value> -> extension of the SGUD block
$MN_MM_NUM_SYNACT_GUD_STRING[1] =  <value> -> extension of the MGUD block
$MN_MM_NUM_SYNACT_GUD_STRING[2] =  <value> -> extension of the UGUD block
$MN_MM_NUM_SYNACT_GUD_STRING[3] =  <value> -> extension of the GUD4 block
$MN_MM_NUM_SYNACT_GUD_STRING[8] =  <value> -> extension of the GUD9 block
In each case, fields with the following properties are created:
Data type STRING
Field size corresponding to <value> of the relevant machine data
The maximum length of a string is 31 characters.
Predefined names:
   SYG_SS[ ] -> Synact parameter of type STRING in the SGUD block
   SYG_SM[ ] -> Synact parameter of type STRING in the MGUD block
   SYG_SU[ ] -> Synact parameter of type STRING in the UGUD block
   SYG_S4[ ] -> Synact parameter of type STRING in the GUD4 block
   ....
   SYG_S9[ ] -> Synact parameter of type STRING in the GUD9 block
The parameters can be read and written both by the part program
and also via synchronous actions.
```

-					
-	9	0,0,0,0,0,0,0,0,0	0	25	7/2

18700	**MM_SIZEOF_LINKVAR_DATA**			N02	B3
-	Size of NCU-link variable memory			DWORD	POWER ON
Number of bytes of the NCK link memory for the variables $A_DLx.					
LINK					
-	-	0	-	-	7/2

18710	**MM_NUM_AN_TIMER**			N02	-
-	Number of global time variable for synchronized actions			DWORD	POWER ON
Number of global time variables for motion-synchronous actions (DRAM)					
-					
-	-	0	0	10000	7/2

18720	**MM_SERVO_FIFO_SIZE**			EXP, N01	-
-	Setpoint value for buffer size between IPO and position control			DWORD	POWER ON
The machine data determines the size of the setpoint value buffer between interpolator and position control, and has a direct effect on the dynamic user memory requirement. That is normally 2. If several NCUs are connected via NCU link for e.g. rotary indexing machines, the value should be set to 3 on all NCUs. This will balance the transmission rates of the setpoint values via the link. In a master value application (e.g. line shaft), the value should be set to 4, but only on the NCU that generates the master value. For all the other NCUs, the preset value should be maintained at 2. Note: In control loops that are connected via interpolator, every increase of the value generates a further dead-time. When the IPO cycles of the NCUs within an NCU group are set to different values, the link communication will only run in the slowest IPO cycle. The MD must be increased in the ratio of the NCU IPO cycle to the slowest IPO cycle in the NCU group, in order to achieve a synchronized output of the setpoint values on the drive interface. The formula for this is as follows: MM_SERVO_FIFO_SIZE = 2 * IPO cycle ratio + 1 Example: In an IPO cycle ratio of 4:1, the value on the fast NCU should be set to 9 instead of 3. On the slow NCU, the value must be set to 3.					
-					
-	-	2	2	35	3/2

18780	**MM_NCU_LINK_MASK**			N01	B3
-	Activation of NCU-link communication			DWORD	POWER ON

```
Activating NCU link communication
Bit-coded activation data. That is the NCU link communication can be acti-
vated in various forms.
Bit-coded activation data:
Bit 0 = 0x1: Link communication is to be activated.
Bit 1 = 0x2: Different IPO and position-control cycles can be enabled.

(See description FAST_IPO_LINK)

Irrelevant for:
   Systems without link modules

Related to:
   IS_LOCAL_LINK_AXIS,
   NCU_LINK_NO,
   LINK_TERMINATION,
   LINK_NUM_OF_MODULES,
   LINK_BAUDRATE_SWITCH,
   LINK_RETRY_CTR
```

-					
-	-	0	0	3	3/2

18781	**NCU_LINK_CONNECTIONS**			N01	B3
-	Number of internal link connections			DWORD	POWER ON

```
Value = 0
The software calculates the internal link connnections itself.

Value > 0
Number of internal link connnections from each NCU to each other NCU.
These link connnections do not accommodate the non-cyclic messages.
Each of these connections can transfer 240 bytes of raw data.

Non-cyclic messages occur with alarms, container switches and link variablen.
```

LINK					
-	-	0	0	32	3/1

18782	**MM_LINK_NUM_OF_MODULES**			N01, N02	B3
-	Number of NCU-link modules			DWORD	POWER ON

```
LINK_NUM_OF_MODULES defines how many link modules can participate in the link
communication.
```

-					
-	-	2	2	16	3/2

18790	**MM_MAX_TRACE_LINK_POINTS**			EXP, N02, N06	B3
-	Trace data buffer size for NCU-Link			DWORD	POWER ON
MM_MAX_TRACE_LINK_DATAPOINTS defines the size of an internal data buffer which contains the trace recordings for the NCU-link functionality. The MD is only evaluated if bit 0 is set in MM_TRACE_LINK_DATA_FUNCTION BIT0. Related to: TRACE_SCOPE_MASK, MM_TRACE_DATA_FUNCTION, MM_MAX_TRACE_DATAPOINTS TRACE_STARTTRACE_EVENT, TRACE_STARTTRACE_STEP, TRACE_STOPTRACE_EVENT, TRACE_STOPTRACE_STEP, TRACE_VARIABLE_NAME, TRACE_VARIABLE_INDEX, MM_TRACE_LINK_DATA_FUNCTION					
NBUP					
-	-	8	0	20000	2/2

18792	**MM_TRACE_LINK_DATA_FUNCTION**			EXP, N02, N06	B3
-	Specifies the contents of the NCU-link files			DWORD	POWER ON
The NCK sends and receives 32 buffers with a length of 240 bytes in each interpolation cycle. These buffers are saved in an FIFO (first in-first out) memory of the length MM_MAX_TRACE_LINK_POINTS, and written to a file (ncsctr01.mpf for the 1st channel) if a "trigger event" occurs (e.g. Cancel Alarm button, see MD TRACE_STOPTRACE_EVENT and TRACE_STARTTRACE_EVENT). The machine data should be interpreted as bit mask and has the following meaning: BIT0 = 1 Enables the NCU-link trace file. The others are only evaluated when this bit is set! MD MM_MAX_TRACE_LINK_POINTS is only evaluated with this bit. BIT1 = 1 The stored buffer contents are analyzed according to their meanings and stored in the file in plain text. This means that one can, for example, recognize the setpoint transfer by means of the text items "desVal", actual value transfer under the identifiers "actVal".... BIT1 = 0 The buffers contents are displayed in HEX and not analyzed. BIT2 = 1 Only those buffers are recorded that contain a sporadically occuring communication message(dynamic message) between the NCUs. This include, for example, the following events: - Set machine data - Set link variables - Alarms spanning NCUs - Axis container rotation					
NBUP					
-	-	0	0	0x7FFFFFFF	2/2

18794	**MM_TRACE_VDI_SIGNAL**			EXP, N02, N06	-
-	Trace specification of VDI signals			DWORD	POWER ON
The NCK sends and receives PLC VDI signals. The Trace function stores the signals which have changed in each interpolation cycle in an FIFO memory (first in-first out) having a size of MM_MAX_TRACE_POINTS. The FIFO is written to a file (for the 1st channel: ncsctr01.mpf) when a "trigger event" occurs (e.g. Cancel Alarm key, see MD TRACE_STOPTRACE_EVENT and TRACE_STARTTRACE_EVENT). The machine data should be interpreted as bit mask. The corresponding VDI signals are recorded depending on which bit is set. Bits 1.. 6 describe which axial VDI input signals are recorded in the trace (see .. TRACE_DATA_FUNCTION).					
NBUP					
-	-	0	0	0x7FFFFFFF	2/2

18800	**MM_EXTERN_LANGUAGE**			N01, N12	FBFA
-	Activation of external NC languages			DWORD	POWER ON
The corresponding NC language must be activated to execute part programs of other control manufacturers. Only one external NC language can be selected. The range of instructions which is made available in each case is to be taken from the current documentation. Bit 0 (LSB): Execution of part programs ISO_2 or ISO_3. See $MN_MM_EXTERN_CNC_SYSTEM for coding.					
-					
-	-	0x0000	0x0000	0x0001	7/2

18860	**MM_MAINTENANCE_MON**			EXP, N01	-
-	Activation of maintenance data recording			BOOLEAN	POWER ON
Maintenance data is recorded when this MD has the value TRUE. The axial MD $MA_MAINTENANCE_DATA sets which data are to be recorded. Details are to be found in the service documentation.					
-					
-	-	FALSE	-	-	7/2

18870	**MM_MAXNUM_KIN_CHAINS**			EXP, N01	-
-	Max. number of kinematic chains			DWORD	POWER ON
Maximum number of kinematic chains in the system					
-					
-	-	0	-	200	7/2

18880	**MM_MAXNUM_KIN_CHAIN_ELEM**			EXP, N01	-
-	maximum number of elements in kinematic chains			DWORD	POWER ON
Maximum number of links in kinematic chains. If this MD has the value 0 (default value) then no kinematic chains at all are possible.					
-					
-	-	0	-	1000	7/2

18890	**MM_MAXNUM_3D_PROT_AREAS**			EXP, N01	-
-	Maximum number of elements in 3D protection areas			DWORD	POWER ON
Maximum number of elements in protection zones. If this MD has the value 0 (default value) then no protection zones are possible.					
-					
-	-	0	-	200	7/2

18892	**MM_MAXNUM_3D_PROT_AREA_ELEM**			EXP, N01	-
-	Max. number of protection zone elements			DWORD	POWER ON
Maximum number of protection zone elements. If this MD is 0 (default value), no protection zones are possible.					
-					
-	-	0	0	1000	7/2

18894	**MM_MAXNUM_3D_PROT_GROUPS**			EXP, N01	-
-	Max. number of protection zone groups			DWORD	POWER ON
Maximum number of protection zone groups in the system					
-					
-	-	0	0	100	7/2

18896	**MM_MAXNUM_3D_COLLISION**			EXP, N01	-
-	Max. number of temp. memories for collision check			DWORD	POWER ON
Maximum size of a temporary memory area, which is required for the collision check of two protection zones. If the two protection zones have m or n elements, a memory space of von 4 * n * m elements is required. Each memory space requires 4 bytes (FLOAT). If this machine data is 0, the size of the required memory is automatically derived from machine data $MN_MM_MAXNUM_3D_PROT_AREA_ELEM and $MN_MM_MAXNUM_3D_PROT_AREAS. If this memory size is not sufficient, it can explicitly be defined via this machine data.					
-					
-	-	0	0	MAX_SIZE_3D_S_MATRIX_MD	7/2

18898	**PROT_AREA_3D_TYPE_NAME_TAB**			EXP, N12, N07	-
-	Table of names for protection zone types			STRING	POWER ON
Contains the names for the protection zone types. The meaning of the entry is determined by the postition in the list. A change of name does therefore not cause a change of function. Meaning of entries: 1. Empty (no protection zone defined) 2. Cuboid 3. Sphere 4. Cylinder 5. Cone 6. Truncated cone 7. Square pyramid 8. Rectangular pyramid 9. Square truncated pyramid 10.Rectangular truncated pyramid Example: If the third entry "SPHERE" is changed into "CUBOID", this new key-word "CUBOID" still designates a sphere. A meaningful change would be, for example "SP".					
-					
-	10	"BOX","SPHERE","CYLINDER","CONE"...	-	-	7/2

18900	**FPU_ERROR_MODE**			EXP	-
-	System reaction to FPU calculation error			DWORD	POWER ON
System response to floating point unit arithmetic errors Bit 0 = 0: (LSB) The response to an FPU arithmetic error takes place during a station change by the station controller polling the FPU status word. (For CPUs without exception handling) Bit 0 = 1: There is an immediate branch into an exception when an FPU arithmetic error occurs: The address at which the arithmetic error occurred can be exactly local-ized in the alarm output					
NBUP, NDLD					
-	-	0x1	-	-	0/0

18910	**FPU_CTRLWORD_INIT**			EXP	-
-	Basic initialization of FPU control word			DWORD	POWER ON
The basic initialization of the FPU control word enables the FPU mode of oper-ation (e.g. rounding mode) to be changed. Significance of the bit: see manual of the FPU used.					
NBUP, NDLD					
-	-	0x37F	-	-	0/0

18920	FPU_EXEPTION_MASK	EXP	-
-	Exception mask for FPU calculation errors	DWORD	POWER ON

```
The exception mask for FPU calculation errors enables selection of the FPU
    error for which an exception was issued.
Significance of the bits for Intel 486:
Bit 0 (LSB):
   invalid operation
Bit 1:
   denormalized operand: | operand | < as the smallest 2nd power
Bit 2:
   zero divide
Bit 3:
   overflow: result is larger than the largest displayable number
Bit 4:
   underflow: result is smaller than the smallest displayable number
Bit 5:
   precision: result cannot be displayed exactly (e.g. 1/3)

Significance of the bits for Intel 960:
Bit 12:
   integer overflow
Bit 24:
   floating overflow
Bit 25:
   floating underflow
Bit 26:
   invalid operation
Bit 27:
   zero divide
Bit 28:
   floating inexact (precision): result cannot be displayed exactly
Bit 29:
   denormalized operand
```

NBUP, NDLD					
-	-	0xD	-	-	0/0

1.4 Channel specific machine data

Number	**Identifier**			Display filters	Reference
Unit	Name			Data type	Active
Description					
Attributes					
System	Dimension	Default value	Minimum value	Maximum value	Protection

1.4.1 Basic channel machine data

20000	**CHAN_NAME**			C01, C10	K1
-	Channel name			STRING	POWER ON
The channel name can be defined in this MD. The channel name is only used for the display on the HMI.					
-					
-	-	"CHAN1","CHAN2", "CHAN3","CHAN4"...	-	-	7/2

20050	**AXCONF_GEOAX_ASSIGN_TAB**			C01, C10	K2
-	Assignment of geometry axis to channel axis			BYTE	POWER ON
This MD is used to specify which channel axis the geometry axis is assiged to. The assignment must be made channel-specifically for all geometry axes. If a geometry axis is not assigned to a channel axis, this geometry axis is not existing and cannot be programmed (with the name defined under AXCONF_GEOAX_NAME_TAB). For example: Turning machine without transformation: $MC_AXCONF_GEOAX_ASSIGN_TAB[0] = 1 ; 1st geometry axis = 1st channel axis $MC_AXCONF_GEOAX_ASSIGN_TAB[1] = 0 ; 2nd geometry axis not defined $MC_AXCONF_GEOAX_ASSIGN_TAB[2] = 2 ; 3rd geometry axis = 2nd channel axis The assignment made here is valid if no transformation is active. With active transformation n, the transformation-specific assignment table TRAFO_GEOAX_ASSIGN_TAB_n becomes active.					
-					
-	3	1, 2, 3,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2
710-2a2c	-	0, 0, 0	-	-	-/-
840d-2a2c	-	0, 0, 0	-	-	-/-

20060	**AXCONF_GEOAX_NAME_TAB**			C01, C11, C10	K2
-	Geometry axis name in channel			STRING	POWER ON

```
This MD is used to enter the names of the geometry axes for the channel sepa-
rately. Geometry axes can be programmed in the part program using the names
specified here.

Special cases:
- The specified geometry axis name must not conflict with the designation and
    assignment of the machine and channel axis names.
- The entered machine axis name must not be the same as the names entered for
    Euler angles (MD 10620: EULER_ANGLE_NAME_TAB), names specified for direc-
    tional vectors (MD 10640: DIR_VECTOR_NAME_TAB), names given to intermedi-
    ate point coordinates in the case of CIP (MD 10660:
    INTERMEDIATE_POINT_NAME_TAB) and the names of interpolation parameters (MD
    10650: IPO_PARAM_NAME_TAB).

- The geometry axis name must not include any of the following reserved
    address letters:
    - D Tool offset (D function)                     - E Reserved
    - F Feedrate (F function)                         - G Preparatory func-
    tion
    - H Auxiliary function (H function)             - L Subroutine call
    - M Miscellaneous function (M function)  - N Subblock
    - P Subroutine number of passes           - R Arithmetic parameters
    - S Spindle speed (S function)                - T Tool (T function)

- The name must not include any keywords (e.g. DEF, SPOS etc.) or pre-defined
    designations (e.g. ASPLINE, SOFT).
- The use of axis designations consisting of a valid address letter (A, B, C,
    I, J, K, Q, U, V, W, X, Y, Z), followed by an optional numerical exten-
    sion (1-99) gives slightly better block cycle times than a general desig-
    nation.
- Identical names may be given to geometry axes assigned to different chan-
    nels.

Related to:
    MD 10000: AXCONF_MACHAX_NAME_TAB
   (machine axis name [axis no.])
    MD 20080: AXCONF_CHANAX_NAME_TAB
   (channel axis name in the channel [channel axis no.])
```

-					
-	3	"X", "Y", "Z","X", "Y", "Z"...	-	-	7/2

20070	AXCONF_MACHAX_USED	C01, C10	K2
-	Machine axis number valid in channel	BYTE	POWER ON

This MD is used to specify the machine axis which the channel axis/special axis is assigned to. Each channel axis has to be assigned to a specific channel. A machine axis that is not assigned to a channel is not active, i.e. the axis control is not computed, the axis is not shown on the screen and it cannot be programmed in any channel.

From software version 5, it is permissible not to assign a machine axis to a channel axis for reasons of uniform configuration. The MD for the machine axis is set to 0 in this case. At the same time, MD 11640: ENABLE_CHAN_AX_GAP must be set to 1 (channel axis gaps are permitted).

From software version 5, the machine data MD 20070: AXCONF_MACHAX_USED does not directly refer to the machine axes created with MD 10000: AXCONF_MACHAX_NAME_TAB, but to the logical machine axis map which is defined with MD 10002: AXCONF_LOGIC_MACHAX_TAB.

MD 10002: AXCONF_LOGIC_MACHAX_TAB refers:
- directly to a local machine axis on the NCU,
- to a machine axis of another NCU in the NCU grouping or
- indirectly to an axis container with local or remote machine axes.

If the default values AX1, AX2, ..., AX31 are entered with MD 10002: AXCONF_LOGIC_MACHAX_TAB, then the NCK behaves in the same way as up to software version 4, this means that machine data MD 20070: AXCONF_MACHAX_USED refers to the corresponding local machine axis.

Special cases:
- Each geometry axis must be assigned to a channel axis and a machine axis so that it can be programmed.
- If a machine axis is assigned to several channels by means of AXCONF_MACHAX_USED, then the number of the channel from which the axis must be programmed must be entered in MD 30550: AXCONF_ASSIGN_MASTER_CHAN.
- Up to software version 4, the list of entries must not contain any gaps (from software version 5 see above). In contrast, the machine axes used may contain gaps.

```
For example:
Permissible:
   AXCONF_MACHAX_USED [0] = 3; 3rd MA is 1st axis in channel
   AXCONF_MACHAX_USED [1] = 1; 1st MA is 2nd axis in channel
   AXCONF_MACHAX_USED [2] = 5; 5th MA is 3rd axis in channel
   AXCONF_MACHAX_USED [3] = 0

Error for software version 4, permissible for version 5:
   AXCONF_MACHAX_USED [0] = 1; 1st MA is 1st axis in channel
   AXCONF_MACHAX_USED [1] = 2; 2nd MA is 2nd axis in channel
   AXCONF_MACHAX_USED [2] = 0; gap in the list ...
   AXCONF_MACHAX_USED [3] = 3; ... of the channel axes

Axis identifiers must be defined in the corresponding list places of
AXCONF_CHANAX_NAME_TAB for axes activated in the channel.
Related to:
    MD 30550: AXCONF_ASSIGN_MASTER_CHAN
   (Initial setting of the channel for axis change)
    MD 20080: AXCONF_CHANAX_NAME_TAB
   (Channel axis name in the channel [channel axis number])
    MD 10002: AXCONF_LOGIC_MACHAX_TAB
    MD 11649: ENABLE_CHAN_AX_GAP
Reference:
   Description of Functions B3.
```

-					
-	20	1, 2, 3, 4, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	31	7/2
710-2a2c	2	1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	-/-
710-6a2c	-	1, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	-/-
840d-2a2c	2	1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	-/-
840d-4a1cg	4	-	-	-	-/-
840di-basic	-	1, 2, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	-/-

20080	**AXCONF_CHANAX_NAME_TAB**		C01, C11, C10		K2
-	Channel axis name in channel		STRING		POWER ON

This MD is used to set the name of the channel axis/special axis. The first three channel axes are normally occupied by the three assigned geometry axes (see also MD 20050: AXCONF_GEOAX_ASSIGN_TAB). The remaining channel axes are also designated as special axes. The channel axis/special axis is always displayed on the screen in the WCS (workpiece coordinate system) with the name set in this MD.

Special cases:
- The specified channel axis name/special axis name must not conflict with the designation and assignment of the machine and geometry axis names.
- The specified channel axis name must not be the same as the names entered for Euler angles (MD 10620: EULER_ANGLE_NAME_TAB), names specified for directional vectors (MD 10640: DIR_VECTOR_NAME_TAB), names given to intermediate point coordinates in the case of CIP (MD 10660: INTERMEDIATE_POINT_NAME_TAB) and the names of interpolation parameters (MD 10650: IPO_PARAM_NAME_TAB).
- The channel axis name entered must not include any of the following reserved address letters:
  - D Tool offset (D function) - E Reserved
  - F Feedrate (F function) - G Preparatory function
  - H Auxiliary function (H function) - L Subroutine call
  - M Miscellaneous function (M function) - N Subblock
  - P Subroutine number of passes - R Arithmetic parameters
  - S Spindle speed (S function) - T Tool (T function)

- The name must not include any keywords (e.g. DEF, SPOS etc.) or pre-defined identifiers (e.g. ASPLINE, SOFT).
- The use of axis identifiers consisting of a valid address letter (A, B, C, I, J, K, Q, U, V, W, X, Y, Z), followed by an optional numerical extension (1-99) gives slightly better block cycle times than a general identifier.
- No special names need be entered in this MD for channel axes to which geometry axes are assigned (normally the first three channel axes) .

Axis identifiers that are not allowed are rejected with an alarm during runup.

-					
-	20	"X", "Y", "Z", "A", "B", "C", "U", "V", "X11", "Y11"...	-	-	7/2
710-2a2c	2	-	-	-	-/-
840d-2a2c	2	-	-	-	-/-
840d-4a1cg	4	-	-	-	-/-

20082	**AXCONF_CHANAX_DEFAULT_NAME**		C01, C11, C10	-	
-	Default axis name for axis variables in the channel		STRING	POWER ON	
Variables or parameters of type Axis which have not been initialized are initialized with a default axis identifier. The identifier can be configured via the machine data $MC_AXCONF_CHANAX_DEFAULT_NAME. If this machine data is set with an empty string, the 1st geometry axis is used, as previously. $MC_AXCONF_CHANAX_DEFAULT_NAME can be set by default with all available, valid axis identifiers. The value of this machine data should generally always correspond to a value of $MC_AXCONF_GEOAX_NAME_TAB, $MC_AXCONF_CHANAX_NAME_TAB or $MN_AXCONF_MACHAX_NAME_TAB. If an invalid axis name is entered as a value or if this name has been changed, for example, in $MC_AXCONF_CHANAX_NAME_TAB but not in $MC_AXCONF_CHANAX_DEFAULT_NAME, this is indicated with alarm 4041 channel %1 block %2 axis identifier %3 is invalid". For $MC_AXCONF_CHANAX_DEFAULT_NAME, only valid axis identifiers, empty string, and "NO_AXIS" are allowed. "NO_AXIS" is used for recognition of a non-initialized axis variable, empty string means previous behavior, i.e. each variable is initialized with the 1st geometry axis.					
-					
-	-		-	-	7/2

20090	**SPIND_DEF_MASTER_SPIND**		C01, C03	S1	
-	Initial setting of master spindle in channel		BYTE	POWER ON	
Each channel must have a master spindle for the following functions: - G95 Revolutional feedrate - G96 /G961 S1 --> Spindle 1 constant cutting speed in m/min (SINUMERIK FM-NC only) - G97 /G971 Cancel G96/G961 and freeze last spindle speed - G63 Tapping with compensating chuck - G33 Thread cutting - G34 Thread lead increase (progress. speed change) - G35 Thread lead increase (degress. speed change) - G331/G332 Rigid tapping - G4 S1 --> Spindle 1 dwell time in spindle revolutions The master spindle can also be programmed with the program commands M3, M4, M5, S, SPOS, WAITS, SPOSA, M19, M40, M41 to M45 without specifying the spindle number. The spindle number of the channel's master spindle is entered in MD 20090: SPIND_DEF_MASTER_SPIND. The initial setting of the master spindle applies until a new master spindle is defined with the SETMS program command. The SETMS setting is deleted with NC start. Following an M02/M30 and new NC start, the spindle defined in SPIND_DEF_MASTER_SPIND is always the master spindle.					
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	1	20	7/2

20092	SPIND_ASSIGN_TAB_ENABLE		C01, C03, C10		S1
-	Enable/disable the spindle converter.		BYTE		RESET

```
Value 0:
The spindle converter function is deactivated. The contents of SD 42800:
    SPIND_ASSIGN_TAB[..] are not evaluated.

Value 1:
The spindle converter is activated. Conversion from logical to physical spin-
    dle takes place. For more information, see SD 42800: SPIND_ASSIGN_TAB.

Note:
   The spindle converter is deactivated after "Delete SRAM" (startup switch to
position "1").

Related to:
    SD 42800: SPIND_ASSSIGN_TAB
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/7

20094	SPIND_RIGID_TAPPING_M_NR		C01, C03, C10		FBFA
-	M function for switching into controlled axis mode		DWORD		POWER ON

```
This machine data defines the M auxiliary function number with which the spin-
dle is switched over to the axis mode.
The M number defined in the machine data replaces M70 in the Siemens language
    mode.

Note:
    On the VDI interface, M70 with the corresponding address extension is
    always output as an identifier for the switchover to the axis mode.
   Restrictions: Refer to machine data 10715: $MN_M_NO_FCT_CYCLE

Related to:
   $MN_M_NO_FCT_EOP,
   $MN_M_NO_FCT_CYCLE,
   $MC_SPIND_RIGID_TAPPING_M_NR,
   $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:
   $MN_EXTERN_M_NO_MAC_CYCLE,
   $MN_EXTERN_M_NO_SET_INT
   $MN_EXTERN_M_NO_DISABLE_INT,
   $MN_EXTERN_CHAN_SYNC_M_NO_MIN,
   $MN_EXTERN_CHAN_SYNC_M_NO_MAX
   $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:
   $MC_NIBBLE_PUNCH_CODE
```

-					
-	-	70,70,70,70,70,70,70,70,70,70,70,70,70...	-	-	7/2

<table>
<tr><td>20095</td><td colspan="3">EXTERN_RIGID_TAPPING_M_NR</td><td>C01, C11, C03, C10</td><td>FBFA</td></tr>
<tr><td>-</td><td colspan="3">M function for switching to controlled axis mode(external mode)</td><td>DWORD</td><td>POWER ON</td></tr>
<tr><td colspan="6">This machine data defines the M function number, with which switchover to controlled spindle/axis mode is to be carried out.
The M number defined in the machine data replaces M29 in external language mode.
Pre-defined M numbers such as M00,M1,M2,M3, etc. are not allowed as M number.

Restrictions: See machine data 10715 $MN_M_NO_FCT_CYCLE

Related to:
$MN_M_NO_FCT_EOP,
$MN_M_NO_FCT_CYCLE,
$MC_SPIND_RIGID_TAPPING_M_NR,
$MC_AUXFU_ASSOC_M0_VALUE

For external language mode:
$MN_EXTERN_M_NO_MAC_CYCLE,
$MN_EXTERN_M_NO_SET_INT
$MN_EXTERN_M_NO_DISABLE_INT,
$MN_EXTERN_CHAN_SYNC_M_NO_MIN,
$MN_EXTERN_CHAN_SYNC_M_NO_MAX
$MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:
$MC_NIBBLE_PUNCH_CODE</td></tr>
<tr><td>-</td><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td>-</td><td>-</td><td>29,29,29,29,29,29,29,29,29,29,29,29,29 ...</td><td>-</td><td>-</td><td>7/2</td></tr>
</table>

20096	**T_M_ADDRESS_EXT_IS_SPINO**		C01, C04, C09		W1,FBW
-	Meaning of address extension at T, M tool change		BOOLEAN		POWER ON

This MD is only significant if the functions 'Tool management'/'flat D numbers' are inactive.

FALSE

The contents of the address extension of the NC addresses T and M 'tool change command number' are not evaluated by the NCK. The PLC decides on the significance of the programmed extension.

TRUE

The address extension of the NC addresses T and M 'tool change command number' - 'tool change command number'=TOOL_CHANGE_M_CODE with 6 as the default value - are interpreted as the spindle number.
NCK treats the extension in the same way as the active functions 'tool management', and 'flat D number management'.
That is, the programmed D number always refers to the T number of the programmed main spindle number.

See also:
$MC_SPIND_DEF_MASTER_SPIND,
$MC_TOOL_CHANGE_MODE,
$MC_TOOL_CHANGE_M_CODE

-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

20098	**DISPLAY_AXIS**			EXP, C01	IAD
-	Display axis on HMI			DWORD	SOFORT

```
Identification whether the axis is to be displayed by the HMI as a machine,
geometry or auxiliary axis.
This data is only evaluated by the HMI.


Bit 0 to 15: MCS
Bit 0= 1 Display machine axis in the actual-value windows
       0       Hide machine axis in the actual-value windows
Bit 1= 1 Display machine axis in the reference-point windows
       0       Hide machine axis in the reference-point windows
Bit 2=1  Display machine axis in the present/basic offset/scratch window
       0        Hide machine axis in the present/basic offset/scratch window
Bit 3= 1 Display machine axis in the handwheel selection window
       0       Hide machine axis in the handwheel selection window

Bit 16 to 31: WCS
Bit 16= 1 Display geometry axis in the actual-value window
        0     Hide geometry axis in the actual-value window
(Bit 17)   not assigned
Bit 18= 1 Display geometry axis in the basic offset window
        0   Hide geometry axis in the basic offset window
Bit 19= 1 Display geometry axis in the handwheel selection window
        0     Hide geometry axis in the handwheel selection window
```

-					
-	20	0xFFFFFFFF, 0xFFFFFFFF, 0xFFFFFFFF, 0xFFFFFFFF, 0xFFFFFFFF...	-	-	7/2
710-2a2c	2	-	-	-	-/-
840d-2a2c	2	-	-	-	-/-
840d-4a1cg	4	-	-	-	-/-

20100	DIAMETER_AX_DEF		C01, C10	P1
-	Geometry axis with transverse axis function		STRING	POWER ON

```
This MD is used to determine a geometry axis as a transverse axis. Only one
transverse axis can be defined here for each channel.
Further transverse axes for axis-specific diameter programming can be acti-
vated via MD30460, bit 2.
The axis identifier of an active geometry axis that has been defined via chan-
    nel-specific MD 20050: AXCONF_GEOAX_ASSIGN_TAB[n] or MD 24120:
    TRAFO_AX_GEOAX_ASSIGN_TAB_1[n] (from SW 4) and MD 20060:
    AXCONF_GEOAX_NAME_TAB[n] must be specified.

If space characters are entered or if an axis identifier is specified for an
    axis which is not defined as a geometry axis, this leads to the following
    alarms:
- during runup, to alarm 4032 "Channel %1 wrong identifier for transverse axis
    in %2, if the "Diameter programming" function (DIAMON) or constant cut-
    ting velocity G96/G961/G962 is the switch-on setting.
- when the "Diameter programming (DIAMON)" function is activated, to alarm
    16510 "Channel %1 block %2 No transverse axis available for diameter pro-
    gramming", if no axis has been permitted via DIAMCHANA[AX] for channel-
    specific diameter programming.
- when G96/G961/G962 has been programmed, to alarm 10870 "Channel %1 block %2
    No transverse axis defined as reference axis for G96/G961/G962", if no
    geometry axis has been defined via the instruction SCC[ax] as reference
    axis for G96/G961/G962.

Related to:
    MD 20050: AXCONF_GEOAX_ASSIGN_TAB[n]
   (assignment of geometry axis to channel axis)
    MD 20060: AXCONF_GEOAX_NAME_TAB[n]
   (geometry axis name in the channel)
    MD 24120: TRAFO_AX_GEOAX_ASSIGN_TAB_1[n]
   (assignment of  GEO axis to channel axis for transformation 1)
    MD 30460: BASE_FUNCION_MASK
   (Bit2 == 1: Axis-specific diameter programming)
```

-					
-	-		-	-	7/2

20106	**PROG_EVENT_IGN_SINGLEBLOCK**			N01	-
-	Prog-Events ignore single block			DWORD	POWER ON

```
Event-controlled programm calls (Prog-Events) can be set regarding their sin-
gle block behavior.

Bit 0 = 1 :
   Prog-Event after part program start causes block change without restart
Bit 1 = 1 :
   Prog-Event after part program end causes block change without restart
Bit 2 = 1 :
   Prog-Event after OP reset causes block change without restart
Bit 3 = 1 :
   Prog-Event after runup causes block change without restart
Bit 4 = 1 :
   Prog-Event after 1st start after search run causes block change without
restart
```

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1F	7/2

20107	**PROG_EVENT_IGN_INHIBIT**			N01	-
-	Prog-Events ignore read-in disable			DWORD	POWER ON

```
Event-controlled programm calls (Prog-Events) can be set regarding their read-
in disable behavior.

Bit 0 = 1 :
   Prog-Event after part program start causes block change despite read-in
disable
Bit 1 = 1 :
   Prog-Event after part program end causes block change despite read-in dis-
able
Bit 2 = 1 :
   Prog-Event after OP reset causes block change despite read-in disable
Bit 3 = 1 :
   Prog-Event after runup causes block change despite read-in disable
Bit 4 = 1 :
   Prog-Event after 1st start after search run causes block change despite
read-in disable
```

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1F	7/2

20108	**PROG_EVENT_MASK**			N01, -	K1
-	Setting of event-driven programm calls			DWORD	POWER ON
Parameterization of the events, at which the user program set with $MN_PROG_EVENT_NAME (default: _N_PROG_EVENT_SPF) is called implicitly: Bit 0 = 1 : Part program start Bit 1 = 1 : Part program end Bit 2 = 1 : Operator panel reset Bit 3 = 1 : Runup The user program is called via the following search path: 1. /_N_CUS_DIR/_N_PROG_EVENT_SPF 2. /_N_CMA_DIR/_N_PROG_EVENT_SPF 3. /_N_CST_DIR/_N_PROG_EVENT_SPF					
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xF	7/2

20109	**PROG_EVENT_MASK_PROPERTIES**			N01	K1
-	Properties of Prog-Events			DWORD	POWER ON
Parameterization of additional properties of the event-controlled program calls (in short, Prog-Event), that is, the MD $MC_PROG_EVENT_MASK is further parameterized. Bit 0 = 1 : An ASUB started from channel status RESET does not result in a Prog-Event.					
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1	7/2

20110	RESET_MODE_MASK	C11, C03	K1
-	Definition of basic control settings after reset/PP end	DWORD	RESET

```
Definition of the initial setting of the control after runup and on reset /
   end-of-part-program with regard to the G codes (in particular the active
   plane and the settable zero offset), tool length compensation and trans-
   formation by setting the following bits:

Bit Hex.Meaning
    value
 0: 0x1 Reset mode
 1: 0x2 Suppress aux. funct. output on tool selection
 2: 0x4 Select reset response after POWER ON (e.g. tool offset)
 3: 0x8 Relevant only without active tool management:
       Select reset response after end of test mode with reference to active
    tool offsets.
       The bit is only relevant when bits 0 and 6 (0x41) are set.
       It defines what 'Current setting for active tool length compensation'
    refers to:
       - the program which was active at the end of test mode
       - the program which was active before test mode was switched on
 4: 0x10Reserved!   Setting now via
 5: 0x20Reserved!   $MC_GCODE_RESET_MODE[]
 6: 0x40Reset response "Active tool length compensation"
 7: 0x80Reset response "Active kinematic transformation"
 8: 0x100Reset response "Coupled-motion axes"
 9: 0x200Reset response "Tangential follow-up"
10: 0x400Reset response "Synchronous spindle"
11: 0x800Reset response "Revolutional feedrate"
12: 0x1000Reset response "Geo-axis replacement"
13: 0x2000Reset response "Master value coupling"
14: 0x4000Reset response "Basic frame"
15: 0x8000Reset response "Electronic gearbox"
16: 0x10000Reset response "Master spindle"
17: 0x20000Reset response "Master tool holder"
18: 0x40000Reset response "Reference axis for G96/G961/G962"


Bits 4 to 11, 16 and 17 are only evaluated when bit 0 = 1.

Meaning of each bit:

Bit 0(LSB) = 0 :   Corresponds to response of SW 1

Initial setting after power-up:
- G codes acc. to $MC_GCODE_RESET_VALUES;
- Tool length compensation not active
- Transformation not active
- No coupled axis groupings active
- No tangential follow-up active
- No axial revolutional feedrate active
- Path revolutional feedrate with master spindle (default)
```

```
Initial setting after reset or end of part program:
The current settings are retained. When next part program is started, the fol-
    lowing reset state is in effect:
- G codes acc. to $MC_GCODE_RESET_VALUES;
- Tool length compensation not active
- Transformation not active
- No coupled axis groupings active
- No tangential follow-up active
- No master value coupling active
- No axial revolutional feedrate active
- Path revolutional feedrate with master spindle (default)

Bit 0(LSB) = 1:
    Initial setting after power-up:
- G codes acc. to $MC_GCODE_RESET_VALUES;
- Tool length compensation active acc. to  $MC_TOOL_RESET_VALUE,
    $MC_CUTTING_EDGE_RESET_VALUE and $MC_SUMCORR_RESET_VALUE
- Transformation active acc. to $MC_TRAFO_RESET_VALUE
- Geometry axis change acc. to $MC_GEOAX_CHANGE_RESET
- No coupled axis groupings active
- No tangential follow-up active
    Initial setting after reset or end of part program:
    Depending on $MC_GCODE_RESET_MODE the current settings are retained for
    the G groups or the initial settings stored in $MC_GCODE_RESET_VALUES are
    set.

    Initial setting after reset or end of part program:
    Depending on $MC_RESET_MODE_MASK bits 6 to 7,
    the current settings are retained or the initial settings stored in the
    MDs are set for
     - tool length compensation
     - transformation.
    Depending on bits 8 and 9, the current settings of coupled motion axes or
    tangentially corrected axes are either deactivated or retained.
     - Synchronous spindle coupling configured:
    The coupling is deselected depending on the setting in
    $MC_COUPLE_RESET_MODE_1.
     - Synchronous spindle coupling not configured:
    Depending on bit 10, the copling is either deactivated or retained.
    Depending on bit 14, the basic frame is either retained or deselected.

Bit 1 = 0:
    Aux. funct. output (D, T, M) to PLC on tool selection according to MDs
    $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE,
    $MC_TOOL_PRESEL_RESET_VALUE and $MC_TOOL_CHANGE_MODE. With active maga-
    zine management, T, M are generally not output as auxiliary functions.
    The function
Bit 1 = 1:
    Suppress aux. funct. output to PLC on tool selection. When
    the tool management or magazine management function is active, T, M are
    generally not output as auxiliary functions.

 uses its own communication in order to output T, M to the PLC.
```

```
Bit 2 = 0:
    When tool or magazine management not active:
- No tool offset after POWER ON active Active and programmed T depend on the
    further settings of the machine data  (bits 0, 6).
    When tool or magazine management active:
- Not relevant.

Bit 2 = 1:
    When tool or magazine management not active:
- If bit 0 and bit 6 = 1 (0x41), the tool offset of the last active tool in
    NCK is active after the first resedt after Power ON.
    (The value of the programmed tool depends on the value of machine data
    $MC_TOOL_PRESEL_RESET_VALUE.)
    Notice: The NCK does not know the conditions at the machine
    When tool or magazine management active:
- Not rellevant.
Bit 3 = 0:
    With and without active tool management:
    End of test mode: "Current setting for active tool length compensation is
    retained" (bits 0 and 6 set) refers to the program which was active before
    activation (!) of test mode.

Bit 3 = 1:
    Relevant only without active tool management:
    End of test mode: "Current setting for active tool length compensation is
    retained" (bits 0 and 6 set) refers to the program which was active at the
    end of test mode. (When tool management is active, the tool on the spin-
    dle is generally the active tool. Exception only for
    $MC_CUTTING_EDGE_DEFAULT = -2)

Bit 4 = 0:    Reserved!  Setting now via
Bit 4 = 1:    Reserved!  $MC_GCODE_RESET_MODE[]

Bit 5 = 0:    Reserved!  Setting now via
Bit 5 = 1:    Reserved!  $MC_GCODE_RESET_MODE[]


Bit 6 = 0:
    Initial setting for active tool length compensation after reset/part pro-
    gram end acc. to $MC_TOOL_RESET_VALUE,$MC_CUTTING_EDGE_RESET_VALUE,
    $MC_USEKT_RESET_VALUE and $MC_SUMCORR_RESET_VALUE.
    If $MC_TOOL_CHANGE_MODE = 1, the tool specified in
    $MC_TOOL_PRESEL_RESET_VALUE is also preselected.
    When the tool or magazine management function is active, data
    $MC_TOOL_RESET_VALUE is not used but $MC_TOOL_RESET_NAME instead.


Bit 6 = 1:
    Current setting for active tool length compensation is retained after
    reset/end of part program.
    When the tool or magazine management function is active, the tool that is
    currentlly on the master spindle (generally=master tool holder) is
    selected.
    If the tool on the master spindle is blocked, the 'blocked' status is
    ignored.
```

It must be observed that after program end, program abort either the value for master spindle or master tool holder programmed last in the program or the value defined by $MC_SPIND_DEF_MASTER_SPIND or $MC_TOOL_MANAGEMENT_TOOLHOLDER defines the master spindle or master tool holder.
(selected via bit16 or bit17)

For $MC_CUTTING_EDGE_DEFAULT = -2 the following applies especially:
If a tool has been changed in onto the spindle, but a new compensation D has not yet been programmed, the previous tool is still active in the NCK. If machining is aborted in this status, e.g. with the Reset key, the compensation is determined with the smallest D number of the master spindle tool.

Bit 7 = 0:
Initial setting for active transformation after reset/part program end according to $MC_TRAFO_RESET_VALUE.

Bit 7 = 1:
The current setting for the active transformation is retained after reset/end of part program.

Bit 8 = 0:
Coupled axis groupings are ungrouped after reset/end of part program.

Bit 8 = 1:
Coupled axis groupings remain active after reset/end of part program.

Bit 9 = 0:
Tangential follow-up is switched off at reset/end of part program.

Bit 9 = 1:
Tangential follow-up remains active after reset/end of part program.

Bit 10 = 0:
Non-configured synchronous spindle coupling is switched off at reset/end of part program.

Bit 10 = 1:
Non-configured synchronous spindle coupling remains active after reset/end of part program.

Bit 11 = 0:
On reset/end of part program, the setting data $SA_ASSIGN_FEED_PER_REV_SOURCE is reset to 0 for all non-active axes/spindles, i.e. traversing at revolutional feedrate is cancelled and the setting for path and synchronous axes is reset to the master spindle (default).

Bit 11 = 1:
The current setting for revolutional feedrate is retained after reset/end of part program. At the start of the part program, the setting data $SA_ASSIGN_FEED_PER_REV_SOURCE is reset to 0 for all non-active axes/spindles, i.e. traversing at revolutional feedrate is cancelled and the setting for path and synchronous axes is reset to the master spindle (default).

Bit 12 = 0:
With machine data $MC_GEOAX_CHANGE_RESET set, a changed geometry axis assignment is cancelled with reset/end of part program. The initial setting for the geometry axis assignment defined in the machine data becomes active.

Bit 12 = 1:
A changed geometry axis assignment remains active after reset/end of part program.

Bit 13 = 0:
Master value couplings are cancelled with reset/end of part program.

Bit 13 = 1:
Master value couplings remain active after reset/end of part program.

Bit 14 = 0:
The basic frame is deselected.

Bit 14 = 1:
The current setting of the basic frame is retained.

Bit 15 = 0:
Active electronic gearboxes remain active after reset/end of part program.

Bit 15 = 1:
Active electronic gearboxes are cancelled with reset/end of part program.

Bit 16 = 0:
Initial setting for the master spindle according to $MC_SPIND_DEF_MASTER_SPIND.
Bit 16 = 1:
The current setting of the master spindle (SETMS) is retained.
With $MC_TOOL_MANAGEMENT_TOOLHOLDER=0, this bit has also an effect on the response of bit6.
Bit 17 = 0:
Initial setting for the master tool holder according to $MC_TOOL_MANAGEMENT_TOOLHOLDER
Bit 17 = 1:
The current setting of the master tool holder (SETMTH) is retained (Bit17 is relevant only with active tool or magazine management and if $MC_TOOL_MANAGEMENT_TOOLHOLDER> 0. Otherwise, the setting for master spindle bit 16 applies with active tool or magazine management. This bit has also an effect on the response of bit6.

Bit 18 = 0:
Reference axis for G96/G961/G962 in accordance with MD20110 $MC_DIAMETER_AX_DEF.
Bit 18 = 1:
Reference axis for G96/G961/G962 is retained.

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x3FFFF	7/2
710-2a2c	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-
710-6a2c	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-
710-12a2c	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-
710-31a10c	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-
840di-basic	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-
840di-universal	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-
840di-plus	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	-	-	-/-

20112	START_MODE_MASK	C03	K1
-	Definition of basic control settings at NC Start	DWORD	RESET

```
Definition of the initial setting of the control at the start of the part pro-
    gram with respect to G codes (in particular, active plane and active set-
    table zero offset), active tool length compensation, transformation and
    axis couplings by setting of the following bits:
Bit          Meaning

 0: (LSB)  0x1   Not assigned; $MC_START_MODE_MASK is evaluated every time a
    part program is started.
 1: Suppress aux. funct. output on tool selection.
 2  - Not assigned (reserved)
      (see corresponding bit in RESET_MODE_MASK).
 3: - Not assigned (reserved).
      (see corresponding bit in RESET_MODE_MASK).
 4: Start response for G code "Current plane"
 5: Start response for G code "Settable zero offset"
 6: Start response for "Active tool length compensation"
 7: Start response for "Active transformation"
 8: Start response for "Coupled-motion axes"
 9: Start response for "Tangential follow-up"
10: Start response for "Synchronous spindle"
11: - Not assigned (reserved)
      (see corresponding bit in RESET_MODE_MASK).
12: Start response for "Geometry axis change"
13: Start response for "Master value coupling"
14: - Not assigned (reserved)
      (see corresponding bit in RESET_MODE_MASK).
15: - Not assigned (reserved)
         (see corresponding bit in RESET_MODE_MASK).
16: Start response for "Master spindle"
17: Start response for "Master tool holder"
18: Start response for "Reference axis for G96/G961/G962"
Meaning of individual bits:

Bit 1 = 0:
    Auxiliary function output (D,T,M,DL) to PLC with tool selection according
    to the following MDs:
    $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE,
    $MC_TOOL_PRESEL_RESET_VALUE and $MC_TOOL_CHANGE_MODE.
    Note: With active tool or magazine management only auxiliary functions D
    and DL are output.

Bit 1 = 1:
    Suppress auxiliary function output to PLC on tool selection.
    Bit 1 is not relevant with active tool or magazine management.

Bit 2 :  Reserved (reset response after Power On)
Bit 3 :  Reserved (end of test mode)
```

```
Bit 4 = 0:
    The current setting for a G code "current plane" is retained.

Bit 4 = 1:
    Initial setting for G code "current plane" according to
    $MC_GCODE_RESET_VALUES.

Bit 5 = 0:
    The current setting for G code "settable zero offset" is retained.

Bit 5 = 1:
    Initial setting for G code "settable zero offset" according to
    $MC_GCODE_RESET_VALUES.

Bit 6 = 0:
    The current setting for the active tool length compensation is retained.
    With active tool or magazine management, the tool currently on the active
    tool holder (spindle) is always selected.
    If the tool that is currently on the spindle is blocked, it is automati-
    cally replaced by a suitable spare tool.
    If such a spare tool does not exist, an alarm is output.

Bit 6 = 1:
    Initial setting for active tool length compensation according to
    $MC_TOOL_RESET_VALUE, $MC_CUTTING_EDGE_RESET_VALUE, $MC_USEKT_RESET_VALUE
    and $MC_SUMCORR_RESET_VALUE.
    If $MC_TOOL_CHANGE_MODE == 1, the tool selected via
    $MC_TOOL_PRESEL_RESET_VALUE s preselected in addition.
    With active tool or magazine management, MD $MC_TOOL_RESET_VALUE is not
    used, but $MC_TOOL_RESET_NAME instead.

    Bit 7 = 0:
    The current setting for the active transformation is retained.

Bit 7 = 1:
    Initial setting for active transformation after reset/ end of part pro-
    gram according to $MC_TRAFO_RESET_VALUE.

Bit 8 = 0:
    Coupled axis groupings remain active.

Bit 8 = 1:
    Coupled axis groupings are ungrouped.

Bit 9 = 0:
    Tangential follow-up remains active.
Bit 9 = 1:
    Tangential follow-up is switched off.

Bit 10 = 0:
    Non-configured synchronous spindle coupling remains active.

Bit 10 = 1:
    Non-configured synchronous spindle coupling is switched off.
```

```
Bit 11 :   Reserved (revolutional feedrate)

Bit 12 = 0:
    A changed geometry axis assignment remains active when the part program is
    started.
Bit 12 = 1:
   When the machine data $MC_GEOAX_CHANGE_RESET is set, a changed geometry
axis assignment is deleted when the part program is started.

Bit 13 = 0:
   Master value couplings remain active.

Bit 13 = 1:
   Master value couplings are cancelled.

Bit 14 :   Reserved (basic frame)

Bit 15 = 0:
   Active electronic gearboxes remain active.
Bit 15 = 1:
   Active electronic gearboxes are cancelled.

Bit 16 = 0:
   The current setting of the master spindle (SETMS) is retained.

Bit 16 = 1:
   Initial setting for the master spindle according to
$MC_SPIND_DEF_MASTER_SPIND.

Bit 17 = 0:
   The current setting of the master tool holder (SETMTH) is retained (rele-
vant only with active tool or magazine management)

Bit 17 = 1:
   Only if $MC_TOOL_MANAGEMENT_TOOLHOLDER> 0: Inital setting for the master
tool holder according to  $MC_TOOL_MANAGEMENT_TOOLHOLDER.
   Otherwise, the setting for the master spindle applies.

Bit 18 = 0:
   Reference axis for G96/G961/G962 in accordance with MD20110
$MC_DIAMETER_AX_DEF.
Bit 18 = 1:
   Reference axis for G96/G961/G962 is retained.
```

-					
-	-	0x400,0x400,0x400, 0x400,0x400,0x400. ..	0	0x3FFFF	7/2

20114	**MODESWITCH_MASK**			C03	K1
-	Interruption MDA by mode change			DWORD	RESET

After program interruption in MDI mode (e.g. in order to carry out a measurement on the workpiece and to correct the tool wear values or after tool breakage) the tool can be manually withdrawn from the contour by changing into JOG mode.
In this case, the control stores the coordinates of the position of the interruption and indicates the path differences traversed by the axes in JOG mode as "Repos offset". When MDI mode is selected again, the axis is repositioned on the contour. This response can be canceled by means of this machine data.

Bit 0 (LSB)= 0:
When MDI (JOG, JOGREF, JOGREPOS, MDIREF and MDIREPOS) are deselected in stopped status, the system ASUB Repos is selected.
Bit 0 (LSB) = 1:
When MDI (JOG, JOGREF, JOGREPOS, MDIREF and MDIREPOS) are deselected in stopped status, the system ASUB Repos is not selected.
Bit 1 (LSB) = 0:
If the NCK stops at a part program block in the program execution in which repositioning is not possible, alarm 16916 is generated if an attempt is made to switch to manual mode.
Bit 1 (LSB) = 1:
If the NCK stops at a part program block in the program execution in which repositioning is not possible, no alarm is generated if an attempt is made to switch to manual mode.

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFF	7/2

20116	**IGNORE_INHIBIT_ASUP**			C01	K1
-	Execuite interrupt program despite read-in disable			DWORD	NEW CONF

In spite of the set read-in disable, an assigned user ASUB is completely executed for the interrupt channel with the set bit.
Bit 0 is assigned to interrupt channel 1.
Bit 1 is assigned to interrupt channel 2, etc.

Related to:
IGNORE_SINGLEBLOCK_ASUP

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

20117	**IGNORE_SINGLEBLOCK_ASUP**			C01	K1
-	Execute interrupt program completely despite single block			DWORD	NEW CONF
In spite of the set single-block processing mode, an assigned user ASUB is completely executed for the relevant channel with the set bit. Bit 0 is assigned to interrupt channel 1. Bit 1 is assigned to interrupt channel 2, etc. The MD is only active with single block type 1. Related to: IGNORE_INHIBIT_ASUP					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

20118	**GEOAX_CHANGE_RESET**			C03	K1
-	Enable automatic geometry axis change			BOOLEAN	RESET
0: The current configuration of the geometry axes remains unchanged on reset and on part program start. With this setting, the response is identical to older software versions without geometry axis replacement. 1: The configuration of the geometry axes remains unchanged on reset or part program end, depending on MD 20110: RESET_MODE_MASK and, on part program start, depending on MD 20112: START_MODE_MASK or is switched to the initial state defined by MD 20050: AXCONF_GEOAX_ASSIGN_TAB. Related to: MD 20050: AXCONF_GEOAX_ASSIGN_TAB MD 20110: RESET_MODE_MASK MD 20112: START_MODE_MASK					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

20120	**TOOL_RESET_VALUE**			C03	K1
-	Tool with length compens. during runup (reset/part program end).			DWORD	RESET
Definition of tool for which tool length compensation is selected during runup or on reset or part program end as a function of MD 20110: RESET_MODE_MASK and, on part program start, depending on MD 20112: START_MODE_MASK. MD irrelevant for: MD 20110: RESET_MODE_MASK, bit 0 = 0					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2

20121	**TOOL_PRESEL_RESET_VALUE**			C03	FBW,K1
-	Preselected tool on RESET			DWORD	RESET

```
Definition of preselected tool for which tool length compensation is selected
during runup or on reset or part program end as a function of MD 20110:
RESET_MODE_MASK and, on part program start, depending on MD 20112:
START_MODE_MASK.
The MD is valid only without tool management.

MD irrelevant for:
    MD 20110: RESET_MODE_MASK, bit 0 = 0
    MD 22550: TOOL_CHANGE_MODE = 0
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2

20122	**TOOL_RESET_NAME**			C03	FBW
-	Active tool at RESET/START with tool management			STRING	RESET

```
This MD is used only with active tool or magazine management (i.e.
$MN_MM_TOOL_MANAGEMENT_MASK / $MC_TOOL_MANAGEMENT_MASK, with bit0=1 each time)
and the setting which indicates that init blocks are to be processed
($MC_TOOL_MANAGEMENT_MASK, bit10=1 -'H4000'-).

Definition of tool for which tool length compensation is selected during runup
or on reset or part program end as a function of $MC_RESET_MODE_MASK (see bits
0, 6)  and, on part program start, depending on $MC_START_MODE_MASK (see bit
6).
If $MC_TOOL_RESET_NAME="" applies, this has the same content as the program-
    ming of T0, if a tool is on the tool holder at that moment.

Related to:
    MD 20110: RESET_MODE_MASK,
    MD 20112: START_MODE_MASK
    MD 20124: TOOL_MANAGEMENT_TOOLHOLDER
    MD 20130: CUTTING_EDGE_RESET_VALUE

References:
   Description of Functions: Coordinate Systems (K2)
```

-					
-	-		-	-	7/2

20123	**USEKT_RESET_VALUE**			C03	-
-	Preselected value of $P_USEKT on RESET			DWORD	RESET

```
The system variable $P_USEKT is set with the value of this MD:

- after run-up:
   depending on  $MC_START_MODE_MASK

- after RESET or part program end:
   depending on $MC_RESET_MODE_MASK
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0xF	7/2

20124	**TOOL_MANAGEMENT_TOOLHOLDER**		C03	FBW	
-	Tool holder number		DWORD	POWER ON	

```
This MD is only relevant with tool management active.
The TM must know on which tool holder a tool has to be loaded.
The data is only evaluated if the value is greater than zero.
Then the numbers $TC_MPP5 are no longer regarded as spindle numbers but as
tool holder numbers.
The automatic address extension of T and of M=6 is then the value of this
    machine data and no longer the value of $MC_SPIND_DEFMASTER_SPIND.
The MD defines the master tool holder number to which a tool preparation or a
    tool change refers.
Reference is also made to this value for the determination of the tool on the
tool holder for the setting 'retain old offset' of MD $MC_RESET_MODE_MASK.
If a machine has several tool holders, but no defined master spindle then the
    MD serves as a default value for determining the tool holder on which the
    tool is to be loaded during a tool change (reset, start, T='identifier',
    M6).

When defining the magazine locations of an internal magazine (see documenta-
tion for TM), locations of the type 'SPINDEL' - $TC_MPP1=2 = spindle location
can be given a 'location kind index' ($TC_MPP5). This assigns the location to
a concrete tool holder.
The tool holder with the number n can be declared the master tool holder with
    the language command SETMTH(n). That is, the offsets of a tool which is
    loaded in a provisional buffer memory location of the type 'SPINDLE' and
    with the value $TC_MPP5=n, corrects the tool path .

Tool change on 'SPINDLE' locations with $TC_MPP5 unequal to the number of the
master tool holder do not influence the path.
The tool holder defined in the MD is again declared as the master tool holder
    with SETMTH.

Related to:
    MD 20110: RESET_MODE_MASK,
    MD 20112: START_MODE_MASK
    MD 20122: TOOL_RESET_NAME
    MD 20130: CUTTING_EDGE_RESET_VALUE

References:
  Description of Functions: Coordinate Systems (K2)
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	20	7/2

20126	**TOOL_CARRIER_RESET_VALUE**			C03	W1
-	Active tool holder on RESET			DWORD	RESET
Definition of tool holder for which tool length compensation is selected during runup or on reset or part program end as a function of $MC_RESET_MODE_MASK and, on part program start, depending on $MC_START_MODE_MASK. This machine data is valid only without tool management. References: /FBW/, Tool Management					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

20128	**COLLECT_TOOL_CHANGE**			C04	FBW,K1
-	Tool change commands to PLC after search run			DWORD	POWER ON
This MD is only relevant with active magazine management ($MN_MM_TOOL_MANAGEMENT_MASK, $MC_TOOL_MANAGEMENT_MASK). It defines whether tool change commands, tool preparation command (tool change commands in general) are output or not output to the PLC after block search with calculation. 1: Tool change commands, tool preparation commands are gathered and output to the PLC with program start after reaching of the search target 0: All tool/magazine-specific commands that have been gathered during block search are not output to the PLC with a subsequent program start! That means that programmed POSM, TCI, TCA commands are not output either. Note 1: Without active magazine management, the tool change M code is not gathered if it is not assigned to an auxiliary function group. With active magazine management, this corresponds to MD value = 0 Note 2: Value = 0 is appropriate, for example if, after reaching of the search target, the gathered tool change commands are output to the PLC in an ASUB by means of the GETSELT, GETEXET commands					
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	1/1

20130	CUTTING_EDGE_RESET_VALUE			C03	K1
-	Tool edge with length compens. during runup (reset/ end of pp)			DWORD	RESET
Definition of cutting edge for which tool length compensation is selected during runup or on reset or part program end as a function of MD 20110: RESET_MODE_MASK and, on part program start, depending on MD 20112: START_MODE_MASK. With active tool management and with the selection bit 0 and bit 6 are set in $MC_RESET_MODE_MASK, the last offset of the active tool at power OFF - as a rule the tool on the spindle - is effective after runup. MD irrelevant for: MD 20110: RESET_MODE_MASK, bit 0 = 0					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32000	7/2

20132	SUMCORR_RESET_VALUE			C03	W1
-	Effective resulting offset on RESET			DWORD	RESET
Definition of the resulting offset with which the tool length compensation is selected in the runup and on reset or part program end as a function of machine data $MC_RESET_MODE_MASK and, on part program start, depending on machine data $MC_START_MODE_MASK. The machine data $MN_MAX_SUMCORR_PERCUTTING_EDGE determines the maximum useful value which can be entered.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	6	7/2

20140	TRAFO_RESET_VALUE			C03	K1
-	Transformation data block selected during runup (reset/pp end)			BYTE	RESET
Definition of transformation data block which is selected during runup and on reset or part program end as a function of MD 20110: RESET_MODE_MASK and, on part program start, depending on MD 20112: START_MODE_MASK. Number of transformation data block (1...8) corresponding to MD TRAFO_TYPE_1 to TRAFO_TYPE_8. MD irrelevant for: MD 20110: RESET_MODE_MASK, bit 0 = 0					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8	7/2

20144	TRAFO_MODE_MASK			C07	M1
-	Function selection of kinematic transformation			BYTE	RESET
Selects certain functionality of kinematic transformation by setting the following bits: Bit 1 = 0: Default behavior. Bit 1 = 1: Transformation as defined in $MC_TRAFO_RESET_VALUE is persistent, i.e. it is also selected with TRAFOOF and not shown in the display. It requires that transformation as defined in $MC_TRAFO_RESET_VALUE is selected automatically after RESET and START via $MC_RESET_MODE_MASK and $MC_START_MODE_MASK, i.e. $MC_RESET_MODE_MASK bit 0 = 1 and bit 7 = 0, $MC_START_MODE_MASK bit 7 = 1 $MC_GEOAX_CHANGE_RESET = TRUE					
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x01	7/2

20150	GCODE_RESET_VALUES	C11, C03	K1,G2,F2
-	Initial setting of G groups	BYTE	RESET

Definition of G codes which become active on runup and reset or at part program end depending on MD 20110 RESET_MODE_MASK (up to software version 4) and MD: GCODE_RESET_MODE (from software version 5) and at part program start depending on MD 20112 START_MODE_MASK.
The index of the G codes in the respective groups must be programmed as the default value.
For a list of the G groups with the G functions they contain, please refer to References:
/PA/, Programming Guide, Advanced

Title	Group	Default setting on 840D/810D/ FM-NC
GCODE_RESET_VALUES[0]	1	2 (G01)
GCODE_RESET_VALUES[1]	2	0 (inactive)
GCODE_RESET_VALUES[2]	3	0 (inactive)
GCODE_RESET_VALUES[3]	4	1 (START FIFO)
GCODE_RESET_VALUES[4]	5	0 (inactive)
GCODE_RESET_VALUES[5]	6	1 (G17)
GCODE_RESET_VALUES[6]	7	1 (G40)
GCODE_RESET_VALUES[7]	8	1 (G500)
GCODE_RESET_VALUES[8]	9	0 (inactive)
GCODE_RESET_VALUES[9]	10	1 (G60)
GCODE_RESET_VALUES[10]	11	0 (inactive)
GCODE_RESET_VALUES[11]	12	1 (G601)
GCODE_RESET_VALUES[12]	13	2 (G71)
GCODE_RESET_VALUES[13]	14	1 (G90)
GCODE_RESET_VALUES[14]	15	2 (G94)
GCODE_RESET_VALUES[15]	16	1 (CFC)
GCODE_RESET_VALUES[16]	17	1 (NORM)
GCODE_RESET_VALUES[17]	18	1 (G450)
GCODE_RESET_VALUES[18]	19	1 (BNAT)
GCODE_RESET_VALUES[19]	20	1 (ENAT)
GCODE_RESET_VALUES[20]	21	1 (BRISK)
GCODE_RESET_VALUES[21]	22	1 (RTCPOF)
GCODE_RESET_VALUES[22]	23	1 (CDOF)
GCODE_RESET_VALUES[23]	24	1 (FFWOF)
GCODE_RESET_VALUES[24]	25	1 (ORIWK
GCODE_RESET_VALUES[25]	26	2 (RMI)
GCODE_RESET_VALUES[26]	27	1 (ORIC)
GCODE_RESET_VALUES[27]	28	1 (WALIMON)
GCODE_RESET_VALUES[28]	29	1 (DIAMOF)
GCODE_RESET_VALUES[29]	30	1 (COMPOF)
GCODE_RESET_VALUES[30]	31	1 (inactive)
GCODE_RESET_VALUES[31]	32	1 (inactive)

S)

```
GCODE_RESET_VALUES[32]      33                    1 (FTCOF)
GCODE_RESET_VALUES[33]      34                    1 (OSOF)
GCODE_RESET_VALUES[34]      35                    1 (SPOF)
GCODE_RESET_VALUES[35]      36                    1 (PDLAYON)
GCODE_RESET_VALUES[36]      37                    1 (FNOORM)
GCODE_RESET_VALUES[37]      38                    1 SPF1)
GCODE_RESET_VALUES[38]      39                    1 (CPRECOF)
GCODE_RESET_VALUES[39]      40                    1 (CUTCONOF)
GCODE_RESET_VALUES[40]      41                    1 (LFOF)
                          :                                             :
GCODE_RESET_VALUES[45]      46                    1 (LFTXT)
GCODE_RESET_VALUES[46]      47                    1 (SINUMERIK mode)
                          :                                             :
GCODE_RESET_VALUES[59]      60                    1 (not defined)
```

-					
-	60	2, 0, 0, 1, 0, 1, 1, 1, 0, 1, 0, 1, 2, 1, 2, 1, 1, 1, 1, 1, 1...	-	-	7/2

20152	**GCODE_RESET_MODE**	C03	K1
-	Reset response of G groups	BYTE	RESET

```
This MD is only evaluated if bit 0 is set in $MC_RESET_MODE_MASK!
This MD used to determine for each entry in MD $MN_GCODE_RESET_VALUES (there-
fore for each G group) whether, in the case of a reset/part program end, the
setting according to $MC_GCODE_RESET_VALUES is taken again ( MD = 0 ), or the
current setting is retained ( MD = 1 ).

Example:
   Here the basic setting for the 6th G group (current level) is read out of
the machine data $MC_GCODE_RESET_VALUES at each reset / part program end:
$MC_GCODE_RESET_VALUES[5]=1  ;Reset value of the 6th G group is M17
$MC_GCODE_RESET_MODE[5]=0    ;Basic setting for 6th G group corresponds, after
                             ;reset / part program end
                             ;to $MC_GCODE_RESET_VALUES[5]

However, if the current setting for the 6th G group (current level) is to be
retained after reset / part program end, then the following setting results:
$MC_GCODE_RESET_VALUES[5]=1  ;Reset value of the 6th G group is M17
$MC_GCODE_RESET_MODE[5]=1     ;Current setting for 6th G group
                             ;is retained
                             ;even after reset / part program end
```

-					
-	60	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2

20154	**EXTERN_GCODE_RESET_VALUES**			C11, C03	FBFA
-	Initial setting of G groups in ISO mode			BYTE	RESET
When an external NC programming language is used, definition of G codes which become active on runup and reset or at part program end depending on machine data $MC_RESET_MODE_MASK and at part program start depending on machine data $MC_START_MODE_MASK. The following external programming languages are possible: ISO2 dialect Milling ISO3 dialect Turning The G group division to be used is indicated in the current SINUMERIK documentations. The following groups within the MD EXTERN_GCODE_RESET_VALUES are writable: ISO2 dialect M: G group 2: G17/G18/G19 G group 3: G90/G91 G group 5: G94/G95 G group 6: G20/G21 G group 13: G96/G97 G group 14: G54-G59 ISO3 dialect T: G group 2: G96/G97 G group 3: G90/G91 G group 5: G94/G95 G group 6: G20/G21 G group 16: G17/G18/G19					
-					
-	31	1, 1, 1, 2, 1, 1, 1, 3, 4, 1, 1, 2, 2, 1, 3, 2, 1, 0, 1, 1, 1...	-	-	2/2

20156	EXTERN_GCODE_RESET_MODE		C03		K1
-	Reset response of external G groups		BYTE		RESET

```
This MD is evaluated only if bit0 in $MC_RESET_MODE_MASK (see there) is set!
This MD is used to define for each entry in MD $MN_EXTERN_GCODE_RESET_VALUES
(i.e. for each G group), whether the setting as per
$MC_EXTERN_GCODE_RESET_VALUES is adopted again after a reset / part program
end ( MD = 0 ) or if the current setting is retained ( MD = 1 ).

Example for ISO dialect M:
Here, the basic setting for the 14th G group (settable zero offset) is read
out of machine data $MC_EXTERN_GCODE_RESET_VALUES after each reset / part pro-
gram end:

$MC_EXTERN_GCODE_RESET_VALUES[13]=1 ;reset value of the 14th G group
                                    ;is G54
$MC_EXTERN_GCODE_RESET_MODE[13]=0   ;basic setting for the 14th G group is
                                    ;defined  by
                                    ;$MC_EXTERN_GCODE_RESET_VALUES[13]
                                    ;after reset / part program end

However, if the current setting for the 14th G group is to be retained beyond
reset / part program end, this results in the following setting:

$MC_EXTERN_GCODE_RESET_VALUES[13]=1 ;reset value of the 14th G group
                                    ;is G54
$MC_EXTERN_GCODE_RESET_MODE[13]=1   ;current setting for the 14th
                                    ;G group is retained even after
                                    ;reset / part program end
```

-					
-	31	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	1	7/2

20160	CUBIC_SPLINE_BLOCKS		EXP, C09		K1
-	Number of blocks for C spline		BYTE		POWER ON

```
Number of motion blocks across which a spline section is calculated with the
cubic spline (CSPLINE) function.
The larger the value, the closer the generated contour is to the ideal mathe-
    matical cubic spline, which in the boundary condition CUBIC_SPLINE_BLOCKS
    = reaches infinity.
However, the higher the value, the longer the block search calculation time.

References:
   /PA/, Programming Guide: Fundamentals
```

-					
-	-	8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8	4	9	7/2

20170	**COMPRESS_BLOCK_PATH_LIMIT**			C09	K1,PGA
mm	Maximum traversing distance of an NC block with compression			DOUBLE	NEW CONF
The machine data defines the maximum traversing length of a block that can be compressed. Longer blocks interrupt the compression and are traversed in the normal way. Related to: MD 33100: COMPRESS_POS_TOL (maximum deviation with compression) References: /PA/, Programming Guide: Fundamentals					
-					
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/2

20172	**COMPRESS_VELO_TOL**			C09	V1,PGA
mm/min	Max. permissible deviation of path feedrate with compression			DOUBLE	POWER ON
The value indicates the maximum permissible deviation for the compression for the path feedrate. The larger the value, the more short blocks can be compressed into a long block. The maximum number of compressible blocks is limited by the size of the spline buffer. Related to: $MA_COMPRESS_POS_TOL[AXn] $MC_COMPRESS_BLOCK_PATH_LIMIT References: /PGA/, Programming Guide, Advanced					
-					
-	-	60000.0,60000.0,60000.0,60000.0...	-	-	7/2

20180	**TOCARR_ROT_ANGLE_INCR**			C08	W1
-	Rotary axis increment of orientable tool holder			DOUBLE	NEW CONF
For orientable tool holders, this machine data indicates the size of the minimum increment (in degrees) by which the first or second orientation axis can be changed (e.g. for Hirth tooth systems). A programmed or calculated angle is rounded to the nearest value resulting from phi = s + n * d with integer n. Where s = $MC_TOCARR_ROT_ANGLE_INCR[i] d = $MC_TOCARR_ROT_ANGLE_OFFSET[i] with i equal 0 for the 1st and i equal 1 for the 2nd axis. If this machine data is equal to zero, no rounding is performed.					
-					
-	2	0.0, 0.0,0.0, 0.0,0.0, 0.0,0.0, 0.0...	-	-	7/3

20182	**TOCARR_ROT_ANGLE_OFFSET**			C08	W1
-	Rotary axis offset of orientable tool holder			DOUBLE	NEW CONF
For orientable tool holders, this machine data indicates the offset of the rotary axis if its position cannot be continuously changed. It is only evaluated if $MC_TOCARR_ROT_ANGLE_INCR is not equal to zero. For the precise meaning of this machine data, see the description of $MC_TOCARR_ROT_ANGLE_INCR.					
-					
-	2	0.0, 0.0,0.0, 0.0,0.0, 0.0,0.0, 0.0...	-	-	7/3

20184	**TOCARR_BASE_FRAME_NUMBER**			C08	W1
-	Base frame number for holding machine table offset			DWORD	NEW CONF
This machine data indicates into which channel-specific base frame the table offset of an orientable tool holder with a rotary table is written. This machine data must refer to a valid base frame. If its content is less than 0 or greater than or equal to the maximum number of base frames set in MM_NUM_BASE_FRAMES, selection of a corresponding tool holder causes an alarm.					
-					
-	-	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-1	15	7/3

20188	**TOCARR_FINE_LIM_LIN**			C07	-
mm	Limit of linear fine offset TCARR			DOUBLE	SOFORT
Indicates for each channel the input limit for the linear fine offset values of an orientable tool holder.					
-					
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/3

20190	**TOCARR_FINE_LIM_ROT**			C07	-
degrees	Limit of rotary fine offset TCARR			DOUBLE	SOFORT
Indicates for each channel the input limit for the rotary fine offset values of an orientable tool holder.					
-					
-	-	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/3

20200	**CHFRND_MAXNUM_DUMMY_BLOCKS**			EXP, C02, C06, C09	K1
-	Empty blocks with chamfer/radii			BYTE	POWER ON
Indicates the maximum number of blocks without traversing information in the compensation plane (dummy blocks) that can be programmed between two blocks with traversing information when chamfer/rounding are active.					
-					
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	0	15	7/2

20201	**CHFRND_MODE_MASK**			C09	V1
-	Chamfer/rounding behavior			DWORD	RESET
Determination of the chamfer/rounding behavior Bit 0: (LSB) Assignment of the chamfer/rounding to the preceding or following block. This influences: - The technology of the chamfer/rounding (feed, type of feed, M commands ...) - The execution of the blocks without movement in the active plane (e.g. M commands, movement in the applicate) before or after a modal rounding (RNDM) Bit 1: free Meaning of the individual bits: Bit 0 = 0 Chamfer/rounding is derived from the following block (default value). The technology of the chamfer/rounding is determined by the following block. Blocks without movement (M commands) or movement only in the applicate between two movement blocks in the plane are executed before the modal rounding. Bit 0 = 1: Chamfer/rounding is derived from the preceding block. The technology of the chamfer/rounding is determined by the preceding block. Blocks without movement (M commands) or movement only in the applicate between two movement blocks in the plane are executed after the modal rounding.					
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFF	7/2

20202	**WAB_MAXNUM_DUMMY_BLOCKS**			C02, C06	W1
-	maximum number of blocks w/o traversing movement with SAR			BYTE	RESET
Maximum number of blocks which can appear between the SAR (soft approach and retraction) block and the traversing block which determines the direction of the approach or retraction tangent.					
-					
-	-	5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5	0	10	7/2

20204	**WAB_CLEARANCE_TOLERANCE**			C06	W1
mm	Change of direction with SAR			DOUBLE	POWER ON
In the case of smooth approach and retraction, the point defined with DISCL, from which, in the case of infeed from the initial plane, traversing is carried out at lower speed (G341) or the point in which the actual approach movement begins (G 340), must lie between the initial plane and the approach plane. If this point lies outside this interval and the deviation is less than or equal to this machine data, it is assumed that the point lies in the approach or retraction plane. If the deviation is greater, then alarm 10741 is output. Example: An approach is made from position Z = 20. The SAR plane is at Z = 0. The point defined by DISCL must therefore lie between these two values. If it lies between 20.000 and 20.010 or between 0 and -0.010, it is assumed that the value 20.0 or 0.0 was programmed (under the condition that the MD has the value 0.010). The alarm is output if the position is greater than 20.010 or less than -0.010.					
-					
-	-	0.01,0.01,0.01,0.01, 0.01,0.01,0.01...	-	-	7/2

20210	**CUTCOM_CORNER_LIMIT**			C08, C06	W1
degrees	Maximum angle f. compensation blocks in tool radius compensation			DOUBLE	RESET
Where outer corners are very pointed, G451 can result in long idle paths. The system therefore switches automatically from G451 (intersection) to G450 (transition circle, with DISC where appropriate) when the outer corners are very pointed. The contour angle which can be traversed following this automatic switchover (intersection ---> transition circle) can be defined in CUTCOM_CORNER_LIMIT.					
-					
-	-	100.,100.,100.,100., 100.,100.,100....	0.0	150.	7/2

20220	CUTCOM_MAX_DISC		C08, C06	W1	
-	Maximum value for DISC		DOUBLE	RESET	
The G450 transition circle cannot produce sharp outer contour corners, because the path of the tool center point through the transition circle is controlled so that the cutting edge stops at the outer corner (programmed position). Where sharp outer corners are to be machined with G450, the DISC instruction can be used in the program to program an overshoot. This transforms the transition circle into a conic section and the cutting edge lifts off from the outer corner. The value range of the DISC instruction extends from 0 to theoretically 100 in steps of 1. DISC = 0 ...Overshoot disabled, transition circle active DISC = 100 ...Overshoot large enough to theoretically produce a response similar to intersection (G451). Programmed values of DISC which are higher than those stored in CUTCOM_MAX_DISC are limited to this maximum value without output of a message. A severely non-linear alteration in the path speed can thus be avoided. Special cases: It is not generally meaningful to enter values higher than 50 in DISC. It is therefore not possible to enter values > 75.					
-					
-	-	50.0,50.0,50.0,50.0, 50.0,50.0,50.0...	0.0	75.0	7/2

20230	CUTCOM_CURVE_INSERT_LIMIT		C08, C06	W1	
-	Maximum angle for calculation of intersection with TRC		DOUBLE	RESET	
Where outer corners are very flat, G450 (transition circle) and G451 (intersection) approximate each other more and more. In such a case, it is no longer useful to insert a transition circle. Especially with 5-axis machining, it is not allowed to insert a transition circle at these outer corners, as this might lead to losses in velocity during continuous-path mode (G64). That is why the system switches automatically from G450 (transition circle, possibly with DISC) to G451 (intersection) in the case of very flat outer corners. The contour angle (in degrees), as of which the automatic switchover (transition circle ---> intersection) is to be carried out, can be specified in CUTCOM_CURVE_INSERT_LIMIT.					
-					
-	-	10.,10.,10.,10.,10.,1 0.,10.,10.,10....	0.0	150.	7/2

20240	CUTCOM_MAXNUM_CHECK_BLOCKS		C08, C02	W1	
-	Blocks for look-ahead contour calculation with TRC		DWORD	POWER ON	
Indicates the maximum number of blocks with traversing information at the offset plane that are considered simultaneously for collision detection with active radius compensation.					
-					
-	-	4,4,4,4,4,4,4,4,4,4,4 ,4,4,4,4,4	2	-	7/2

20250	**CUTCOM_MAXNUM_DUMMY_BLOCKS**			C08, C02	W1
-	maximum number of blocks without traversing motion in TRC			DWORD	POWER ON

```
During active TRC only program blocks with movements of geometry axes perpen-
dicular to the current tool orientation are normally programmed. Neverthe-
less, individual intermediate blocks that do not contain such path information
may also be programmed during active TRC. For example:

- Movements in the direction of tool orientation
- Movements in axes that are not geometry axes
- Auxiliary functions
- In general: Blocks that are taken over into the main run and executed there

The maximum number of intermediate blocks is defined with this MD. If the
    value is exceeded, alarm 10762 "Too many empty blocks between 2 travers-
    ing blocks during active tool radius compensation" is output.

Note:
   Comment blocks, arithmetic blocks and empty blocks are not intermediate
blocks in the sense of this MD and can therefore be programmed in any number
(without an alarm being triggered).
```

-					
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	-	-	7/2

20252	**CUTCOM_MAXNUM_SUPPR_BLOCKS**			EXP, C01, C08, C02	W1
-	Maximum number of blocks with compensation suppression			DWORD	POWER ON

```
Indicates the maximum number of blocks for active tool radius compensation, in
which the function "Keep radius offset constant" (CUTCONON or reprogramming of
G41 / G42 during active TRC) may be active.

Note:
   The restriction of the number of blocks with active CUTONON is necessary in
order to carry out repositioning in this situation too. Increasing this value
for the machine data can lead to an increased memory requirement for NC
blocks.
```

-					
-	-	5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5	-	-	7/2

20254	**ONLINE_CUTCOM_ENABLE**			EXP, C01, C08	W4
-	Real-time tool radius compensation enabled			BOOLEAN	POWER ON
This data enables online tool radius compensation. When the function is enabled, the control reserves the necessary memory space required for online tool radius compensation after POWER ON. ONLINE_CUTCOM_ENABLE = 0: Online tool radius compensation can be used ONLINE_CUTCOM_ENABLE = 1: Online tool radius compensation cannot be used					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

20256	**CUTCOM_INTERS_POLY_ENABLE**			C09	W1
-	Intersection procedure for polynomials is possible			BOOLEAN	POWER ON
If this machine data is TRUE and tool radius compensation active, the transitions at outer corners where polynomes (splines) are involved can be treated with the intersection mode. If the machine data is FALSE, conic sections (circles) are always inserted in this case. If the machine data is FALSE, the response is identical to that of software releases older than 4.0.					
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2

20260	**PATH_IPO_IS_ON_TCP**			EXP, C09, C05	-
-	Velocity control with spline			BOOLEAN	POWER ON
For SW-internal function optimization.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	0/0

20262	**SPLINE_FEED_PRECISION**		EXP, C09, C05	-	
-	Permissible rel. error of path velocity for spline		DOUBLE	POWER ON	
This machine data is evaluated only if MD MM_ARCLENGTH_SEGMENTS is larger than 0. The factor indicates how large the relative error of the path velocity may be for splines, compressor and polynomial interpolation. The smaller the factor the more computing time is required for preprocessing. Furthermore, more memory is required for the display of the arc length function (see MD MM_ARCLENGTH_SEGMENTS). Example: SPLINE_FEED_PRECISION=0.1, programmed path velocity=1000 mm/min. The actual path velocity for polynomial and spline interpolations can then vary in the range between 900 mm/min and 1100 mm/min.					
-					
-	-	0.001,0.001,0.001,0.001,0.001,0.001...	0.000001	1.0	0/0

20270	**CUTTING_EDGE_DEFAULT**		C11, C03	W1	
-	Initial position of tool cutting edge without programming		DWORD	POWER ON	
Default cutting edge after tool change If no cutting edge is programmed after a tool change, the default cutting edge number set in CUTTING_EDGE_DEFAULT will be used. Value := 0 Initially, no cutting edge is active after a tool change. The cutting edge is not selected until D programming. := 1 MD_SLMAXCUTTINGEDGENUMBER No. of cutting edge (up to P4, MD_SLMAXCUTTINGEDGENUMBER=9 is valid) := -1 Cutting edge number of old tool applies also to new tool. := -2 Cutting edge (correction) of old tool remains active until D is programmed. That means that the old tool remains the active tool until D is programmed. In other words: the tool on the spindle remains the programmed tool until D is programmed. Example: MD: CUTTING_EDGE_DEFAULT = 1; After a tool change, the first cutting edge is active if no other cutting edge has been programmed.					
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-2	32000	7/2

20272	**SUMCORR_DEFAULT**		C03		W1
-	Initial position resulting offset without program		DWORD		POWER ON

The number of the resulting offset of the cutting edge which becomes active if a new cutting edge correction is activated without a programmed DL value being available.
Machine data $MN_MAX_SUMCORR_PERCUTTING_EDGE determines the maximum useful value which can be entered.

```
Value        Meaning
> 0            Number of the resulting offset
= 0            No resulting offset active with D programming
= 1            The resulting offset number for the previously programmed D is
    used.
```

See also: $MC_CUTTING_EDGE_DEFAULT.

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-1	6	7/2

20310	TOOL_MANAGEMENT_MASK	C09	FBW
-	Activation of tool management functions	DWORD	POWER ON

Activation of tool or magazine management (TM) (only if option TM is set).
Bit-coded activation data. That is, the TM can be activated in various versions.

Comment:
The entire tool change process is essentially composed of two commands to the PLC --> tool change preparation and tool change ON.These terms must be known if one wants to use the following setting options.
(Tool change preparation and ON-T combine both steps from the NCK into one if no M6 is used for programming).
Transport acknowledgement means that the PLC has received the tool change preparation or tool change ON command from the NCK. That is, the tool management command number output from the NCK is acknowledged by the PLC with the value zero (see PLC description).

Comment:
Bits 5, 6, 7, 8 slow down the block processing sequence. Bits 7, 8 have a greater slowing effect than bits 5, 6.

Comment:
Bit 18 lengthens the search procedure for a suitable tool, above all if there are many disabled replacement tools present.

Comment:
Bit 19 in conjunction with set bits 5,6,7,8 slows down block processing.

Notice:
Bits 5 and 7, or 6 and 8 can only be set alternatively.
That is either bit 5 or bit 7; or bit 6 or bit 8.
If bits 5 and 7 or 6 and 8 are set simultaneously then bit 5 or bit 6 will become active with priority over bit 7 or 8.
(Simply formulated: The transport acknowledgement is given priority over the end acknowledgement.)

Bit no.	Hexadec. Value	Meaning of set bit
0 (LSB)	0x00001	Tool or magazine management active (only possible with option release).
1	0x00002	TM monitoring functions active (only possible with option release. If the magazine management is activated then that option is sufficient for this function.)
2	0x00004	OEM functions, compile cycles functions can become active.
3	0x00008	Adjacent location is treated.
4	0x00010	The PLC has the option of requesting a tool change preparation again (PLC command numbers = 2,4,5) with changed parameters. Rejected by acknowledging with status = 2, or status = 7. That is, if the PLC uses this option the tool selection is recalculated in NCK and a corresponding new command output to the PLC. If acknowledged with status=2, the tool proposed by the NCK is also disabled. If these two status numbers 2 and 7 are used although the bit has the value=0, an alarm is generated.

The PLC must not reject the tool defined by the NCK for tool selection after the first start of "block search with calculation". An alarm is generated if this is done nevertheless. The same applies if a tool selection is refused within the scope of an init block.

Programming which needs the selected T number (e.g. GETSELT) must wait until the end acknowledgement = 1 is received (or one of the acknowledgements 103, 105 that show that the T no. is defined).

5 0x00020The main run PLC synchronization with tool change ON command for the main spindle/main tool holder takes place at the same time as the transport acknowledgement to NCK (see PLC description). If bit 19 (0x80000) = 0 -> synchronization with respect to the tool command output (tool change). This means that the command is not regarded as output until the stated acknowledgement from the PLC is present in the NCK. If bit 19 (0x80000) = 1 -> Synchronization with respect to the IPO block. That is, the main run block remains active at least until the stated acknowledgement from the PLC is present in the NCK.

Example: Value = 1

```
M6    ; the next block is processed if the transport acknowledgement
      ; has been made for the tool change ON command.
X5
D2 ; latest possible time for synchronization.
    ; That is, at the time D2 is processed, the PLC must have
    ; acknowledged the two commands tool preparation,
    ; tool change ON as ended.
```

6 0x00040In the case of a tool change ON command for a secondary spindle resp. a secondary tool holder, the main run PLC synchronization takes place at the same time as the transport acknowledgement. If bit 19 (0x80000) = 0 -> Synchronization with respect to the tool command output (tool change). That is, the command is not regarded as output until the stated acknowledgement from the PLC is present in the NCK. If bit 19 (0x80000) = 1 -> Synchronization with respect to the IPO block. That is the main run block remains active at least until the stated acknowledgement from the PLC is received in the NCK.

7 0x00080The main run PLC synchronization with tool change ON command for the main spindle resp. a main tool holder does not take place until receipt of the PLC acknowledgement that the tool change ON command has finished. If bit 19 (0x80000) = 0 -> Synchronization with respect to the tool command output (tool change). This means that the command is not regarded as output until the stated acknowledgement from the PLC is present in the NCK. If bit 19 (0x80000) = 1 -> Synchronization with respect to the IPO block. That is the main run block remains active at least until the stated acknowledgement from the PLC is received in the NCK.

Example: Value=1

```
M6   ; the next block is processed if the end acknowledgement
X5
D2   ; latest possible time for synchronization.
    ; That is, at the time D2 is processed, the PLC must have
    ; acknowledged the two commands tool preparation,
    ; tool change as ended.
```

8 0x00100The main run PLC synchronization with tool change ON command for an auxiliary spindle resp. an auxiliary tool holder does not take place until receipt of the PLC acknowledgement that the tool change ON command has finished. If bit 19 (0x80000) = 0 -> Synchronization with respect to the tool command output (tool change). This means that the command is not regarded as output until the stated acknowledgement from the PLC is present in the NCK. If bit 19 (0x80000) = 1 -> Synchronization with respect to the IPO block. That is the main run block remains active at least until the stated acknowledgement from the PLC is received in the NCK.

9 0x00200This bit is only used for test purposes. Simulation of the PLC acknowledgements for tool motion and change active. It is used for testing the data transport to NCK and HMI - without the otherwise necessary PLC program. NCK gives itself the necessary acknowledgements from the PLC.

10 0x00400The tool change ON command (PLC command number= 3) is not output until a PLC preparation acknowledgement is received.

11 0x00800The tool preparation command (PLC command numbers=2,4,5) is also executed if the same tool preparation command has already been made. (Commands 4,5 contain the tool preparation)

```
    Example: (Tool change made with M6 (PLC command no.= 3):
    T="Tool1" ; tool preparation
    M6 ; Tool change
    T="Tool2" ; 1st tool preparation after M6 (for same tool holder) is
always output to PLC
    T="Tool2" ; 2nd tool preparation is only output as command to the PLC;
if bit 11 = 1.
    ; This tool preparation counts as the first if the state of the tool
has changed since the previous tool preparation such that it would no
longer be serviceable. That can, for example, be an asynchronous unload-
ing of the tool. This tool preparation then attempts to select a replace-
ment tool.
```

12 0x01000The tool preparation command (PLC command numbers=2,4,5) is also executed if the tool is already in the spindle/tool holder.

```
    T="Tool1" ; tool preparation
    M6   ; Tool change
    T="Tool1" ;Tool is already in the tool holder
    ; 1st tool preparation after M6 (for the same tool holder) is only
output to the PLC if; bit 12 = 1.
    ; An unserviceable tool (e.g. disabled because of tool monitoring.) on
the tool holder does not count as being on the tool holder. This tool
preparation then attempts to select a replacement tool.
    T="Tool1" ; 2. Tool preparation - the rules of bit 11 apply to the
output.
```

13 0x02000This bit is only used for test purposes. Recording of the tool sequences in a diagnosis buffer. On reset, the commands are retrieved from the diagnosis buffer and stored in a file in the part program memory. The diagnosis file can be used to investigate problems in the set up of the NCK-PLC communication (of the PLC program).

14 0x04000Automatic tool change on Reset and Start as per the machine data:
$MC_TOOL_RESET_NAME,$MC_RESET_MODE_MASK,
$MC_TOOL_MANAGEMENT_TOOLHOLDER .

```
15 0x08000No return transport of the tool from any defined buffers if there
   are multiple preparation commands (Tx->Tx) during the power on process.

16 0x10000Programming T 'location number' is active, otherwise T=''identi-
   fier'.

17 0x20000Value 1 = Control of the time monitoring via the PLC. That is the
   PLC starts/stops the time monitoring counter.
       Value = 0 standard. That is, traversing blocks unequal to G00 let the
   counter run.
18 0x40000Message to the PLC if the last replacement tool is loaded from a
   tool group.

19 0x80000Value 0 = The synchronizations defined by bits 5,6,7,8
   (0x20,...0x100) refer to the TM command output.
       Value 1 = The synchronizations defined by bits 5,6,7,8 (0x20,...0x100)
   refer to the main run block.

20 0x100000Value 0 = Standard setting: If the PLC signal 'program test
   active' is present, then the commands generated are not output to the PLC!
   NCK acknowledges the commands itself. No magazine data is changed. Tool
   data are not changed. Exception: The tool status of the tool activated in
   test mode can assume the status 'active'.
       Value 1 = If the PLC signal 'program test active' is present, then the
   commands generated are output to the PLC. Depending upon the type of
   acknowledgement by the PLC, tool/magazine data can be changed in the NCK.
   If the acknowledgement parameters for the 'target magazine' are given the
   values of the 'source magazine', then there is no tool transport and thus
   also no data change in the NCK. Exception: The tool status of the tool
   activated in test mode can assume the status 'active'.

21 0x200000Value 0 = Standard setting: Ignore the tool state 'W' during tool
   selection (0x20 = tool is being changed).
       Value 1 = Tools in the state 'W' cannot be selected by another tool
   change/tool preparation command.

22 0x400000Value 0 = Standard setting
       Value 1 = If the function T='location number' (bit16) is active then
   the tool groups are divided into subgroups. $TC_TP11 is the grouping
   parameter.During the transition to the replacement tool, only those tools
   of the group are recognized as replacement tools that have set at least
   one bit of the tool on the programmed location in the $TC_TP11 value.

23 0x800000Value 0 = Standard setting: TMMG selects the tool in the main run
   optimally and safely. That is, in a serious case of offset selection, the
   interpreter must wait for the end of the tool selection.
       Value 1 = For simple applications. Interpreter selects the tool
   itself. That is there is no synchronization with the main run is required
   for offset selection. (However, an 'uncorrectable' alarm may be issued if
   the tool becomes unserviceable after selection but before being loaded.)
```

```
24  0x1000000Value 0 = Standard setting: If the PLC commands 8 and 9 want to
    move a tool to a location reserved for another tool, then this is rejected
    with an alarm.
        Value 1 = If the PLC commands 8 and 9 want to move a tool to a loca-
    tion reserved for another tool with 'reserved for tool from buffer' (bit
    value= 'H4'), then this is possible. This location reservation is removed
    before the execution of the motion ('reserved for new tool to be loaded'
    (bit value= 'H8') remains effective).

With the default setting - Bit6-9 = 0 - the synchronization is related to a
tool change for main spindle/main tool holder in the block in which a cutting
edge of the new tool has been selected for the first time.
The synchronization can either be made via the transport acknowledgement or
    via the end acknowledgement.

If the option for the tool management or magazine management is missing, bit
    no. 0 cannot be set.
If the option for the tool monitoring is missing, bit no. 1 cannot be set.
(However, if bit no. 0 can be set, then that also gives the right to set bit
no. 1.)
All functions as from bit no. 3 only become effective if bit no. 0 is set.

Examples:
 TOOL_MANAGEMENT_MASK = 0x1 -> tool and/or magazine management active
 TOOL_MANAGEMENT_MASK = 0x3 -> TM + tool monitoring function active
 TOOL_MANAGEMENT_MASK = 0x20003 -> TM + tool monitoring function active;
                                     PLC controls time monitoring
 TOOL_MANAGEMENT_MASK = 0x2 -> tool monitoring function active without TM
```

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFFFFF	7/2

20320	**TOOL_TIME_MONITOR_MASK**		C06, C09		FBW
-	Time monitoring for tool in tool holder		DWORD		POWER ON

```
Activation of the tool time monitoring for the tool holders / spindles 1..x.
As soon as the path axes are traversed (not with G00, always with G63), the
    tool time monitoring data of the active D compensation for the tool that
    is present in the selected tool holder, which is also the master tool
    holder, are updated.

 Notice:
   The time monitoring can be switched off through the PLC.
 Notice:
   With test mode activated, the time monitoring is switched off automati-
cally.


 Bit No.         Meaning when bit is set
 ---------------------------------------------------------------------------
 0...x-1        Monitoring of tool in tool holder 1...x


Example: $MC_TOOL_TIME_MONITOR_MASK = 'H5' or = 'B101'.
The two tool holders with numbers 1 and 3 are generally time-monitored.
If tools are present on tool holders 1, 2, 3 and if the active tool is on mas-
    ter tool holder 1, then exactly this tool is monitored, and the actual
    time value of the active D compensation reduced.
If the active tool is later on tool holder 2, then it is not time-monitored,
    as bit 1 (for tool holder=2) of $MC_TOOL_TIME_MONITOR_MASK is not set.

Note:
    If you are working with setting $MC_CUTTING_EDGE_DEFAULT=-2, then there
    can be programming situations, where the active tool does not equal the
    tool changed in. In this situation, the tool of the master tool holder is
    monitored (instead of the active tool).
   And this only, if the active D compensation number is also known to the
tool on the tool holder. Otherwise, there will be no time monitoring.
```

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	-	-	7/2

20350	**TOOL_GRIND_AUTO_TMON**		C06, C09		W4
-	Activation of tool monitoring. 0/1: Monitoring off/on		BYTE		POWER ON

```
This MD is used to define whether tool monitoring is switched on automati-
cally if tool length compensation for a grinding tool with monitoring is
selected (odd type number types 401 - 499).
TOOL_GRIND_AUTO_TMON = 1 : Automatic monitoring switched on
TOOL_GRIND_AUTO_TMON = 0 : Automatic monitoring switched off
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

20360	**TOOL_PARAMETER_DEF_MASK**	C09	W1
-	Definition of tool parameters	DWORD	POWER ON

```
Definition of effects of tool parameters.


Bit no. Meaning when bit is set
-----------------------------------------------------------------------------
Bit 0: (LSB):
   For turning and grinding tools, the wear parameter of the transverse axis
is allowed for as diameter value.
For SW 5.3 and higher:
Bit 1:
   For turning and grinding tools, the tool length component of the trans-
verse axis is allowed for as diameter value.
Bit 2:
    If a wear component or a length component is allowed for as diameter
    value, the tool may be used only in the plane that was active when the
    tool was selected. A plane change leads to an alarm.
Bit 3:
   Zero offsets in frames in the transverse axis are allowed for as diameter
value.
Bit 4:
   PRESET value is allowed for as diameter value
Bit 5:
   Allow for external zero offset in the transverse axis as diameter value
Bit 6:
   Read actual values of the transverse axis as diameter value (AA_IW, AA_IEN,
AA_IBN, AA_IB, caution: but not AA_IM)
Bit 7:
   Display of all actual values of the transverse axis as diameter value inde-
pendent of the G code of group 29 (DIAMON / DIAMOF)
Bit 8:
   Display of the distance-to-go in the WCS always as radius
Bit 9:
   During DRF handwheel travel of a transverse axis, only half the distance of
the specified increment is traveled (on the condition that
$MN_HANDWHEEL_TRUE_DISTANCE = 1).
Bit10:
   Activate the tool component of an active orientable tool holder even if no
tool is active.
Bit11:
   The tool parameter $TC_DP6 is not interpreted as tool radius but as tool
diameter.
Bit12:
   The tool parameter $TC_DP15 is not interpreted as wear of the tool radius
but as wear of the tool diameter.
```

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFF	7/2

20370	SHAPED_TOOL_TYPE_NO		C01, C08	-	
-	Tool type number for contour tools		DWORD	SOFORT	
Indicates for each channel max. two number ranges for tool types that are treated as forming tools. Therefore individual ranges are possible both for grinding and for turning tools. The first range is specified by the first and the second number, the second range by the third and fourth number. If the first number is not smaller than the second one (the same applies for the third and fourth number), no range will be defined, but two individual numbers will be specified instead. The numbers 400 through 599 are permissible (tool type numbers for turning and grinding tools), and also value 0 (no tool type number defined). Examples: 400 405 590 596 : Tool types 400-405 and 590-596 are contour tools 410 400 590 596 : tool types 400, 410 and 590-596 are contour tools 450 0 420 430 : Tool types 450 and 420-430 are contour tools					
-					
-	4	0, 0, 0, 0,0, 0, 0, 0,0, 0, 0, 0...	-	-	7/2

20372	SHAPED_TOOL_CHECKSUM		C01, C08	-	
-	Checksum test for contour tools		BOOLEAN	SOFORT	
Indicates for each channel whether for completion of the contour tool definition an edge must be available that includes the negative sums of tool length components and tool radius of the previous edges.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/5

20380	TOOL_CORR_MODE_G43G44		C01, C08, C11	FBFA	
-	Treatment of tool length compensation with G43 / G44		BYTE	RESET	
This machine data determines in ISO dialect M (G43 / G44) the way in which length compensations programmed with H are processed. 0: Mode A Tool length H always acts on the third geometry axis (usually Z) 1: Mode B Tool length H acts, depending on the active plane, on one of the three geometry axes. This means with G17 on the 3rd geometry axis (usually Z) G18 on the 2nd geometry axis (usually Y) G19 on the 1st geometry axis (usually X) In this mode, compensations in all three geometry axes can be configured through multiple programming, i.e. through the activation of one component, the length compensation possibly active in another axis is not deleted. 2: Mode C The tool length acts, independent of the active plane, on the axis that has simultaneously been programmed with H. Otherwise, the response is the same as with mode B.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/2

20382	**TOOL_CORR_MOVE_MODE**			C01, C08	FBFA
-	Traversing of tool length compensation			BOOLEAN	RESET
This machine data determines how the tool length compensations are traversed. 0: A tool length compensation is only traversed if the associated axis has been programmed (behavior as in previous software versions) 1: Tool lengths are always traversed independently of whether the associated axes are programmed or not.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

20384	**TOOL_CORR_MULTIPLE_AXES**			C01, C08, C11	FBFA
-	Tool length compensation in several axes simultaneously			BOOLEAN	RESET
This machine data determines for tool length compensation in ISO dialect M (ISO2) (G43 / G44), whether the compensation shall be allowed in mode C (selection of the axis on which the compensation is acting by specifying the corresponding axis letter) to act on several axes simultaneously. If this machine data is 1, this type of programming is allowed; otherwise it is rejected with an alarm.					
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2

20390	**TOOL_TEMP_COMP_ON**			C01, C08	W1
-	Activation of temperature compensation for tool length			BOOLEAN	RESET
This machine data activates the temperature compensation in tool direction (see also setting data TOOL_TEMP_COMP)					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

20392	**TOOL_TEMP_COMP_LIMIT**			C01, C08	W1,BAS,PG
mm	Max. temperature compensation for tool length			DOUBLE	RESET
With temperature compensation, this machine data indicates the maximum permissible value for the tool length for each geometry axis. If a temperature compensation value larger than this limit value is entered, it will be limited without an alarm.					
-					
-	3	1.0, 1.0 , 1.0,1.0, 1.0 , 1.0...	-	-	7/7

20396	**TOOL_OFFSET_DRF_ON**			C01, C08	W1
-	Handwheel override in tool direction			BOOLEAN	RESET
This machine data activates the handwheel override in tool direction. When this machine data is set, a handwheel override is active in the axis that is assigned to length L1 of the active tool, in the direction defined by tool orientation. Example: G17 is active; the tool is a milling tool; tool length L1 is therefore assigned to the Z axis (the 3rd geometry axis). When the tool (e.g. with active 5-axis transformation) is turned around the Y axis by 90 degrees, so that it shows in X direction, a handwheel override becomes active in the 3rd axis in the X axis.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2
710-2a2c	-	-	-	-	-1/-
710-6a2c	-	-	-	-	-1/-
710-12a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
840d-2a2c	-	-	-	-	-1/-
840d-4a1cg	-	-	-	-	-1/-
840d-6a2c	-	-	-	-	-1/-
840d-12a2c	-	-	-	-	-1/-
840d-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

20400	**LOOKAH_USE_VELO_NEXT_BLOCK**			EXP, C05	B1
-	LookAhead following block velocity			BOOLEAN	POWER ON
For SW-internal function optimization.					
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2

20430	**LOOKAH_NUM_OVR_POINTS**			EXP, C02, C05	B1
-	Number of override characteristics for LookAhead			DWORD	POWER ON
For SW-internal function optimization.					
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	2	7/2

20440	**LOOKAH_OVR_POINTS**			EXP, C05	B1
-	Override switch points for Look Ahead			DOUBLE	POWER ON
For SW-internal function optimization.					
-					
-	2	1.0, 0.2,1.0, 0.2,1.0, 0.2,1.0, 0.2...	0.2	2.0	7/2

20450	**LOOKAH_RELIEVE_BLOCK_CYCLE**			EXP, C05	B1
-	Relief factor for block cycle time			DOUBLE	POWER ON
Block cycle problems occur for the following reason: The traversing length of the NC blocks to be processed is so short that the Look Ahead function must reduce the machine velocity to provide enough time for block preparation. In this situation, constant deceleration and acceleration of the path motion can occur. This machine data defines the extent to which such velocity fluctuations are to be smoothed. Special cases: Values up to approx. 1.0 are appropriate. The value 0.0 means that the function is deactivated.					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

20455	**LOOKAH_FUNCTION_MASK**			EXP, C05	FBSI
-	Look Ahead special functions			BYTE	NEW CONF
Look Ahead special functions: Bit 0 = 1: The Safety Integrated setpoint limitation is already taken into account in Look Ahead.					
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	1	7/2

20460	**LOOKAH_SMOOTH_FACTOR**			EXP, C05	B1
%	Smoothing factor for Look Ahead			DOUBLE	NEW CONF
A smoothing factor can be defined to give a more stable path velocity control. It defines the maximum permitted productivity loss. Acceleration procedures which contribute less than this factor to a shorter program run time are then not executed. In this case, only those acceleration procedures whose frequency lies above the frequency parameterized in MD $MA_LOOKAH_FREQUENCY are taken into account. The entry of 0.0 deactivates the function.					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.	500.0	7/2

20462	**LOOKAH_SMOOTH_WITH_FEED**		EXP, C05		B1
-	Path velocity smoothing with programmed feed		BOOLEAN		NEW CONF
The MD defines whether the programmed feed is also taken into account with tool path velocity smoothing. In these cases, the defined factor of MC_LOOKAH_SMOOTH_FACTOR can be met better when the override is set to 100%. Related to: $MA_LOOKAH_FREQUENCY, $MC_LOOKAH_SMOOTH_FACTOR					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/2

20464	**PATH_MODE_MASK**		EXP, C05		-
-	Path behavior		DWORD		RESET
This machine data is used to influence the path action Bit0: If only rotary axes are traversed in the block as path axes with active G700, the programmed rotary axis velocity corresponds to 0: [degrees/min] 1: [25.4*degrees/min]					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0	0	0xffff	7/2

20465	**ADAPT_PATH_DYNAMIC**		EXP, C05		B1
-	Adaptation of path dynamic response		DOUBLE		NEW CONF
This adaptation factor can be used to reduce the dynamics of changes in tool path velocity. ADAPT_PATH_DYNAMIC[0] is effective with Brisk, reducing the permissible acceleration ADAPT_PATH_DYNAMIC[1] is effective with Soft, reducing the permissible jerk Considering only acceleration processes using a frequency above the frequency parameterized in MD $MA_LOOKAH_FREQUENCY. To disable this function, enter 1.0.					
-					
-	2	1.0, 1.0,1.0, 1.0,1.0, 1.0,1.0, 1.0...	1.0	100.0	7/2

20470	**CPREC_WITH_FFW**			EXP, C06, C05	K6,B1
-	Programmable contour accuracy			BOOLEAN	POWER ON
This machine data defines the behavior of the programmable function CPRECON in conjunction with feedforward control. FALSE: The CPRECON function is inactive when feedforward control is activated simultaneously. TRUE: CPRECON is also active with feedforward control. Related to: $SC_CONTPREC, $SC_MINFEED					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

20480	SMOOTHING_MODE	EXP	B1
-	Behavior of smoothing with G64x	DWORD	NEW CONF

```
Configuration of smoothing with G641 and G642 or G643.
The MD is decimal-coded. The units digits define the behavior of G643 and the
    tens digits the behavior of G642. With the hundreds digit, you can define
    whether, with G641 or G642, the axes are possibly accelerated within the
    smoothing area or traversed at constant velocity. With the thousands and
    ten-thousands digit, smoothing with G644 is configured.

x0: G643 uses axis-specific tolerances. They are set with the axis-specific MD
    MA_COMPRESS_POS_TOL.
x1: G643 uses the contour tolerance SC_SMOOTH_CONTUR_TOL for the geometry axes
    at smoothing. The remaining axes are smoothed by using the axis-specific
    tolerances MA_COMPRESS_POS_TOL.
x2: The orientation movement is smoothed by using the angular tolerance
    SC_SMOOTH_ORI_TOL. For all other axes, the axis-specific tolerances
    MA_COMPRESS_POS_TOL are used.
x3: Combination of the two possibilities 01 and 02. That means, G643 uses the
    tolerances SC_SMOOTH_CONTUR_TOL and SC_SMOOTH_ORI_TOL. Any further axes
    are smoothed with axis-specific tolerance.
x4: G643 uses the smoothing length programmed with ADIS= or ADISPOS=. Specifi-
    cation of possible axis-specific tolerances or the contour and orienta-
    tion tolerance is ignored.

0x: G642 uses axis-specific tolerances. They are set with the axis-specific MD
    MA_COMPRESS_POS_TOL.
1x: G642 uses the contour tolerance for the geometry axes at smoothing. The
    remaining axes are smoothed by using the axis-specific tolerances
    MA_COMPRESS_POS_TOL.
2x: The orientation movement of G642 is smoothed by using the angular toler-
    ance SC_SMOOTH_ORI_TOL. For all other axes, the axis-specific tolerances
    MA_COMPRESS_POS_TOL are used.
3x: Combination of the two possibilities 10 and 20. That means, G642 uses the
    tolerances SC_SMOOTH_CONTUR_TOL and SC_SMOOTH_ORI_TOL. Any further axes
    are smoothed with axis-specific tolerance.
x4: G642 uses the smoothing length programmed with ADIS= or ADISPOS=. Specifi-
    cation of possible axis-specific tolerances or the contour and orienta-
    tion tolerance is ignored.

< 100:
    Within the smoothing range, a profile of the limit velocity is calcu-
    lated, as it results from the specified maximum values for acceleration
    and jerk of the axes or the path involved. This can lead to an increase of
    the path velocity in the smoothing range and consequently to an accelera-
    tion of the axes involved.
>=100:
    For smoothing blocks with G641/G642, a profile of the limit velocity is
    not calculated. Only a constant limit velocity is specified. Thus, it can
    be avoided that, during smoothing with G641/G642, the involved axes are
    possibly accelerated in the smoothing range. However, this setting can
    possibly lead to smoothing blocks being traversed at a velocity that is
    too low, especially with large smoothing ranges.
1xx:
    No velocity profile for G641
2xx:
    No velocity profile for G642
```

Possible values for the thousands digit (configuration of G644):

0xxx:
When smoothing with G644, the maximum deviations of each axis specified in MD COMPRESS_POS_TOL are adhered to. If the dynamic response of the axis allows it, the specified tolerance is possibly not fully utilized.
1xxx:
When smoothing with G644, the smoothing distance is specified.
2xxx:
When smoothing with G644, the maximum occuring frequency of the smoothing movement of each axis will be limited. The maximum frequency is specified in MD $MA_LOOKAH_FREQUENCY.
3xxx:
When smoothing with G644, neither the tolerance nor the smoothing sitance are monitored. Each axis traverses around a corner with the maximum possible dynamic response. With SOFT, both the maximum acceleration and the maximum jerk of each axis is observed. With BRISK, the jerk is not limited; instead each axis traverses with the maximum possible acceleration.
4xxx:
When smoothing with G644, the maximum deviations of each axis specified in MD COMPRESS_POS_TOL are adhered to. Differing from value 0xxx, the specified tolerance is fully utilized where possible. The axis then does not reach its maximum possible dynamic response.
5xxx:
When smoothing with G644, the smoothing distance is specified (ADIS or ADISPOS). Differing from value 1xxx, the specified smoothing distance is fully utilized here, if possible. The axes involved then possibly do not reach their maximum possible dynamic response.

Possible values for the ten-thousands digit (configuration of G644):

0xxxx:
The velocity profiles of the axes are defined in the smoothing range without jerk limitiation when BRISK is active and with jerk limitation when SOFT is active.
1xxxx:
The velocity profiles of the axes are defined in the smoothing range always with jerk limitation independent of whether BRISK or SOFT is active.

The values of the units, tens, hundreds and thousands digits are added.

Related to:
$MA_COMPRESS_POS_TOL,
$SC_SMOOTH_CONTUR_TOL,
$SC_SMOOTH_ORI_TOL

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	15344	7/7

20482	**COMPRESSOR_MODE**			EXP	F2,PGA
-	Mode of compressor			BYTE	NEW CONF

This MD is used to set the compressor operating mode.
The units digits and the tens digits have different meanings.
The following possibilities are available:

0: With the compressor, the tolerances specified via $MA_COMPRESS_POS_TOL are met for all axes (geometry and orientation axes).
1: With the compressor, the contour tolerances specified via $SC_COMPRESS_CONTUR_TOL become active for the geometry axes.
For the orientation axes, the axis-specific tolerances $MA_COMPRESS_POS_TOL become active.
2: With the compressor, the axis-specific tolerances $MA_COMPRESS_POS_TOL become active for the geometry axes. The orientation movement is compressed with the maximum angular deviations specified via $SC_COMPRESS_ORI_TOL and $SC_COMPRESS_ORI_ROT_TOL being observed.
3: With the compressor, the contour tolerance $SC_COMPRESS_CONTUR_TOL becomes active for the geometry axes and the maximum angular deviation $SC_COMPRESS_ORI_TOL or $SC_COMPRESS_ORI_ROT_TOL for the orientation axes.

The tens digits of this MD can be used to set a compressor response that is compatible with previous software releases (< SW 6.3).

0x:All blocks with orientations and value assignments are compressed.
This is the default setting.
Notice: This response is incompatible with previous software releases!

1x:Blocks with value assignments are not compressed (e.g. X=100 ... etc.)

2x:Blocks with a programmed tool orientation are not compressed.
(e.g. A3= B3= C3=).

3x:All blocks with value assignments and/or programmed tool orientation are not compressed. With this setting, the response is fully compatible with previous software releases (< 6.3).

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	33	7/7

20484	**COMPRESSOR_PERFORMANCE**			EXP	PGA
-	Compressor power			BYTE	RESET

This MD is used to set the compressor power. Higher values ensure better surfaces, but also require a higher computer power. The correct value is prespecified for each NCU. For this reason, this MD should only be modified in exceptional cases.

-					
-	-	9,9,9,9,9,9,9,9,9,9,9,9,9,9,9,9	0	9	0/0

20488	**SPLINE_MODE**			EXP	-
-	Setting for spline interpolation			BYTE	NEW CONF
This MD is used to determine the settings for spline interpolation. The allocation of the spline segments to the NC blocks can thus be influenced. With spline interpolation, the spline blocks are combined, if possible, in such a way, that there are no blocks that are too short and could lead to a reduction in the possible path velocity. Bit 0: With BSPLINE, blocks that are too short are avoided. Bit 1: With BSPLINE/ORICURVE, blocks that are too short are avoided. Bit 2: With CSPLINE, blocks that are too short are avoided.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	7	7/7

20490	**IGNORE_OVL_FACTOR_FOR_ADIS**			EXP	-
-	G641/G642 independent of overload factor			BOOLEAN	NEW CONF
A block transition is normally only smoothed with G641 and G642 when the tool path velocity at block transition is reduced due to the set overload factor (MD $MA_MAX_ACCEL_OVL_FACTOR). When SOFT is active, the maximum jerk at block transitions is limited additionally by machine data $MA_PATH_TRANS_JERK_LIM. This means that the effect of smoothing with G641 and G642 depends on the set values for the overload factor and possibly for the maximum jerk. By setting MD $MC_IGNORE_OVL_FACTOR_FOR_ADIS = TRUE, you can achieve that a block transition is smoothed with G641 and G642 independent of the set values for the overload factor.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

20500	**CONST_VELO_MIN_TIME**			EXP, C05	B2
s	Minimum time with constant velocity			DOUBLE	POWER ON
Defines the minimum time for constant velocity during transition from acceleration to deceleration in short blocks in which the set velocity cannot be reached. Entering a time of at least several IPO cycles prevents a direct transition from the acceleration to the deceleration phase and thus reduces the acceleration jump to half. This acceleration limitation is only active with the acceleration profile BRISK. MD irrelevant for: Look Ahead does not take account of this function.					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	0.1	7/2

20550	**EXACT_POS_MODE**			EXP	B1
-	Exact stop conditions on G00/G01.			BYTE	NEW CONF

```
Configuration of the exact stop conditions for G00 and other G codes of the
1st G code group.
The MD is decimal-coded. The units digits define the behavior at G00 (infeed
    motion) and the tens digits the behavior of all the other G codes of the
    1st group ("machining G codes").

x0:At G00, the relevant programmed exact stop conditions become active.
x1:At G00, G601 (fine positioning window) becomes active independent of the
programmed exact stop condition.
x2:At G00, G602 (coarse positioning window) becomes active independent of the
programmed exact stop condition.
x3:At G00, G603 (setpoint value reached) becomes active independent of the
programmed exact stop condition.

0x:At the machining G codes, the relevant programmed exact stop conditions
become active.
1x:At the machining G codes, G601 (fine positioning window) becomes active
independent of the programmed exact stop condition.
2x:At the machining G codes, G602 (coarse positioning window) becomes active
independent of the programmed exact stop condition.
3x:At the machining G codes, G603 (setpoint value reached) becomes active
independent of the programmed exact stop condition.
The values of the units digits and tens digits are added.

For example, the value of EXACT_POS_MODE = 2 means that the exact stop condi-
    tion G602 is always activated automatically at G00, independently of which
    exact stop condition was programmed. At all other G codes of group 1, the
    programmed exact stop condition becomes active.
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	33	7/2

20552	EXACT_POS_MODE_G0_TO_G1			EXP	PG
-	Exact stop condition at G00-G01 transition			BYTE	NEW CONF
Configuration of a stop at transition from G00 to a different G code of the 1st G code group, and also vice versa, at transition from non-G00 to G00 in continuous-path mode. In exact-stop mode, the positioning window programmed or set in $MC_EXACT_POS_MODE is used. The following applies: 0: No additional stop, no control of exact stop 1: Behavior active as with G601 (positioning window, fine). 2: Behavior active as with G602 (positioning window, coarse). 3: Behavior active as with G603 (setpoint reached). 4: As 0, in addition, the override of the subsequent non-G00 block is taken into account in the G00 block via LookAhead in the case of a change from G00 to non-G00. 5: As 0, in addition, the override of the subsequent block is taken into account via LookAhead in the case of a change from G00 to non-G00 and non-G00 to G00.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	5	7/2

20600	MAX_PATH_JERK			C05	B2
m/s³	Path-related maximum jerk			DOUBLE	NEW CONF
The jerk limitation restricts the path acceleration change in SOFT mode. The path acceleration divided by the jerk limitation value produces a time in which the acceleration change takes place. The jerk limitation is activated on the path by the NC command SOFT, and deactivated by BRISK. MD irrelevant for: Error states that lead to a rapid stop. In addition, the limitation is also inactive for positioning axes. There is an entry for each dynamic G code group.					
-					
-	5	100., 100., 100., 100., 100....	1.e-9	-	7/2

20602	**CURV_EFFECT_ON_PATH_ACCEL**			EXP, C05	B1
-	Effect of path curvature on path dynamic			DOUBLE	NEW CONF

```
This MD is used to determine whether the reaction of path curvature on path
acceleration and path velocity is taken into account

  0:
   Not taken into account
> 0:
    If required, path velocity and path acceleration are reduced to keep a
    sufficient reserve on the machine axes for centripetal acceleration.
   0.75: Recommended setting.
$MC_CURV_EFFECT_ON_PATH_ACCEL indicates the share of the axis accelerations
(see $MA_MAX_AX_ACCEL[..]), which can be used for centripetal acceleration.
The remainder is used for changes in path velocity.
Centripetal acceleration is not required for linear blocks; therefore, full
axis acceleration is available for path acceleration. On slightly curved con-
tours or with a sufficiently low maximum path feedrate
$MC_CURV_EFFECT_ON_PATH_ACCEL has no full or no effect at all. Correspond-
ingly, path acceleration is higher than specified via (1. -
$MC_CURV_EFFECT_ON_PATH_ACCEL) * $MA_MAX_AX_ACCEL[..].

There is an entry for each dynamic G code group.
```

-					
-	5	0., 0., 0., 0., 0.,0., 0., 0., 0., 0....	0.	0.95	7/2

20603	**CURV_EFFECT_ON_PATH_JERK**			EXP, C05	B1
-	Effect of path curvature on path jerk			DOUBLE	NEW CONF

```
Allows the reaction of the path curvature on the path jerk to be taken into
account on especially jerk-sensitive machines.

Entry for each dynamic G code group.
```

-					
-	5	0., 0., 0., 0., 0.,0., 0., 0., 0., 0....	0.	1000.	7/2

20610	**ADD_MOVE_ACCEL_RESERVE**			C05	K1,B1,B2
-	Acceleration margin for overlaid movements			DOUBLE	POWER ON

```
This machine data contains the factor which defines the acceleration margin
which is not used by a path movement in order to provide sufficient accelera-
tion reserves for an overlaid movement for the velocity control.
A factor of 0.2 means that the path axes utilize 80% of the path acceleration
    in normal operation. Only when a request for overlaid movement is made,
    can 100% of the path acceleration be utilized.

MD irrelevant for:
   Error states that lead to a rapid stop. In addition, the limitation is also
ineffective for positioning axes.

Special cases:
    At the moment the machine data is only taken into account if the function
    "Fast retraction" is first activated.

Related to:
    MD 32300: MAX_AX_ACCEL (axis acceleration)
```

-					
-	-	.2,.2,.2,.2,.2,.2,.2,.2, .2,.2,.2,.2,.2...	0.	0.9	7/2

20620	**HANDWH_GEOAX_MAX_INCR_SIZE**			C08, C06	H1
mm	Limitation handwheel increment for geometry axes			DOUBLE	POWER ON

```
> 0: Limitation of the size of the selected increment for geometry axes
   $MN_JOG_INCR_SIZE0[<increment/VDI signal>] or
   $SN_JOG_VAR_INCR_SIZE for geometry axes

 0: No limitation on geometry axes
```

-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0 .0,0.0,0.0,0.0...	-	-	7/2

20621	**HANDWH_ORIAX_MAX_INCR_SIZE**			C08, C06	F2
degrees	Limiting of handwheel increment for orientation axes			DOUBLE	POWER ON

```
> 0: Limitation of the size of the selected increment for orientation axes
   $MN_JOG_INCR_SIZE[<increment/VDI signal>] or
   $SN_JOG_VAR_INCR_SIZE for orientation axes

= 0:  No limitation on orientation axes
```

-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0 .0,0.0,0.0,0.0...	-	-	7/2

20622	**HANDWH_GEOAX_MAX_INCR_VSIZE**			C08, C06, C05	H1
mm/min	Path velocity override			DOUBLE	POWER ON
The following applies to the velocity override of the path: > 0: Limitation of the size of the selected increment ($MN_JOG_INCR_SIZE_[<increment/VDI signal>] or $SN_JOG_VAR_INCR_SIZE) / 1000*IPO sampling time = 0: No limitation					
-					
-	-	500.,500.,500.,500.,500.,500.,500....	-	-	7/2

20623	**HANDWH_ORIAX_MAX_INCR_VSIZE**			C08, C06, C05	F2
rev/min	Orientation velocity overlay			DOUBLE	POWER ON
For the orientation velocity overlay: > 0: Limitation of the size of the selected increment ($MN_JOG_INCR_SIZE[< increment/VDI signal>] or $SN_JOG_VAR_INCR_SIZE) / 1000 * IPO sampling time = 0: No limitation					
-					
-	-	0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1...	-	-	7/2

20624	HANDWH_CHAN_STOP_COND	EXP, C09	H1
-	Definition of response of handwheel travel, channel-specific	DWORD	POWER ON

```
This MD is used to determine the response of handwheel travel to channel-spe-
    cific VDI interface signals:
Bit=0:
    Interruption or gathering of the displacements entered via the handwheel
Bit=1:
    Stop of traversing and no gathering

Bit assignment
Bit  0: Mode group stop
Bit  1: Mode group stop, axes plus spindle
Bit  2: NC stop
Bit  3: NC stop, axes plus spindles
Bit  4: Feed disable
Bit  5: Feedrate override
Bit  6: Rapid traverse override
Bit  7: Feed stop, geometry axis

Setting for geometry axes:
Bit 8 == 0:
    The maximum feedrate for handwheel travel is that specified in machine
    data JOG_AX_VELO of the corresponding machine axis/axes.
Bit 8 == 1:
    The maximum feedrate for handwheel travel is that specified in machine
    data MAX_AX_VELO of the corresponding machine axis/axes.
Bit 9 == 0:
    The override is active during handwheel travel
Bit 9 == 1:
    During handwheel travel, the override is assumed to be 100% independent of
    the position of the override switch; an exception is override 0, which is
    always active.

Setting for DRF for all axes of the channel:
Bit 10 == 0:
    Machine data $MN_HANDWH_REVERSE is not active for DRF, i.e. handwheel
    travel with DRF is carried out as if $MN_HANDWH_REVERSE == 0.
Bit 10 == 1:
    Machine data $MN_HANDWH_REVERSE is active for DRF.

Settings for contour handwheel:
Bit 11 == 0:
    When the contour handwheel is deselected, program processing is continued
    automatically.
Bit 11 == 1:
When the contour handwheel is deselected, an NCSTOP is triggered automati-
    cally. Program processing is not continued until NCSTART is entered.
```

Bit 12: NC Start

Bit 13 == 0:
For DRF, bits 0 - 3 and bit 12: bit == 0 / bit == 1 are active, see above.
Bit 13 == 1:
For DRF, bits 0 - 3 and bit 12 are NOT active: the DRF motion is not interrupted by a stop, and even in the 'Automatic interrupted' state (achieved by NC Stop), a DRF motion can be carried out.
Note: If an alarm leads to an axis stop and if such an alarm is pending, no DRF motion can take place.

Bit 14 == 0:
The maximum feedrate for handwheel travel is that specified in setting data $SN_JOG_REV_SET_VELO or in machine data $MA_JOG_REV_VELO (for revolutional feedrate) or in $MA_JOG_REV_VELO_RAPID (for rapid traverse) of the corresponding machine axis, allowing for the spindle or rotary axis feedrate.
Bit 14 == 1:
The maximum feedrate for handwheel travel in the case of rotational feedrate is that specified in machine data $MA_MAX_AX_VELO of the corresponding machine axis (see also bit 6).

Bit 15 == 0:
If the geometry axis is traversed in the channel as a transverse axis, only half of the distance of the specified increment is traveled during handwheel travel (HANDWH_TRUE_DISTANCE == 1).
Bit 15 == 1:
If the geometry axis is traversed in the channel as a transverse axis, the specified increment is fully traveled during handwheel travel (HANDWH_TRUE_DISTANCE == 1).

-					
-	-	0x13FF,0x13FF,0x13FF,0x13FF,0x13FF...	0	0xFFFF	7/2

20700	**REFP_NC_START_LOCK**		C01, C03	R1
-	NC start disable without reference point		BOOLEAN	RESET

0: The IS "NC Start" (DB21, ... DBX7.1) for starting of part programs or part program blocks (MDI and overstore) is active even if one or all axes of the channel has/have not yet been referenced.
To ensure that the axes nevertheless reach the correct position after NC Start, the workpiece coordinate system (WCS) must be set to the correct value by means of other methods (scratch method, automatic zero offset determination, etc.).

1: Those axes, for which the axial MD $MA_REFP_CYCLE_NR specifies that a reference point is obligate (value > -1), must have been referenced before NC Start is allowed.

-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2

20730	**G0_LINEAR_MODE**			C09	P2
-	G0 interpolation mode			BOOLEAN	POWER ON
This machine data defines the interpolation behavior of G0: 0: Non-linear interpolation: Every path axis interpolates as individual axis (positioning axis) independently of the other axes at rapid traverse of the axis ($MA_MAX_AX_VELO). 1: Linear interpolation: The path axes are interpolated jointly. With the part program command G0LINOF, the non-linear interpolation can be selected; with G0LINON it can be deselected. Related to: $MC_EXTERN_G0_LINEAR_MODE					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/2

20732	**EXTERN_G0_LINEAR_MODE**			N12	P2
-	G00 interpolation mode			BOOLEAN	POWER ON
This machine data defines the interpolation behavior of G00: 0: Axes are traversed as positioning axes 1: Axes interpolate with each other Related to: EXTERN_INCREMENT_SYSTEM					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/2

20734	EXTERN_FUNCTION_MASK	N12	FBFA
-	Function mask for external language	DWORD	RESET

```
This machine data is used to influence functions in ISO mode.

Bit0: 0:
    ISO mode T: "A" and "C" are interpreted as axes. If contour definition has
    been programmed, "A" or "C" must be preceded by a comma.
      1:
    "A" and "C" in the part program are always interpreted as a contour defi-
    nition. An axis "A" or "C" is not allowed.

Bit1: 0:
    ISO mode T: G10 P < 100 tool geometry
                    P > 100 tool wear
      1:
                G10 P < 10000 tool geometry
                    P > 10000 tool wear

Bit2: 0:
    G04 dwell time: always [s] or [ms]
      1:
    If G95 is active, in spindle revolutions

Bit3: 0:
    Errors in ISO scanner lead to an alarm
      1:
    Errors in ISO scannner are not output, the block is transferred to the
    Siemenstranslator.

Bit4: 0:
    G00 is traversed with the current exact stop - continuous-path mode G code
      1:
    G00 is always traversed with G09

Bit5: 0:
    Modulo rotary axis is positioned at the shortest possible distance
      1:
    Direction of rotation of modulo rotary axis depends on sign

Bit6: 0:
    Only 4-digit program number allowed.
      1:
    8-digit program number allowed. If the program number has less than 4 dig-
    its, it is expanded to 4 digits with 0.

Bit7: 0:
    Axis programming for geometry axis exchange/parallel axes is ISO mode-com-
    patible.
      1:
    Axis programming for geometry axis exchange/parallel axes is compatible in
    ISO mode with Siemensmode.
```

```
Bit8: 0:
   With cycles, the F value transferred  is always interpreted as a feedrate.
       1:
   With threading cycles, the F value transferred is interpreted as pitch.

Bit9: 0:
   Multiplication with 0.01mm / 0.0001inch is carried out in ISO mode T for
G84, G88 and in standard mode F for G95.
      1:
   Multiplication with 0.001mm / 0.00001inch is carried out in ISO mode T for
G84, G88 and in standard mode F for G95.

Bit10: 0:
   With M96 Pxx, the program programmed with Pxx is always called in the case
of an interrupt
       1:
   With M96 Pxx, CYCLE396.spf is always called in the case of an interrupt

Bit11: 0:
   With G54 Pxx, only G54.1 is displayed
       1:
   With G54 Pxx, the programmed program is displayed after the point, e.g.
G54.48

Bit12: 0:
   When the subroutine defined with M96 Pxx is called, $P_ISO_STACK is not
modified
       1:
   When the subroutine defined with M96 Pxx is called, $P_ISO_STACK is incre-
mented
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	0xFFFF	7/2

20750	**ALLOW_G0_IN_G96**		C09, C05	V1
-	G0 logic with G96		BOOLEAN	POWER ON

```
This machine data defines the speed regulation characteristic of the spindle
in G0 blocks with constant cutting rate (G96, G961) selected .

1: In a G0 block, the spindle speed is kept constant at the last value of the
previous block that was unequal G0.
   Prior to a subsequent block that does not contain G0, the spindle speed is
increased to a value that belongs to the transverse axis position of the sub-
sequent block.
0: In a G0 block, the spindle speed changes against the transverse axis posi-
tion.
```

-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/2

20800	SPF_END_TO_VDI		C04, C03	H2
-	End of subroutine to PLC		BYTE	POWER ON

```
Bit 0 = 1:
   The M functions for subroutine end (M17 and/or M2/M30) are transferred to
the PLC interface.

Bit 0 = 0:
   The M functions for subroutine end (M17 and/or M2/M30) are not transferred
to the PLC interface.

Note:
    To prevent stopping in continuous-path mode, M17 must not be programmed
    alone in a block.
Example of a subroutine:  G64 F2000 G91 Y10 X10
                             X10 Z10 M17
Bit 1 = 0:
   M01:
   conditional program stop is always output to PLC, irrespective of whether
the M01 signal is active or not.
   Fast auxiliary function output M=QU(1) is inactive because M01 is assigned
to the 1st M function group and thus is always output at block end.

Bit 1 = 1:
   M01:
   conditional program stop is only output to PLC, if M01 is also active.
   This thus enables optimal run-time processing of the part program.
   With fast auxiliary function output M=QU(1), M1 is output during the move-
ment; thus it is possible to traverse blocks in continuous-path mode with pro-
grammed M01 as long as M01 is not active.
   The request of the M01 signal with M=QU(1) no longer occurs at block end
but during the movement.
```

-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	7/2

20850	SPOS_TO_VDI		C04, C03	S1
-	Output of M19 to PLC on SPOS/SPOSA		BYTE	POWER ON

```
Bit 0 = 0:
   SPOS and SPOSA are not output to the VDI interface.
   Therefore there is no acknowledgement time of the M function, which can
cause faults in the case of the very short spindle positioning blocks and
SPOSA blocks.

Bit 0 = 1:
    In the case of SPOS and SPOSA, "M19" is output to the VDI interface.
   The response is the same as that of a programmed "M19".
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

20900	**CTAB_ENABLE_NO_LEADMOTION**			EXP	M3
-	Curve tables with jump of slave axis			BYTE	RESET
This MD is used to configure the way jumps of the slave axis are processed in curve tables. A jump of the slave axis results from the presence of a movement of the slave axis in a segment of the curve table with no corresponding movement of the master axis. The jumps of the slave axis may be programmed directly, or they are created internally in the control. These segments may be created especially if a curve table with active tool radius compensation is generated. The following configurations are possible: 0: No curve tables are created that contain a jump of the slave axis. If a jump of the slave axis occurs, alarm 10949 (CTAB_NO_LEADMOTION) is issued and program processing is terminated. This setting is compatible with previous software versions. 1: Curve tables containing a jump of the slave axis may be implemented. If a jump of the slave axis occurs, alarm 10955 (CTAB_NO_LEADMOTIONWARNING) is issued without terminating program processing. 2: Curve tables with jumps of the slave axis are implemented without issuing an alarm or a note.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/2

20905	**CTAB_DEFAULT_MEMORY_TYPE**			EXP	M3
-	Default memory type for curve tables			BYTE	RESET
This machine data defines the memory (SRAM or DRAM) in which the curve tables are created by default. This MD is only relevant if no memory type was specified when defining a curve table using CTABDEF(). The following settings can be selected: 0: By default, curve tables are created in the SRAM. 1: By default, curve tables are created in the DRAM.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

21000	CIRCLE_ERROR_CONST		C06	K1	
mm	Circle end point monitoring constant		DOUBLE	POWER ON	
This machine data is used to specify the permissible absolute circle error [mm]. When a circle is programmed, the radius from the programmed center point to the start point and to the end point are usually not equal (the circle is "overdefined"). The maximum permissible difference of those two radii that is accepted without an alarm is defined by the larger value of the following data: - CIRCLE_ERROR_CONST - Start radius multiplied with MD 21010: CIRCLE_ERROR_FACTOR This means that for small circles the tolerance is a fixed value (CIRCLE_ERROR_CONST) and for large circles it is proportional to the start radius. Related to: MD 21010: CIRCLE_ERROR_FACTOR (circle end point monitoring factor)					
-					
-	-	0.01,0.01,0.01,0.01, 0.01,0.01,0.01...	-	-	7/2

21010	CIRCLE_ERROR_FACTOR		C06	K1	
-	Circle end point monitoring factor		DOUBLE	POWER ON	
Factor for permissible radius difference. Defines the factor for large circles by which the starting radius and end radius may deviate from each other (see also MD 21000: CIRCLE_ERROR_CONST (circle end point monitoring constant).					
-					
-	-	0.001,0.001,0.001,0 .001,0.001,0.001...	-	-	7/2

21015	INVOLUTE_RADIUS_DELTA		C06	PG	
mm	Involute end point monitoring		DOUBLE	POWER ON	
Permissible absolute difference of radius at involute interpolation [mm]. At involute interpolation, the radius of the basic circle determined by the end point may differ from the programmed radius. This data is used to limit the permissible maximum difference between start radius and end radius.					
-					
-	-	0.01,0.01,0.01,0.01, 0.01,0.01,0.01...	-	-	7/2

21016	**INVOLUTE_AUTO_ANGLE_LIMIT**			C06	PG
-	Automatic angle limitation during involute interpolation			BOOLEAN	POWER ON
If the angle of rotation is programmed for an involute (AR=angle), the maximum angle of rotation is limited in case the involute is travelling towards the basic circle (AR < 0). The maximum angle of rotation is reached when the involute touches the basic circle. Normally, if an angle larger than the maximum angle is programmed, an alarm is issued and the NC program aborted. If this MD is set to TRUE any angle is accepted without an alarm for programming. If required, this angle is limited automatically.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

21020	**WORKAREA_WITH_TOOL_RADIUS**			C03, C06	A3
-	Consideration of tool radius for working area limitation			BOOLEAN	RESET
This machine data indicates whether the tool radius is taken into account with working area limitation. 0: It is checked whether the tool center lies within the working area limits (corresponds to version P2) 1: The tool radius is taken into account when the working area limitation is checked. This means that the working area is reduced by the tool radius.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

21050	**CONTOUR_TUNNEL_TOL**			C06	F2
mm	Response threshold for contour tunnel monitoring			DOUBLE	NEW CONF
Response threshold for contour tunnel monitoring. Defines the radius of the "tunnel" around the path of the tool tip. If three geometry axes are defined, the tunnel can be regarded as a tube through the center of which the path of the tool tip travels. If only two geometry axes are defined, this tube can be regarded as squashed flat in the plane of the two geometry axes. Monitoring is only active if: - option contour tunnel monitoring is present and - $MC_CONTOUR_TUNNEL_TOL is larger than 0.0 and - at least two and at most three geometry axes are defined. Related to: CONTOUR_TUNNEL_REACTION, CONTOUR_ASSIGN_FASTOUT, ENC_CHANGE_TOL					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

21060	CONTOUR_TUNNEL_REACTION			C06	F2
-	Reaction when contour tunnel monitoring responds			BYTE	POWER ON
Reaction to response of the alarm 0: Only display alarm, continue machining 1: Ramp stop 2: Rapid stop MD irrelevant: if 'contour tunnel monitoring' option is not available Related to: CONTOUR_TUNNEL_TOL, CONTOUR_ASSIGN_FASTOUT					
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	2	7/2

21070	CONTOUR_ASSIGN_FASTOUT			C01, C06	F2
-	Assignment of an analog output for the output of contour error			BYTE	POWER ON
Assignment of an analog output on which the calculated contour error can be output. 0: No output 1: Output on output 1 2: Output on output 2 etc. 8: Output on output 8 An error in the amount of the response threshold $MC_CONTOUR_TUNNEL_TOL appears on the output as a voltage of 10V. Multiple assignment of the same output through other signals is checked automatically. MD irrelevant: if 'contour tunnel monitoring' option is available Related to: CONTOUR_TUNNEL_TOL, CONTOUR_TUNNEL_REACTION					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	8	7/2

21080	**CUTCOM_PARALLEL_ORI_LIMIT**			C08, C06	W5
degrees	Minimum angle (path tangent / tool orientation) in 3D TRC			DOUBLE	RESET
With 3D tool radius compensation, the angle between the path tangent and the tool orientation may not drop below a certain limit angle. This machine data specifies this angle (in degrees). Generally speaking, the lower the value entered in this machine data, the greater the computing capacity required to check that the above conditions are fulfilled. Linear blocks with constant orientation are an exception.					
-					
-	-	3.,3.,3.,3.,3.,3.,3.,3., 3.,3.,3.,3.,3....	0.1	89.	7/2

21082	**CUTCOM_PLANE_ORI_LIMIT**			C08, C06	W5
degrees	Minimum angle between surface normal vector and tool orientation			DOUBLE	RESET
This machine data applies to 3D face milling operations and specifies the minimum angle that must exist between the surface normal vector and the tool orientation on every point of the path if the applied lateral angle is not equal to zero and the tool is not a ball mill. Otherwise, machining is aborted with an alarm if the angle is smaller than the value set here. Generally speaking, the lower the value entered in this machine data, the greater the computing capacity required to check that the above conditions are fulfilled.This data has no effect in linear blocks with constant orientation. The angle between the surface normal vector and tool orientation may be as small as desired in such cases, even if the lateral angle is not equal to zero.					
-					
-	-	3.,3.,3.,3.,3.,3.,3.,3., 3.,3.,3.,3.,3....	1.0	89.	7/2

21084	**CUTCOM_PLANE_PATH_LIMIT**			C08, C06	W5
degrees	Min. angle betw. surface normal vector and path tangent vector			DOUBLE	RESET
This machine data applies to 3D face milling operations and specifies the minimum angle that must exist between the surface normal vector and the path tangent vector on every point of the path. Otherwise machining is aborted with an alarm if the angle is smaller than the value set here. Generally speaking, the lower the value entered in this machine data, the greater the computing capacity required to check that the above conditions are fulfilled.					
-					
-	-	3.,3.,3.,3.,3.,3.,3.,3., 3.,3.,3.,3.,3....	1.0	89.	7/2

21090	**MAX_LEAD_ANGLE**			C08, C09	-
degrees	Maximum value of permitted lead angle for orientation progr.			DOUBLE	NEW CONF
Maximum permissible value of the lead angle in degrees.					
-					
-	-	80.,80.,80.,80.,80.,80.,80.,80.,80....	0.	80.	7/7

21092	**MAX_TILT_ANGLE**			C08, C09		-
degrees	Maximum value of permitted side angle for orientation progr.			DOUBLE		NEW CONF
Maximum permissible value of the tilt angle in degrees.						
-						
-	-	180.,180.,180.,180., 180.,180.,180....	-180.	180.	7/7	

21094	ORIPATH_MODE		C02	-	
-	Setting for ORIPATH path-relative orientation		BYTE	NEW CONF	

```
This MD is used to set the behavior for ORIPATH, i.e. path-relevant interpola-
tion of tool orientation.
With the various digits of this machine data various functions for ORIPATH are
activated.
Meaning of the units digit: Activation of the "real" path-relative orienta-
tion interpolation

xx 0:
   Only at the end of the block, the tool orientation has the relation pro-
grammed with LEAD and TILT to the path tangent and the normal vector; within
the block, the orientation does not follow the path tangent. This corresponds
to the behavior of SW release 6.xx.
xx1:
   The relation of the tool orientation to the path tangent and the surface
normal vector  programmed with LEAD/TILT is retained during the whole block.
Meaning of the tens digit: Interpretation of the TILT angle
x0x:
   LEAD = Rotation around direction vertical to tangent and normal vector
   (forward angle)
   TILT = Rotation of orientation around normal vector
   This is the interpretation of the LEAD/TILT angles in SW releases < 7.2
x1x:
   LEAD = Rotation around direction vertical to tangent and normal vector
   (forward angle)
   TILT = Rotation of orientation around vector in direction of tangent
   (tilt angle)

Meaning of hundreds digit: Activation of a retract movement in the case of re-
orientation.

0xx:
    In the case of re-orientation with ORIPATH, a retract movement is not car-
    ried out.

1xx:
    In the case of re-orientation with active ORIPATH, a retract movement in
    the direction of the programmed vector is carried out. The programmed vec-
    tor for the direction of the retract movement refers to the coordinate
    system defined by the current tool direction (z coordinate) and the change
    in orientation (x coordinate).

2xx:
    In the case of re-orientation with active ORIPATH, a retract movement in
    the direction of the programmed vector is carried out. The programmed vec-
    tor for the direction of the retract movement refers to the coordinate
    system defined by the current surface normal vector (z coordinate) and the
    change in orientation (x coordinate).

A retract movement is possible only with a "real" path-relative orientation
    interpolation, i.e. if the units digit of the MD has the value one.
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	211	7/7

21100	**ORIENTATION_IS_EULER**		C01, C09	F2	
-	Angle definition for orientation programming		BOOLEAN	NEW CONF	
MD = 0 (FALSE): The values programmed with A2, B2, C2 during orientation programming are interpreted as an RPY angle (in degrees). The orientation vector is produced by rotating a vector in direction Z first by C2 around the Z axis, then by B2 around the new Y axis and finally by A2 around the new X axis. In contrast to Euler angle programming, all three values influence the orientation vector in this case. MD = 1 (TRUE): The values programmed with A2, B2, C2 during orientation programming are interpreted as Euler angles (in degrees). The orientation vector is produced by rotating a vector in direction Z first by A2 around the Z axis, then by B2 around the new X axis and finally by C2 around the new Z axis. This means that the value of C2 is meaningless.					
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

21102	**ORI_DEF_WITH_G_CODE**		C01, C07	F2	
-	Definition of orientation axes with G code		BOOLEAN	NEW CONF	
Definition of the orientation angles A2, B2, C2 0: Definition as per MD $MC_ORIENTATION_IS_EULER 1: Definition as per G code (ORIEULER, ORIRPY, ORIVIRT1, ORIVIRT2)					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

21103	**ORI_ANGLE_WITH_G_CODE**		C01, C07	-	
-	Definition of orientation angles via G code		BOOLEAN	NEW CONF	
Definition of the orientation angles A2, B2, C2: FALSE: Definition as per MD $MC_ORIENTATION_IS_EULER TRUE : Definition as per G code (ORIEULER, ORIRPY, ORIVIRT1, ORIVIRT2) Only programming of angles with A2, B2, C2 is interpreted in accordance with G codes ORIEULER, ORIRPY, ORIVIRT1, ORIVIRT2 and not programming of angles by means of the orientation axes, as is the case with MD $MC_ORI_DEF_WITH_G_CODE = 1.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

21104	ORI_IPO_WITH_G_CODE			C01, C07	F2
-	G code for orientation interpolation			BOOLEAN	NEW CONF
Definition of the type of interpolation for the orientation FALSE:Referred to G codes ORIWKS and ORIMKS TRUE :Referred to G codes ORIAXES, ORIVECT, ORIPLANE, ORICONxx and ORICURVE of the 51st G code group					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

21106	CART_JOG_SYSTEM			C01, C07	H1
-	Coordinate systems for Cartesian JOG			DWORD	POWER ON
This machine data has two meanings. First, it is used to activate the "Cartesian manual traverse" function. Second, it is used to determine the reference systems between which a switchover can be performed. The meaning of the individual bits is determined as follows: Bit 0 : Basic coordinate system Bit 1 : Workpiece coordinate system Bit 2 : Tool coordinate system					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	7	7/2

21108	POLE_ORI_MODE	C07	-
-	Response with vector interpolation in pole position	DWORD	NEW CONF

This MD defines how the change in orientation in the case of vector interpolation is treated if the orientation runs through the pole taper, which is defined by MD $TRAFO5_POLE_LIMIT_1/2.

Vector interpolation is present, if tool orientation is interpolated independent of the kinematics, e.g. by means of large circle interpolation (orientation is swiveled in a plane), taper interpolation or through interpolation of a 2nd reference point on the tool (ORICURVE), and not directly the orientation axes.

In the pole, the pole axis can have any position. For large circle interpolation, however, this axis requires a certain orientation.

If the start orientation is equal or close to the pole orientation and the end orientation of the block lies outside the tolerance circle defined by machine data TRAFO5_POLE_LIMIT_1/2, the pole axis can be moved to a position suitable to ensure that the subsequent vector interpolation can be carried out. This is set via the units and tens digits of this machine data.

The units digits can have the following values (active if start orientation equal to pole orientation):

0: The interpolation is carried out as an axis interpolation. The specified orientation path (large circle) is followed only if the pole axis (coincidentally) has the right position and the basic orientation is perpendicular to the 2nd rotary axis.

1: A block, that positions the pole axis to a position enabling large circle interpolation to be carried out in the subsequent block, is inserted before the block where the situation described occurs.

2: If the block preceding the block in which the situation described occurs contains a geometry axis movement but no orientation movement the required positioning movement of the pole axis is additionally carried out in this previous block.
If one of the two conditions is not fulfilled (block does not contain a geometry axis movement or block contains an orientation movement), the pole axis movement is carried out in a separate block (same behavior as under 1.)

The tens digits can have the following values (active if the start orientation differs from the pole orientation, but lies within the tolerance circle defined by TRAFO5_POLE_LIMIT_1/2):

00:The interpolation is carried out as an axis interpolation. The specified orientation path (large circle) is followed only if the pole axis (coincidentally) has the right position hat and the basic orientation is perpendicular to the 2nd rotary axis.

10:A block, which positions the two rotary axes to the point where the programmed large circle interpolation intersects with the tolerance circle defined by TRAFO5_POLE_LIMIT_1/2, is inserted before the block where the situation described occurs. In the original block, large circle interpolation is applied as of this point.

20:If the block preceding the block in which the described situation occurs contains a geometry axis movement but no orientation movement the necessary positioning movements of the two rotary axes are additionally carried out in this previous block. The residual movement in the original block is the same as that of value 10 of this machine data.

If one of the two conditions is not fulfilled (block does not contain a geometry axis movement or block contains an orientation movement), the pole axis movement is carried out in a separate block (same behavior as under 10.)

The behavior for the case that the orientation runs through the pole taper or ends within the pole taper is set with the hundreds digit of this MD.

The hundreds digit can have the following values:

000:A block with the orientation running within the pole taper is subdivided only if the start orientation is equal to the pole orientation (with POLE_ORI_MODE = 1) or is close to the pole orientation (with POLE_ORI_MODE = 10). If the pole orientation occurs at an arbitrary point in the block, the whole change in orientation is traversed by means of rotary axis interpolation. In general, this leads to a more or less significant deviation from the programmed orientation path.

100:If the programmed orientation path runs through the pole taper, the block is subdivided in up to 3 parts, so that there is a deviation from the orientation path only within the pole taper. Outside the pole taper, the orientation is interpolated exactly on the programmed orientation path.

The values of the units, tens and hundreds digits are added.

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	122	7/7

21110	**X_AXIS_IN_OLD_X_Z_PLANE**		EXP, C01, C09		M1
-	Coordinate system for automatic frame definition		BOOLEAN		POWER ON
1 = With automatic definition of a frame (TOFRAME), the Z direction of which equals the current tool orientation, the new coordinate system is additionally rotated around the new Z axis so that the new X axis is in the old Z-X plane. 0 = With automatic definition of a frame (TOFRAME), the Z direction of which equals the current tool orientation, the new coordinate system is maintained as it results from the kinematics of the machine, i.e. it is assumed that the coordinate system is fixed to the tool and rotates with the tool (orientation). From SW 5.3: This machine data is only effective when the three lowest value decimal positions (units, tens, hundreds) of the setting data 42980 (TOFRAME_MODE) equal zero. Otherwise the frame definition is specified by TOFRAME_MODE. MD irrelevant for: No orientation programming Related to: MD 21100 Further references: /PG/, Programming Guide, Fundamentals					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

21120	**ORIAX_TURN_TAB_1**		C07		F2
-	Definition of reference axes for orientation axes		BYTE		RESET
Defines the assignment of the rotations of the orientation axes around the reference axes for each channel (definition 1). This orientation description is activated with the G code ORIVIRT1 0 : No rotation 1 : Rotation around reference axis X 2 : Rotation around reference axis Y 3 : Rotation around reference axis Z Example : $MC_ORIAX_TURN__TAB_1[0] = 3 ; 1st ORI axis rotates around reference axis Z $MC_ORIAX_TURN__TAB_1[1] = 2 ; 2nd ORI axis rotates around reference axis Y $MC_ORIAX_TURN__TAB_1[2] = 1 ; 3rd ORI axis rotates around reference axis X					
-					
-	3	1, 2, 3,1, 2, 3,1, 2, 3,1, 2, 3...	0	3	7/2

21130	**ORIAX_TURN_TAB_2**			C07	F2
-	Definition of reference axes for orientation axes			BYTE	RESET
Defines the assignment of the rotations of the orientation axes around the reference axes for each channel (definition 2). This orientation description is activated with the G code ORIVIRT2 0 : No rotation 1 : Rotation around reference axis X 2 : Rotation around reference axis Y 3 : Rotation around reference axis Z Example : $MC_ORIAX_TURN__TAB_1[0] = 3 ; 1st ORI axis rotates around reference axis Z $MC_ORIAX_TURN__TAB_1[1] = 2 ; 2nd ORI axis rotates around reference axis Y $MC_ORIAX_TURN__TAB_1[2] = 1 ; 3rd ORI axis rotates around reference axis X					
-					
-	3	1, 2, 3,1, 2, 3,1, 2, 3,1, 2, 3...	0	3	7/2

21150	**JOG_VELO_RAPID_ORI**			C07	-
rev/min	JOG rapid traverse for orientation axes			DOUBLE	RESET
Velocity in JOG mode with rapid traverse override for orientation axes in the channel [degrees/min]					
-					
-	3	10.0, 10.0, 10.0,10.0, 10.0, 10.0...	-	-	7/2

21155	**JOG_VELO_ORI**			C07	-
rev/min	Jog feedrate for orientation axes			DOUBLE	RESET
Velocity in JOG mode for orientation axes in the channel					
-					
-	3	2.0, 2.0, 2.0,2.0, 2.0, 2.0...	-	-	7/2

21160	**JOG_VELO_RAPID_GEO**			C07	F2
mm/min	JOG rapid traverse for geometry axes			DOUBLE	RESET
Velocity in JOG mode with rapid traverse override for geometry axes in the channel (mm/min)					
-					
-	3	10000., 10000.0, 10000.,10000., 10000.0, 10000....	-	-	7/2

21165	**JOG_VELO_GEO**			C07	F2
mm/min	Jog feedrate for geometry axes			DOUBLE	RESET
JOG velocity for geometry axes in the channel (mm/min)					
-					
-	3	1000., 1000., 1000.,1000., 1000., 1000....	-	-	7/2

21170	**ACCEL_ORI**			C07	-
rev/s²	Acceleration for ORI axes			DOUBLE	NEW CONF
Acceleration for orientation axes in the channel					
-					
-	3	.05, .05, .05,.05, .05, .05...	-	-	7/2

21180	ROT_AX_SWL_CHECK_MODE	C07	F2
-	Check of software limits for orientation axes	DWORD	NEW CONF

```
This machine data is evaluated only with generic 5-axis transformation.
If block preparation shows that the programmed path causes a violation of the
    software limits of the orientation axes, this machine data determines the
    type of modification rotary axes may travel if the direction is pro-
    grammed.

The units digit of the MD is used to determine how alternative end positions
    of the rotary axes are created if the software limits are violated.
The tens digit is used to determine how the axes approach those end positions.
The hundreds digit is used to activate an automatic limitation of the axis
    that swivels through the pole (non-pole axis).

Meaning of the units digit:
0:  The path is not modified. If it is not possible to travel the shortest
    path, alarm 10720 (SW_LIMITSWITCH) is issued.
1:  If the orientation path determined first violates the axis limits of the
    orientation axes, the end point will be adapted to try a motion.
    In a first attempt, the second solution will be used. (In general, there
    are always two solutions when converting orientation ==> angle of axis).
    If this solution will violate the limits of the axis as well, there will
    be an attempt to find a permissible solution modifying both rotary axes by
    multiples of 360 degrees with both solutions.
    The modifications of final positions described will only be performed if
    axis interpolation of rotary axes is activated.
2:  Monitoring and modifications of rotary-axis positions - if applicable -
    correspond to value 1 of the machine data.
    However, modifications are also permissible if vector interpolation
    (large-circle interpolation, outside-of-the-taper interpolation, etc.) is
    activated. If in such a case the rotary-axes positions have to be modi-
    fied, there will be a switchover to axis interpolation. The orientation
    path programmed originally will usually not be followed.

Meaning of the tens digit:

0x: The orientation axes travel simultaneously to the possible end position.
    There may possibly be
      more or less large deviations from the original orientation path.

1x: If possible, the orientation is first turned into pole direction. In the
    pole position, the pole axis is then positioned so that the final orienta-
    tion can then be approached by turning the orientation from the pole posi-
    tion into the programmed direction. The originally programmed orientation
    path is then followed.
```

Meaning of the hundreds digit:

0xx: The range of the non-pole axis is determined by its software limits or working area limitations.

1xx: The range of the non-pole axis is limited either to the positive or negative travel range.
The possible range is determined by the limits (positive or negative value) with the largest absolute value.
Examples:
1. $MA_POS_LIMIT_MINUS[AX5] = -5.0 and $MA_POS_LIMIT_PLUS[AX5] = 135.0, the possible range of axis AX5 is 0 ... 135.0
2. $MA_POS_LIMIT_MINUS[AX5] = -100.0 and $MA_POS_LIMIT_PLUS[AX5] = 10.0, the possible range of axis AX5 is -100.0 ... 0.0
3. $MA_POS_LIMIT_MINUS[AX5] = 5.0 and $MA_POS_LIMIT_PLUS[AX5] = 120.0, the possible range is 5.0 ... 120.0, there is no automatic limitation of the travel range.

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	112	7/7

21186	**TOCARR_ROT_OFFSET_FROM_FR**	C01, C07	-
-	Offset of TOCARR rotary axes from WO	BOOLEAN	SOFORT

Rotary axes offset for the orientable tool holder is automatically accepted from the work offset activated on activation of the orientable tool holder for the rotary axes.

-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

21190	**TOFF_MODE**		C08		F2
-	Mode of correction in tool direction		BYTE		RESET
This machine data specifies the online correction mode in tool direction via $AA_TOFF[ ]. Bit 0: Behavior of $AA_TOFF in case of a RESET 0: $AA_TOFF is deseclected in case of a RESET 1: $AA_TOFF is maintained also after RESET Bit 1: Effect of the value assignment on the 1st component of $AA_TOFF[ ] 0: absolute value 1: incremental value (integrator) Bit 2: Effect of the value assignment on the 2nd component of $AA_TOFF[ ] 0: absolute value 1: incremental value (integrator) Bit 3: Effect of the value assignment on the 3rd component of $AA_TOFF[ ] 0: absolute value 1: incremental value (integrator)					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

21194	**TOFF_VELO**		C08		F2
mm/min	Feedrate for online correction in tool direction		DOUBLE		NEW CONF
Feedrate for online correction in tool direction [mm/min] via $AA_TOFF[ ]					
-					
-	3	0., 0., 0.,0., 0., 0.,0., 0., 0....	-	-	7/2

21196	**TOFF_ACCEL**		C08		F2
m/s²	Acceleration for online correction in tool direction		DOUBLE		NEW CONF
Acceleration for online correction in tool direction [m/s**2] via $AA_TOFF[ ]					
-					
-	3	100., 100., 100.,100., 100., 100....	1.0e-3	-	7/2

21200	**LIFTFAST_DIST**		C09		K1
mm	Traversing distance on rapid lift from contour		DOUBLE		POWER ON
The machine data determines the absolute value of the traverse movement for rapid lift. The direction of the traverse movement is defined in the part program by the command ALF. References: /PA/, Programming Guide: Fundamentals					
-					
-	-	0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1,0.1...	-	-	7/2

21202	LIFTFAST_WITH_MIRROR		C09	K1	
-	Rapid retract with mirrorring		BOOLEAN	POWER ON	
1: When determining the retraction direction, if mirroring of the contour is active then the retraction direction is also mirrored. Mirroring of the retraction direction only refers to the directional components vertical to the tool direction. 0: Mirroring of the contour is NOT taken into account when determining the retraction direction.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

21204	LIFTFAST_STOP_COND		C09	PGA	
-	Stop behavior with fast retraction		DWORD	NEW CONF	
Specifies the stop behavior of the liftfast motion under different stop conditions Bit0: Axial VDI signal feed stop DB31 DBB4.3 =0 Stop of the retraction motion in case of an axial feed stop =1 No stop of the retraction motion in case of an axial feed stop Bit1: Feed disable in channel DB21 DBB6.0 =0 Stop of the retraction motion in case of the feed stop in the channel =1 No stop of the retraction motion in case of the feed stop in the channel					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

21210	SETINT_ASSIGN_FASTIN		C01, C09	K1	
-	HW assignment of ext. NCK input byte for NC progr. interrupts		DWORD	POWER ON	
HW assignment of the fast input byte for NC program interrupts Bit 0 to 7: Number of input used Bit 16 to 23: Mask of signals that the channel is not to evaluate Bit 24 to 31: Mask of signals that are to be evaluated in inverted form Bit set: Interrupt initiated by falling edge. Possible inputs: 1: On board-inputs of the 840D (4 fast + 4 bits via VDI default) 2 - 5: External digital inputs (fast NCK I/Os or VDI default) 128 - 129: Comparator byte (results from fast analog inputs or VDI default)					
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	7/2

21220	MULTFEED_ASSIGN_FASTIN		C01, C09		V1
-	Assignment of the NCK I/Os for 'several feedrates in the block'		DWORD		POWER ON

```
In MD: MULTFEED_ASSIGN_FASTIN (assignment of the input bytes of the NCK I/Os
    for "Multiple feeds in one block"), at most two digital input bytes or
    comparator input bytes of the NCK I/Os can be assigned to the input byte
    for the "Multiple feeds in one block" function.
Furthermore, the assigned input signals can be inverted with the machine data.

The MD is coded as follows:
Bit 0-7:
   No. of 1st digital input byte or comparator input byte used
Bit 8 - 15:
   No. of 2nd digital input byte or comparator input byte used
Bit 16 - 23:
   Inversion mask for describing the 1st byte
Bit 24 - 31:
   Inversion mask for describing the 2nd byte
   Bit=0:   do not invert
   Bit=1:   invert

If a 2nd byte is entered, the contents of the 1st and 2nd bytes are ORed
    before being used.

The number for the digital inputs should be specified as follows:
1:                  for the on-board byte
2 - 5:              for external bytes

The number for a comparator input byte should be specified as follows:
128:             for comparator 1 (corresponds to 80Hex)
129:             for comparator 2 (corresponds to 81Hex)
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

21230	**MULTFEED_STORE_MASK**			C01, C09	V1
-	Memory response for 'several feedrates in the block'			BYTE	POWER ON
The priority of the signals for feeds F2 - F7 of the "Multiple feeds in one block" function decreases as the bit number increases in the input byte. The highest priority signal determines the current feed. The MD: MULTFEED_STORE_MASK (store input signals of the "Multiple feeds in one block" function) can be used to specify the response when the highest priority input drops out: Set bit 2 - 7 has the effect that the associated feed (F2 to F7) that has been selected by the highest priority input signal in each case is retained, even if the input signal drops out and a lower priority is present. The MD is coded as follows: Bit 0 - 1: No significance Bit 2 - 7: Storage response of the feed signals Bit 8 - 31: Reserved					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

21240	**PREVENT_SYNACT_LOCK_CHAN**			C01, C09	FBSY
-	Protected synchronized actions			DWORD	POWER ON
The machine data specifies a range of synchronized action IDs. Synchronized actions with IDs in this range cannot be overwritten, cancelled or locked via synchronized actions. With 0.0, there is no range of protected synchronized actions. The values are read as absolute values; the upper value and the lower value can be indicated in any order. If a value is configured with -1, the configuration of the general machine data becomes active. Note: During the creation of protected static synchronized actions, the protection should be cancelled; otherwise, a power ON would be necessary for each change in order to be able to redefine the logic.					
-					
-	2	-1, -1,-1, -1,-1, -1,-1, -1,-1, -1...	-1	255	7/2

21300	**COUPLE_AXIS_1**			C09	S3
-	Synchr.spindle pair def, mach.axis no: follow.sp[0], lead.sp[1]			BYTE	POWER ON
One synchronized spindle pair per NC channel can be defined in a fixed configuration with this machine data. The machine axis numbers (channel-specific MD: AXCONF_MACHAX_USED) applicable in the NC channel must be entered for the following spindle [n=0] and the leading spindle [1]. If a value of "0" is entered, then the coupling is not configured, thus leaving 2 couplings to be configured freely via the NC part program. MD irrelevant for: User-defined coupling Related to: Channel-specific MD; COUPLING_MODE_1 (type of coupling in synchronous spindle mode) Channel-specific MD: COUPLE_IS_WRITE_PROT_1 (write-protection for coupling parameters) Channel-specific MD: COUPLE_RESET_MODE_1 (coupling abort response) Channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1 (block change response in synchronous spindle mode) SD: $SC_COUPLE_RATIO_1 (speed ratio parameters for synchronous spindle mode)					
-					
-	2	0, 0,0, 0,0, 0,0, 0,0, 0,0, 0,0, 0...	0	31	7/2

21310	COUPLING_MODE_1	C03, C09	S3
-	Type of coupling in synchronous spindle operation	BYTE	POWER ON

```
This machine data determines the type of coupling for the fixed coupling con-
    figuration defined with machine data COUPLE_AXIS_1[n].

1:  Setpoint coupling activated.
    With a setpoint coupling, the reference variable for the following spin-
    dle is calculated from the position setpoint for the leading spindle,
    allowing the setpoints for the FS and LS to be input simultaneously. This
    has a particularly positive effect on the spindle synchronization during
    acceleration and deceleration processes.

    Better command behavior to setpoint changes is thus obtained with the set-
    point coupling than with the actual-value coupling.

    When a setpoint coupling is selected, the following conditions must be
    fulfilled before synchronous mode is activated:
- The LS must be assigned to the same NC channel as the FS
- The FS and LS must be in position control mode (SPCON)
- The FS and LS must have the same dynamic control response

0:  Actual-value coupling activated.
    With an actual-value coupling, the command variable for the following
    spindle is calculated from the position actual value of the leading spin-
    dle. With this type of coupling, the following drive must be signifi-
    cantly more dynamic than the leading drive, but never vice versa.

    The actual-value coupling can be used, for example, in the following
    cases:
- The LS must be assigned to a different NC channel than the FS
- For leading spindles which are not suitable for position control
- In cases where the dynamic control response of the leading spindle is con-
    siderably slower than that of the following spindle. As soon as the
    actual-value coupling is active, the IS "Actual-value coupling" for the FS
    is set to "1-signal".

2:  Velocity coupling activated.
    Internally, velocity coupling is a setpoint coupling. The dynamic require-
    ments placed on FS and LS are lower. A defined position relation between
    FS and LS cannot be established.

    Velocity coupling is applied in the following cases:
- LS and/or FS are not in position control.
- There are no measuring systems present.

The coupling type can be altered in the NC part program when the coupling is
    deactivated by means of language instruction COUPDEF provided this option
    has not been inhibited by channel-specific MD: COUPLE_IS_WRITE_PROT_1. The
    parameterized value of channel-specific MD: COUPLING_MODE_1 does not, how-
    ever, get altered.
```

```
MD irrelevant for:
   User-defined coupling

Related to:
   Channel-specific MD: COUPLE_AXIS_1
   (definition of pair of synchronous spindles)
   Channel-specific MD: COUPLE_IS_WRITE_PROT_1
   (write-protection for configured parameters)
    IS "Actual-value coupling" (DB31-48, DBX98.2)
```

-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	2	7/2

21320	**COUPLE_BLOCK_CHANGE_CTRL_1**	C09	S3
-	Block change behavior in synchronous spindle operation	BYTE	POWER ON

```
This machine data determines the condition on which a block change must be
executed when synchronous mode is activated for the fixed coupling configura-
tion defined in channel-specific machine data COUPLE_AXIS_ [n].

The following options are available:

0: Block change is enabled immediately
1: Block change in response to "Fine synchronization"
2: Block change in response to "Coarse synchronization"
3: Block change in response to IPOSTOP (i.e. after setpoint-based synchroniza-
tion)

The block change response can be altered in the NC part program with language
    instruction COUPDEF provided this option has not been inhibited by chan-
    nel-specific MD: COUPLE_IS_WRITE_PROT_1. The parameterized value of chan-
    nel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1 does not, however, get
    altered.

The selected block change response remains valid even when the velocity ratio
    is changed or a defined angular offset is programmed while the coupling is
    active.

MD irrelevant for:
   User-defined coupling

Related to:
   Channel-specific MD; COUPLE_AXIS_1
   (definition of pair of synchronous spindles)
   Channel-specific MD: COUPLE_IS_WRITE_PROT_1
   (change of coupling parameters not possible)
   Channel-specific MD: COUPLE_POS_TOL_COARSE or COUPLE_VELO_TOL_COARSE
   (threshold value for coarse synchronization)
   Channel-specific MD: COUPLE_POS_TOL_FINE or COUPLE_VELO_TOL_FINE
   (threshold value for fine synchronization)
```

-					
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	0	3	7/2

21330	**COUPLE_RESET_MODE_1**	C03, C09	S3
-	Coupling abort behavior	DWORD	POWER ON

```
This machine data defines the behavior of the synchronous mode for the pair of
synchronous spindles configured with machine data COUPLE_AXIS_1[n].

Bit 0=0:
   Synchronous mode remains active with a new program start and can be can-
celled only with COUPOF as long as the control remains switched on.
Bit 0=1:
   Synchronous mode is cancelled with program start (from the reset condi-
tion).
Bit 1=0:
   Synchronous mode remains active even with program end and reset and can be
cancelled only with COUPOF as long as the control remains switched on.
Bit 1=1:
   Synchronous mode is cancelled with program end or RESET.
Bit 5=1:
   The configured data are activated with program start.
Bit 6=1:
   The configured data are activated with program end or RESET.
Bit 9=1:
   Synchronous mode is switched on with program start.

Note:
   Synchronous mode is not deselected with NC Start after NC Stop!

MD irrelevant for:
   User-defined coupling

Related to:
   Channel-specific MD; COUPLE_AXIS_1 (definition of pair of synchronous spin-
dles)
    IS "Synchronous mode" (DB31-48, DBX84.4)
```

-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	0x3FF	7/2

21340	**COUPLE_IS_WRITE_PROT_1**			C09	S3
-	Coupling parameters cannot be altered			BOOLEAN	POWER ON
This machine data defines whether or not the coupling parameters (velocity ratio, block change response, coupling type) for the pair of synchronous spindles configured with channel-specific machine data COUPLE_AXIS_1[n] may be altered by the NC part program. 1: Coupling parameters may not be altered by the NC program (write-protection active) An alarm message is generated if an attempt is made to change the parameters. 0: NC part program may alter coupling parameters using language instruction COUPDEF. MD irrelevant for: User-defined coupling Related to: Channel-specific MD: COUPLE_AXIS_1 (definition of pair of synchronous spindles) Channel-specific MD: COUPLING_MODE_1 (type of coupling in synchronous spindle mode) Channel-specific MD: COUPLE_RESET_MODE_1 (coupling abort response) Channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1 (block change response in synchronous spindle mode) SD: $SC_COUPLE_RATIO_1 (velocity ratio parameters for synchronous spindle mode)					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

21380	**ESR_DELAY_TIME1**			EXP, N09	M3
s	Delay time ESR axes			DOUBLE	NEW CONF
When, for example, an alarm occurs, this MD can be used to delay deceleration in order, for example, to enable a retraction from the tooth gap (ESR) in gear wheel machining.					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

21381	**ESR_DELAY_TIME2**			EXP, N09	M3
s	ESR time for IPO controlled braking			DOUBLE	NEW CONF
When time $MN_ESR_DELAY_TIME1 has expired, the time ($MN_ESR_DELAY_TIME2) specified for interpolatory braking is still available. When time $MN_ESR_DELAY_TIME2 has expired, rapid deceleration with following follow-up is initiated.					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/2

1.4.2 Machine data for grinding function

21500	**TRACLG_GRINDSPI_VERT_OFFSET**			C07	S8
mm	Vertical position offset of grinding axis in centerless grinding			DOUBLE	POWER ON
The vertical offset of the grinding axis is specified in this MD.					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/2

21501	**TRACLG_GRINDSPI_HOR_OFFSET**			C07	S8
mm	Horiz. position offset of grinding axis in centerless grinding			DOUBLE	POWER ON
Horizontal position offset of the grinding axis in centerless grinding. The setting in this MD is significant only when MD: TRAFO_AXES_IN_n[0] = 0, i.e. no axis is programmed for the grinding wheel.					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/2

21502	**TRACLG_CTRLSPI_VERT_OFFSET**			C07	S8
mm	vert. position offset of regulating axis in centerless grinding			DOUBLE	POWER ON
The vertical offset for the regulating axis is specified in this MD.					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/2

21504	**TRACLG_SUPPORT_VERT_OFFSET**			C07	S8
mm	Vertical offset of work blade in centerless grinding			DOUBLE	POWER ON
Y offset for work blade Rule: X(0) = Y(offset) + Q1 <Y(direction vectorQ1) + Q2 < Y(direction vector Q2)					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/2

21506	**TRACLG_SUPPORT_HOR_OFFSET**			C07	S8
mm	Horizontal offset of work blade in centerless grinding			DOUBLE	POWER ON
X offset for work blade Rule: X(0) = X(offset) + Q1 <X(direction vector Q1) + Q2 < X(direction vector Q2)					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/2

21508	**TRACLG_VERT_DIR_SUPPORTAX_1**			C07	S8
-	Vertical component of work blade direction vector for Q1			DOUBLE	POWER ON
Y component of blade direction vector for Q1 Rule: Y0 = Y(offset) + Q1 <Y(direction vectorQ1) + Q2 < Y(direction vector Q2)					
-					
-	-	1.,1.,1.,1.,1.,1.,1.,1., 1.,1.,1.,1.,1....	-	-	7/2

21510	**TRACLG_HOR_DIR_SUPPORTAX_1**			C07	S8
-	Horizontal component of work blade direction vector for Q1			DOUBLE	POWER ON
X component of blade direction vector for Q1 Rule: X(0) = X(offset) + Q1 <X(direction vector Q1) + Q2 < X(direction vector Q2)					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/2

21512	**TRACLG_VERT_DIR_SUPPORTAX_2**			C07	S8
-	Vertical component of work blade direction vector for Q2			DOUBLE	POWER ON
Y component of blade direction vector for Q2 Rule: Y(0) = Y(offset) + Q1 <Y(direction vectorQ1) + Q2 < Y(direction vector Q2)					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/2

21514	**TRACLG_HOR_DIR_SUPPORTAX_2**			C07	S8
-	Horizontal component of work blade direction vector for Q2			DOUBLE	POWER ON
X component of blade direction vector for Q2 Rule: X(0) = X(offset) + Q1 <X(direction vector Q1) + Q2 < X(direction vector Q2)					
-					
-	-	1.,1.,1.,1.,1.,1.,1.,1., 1.,1.,1.,1.,1....	-	-	7/2

21516	**TRACLG_SUPPORT_LEAD_ANGLE**			C07	S8
degrees	Lead angle of work blade in centerless grinding			DOUBLE	POWER ON
The angle of lead of the work blade (a) is entered here.					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-90.	90.	7/2

21518	**TRACLG_CONTACT_UPPER_LIMIT**		C07	S8	
mm	Upper contact limit of work blade with work in centerl. grinding		DOUBLE	POWER ON	
It is necessary to specify the upper contact limit of the blade with the part to be ground (d1) for the purpose of monitoring the support range limits. Related to: MD: TRACLG_CONTACT_LOWER_LIMIT					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

21520	**TRACLG_CONTACT_LOWER_LIMIT**		C07	S8	
mm	Lower contact limit of work blade with work in centerl. grinding		DOUBLE	POWER ON	
It is necessary to specify the lower contact limit of the blade with the part to be ground (d2) for the purpose of monitoring the support range limits. Related to: MD: TRACLG_CONTACT_UPPER_LIMIT					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

21522	**TRACLG_GRINDSPI_NR**		C07	S8	
-	Definition of grinding spindle for centerless grinding		BYTE	POWER ON	
The number of the grinding spindle is specified in this MD.					
-					
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	1	20	7/2

21524	**TRACLG_CTRLSPI_NR**		C07	S8	
-	Definition of regulating spindle for centerless grinding		BYTE	POWER ON	
The number of the regulating spindle is specified in this MD.					
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	1	20	7/2

21526	**TRACLG_G0_IS_SPECIAL**			C07	S8
-	Special logic for G0 in centerless grinding			BOOLEAN	POWER ON
This MD can be used to define how the speed of the regulating wheel must respond in the case of transitions from motion blocks with G0 and without G0 (see table). TRACLG_G0_IS_SPECIAL = 1: On transition from a motion block with G0 to one without G0, the speed of the regulating wheel is increased during the G0 block to the desired initial speed in the block without G0. TRACLG_G0_IS_SPECIAL = 0: The speed of the regulating wheel is controlled only for motion blocks without G0 (the transitions from a motion block with G0 to one without G0 are not taken into account).					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/2

1.4.3 Channel auxiliary function settings

22000	**AUXFU_ASSIGN_GROUP**			C04	H2
-	Auxiliary function group			BYTE	POWER ON
See MD 22010: AUXFU_ASSIGN_TYPE [n] (auxiliary function type)					
-					
-	255	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,1, 1...	1	64	7/2

22010	AUXFU_ASSIGN_TYPE	C04	H2
-	Auxiliary function type	STRING	POWER ON

Machine data AUXFU_ASSIGN_TYPE[n] (auxiliary function type), AUXFU_ASSIGN_EXTENSION[n] (auxiliary function extension), AUXFU_ASSIGN_VALUE[n] (auxiliary function value) and AUXFU_ASSIGN_GROUP[n] (auxiliary function group) can be used to assign an auxiliary function type (M,S,H,T,D), the associated extension and the auxiliary function value to an auxiliary function group .

Example:

```
                              M 0 = 100  =>  Group 5  (corr. M100)
                               | |    |            |
                               | |    |            |
Auxiliary function type      -| |    |            |
Auxiliary function extension ---|    |            |
Auxiliary function value     --------|            |
Auxiliary function group     ---------------------|
```

MD: AUXFU_ASSIGN_TYPE[0] = "M"
MD: AUXFU_ASSIGN_EXTENSION[0] = 0
MD: AUXFU_ASSIGN_VALUE[0] = 100
MD: AUXFU_ASSIGN_GROUP[0] = 5 ; (5th group)

M00, M01, M02, M17 and M30 are assigned to group 1 as default.
M3, M4, M5 and M70 of the master spindle are assigned to group 2 as default.
The S functions of the master spindle are assigned to group 3 as default.
The set synchronization with respect to the PLC interface and a programmed movement can be taken from MD: AUXFU_GROUP_SPEC [n] (auxiliary function group specification) when assigning an auxiliary function to a group. The defaults defined in machine data MD: AUXFU_[M,S,H,T,D,F] _SYNC_TYPE (output time of the [M,S,H,T,D,F] functions) are not considered for the selected auxiliary functions. Even a programmed fast auxiliary function (e.g. M=QU(100)) is not taken into account.

The index [n] of the machine data indicates the auxiliary function number in the channel: 0-49. All auxiliary functions which are assigned to auxiliary function groups must be numbered in ascending consecutive order.
[0]81st auxiliary function [1]82nd.
The four machine data for assigning an auxiliary function to an auxiliary function group must always be given the same index [n].

Note:
It is not possible to assign type DL.

Special cases:
If the auxiliary function value of an auxiliary function is less than 0, all auxiliary functions of this type and extension are assigned to one group.

Example:
S2 = -1 => group 9
(all S values of the 2nd spindle are assigned to group 9)

Related to:
MD 11100: AUXFU_MAXNUM_GROUP_ASSIGN

-				

-	255	"", "", "", "", "", "", "", "", "", "", "", "", "", "", "", ""...	-	-	7/2

22020	**AUXFU_ASSIGN_EXTENSION**	C04	H2
-	Auxiliary function extension	BYTE	POWER ON

```
See MD 22010: AUXFU_ASSIGN_TYPE [n] (auxiliary function type)

Special cases:
   The auxiliary function extensions 1 to 4 are reserved for spindle func-
tions with S and M functions.
```

-					
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	99	7/2

22030	**AUXFU_ASSIGN_VALUE**	C04	H2
-	Auxiliary function value	DWORD	POWER ON

```
See MD 22010: AUXFU_ASSIGN_TYPE [n] (auxiliary function type)
```

-					
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

22035	**AUXFU_ASSIGN_SPEC**	C04	H2
-	Output specification	DWORD	POWER ON

```
Specification of the output behavior of the user-defined auxiliary functions.

Bit 0 (LSB) = 1 -> Acknowledgement "normal" after an OB1 cycle
Bit 1       = 1  -> Acknowledgement "quick" with OB40
Bit 2       = 1  -> No predefined auxiliary function
Bit 3       = 1  -> No output to VDI (may only be set as a single bit)
Bit 4       = 1  -> Spindle reaction after acknowledgement by the PLC
Bit 5       = 1  -> Output before the motion
Bit 6       = 1  -> Output during the motion
Bit 7       = 1  -> Output at block end
Bit 8       = 1  -> No output after block search
```

-					
-	255	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

22040	**AUXFU_PREDEF_GROUP**	C04	H2
-	Predefined auxiliary function groups	BYTE	POWER ON

```
Group assignment of predefined auxiliary functions

The predefined groups cannot be changed for indices 0, 1, 2, 3, 4, 22, 23, 24.
```

-					
-	33	1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 4, 4, 4, 4, 4, 4, 3, 1, 1, 1...	0	64	7/2

22050	**AUXFU_PREDEF_TYPE**		C04	H2	
-	Predefined auxiliary function type		STRING	POWER ON	
The address codes of the predefined auxiliary functions are fix. This setting cannot be changed!					
-					
-	33	"M", "M", "M", "M", "M", "M", "M", "M", "M", "M","M", "M", "M"...	-	-	7/2

22060	**AUXFU_PREDEF_EXTENSION**		C04	H2	
-	Predefined auxiliary function extension		BYTE	POWER ON	
Address extension for predefined auxiliary functions: This setting can be changed only for indices 6 to 17!					
-					
-	33	0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 0, 0, 0...	0	99	7/2

22070	**AUXFU_PREDEF_VALUE**		C04	H2	
-	Predefined auxiliary function value		DWORD	POWER ON	
Value of predefined auxiliary functions: This setting cannot be changed!					
-					
-	33	0, 1, 2, 17, 30, 6, 3, 4, 5, 19, 70, 40, 41, 42, 43, 44, 45, -1...	-	-	7/2

22080	**AUXFU_PREDEF_SPEC**		C04	H2	
-	Output specification		DWORD	POWER ON	
Specification of the output behavior of the predefined auxiliary functions. The settings for the indices 0 to 5 and 22 to 24 cannot be changed! Bit 0 (LSB) = 1 -> Acknowledgement "normal" after an OB1 cycle Bit 1 = 1 -> Acknowledgement "quick" with OB40 Bit 2 = 1 -> No predefined auxiliary function Bit 3 = 1 -> No output to VDI (only a single bit may be set) Bit 4 = 1 -> Spindle reaction after acknowledgement by PLC Bit 5 = 1 -> Output before motion Bit 6 = 1 -> Output during motion Bit 7 = 1 -> Output at block end Bit 8 = 1 -> No output after block search					
-					
-	33	0x81, 0x81, 0x81, 0x81, 0x81, 0x21, 0x21, 0x21, 0x21, 0x21,0x21...	-	-	7/2

22100	**AUXFU_QUICK_BLOCKCHANGE**			C04	H2
-	Block change delay with quick auxiliary functions.			DWORD	POWER ON

```
Block change is not delayed with quick auxiliary functions.
0: With the quick auxiliary function output the block change is delayed until
acknowledgement by the PLC (OB40).
1: With the quick auxiliary function output to the PLC the block change is not
delayed.

MD irrelevant for:
   Auxiliary functions with normal acknowledgement

References:
   /FBSY/, Synchronized Actions
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

22110	**AUXFU_H_TYPE_INT**			C11, C04	H2
-	Data format of H auxiliary functions (integer/real)			DWORD	POWER ON

```
0: The values of H auxiliary functions are present in floating point format.
   The maximum value range is +/-3.4028 ex 38.
1: The value of H auxiliary functions is rounded and changed to an integer.
   The basic program in the PLC must interpret the value as an integer.
   The maximum value range is -2147483648 to 2147483647.
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

22200	**AUXFU_M_SYNC_TYPE**			C04	H2
-	Output time of M functions			BYTE	POWER ON

```
Synchronization of the M auxiliary functions with regard to a simultaneously
programmed axis motion.
0 = Output before motion
1 = Output during motion
2 = Output at block end
3 = No output to the PLC (therefore no block change delay)

Notice:
   The synchronization type of the group, which can be assigned individual
auxiliary functions via configuration, has a higher priority!
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2

22210	AUXFU_S_SYNC_TYPE			C04	H2
-	Output time of S functions (see MD22200 for values)			BYTE	POWER ON

```
Synchronization of the S auxiliary functions with regard to a simultaneously
programmed axis motion.
0 = Output before motion
1 = Output during motion
2 = Output at block end
3 = No output to the PLC (therefore no block change delay)
4 = Output in accordance with the predefined output specification

Notice:
   The synchronization type of the group, which can be assigned individual
auxiliary functions via configuration, has a higher priority!
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	4	7/2

22220	AUXFU_T_SYNC_TYPE			C11, C04	H2
-	Output time for T functions (see MD22200 for values)			BYTE	POWER ON

```
Synchronization of the T auxiliary functions with regard to a simultaneously
programmed axis motion.
0 = Output before motion
1 = Output during motion
2 = Output at block end
3 = No output to the PLC (therefore no block change delay)
4 = Output in accordance with the predefined output specification

Notice:
   The synchronization type of the group, which can be assigned individual
auxiliary functions via configuration, has a higher priority!
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	4	7/2

22230	AUXFU_H_SYNC_TYPE			C04	H2
-	Output time for H functions (see MD22200 for values)			BYTE	POWER ON

```
Synchronization of the H auxiliary functions with regard to a simultaneously
programmed axis motion.
0 = Output before motion
1 = Output during motion
2 = Output at block end
3 = No output to the PLC (therefore no block change delay)

Notice:
   The synchronization type of the group, which can be assigned individual
auxiliary functions via configuration, has a higher priority!
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	3	7/2

22240	AUXFU_F_SYNC_TYPE			C04	H2
-	Output time for F functions (see MD22200 for values)			BYTE	POWER ON
Synchronization of the F auxiliary functions with regard to a simultaneously programmed axis motion. 0 = Output before motion 1 = Output during motion 2 = Output at block end 3 = No output to the PLC (therefore no block change delay) 4 = Output in accordance with the predefined output specification Notice: The synchronization type of the group, which can be assigned individual auxiliary functions via configuration, has a higher priority!					
-					
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	0	4	7/2

22250	AUXFU_D_SYNC_TYPE			C04	H2
-	Output time for D functions (see MD22200 for values)			BYTE	POWER ON
Synchronization of the D auxiliary functions with regard to a simultaneously programmed axis motion. 0 = Output before motion 1 = Output during motion 2 = Output at block end 3 = No output to the PLC (therefore no block change delay) 4 = Output in accordance with the predefined output specification Notice: The synchronization type of the group, which can be assigned individual auxiliary functions via configuration, has a higher priority!					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	4	7/2

22252	AUXFU_DL_SYNC_TYPE			C04	H2
-	Output time of DL functions			BYTE	POWER ON
Synchronization of the auxiliary function with regard to a simultaneously programmed motion. 0 = Output before motion 1 = Output during motion 2 = Output at block end 3 = No output to the PLC (therefore no block change delay) 4 = Output in accordance with the predefined output specification Notice: The synchronization type of the group, which can be assigned individual auxiliary functions via configuration, has a higher priority!					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	4	7/2

22254	AUXFU_ASSOC_M0_VALUE			C01, C03, C10	H2
-	Additional M function to stop a program			DWORD	POWER ON

```
This machine data defines an additional, predefined M function behaving in the
same way as M0. The value of the machine data corresponds to the number of the
auxiliary M function.
Predefined M numbers such as M0, M1, M2, M3, etc. are not allowed.

Restriction:
   See MD 10715: M_NO_FCT_CYCLE

Related to:
   $MN_M_NO_FCT_EOP,
   $MN_M_NO_FCT_CYCLE,
   $MC_SPIND_RIGID_TAPPING_M_NR,
   $MC_AUXFU_ASSOC_M0_VALUE

For external language mode:
   $MN_EXTERN_M_NO_MAC_CYCLE,
   $MN_EXTERN_M_NO_SET_INT
   $MN_EXTERN_M_NO_DISABLE_INT,
   $MN_EXTERN_CHAN_SYNC_M_NO_MIN,
   $MN_EXTERN_CHAN_SYNC_M_NO_MAX
   $MC_EXTERN_RIGID_TAPPING_M_NR

For nibbling:
   $MC_NIBBLE_PUNCH_CODE
```

-					
-	-	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/2

22256	**AUXFU_ASSOC_M1_VALUE**		C01, C03, C10	H2	
-	Additional M function for conditional stop		DWORD	POWER ON	
This machine data defines an additional, predefined M function behaving the same way as M1. The value of the machine data corresponds to the number of the auxiliary M function. Predefined M numbers such as M0, M1, M2, M3, etc. are not allowed. Restriction: See MD 10715: M_NO_FCT_CYCLE Related to: $MN_M_NO_FCT_EOP, $MN_M_NO_FCT_CYCLE, $MC_SPIND_RIGID_TAPPING_M_NR, $MC_AUXFU_ASSOC_M0_VALUE For external language mode: $MN_EXTERN_M_NO_MAC_CYCLE, $MN_EXTERN_M_NO_SET_INT $MN_EXTERN_M_NO_DISABLE_INT, $MN_EXTERN_CHAN_SYNC_M_NO_MIN, $MN_EXTERN_CHAN_SYNC_M_NO_MAX $MC_EXTERN_RIGID_TAPPING_M_NR For nibbling: $MC_NIBBLE_PUNCH_CODE					
-					
-	-	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/2

22400	**S_VALUES_ACTIVE_AFTER_RESET**		C04, C03, C05	S1	
-	S function active beyond RESET		BOOLEAN	POWER ON	
1: The last S values set in the main run are still active after a RESET. 0: The various S values are equal to 0 after a RESET and must therefore be reprogrammed.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

22410	**F_VALUES_ACTIVE_AFTER_RESET**		C04, C03, C05	V1	
-	F function active beyond RESET		BOOLEAN	POWER ON	
1: The last programmed F, FA, OVR and OVRA values are still active after RESET. 0: The various values are set to their default values after reset. Related to: MD 22240: AUXFU_F_SYNC_TYPE Output time of the F functions					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

22420	**FGROUP_DEFAULT_AXES**			C11	FBFA
-	Default setting for FGROUP command			BYTE	POWER ON
Default setting for FGROUP command. You can specify up to 8 channel axes whose resulting velocity is equivalent to the programmed path feed. If all eight values are zero (default), the geo axis entered in $MC_AXCONF_GEOAX_ASSIGN_TAB are active as the default setting for the FGROUP command as previously.					
-					
-	8	0, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/7

22510	**GCODE_GROUPS_TO_PLC**			C04	K1
-	G codes output at NCK-PLC interface on block change/RESET			BYTE	POWER ON
Specification of the G codes, that are output to the NCK/PLC interface in case of block change/ reset. The interface is updated after each block change and reset. Notice: It is not guaranteed that a PLC user program has at all times a block-synchronous relation between the active NC block and the G codes present. Example: Path mode with very short blocks					
-					
-	8	0, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

22512	**EXTERN_GCODE_GROUPS_TO_PLC**			C11, C04	FBFA
-	Send G commands of an external NC language to PLC			BYTE	POWER ON
Specification of the G commands of external NC languages which are output at the NCK -> PLC interface. The interface is updated at each block change and after RESET. Notice: It is not guaranteed that a PLC user program has at all times a block-synchronous relation between the active NC block and the G codes present. (Example: Path mode with very short blocks).					
-					
-	8	0, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

22515	**GCODE_GROUPS_TO_PLC_MODE**			C04	-
-	Behavior of G group transfer to PLC			DWORD	POWER ON
For setting the behavior, i.e. how the G groups are to be interpreted in the PLC with regard to data. With the current behavior (bit 0 = 0), the G group is the array index of a 64-byte field (DBB 208 - DBB 271). Maximally the 64th G group can be reached in this way. With the new behavior (bit 0 = 1), the data storage in the PLC consists of max. 8 bytes (DBB 208 - DBB 215). With this procedure, the array index of this byte array is identical with the index of the MD $MC_GCODE_GROUPS_TO_PLC[Index] and $MC_EXTERN_GCODE_GROUPS_TO_PLC[Index]. Each index (0 - 7) may only be set for one of the two machine data; the value 0 must be entered for the other MD. Bit 0(LSB) = 0: Behavior as before, the 64-byte field is used for displaying the G codes Bit 0(LSB) = 1: The user specifies for which G groups the first 8 bytes are to be used					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

22530	**TOCARR_CHANGE_M_CODE**			C04	W1
-	M code at change of tool holder			DWORD	POWER ON
The absolute value of this machine data indicates the number of the M code, which is output at the VDI interface when a tool holder is activated. - If the MD is positive, the unchanged M code is always output. - If the MD is negative, the number of the tool holder is added to the absolute value of the machine data and the number is output. Special cases: N M code is output, if the number of the M code to be output or the absolute value of this MD is set to one of the values 0 to 6, 17 or 30. It is not monitored whether an M code created in this way will conflict with other functions. References: /FB/, H2, Auxiliary Function Output to PLC					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-99999999	99999999	7/2

22532	**GEOAX_CHANGE_M_CODE**			C04	K2
-	M code at change of geo axes			DWORD	POWER ON
Number of the M code, which is output at the VDI interface in the case of a switchover of the geometry axes. No M code is output if this MD is set to one of the values 0 to 6, 17 or 30. It is not monitored whether an M code created in this way will conflict with other functions.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	99999999	7/2

22534	**TRAFO_CHANGE_M_CODE**			C04	M1
-	M code at change of transformation			DWORD	POWER ON
Number of the M code that is output at the VDI interface in the case of a transformation changeover of the geometry axes. No M code is output if this MD is set to one of the values 0 to 6, 17 or 30. It is not monitored whether an M code created in this way will conflict with other functions.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	99999999	7/2

22550	**TOOL_CHANGE_MODE**			C01, C11, C04, C09	W1
-	New tool compensation for M function			BYTE	POWER ON
The T function is used to select a tool in the program. The setting in this machine data determines whether the new tool is loaded immediately on execution of the T function: MD: TOOL_CHANGE_MODE = 0 The new tool is loaded immediately on execution of the T function. This setting is used mainly on turning machines with tool turrets. MD: TOOL_CHANGE_MODE = 1 The new tool is prepared for loading on execution of the T function. This setting is used mainly on milling machines with a tool magazine, in order to bring the new tool into the tool change position without interrupting the machining process. The M function entered in MD 22560: TOOL_CHANGE_M_CODE is used to remove the old tool from the spindle and load the new tool onto the spindle. This tool change is required to be programmed with the M function M06, in accordance with DIN 66025. Related to: MD 22560: TOOL_CHANGE_M_CODE					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

22560	**TOOL_CHANGE_M_CODE**			C01, C04, C09	W1
-	M function for tool change			DWORD	POWER ON
If the T function is only used to prepare a new tool for a tool change (this setting is used mainly on milling machines with a tool magazine, in order to bring the new tool into the tool change position without interrupting the machining process), another M function must be used to trigger the tool change. The M function entered in TOOL_CHANGE_M_CODE triggers the tool change (remove old tool from the spindle and load new tool into the spindle). This tool change is required to be programmed with M function M06, in accordance with DIN 66025. Related to: MD 22550: TOOL_CHANGE_MODE					
-					
-	-	6,6,6,6,6,6,6,6,6,6,6,6,6,6,6	0	99999999	7/2

22562	TOOL_CHANGE_ERROR_MODE	C09	W1
-	Response to tool change errors	DWORD	POWER ON

```
Behavior if faults/problems occur during programmed tool change.
Bit-coded activation data.
Bit no.Hexadec.
    ValueMeaning
------------------------------------------------------------------------------
0 (LSB)0x00001
    Value 0Standard behavior: Stop on the faulty NC block
    Value 1If a fault is detected in the block with the tool change prepara-
    tion, the alarm is delayed until the corresponding tool change command
    (M06) is interpreted in the program sequence. Not earlier than that will
    the alarm that has been triggered by the preparation command be output.
    The operator can take corrective measures in this block.
        Value = 1 is relevant only if the setting $MC_TOOL_CHANGE_MODE = 1 is
    used.

1   0x00002Relevant only with active tool management:
    Value 0Standard behavior: Only tools with data assigned to a magazine are
    detected during tool change preparation.
    Value 1Manual tools can be loaded. A tool will also be loaded, if its data
    are known in the NCK but are not assigned to a magazine. In this case, the
    tool data will automatically be assigned to the programmed tool holder.
    Corresponding messages prompt the user to carry out the necessary actions
    (insert tools into and remove tools from the tool holder).

2   0x00004Qualifying the offset programming
    Value 0Standard behavior:
        T0 and Dx - with x larger 0 - results in offset zero
        D0 and DL=x - with x larger 0 - results in offset zero
        (and thus also total offset zero)
    Value 1T0 and Dx - with x larger 0 - leads to an alarm message
        D0 and DL=x - with x larger 0 - leads to an alarm message

Bits 3 and 4:    Only relevant with active tool management.

Function:
Control of the behavior of the init block generation on program START, if a
    disabled tool is on the spindle and this tool is to be activated.
In particular, see
    $MC_START_MODE_MASK,
    $MC_RESET_MODE_MASK.
In particular on RESET, the behavior "Keep disabled tool on the spindle
    active" is not influenced hereby.
-----------------------------------------------------------------------------

3   0x00008
    Value 0Standard: If the tool on the spindle is disabled: Create a tool
    change command, which request a replacement tool. If there is no such
    replacement tool, an alarm will be generated.
    Value 1The disabled status of the spindle tool is ignored. The tool
    becomes active. The subsequent part program should be formulated in such a
    way that no parts are machined with the disabled tool.
```

```
4   0x00010
    Value 0Standard: The system tries to activate the spindle tool or its
    replacement tool.
    Value 1If the tool on the spindle is disabled, T0 is programmed in the
    START init block.

5   Reserved

6   0x00040
    Value 0Standard: With T0 or D0, only T0 or D0 is exactly programmed. This
    means that with programming of T0 machine data $MC_CUTTING_EDGE_DEFAULT
    and $MC_SUMCORR_DEFAULT determine the value of D, DL.

        Example: $MC_CUTTING_EDGE_DEFAULT = 1, $MC_SUMCORR_DEFAULT = 2,
    $MC_TOOL_CHANGE_MODE = 0 (tool change with T programming)

        N10 T0 ; T no. 0 has active numbers D1 and DL=2 which results in off-
    set zero
        If bit 2 is set in addition:
        Programming of
        a) T0 ; for tool deselection
        b) D0 ; for offset deselection
        generates an alarm, if
        a) at least one of the machine data $MC_CUTTING_EDGE_DEFAULT or
    $MC_SUMCORR_DEFAULT is unequal to zero (T0 D0 DL=0 is the correct program-
    ming).
        b) machine data $MC_SUMCORR_DEFAULT is unequal to zero (D0 DL=0 is the
    correct programming).

    Value 1Controls the NCK behavior when (x, y, z all larger than zero) is
    programmed, if at least one of the machine data $MC_CUTTING_EDGE_DEFAULT
    or $MC_SUMCORR_DEFAULT is unequal to zero.
        a) Tx Dy --> T0:
        With T0, D0 or D0 DL=0 is automatically programmed in the NCK; i.e.
    values of machine data $MC_CUTTING_EDGE_DEFAULT, $MC_SUMCORR_DEFAULT
    unequal to zero are treated as values equal to zero.

        b) Tx Dy --> T0 Dy, or T0 DL=z, or T0 Dy DL=z, or T0 D0 DL=z
        Explicitly programmed values of D, DL are not influenced.

        c) Dy DL=z --> D0
        With D0, DL=0 is automatically programmed in the NCK; i.e. values of
    machine data $MC_SUMCORR_DEFAULT unequal to zero are treated as values
    equal to zero.
```

```
        d) Dy DL=z --> D0 DL=z
        Explicitly programmed values of DL are not influenced. If bit 2 is set
in addition:
        You only have to program T0 / D0 for tool/offset deselection and you
don't get an alarm. The statements with regard to $MC_SUMCORR_DEFAULT or DL
are valid only if the 'Total offset' function is active (see
$MN_MM_TOOL_MANAGEMENT_MASK, bit 8).

7  0x00080
   Value 0 =Standard behavior:
        When Tx is programmed, a check is carried out to see whether a tool
with the T number x is known in the TO unit of the channel. If not, the pro-
gram is stopped in this block with alarm 17190

   Value 1 =Only if tool basic functionality is active
($MC_TOOL_MANAGEMENT_MASK, bit0,1=0) and ($MN_MM_TYPE_OF_CUTTING_EDGE=0):
        When Tx is programmed, an unknown Tx will firstly be ignored and the
alarm with regard to the preparation command (Tx) will also be ignored until
the D selection is interpreted in the program sequence. Only then will alarm
17191, which has been triggered by the preparation command, be output. This
means that the operator can take corrective measures in this block. When the
program is continued, the incorrect NC block will again be interpreted and the
preparation command will be automatically executed again internally.
        (Is of interest for Cutting-Edge-Default=0 or =-2 or D0 programming,
otherwise the D of Cutting-Edge-Default will be selected on tool change.)
        This variant is justified, if you wish to program "Tool number = Loca-
tion" (revolver as tool holder) without tool management. The revolver can now
positioned on a location for which a tool has not (yet) been defined.
        If bit0=1 of this MD (alarm delay) is set, this bit has no meaning.
        This behavior is compatible with software versions older than P6.5.13.
```

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFF	7/2

22600	**SERUPRO_SPEED_MODE**	EXP	-
-	Speed for block search run type 5	DWORD	SOFORT

```
This machine data specifies the search run mode: SERUPRO
SERUPRO search run is activated with PI service _N_FINDBL mode parameter = 5.
SERUPRO means SEarchRUn by PROgram test, i.e. traversing under program test
from beginning of program to search target.

Note:
   Program test does not move any axes/spindles.

Bit0 and Bit1:
==========

0: Under program test, the axes/spindles are traversed at the following
speeds:
   Axes:      $MC_SERUPRO_SPEED_FACTOR*dry run feed.
   Spindles:  $MC_SERUPRO_SPEED_FACTOR*programmed speed.
   Dynamic axis / spindle limitations are not taken into account.

1:     Under program test, the axes/spindles are traversed at the following
    speeds:
   Axes:     at the same speed as dry run feed.
   Spindles: at the programmed speed.
   Dynamic axis / spindle limitations are taken into account.

2:      Under program test, the axes/spindles are traversed at the programmed
    velocity/speed.
   Dynamic axis /spindle limitations are taken into account.

3:      Not assigned.

Related to:
   $SC_DRY_RUN_FEED, $MC_SERUPRO_SPEED_FACTOR
```

-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	2/2

22601	**SERUPRO_SPEED_FACTOR**			EXP	K1
-	Speed factor for search run type 5			DOUBLE	SOFORT

SERUPRO means SEarch RUn by PROgram test, i.e. traversing under program test from beginning of program to search target.

Note:
Program test does not move any axes / spindles.

The machine data is relevant only if the first two bits of $MC_SERUPRO_SPEED_MODE are 0. The sign of the machine data has the following meaning:

Axes: MD specifies the factor by which the test run feedrate is multiplied.
Spindles: MD specifies the factor by which the programmed speed is multiplied.
Dynamic limitations of axes / spindles are always ignored.

Related to:
$MC_DRY_RUN_FEED, $MC_SERUPRO_SPEED_MODE

-					
-	-	10.0,10.0,10.0,10.0, 10.0,10.0,10.0...	1.0	-	2/2

22620	**START_MODE_MASK_PRT**			EXP, C03	K1
-	Initial setting on special starts			DWORD	RESET

This machine data is activated via $MC_ENABLE_START_MODE_MASK_PRT.
If $MC_ENABLE_START_MODE_MASK_PRT is in its initial setting, $MC_START_MODE_MASK_PRT is inactive.

If $MC_START_MODE_MASK_PRT is activated in the case of a "search via program test" (abbr. SERUPRO), $MC_START_MODE_MASK_PRT will replace the machine data $MC_START_MODE_MASK if "search via program test" is started.

In this case, a behavior deviating from PLC start can be set at the start of the search. The meaning of the bit-oriented assignment of $MC_START_MODE_MASK_PRT is the same as $MC_START_MODE_MASK.

-					
-	-	0x400,0x400,0x400, 0x400,0x400,0x400. ..	0	0xFFFF	7/2

22621	**ENABLE_START_MODE_MASK_PRT**		EXP, C03	K1
-	Enables $MC_START_MODE_MASK_PRT		DWORD	RESET

```
The machine data $MC_START_MODE_MASK_PRT is activated via
    $MC_ENABLE_START_MODE_MASK_PRT.

If $MC_ENABLE_START_MODE_MASK_PRT is at its initial setting
    $MC_START_MODE_MASK_PRT is inactive.

Bit0 =  1:
    If a "search via program test" (abbr. SERUPRO) is started from RESET  (PI
    service  _N_FINDBL  mode paramter == 5), $MC_START_MODE_MASK_PRT will
    replace the machine data $MC_START_MODE_MASK.

This method can be used to set a start behavior differing from PLC start when
the search
is started.
```

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1	7/2

22622	**DISABLE_PLC_START**		EXP	-
-	Enable part program start via PLC		DWORD	POWER ON

```
Allow part program start via PLC.

This machine data will o_n_l_y be evaluated, if "Group-Serupro" mode is
switched on.

"Group-Serupro" is switched on by means of "$MC_SERUPRO_MODE BIT2".

BIT0 = 0
    A part program can be started in this channel only via the PLC. Starting
    via the part program command "START" is interlocked.

BIT0 = 1
    A part program can be started in this channel only by means of the part
    program command "START" from another channel. Starting via the PLC is
    interlocked.
```

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	-	-	2/2

22680	**AUTO_IPTR_LOCK**		EXP, C03	-
-	Disable interrupt pointer		DWORD	RESET

```
With $MC_AUTO_IPTR_LOCK program areas are defined in which the individually
indicated coupling types are active. If a program abort is executed in a pro-
gram range that is defined as such, it will not be the currently executed part
program block that is stored in the interrupt pointer (OPI module Interrup-
tionSearch),but the last block prior to activation of the coupling.
```

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x3	7/2

<table>
<tr><td>22700</td><td colspan="2">TRACE_STARTTRACE_EVENT</td><td></td><td>EXP, C06</td><td>BA,S5,FBSY</td></tr>
<tr><td>-</td><td colspan="3">Diagnostic data rec. starts with event TRACE_STARTTRACE_EVENT.</td><td>STRING</td><td>POWER ON</td></tr>
<tr><td colspan="6">The machine data is used for diagnostics.
The recording of the diagnostic data does not start until the event (TRACE_STARTTRACE_EVENT) has occurred at the trace point (TRACE_STARTTRACE_TRACEPOINT) and in the correct step (TRACE_STARTTRACE_STEP).
The permissible input values are to be taken from the NCSC design documentation.</td></tr>
<tr><td>NBUP</td><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td>-</td><td>-</td><td></td><td>-</td><td>-</td><td>2/2</td></tr>
</table>

<table>
<tr><td>22702</td><td colspan="2">TRACE_STARTTRACE_STEP</td><td></td><td>EXP, C06</td><td>BA,S5,FBSY</td></tr>
<tr><td>-</td><td colspan="3">Conditions for start of trace recording</td><td>STRING</td><td>POWER ON</td></tr>
<tr><td colspan="6">The machine data is only intended for diagnostic use.
See TRACE_STARTTRACE_EVENT

In the case of TRACE_STARTTRACE_EVENT BLOCK_CHANGE the string TRACE_STARTTRACE_STEP is interpreted as a file name and block number.

In the case of BSEVENTTYPE_SETALARM the string is interpreted as an alarm number.

The permissible input values are to be taken from the NCSC design documentation.</td></tr>
<tr><td>NBUP</td><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td>-</td><td>2</td><td>"","","","","","","","","",...</td><td>-</td><td>-</td><td>2/2</td></tr>
</table>

<table>
<tr><td>22704</td><td colspan="2">TRACE_STOPTRACE_EVENT</td><td></td><td>EXP, C06</td><td>BA,S5,FBSY</td></tr>
<tr><td>-</td><td colspan="3">Conditions for stop of trace recording</td><td>STRING</td><td>POWER ON</td></tr>
<tr><td colspan="6">The machine data is only used for diagnostics.
The recording of the diagnostic data ends when the event (TRACE_STOP_ART_EVENT) has occurred at the trace point (TRACE_STOPTRACE_TRACEPOINT) and in the correct step (TRACE_STOPTRACE_STEP).
(After reaching the stop condition, the previously recorded diagnostic data is stored in a file "NCSCTRyy.MPF" or for NCU-LINK in "NCxxTRyy.MPF" in the MPF directory.

The permissible input values are to be taken from the NCSC design documentation.</td></tr>
<tr><td>NBUP</td><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td>-</td><td>-</td><td>"CLEARCANCELALARM_M","CLEARCANCELALARM_M"...</td><td>-</td><td>-</td><td>2/2</td></tr>
</table>

22706	**TRACE_STOPTRACE_STEP**		EXP, C06		BA,S5,FBSY
-	CommandSequenzStep with which the recording ends		STRING		POWER ON

```
The machine data is only intended for diagnostic use.

The permissible input values are to be taken from the NCSC design documenta-
    tion.
```

NBUP					
-	2	"", "", "", "", "", "", "", "", "", ""...	-	-	2/2

22708	**TRACE_SCOPE_MASK**		EXP, C06		BA,S5,FBSY
-	Selects the contents of the trace file		STRING		POWER ON

```
The machine data is only intended for diagnostic purposes.
Specific trace contents are selected with the MD datum.
The entry:
SETALARM
records the alarm environment and the block change in the main run is also
logged by means of BLOCK_CHANGE.

The permissible input values are to be taken from the NCSC design documenta-
    tion.
```

NBUP					
-	-		-	-	2/2

22710	**TRACE_VARIABLE_NAME**		-		BA,S5,FBSY
-	Definition of trace data		STRING		POWER ON

```
The machine data is only intended for diagnostic purposes.
The MD datum defines which data are recorded in the trace file..

The permissible input values are to be taken from the NCSC design documenta-
    tion.
```

NBUP					
-	10	"BL_NR", "TR_POINT", "EV_TYPE", "EV_SRC", "CS_ASTEP"...	-	-	2/2

22712	**TRACE_VARIABLE_INDEX**		EXP, C06		BA,S5,FBSY
-	Index for trace recording data		DWORD		POWER ON

```
The machine data is only intended for diagnostic use.
The MD data, together with TRACE_VARIABLE_NAME, determines which data are
    recorded in the trace file.
It enables access to an array element.
E.g. use as an axis index when accessing axis data.
```

NBUP					
-	10	0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0...	0	0xFFFF	2/2

22714	MM_TRACE_DATA_FUNCTION		EXP, C02, C06	BA,S5,FBSY
-	Activating diagnostics		DWORD	POWER ON

```
The machine data is only intended for diagnostic use.
Activating the diagnostics

An internal ring buffer records important events.
After a trigger event, with the 'Cancel alarm' key set as default,
the ring buffer is briefly freezed, read and converted into an ASCII file
in the part program directory. The file name for the 1st channel
is ncsctr01.mpf and for the 7th channel it is ncsctr07.mpf.
The data in the ring buffer are subsequently called dynamic data.
In addition to the trigger event, further current data are read from the
NCK and transferred to the ASCII file. These recordings do
n o t   have a history and are subsequently called static data.

Bit no.   Significance when bit is set
-----------------------------------------------------------------
0 (LSB)Recording of the dynamic data (see TRACE_VARIABLE_NAME)
1      Recording of the block control static data
2      Recording of the alarm data static data
3      Recording of the process data static data
4      Recording of the command sequence static data
5      Recording of the tool management static data
6      Recording of the NCK version file. Static data
7      Recording of the statuses of the current block
       Various statuses of the axes and the SPARPI.  Static data
8      Recording of various statuses of the channel.  Static data
9      Error statuses in the NCK memory management are scanned during trace
    generation.
       An error renames the trace file. Static data

       Possible names and their meaning:
       NCFIER.MPF   Error in the file system
       NCSLER.MPF   Error during string creation
       NCFIER.MPF   Error on New/Delete


10     All block changes in the interpreter are recorded. Dynamic data.
11     Axial VDI signals are recorded. Dynamic data.
       Only in conjunction with $MN_MM_TRACE_VDI_SIGNAL
12     OEM traces are activated. Dynamic data.
13     Synchronized actions are recorded. Dynamic data.
       N O T I C E:  In applications with an intensive use of
       synchronized actions, the trace buffer is almost exclusively
       filled with these trace points, other events are ignored!
       That is why this bit should remain at 0 in these cases.
14     Not assigned.
15     Recording of the station commands.    Dynamic data.
       Note: Most important output of the NCK module NCSC!
```

NBUP					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFF	2/2

22800	**TRACE_COMPRESSOR_OUTPUT**			EXP, C01	D1
-	Activation of trace output for compressor			BYTE	POWER ON
A trace output of the compressor can be activated with this machine data. With this, the polynomials created by the compressor can be output in an internal file. If this MD is active, the NCK works like a preprocessor, i.e. there is also no program execution. The following values are possible for this MD: 0: Trace output not active. 1: Polynomials created by the compressor are output. 2: The following are also output: - Type of continuousness of the block transitions generated by the compressor - Compression rate (number of compressed blocks) - Corner detection					
NBUP					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	0/0

22900	**STROKE_CHECK_INSIDE**			EXP, C01, C11	FBFA
-	Direction (inside/outside) in which prot. zone 3 is effective			BOOLEAN	POWER ON
This MD defines whether protection zone 3 is a protection zone inside or outside. Meaning: 0: Protection zone 3 is a protection zone inside, i.e. the protection zone must not entered inwardly. 1: Protection zone 3 is a protection zone outside					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

22910	**WEIGHTING_FACTOR_FOR_SCALE**			EXP, C01, C11	FBFA
-	Input resolution for scaling factor			BOOLEAN	POWER ON
Definition of the unit for the scaling factor P and for the axial scaling factors I, J, K Meaning: 0 Scale factor in 0.001 1 Scale factor in 0.00001 Related to: DEFAULT_SCALEFACTOR_AXIS, DEFAULT_SCALE_FACTOR_P					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

22914	**AXES_SCALE_ENABLE**			EXP, C01, C11	FBFA
-	Activation for axial scaling factor (G51)			BOOLEAN	POWER ON
Axial scaling is enabled with this MD. Meaning: 0: axial scaling not possible 1: axial scaling possible -> MD DEFAULT_SCALE_FACTOR_AXIS is active Related to: DEFAULT_SCALE_FACTOR_AXIS					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

22920	**EXTERN_FIXED_FEEDRATE_F1_ON**			EXP, C01, C11	FBFA
-	Activation of fixed feedrates F1 - F9			BOOLEAN	POWER ON
This MD is used to activate the fixed feedrates from the setting data $SC_EXTERN_FIXED_FEEDRATE_F1_F9[]. Meaning: 0: no fixed feedrates with F1 - F9 1: the feedrates set in setting data $SC_EXTERN_FIXED_FEEDRATE_F1_F9[] will become active when programming F1 - F9					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

22930	**EXTERN_PARALLEL_GEOAX**			EXP, C01, C11	FBFA
-	Assignment of a parallel channel axis to the geometry axis			BYTE	POWER ON
Assignment table of the axes positioned parallel to the geometry axes. This table can be used to assign channel axes positioned parallel to the geometry axes. The parallel axes can then be activated as geometry axes in ISO mode using the G functions of plane selection (G17 - G19) and the axis name of the parallel axis. The axis is then replaced by the axis defined via $MC_AXCONF_GEOAX_ASSIGN_TAB[]. Prerequisite: The channel axes used must be active. (list position assigned in AXCONF_MACHAX_USED). Entering zero deactivates the corresponding parallel geometry axis:					
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2

24000	**FRAME_ADD_COMPONENTS**			C03	K2
-	Frame components for G58 and G59			BOOLEAN	POWER ON
Additive programmable frame components can be separately programmed and modi-fied. 0: Additive translations which have been programmed with ATRANS are stored in the frame together with the absolute translation (prog. with TRANS). G58 and G59 are not possible. 1: The sum of the additive translations are stored in the fine offset of the programmable frame. The absolute and the additive translations can be changed independently of one another. G58 and G59 are possible.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7

24002	**CHBFRAME_RESET_MASK**			C03	K2
-	Active channel-specific base frames after reset			DWORD	RESET
Bit mask for the reset setting of the channel-specific base frames which are included in the channel. The following apply: If $MC_RESET_MODE_MASK bit0 = 1 and BIT14 = 1 Entire base frame is derived on reset from linking the base frame field elements whose bit is 1 in the bit mask. If $MC_RESET_MODE_MASK bit0 = 1 and BIT14 = 0 The entire base frame is deselected on reset					
-					
-	-	0xFFFF,0xFFFF,0xFFFF,0xFFFF,0xFFFF,0xFFFF...	0	0xFFFF	7/2

24004	**CHBFRAME_POWERON_MASK**			C03	FBFA
-	Reset channel-specific base frames after power on			DWORD	POWER ON
This machine data defines whether channel-specific base frames are reset in the data management on Power On. That is - Offsets and rotations are set to 0, - Scalings are set to 1. - Mirror image machining is disabled. The selection can be made separately for individual base frames. Bit 0 means base frame 0, bit 1 base frame 1 etc. Value=0: Base frame is retained on Power On Value=1: Base frame is reset in the data management on Power On. Related to: $MN_NCBFRAME_POWERON_MASK					
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0xFFFF	7/2

24006	**CHSFRAME_RESET_MASK**			C03	K2
-	Active system frames after reset			DWORD	RESET

```
Bit mask used for the reset setting of the channel-specific system frames
    included in the channel.

Bit 0: System frame for actual value setting and scratching is active after
    reset.
Bit 1: System frame for external work offset is active after reset.
Bit 2: Reserved, for TCARR and PAROT see $MC_GCODE_RESET_VALUES[].
Bit 3: Reserved, for TOROT and TOFRAME see $MC_GCODE_RESET_VALUES[].
Bit 4: System frame for workpiece reference points is active after reset.
Bit 5: System frame for cycles is active after reset.
Bit 6: Reserved; reset behavior dependent on $MC_RESET_MODE_MASK.

Related to:
   MM_SYSTEM_FRAME_MASK
```

-					
-	-	0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1,0x1...	0	0x0000007F	7/2

24007	**CHSFRAME_RESET_CLEAR_MASK**			C03	-
-	Deletion of system frames after reset			DWORD	RESET

```
Bit mask used to delete channel-specific system frames in data management on
    reset.
Bit 0: System frame for actual value setting and scratching is deleted on
    reset.
Bit 1: System frame for exernal work offset is deleted on reset.
Bit 2: Reserved, for TCARR and PAROT see $MC_GCODE_RESET_VALUES[].
Bit 3: Reserved, for TOROT and TOFRAME see $MC_GCODE_RESET_VALUES[].
Bit 4: System frame for workpiece reference point is deleted on reset.
Bit 5: System frame for cycles is deleted on reset.
Bit 6: Reserved; reset behavior depends on $MC_RESET_MODE_MASK.
```

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0000007F	7/2

24008	CHSFRAME_POWERON_MASK		C03	K2	
-	Reset channel system frames after power on		DWORD	POWER ON	
This machine data defines whether channel-specific system frames are reset in the data management on Power On. That is offsets and rotations are set to 0, scalings to 1. Mirroring is disabled. The selection can be made separately for individual system frames. Bit 0: System frame for set actual value and scratching is deleted at Power On. Bit 1: System frame for external work offset is deleted at Power On. Bit 2: System frame for TCARR and PAROT is deleted at Power On. Bit 3: System frame for TOROT and TOFRAME is deleted at Power On. Bit 4: System frame for work piece reference points deleted at Power On. Bit 5: System frame for cycles retained at Power On. Bit 6: System frame for transformations deleted at Power On. Related to: MM_SYSTEM_FRAME_MASK					
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0000007F	7/2

24010	PFRAME_RESET_MODE		C03	K2	
-	Reset mode for programmable frame		DWORD	POWER ON	
0: Programmable frame is deleted at reset. 1: Programmable frame remains active at reset.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

24020	FRAME_SUPPRESS_MODE		C03	K2	
-	Positions for frame suppression		DWORD	POWER ON	
Bit mask for configuring the positions for frame suppressions (SUPA, G153, G53). The following rule applies: Bit 0: Positions for display (OPI) without frame suppression Bit 1: Position variables without frame suppression					
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0000003	7/2

24030	**FRAME_ACS_SET**			C03	K2
-	Adjustment of SZS coordinate system			DWORD	POWER ON
0: SZS results from the WCS transformed with $P_CYCFRAME and $P_PFRAME. 1: SZS results from the WCS transformed with the $P_CYCFRAME.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

24040	**FRAME_ADAPT_MODE**			C03	-
-	Adaptation of active frames			DWORD	POWER ON
Bit mask for adapting the active frames or axis configuration The following applies: Bit 0: Rotations in active frames that rotate coordinate axes for which there are no geometry axes are deleted from the active frames. Bit 1: Shear angles in active frames are orthogonalized. Bit 2: Scalings of all geometry axes in the active frames are set to value 1.					
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0000007	7/2

24050	**FRAME_SAA_MODE**			C03	-
-	Saving and activating of data management frames			DWORD	POWER ON
Bit mask for saving and activating data handling frames. The following applies: Bit 0: Data handling frames are only activated by programming the bit masks $P_CHBFRMASK, $P_NCBFRMASK and $P_CHSFRMASK. G500..G599 only activate the relevant settable frame. The reset behavior is independent of this. Bit 1: Data handling frames are not written implicitly by system functions such as TOROT, PAROT, ext. work offset, transformations.					
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0000003	7/2

1.4.4 Transformation definitions in channel

24100	TRAFO_TYPE_1	C07	F2
-	Definition of transformation 1 in channel	DWORD	NEW CONF

This MD specifies the first available transformation in each channel.
The 4 low-value bits identify the specific transformation of a specific transformation group. The transformation group is identified by a number starting with the 5th bit.

Meaning:
0 No transformation
16 and higher
    5-axis transformation with turnable tool
32 and higher
    5-axis transformation with turnable workpiece
48 and higher
    5-axis transformation with turnable tool and turnable workpiece
72
    Generic 5-axis transformation. Type and kinematic data are determined by an associated, orientable tool holder, see MD $MC_TRAFO5_TCARR_NO_1 and $MC_TRAFO5_TCARR_NO_2

    The 4 low-value bits have the following meaning for a 5-axis transformation:
    0 Axis sequence AB
    1 Axis sequence AC
    2 Axis sequence BA
    3 Axis sequence BC
    4 Axis sequence CA
    5 Axis sequence CB
    8 Generic orientation transformation (3- 5 axes)

256 and higher
    TRANSMIT transformation
512 and higher
    TRACYL transformation
1024 and higher
    TRAANG transformation
2048
    TRACLG: centerless transformation
From 4096 to 4098
    OEM transformation
8192 and higher
    TRACON: cascaded transformations

ACON: cascaded transformations

```
Example:
    A 5-axis transformation with turnable tool and axis sequence CA (i.e. C
    axis turns A axis) has number 20 ( = 16 + 4)
Attention:
   Not all combinations of group numbers and axis sequences are allowed. If
you enter a number for a non-existing transformation, you will not get an
error message.

Related to:
   TRAFO_TYPE_2, TRAFO_TYPE_3, ... TRAFO_TYPE_8

References:
   /FB/, F2, "5-Axis Transformation"
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

24110	**TRAFO_AXES_IN_1**	C07	F2
-	Axis assignment for the 1st transformation in the channel	BYTE	NEW CONF

```
Axis assignment at input point of 1st transformation

The index input at the nth position states which axis is mapped internally
    from the transformation to axis n.

Not relevant:
    No transformation


Releated to:
   TRAFO_AXES_IN_2, TRAFO_AXES_IN_3, ...
   TRAFO_AXES_IN_8

References:
   /FB/, F2, "5-Axis Transformation"
```

-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

24120	**TRAFO_GEOAX_ASSIGN_TAB_1**	C07	F2
-	Assignment of geometry axes to channel axes for transformation 1	BYTE	NEW CONF

```
This MD states the channel axes on which the axes of the cartesian coordinate
system are mapped for active transformation 1.

Not relevant:
    No transformation

Related to:
   $MC_AXCONF_GEOAX_ASSIGN_TAB, if no transformation is active.

References:
   /FB/, K2, "Coordinate Systems, Axis Types, Axis Configurations, Workpiece-
Related Actual Value System, External Work Offset"
```

-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

24130	**TRAFO_INCLUDES_TOOL_1**	C07	M1,F2
-	Tool handling with 1st active transformation	BOOLEAN	NEW CONF

```
This machine data states for each channel whether the tool is handled during
the 1st transformation or externally.
This machine data is evaluated only with specific transformations.
It is evaluated on the condition that the orientation of the tool with refer-
    ence to the Basic Coordinate System cannot be changed by the transforma-
    tion. In standard transformations, only the "inclined-axis transformation"
    fulfills this condition.
If this machine data is set, the Basic Coordinate System (BCS) refers to the
    tool reference point even with active transformations. Otherwise, it
    refers to the tool tip (Tool Center Point - TCP).
The method of operation of protection zones and working area limitations var-
    ies correspondingly.
```

-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

24200	**TRAFO_TYPE_2**	C07	F2
-	Definition of the 2nd transformation in the channel	DWORD	NEW CONF

```
This MD states the second available transformation in each channel.

Same as TRAFO_TYPE_1, but for the second available transformation in the chan-
nel.

References:
   /FB/, F2, "5-Axis Transformation"
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

24210	**TRAFO_AXES_IN_2**			C07	F2
-	Axis assignment for transformation 2			BYTE	NEW CONF
TRAFO_AXES_IN_2(n) Axis assignment at input of 2nd to 8th transformation. Same meaning as for TRAFO_AXES_IN_1.					
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

24220	**TRAFO_GEOAX_ASSIGN_TAB_2**			C07	F2
-	Assignment of geometry axes to channel axes for transformation 2			BYTE	NEW CONF
This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 2. Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.					
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

24230	**TRAFO_INCLUDES_TOOL_2**			C07	M1,F2
-	Tool handling with active 2nd transformation			BOOLEAN	NEW CONF
This machine data states for each channel whether the tool is handled during the 2nd transformation or externally. This machine data is evaluated only with specific transformations. It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition. If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP). The method of operation of protection zones and working area limitations varies correspondingly.					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

24300	**TRAFO_TYPE_3**			C07	F2
-	Definition of the 3rd transformation in the channel			DWORD	NEW CONF
This MD states the third available transformation in each channel. Same as TRAFO_TYPE_1, but for the third available transformation in the channel. References: /FB/, F2, "5-Axis Transformation"					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

24310	**TRAFO_AXES_IN_3**			C07	F2
-	Axis assignment for transformation 3			BYTE	NEW CONF
Axis assignment at the input point of the 3rd transformation in the channel. Meaning is the same as TRAFO_AXES_IN_1, but for the third available transformation in the channel.					
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

24320	**TRAFO_GEOAX_ASSIGN_TAB_3**			C07	F2
-	Assignment of geometry axes to channel axes for transformation 3			BYTE	NEW CONF
This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 3. Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.					
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

24330	**TRAFO_INCLUDES_TOOL_3**			C07	M1,F2
-	Tool handling with active 3rd transformation			BOOLEAN	NEW CONF
This machine data states for each channel whether the tool is handled during the 3rd transformation or externally. This machine data is evaluated only with specific transformations. It is evaluated on the condition that the orientation of the tool with reference to to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition. If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP). The method of operation of protection zones and working area limitations varies correspondingly.					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

24400	**TRAFO_TYPE_4**			C07	F2
-	Definition of the 4th transformation in the channel			DWORD	NEW CONF
This MD states the fourth available transformation in each channel. Same as TRAFO_TYPE_1, but for the fourth available transformation in the channel. References: /FB/, F2, "5-Axis Transformation"					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

24410	**TRAFO_AXES_IN_4**			C07	F2
-	Axis assignment for the 4th transformation in the channel			BYTE	NEW CONF
Axis assignment at the input point of the 4th transformation in the channel. Meaning is the same as TRAFO_AXES_IN_1, but for the fourth available transformation in the channel.					
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

24420	**TRAFO_GEOAX_ASSIGN_TAB_4**			C07	F2
-	Assignment of geometry axes to channel axes for transformation 4			BYTE	NEW CONF
This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 4. Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.					
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

24426	**TRAFO_INCLUDES_TOOL_4**			C07	M1,F2
-	Tool handling with active 4th transformation			BOOLEAN	NEW CONF
This machine data states for each channel whether the tool is handled during the 4th transformation or externally. This machine data is evaluated only with specific transformations. It is evaluated on the condition that the orientation of the tool with reference to to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition. If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP). The method of operation of protection zones and working area limitations varies correspondingly.					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

24430	**TRAFO_TYPE_5**			C07	F2,M1
-	Type of transformation 5 in the channel			DWORD	NEW CONF
Type of transformation available as the fifth in the channel. See $MC_TRAFO_TYPE_1 for explanation.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0	-	-	7/7

24432	**TRAFO_AXES_IN_5**			C07	F2,M1
-	Axis assignment for transformation 5			BYTE	NEW CONF
Axis assignment at the input point of the 5th transformation. See TRAFO_AXES_IN_1 for explanation.					
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

24434	**TRAFO_GEOAX_ASSIGN_TAB_5**			C07	F2,M1
-	Assignment of geometry axes to channel axes for transformation 5			BYTE	NEW CONF
This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 5. Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.					
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

24436	**TRAFO_INCLUDES_TOOL_5**			C07	M1,F2
-	Tool handling with active 5th transformation			BOOLEAN	NEW CONF
This machine data states for each channel whether the tool is handled during the 5th transformation or externally. This machine data is evaluated only with specific transformations. It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition. If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP). The method of operation of protection zones and working area limitations varies correspondingly.					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

24440	**TRAFO_TYPE_6**			C07	F2,M1
-	Type of transformation 6 in the channel			DWORD	NEW CONF
Type of transformation available as the sixth in the channel. See $MC_TRAFO_TYPE_1 for explanation.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

24442	**TRAFO_AXES_IN_6**			C07	F2,M1
-	Axis assignment for transformation 6			BYTE	NEW CONF
Axis assignment at the input point of the 6th transformation. See TRAFO_AXES_IN_1 for explanation.					
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

24444	**TRAFO_GEOAX_ASSIGN_TAB_6**			C07	F2,M1
-	Assignment of geometry axes to channel axes for transformation 6			BYTE	NEW CONF
This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 6. Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.					
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

24446	**TRAFO_INCLUDES_TOOL_6**			C07	M1,F2
-	Tool handling with active 6th transformation			BOOLEAN	NEW CONF
This machine data states for each channel whether the tool is handled during the 6th transformation or externally. This machine data is evaluated only with specific transformations. It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition. If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP). The method of operation of protection zones and working area limitations varies correspondingly.					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

24450	**TRAFO_TYPE_7**			C07	F2,M1
-	Type of transformation 7 in the channel			DWORD	NEW CONF
Type of transformation available as the seventh in the channel. See $MC_TRAFO_TYPE_1 for explanation.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

24452	**TRAFO_AXES_IN_7**			C07	F2,M1
-	Axis assignment for transformation 7			BYTE	NEW CONF
Axis assignment at the input point of the 7th transformation. See TRAFO_AXES_IN_1 for explanation.					
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

24454	**TRAFO_GEOAX_ASSIGN_TAB_7**			C07	F2,M1
-	Assignment of geometry axes to channel axes for transformation 7			BYTE	NEW CONF
This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 7. Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.					
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

24456	**TRAFO_INCLUDES_TOOL_7**			C07	M1,F2
-	Tool handling with active 7th transformation			BOOLEAN	NEW CONF
This machine data states for each channel whether the tool is handled during the 7th transformation or externally. This machine data is evaluated only with specific transformations. It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition. If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP). The method of operation of protection zones and working area limitations varies correspondingly.					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

24460	**TRAFO_TYPE_8**			C07	F2,M1
-	Type of transformation 8 in the channel			DWORD	NEW CONF
Type of transformation available as the eighth in the channel. See $MC_TRAFO_TYPE_1 for explanation.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

24462	**TRAFO_AXES_IN_8**			C07	F2,M1
-	Axis assignment for transformation 8			BYTE	NEW CONF
Axis assignment at the input point of the 8th transformation. See TRAFO_AXES_IN_1 for explanation.					
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

24464	**TRAFO_GEOAX_ASSIGN_TAB_8**			C07	F2,M1
-	Assignment of geometry axes to channel axes for transformation 8			BYTE	NEW CONF
This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 8. Otherwise the meaning corresponds to TRAFO_GEOAX_ASSIGN_TAB_1.					
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

24466	**TRAFO_INCLUDES_TOOL_8**			C07	M1,F2
-	Tool handling with 8th active transformation			BOOLEAN	NEW CONF
This machine data states for each channel whether the tool is handled during the 8th transformation or externally. This machine data is evaluated only with specific transformations. It is evaluated on the condition that the orientation of the tool with reference to the Basic Coordinate System cannot be changed by the transformation. In standard transformations, only "inclined-axis transformation" fulfills this condition. If this machine data is set, the Basic Coordinate System (BCS) refers to the tool reference point even with active transformations. Otherwise, it refers to the tool tip (Tool Center Point - TCP). The method of operation of protection zones and working area limitations varies correspondingly.					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

24470	**TRAFO_TYPE_9**			C07	M1
-	Type of transformation 9 in the channel			DWORD	NEW CONF
Type of transformation available as the ninth in the channel. See $MC_TRAFO_TYPE_1 for explanation.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0	-	-	7/7

24472	**TRAFO_AXES_IN_9**			C07	M1
-	Axis assignment for transformation 9			BYTE	NEW CONF
Axis assignment at the input point of the 9th transformation. See TRAFO_AXES_IN_1 for explanation.					
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

24474	**TRAFO_GEOAX_ASSIGN_TAB_9**			C07	M1
-	Assignment of geometry axes to channel axes for transformation 9			BYTE	NEW CONF
This MD states the channel axes on which the axes of the cartesian coordinate system are mapped for active transformation 9.					
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

24476	**TRAFO_INCLUDES_TOOL_9**			C07	M1
-	Treatment of tool with active 9th transformation			BOOLEAN	NEW CONF
Same as TRAFO_INCLUDES_TOOL_1, but for the 9th transformation.					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

24480	**TRAFO_TYPE_10**			C07	M1
-	Transformation 10 in channel			DWORD	NEW CONF
Same as TRAFO_TYPE_1, but for the tenth available transformation in the channel.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0	-	-	7/7

24482	**TRAFO_AXES_IN_10**			C07	M1
-	Axis assignment for transformation 10			BYTE	NEW CONF
Axis assignment at the input of the 10th transformation. See TRAFO_AXES_IN_1 for explanation.					
-					
-	20	1, 2, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	7/7

24484	**TRAFO_GEOAX_ASSIGN_TAB_10**			C07	M1
-	Assignment of geometry axes to channel axes f. transformation 10			BYTE	NEW CONF
Assignment table of geometry axes with transformation 10 Same as AXCONF_GEOAX_ASSIGN_TAB, but only effective when transformation 10 is active.					
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/7

24486	**TRAFO_INCLUDES_TOOL_10**			C07	M1
-	Treatment of tool with active 10th transformation			BOOLEAN	NEW CONF
Same as TRAFO_INCLUDES_TOOL_1, but for the 10th transformation.					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

24500	**TRAFO5_PART_OFFSET_1**			C07	F2
mm	Offset vector of 5-axis transformation 1			DOUBLE	NEW CONF
This machine data designates an offset of the workpiece carrier for the first (MD: TRAFO5_PART_OFFSET_1) or second (MD: TRAFO5_PART_OFFSET_2) 5-axis transformation of a channel and has a specific meaning for the different machine types: Machine type 1 (two-axis swivel head for tool): Vector from machine reference point to zero point of workpiece table. This will generally be a zero vector if both coincide. Machine type 2 (two-axis rotary table for workpiece): Vector from the second rotary joint of workpiece rotary table to zero point of table. Machine type 3 (single-axis rotary table for workpiece and single-axis swivel head for tool): Vector from rotary joint of workpiece table to zero point of table. MD irrelevant: if the "5-Axis Transformation" option is not installed.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24510	**TRAFO5_ROT_AX_OFFSET_1**			C07	F2
degrees	Position offset of rotary axes 1/2/3 for 5-axis transformation 1			DOUBLE	NEW CONF
This machine data designates the angular offset of the first or second rotary axis in degrees for the first 5-axis transformation of a channel. MD irrelevant: if the "5-Axis Transformation" option is not installed.					
-					
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7

24520	**TRAFO5_ROT_SIGN_IS_PLUS_1**			C07	F2
-	Sign of rotary axis 1/2/3 for 5-axis transformation 1			BOOLEAN	NEW CONF
This machine data designates the sign with which the two rotary axes are included in the first (MD: TRAFO5_ROT_SIGN_IS_PLUS_1) or the second (MD: TRAFO5_ROT_SIGN_IS_PLUS_2) 5-axis transformation of a channel. MD = 0 (FALSE): Sign is reversed. MD = 1 (TRUE) : Sign is not reversed and the traversing direction is defined according to AX_MOTION_DIR. This machine data does not mean that the rotational direction of the rotary axis concerned is to be reversed, but specifies whether its motion is in the mathematically positive or negative direction when the axis is moving in the positive direction. The result of a change to this machine data is not therefore a change in the rotational direction, but a change in the compensatory motion of the linear axes. However, if a directional vector and thus, implicitly, a compensatory motion is specified, the result is a change in the rotational direction of the rotary axis concerned. On a real machine, therefore, the machine data may be set to FALSE (or zero) only if the rotary axis is turning in an anti-clockwise direction when moving in a positive direction. MD irrelevant: if the "5-Axis Transformation" option is not installed.					
-					
-	3	TRUE, TRUE, TRUE,TRUE, TRUE, TRUE...	-	-	7/7

24530	**TRAFO5_NON_POLE_LIMIT_1**		C07	F2	
degrees	Definition of pole range for 5-axis transformation 1		DOUBLE	NEW CONF	

```
This MD designates a limit angle for the fifth axis of the first 5-axis trans-
formation with the following properties: if the path runs below this angle
past the pole, the traverse will pass through the pole.

For the 5-axis transformation, the two orientation axes of the tool form a
    coordinate system of length and width circles on a  spherical surface. If
    orientation programming (that is the orientation vector lies in a plane)
    leads the path so close past the pole that the angle defined by the MD is
    undershot then there is a deviation from the defined interpolation such
    that the interpolation runs through the pole.

Alarm 14112 is output if this modification of the path gives a deviation
greater than a tolerance defined by MD 24540: TRAFO5_POLE_LIMIT_1.

MD irrelevant:
    If the "5-Axis Transformation" option is not installed.
   Also irrelevant with programming in the machine coordinate system ORIMKS.

Related to:
   MD: TRAFO5_POLE_LIMIT _2
```

-					
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7

24540	**TRAFO5_POLE_LIMIT_1**			C07	F2
degrees	End angle toler. with interpol. through pole for 5-axis transf.			DOUBLE	NEW CONF
This MD designates an end angle tolerance for the fifth axis of the first (MD: TRAFO5_POLE_LIMIT_1) or the second (MD: TRAFO5_POLE_LIMIT_2) 5-axis transformation with the following properties: With the interpolation through the pole point, only the fifth axis moves, the fourth axis retains its starting position. If a motion is programmed that does not run exactly through the pole point but is to run near the pole within the area given by MD: TRAFO5_NON_POLE_LIMIT then there is a deviation from the defined path as the interpolation runs exactly through the pole point. This results in a deviation in the position of the end point of the fourth axis (the polar axis) from the programmed value. This MD defines the angle by which the polar axis may deviate from the programmed value with 5-axis transformation when switching from the programmed interpolation to the interpolation through the pole point. Alarm 14112 is output if there is a greater deviation and the interpolation is not executed. MD irrelevant: If the "5-Axis Transformation" option is not installed. Also irrelevant with programming in the machine coordinate system ORIMKS. Related to: MD: TRAFO5_NON_POLE_LIMIT_1 and _2					
-					
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7

24542	**TRAFO5_POLE_TOL_1**			C07	-
degrees	End angle tolerance for pole interpolation			DOUBLE	NEW CONF
End angle tolerance for interpolation through the pole for the 1st 5/6-axis transformation. This MD is evaluated only by the generic 5/6-axis transformation. If the end orientation lies within the pole cone and within the tolerance cone specified by means of this MD, the pole axis does not move and retains it start position. The other rotary axis, however, moves to the programmed angle. This results in a deviation of the end orientation from the programmed orientation. The maximum active value of this MD is the value of MD TRAFO5_POLE_LIMIT_1, which is used to define the pole cone.					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0	-	7/7

24550	TRAFO5_BASE_TOOL_1		C07	F2	
mm	Vector of base tool on activation of 5-axis transformation 1		DOUBLE	NEW CONF	
This MD specifies the vector of the base tool which takes effect when the first transformation (MD: TRAFO5_BASE_TOOL_1) or the second (MD: TRAFO5_BASE_TOOL_2) is activated without a length compensation being selected. Programmed length compensations have an additive effect with respect to the base tool. MD irrelevant: if the "5-Axis Transformation" option is not installed.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24558	TRAFO5_JOINT_OFFSET_PART_1		C07	F2	
mm	Vector of kinematic table offset		DOUBLE	NEW CONF	
This machine data is only evaluated for generic 5-axis transformations with rotatable workpiece and rotatable tool (TRAFO_TYPE = 56, mixed kinematics). It indicates the part of the vector between table and turning head assigned to the table. Only the sum of this MD and MD TRAFO5_JOINT_OFFSET is entered in the transformation equations. A difference results only when reading the whole tool length using the function GETTCOR. In this case, only the MD TRAFO5_JOINT_OFFSET is considered. On a machine with mixed kinematics, this machine data can be used to assign the machine data of the 5-axis transformation and the parameters of the orientable tool holder uniquely to one another as follows: Orientable tool holder — 5-axis transformation (1st transformation) 1 — TRAFO5_JOINT_OFFSET_1 2 — TRAFO5_BASE_TOOL_1 3 — TRAFO5_JOINT_OFFSET_PART_1 4 — TRAFO5_PART_OFFSET_1					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24560	TRAFO5_JOINT_OFFSET_1		C07	F2	
mm	Vector of the kinem.offset of the 1st 5-axis transf. in channel		DOUBLE	NEW CONF	
This machine data designates the vector from the first to the second joint for the first (MD: TRAFO5_JOINT_OFFSET_1) or second (MD: TRAFO5_JOINT_OFFSET_2) transformation of a channel and has a specific meaning for the various machine types: Machine type 1 (two-axis swivel head for tool) and: Machine type 2 (two-axis rotary table for workpiece): Vector from first to second joint of tool rotary head or workpiece rotary table. Machine type 3 (single-axis rotary table for workpiece and single-axis swivel head for tool): Vector from machine reference point to joint of workpiece table. MD irrelevant: if the "5-Axis Transformation" option is not installed. The same applies for 3-axis and 4-axis transformations.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24561	TRAFO6_JOINT_OFFSET_2_3_1		C07	-	
mm	Vector of kinematic offset		DOUBLE	NEW CONF	
In the case of 6-axis transformations, defines the offset between the 2nd and third rotary axes for the 1st transformation of each channel.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24562	TRAFO5_TOOL_ROT_AX_OFFSET_1		C07	F2	
mm	Offset of swivel point of 1st rotary axis on 5-axis transform. 1		DOUBLE	NEW CONF	
In the case of 5-axis transformation with swiveling linear axis, the value indicates the offset of the rotary axis which swivels the linear axis with reference to machine zero for the 1st transformation. MD irrelevant for: other 5-axis transformations Related to: MD 24662					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24564	TRAFO5_NUTATOR_AX_ANGLE_1		C07	F2	
degrees	Nutating head angle in 5-axis transformation		DOUBLE	NEW CONF	
Angle between the second rotary axis and the axis corresponding to it in the rectangular coordinate system MD irrelevant for: Transformation type other than "universal milling head". Related to: TRAFO_TYPE_n					
-					
-	-	45.0,45.0,45.0,45.0, 45.0,45.0,45.0...	-89.	89.	7/7

24566	TRAFO5_NUTATOR_VIRT_ORIAX_1		C07	-	
-	Virtual orientation axes		BOOLEAN	NEW CONF	
The MD has the following values: 0: The axis angles of the orientation axes are machine axis angles. 1: Virtual orientation axes are defined that form a rectangular coordinate system and the axis angles are rotations around these virtual axes.					
-					
-	-	FALSE,FALSE,FAL SE,FALSE,FALSE, FALSE...	-	-	7/7

24570	TRAFO5_AXIS1_1		C07	F2	
-	Direction of 1st rotary axis		DOUBLE	NEW CONF	
The MD indicates the vector that describes the direction of the first rotary axis in the general 5-axis transformation (TRAFO_TYPE_* = 24). The vector can have any magnitude. Example: Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y). Valid for the first transformation of a channel.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24572	TRAFO5_AXIS2_1		C07	F2	
-	Direction of 2nd rotary axis		DOUBLE	NEW CONF	
Indicates the vector that describes the direction of the second rotary axis in the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56). The vector can have any magnitude except zero. Example: Both with (0, 1, 0) and with (0, 7.21, 0), the same axis is described (in the direction of the 2nd geometry axis, i.e. usually Y). Valid for the first transformation of a channel.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24573	TRAFO5_AXIS3_1		C07	-	
-	Direction of third rotary axis		DOUBLE	NEW CONF	
Indicates the vector which defines the direction of the third rotary axis in the case of the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57). The vector may have any value except zero. Example: The same axis is defined with both (0, 1, 0) and (0, 7.21, 0) (in the direction of the 2nd geometry axis, that is as a rule Y). Valid for the first orientation transformation of a channel.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24574	TRAFO5_BASE_ORIENT_1		C07	-	
-	Vector of the tool base orientation for 5-axis transformation		DOUBLE	NEW CONF	
Indicates the vector of the tool orientation in the general 5-axis transformation (TRAFO_TYPE_* = 24, 40, 56) if this is not defined on the transformation call or read from a programmed tool. The vector can have any magnitude except zero.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24576	TRAFO6_BASE_ORIENT_NORMAL_1		C07	-	
-	Normal tool vector in 6-axis transformation		DOUBLE	NEW CONF	
Indicates a vector that is perpendicular to the tool orientation (TRAFO5_BASE_ORIENTATION_1) in the case of the general 6-axis transformation (TRAFO_TYPE_* = 24, 40, 56, 57). If TRAFO6_BASE_ORIENT_NORMAL_1 and TRAFO5_BASE_ORIENTATION_1 are neither orthogonal nor parallel, then the two vectors are orthogonalized by modifying the normal vector.The two vectors must not be parallel. The vector may have any value other than zero. Valid for the first orientation transformation of a channel.					
-					
-	3	0.0, 1.0 , 0.0,0.0, 1.0 , 0.0...	-	-	7/7

24580	TRAFO5_TOOL_VECTOR_1		C07	F2	
-	Direction of orientation vector for the first 5-axis transf.		BYTE	POWER ON	
Indicates the direction of the orientation vector for the first 5-axis transformation for each channel. 0: Tool vector in x direction 1: Tool vector in y direction 2: Tool vector in z direction					
-					
-	-	2,2,2,2,2,2,2,2,2,2,2 ,2,2,2,2,2	0	2	7/2

24582	TRAFO5_TCARR_NO_1			C07	-
-	TCARR number for the first 5-axis transformation			DWORD	NEW CONF
If the value of this machine data is not zero and if machine data $MC_TRAFO_TYPE_X that points to the first orientation transformation has value 72, the kinematics data (offsets etc.) that parameterize the first 5-axis transformation, will not be read from the machine data, but from the data of the orientable tool holder to which this machine data refers.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

24585	TRAFO5_ORIAX_ASSIGN_TAB_1			C07	F2
-	Orientation axis / channel axis assignment transformation 1			BYTE	POWER ON
Assignment table of the orientation axes for 5-axis transformation 1 Only active with active 5-axis transformation 1.					
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2

24590	TRAFO5_ROT_OFFSET_FROM_FR_1			C01, C07	-
-	Offset of transformation rotary axes from WO.			BOOLEAN	SOFORT
The programmable offset for orientation axes is automatically accepted from the work offset active for the orientation axes on switch-on of an orientation transformation.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/2

24600	TRAFO5_PART_OFFSET_2			C07	F2
mm	Offset vector of the 2nd 5-axis transformation in the channel			DOUBLE	NEW CONF
This machine data designates an offset of the workpiece carrier for the first (MD: TRAFO5_PART_OFFSET_1) or second (MD: TRAFO5_PART_OFFSET_2) 5-axis transformation of a channel and has a specific meaning for the different machine types: Machine type 1 (two-axis swivel head for tool): Vector from machine reference point to zero point of workpiece table. This will generally be a zero vector if both coincide. Machine type 2 (two-axis rotary table for workpiece): Vector from second joint of workpiece rotary table to zero point of table. Machine type 3 (single-axis rotary table for workpiece and single-axis swivel head for tool): Vector from joint of workpiece table to zero point of table. MD irrelevant: if the "5-Axis Transformation" option is not installed.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24610	TRAFO5_ROT_AX_OFFSET_2			C07	-
degrees	Position offset of rotary axes 1/2/3			DOUBLE	NEW CONF
Indicates the offset for each channel of the rotary axes in degrees for the second orientation transformation.					
-					
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7

24620	TRAFO5_ROT_SIGN_IS_PLUS_2		C07		F2
-	Sign of rotary axis 1/2/3 for 5-axis transformation 2		BOOLEAN		NEW CONF

```
This machine data designates the sign with which the two rotary axes are
included in the first (MD: TRAFO5_ROT_SIGN_IS_PLUS_1) or the second (MD:
TRAFO5_ROT_SIGN_IS_PLUS_2) 5-axis transformation of a channel.

MD = 0 (FALSE):
   Sign is reversed.
MD = 1 (TRUE) :
   Sign is not reversed and the traversing direction is defined according to
AX_MOTION_DIR.

This machine data does not mean that the rotational direction of the rotary
axis concerned is to be reversed, but specifies whether its motion is in the
mathematically positive or negative direction when the axis is moving in the
positive direction.
The result of a change to this data is not therefore a change in the rota-
    tional direction, but a change in the compensatory motion of the linear
    axes.

However, if a directional vector and thus, implicitly, a compensatory motion
is specified, the result is a change in the rotational direction of the rotary
axis concerned.
On a real machine, therefore, the machine data may be set to FALSE (or zero)
    only if the rotary axis is turning in an anti-clockwise direction when
    moving in a positive direction.

MD irrelevant:
    if the "5-Axis Transformation" option is not installed.
```

-					
-	3	TRUE, TRUE, TRUE,TRUE, TRUE, TRUE...	-	-	7/7

24630	TRAFO5_NON_POLE_LIMIT_2			C07	F2
degrees	Definition of pole range for 5-axis transformation 2			DOUBLE	NEW CONF

This MD designates a limit angle for the fifth axis of the second 5-axis transformation with the following properties: if the path runs below this angle past the pole, the traverse will pass through the pole.

For the 5-axis transformation, the two orientation axes of the tool form a coordinate system of length and width circles on a spherical surface. If orientation programming (that is the orientation vector lies in a plane) leads the path so close past the pole that the angle defined by this MD is undershot, then there is a deviation from the defined interpolation such that the interpolation runs through the pole.

Alarm 14112 is output if this modification of the path gives a deviation greater than a tolerance defined by MD 24640: TRAFO5_POLE_LIMIT_2.

MD irrelevant:
If the "5-Axis Transformation" option is not installed.
Also irrelevant with programming in the machine coordinate system ORIMKS.

Related to:
MD: TRAFO5_POLE_LIMIT_1

-					
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7

24640	TRAFO5_POLE_LIMIT_2			C07	F2
degrees	End angle toler. with interpol. through pole for 5-axis transf.			DOUBLE	NEW CONF

This MD designates an end angle tolerance for the fifth axis of the second 5-axis transformation with the following properties:

With the interpolation through the pole point, only the fifth axis moves, the fourth axis retains its starting position. If a motion is programmed that does not run exactly through the pole point but is to run near the pole within the area given by MD: TRAFO5_NON_POLE_LIMIT then there is a deviation from the defined path as the interpolation runs exactly through the pole point. This results in a deviation in the position of the end point of the fourth axis (the polar axis) from the programmed value.

This MD defines the angle by which the polar axis may deviate from the programmed value with 5-axis transformation when switching from the programmed interpolation to the interpolation through the pole point.
An error message (alarm 14112) is output if there is a greater deviation and the interpolation is not executed.

MD irrelevant:
If the "5-Axis Transformation" option is not installed.
Also irrelevant with programming in the machine coordinate system ORIMKS.

Related to:
MD: TRAFO5_NON_POLE_LIMIT_1

-					
-	-	2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0,2.0...	-	-	7/7

24642	**TRAFO5_POLE_TOL_2**		C07		-
degrees	End angle tolerance for pole interpolation		DOUBLE		NEW CONF
End angle tolerance for interpolation through the pole for the 2nd 5/6-axis transformation. This MD is evaluated only by the generic 5/6-axis transformation. If the end orientation lies within the pole cone and within the tolerance cone specified by means of this MD, the pole axis does not move and retains it start position. The other rotary axis, however, moves to the programmed angle. This results in a deviation of the end orientation from the programmed orientation. The maximum active value of this MD is the value of MD TRAFO5_POLE_LIMIT_2, which is used to define the pole cone.					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0	-	7/7

24650	**TRAFO5_BASE_TOOL_2**		C07		F2
mm	Vector of base tool on activation of 5-axis transformation 2		DOUBLE		NEW CONF
This MD indicates the vector of the base tool which takes effect when the first transformation is activated without a length compensation being selected. Programmed length compensations have an additive effect with respect to the base tool. MD irrelevant: if the "5-Axis Transformation" option is not installed.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24658	**TRAFO5_JOINT_OFFSET_PART_2**		C07		F2
mm	Vector of kinematic table offset		DOUBLE		NEW CONF
Same as MD 24558: TRAFO5_JOINT_OFFSET_PART_1, but for the second transformation.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24660	TRAFO5_JOINT_OFFSET_2		C07		F2
mm	Vector of the kinem.offset of the 2nd 5-axis transformation		DOUBLE		NEW CONF
This machine data designates the vector from the first to the second joint for the first (MD: TRAFO5_JOINT_OFFSET_1) or second (MD: TRAFO5_JOINT_OFFSET_2) transformation of a channel and has a specific meaning for the various machine types: Machine type 1 (two-axis swivel head for tool) and: Machine type 2 (two-axis rotary table for workpiece): Vector from first to second joint of tool rotary head or workpiece rotary table. Machine type 3 (single-axis rotary table for workpiece and single-axis swivel head for tool): Vector from machine reference point to joint of workpiece table. MD irrelevant: if the "5-Axis Transformation" option is not installed. The same applies for 3-axis and 4-axis transformations.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24661	TRAFO6_JOINT_OFFSET_2_3_2		C07		-
mm	Vector of kinematic offset		DOUBLE		NEW CONF
As TRAFO6_JOINT_OFFSET_2_3_1 but for the second transformation.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24662	TRAFO5_TOOL_ROT_AX_OFFSET_2		C07		F2
mm	Offset swivel point of 2nd 5-axis transf. (swivelled lin.axis)		DOUBLE		NEW CONF
In the case of 5-axis transformation with swiveled linear axis, the value indicates the offset of the rotary axis which swivels the linear axis with reference to machine zero for the 2nd transformation. MD irrelevant for: other 5-axis transformations Related to: MD 24562					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24664	**TRAFO5_NUTATOR_AX_ANGLE_2**			C07	F2
degrees	Nutating head angle			DOUBLE	NEW CONF
Angle between the second rotary axis and the axis corresponding to it in the rectangular coordinate system MD irrelevant for: Transformation type other than "universal milling head" Related to: TRAFO5_NUTATOR_AX_ANGLE_1					
-					
-	-	45.0,45.0,45.0,45.0, 45.0,45.0,45.0...	-89.	89.	7/7

24666	**TRAFO5_NUTATOR_VIRT_ORIAX_2**			C07	-
-	Virtual orientation axes			BOOLEAN	NEW CONF
The MD has the following values: 0: The axis angles of the orientation axes are machine axis angles. 1: Virtual orientation axes are defined that form a rectangular coordinate system and the axis angles are rotations around these virtual axes.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE, FALSE...	-	-	7/7

24670	**TRAFO5_AXIS1_2**			C07	F2
-	Direction of 1st rotary axis			DOUBLE	NEW CONF
As for TRAFO5_AXIS1_1 but for the second orientation transformation of a channel.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24672	**TRAFO5_AXIS2_2**			C07	F2
-	Direction of 2nd rotary axis			DOUBLE	NEW CONF
As for TRAFO5_AXIS2_1 but for the second transformation of a channel.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24673	**TRAFO5_AXIS3_2**			C07	-
-	Direction of third rotary axis			DOUBLE	NEW CONF
As TRAFO5_AXIS3_1 but for the second orientation transformation of a channel.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24674	**TRAFO5_BASE_ORIENT_2**			C07	F2
-	Basic tool orientation			DOUBLE	NEW CONF
As for TRAFO5_BASE_ORIENT_1 but for the second transformation of a channel.					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24676	**TRAFO6_BASE_ORIENT_NORMAL_2**			C07	-
-	Normal tool vector			DOUBLE	NEW CONF
As TRAFO6_BASE_ORIENT_NORMAL_1 but for the second orientation transformation					
-					
-	3	0.0, 1.0 , 0.0,0.0, 1.0 , 0.0...	-	-	7/7

24680	**TRAFO5_TOOL_VECTOR_2**			C07	F2
-	Direction of orientation vector			BYTE	POWER ON
Indicates the direction of the orientation vector for the second 5-axis transformation for each channel. 0: Tool vector in x direction 1: Tool vector in y direction 2: Tool vector in z direction					
-					
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	0	2	7/2

24682	**TRAFO5_TCARR_NO_2**			C07	-
-	TCARR number for the second 5-axis transformation			DWORD	NEW CONF
Same as TRAFO5_TCARR_NO_1, but for the second orientation transformation.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

24685	**TRAFO5_ORIAX_ASSIGN_TAB_2**			C07	F2
-	Orientation axis / channel axis assignment transformation 1			BYTE	POWER ON
Assignment table of the orientation axes for 5-axis transformation 2 Only active with active 5-axis transformation 2.					
-					
-	3	0, 0, 0,0, 0, 0,0, 0, 0,0, 0, 0...	0	20	7/2

24690	**TRAFO5_ROT_OFFSET_FROM_FR_2**			C01, C07	-
-	Offset of transformation rotary axes from WO.			BOOLEAN	SOFORT
Same as TRAFO5_ROT_OFFSET_FROM_FR_1, but for the 2nd transformation of a channel					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE, FALSE...	-	-	7/2

24700	TRAANG_ANGLE_1		C07		M1
degrees	Angle between Cartesian axis and real (inclined) axis		DOUBLE		NEW CONF
Indicates for the first agreed TRAANG transformation of the channel the angle of the inclined axis in degrees between the 1st machine axis and the 1st basic axis while TRAANG is active. The angle is measured positively clockwise. Related to: TRAANG_ANGLE_2					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

24710	TRAANG_BASE_TOOL_1		C07		M1
mm	Vector of base tool for 1st TRAANG transformation		DOUBLE		NEW CONF
Indicates a basic offset of the tools zero for the 1st TRAANG transformation. The offset is referenced to the geometry axes valid when TRAANG is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool. The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes. Related to: $MC_TRAANG_BASE_TOOL_2					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24720	TRAANG_PARALLEL_VELO_RES_1		C07		M1
-	Velocity margin for 1st TRAANG transformation		DOUBLE		NEW CONF
Indicates the axis velocity reserve for jog, positioning and oscillating movements for each channel for the first TRAANG transformation, which is held ready on the parallel axis (see $MC_TRAFO_AXES_IN_n[1]) for the compensating movement. Velocity reserve to be provided for jog, positioning and oscillating movements on the parallel axis to handle the compensating movement as a consequence of the inclined axis. 0.0 means that the control or the transformation itself determines the reserve according to the angle of the inclined axis and the velocity capacity of the inclined and parallel axes. - The criterion for this is that the same speed limit is to be maintained in the direction of the parallel axis and the vertical (virtual) axis. >0.0 means that a fixed reserve has been set (TRAANG_PARALLEL_VELO_RES_1 * MAX_AX_VELO of the parallel axis). The velocity capacity in the virtual axis is determined by this. The lower TRAANG_PARALLEL_VELO_RES_1 has been set, the lower it is Related to: TRAANG_PARALLEL_ACCEL_RES_2					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	1.0	7/7

24721	**TRAANG_PARALLEL_ACCEL_RES_1**		C07	M1	
-	Acceleration margin of parallel axis for the 1st TRAANG transf.		DOUBLE	NEW CONF	
Indicates the acceleration margin for jog, positioning and oscillating movements which is held ready on the parallel axis (see $MC_TRAFO_AXES_IN_n[1]) for the compensatory movement; MD setting applies to the first TRAANG transformation for each channel. Related to: $MC_TRAANG_PARALLEL_VELO_RES_1					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	1.0	7/7

24750	**TRAANG_ANGLE_2**		C07	M1	
degrees	Angle between Cartesian axis and real (inclined) axis		DOUBLE	NEW CONF	
Indicates for the second agreed TRAANG transformation of the channel the angle of the inclined axis in degrees between the 1st machine axis and the 1st basic axis while TRAANG is active. The angle is measured positively clockwise. Related to: TRAANG_ANGLE_1					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

24760	**TRAANG_BASE_TOOL_2**		C07	M1	
mm	Vector of base tool for 2nd TRAANG transformation		DOUBLE	NEW CONF	
Indicates a basic offset of the tools zero for the 2nd TRAANG transformation. The offset is referenced to the geometry axes valid when TRAANG is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool. The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes. Related to: $MC_TRAANG_BASE_TOOL_1					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24770	**TRAANG_PARALLEL_VELO_RES_2**		C07	M1	
-	Velocity margin for 2nd TRAANG transformation		DOUBLE	NEW CONF	
Indicates the axis velocity reserve for jog, positioning and oscillating movements which is held ready on the parallel axis (see $MC_TRAFO_AXES_IN_n[1]) for the compensatory movement; MD setting applies to the second TRAANG transformation for each channel. Related to: TRAANG_PARALLEL_ACCEL_RES_2					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	1.0	7/7

24771	**TRAANG_PARALLEL_ACCEL_RES_2**		C07	M1	
-	Acceler. margin of parallel axis for the 2nd TRAANG transform.		DOUBLE	NEW CONF	
Indicates the axis acceleration margin for jog, positioning and oscillating movements which is held ready on the parallel axis (see $MC_TRAFO_AXES_IN_n[1]) for the compensatory movement; MD setting applies to the second TRAANG transformation for each channel. Related to: $MC_TRAANG_PARALLEL_RES_1					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	0.0	1.0	7/7

24800	**TRACYL_ROT_AX_OFFSET_1**		C07	M1	
degrees	Offset of rotary axis for the 1st TRACYL transformation		DOUBLE	NEW CONF	
Indicates the offset of the rotary axis for the first agreed TRACYL transformation in degrees in relation to the neutral position while TRACYL is active. Related to: TRACYL_ROT_AX_OFFSET_2					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

24805	**TRACYL_ROT_AX_FRAME_1**		C07	-	
-	Rotary axis offset TRACYL 1		BYTE	NEW CONF	
0: axial rotary axis offset is not considered. 1: axial rotary axis offset is considered. 2: axial rotary axis offset is considered until SZS. SZS frames include transformed axial rotary axis offsets.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7

24808	**TRACYL_DEFAULT_MODE_1**		C07	M1	
-	TRACYL mode selection		BYTE	NEW CONF	
Default setting of TRACYL type 514: 0: without groove side offset (i.e. TRACYL type 514 - equals 512) 1: with groove side offset (i.e. TRACYL type 514 - equals 513) With $MC_TRAFO_TYPE_.. = 514 it can be decided via the selection parameters, whether calculation is made with or without groove side offset. The parameter will define the variable to be selected, if no selection is made in the call parameters. If $MC_TRACYL_DEFAULT_MODE_1 = 1, it will be sufficient to program TRACYL(30) in the part program instead of TRACYL(30,1,1).					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/7

24810	**TRACYL_ROT_SIGN_IS_PLUS_1**		C07	M1	
-	Sign of rotary axis for 1st TRACYL transformation		BOOLEAN	NEW CONF	
Indicates the sign with which the rotary axis is taken into account in the TRACYL transformation for the first agreed TRACYL transformation. Related to: TRACYL_ROT_SIGN_IS_PLUS_2					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

24820	**TRACYL_BASE_TOOL_1**		C07	M1	
mm	Vector of base tool for 1st TRACYL transformation		DOUBLE	NEW CONF	
Indicates a basic offset of the tools zero for the 1st TRACYL transformation. The offset is referenced to the geometry axes valid when TRACYL is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool. The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes. Related to: $MC_TRACYL_BASE_TOOL_2					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24850	TRACYL_ROT_AX_OFFSET_2		C07	M1	
degrees	Offset of rotary axis for the 2nd TRACYL transformation		DOUBLE	NEW CONF	
Indicates the offset of the rotary axis in degrees in relation to the neutral position for the 2nd agreed TRACYL transformation for each channel. MD irrelevant: If no TRACYL is active Related to: TRACYL_ROT_AX_OFFSET_1					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

24855	TRACYL_ROT_AX_FRAME_2		C07	-	
-	Rotary axis offset TRACYL 2		BYTE	NEW CONF	
0: axial rotary axis offset is not considered. 1: axial rotary axis offset is considered. 2: axial rotary axis offset is considered until SZS. SZS frames include transformed axial rotary axis offsets.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7

24858	TRACYL_DEFAULT_MODE_2		C07	M1	
-	TRACYL mode selection		BYTE	NEW CONF	
Default setting of TRACYL type 514 for the 2nd TRACYL: 0: without groove side offset (i.e. TRACYL type 514 - equals 512) 1: with groove side offset (i.e. TRACYL type 514 - equals 513) With $MC_TRAFO_TYPE_.. = 514 it can be decided via the selection parameters, whether calculation is made with or without groove side offset. The parameter defines the variable to be selected, if no selection is made in the call parameters. If $MC_TRACYL_DEFAULT_MODE_2 = 1, it will be sufficient to program TRA-CYL(30,2) in the part program instead of TRACYL(30,2,1).					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/7

24860	TRACYL_ROT_SIGN_IS_PLUS_2		C07	M1	
-	Sign of rotary axis for 2nd TRACYL transformation		BOOLEAN	NEW CONF	
Indicates the sign with which the rotary axis is taken into account in the TRACYL transformation for the 2nd agreed TRACYL transformation for each channel. Related to: TRACYL_ROT_SIGN_IS_PLUS_1					
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

24870	**TRACYL_BASE_TOOL_2**		C07		M1
mm	Vector of base tool for 2nd TRACYL transformation		DOUBLE		NEW CONF
Indicates a basic offset of the tools zero for the 2ndTRACYL transformation. The offset is referenced to the geometry axes valid when TRACYL is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool. The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes. Related to: $MC_TRACYL_BASE_TOOL_1					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24900	**TRANSMIT_ROT_AX_OFFSET_1**		C07		M1
degrees	Offset of rotary axis for the 1st TRANSMIT transformation		DOUBLE		NEW CONF
Indicates the offset of the rotary axis for the first agreed TRANSMIT transformation in degrees in relation to the neutral position while TRANSMIT is active. Related to: TRANSMIT_ROT_AX_OFFSET_2					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

24905	**TRANSMIT_ROT_AX_FRAME_1**		C07		-
-	Rotary axis offset TRANSMIT 1		BYTE		NEW CONF
0: axial rotary axis offset is not considered. 1: axial rotary axis offset is considered. 2: axial rotary axis offset is considered until SZS. SZS frames include transformed rotations around the rotary axis.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7

24910	**TRANSMIT_ROT_SIGN_IS_PLUS_1**		C07		M1
-	Sign of rotary axis for 1st TRANSMIT transformation		BOOLEAN		NEW CONF
Indicates the sign with which the rotary axis is taken into account in the TRANSMIT transformation for the first agreed TRANSMIT transformation for each channel. Related to: TRANSMIT_ROT_SIGN_IS_PLUS_2					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

24911	TRANSMIT_POLE_SIDE_FIX_1			C07	M1
-	Restr. working range before/behind the pole, 1. TRANSMIT			BYTE	NEW CONF
Restriction of the working area in front of/behind pole or no restriction, i.e. traversal through the pole. The assigned values have the following meanings: 1: Working area of linear axis for positions >=0, (if tool length compensation parallel to linear axis equals 0) 2: Working area of linear axis for positions <=0, (if tool length compensation parallel to linear axis equals 0) 0: No restriction of working area. Traversal through pole.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7

24920	TRANSMIT_BASE_TOOL_1			C07	M1
mm	Vector of base tool for 1st TRANSMIT transformation			DOUBLE	NEW CONF
Indicates a basic offset of the tools zero for the 1st TRANSMIT transformation. The offset is referenced to the geometry axes valid when TRANSMIT is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool. The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes. Related to: $MC_TRANSMIT_BASE_TOOL_2					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24950	TRANSMIT_ROT_AX_OFFSET_2			C07	M1
degrees	Offset of rotary axis for the 2nd TRANSMIT transformation			DOUBLE	NEW CONF
Indicates the offset of the rotary axis for the second agreed TRANSMIT transformation in degrees in relation to the neutral position while TRANSMIT is active. Related to: TRANSMIT_ROT_AX_OFFSET_1					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

24955	**TRANSMIT_ROT_AX_FRAME_2**		C07	-	
-	Rotary axis offset TRANSMIT 2		BYTE	NEW CONF	
0: axial rotary axis offset is not considered. 1: axial rotary axis offset is considered. 2: axial rotary axis offset is considered until SZS. SZS frames include transformed rotations around the rotary axis.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7

24960	**TRANSMIT_ROT_SIGN_IS_PLUS_2**		C07	M1	
-	Sign of rotary axis for 2nd TRANSMIT transformation		BOOLEAN	NEW CONF	
Indicates the sign with which the rotary axis is taken into account in the TRANSMIT transformation for the second agreed TRANSMIT transformation for each channel. Related to: TRANSMIT_ROT_SIGN_IS_PLUS_1					
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

24961	**TRANSMIT_POLE_SIDE_FIX_2**		C07	M1	
-	Restr. of working range before/behind the pole, 2. TRANSMIT		BYTE	NEW CONF	
Restriction of working area in front of/behind pole or no restriction, i.e. traversal through pole. The assigned values have the following meanings: 1: Working area of linear axis for positions >=0, (if tool length compensation parallel to linear axis equals 0) 2: Working area of linear axis for positions <=0, (if tool length compensation parallel to linear axis equals 0) 0: No restriction of working area. Traversal through pole.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	2	7/7

24970	**TRANSMIT_BASE_TOOL_2**			C07	M1
mm	Vector of base tool for 2nd TRANSMIT transformation			DOUBLE	NEW CONF
Indicates a basic offset of the tools zero for the 2nd TRANSMIT transformation. The offset is referenced to the geometry axes valid when TRANSMIT is active. The basic offset is included with and without selection of the tool length compensation. Programmed length corrections have an additive effect with respect to the basic tool. The index i takes the values 0, 1, 2 for the 1st to 3rd geometry axes. Related to: $MC_TRANSMIT_BASE_TOOL_1					
-					
-	3	0.0, 0.0 , 0.0,0.0, 0.0 , 0.0...	-	-	7/7

24995	**TRACON_CHAIN_1**		C07	M1	
-	Transformation grouping		DWORD	NEW CONF	
Transformation chain of the first concatenated transformation. In the table, the numbers of the transformations which are to be concatenated are given in the order in which the transformation has to be executed from BCS into MCS. Example: A machine can be operated optionally either as a 5-axis machine or as a transmit machine. A linear axis is not arranged at a right-angles to the other linear axes (inclined axis). 5 transformations must be set via the machine data, e.g. TRAFO_TYPE_1 = 16 (5-axis transformation) TRAFO_TYPE_2 = 256 (Transmit) TRAFO_TYPE_3 = 1024 (Inclined axis) TRAFO_TYPE_4 = 8192 (Concatenated transformation) TRAFO_TYPE_5 = 8192 (Concatenated transformation) If the 4th transformation concatenates the 5-axis transformation / inclined axis and the 5th transformation concatenates the transmit / inclined axis, then (1, 3, 0, 0) is entered in the first table TRACON_CHAIN_1, and (2, 3, 0, 0) in the table TRACON_CHAIN_2. The entry 0 means no transformation. The order in which the transformations are assigned (TRAFO_TYPE_1 to TRAFO_TYPE_8) is arbitrary. The linked transformations do not have to be the last. However, they must always stand behind all the transformations which occur in a transformation chain. In the previous example, this means that, e.g. the third and fourth transformations must not be switched. However, it would be possible to define a further, sixth transformation, if this does not go into a linked transformation. Transformations cannot be linked with one another at will. The following limitations apply in SW version 5: The first transformation in the chain must be an orientation transformation (3- , 4- , 5-axis transformation, nutator) transmit or peripheral curve transformation. The second transformation must be an inclined axis transformation. No more than two transformations may be linked.					
-					
-	4	0, 0, 0, 0,0, 0, 0, 0,0, 0, 0, 0...	0	8	7/7

24996	**TRACON_CHAIN_2**			C07	M1
-	Transformation grouping			DWORD	NEW CONF

```
Transformation chain of the first concatenated transformation.
In the table, the numbers of the transformations which are to be concatenated
    are given in the order in which the transformation has to be executed from
    BCS into MCS.
Example:
A machine can be operated optionally either as a 5-axis machine or as a trans-
    mit machine. A linear axis is not arranged at a right-angles to the other
    linear axes (inclined axis).
Transformation chain of the second concatenated transformation.

Example: 5 transformations must be set via the machine data
TRAFO_TYPE_1 =   16         (5-axis transformation)
TRAFO_TYPE_2 =  256        (Transmit)
TRAFO_TYPE_3 = 1024       (Inclined axis)
TRAFO_TYPE_4 = 8192       (Concatenated transformation)
TRAFO_TYPE_5 = 8192       (Concatenated transformation)

If the 4th transformation concatenates the 5-axis transformation / inclined
    axis and the 5th transformation concatenates the transmit / inclined axis,
    then (1, 3, 0, 0) is entered in the first table TRACON_CHAIN_1, and (2, 3,
    0, 0) in the table TRACON_CHAIN_2. The entry 0 means no transformation.

The order in which the transformations are assigned (TRAFO_TYPE_1 to
    TRAFO_TYPE_8) is arbitrary. The cocatenated transformations do not have to
    be the last. However, they must always follow all the transformations
    which occur in a transformation chain. In the previous example, this means
    that, e.g. the third and fourth transformations must not be switched.
However, it would be possible to define a further, sixth transformation, if
this does not go into a concatenated transformation.

Transformations cannot be concatenated with one another at will.
The following limitations apply in SW version 5:
The first transformation in the chain must be an orientation transformation
    (3- , 4- , 5-axis transformation, nutator) transmit or peripheral curve
    transformation.
The second transformation must be an inclined axis transformation.
No more than two transformations may be concatenated.
```

-					
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	8	7/7

24997	**TRACON_CHAIN_3**			C07	M1
-	Transformation grouping			DWORD	NEW CONF

```
Transformation chain of the third concatenated transformation.
See TRACON_CHAIN_1 for documentation.
```

-					
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	8	7/7

24998	**TRACON_CHAIN_4**			C07	M1
-	Transformation grouping			DWORD	NEW CONF
Transformation chain of the fourth concatenated transformation. See TRACON_CHAIN_1 for documentation.					
-					
-	4	0, 0, 0 ,0,0, 0, 0, 0,0, 0, 0, 0...	0	8	7/7

1.4.5 Punching and nibbling

26000	**PUNCHNIB_ASSIGN_FASTIN**			C01, C09	N4
-	Hardware assignment for input byte for stroke control			DWORD	POWER ON
Assignment of the high-speed input byte for "punching and nibbling" Bit 0-7: Number of the input byte used Bit 8-15: Free Bit 16-23: Inversion mask for writing the hardware byte Bit 24-31: Free This data defines which input byte is to be used for the signal "travel active". = 1: On-board inputs (4 high-speed NCK outputs) are used. 2, 3, 4, 5 The external digital NCK inputs are used 128-129: Comparator byte (results from high-speed analog inputs or VDI specifica-tion) Related to: NIBBLE_PUNCH_INMASK[n] References: /FB/, A4, Digital and Analog NCK I/Os The signal is high active as default from software 3.2. That is there is wire break monitoring. If the signal is low active then, e.g., the MD must be set to the value MD ="H 0001 0001" for the outboard inputs.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

26002	PUNCHNIB_ASSIGN_FASTOUT		C01, C09	N4
-	Hardware assignment for output byte for stroke control		DWORD	POWER ON

```
This data defines which output byte is to be used for the stroke control.
Number of the high-speed output byte for "punching and nibbling"
Bit 0-7:    Number of the output byte used
Bit 8-15:   Free
Bit 16-23:  Inversion mask for writing the hardware byte
Bit 24-31:  Free

Possible inputs:
1:
   840D on-board outputs (4 high-speed + 4 bits via VDI specification)

2, 3, 4, 5
   External digital outputs (high-speed NCK O/I or VDI specification)


Related to:
   NIBBLE_PUNCH_OUTMASK[n]

References:
   /FB/, A4, Digital and Analog NCK I/Os
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

26004	NIBBLE_PUNCH_OUTMASK		C01, C09	N4
-	Mask for fast output bits		BYTE	POWER ON

```
Mask for high-speed output bits for punching and nibbling.

Byte 1:    Contains the bit for stroke release
Bytes 2-8: Currently free

Special cases:
   Only NIBBLE_PUNCH_OUTMASK[0] is significant.
   This is used to define the output bit for the signal "Release stroke".

Related to:
   PUNCHNIB_ASSIGN_FASTOUT
```

-					
-	8	1, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

26006	NIBBLE_PUNCH_INMASK			C01, C09	N4
-	Mask for fast input bits			BYTE	POWER ON

```
This data can define up to 8 byte masks for the output of the high-speed bits.
The standard assignment of this data is as follows:

NIBBLE_PUNCH_INMASK[0]=1:
2° = first bit for the first punch interface (SPIF1)
NIBBLE_PUNCH_INMASK[1]=4:
Second punch interface (SPIF2), not available as standard
NIBBLE_PUNCH_INMASK[2]=0
...
NIBBLE_PUNCH_INMASK[7]=0

Note:
The significance of the bit to be defined must be input as a value (refer to
    MD 26004: NIBBLE_PUNCH_OUTMASK[n]).

Special cases:
   Only NIBBLE_PUNCH_INMASK[0] is relevant. This is used to define the input
bit for the signal "Stroke active".

Related to:
   PUNCHNIB_ASSIGN_FASTIN
```

-					
-	8	1, 0, 0, 0, 0, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

26008	NIBBLE_PUNCH_CODE			C09	N4
-	Definition of M functions			DWORD	POWER ON

```
This data defines the special M functions for punching and nibbling.

                            Standard value             Example
NIBBLE_PUNCH_CODE[0] =  0         20       End punching, nibbling with M20
NIBBLE_PUNCH_CODE[1] = 23         23       End punching, nibbling with M23
NIBBLE_PUNCH_CODE[2] = 22         22       Start nibbling
NIBBLE_PUNCH_CODE[3] = 25         25       Start punching
NIBBLE_PUNCH_CODE[4] = 26         26       Activate dwell time
NIBBLE_PUNCH_CODE[5] =122        122       Start nibbling with pretension,
                                             stroke control at servo level
NIBBLE_PUNCH_CODE[6] =125        125       Start punching with pretension,
                                             stroke control at servo level
NIBBLE_PUNCH_CODE[7] =  0          0       Not used
                                             (in preparation)

Special cases:
If MD: PUNCHNIB_ACTIVATION = 2 (M functions are interpreted directly by the
    software), then MD: NIBBLE_PUNCH_CODE[0] =20 has to be set.

Related to:
   PUNCHNIB_ACTIVATION
```

-					
-	8	0,23,22, 25, 26, 0, 0, 0,0, 0, 0, 0, 0, 0, 0, 0...	-	-	7/2

26010	**PUNCHNIB_AXIS_MASK**			C09	N4
-	Definition of punching and nibbling axes			DWORD	POWER ON
Defines the axes involved in punching and nibbling. That is all the axes defined here must be at rest during punching and nibbling. Related to: PUNCH_PARTITION_TYPE					
-					
-	-	7,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

26012	**PUNCHNIB_ACTIVATION**			C09	N4
-	Activation of punching and nibbling functions			DWORD	POWER ON
This MD defines the ways in which punching and nibbling functions can be activated: PUNCHNIB_ACTIVATION = 0 None of the punching or nibbling functions can be activated. The automatic path segmentation is the only exception if it is enabled via MD: PUNCH_PATH_SPLITTING. PUNCHNIB_ACTIVATION = 1 The functions are activated via language commands. If M functions are to be used, then they must be programmed using macros. PUNCHNIB_ACTIVATION = 2 The M functions are interpreted directly by the software. Language commands can still be used. Note: This option is intended only as a temporary solution. Related to: PUNCH_PATH_SPLITTING NIBBLE_PUNCH_CODE[n]					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

26014	PUNCH_PATH_SPLITTING			C09	N4
-	Activation of automatic path segmentation			DWORD	POWER ON

```
Activation data for automatic path segmentation.

Value   Significance
------------------------------------------------------------------
0 =
   Automatic path segmentation only active with punching and nibbling.

1 =
   Automatic path segmentation can also be activated without punching and nib-
bling functions;
   that is, it is programmable and be used NC internally

2 =
   Automatic path segmentation can only be used NC internally;
   that is it cannot be programmed.
```

-					
-	-	2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	-	-	7/2

26016	PUNCH_PARTITION_TYPE			C09	N4
-	Behavior of individual axes with automatic path segmentation			DWORD	POWER ON

```
This machine data defines how single axes that are also nibbling axes within
the meaning of MD: PUNCHNIB_AXIS_MASK are to behave.
In this case, there are the following options for the behavior of the single
    axes during path segmentation and stroke control:

PUNCH_PARTITION_TYPE = 0
No special behavior during automatic path segmentation. If the single axes are
    programmed together with path axes in one block then their total travers-
    ing path is split up according to the path axes. That is the pure geomet-
    ric relationship between the single axes and path axes is identical to the
    undivided motion. If the single axes are programmed without the path axes
    but with SPN=<value>  then the path is divided accordng to the programmed
    SPN value.

PUNCH_PARTITION_TYPE = 1
In this case, the path of the single axes, if they are programmed together
    with path axes, are generally traversed in the first section (that is
    independently of the currently active type of interpolation).
PUNCH_PARTITION_TYPE = 2
In this case the single axes behave with linear interpolation in the same way
    as with PUNCH_PARTITION_TYPE = 1, with all other types of interpolation,
    in the same way as with PUNCH_PARTITION_TYPE = 0.

Related to:
   PUNCHNIB_AXIS_MASK
```

-					
-	-	1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

26018	**NIBBLE_PRE_START_TIME**			C09	N4
s	Delay time for nibbling/punching with G603			DOUBLE	POWER ON
To minimize any dead times due to the reaction time of the punching unit, it is possible to release the stroke before reaching the in-position window of the axes. The reference time for this is the interpolation end. Since there is normally a delay of some interpolation cycles after reaching the interpolation end (depending on the machine dynamics) until the axes actually come into position, the prestart time is a delay time with respect to reaching the interpolation end. The function is therefore coupled to G603 (block change at the end of interpolation). The time can be set via the machine data NIBBLE_PRE_START_TIME). Example: With an interpolation cycle of 5 µs, a stroke shall be released 2 cycles after reaching the interpolation end. In this case, the value 0.010 s must be selected for NIBBLE_PRE_START_TIME. If a value that is not integrally divisible by the set interpolation time is selected, then the stroke is initiated in the interpolation cycle following the set time.					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/2

26020	**NIBBLE_SIGNAL_CHECK**			C09	N4
-	Alarm on chattering punching signal			DWORD	POWER ON
When stroke active signal is set, for example by punch overshoots between the strokes, then the interpolation is stopped. It is also possible to generate the message "unclean punch signal" as a function of machine data NIBBLE_SIGNAL_CHECK. 0: No error message when the punching signal is irregular 1: Alarm, when the punching signal is irregular between strokes					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

27100	**ABSBLOCK_FUNCTION_MASK**			N01	-
-	Parameterize the block display with absolute values			DWORD	POWER ON
Parameterization of the "block display with absolute values" function Bit 0 = 1 : The position values of the transverse axis are always displayed as diameter values. Transverse axes can be applied via MD20100 or MD30460, bit2.					
-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x1	7/2

27200	**MMC_INFO_NO_UNIT**			EXP, -	-
-	HMI info (without physical unit)			DOUBLE	POWER ON
-					
-					
-	80	45., 2., 0., 1., 0., -1., 0., 1., 100., 1., 1., 0., 0., 0., 0....	-	-	0/2

27201	**MMC_INFO_NO_UNIT_STATUS**			EXP, -	-
-	HMI status info (without physical unit)			BYTE	POWER ON
-					
-					
-	80	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1...	-	-	0/2

27202	**MMC_INFO_POSN_LIN**			EXP, -	-
mm	HMI info (linear positions)			DOUBLE	POWER ON
-					
-					
-	50	0., 0., 1., 1., 0., 0., 100., 0., 0., 1000., 1., 1....	-	-	0/2

27203	**MMC_INFO_POSN_LIN_STATUS**			EXP, -	-
-	HMI status info (linear positions)			BYTE	POWER ON
-					
-					
-	50	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1...	-	-	0/2

27204	**MMC_INFO_VELO_LIN**			EXP, -	-
mm/min	HMI info (linear velocities)			DOUBLE	POWER ON
-					
-					
-	16	10., 10., 2000., 10000., 300., 1000., 1000., 10., 0.,0.,0.,0....	-	-	0/2

27205	**MMC_INFO_VELO_LIN_STATUS**			EXP, -	-
-	HMI status info (linear velocities)			BYTE	POWER ON
-					
-					
-	16	1,1,1,1,1,1,1,1,0,0,0,0,0,0,0,0...	-	-	0/2

27206	**MMC_INFO_CUT_SPEED**			EXP, -	-
m/min	HMI info (cutting speed)			DOUBLE	POWER ON
-					
-					
-	5	100.,0.,0.,0.,0.,100.,0.,0.,0.,0....	-	-	0/2

27207	**MMC_INFO_CUT_SPEED_STATUS**			EXP, -	-
-	HMI status info (cutting speed)			BYTE	POWER ON
-					
-					
-	5	1,0,0,0,0,1,0,0,0,0,1,0,0,0,0...	-	-	0/2

27208	**MMC_INFO_REV_FEED**			EXP, -	-
mm/rev	HMI info (feed)			DOUBLE	POWER ON
-					
-					
-	10	1.,0.100,1.,1.,0.,0.,0.,0.,0.,0....	-	-	0/2

27209	**MMC_INFO_REV_FEED_STATUS**			EXP, -	-
-	HMI status info (feed)			BYTE	POWER ON
-					
-					
-	10	1,1,1,1,0,0,0,0,0,0,1,1,1,1,0,0,0,0,0,0...	-	-	0/2

27400	**OEM_CHAN_INFO**			A01, A11	-
-	OEM version information			STRING	POWER ON
A version information freely available to the user (is indicated in the version screen)					
-					
-	3	"","","","","","","","",""...	-	-	7/2

27800	TECHNOLOGY_MODE		C09		A2
-	Mode of technology in channel		BYTE		NEW CONF

```
This machine data can be used for stating the technology independently of the
channel.
This information is used, among other things, for evaluating HMI, PLC and
standard cycles.
Meaning:
MD=0 Milling
MD=1 Turning
MD=2 Grinding
MD=3 Nibbling
MD=4 ...

(Enter further technologies as and when required)

Application example(s):
This information is used, among other things, for evaluating HMI, PLC and
standard cycles.
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

27860	**PROCESSTIMER_MODE**	C09	K1
-	Activation of program runtime measurement	DWORD	RESET

```
Timers are provided as system variables under the function program runtime.
Whereas the NCK-specific timers are always activated (for time measurements
since the last control power on), the channel-specific timers have to be
started via this machine data.
Meaning:
Bit 0 = 0
    No measurement of total operating time for all part programs
Bit 0 = 1
   Measurement of total operating time for all part programs is active
($AC_OPERATING_TIME)
Bit 1 = 0
    No measurement of current program runtime
Bit 1 = 1
   Measurement of current program runtime is active ($AC_CYCLE_TIME)
Bit 2 = 0
    No measurement of tool operation time
Bit 2 = 1
   Measurement of tool operation time is active ($AC_CUTTING_TIME)
Bit 3
   Reserved

Other bits only when bit 0,1,2 = 1:

Bit 4 = 0   No measurement with active dry run feed
Bit 4 = 1   Measurement also with active dry run feed
Bit 5 = 0   No measurement with program test
Bit 5 = 1   Measurement also with program test

Bit 6 only when Bit 1 = 1:
Bit 6 = 0
   Delete $AC_CYCLE_TIME also with start by ASUB and PROG_EVENTs
Bit 6 = 1
   $AC_CYCLE_TIME is not deleted on start by ASUB and PROG_EVENTs.

Bit 7 only when Bit 2 = 1:
Bit 7 = 0
   $AC_CUTTING_TIME counts only with active tool
Bit 7 = 1
   $AC_CUTTING_TIME counts irrespective of tool

Bits 8 to 31
   Reserved
```

-					
-	-	0x00,0x00,0x00,0x00,0x00,0x00,0x00...	0	0x0FF	7/2

27880	PART_COUNTER		C09	K1
-	Activation of workpiece counter		DWORD	RESET

```
The part counters can be configured with this machine data.
Significance of the individual bits:
Bits 0 - 3:Activating $AC_REQUIRED_PARTS
------------------------------------------------------------------------
Bit 0 = 1:Counter $AC_REQUIRED_PARTS is active
Further significance of bits 1-3 only when bit 0 =1:
Bit 1 = 0:Alarm/VDI output if $AC_ACTUAL_PARTS corresponds to
    $AC_REQUIRED_PARTS
Bit 1 = 1:Alarm/VDI output if $AC_SPECIAL_PARTS corresponds to
    $AC_REQUIRED_PARTS
Bit 2Reserved!
Bit 3Reserved!

Bits 4 - 7:Activating $AC_TOTAL_PARTS
-------------------------------------------------------------------------
Bit 4 = 1:Counter $AC_TOTAL_PARTS is active
Further significance of bits 5-7 only when bit4 =1:
Bit 5 = 0:Counter $AC_TOTAL_PARTS is incremented by 1 with a VDI output of
    M02/M30
Bit 5 = 1:Counter $AC_TOTAL_PARTS  is incremented by 1 with output of the M
    command from MD PART_COUNTER_MCODE[0]
Bit 6 = 0:$AC_TOTAL_PARTS also active with program test/block search
Bit 7Reserved!

Bits 8 - 11:Activating $AC_ACTUAL_PARTS
-------------------------------------------------------------------------
Bit 8 = 1:Counter $AC_ACTUAL_PARTS is active
Further significance of bits 9-11 only when bit8 =1:
Bit 9 = 0:Counter $AC_ACTUAL_PARTS is incremented by 1 with a VDI output of
    M02/M30
Bit 9 = 1:Counter $AC_ACTUAL_PARTS  is incremented by 1 with output of the M
    command from MD PART_COUNTER_MCODE[1]
Bit 10 = 0:$AC_ACTUAL_PARTS also active with program test/block search
Bit 10 = 1:No machining $AC_ACTUAL_PARTS with program test/block search
Bit 11Reserved!

Bit 12 - 15:Activating $AC_SPECIAL_PARTS
-------------------------------------------------------------------------
Bit 12 = 1:Counter $AC_SPECIAL_PARTS is active
Further significance of bits 13-15 only when bit12 =1:
Bit 13 = 0:Counter $AC_SPECIAL_PARTS  is incremented by 1 with a VDI output of
    M02/M30
Bit 13 = 1:Counter $AC_SPECIAL_PARTS  is incremented by 1 with  output of the
    M command from MD PART_COUNTER_MCODE[2]
Bit 14 = 0:$AC_SPECIAL_PARTS also active with program test/block search
Bit 14 = 1:No machining $AC_SPECIAL_PARTS with program test/block search
Bit 15Reserved!

Related to:
   PART_COUNTER_MCODE
```

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0FFFF	7/2

27882	**PART_COUNTER_MCODE**			C09	K1
-	Workpiece counting with user-defined M command			BYTE	POWER ON
If part counter is activated via MD PART_COUNTER the count pulse can be triggered via a special M command. Only then are values defined here taken into account: Meaning: The part counters are incremented by 1 in the VDI output of the described M command, where: $PART_COUNTER_MCODE[0] for $AC_TOTAL_PARTS $PART_COUNTER_MCODE[1] for $AC_ACTUAL_PARTS $PART_COUNTER_MCODE[2] for $AC_SPECIAL_PARTS					
-					
-	3	2, 2, 2,2, 2, 2,2, 2, 2,2, 2, 2...	0	99	7/2

27900	**REORG_LOG_LIMIT**			EXP, C02	S7
-	Percentage of IPO buffer for enabling log file			BYTE	POWER ON
The machine data defines the percentage of the IPO buffer above which data in the REORG LOG memory can be released in stages, if the block preparation has been interrupted due to an overflow of the REORG LOG data memory. The released data are no longer available to the REORG function (References: /FB /, K1, "Mode Groups, Channels, Program Operation Mode"). A consequence of this status is that a further REORG command is cancelled with an error message. If the status of "non-reorganizability" occurs, warning 15110 is output. The output of the warning can be suppressed by enabling the highest significant bit. The bit is set by adding the value 128 to the input value in REORG_LOG_LIMIT. In addition to the instructions of the NC blocks, the size of the IPO buffer and the REORG data memory also affect the frequency of data release. Related to: MD 28000: MM_REORG_LOG_FILE_MEM (memory size for REORG) MD 28060: MM_IPO_BUFFER_SIZE (number of blocks in the IPO buffer)					
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	0/0

1.4.6 Channel-specific memory settings

28000	**MM_REORG_LOG_FILE_MEM**			EXP, C02	S7
-	Memory space for REORG (DRAM)			DWORD	POWER ON
Definition of the size (in kbyte) of the dynamic memory for the REORG-LOG data. The size of the memory determines the quantity of the data available for the function REORG. References: /FB/, K1, "Mode Groups, Channel, Program Operation"					
-					
-	-	50,50,50,50,50,50,50,50,50,50,50,50 ...	1	500	7/2
840d-2a2c	-	10,10,10,10,10,10,10,10,10,10	-	-	-/-
840d-4a1cg	-	10,10,10,10,10,10,10,10,10,10	-	-	-/-
840d-6a2c	-	10,10,10,10,10,10,10,10,10,10	-	-	-/-
840d-12a2c	-	10,10,10,10,10,10,10,10,10,10	-	-	-/-
840d-31a10c	-	10,10,10,10,10,10,10,10,10,10	-	-	-/-

28010	**MM_NUM_REORG_LUD_MODULES**			EXP, C02	S7
-	Number of blocks for local user variables in REORG (DRAM)			DWORD	POWER ON
Defines the number of additional LUD data blocks available for the function REORG (see Description of Functions, Channels, Mode Groups, Program Operation (K1)). This value can be 0 if the function REORG is not used. The CNC always opens 12 LUD data blocks, of which 8 are used for NC programs and 4 for the ASUBs. An LUD data block is needed for each NC program and ASUB in which a local user variable is defined. This value may have to be increased for the function REORG if a large IPO buffer is present and a large number of short NC programs in which LUD variables are defined are active (prepared NC blocks of the programs are located in the IPO buffer). An LUD data block is needed for each of these programs. The size of the reserved memory is affected by the number of LUDs per NC program and their individual memory requirements. The LUD data blocks are stored in the dynamic memory. The memory requirement for managing the blocks for local user variables with REORG can be determined as follows: The size of the LUD blocks depends on the number of active LUDs and their data type. The memory for the LUD blocks is limited by the MD 28000: MM_REORG_LOG_FILE_MEM (memory size for REORG).					
-					
-	-	8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8	0	SLMAXNUMBEROF_USERMODULES	7/2

28020	**MM_NUM_LUD_NAMES_TOTAL**	C02	S7
-	Number of local user variables (DRAM)	DWORD	POWER ON

Defines the number of variables for the local user data (LUD) which are permitted to exist in the active sections of the program. Approximately 150 bytes of memory per variable are reserved for the names of the variables and the variable values. The memory required for the variable value is equal to the size of the data type. If the total of the local user variables from the active main program and the related subprograms is larger than the defined limit, the variables which are over the limit are not accepted during execution of the program. Dynamic memory is used for the variable names and variable values.

```
Overview of the memory used by the data types:
Data type           Memory used
REAL                  8 bytes
INT                   4 bytes
BOOL                  1 byte
CHAR                  1 byte
STRING                1 byte per character, 200 characters per string are possible
AXIS                  4 bytes
FRAME               400 bytes
```

-						
-	-	400,400,400,400,400,400,400,400,400...	-	-	7/2
840d-2a2c	-	200,200,200,200,200,200,200,200,200...	-	-	-/-
840d-4a1cg	-	200,200,200,200,200,200,200,200,200...	-	-	-/-
840d-6a2c	-	200,200,200,200,200,200,200,200,200...	-	-	-/-
840d-12a2c	-	200,200,200,200,200,200,200,200,200...	-	-	-/-
840d-31a10c	-	200,200,200,200,200,200,200,200,200...	-	-	-/-

28040	MM_LUD_VALUES_MEM			C02	S7
-	Memory space for local user variables (DRAM)			DWORD	POWER ON
This MD defines the amount of memory space available for LUD variables. The number of available LUDs is exhausted when one of the limit values in either MD 28020: MM_NUM_LUD_NAMES_TOTAL or MM_LUD_VALUES_MEM is reached. The memory defined here is subdivided into (MM_LUD_VALUES_MEM * 1024) / MM_MAX_SIZE_OF_LUD_VALUE blocks and allocated to part programs which request memory. Each part program which contains at least one definition of an LUD variable or which has call parameters uses at least one such block. It should be remembered that several part programs can be open at once and thus use memory in the NCK. The number depends on the type of programming, the program length and the size of the internal NCK block memory upwards of (MM_IPO_BUFFER_SIZE, MM_NUM_BLOCKS_IN_PREP). Related to: MD 28020: MM_NUM_LUD_NAMES_TOTAL (number of local user variables (DRAM))					
-					
-	-	50,50,50,50,50,50,50,50,50,50,50,50,50 ...	-	-	7/2
840d-2a2c	-	25,25,25,25,25,25,25,25,25,25	-	-	-/-
840d-4a1cg	-	25,25,25,25,25,25,25,25,25,25	-	-	-/-
840d-6a2c	-	25,25,25,25,25,25,25,25,25,25	-	-	-/-
840d-12a2c	-	25,25,25,25,25,25,25,25,25,25	-	-	-/-
840d-31a10c	-	25,25,25,25,25,25,25,25,25,25	-	-	-/-

28050	MM_NUM_R_PARAM			C02	S7
-	Number of channel-specific R parameters (SRAM)			DWORD	POWER ON
Defines the number of R parameters available in the channel. A maximum of 65535 R parameters are available per channel. This machine data reserves 8 bytes of buffered user memory per R parameter. R parameters have a considerably lower management overhead in comparison to LUD and GUD variables. Attention: The buffered data are lost when this machine data is changed!					
-					
-	-	100,100,100,100,100,100,100,100,100...	0	32535	7/2

28060	**MM_IPO_BUFFER_SIZE**			C02	S7
-	Number of NC blocks in IPO buffer (DRAM)			DWORD	POWER ON
Defines the number of blocks for the interpolation buffer. This buffer contains prepared NC blocks available for the interpolation. A number of kbytes of the dynamic user memory are reserved for each NC block. The data also limits the number of blocks for look ahead consideration of speed limitation for the LookAhead function. The MM_IPO_BUFFER_SIZE is set by the system. Related to: MD 28070: MM_NUM_BLOCKS_IN_PREP (number of blocks for block preparation)					
-					
-	-	10,10,10,10,10,10,10,10,10,10,10,10,10 ...	2	300	7/2

28070	**MM_NUM_BLOCKS_IN_PREP**			EXP, C02	S7
-	Number of blocks for block preparation (DRAM)			DWORD	POWER ON
Defines the number of NC blocks available for NC block preparation. This figure is determined mainly by the system software and is used largely for optimization. Approximately 10 Kbytes of dynamic memory is reserved per NC block. Related to: MD 28060: MM_IPO_BUFFER_SIZE (number of NC blocks with IPO buffer)					
-					
-	-	50,50,50,50,50,50,50,50,50,50,50,50,50 ...	20	-	7/2
840d-2a2c	-	38,38,38,38,38,38,38,38,38,38	-	-	-/-
840d-4a1cg	-	38,38,38,38,38,38,38,38,38,38	-	-	-/-
840d-6a2c	-	38,38,38,38,38,38,38,38,38,38	-	-	-/-
840d-12a2c	-	38,38,38,38,38,38,38,38,38,38	-	-	-/-
840d-31a10c	-	38,38,38,38,38,38,38,38,38,38	-	-	-/-

28080	MM_NUM_USER_FRAMES			C11, C02	S7
-	Number of settable frames (SRAM)			DWORD	POWER ON
Defines the number of predefined user frames. Approximately 400 bytes of backup memory are reserved per frame. The standard system configuration provides four frames for G54 to G57 and one frame for G500. Special cases: The backup data are lost if this machine data is altered!					
-					
-	-	5,5,5,5,5,5,5,5,5,5,5,5,5,5,5,5	5	100	7/2

28081	MM_NUM_BASE_FRAMES			C02	K2
-	Number of base frames (SRAM)			DWORD	POWER ON
Number of channel-specific base frames per channel. The value corresponds to the number of field elements for the predefined field $P_CHBFR[]. Buffered memory is reserved for this.					
-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	0	16	7/2

28082	MM_SYSTEM_FRAME_MASK			C02	K2
-	System frames (SRAM)			DWORD	POWER ON
Bit mask for configuring channel-specific system frames included in the channel. The following applies: Bit 0: System frame for setting actual value and scratching Bit 1: System frame for external work offset Bit 2: System frame for TCARR aund PAROT Bit 3: System frame for TOROT and TOFRAME Bit 4: System frame for workpiece reference points Bit 5: System frame for cycles Bit 6: System frame for transformations					
-					
-	-	0x21,0x21,0x21,0x21,0x21,0x21,0x21...	0	0x0000007F	7/2

28083	MM_SYSTEM_DATAFRAME_MASK			C02	-
-	System frames (SRAM)			DWORD	POWER ON
Bit mask for configuring channel-specific system frames in the data storage (SRAM). The following applies: Bit 0: System frame for setting actual value and scratching Bit 1: System frame for external work offset Bit 2: System frame for TCARR aund PAROT Bit 3: System frame for TOROT and TOFRAME Bit 4: System frame for workpiece reference points Bit 5: System frame for cycles Bit 6: System frame for transformations					
-					
-	-	0x1F,0x1F,0x1F,0x1F,0x1F,0x1F,0x1F...	0	0x0000007F	7/2

28085	**MM_LINK_TOA_UNIT**			C02, C09	FBW,S7
-	Assignment of a TO unit to a channel (SRAM)			DWORD	POWER ON
A TO unit is assigned to each channel through a default setting. The memory is thus reserved for the data blocks (tools, magazines). A TOA unit can also be assigned to several channels. Def.: The TOA area is the sum of all TOA and magazine blocks in the NC. The TOA unit consists of a TOA block and, with activated TM function, a magazine block. Special cases: The backup data are lost if this machine data is altered!					
-					
-	-	1,2,3,4,5,6,7,8,9,10, 11,12,13,14,15,16	1	10	7/2

28090	**MM_NUM_CC_BLOCK_ELEMENTS**			EXP, C02	S7
-	Number of block elements for compile cycles (DRAM)			DWORD	POWER ON
The input value defines the number of block elements that can be used for compile cycles. In the case of software version 2, approximately 1.2KB of dynamic memory is required per block element.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0	0	130	7/1

28100	**MM_NUM_CC_BLOCK_USER_MEM**			EXP, C02	S7
-	Size of block memory for compile cycles (DRAM), in KB			DWORD	POWER ON
The value defines the total capacity of block memory available to the user in the dynamic memory area for the compile cycles. The memory is allocated in staggered blocks of 128 bytes.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0	0	-	7/1

28105	**MM_NUM_CC_HEAP_MEM**			EXP, C02	S7
-	Heap memory in kbytes for compile-cycle applications (DRAM)			DWORD	POWER ON
Size of the heap memory in kbytes which can be used by the compile cycle user. Dynamic memory is reserved. The memory is allocated in subdivisions of 128 byte blocks. The start address and the size of the reserved memory is made available via a binding, the management lies in the hands of the CC user.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0	-	-	7/2

28150	**MM_NUM_VDIVAR_ELEMENTS**			C02	P3
-	Number of elements for writing PLC variables			DWORD	POWER ON
The MD defines the number of elements which the user has available for writing PLC variables ($A_DBx=...). This number also applies to block search, but not to synchronized actions. The memory requirement is ca. 24 bytes per element. One element is needed for each write action when writing PLC variables in quick succession. However, the number of elements can be reduced if the accessing actions are made separately (block transport has already been accomplished). Writing accesses (var=$A_DBx) are unlimited.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

28160	**MM_NUM_LINKVAR_ELEMENTS**			C02	B3
-	Number of elements for writing NCU-link variables			DWORD	POWER ON
Defines the number of elements which the user has available for programming link variables ($A_DLx). This number also applies to block search, but not to synchronized actions. The memory requirement is ca. 24 bytes per element. One element is needed for each write action when writing NCU-link variables in quick succession. However, the number of elements can be reduced if the accessing actions are made separately (block transport has already been accomplished).					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

28180	**MM_MAX_TRACE_DATAPOINTS**			EXP, C02, C06	BA,S5,FBSY
-	Length of the trace data buffer			DWORD	POWER ON
MM_MAX_TRACE_DATAPOINTS defines the size of an internal data buffer which contains the trace recordings.					
NBUP					
-	-	100,100,100,100,100,100,100,100,100...	0	20000	2/2

28200	**MM_NUM_PROTECT_AREA_CHAN**			C02, C06, C09	S7
-	Number of files for channel-specific protection zones (SRAM)			DWORD	POWER ON

```
This machine data defines how many blocks are set up for channel-specific pro-
tection zones.

Related to:
    MD 28210: MM_NUM_PROTECT_AREA_ACTIVE
   (number of simultaneously active protection zones)
    MD 18190: MM_NUM_PROTECT_AREA_NCK
   (number of files for machine-related protection zones (SRAM))

References:
   /FB/, A3, "Axis/Contour Tunnel Monitoring, Protection Zones"
```

-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10	7/2	

28210	**MM_NUM_PROTECT_AREA_ACTIVE**			C11, C02, C06, C09	S7
-	Number of simultaneously active protection zones in one channel			DWORD	POWER ON

```
This machine data defines the number of protection zones that may be acti-
vated simultaneously for each channel. No more than 10 protection zones may be
defined in the entire NC.

It is not practical to enter a numerical value higher than the setting of MD
    18190: MM_NUM_PROTECT_AREA_NCK + MD 28200: MM_NUM_PROTECT_AREA_CHAN.

Related to:
    MD 28200: MM_NUM_PROTECT_AREA_CHAN
   (Number of blocks for channel-specific protection zones)
    MD 18190: MM_NUM_PROTECT_AREA_NCK
   (Number of files for machine-related protection zones (SRAM))

References:
   /FB/, A3, "Axis Monitoring, Protection Zones"
```

-						
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10	7/2	

28212	**MM_NUM_PROTECT_AREA_CONTOUR**		C11, C02, C06, C09	-	
-	Elements for active protection zones (DRAM)		DWORD	POWER ON	
This machine data defines for each channel how many internal contour elements are held available for individual, active protection zones. Dynamic memory is used. The MD affects the memory requirements for the activated protection zones. This machine data is only active if $MC_MM_NUM_PROTECT_AREA_ACTIVE is not 0.					
-					
-	-	30,30,30,30,30,30,30,30,30,30,30,30,30 ...	0	50	7/2

28250	**MM_NUM_SYNC_ELEMENTS**		C02, -	S5,FBSY	
-	Number of elements for expressions in synchronized actions		DWORD	POWER ON	
The expressions of the motion-synchronous actions are stored in memory elements in the control. A motion-synchronous action occupies at least 4 elements. It occupies: - 1 element for each operand in the condition - >= 1 element for each action - 2 elements for each assignment - 1 element for each further operand in complex expressions. One element is ca 64 bytes. The option "Synchronous actions stage 2" is required if the MD is to be changed beyond its default value. References: Programming Guide, Advanced					
-					
-	-	159,159,159,159,159,159,159,159,159...	-	-	7/2

28252	**MM_NUM_FCTDEF_ELEMENTS**		C02	S5,FBSY	
-	Number of FCTDEF elements		DWORD	POWER ON	
Defines the number of FCTDEF elements.					
-					
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	0	100	7/2

28254	**MM_NUM_AC_PARAM**			C02	FBSY
-	Dimension of $AC_PARAM.			DWORD	POWER ON
Panel size of $AC_PARAM.					
-					
-	-	50,50,50,50,50,50,50,50,50,50,50,50 ...	0	20000	7/2

28255	**MM_BUFFERED_AC_PARAM**			C02	FBSY
-	$AC_PARAM[] is stored in SRAM.			DWORD	POWER ON
$AC_PARAM[] is stored in SRAM.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

28256	**MM_NUM_AC_MARKER**			C02	FBSY
-	Dimension of $AC_MARKER			DWORD	POWER ON
Number of channel-specific markers $AC_MARKER for motion-synchronous actions. DRAM or SRAM is required depending on $MC_MM_BUFFERED_AC_MARKER.					
-					
-	-	8,8,8,8,8,8,8,8,8,8,8,8,8,8,8,8	0	20000	7/2

28257	**MM_BUFFERED_AC_MARKER**			C02	FBSY
-	$AC_MARKER[] is stored in SRAM.			DWORD	POWER ON
$AC_MARKER[] is stored in SRAM.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	7/2

28258	**MM_NUM_AC_TIMER**			C02	S5,FBSY
-	Number of time variables $AC_TIMER (DRAM)			DWORD	POWER ON
Number of channel-specific time variables $AC_TIMER for motion-synchronous actions (DRAM)					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10000	7/2

28260	**NUM_AC_FIFO**			C01	S5,FBSY
-	Number of FIFO variable for synchronized actions			DWORD	POWER ON

```
Number of FIFO variables $AC_FIFO1 - $AC_FIFO10 for motion-synchronous
actions.
FIFO variables are used for product tracking. A piece of information (e.g. the
product length) for each part can be temporarily stored on a band in each FIFO
variable.
FIFO variables are stored in R parameters.
The MD $MC_START_AC_FIFO defines the number of the R parameter from which the
    FIFO variables can be stored.  All R parameters with lower numbers can be
    used freely in the part program.
R parameters above the FIFO range cannot be written from the part program.
The number of R parameters must set via machine data MD $MC_MM_NUM_R_PARAM so
    that all FIFI variables can be accommodated from the start of the R param-
    eters:
$MC_MM_NUM_R_PARAM=$MC_MM_START_FIFO + $MC_NUM_AC_FIFO*($MC_LEN_AC_FIFO+6)
The FIFO variables bear the names $AC_FIFO1 to $AC_FIFOn.
They are stored as fields.
The indices 0 - 5 have special meanings:
n= 0:
    A new value is stored in the FIFO when writing with index 0.
   The oldest element is read and removed from the FIFO when writing with
index 0.
n=1:  Access to the first element read in
n=2:  Access to the last element 1 read in
n=3:  Sum of all FIFO elements
n=4:  Number of elements available in the FIFO
n=5:  Current write index relative to FIFO start
n=6:  1st element read in
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	10	7/2

28262	**START_AC_FIFO**			C01	S5,FBSY
-	FIFO variables store from R parameter			DWORD	POWER ON

```
Number of the R parameter from which FIFO variables are stored. All R parame-
ters with lower numbers can be used freely in the part program. R parameters
above the FIFO range cannot be written from the part program.
The number of R parameters must set via machine data MD 28050:
    $MC_MM_NUM_R_PARAM so that all FIFI variables can be accommodated  from
    the start of the R parameters:
$MC_MM_NUM_R_PARAM=$MC_START_FIFO + $MC_NUM_AC_FIFO*($MC_LEN_AC_FIFO+6)
The FIFO variables bear the names $AC_FIFO1 to $AC_FIFOn. They are stored as
    fields.

The indices 0 - 5 have special meanings:
n= 0:
    A new value is stored in the FIFO when writing with index 0.
   The oldest element is read and removed from the FIFO  when writing with
index 0.
n=1:  Access to the first element read in
n=2:  Access to the last element read in
n=3:  Sum of all FIFO elements
n=4:  Number of elements available in the FIFO
n=5:  Current write index relative to FIFO start

Related to:
    MD 28260: NUM_AC_FIFO
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32535	7/2

28264	**LEN_AC_FIFO**			C01	S5,M5,FBSY
-	Length of FIFO variables AC_FIFO1-AC_FIFO10			DWORD	POWER ON

```
Length of the FIFO variables $AC_FIFO1 to $AC_FIFO10.
All FIFO variables are the same length.
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	32535	7/2

28266	**MODE_AC_FIFO**			C01	S5,FBSY
-	Mode of FIFO processing			BYTE	POWER ON

```
Mode of FIFO processing:
Bit 0 = 1:
   The sum of all FIFO contents is updated at each write access.
Bit 0 = 0:
    No summation

Related to:
    MD 28260: NUM_AC_FIFO
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	-	7/2

28274	**MM_NUM_AC_SYSTEM_PARAM**			EXP, C02	FBSY
-	Number of $AC_SYSTEM_ PARAM for motion-synchronous actions			DWORD	POWER ON
Number of $AC_SYSTEM_ PARAM parameters for motion-synchronous actions. Depending on $MC_MM_BUFFERED_AC_PARAM, DRAM or SRAM is required. Reserved for SIEMENS applications.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	20000	7/2

28276	**MM_NUM_AC_SYSTEM_MARKER**			EXP, C02	FBSY
-	Number of $AC_SYSTEM_MARKER for motion-synchronous actions			DWORD	POWER ON
Number of $AC_SYSTEM_MARKER markers for motion-synchronous actions. Depending on $MC_MM_BUFFERED_AC_MARKER, DRAM or SRAM is required. Reserved for SIEMENS applications.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	20000	7/2

28290	**MM_SHAPED_TOOLS_ENABLE**			C01, C08, C02	-
-	Enable tool radius compensation for contour tools			BOOLEAN	POWER ON
The function "Tool radius compensation for contour tools" is enabled with this tool. Modification of this machine data will cause a reconfiguration of the memory.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/0

28300	**MM_PROTOC_USER_ACTIVE**			C02	D1,OEM
-	Activation of logging for a user			BOOLEAN	POWER ON
Activation of recording for a user. The users 0 and 1, and 5 - 9 are reserved for system functions. The users 2, 3 and 4 can be used by OEM.					
-					
-	10	TRUE, FALSE, FALSE, FALSE, FALSE, TRUE, TRUE, FALSE, FALSE...	-	-	1/1

28301	**MM_PROTOC_NUM_ETP_OEM_TYP**			C02	D1,OEM
-	Number of OEM event types ETP.			DWORD	POWER ON
Number of OEM event types in OPI module ETP.					
-					
-	10	0, 0, 0, 0, 0, 0, 0, 0, 0, 0...	0	20	1/1

28302	**MM_PROTOC_NUM_ETP_STD_TYP**			C02	-
-	Number of standard event types ETP			DWORD	POWER ON
Number of standard event types required in the ETP OPI block.					
-					
-	10	28, 0, 0, 0, 0, 20, 20, 0, 0, 3...	0	51	1/1

28400	**MM_ABSBLOCK**			EXP, C02	S7
-	activate block display w. absolute values			DWORD	POWER ON
Value: 0 : Block display with absolute values deactivated 1 : Block display with absolute values activated; A display buffer with a size of ($MN_MM_IPO_BUFFER_SIZE + $MN_MM_NUM_BLOCKS_IN_PREP) * 256 bytes is implemented. >= 128: Block display with absolute values activated; A display buffer with a size of ($MN_MM_IPO_BUFFER_SIZE + $MN_MM_NUM_BLOCKS_IN_PREP) * <value> is implemented.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/2

28402	**MM_ABSBLOCK_BUFFER_CONF**			EXP, C02	S7
-	Setting of upload buffer size			DWORD	POWER ON
Size of upload buffer: $MC_MM_ABSBLOCK_BUFFER_CONF[0] : Number of blocks before current block $MC_MM_ABSBLOCK_BUFFER_CONF[1] : Number of blocks after current block The machine data is tested for the following upper / lower limits during star-tup: 0 <= $MC_MM_ABSBLOCK_BUFFER_CONF[0] <= 8 0 <= $MC_MM_ABSBLOCK_BUFFER_CONF[1] <= ($MC_MM_IPO_BUFFER_SIZE + $MC_MM_NUM_BLOCKS_IN_PREP) When violating the limits, alarm 4152 is issued.					
-					
-	2	0, 0,0, 0,0, 0,0, 0,0, 0,0, 0,0, 0...	-	-	7/2

28450	**MM_TOOL_DATA_CHG_BUFF_SIZE**			-, C02, C06	-
-	Buffer for tool data changes (DRAM)			DWORD	POWER ON
Number of entries in the buffer for the OPI change service for tool data. Dynamic memory is used. This buffer is created only if bit 2 or bit 3 is set in MD $MN_TOOL_DATA_CHANGE_COUNTER.					
-					
-	-	60,60,60,60,60,60,60,60,60,60,60,60 ...	0	2500	7/2

28500	**MM_PREP_TASK_STACK_SIZE**			EXP, C02	S7
-	Stack size of preparation task (DRAM)			DWORD	POWER ON
Defines the stack size in kbytes for the preparation task. The stack is stored in the dynamic memory. Note: This machine data is assigned internally by the control and must not be altered by the user.					
-					
-	-	70,70,70,70,70,70,70,70,70,70,70,70,70...	45	100	0/0

28520	**MM_MAX_AXISPOLY_PER_BLOCK**			C02	S7
-	maximal number of axial polynomials per block			DWORD	POWER ON
Maximum number of axis polynomials which can be contained in a block. In the standard case, each block only contains one polynomial per axis, i.e. this data can immediately be set to one. Currently, more polynomials are only needed for the new ADIS function with G643. In this case, this data must have a minimum value of three.					
-					
-	-	3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	1	5	7/2

28530	MM_PATH_VELO_SEGMENTS		C02		K1
-	Number of memory elements for path velocity limitation		DWORD		POWER ON

```
Number of memory elements available for limiting the path velocity and chang-
ing it in the block.
0   : Each block is limited by a maximum path velocity.
> 0 : If required, a profile of the permissible path velocity
    ; and its modification options is generated and monitored
    ; in the block.
    ; This results in a smoother axis velocity progression and
    ; a shorter travel time.
    ; $MC_MM_PATH_VELO_SEGMENTS defines the average available
    ; number of segments in the block.
    ; The necessary setting essentially depends
    ; on the requirements.

The following values are recommended:
3: for G643, if only geometry axes are traversed
5: for G643, if geometry and rotary axes are traversed
5: for COMPCAD
5: for dyn. transformation

A value that is too low this may lead to additional velocity limitations if an
    insufficient number of blocks can be made available for interpolation.
$MC_MM_PATH_VELO_SEGMENTS additionally increases the memory requirement of
dyn. Look Ahead. Values higher than 5 are only practical in exceptional cases.

3 ... 5   :
   Recommended setting.
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	100	7/2

28535	MM_FEED_PROFILE_SEGMENTS		C02		-
-	Number of memory element for feed profiles		DWORD		POWER ON

```
Number of memory elements available for feed profile per block.
The default value 1 is adequate for a programmable feed profile (FLIN, FCUB,
    FPO()).
If compile cycle applications require more segments per block, this machine
    data must be increased accordingly.
If, for example, a feed profile is to be activated in which there is decelera-
    tion at both the beginning and the end of the block, 3 segments will be
    required for the feed profile in the block, i.e. this MD must have value
    3.
```

-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	1	10	7/2

28540	MM_ARCLENGTH_SEGMENTS		C02	K1
-	Number of memory elements for arc length function representation		DWORD	POWER ON

Number of memory elements available for the arc length function for parameterizing polynomials.
If this machine data is equal to zero, a fixed interval division is used to represent the arc length function. In this case, the calculated function is only tangent-continuous. This can lead to discontinuities in the axis acceleration.
If the function G643 is used for smoothing and/or COMPCAD, this MD should be assigned a value of at least 10. In this case, the calculated function also has a constant curvature which results in a smoother progression of the path velocity as well as the axis velocities and accelerations.
Values substantially larger than 10 are only practical in exceptional cases.
Not only the value of $MC_MM_ARCLENGTH_SEGMENTS but also that of $MC_SPLINE_FEED_PRECISION are crucial for the accuracy.

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	100	7/2

28560	MM_SEARCH_RUN_RESTORE_MODE		C02	K1
-	Data restore after simulation		DWORD	POWER ON

Bit mask to restore data after abort of a simulated program execution. The following applies:
Bit 0: All frames in the data storage are restored.

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x00000001	7/2

28580	MM_ORIPATH_CONFIG		C02	-
-	Setting for ORIPATH path-relative orientation		BYTE	POWER ON

This MD is used to configure the behavior with ORIPATH, that is path-relative interpolation of the tool orientation. The following options are available:

0: The MD $MC_ORIPATH_MODE has no effect.

1: The "genuine" path-relative orientation intepolation can be activated with the MD $MC_ORIPATH_MODE = 1. The reference of the tool orientation to the path tangent and to the vector normal to the surface programmed with LEAD/TILT is retained throughout the block.

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	1	1/1

1.5 Axis-specific machine data

Number	**Identifier**			Display filters	Reference
Unit	Name			Data type	Active
Description					
Attributes					
System	Dimension	Default value	Minimum value	Maximum value	Protection

1.5.1 Configuration

30100	**CTRLOUT_SEGMENT_NR**			EXP, A01	G2
-	Setpoint assignment: bus segment number			BYTE	POWER ON
This MD is used to enter the number of the bus segment via which the output is addressed. 0: Local bus (for 802d MCPA) 1: 611D drive bus for SINUMERIK 840D/810D (1st DCM) 2: reserved (previously local P bus) 3: reserved (previously 611D bus, 2nd DCM) 4: reserved (virtual buses) 5: Profibus DP (e.g. SINUMERIK 840Di) 6: reserved (same effect as 5)					
-					
-	1	1	1	5	7/2
710-2a2c	-	5	5	5	-1/-
710-6a2c	-	5	5	5	-1/-
710-12a2c	-	5	5	5	-1/-
710-31a10c	-	5	5	5	-1/-
840di-basic	-	5	5	5	-1/-
840di-universal	-	5	5	5	-1/-
840di-plus	-	5	5	5	-1/-

30110	**CTRLOUT_MODULE_NR**			A01, A11, -	G2
-	Setpoint assignment: module number			BYTE	POWER ON
The number of the module within a bus segment through which the output is addressed must be entered in the MD. - For axes with 611D, the logical drive number (see MD 13010: DRIVE_LOGIC_NR[n]) must be entered here - For axes on the PROFIBUS, the number of the drive assigned with MD DRIVE_LOGIC_ADDRESS must be entered here (CTRLOUT_MODULE_NR=n consequently points to DRIVE_LOGIC_ADDRESS[n])					
-					
-	1	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18...	1	31	7/2

30120	**CTRLOUT_NR**			EXP, A01	G2
-	Setpoint assignment: Setpoint output on drive submodule/module			BYTE	POWER ON
Number of the output on a module, through which the setpoint output is addressed. In SIMODRIVE 611D the value is always 1.					
-					
-	1	1	1	3	2/2

30130	**CTRLOUT_TYPE**			A01, A11	G2,S6
-	Output type of setpoint			BYTE	POWER ON
The type of setpoint output is entered into the MD: 0: Simulation (no hardware required) 1: Standard (distinguished via hardware configuration) 2: reserved (previously stepper motor) 3: reserved (previously stepper motor) 4: reserved (previously virtual axis (up to SW 3), simulation, no hardware available For SW 4 and higher, MD 30132 IS_VIRTUAL_AX must now be used instead of value 4.					
-					
-	1	0	0	3	7/2

30132	**IS_VIRTUAL_AX**			A01	M3
-	Axis is a virtual axis			BOOLEAN	POWER ON
Virtual axis. An axis that is also interpolated in the follow-up mode. (electronic transfer technology; virtual and real master value) This MD is the successor of MD 30130: CTRLOUT_TYPE=4. Instead of MD 30130: CTRLOUT_TYPE=4, MD 30130: CTRLOUT_TYPE=0 and IS_VIRTUAL_AX=1 are to be used. Related to: MD 30130: CTRLOUT_TYPE					
CTEQ					
-	1	FALSE	-	-	7/2

30134	**IS_UNIPOLAR_OUTPUT**			A01	G2
-	Setpoint output is unipolar			BYTE	POWER ON
Unipolar output driver (for unipolar analog drive actuator): Only positive set speeds are supplied to the drive, the sign of the set speed is separately output in its own digital control signal. Input value "0": Bipolar output with pos./neg. set speed (this is the normal case) Input value "1": 0. Digital bit = servo enable 1. Digital bit = neg. direction of travel Input value "2": (linking of enable and direction of travel signals): 0. Digital bit = servo enable pos. direction of travel 1. Digital bit = servo enable neg. direction of travel					
-					
-	1	0	0	2	7/2

30200	**NUM_ENCS**			A01, A02, -	G2
-	Number of encoders			BYTE	POWER ON
The number of encoders of the axis or spindle is to be entered in the MD for actual position value sensing (the differentiation of direct/indirect measuring system, i.e. the installation location of these encoders, is then specified, for example, via MD 31040: ENC_IS_DIRECT) For simulation axes/spindles, NUM_ENCS > 0 must be specified for referencing.					
-					
-	-	1	0	2	7/2

30210	**ENC_SEGMENT_NR**			EXP, A01, A02	G2
-	Actual value assignment: bus segment number.			BYTE	POWER ON
Number of the bus segment, through which the encoder is addressed. The bus segments are assigned to control systems SINUMERIK FM-NC or SINUMERIK 840/810D. The bus segments are assigned to the control systems. 0: reserved (previously local bus) 1: 611D drive bus for SINUMERIK 840D/810D (1st DCM) 2: reserved (previously local P bus) 3: reserved (previously 611D bus, 2nd DCM) 4: reserved (virtual busses) 5: PROFIBUS DP (for example SINUMERIK 840Di) 6: reserved (same effect as 5) Index [n] has the following coding [Encodernr.]: 0 or 1					
-					
-	2	1, 1	1	5	7/2
710-2a2c	-	5, 5	5	5	-1/-
710-6a2c	-	5, 5	5	5	-1/-
710-12a2c	-	5, 5	5	5	-1/-
710-31a10c	-	5, 5	5	5	-1/-
840di-basic	-	5, 5	5	5	-1/-
840di-universal	-	5, 5	5	5	-1/-
840di-plus	-	5, 5	5	5	-1/-

30220	**ENC_MODULE_NR**			A01, A02, A11	G2
-	Actual value assignment: Drive number/measuring circuit number			BYTE	POWER ON
Number of the module within a bus segment (MD: ENC_SEGMENT_NR[n]), through which the encoder is addressed. - For axes with 611D, the logical drive number (see MD: DRIVE_LOGIC_NR[n]) must be entered here. - For axes on the PROFIBUS, the number of the drive assigned via MD: DRIVE_LOGIC_ADDRESS must be entered here (ENC_MODULE_NR=n points to DRIVE_LOGIC_ADDRESS[n]) The index[n] of the machine data has the following coding: [Encodernr.]: 0 or 1 Related to: MD: CTRLOUT_MODULE_NR[n] (setpoint assignment: drive number/module number)					
-					
-	2	1, 1,2, 2,3, 3,4, 4,5, 5,6, 6,7, 7...	1	31	7/2

30230	**ENC_INPUT_NR**			A01, A02, A11, -	G2
-	Actual value assignm.: Input on drive module/meas. circuit board			BYTE	POWER ON
Number of the input on a module through which the encoder is addressed. This determines through which input the actual position value is sensed: for example with SIMODRIVE 611D = 1 or 2. The index[n] of the machine data has the following coding: [Encodernr.]: 0 or 1 If an input is selected, to which no encoder is connected, alarm 300008 "Measuring circuit not available on drive" is output. (Only applies for SINUMERIK 840D/810D).					
-					
-	2	1, 2	1	3	7/2

30240	**ENC_TYPE**			A01, A02, A11, -	G2,R1
-	Encoder type of actual value sensing (actual position value).			BYTE	POWER ON

```
Encoder type:
0: Simulation
1: Raw signal generator (high resolution)
2: Rectangular signal encoder (quadruplication of the pulse number per revolu-
tion)
3: reserved (previously encoder for stepper motor)
4: General absolute encoder in general (e.g. with EnDat interface)
5: Special absolute encoder with SSI interface

Related to:
   SIMODRIVE-611D drive MD:
      1011ACTUAL_VALUE_CONFIG, bit 3
      1030 ACTUAL_VALUE_CONFIG_DIRECT, bit 3
```

-					
-	2	0, 0	0	5	7/2

30242	**ENC_IS_INDEPENDENT**			A02, A11, -	G2
-	Encoder is independent			BYTE	NEW CONF

```
If actual value corrections performed by the NC on the encoder selected for
    position control are not to influence the actual value of any other
    encoder defined in the same axis, then the position control encoder must
    be declared to be "independent".
Actual value corrections include the following:
- Modulo treatment,
- Reference point approach,
- Measuring system calibration,
- PRESET
Example:
$MA_NUM_ENCS[ AX1 ] = 2
$MA_ENC_IS_INDEPENDENT[ 0, AX1 ] = 0
$MA_ENC_IS_INDEPENDENT[ 1, AX1 ] = 1
When the VDI interface has selected the first encoder for position control,
the above mentioned actual value corrections will be executed on this encoder
only.
When the VDI interface has selected the second encoder for position control,
the above mentioned actual value corrections will be executed on both encod-
ers.
The machine data is therefore only valid for encoders that have not been
    selected by the VDI interface for positon control (passive encoders)!

For SW5 and higher, the scope of functions has been extended:
ENC_IS_INDEPENDENT = 2
The passive encoder is dependent. The active encoder changes the actual
    encoder value. In combination with MD35102 REFP_SYNC_ENCS = 1, the pas-
    sive encoder is adjusted to the active encoder during reference point
    approach, but is NOT referenced.
In reference mode MD34200 ENC_REFP_MODE = 3 (distance-coded reference marks),
    the passive encoder is automatically referenced with the next traversing
    movement after zero mark distance overtravel. This is done independently
    of the current mode setting.
ENC_IS_INDEPENDENT = 3
In contrast to ENC_IS_INDEPENDENT = 1, modulo actual value corrections are
    executed in the passive encoder of modulo rotary axes.
```

-					
-	2	0, 0	0	3	7/2

30244	**ENC_MEAS_TYPE**			A01, A02, A11	-
-	Encoder measurement type			BYTE	POWER ON

```
In combination with the NCK MD MEAS_TYPE=1 (decentralized measurement), this
    MD can be used to set the type of the axial measuring function for drives.

Encoder measurement type:
0: Encoder measurement type central (global) measurement
1: Encoder measurement type decentral (local) measurement

MEAS_TYPE    ENC_MEAS_TYPE      Measuring sensor input used
   0               0                          central
   0               1                          central
   1               0                          central
   1               1                          decentralized
```

-					
-	2	1, 1	0	1	7/2
840d-2a2c	-	-	-	-	0/0
840d-6a2c	-	-	-	-	0/0
840d-12a2c	-	-	-	-	0/0
840d-31a10c	-	-	-	-	0/0

30250	**ACT_POS_ABS**			EXP, A02, A08	R1
-	Internal encoder position			DOUBLE	POWER ON

```
In this MD, the actual position (mere hardware counter status without machine
    reference) is stored (in internal format display).
At power ON (or activated encoder) it functions with:

- Absolute encoders:
   for restoring the current position (in combination with the position (pos-
sibly with several meanings) buffered in the encoder).
- Incremental encoders:
   for actual value buffering via power OFF when the functionality is acti-
vated     MD 34210: ENC_REFP_STATE > 0 (i.e. as reference point replacement).

Note:
   This MD is changed control-internal during traversing movements. Loading an
MD data block that was saved earlier, can therefore destroy the encoder cali-
bration of absolute encoders.
    We recommend for software conversions to remove the MD data block in the
    old software release prior to conversion and to reload it to the new soft-
    ware release without moving any axis in between. Protection level 1 should
    be set for SW 3.6; for SW 4 and higher, protection level 2 will suffice.
    The encoder calibration must be explicitely verified (controlled, cali-
    brated) after software conversion.
```

ODLD, -, -					
-	2	0.0, 0.0	-	-	7/2

30260	**ABS_INC_RATIO**			EXP, A01, A02	R1
-	Absolute encoder: Ratio of absolute to incremental resolution			DWORD	POWER ON

```
Absolute track in relation to the incremental signal.
This MD only applies for absolute encoders:

a. SIMODRIVE 611D drives:
   With plausible 611D parameters (for example values unequal 0 of 611D and
ratio of integral multiple of "4"), the value of this MD in combination with
SIMODRIVE 611D is automatically calculated and updated from 611D parameters
(1005/1022 or 1007/1032; if the 611D values are plausible).
   Unplausible input values in the current MD are reset to default value "4".
In addition, alarm 26002 is output in order to inform the user.

b. PROFIBUS drives:
   Absolute information XIST2 related to incremental information XIST1.
   With plausible drive parameters (e.g. for SIMODRIVE 611U: P1042/P1043 or
P1044/P1045) the value of this MD is automatically calculated and updated from
drive parameters (if parameter read-out has not been deactivated by
$MN_DRIVE_FUNCTION_MASK, bit2.

Unplausible drive parameters (e.g. multiplication of absolute track higher
than that of the incremental signal) are rejected and replaced by the value
entered in the current MD.
Unplausible input values in the current MD (e.g. value=0) are reset to the
default value. In addition, alarm 26025 or 26002 is output in order to inform
the user.
```

-					
-	2	4, 4	-	-	7/2

30270	**ENC_ABS_BUFFERING**			EXP, A01, A02	FBA,R1
-	Absolute encoder: Traversing range extension			BYTE	POWER ON

This MD defines in which way the absolute encoder position is buffered, and whether a traversing range extension is active on software side (exceeding the limits of the absolute value encoder area that can be displayed on the hardware).

"0" = standard = traversing range extension (comp. ACT_POS_ABS) is active.
"1" = traversing range extension on software side is inactive.
When using an absolute linear scale, there will not be a traversing range overflow for mechanical reasons. This MD is therefore only valid for rotary absolute value encoders.
For rotary absolute value encoders, the traversing range that can be clearly displayed on encoder side, is stored in ENC_ABS_TURNS_MODULO. You can do without a traversing range extension without any problems (a hardware counter overflow that might be within the traversing range, is concealed in the software via shortest-path decision):

a. in linear axes or limited rotary axes, if the actual traversing range on load side is smaller than the traversing range on load side that corresponds to ENC_ABS_TURNS_MODULO.

b. in endlessly turning rotary axes (ROT_IS_MODULO = TRUE), if the absolute encoder is connected on load side (no gear to be considered) or if "without remainder" can be calculated:

Number of rotations on load side = ENC_ABS_TURNS_MODULO * gear ratio

(Example: ENC_ABS_TURNS_MODULO = 4096 encoder rotations, gear 25:32, i.e. number of rotations on load side = 4096*(25/32)=3200).
Notice:
If you do not meet the conditions under a. or b., you run the risk of getting a wrong absolute encoder position at next Power ON or encoder activation after parking without prewarning, in case the traversing range extension is not working. Therefore, the traversing range extension remains active in the standard version.

Related to:
$MA_ENC_TYPE
$MA_IS_ROT_AX
$MA_ROT_IS_MODULO
$MA_ACT_POS_ABS
$MA_ENC_ABS_TURNS_MODULO
$MA_REFP_MOVE_DIST_CORR

-					
-	2	0, 0	0	1	7/2

30300	**IS_ROT_AX**			A01, A06, A11, -	R2
-	Rotary axis / spindle			BOOLEAN	POWER ON

```
1: Axis: The axis is defined as a "rotary axis".
- The special functions of the rotary axis are active or can be activated by
    means of additional machine data according to the type of machine required
    (see below).
- The unit of measurement is degrees.
- The units of the axis-specific machine and setting data are interpreted as
    follows with the standard control setting:
    - Positions   in "degrees"
    - Velocitiesin "rev/minute"
    - Accelerationin "rev/second²"
    - Jerk limitationin "rev/second³"

Spindle:
   The machine data should always be set to "1" for a spindle, otherwise alarm
4210 "Rotary axis declaration missing" is output.

0: The axis is defined as a "linear axis".

Special cases:
   For axis: Alarm 4200 if the axis is already defined as a geometry axis.
   For spindle: Alarm 4210

Related to:
   The following machine data are active only after activation of MD:
IS_ROT_AX = "1":
    - MD: ROT_IS_MODULO"Modulo conversion for rotary axis"
    - MD: DISPLAY_IS_MODULO"Position display is modulo"
    - MD: INT_INCR_PER_DEG"Calculation precision for angular positions"
```

SCAL, CTEQ					
-	-	FALSE	-	-	7/2

30310	**ROT_IS_MODULO**			A01, A06, A11, -	R2
-	Modulo conversion for rotary axis / spindle			BOOLEAN	POWER ON

```
1: A modulo conversion is performed on the setpoints for the rotary axis. The
software limit switches and the working area limitations are inactive; the
traversing range is therefore unlimited in both directions. MD: IS_ROT_AX must
be set to "1"

0: No modulo conversion

MD irrelevant for:
   MD: IS_ROT_AX = "0" (linear axes)

Related to:
   MD: DISPLAY_IS_MODULO
   "Position display is modulo 360°"
   MD: IS_ROT_AX  = 1
   "Rotary axis"
   MD: POS_LIMIT_MINUS
   "Software limit switch minus"
   MD: POS_LIMIT_PLUS
   "Software limit switch plus"
   SD: WORKAREA_LIMIT_MINUS
   "Working area limitation minus"
   SD: WORKAREA_LIMIT_PLUS
   "Working area limitation plus"
```

CTEQ					
-	-	FALSE	-	-	7/2

30320	**DISPLAY_IS_MODULO**			A01, A06, A11	R2
-	Modulo 360 degrees displayed for rotary axis or spindle.			BOOLEAN	POWER ON

```
1: "Modulo 360° " position display is active:
   The position display of the rotary axis or spindle (for basic or machine
coordinate system) is defined as "Modulo 360° ". In the case of a positive
direction of rotation, the control resets the position display internally to
0.000° following each cycle of 359.999°. The display range is always positive
and always between 0° and 359.999°.
0: Absolute position display is active:
    In contrast to the modulo 360° display method, absolute positions are
    indicated by the absolute position display, e.g. +360° after 1 rotation
    and +720° after 2 rotations, etc. In this case, the display range is lim-
    ited by the control in accordance with the linear axes.

MD irrelevant for:
   Linear axes MD: IS_ROT_AX = "0"

Related to:
   MD: IS_ROT_AX = 1 "Axis is rotary axis"
```

CTEQ					
-	-	FALSE	-	-	7/2

30330	MODULO_RANGE			EXP, A01, -	R2
degrees	Size of modulo range.			DOUBLE	RESET
Defines the size of the modulo range. Default positions are accepted and displayed within this range. Useful modulo ranges are n * 360 degrees with n element N. Other settings are equally possible in principle. Attention should be paid to having a useful relationship between the positions in the NC and the mechanics (ambiguity). Velocity definitions are not affected by settings in this MD.					
CTEQ					
-	-	360.0	1.0	360000000.0	7/2

30340	MODULO_RANGE_START			EXP, A01	R2
degrees	Modulo range start position			DOUBLE	RESET
Defines the start position for the modulo range. Example: Start = 0 degree -> modulo range 0 <->360 degrees Start = 180 degrees -> modulo range 180 <->540 degrees Start = -180 degrees -> modulo range -180 <->180 degrees					
CTEQ					
-	-	0.0	-	-	7/2

30350	SIMU_AX_VDI_OUTPUT			A01, A06	G2
-	Axis signals output for simulation axis			BOOLEAN	POWER ON
This machine data defines whether axis-specific interface signals are output to the PLC during simulation of an axis. 1: The axis-specific interface signals of a simulated axis are output to the PLC. In this way the user PLC program can be tested without the drives. 0: The axis-specific interface signals of a simulated axis are not output to the PLC. All axis-specific interface signals are set to "0". MD irrelevant for: MD 30130: CTRLOUT_TYPE (output type of setpoint value) = 1					
CTEQ					
-	-	FALSE	-	-	7/2

30450	IS_CONCURRENT_POS_AX			EXP, A01	P2
-	Default for reset: neutral/channel axis			BOOLEAN	RESET
For SW4.3 (not FM-NC) and higher: If FALSE: On RESET, a neutral axis is reassigned to the NC program. If TRUE: On RESET, a neutral axis remains in the neutral axis state and an axis assigned to the NC program becomes a neutral axis					
CTEQ					
-	-	FALSE	-	-	7/2

30455	MISC_FUNCTION_MASK	A06, A10	R2
-	Axis functions	DWORD	RESET

```
Bit 0 =0:
    Modulo rotary axis/spindle: Programmed positions must lie within the mod-
    ulo range. Otherwise, an alarm is issued.
Bit 0 =1:
    When positions outside the modulo range are programmed, no alarm is
    issued. The position will be modulo-converted internally.
    Example: B-5 is equivalent to B355, POS[A]=730 is identical to POS[A]=10
    and SPOS=-360 behaves the same as SPOS=0 (modulo range 360 degrees)

Bit 1 =0:
    Determination of reference point position of rotary, distance-coded encod-
    ers analogously (1:1) to the mechanical absolute position.
Bit 1 =1:
    Determination of reference point position of rotary, distance-coded encod-
    ers within the configured modulo range.
    For rotary axes with $MA_ROT_IS_MODULO=0 using rotary, distance-coded
    encoders $MA_ENC_REFP_MODE=3 the reference point position is determined
    depending on$MA_MODULO_RANGE and $MA_MODULO_RANGE_START. It is automati-
    cally adapted to the motion limits of the modulo range. This bit is irrel-
    evant for rotary axes with $MA_ROT_IS_MODULO=1, since the reference point
    position is always determined within the modulo range.

Bit 2 =0:
    Modulo rotary axis positioned at G90 with AC by default
Bit 2 =1:
    Modulo rotary axis positioned at G90 with DC by default (shortest path)

Bit 3 =0:
    With spindle/axis disable, $VA_IM,$VA_IM1,$VA_IM2 supply the setpoint
    value
Bit 3 =1:
    With spindle/axis disable, $VA_IM,$VA_IM1,$VA_IM2 supply the actual value

Bit 4 =0:
    Synchronous spindle link, following spindle: Cancelation of feedrate
    enable will decelerate link grouping.
Bit 4 =1:
    Following spindle: Feedrate enable only refers to the interpolation share
    of the overlaid motion (SPOS,..) and has no impact on the link.

Bit 5 =1:
    Synchronous spindle link: The parameters of the following spindle are set
    as in the unlinked case.
```

Bit 6 =0: The programming of FA, OVRA, ACC and VELOLIMA acts separately for spindle and axis mode. The assignment is made by the programmed axis or spindle identifier. Bit 6 =1: The programming of FA, OVRA, ACC and VELOLIMA acts in concert for spindle and axis mode irrespective of the programmed identifier. Bit 7 == 0: Synchronous spindle, correct synchronism error: The correction value $AA_COUP_CORR[Sn] is continuously calculated as long as the VDI interface signal DB31..,DBX31.6 'Correct synchronism' is set and setpoint-related synchronism is present. Bit 7 == 1: Synchronous spindle, correct synchronism error: The correction value $AA_COUP_CORR[Sn] is calculated only at the moment the VDI interface signal DB31..,DBX31.6 'Correct synchronism' is set from 0 to 1.					
CTEQ					
-	-	0x00	0	0x80	7/2

30460	**BASE_FUNCTION_MASK**	A01	-
-	Axis functions	DWORD	POWER ON

Axis-specific functions can be set by means of this MD.

The MD is bit-coded; the following bits are assigned:
Bit 0 == 0:
"Axis control" is not permissible
Bit 0 == 1:
"Axis control" is permissible (the axis moves in the speed mode, if the VDI signal "Axis control" is set)
Bit 1:
reserved for "Axis control"
Bit 2 == 0:
Axis-specific diameter programming not permitted"
Bit 2 == 1:
Axis-specific diameter programming permitted"
Bit 3:
reserved for "Axis control"
Bit 4 == 0:
For control purposes, the axis can be used by NC and PLC.
Bit 4 == 1:
The axis is exclusively controlled by the PLC.
Bit 5 == 0:
The axis can be used by the NC and PLC.
Bit 5 == 1:
The axis is a permanently assigned PLC axis. However, the axis can be jogged and referenced.
Axis exchange between channels is not possible. The axis cannot be assigned to the NC program.

CTEQ					
-	-	0x00	0	0xFF	7/2

30465	**AXIS_LANG_SUB_MASK**		N01	-	
-	Substitution of NC language commands		DWORD	POWER ON	

```
$MA_AXIS_LANG_SUB_MASK defines for the leading spindle(s) of a coupling (syn-
chronous spindle coupling, ELG, tangential tracking, coupled motion, master
value coupling, master/slave) which language constructs/functions are to be
substituted by the user program set by $MN_LANG_SUB_NAME / $MN_LANG_SUB_PATH
(default: /_N_CMA_DIR/_N_LANG_SUB_SPF).
The substitution is executed only if a coupling is active for the relevant
    spindle and in the case of a gear stage change only if a gear stage change
    is actually pending.

Bit 0 = 1:
   Automatic (M40) and direct (M41-M45) gear stage change
Bit 1 = 1:
   Spindle positioning with SPOS/SPOSA/M19
```

-					
-	-	0	0	3	7/2

30500	**INDEX_AX_ASSIGN_POS_TAB**		A01, A10	T1	
-	Axis is an indexing axis		BYTE	RESET	

```
The axis is declared as an indexing axis by assignment of indexing position
    table 1 or 2.
 0: The axis is not declared as an indexing axis
 1: The axis is an indexing axis. The associated indexing positions are stored
    in table 1 (MD: INDEX_AX_POS_TAB_1).
 2: The axis is an indexing axis. The associated indexing positions are stored
    in table 2 (MD: INDEX_AX_POS_TAB_2).
 3: Equidistant indexing with SW 4.3 and higher (840D) and SW 2.3 and higher
    (810D)
>3:Alarm 17090 "Value violates upper limit"

Special cases:
   Several axes can be assigned to an indexing position table on the condi-
tion that all the axes are of the same type (linear axis, rotary axis, modulo
360° function). If they are not, alarm 4000 is output during power-up.
   Alarm 17500 "Axis is not an indexing axis"
   Alarm 17090 "Value violates upper limit"

Related to:
   MD: INDEX_AX_POS_TAB1 (indexing position table 1)
   MD: INDEX_AX_LENGTH_POS_TAB_1
   (no. of indexing positions used in table 1)
   MD: INDEX_AX_POS_TAB2 (indexing position table 2)
   MD: INDEX_AX_LENGTH_POS_TAB_2
   (no. of indexing positions used in table 2)
   For equidistant indexings with value 3:
   MD: INDEX_AX_NUMERATOR  Numerator
   MD: INDEX_AX_DENOMINATOR Denominator
   MD: INDEX_AX_OFFSET First indexing position
   MD: HIRTH_IS_ACTIVE    Hirth tooth system
```

-					
-	-	0	0	3	7/2

30501	**INDEX_AX_NUMERATOR**			A01, A10	T1
mm, degrees	Indexing axis equidistant positions numerator			DOUBLE	RESET
Defines the value of the numerator for calculating the distances between two indexing positions when the positions are equidistant. Modulo axes ignore this value and use $MA_MODULO_RANGE instead. MD irrelevant for non-equidistant indexes in accordance with tables. Related to: MD 30502: INDEX_AX_DENOMINATOR, MD 30503: INDEX_AX_OFFSET; MD 30500: INDEX_AX_ASSIGN_POS_TAB					
-					
-	-	0.0	-	-	7/2

30502	**INDEX_AX_DENOMINATOR**			A01, A10	T1
-	Indexing axis equidistant positions denominator			DWORD	RESET
Defines the value of the denominator for calculating the distances between two indexing positions when the positions are equidistant. For modulo axes it therefore specifies the number of indexing positions. MD irrelevant for non-equidistant indexes in accordance with tables. Related to: MD 30501: INDEX_AX_NUMERATOR MD 30503: INDEX_AX_OFFSET MD 30500: INDEX_AX_ASSIGN_POS_TAB					
-					
-	-	1	1	-	7/2

30503	**INDEX_AX_OFFSET**			A01, A10	T1
mm, degrees	Indexing axis with equidistant positions first index position			DOUBLE	RESET
Defines the position of the first indexing position from zero for an indexing axis with equidistant positions. MD irrelevant for non-equidistant indexes in accordance with tables. Related to: MD 30501, 30502, 30500					
-					
-	-	0.0	-	-	7/2

30505	**HIRTH_IS_ACTIVE**			A01, A10	T1
-	Axis is an indexing axis with Hirth tooth system			BOOLEAN	RESET
Hirth tooth system is active when value 1 is set. MD irrelevant is axis is not the indexing axis. Related to: MD 30500, 30501, 30502, 30503					
CTEQ					
-	-	FALSE	-	-	7/2

30550	AXCONF_ASSIGN_MASTER_CHAN			A01, A06, A10	K5
-	Initial setting of channel for change of axis			BYTE	POWER ON
Definition of the channel to which the axis is assigned after Power ON. Related to: MD: AXCONF_MACHAX_USED					
-					
-	-	0	0	10	7/2

30552	AUTO_GET_TYPE			EXP, A06, A10	S1,K5
-	Automatic GET for get axis			BYTE	POWER ON
0 = No automatically created GET -> Alarm in response to incorrect programming. 1 = GET is output when GET is generated automatically. 2 = GETD is output when GET is generated automatically.					
-					
-	-	1	0	2	7/2

30554	AXCONF_ASSIGN_MASTER_NCU			A01, A06, A10	B3
-	Initial setting which NCU creates setpoints for the axis			BYTE	POWER ON
This machine data is evaluated only if the NCU is linked with other NCUs via the NCU link communication. Assignment of master NCU: If a machine axis is activated via $MC_AXCONF_LOGIC_MACHAX_TAB in several NCUs in an NCU cluster, then a MASTER NCU must be assigned to it. This NCU takes over the setpoint creation for the axis after the runup. For axes which are only activated in one NCU, the number of this NCU or 0 must be entered. Other entries initiate a runup interrupt.					
-					
-	-	0	0	16	7/2

30560	IS_LOCAL_LINK_AXIS			EXP, A01	B3
-	Axis is a local link axis			BOOLEAN	POWER ON
An axis for which this MD is set to 1 is not addressed by the local NCU at runup. The associated drive is put into operation. The axis is traversed by another NCU. The evaluation is made only if link communication exists. Not relevant for: Systems without link modules Related to: MM_NCU_LINK_MASK					
-					
-	-	FALSE	-	-	7/2

30600	**FIX_POINT_POS**			A03, A10	K1
mm, degrees	Fixed-value positions of axis with G75			DOUBLE	POWER ON
The fixed-point positions (max. 2) for each axis which can be approached when G75 is programmed are entered in these machine data. References: /PA/, "Programming Guide: Fundamentals"					
-					
-	2	0.0, 0.0	-	-	7/2

30800	**WORKAREA_CHECK_TYPE**			-	A2
-	Type of check of working area limitations.			BOOLEAN	NEW CONF
With this machine data you can specify whether only the working area limitations of traversing axes are to be checked (0) or whether the stationary axes in a traversing block are also to be checked (1). The value 0 corresponds to the behavior up to SW5.					
CTEQ					
-	-	FALSE	-	-	7/2

1.5.2 Encoder matching

31000	**ENC_IS_LINEAR**			A02, A11, -	G2
-	Linear scale			BOOLEAN	POWER ON
MD = 1: Encoder for position actual-value acquisition is linear (linear scale). MD = 0: Encoder for position actual-value acquisition is rotary. The index [n] of the machine data has the following coding: [encoder no.]: 0 or 1					
-					
-	2	FALSE, FALSE	-	-	7/2

31010	**ENC_GRID_POINT_DIST**			A02, A11, -	G2
mm	Division period for linear scales			DOUBLE	POWER ON
The distance between the reference marks on the linear scale is entered in this MD. The index [n] of the machine data has the following coding: [encoder no.]: 0 or 1					
-					
-	2	0.01, 0.01	-	-	7/2

31020	ENC_RESOL			A02, A11, -	G2
-	Encoder lines per revolution			DWORD	POWER ON
The number of encoder lines per encoder revolution are entered in this MD. The index [n] of the machine data has the following coding: [encoder no.]: 0 or 1					
-					
-	2	2048, 2048	-	-	7/2

31025	ENC_PULSE_MULT			EXP, A01, A02	K4
-	Encoder multiplication (high-resolution)			DWORD	POWER ON
This MD describes the measuring system multiplication on PROFIBUS. The standard value 2048 means: Changing by just one encoder line can be seen in bit11 of the actual PROFIBUS value XIST1, that is, the actual encoder value is multiplied by 2 to the power of 11= 2048.					
-					
-	2	2048, 2048	-	-	7/2

31030	LEADSCREW_PITCH			A02, A11, -	G2
mm	Pitch of leadscrew			DOUBLE	POWER ON
The ball screw lead must be entered in the MD (see data sheet: mm/rev or inch/rev). Special meaning for hydraulic linear drives: If a hydraulic linear drive (HLA) is configured as rotary axis, it must be specified in this MD, which drive feedrate in mm corresponds to a programmed revolution (360 degrees).					
-					
-	-	10.0	-	-	7/2

31040	ENC_IS_DIRECT			A02, A11, -	G2
-	Direct measuring system (no compilation to load position)			BOOLEAN	POWER ON
MD = 1: Encoder for actual position value sensing is attached directly (without intermediate gear unit) to the machine. MD = 0: Encoder for actual position value sensing is attached to the motor (MD: DRIVE_AX_RATIO_NUMERA and DRIVE_AX_RATIO_DENOM are included in encoder valuation). The index[n] of the machine data has the following coding: [encoder no.]: 0 or 1 Special cases: Incorrect entry may cause faulty encoder resolution, as, for example, incorrect gear ratios are then calculated.					
-					
-	2	FALSE, FALSE	-	-	7/2

31044	**ENC_IS_DIRECT2**			A02, -	-
-	Encoder mounted on the additional gearbox			BOOLEAN	NEW CONF
When using a load intermediate gearbox (for example for rotating tools, compare $MA_DRIVE_AX_RATIO2_NUMERA and $MA_DRIVE_AX_RATIO2_DENOM), the encoder installation location can be defined "on the output" of this load intermediate gearbox: Encoder installation "on the output of the load intermediate gearbox" is configured by $MA_ENC_IS_DIRECT=1 and $MA_ENC_IS_DIRECT2=1 at the same time. Encoder installation "on the input of the load intermediate gearbox" is configured by $MA_ENC_IS_DIRECT=1 together with $MA_ENC_IS_DIRECT2=0. A parameterization alarm will be output, if $MA_ENC_IS_DIRECT2=1 is set without $MA_ENC_IS_DIRECT=1 (this combination has not been defined).					
-					
-	2	FALSE, FALSE	-	-	7/2

31050	**DRIVE_AX_RATIO_DENOM**			A02, A11, -	G2
-	Denominator load gearbox			DWORD	POWER ON
The load gearbox denominator is entered in this MD. The index [n] of the machine data has the following coding: [control parameter set no.]: 0-5					
-					
-	6	1, 1, 1, 1, 1, 1	1	2147000000	7/2

31060	**DRIVE_AX_RATIO_NUMERA**			A02, A11, -	G2
-	Numerator load gearbox			DWORD	POWER ON
The load gearbox numerator is entered in this MD. The index [n] of the machine data has the following coding: [control parameter set no.]: 0-5					
-					
-	6	1, 1, 1, 1, 1, 1	-2147000000	2147000000	7/2

31064	**DRIVE_AX_RATIO2_DENOM**			A02, -	-
-	Denominator additional gearbox			DWORD	NEW CONF
Intermediate gearbox denominator The MD together with $MA_DRIVE_AX_RATIO2_NUMERA defines an intermediate gearbox that acts as multiplier to the motor/load gearbox (described by $MA_DRIVE_AX_RATIO_NUMERA and $MA_DRIVE_AX_RATIO_DENOM). The load intermediate gearbox is inactive with default values 1:1. Please consider $MA_ENC_IS_DIRECT2 for encoder installation. When functionality Safety Integrated (see $MA_SAFE_FUNCTION_ENABLE) is active, the intermediate gearbox can be used, if - the effectively active gear ratio from the motor to the tool is considered in the safety-relevant machine data and if - the safety-relevant secondary conditions are considered the gear ratios. For more detailed information see the Safety Integrated Description of Functions.					
-					
-	-	1	1	2147000000	7/2

31066	**DRIVE_AX_RATIO2_NUMERA**			A02, -	-
-	Numerator additional gearbox			DWORD	NEW CONF
Intermediate gearbox numerator Related to: MD 31064					
-					
-	-	1	-2147000000	2147000000	7/2

31070	**DRIVE_ENC_RATIO_DENOM**			A02, A11, -	G2
-	Denominator measuring gearbox			DWORD	POWER ON
The measuring gearbox denominator is entered in this MD. The index [n] of the machine data has the following coding: [encoder no.]: 0 or 1					
-					
-	2	1, 1	1	2147000000	7/2

31080	**DRIVE_ENC_RATIO_NUMERA**			A02, A11, -	G2
-	Numerator measuring gearbox			DWORD	POWER ON
The measuring gearbox numerator is entered in this MD. The index [n] of the machine data has the following coding: [encoder no.]: 0 or 1					
-					
-	2	1, 1	1	2147000000	7/2

31090	**JOG_INCR_WEIGHT**			A01, A12	H1,G2
mm, degrees	Evaluation of an increment with INC/handwheel			DOUBLE	RESET
The path of an increment which applies when an axis is traversed with the JOG keys in incremental mode or with the handwheel is defined in this MD. The path covered by the axis on each increment each time the traversing key is pressed or for each handwheel position is defined by the following parameters: - MD: JOG_INCR_WEIGHT (weighting of an increment of a machine axis for INC/handwheel) - Selected increment size (INC1, ..., INCvar) The possible increment stages are defined globally for all axes in the MD: JOG_INCR_SIZE_TAB [n] and in SD: JOG_VAR_INCR_SIZE. Entering a negative value reverses the direction of the traverse keys and the handwheel rotation. Related to: MD: JOG_INCR_SIZE_TAB SD: JOG_VAR_INCR_SIZE					
CTEQ					
-	2	0.001, 0.00254	-	-	7/2

31122	**BERO_DELAY_TIME_PLUS**			A02, A06	S1
s	BERO delay time Plus			DOUBLE	NEW CONF
The machine data in combination with the setting in MD 34200: ENC_REFP_MODE (referencing mode) = 7 causes a signal runtime compensation in positive direction of movement at position determination with a BERO (zero mark). The typical total delay time of the BERO message path for overtravel in positive direction of movement is entered. The time includes: - the BERO edge delay time - the time for signal digitizing - the time for measured value editing, etc. The periods of time depend on the hardware used. The default value is typical for SIEMENS products. Adjustment by the customer is only required in exceptional cases. Input of minimum value "0.0" deactivates the compensation (only active in combination with MD 34200: ENC_REFP_MODE = 7). The machine data is available for all encoders. Related to: MD 34200: ENC_REFP_MODE (referencing mode) MD 34040: REFP_VELO_SEARCH_MARKER[n] (reference point creep velocity [Enc. no.])					
-					
-	2	0.000110, 0.000110	-	-	7/2

31123	BERO_DELAY_TIME_MINUS			A02, A06	S1
s	BERO delay time minus			DOUBLE	NEW CONF
The machine data in combination with the setting in MD 34200: ENC_REFP_MODE (referencing mode) = 7 causes a signal runtime compensation in negative direction of movement at position determination with a BERO (zero mark). The typical total delay time of the BERO message path for overtravel in negative direction of movement is entered. The time includes: - the BERO edge delay time - the time for signal digitizing - the time for measured value editing, etc. The periods of time depend on the hardware used. The default value is typical for SIEMENS products. Adjustment by the customer is only required in exceptional cases. Input of minimum value "0.0" deactivates the compensation (only active in combination with MD 34200: ENC_REFP_MODE = 7). The machine data is available for all encoders. Related to: MD 34200: ENC_REFP_MODE (referencing mode) MD 34040: REFP_VELO_SEARCH_MARKER[n] (creep velocity [Enc. no.])					
-					
-	2	0.000078, 0.000078	-	-	7/2

31200	SCALING_FACTOR_G70_G71			EXP, A01	G2
-	Factor for converting values while G70/G71 is active			DOUBLE	POWER ON
The conversion factor for inch/metric conversion by which the programmed geometry of an axis (position, polynomial coefficients, radius for circular programming,...) is multiplied when the programmed value for G code group G70/G71 differs from the initial setting value (set in MD: GCODE_RESET_VALUES[n]) is entered in this MD. The factor can be set for each axis individually so that pure positioning axes are not dependent on G70/G71. The factors within the three geometry axes should not be different. The data influenced by G70/G71 are described in the Programming Guide. Related to: MD: GCODE_RESET_VALUES[n] (G group initial setting).					
CTEQ					
-	-	25.4	1.e-9	-	7/2

31500	**AXIS_NUMBER_FOR_MONITORING**			A01	S6
-	Output setpoint of this axis for service purposes			DWORD	POWER ON
Axis number 0: No setpoint output for service purposes >0:Machine axis index of the axis whose setpoint is to be output. Service setpoint =(Setpoint[$MA_AXIS_NUMBER_FOR_MONITORING] - $MA_OFFSETVALUE_FOR_MONITORING) * $MA_GAIN_FOR_MONITORING The service setpoint is automatically limited to the maximum value of the D/A converter.					
-					
-	1	0	0	31	7/2

31510	**OFFSETVALUE_FOR_MONITORING**			A01	S6
V	Offset voltage for service setpoint			DOUBLE	NEW CONF
Offset voltage for service setpoint					
-					
-	1	0.0	-10.0	10.0	7/2

31520	**GAIN_FOR_MONITORING**			A01	S6
-	Gain for service setpoint			DOUBLE	NEW CONF
Gain for service setpoint					
-					
-	1	1.0	-100.0	100.0	7/2

31600	**TRACE_VDI_AX**			EXP, N06	-
-	Trace-specification for axial VDI signals			BOOLEAN	POWER ON
This machine data determines whether the axial VDI signals for this axis are recorded in the NCSC trace (according to MM_TRACE_VDI_SIGNAL).					
NBUP					
-	-	FALSE	-	-	2/2

1.5.3 Closed-loop control

32000	**MAX_AX_VELO**			A11, A04	G2
mm/min, rev/min	maximum axis velocity			DOUBLE	NEW CONF
Maximum velocity at which the axis can permanently travel. The value limits both the positive and the negative axis velocity. The axis traverses at this velocity, if rapid traverse has been programmed. Depending on the machine data $MA_IS_ROT_AX, the maximum rotary or linear axis velocity has to be entered. In the machine data, the dynamic behavior of the machine and drive and the limit frequency of the actual value acquisition must be taken into account.					
CTEQ					
-	-	10000.	1.e-9	-	7/2

32010	**JOG_VELO_RAPID**			A11, A04	H1
mm/min, rev/min	Rapid traverse in jog mode			DOUBLE	RESET

```
The axis velocity entered applies when the rapid traverse override key is
    operated in JOG mode and when the axial feedrate override is set to 100%.
The value entered must not exceed the maximum permissible axis velocity
    (machine data MAX_AX_VELO).
This machine data is not used for the programmed rapid traverse G00.

MD irrelevant for:
   Operating modes AUTOMATIC and MDI

Related to:
   MD: MAX_AX_VELO (maximum axis velocity)
   MD: JOG_REV_VELO_RAPID
   (revolutional feedrate for JOG with rapid traverse override)
    IS "Rapid traverse override" (DB21-28, DBX12.5 ff)
    IS "Feedrate override" (DB21-28, DBB4)
```

CTEQ					
-	-	10000.	-	-	7/2

32020	**JOG_VELO**			A11, A04	H1
mm/min, rev/min	Jog axis velocity			DOUBLE	RESET
The velocity entered applies to traversing in JOG mode when the axial feedrate override switch is on position 100%. This velocity is only used when general setting data JOG_SET_VELO = 0 for linear axes and linear feedrate is selected (MD: JOG_REV_IS_ACTIVE = 0) or SD: JOG_ROT_AX_SET_VELO = 0 for rotary axes. If this is the case, the axis velocity is active for - continuous jogging - incremental jogging (INC1, ... INCvar) - handwheel jogging The value entered must not exceed the maximum permissible axis velocity (machine data MAX_AX_VELO). If DRF is active, the axis velocity for JOG must be reduced with MD: HANDWH_VELO_OVERLAY_FACTOR. Spindles in JOG mode: This machine data can also be used to define the JOG mode speed for specific spindles (if SD: JOG_SPIND_SET_VELO = 0). However, the speed can be modified with the spindle override switch. Related to: MD : MAX_AX_VELO (maximum axis velocity) MD: JOG_REV_VELO (revolutional feedrate for JOG) MD: HANDWH_VELO_OVERLAY_FACTOR (ratio JOG velocity to handwheel velocity (DRF)) SD: JOG_SET_VELO (JOG velocity for G94) SD: JOG_ROT_AX_SET_VELO (JOG velocity for rotary axes) IS "Feedrate override" (DB21-28, DBB4)					
CTEQ					
-	-	2000.	-	-	7/2

32040	**JOG_REV_VELO_RAPID**			A11, A04	H1
mm/rev	Revolutional feedrate in JOG with rapid traverse override			DOUBLE	RESET
The value entered defines the revolutional feedrate of the axis in JOG mode with rapid traverse override referred to the revolutions of the master spindle. This feedrate is active when SD: JOG_REV_IS_ACTIVE = 1. (Revolutional feedrate active with JOG) MD irrelevant for: SD: JOG_REV_IS_ACTIVE = "0" Related to: SD: JOG_REV_IS_ACTIVE (revolutional feedrate for JOG active) MD: JOG_REV_VELO (revolutional feedrate with JOG)					
CTEQ					
-	-	2.5	-	-	7/2

32050	JOG_REV_VELO			A11, A04	H1
mm/rev	Revolutional feedrate in JOG			DOUBLE	RESET
The value entered defines the revolutional feedrate of the axis in JOG mode referred to the revolutions of the master spindle. This feedrate is active when SD: Revolutional feedrate active with JOG, JOG_REV_IS_ACTIVE = 1. MD irrelevant for: Linear feedrate; i.e. SD: JOG_REV_IS_ACTIVE = 0 Related to: SD: JOG_REV_IS_ACTIVE (revolutional feedrate for JOG active) MD: JOG_REV_VELO_RAPID (JOG revolutional feedrate with rapid traverse override)					
CTEQ					
-	-	0.5	-	-	7/2

32060	POS_AX_VELO			A12, A04	P2
mm/min, rev/min	Initial setting for positioning axis velocity			DOUBLE	RESET
Where a positioning axis is programmed in the part program without specifying the axis-specific feedrate, the feedrate entered in MD: POS_AX_VELO is automatically used. The feedrate from MD: POS_AX_VELO applies until an axis-specific feedrate is programmed in the part program for this positioning axis. MD irrelevant for: POS_AX_VELO is irrelevant for all axis types other than positioning axis. Special cases: If a ZERO velocity setting is entered in POS_AX_VELO, the positioning axis does not traverse if it is programmed without feed. If a velocity setting is entered in POS_AX_VELO that is higher than the maximum velocity of the axis (MD 32000: MAX_AX_VELO ZERO), the velocity is automatically restricted to the maximum rate.					
CTEQ					
-	-	10000.	-	-	7/2

32070	CORR_VELO			A04	H1,K2,W4
%	Axis velocity for override			DOUBLE	RESET
Limitation of axis velocity for handwheel override, external zero offset, continuous dressing, distance control $AA_OFF via synchronized actions related to the JOG velocity MD: JOG_VELO, MD: JOG_VELO_RAPID, MD: JOG_REV_VELO, MD: JOG_REV_VELO_RAPID. The maximum permissible velocity is the maximum velocity in MD: MAX_AX_VELO. Velocity is limited to this value. The conversion into linear or rotary axis velocity is made according to MD: IS_ROT_AX.					
CTEQ					
-	-	50.0	-	-	7/2

32074	FRAME_OR_CORRPOS_NOTALLOWED	A01	H1,K2,W4
-	Frame or tool length compensation are not permissible	DWORD	POWER ON

```
This machine data is used to define the effectiveness of the frames and tool
    length compensations for indexing axes, PLC axes and command axes started
    from synchronized actions.

Bit assignment:
Bit 0 = 0:
    Programmable zero offset (TRANS) allowed for indexing axis
Bit 0 = 1:
    Programmable zero offset (TRANS) forbidden for indexing axis
Bit 1 = 0:
    Scale modification (SCALE) allowed for indexing axis
Bit 1 = 1:
    Scale modification (SCALE) forbidden for indexing axis
Bit 2 = 0:
    Direction change (MIRROR) allowed for indexing axis
Bit 2 = 1:
    Direction change (MIRROR) forbidden for indexing axis
Bit 3 = 0:
    DRF offset allowed for axis
Bit 3 = 1:
    DRF offset forbidden for axis
Bit 4 = 0:
    External zero offset allowed for axis
Bit 4 = 1:
    External zero offset forbidden for axis
Bit 5 = 0:
    Online tool compensation allowed for axis
Bit 5 = 1:
    Online tool compensation forbidden for axis
Bit 6 = 0:
    Synchronized action offset allowed for axis
Bit 6 = 1:
    Synchronized action offset forbidden for axis
Bit 7 = 0:
    Compile cycles offset allowed for axis
Bit 7 = 1:
    Compile cycles offset forbidden for axis
Bit 8 = 0:
    Axial frames and tool length compensation are NOT considered for PLC axes
    (bit evaluation so for compatibility reasons)

Bit 8 = 1:
    Axial frames are considered for PLC axes, and the tool length compensa-
    tion is considered for PLC axes which are geometry axes.
Bit 9 = 0:
    Axial frames are considered for command axes, and the tool length compen-
    sation is considered for  command axes which are geometry axes.
Bit 9 = 1:
    Axial frames and tool length compensation are NOT considered for command
    axes
```

```
Bit 10 = 0:
    In JOG mode, too, traversing of a geometry axis as a PLC or command axis
    is NOT allowed with active rotation.
Bit 10 = 1:
    In JOG mode, traversing of a geometry axis as a PLC axis or command axis
    (static synchronized action ) is allowed with active rotation (ROT frame).
    Traversing must be terminated prior to returning to AUTOMATIC mode (neu-
    tral axis state), as otherwise alarm16908 would be output when the mode is
    changed.
Bit 11 = 0:
    In the 'Program interrupted' status, repositioning to the interrupt posi-
    tion  (AUTO - JOG) takes place when changing from JOG to AUTO.
Bit 11 = 1:
   Prerequisite: Bit 10 == 1 (PLC or command axis motion with active rotation
in JOG mode).
    In the 'Program interrupted' status, the end point of the PLC or command
    axis motion is taken over when changing from JOG to AUTOMATIC and the
    geometry axes are positioned according to the rotation
```

CTEQ					
-	-	0	0	0xFFF	7/2

32080	**HANDWH_MAX_INCR_SIZE**		A05, A10	H1
mm, degrees	Limitation of selected increment		DOUBLE	RESET

```
> 0:Limitation of size of selected increment $MN_JOG_INCR_SIZE <Increment/VDI
    signal>Ü or $SN_JOG_VAR_INCR_SIZE for the associated machine axis

 0: No limitation
```

CTEQ					
-	-	0.0	-	-	7/2

32082	**HANDWH_MAX_INCR_VELO_SIZE**		A05, A10, A04	H1
mm/min, rev/min	Limitation for velocity override		DOUBLE	RESET

```
For the velocity override of positioning axes:
 >0:Limitation of size of selected increment $MN_JOG_INCR_SIZEL<Increment/VDI
    signal> 0 or $SN_JOG_VAR_INCR_SIZE for the associated machine axis

 0: No limitation
```

CTEQ					
-	-	500.0	-	-	7/2

32084	HANDWH_STOP_COND		EXP, A10	H1	
-	Effect of VDI signals on handwheel travel		DWORD	RESET	

```
Definition of the behavior of the handwheel travel on axis-specific VDI inter-
face signals:
Bit==0:
   Interruption or collection of the distances preset via the handwheel
Bit==1:
   Abort of the traversing movement or no collection

Bit assignment
Bit 0: Feedrate override
Bit 1: Spindle speed override
Bit 2: Feedrate stop/spindle stop
Bit 3: Clamping procedure running (==0 no effect)
Bit 4: Servo enable
Bit 5: Pulse enable

For machine axis
Bit 6 = 0
   For handwheel travel, the maximum possible velocity corresponds to the fee-
drate set in MD 32020: JOG_VELO for the appropriate machine axis.
Bit 6 = 1
   For handwheel travel, the maximum possible velocity corresponds to the fee-
drate set in MD 32000: MAX_AX_VELO for the appropriate machine axis.
Bit 7 = 0
   The override is active in handwheel travel.
Bit 7 = 1
   The override is always assumed to be 100% for handwheel travel regardless
of how the override switch is set.
   Exception: The override 0% is always active.
Bit 8 = 0
   The override is active with DRF
Bit 8 = 1
   The override is always assumed to be 100% for DRF regardless of how the
override switch is set. Exception: The override 0% is always active.
Bit 9 = 0
   For handwheel travel, the maximum possible velocity with revolutional fee-
drate is
- with the feedrate in the setting data $SN_JOG_REV_SET_VELO or
- the feedrate in the machine data $MA_JOG_REV_VELO or
- in the case of rapid traverse with $MA_JOG_REV_VELO_RAPID of the relevant
    machine axis calculated with the spindle or rotary axis feedrate.
Bit 9 = 1
   For handwheel travel, the maximum possible velocity is with the revolu-
tional feedrate in the machine data $MA_MAX_AX_VELO of the relevant machine
axis. (see also bit 6)
Bit 10 = 0
   For overlaid movements, $AA_OVR is not active.
Bit 10 = 1
   For overlaid movements (DRF, $AA_OFF, external zero offset, online tool
offset) the override $AA_OVR settable via synchronized actions is active.
```

CTEQ					
-	-	0xFF	0	0x7FF	7/2

32090	**HANDWH_VELO_OVERLAY_FACTOR**			A10, A04	H1
-	Ratio of JOG velocity to handwheel velocity (DRF)			DOUBLE	RESET
CTEQ					
-	-	0.5	-	-	7/2

```
The velocity active with the handwheel in DRF can be reduced from the JOG
    velocity with this machine data.
The following applies to linear axes for the velocity active with DRF:
   vDRF = SD:JOG_SET_VELO * MD:HANDWH_VELO_OVERLAY_FACTOR
    or when SD:JOG_SET_VELO  = 0:
   vDRF = MD:JOG_VELO * MD:HANDWH_VELO_OVERLAY_FACTOR
The velocity setting in SD: JOG_ROT_AX_SET_VELO applies for DRF on rotary axes
    instead of the value in SD: JOG_SET_VELO.

MD irrelevant for:
   JOG handwheel

Related to:
   MD: JOG_VELO (JOG axis velocity)
   SD: JOG_SET_VELO (JOG velocity for G94)
   SD: JOG_AX_SET_VELO (JOG velocity for rotary axes)
```

32100	**AX_MOTION_DIR**			A07, A03, A11, -	G2
-	Traversing direction (not control direction)			DWORD	POWER ON
-					
-	-	1	-1	1	7/2

```
The direction of movement of the machine can be reversed with this MD.
The control direction is, however, not reversed, i.e. closed-loop control
    remains stable.
MD  =  +1:  Normal direction
MD  =  -1:  Direction reversed
MD  =  0:  Normal direction
```

32110	**ENC_FEEDBACK_POL**			A07, A02, A11	G2
-	Sign actual value (control direction)			DWORD	POWER ON
-					
-	2	1, 1	-1	1	7/2

```
The evalution direction of the shaft encoder signals is entered into the MD.
  -1: Reversal of direction of movement
0, 1: No reversal of direction of movement
In case of reversal of the direction of movement, the control direction will
    also be reversed, if the encoder is used for position control.

The index[n] of the machine data has the following coding:
[Encoder no.]: 0 or 1

Special cases:
   When an incorrect control direction is entered, the axis can run off.
   Depending on the setting of the corresponding limit values, one of the fol-
lowing alarms is displayed:
   Alarm 25040 "Standstill monitoring"
   Alarm 25050 "Contour monitoring"
   Alarm 25060  "Speed setpoint limitation"
    If an uncontrolled setpoint leap occurs on connection of a drive, the con-
    trol direction might be incorrect.
```

32200	POSCTRL_GAIN			A07, A11	G2
1000/min	Servo gain factor			DOUBLE	NEW CONF

```
Position controller gain, or servo gain factor.
The input/output unit for the user is [ (m/min)/mm].
I.e. POSCTRL_GAIN[n] = 1 corresponds to 1 mm following error at V = 1m/min.
The following machine data have default settings for adapting the standard
    selected input/output unit to the internal unit [rev/s].

- MD 10230: SCALING_FACTORS_USER_DEF[9] = 16.666667S
- MD 10220: SCALING_USER_DEF_MASK = 0x200; (bit no 9 as hex value).

If the value "0" is entered the position controller is opened.
When entering the servo gain factor it is important to check that the gain
factor of the whole position control loop is still dependent on other parame-
ters of the controlled system. A distinction should be made between a "desired
servo gain factor " (MD: POSCTRL_GAIN) and an "actual servo gain factor" (pro-
duced by the machine). Only when all the parameters of the control loop are
matched will these servo gain factors be the same.

These factors are:
- Speed setpoint adjustment (MD 32260: RATED_VELO, MD 32250: RATED_OUTVAL)
- Tacho compensation at speed encoder
- Tacho generator on drive

Note:
   Axes which interpolate together and are to perform a machining, must either
have the same gain setting (i.e. have the same identical following error = 45°
slope at the same velocity) or they must be matched via MD 32910:
DYN_MATCH_TIME.
   The actual servo gain factor can be checked by means of the following error
(in the service display). However, note that the drift compensation must be
checked first (in the case of SINUMERIK FM-NC).

The index [n] of the machine data has the following coding:
[control parameter set no.]: 0-5
```

CTEQ					
-	6	16.66666667, 16.66666667, 16.66666667, 16.66666667, 16.66666667...	0	2000.	7/2

32210	POSCTRL_INTEGR_TIME			A07	G2
s	Position controller integral time			DOUBLE	NEW CONF

```
Position controller integral action time for the integral component in s

The MD is only active if $MA_POSCTRL_INTEGR_ENABLE = TRUE.
A value of the MD less than 0.001 disables the integral component of the PI
    controller. The controller is then a P controller which works with dis-
    abled manipulated variable clamping (s.a. $MA_POSCTRL_CONFIG, bit0 = 1).
```

-					
-	-	1.0	0	10000.0	7/2

32220	**POSCTRL_INTEGR_ENABLE**			A07	G2
-	Enable integral component position controller			BOOLEAN	POWER ON
Enable of the integral component position controller; the position controller is then a PI controller in which the manipulated variable clamping is disabled (s.a. $MA_POSCTRL_CONFIG, bit0 = 1). Position overshoots may occur if the integral component is used. For this reason, this functionality may only be used in special cases.					
-					
-	-	FALSE	-	-	7/2

32230	**POSCTRL_CONFIG**			A07	-
-	Configuration of the position controller structure			BYTE	POWER ON
Configuration of the position controller structure: Bit0 = 1: Manipulated variable clamping inactive Bit4 = 1: Accelerated exact stop signal active					
-					
-	-	0	0	17	7/2

32250	RATED_OUTVAL			A01, A11	G2
%	Rated output voltage			DOUBLE	NEW CONF

a.)
Scaling of the manipulated variable with analog drives:
The value of the speed setpoint in percent is to be entered into the MD, related to the maximum speed setpoint, at which the motor speed specified in MD: RATED_VELO[n] is reached.

Related to:
MD: RATED_OUTVAL[n] only makes sense in combination with MD: RATED_VELO[n].
Example:
1. At a voltage of 5V, the drive reaches a speed of 1875 rev/min ==> RATED_OUTVAL = 50%, RATED_VELO = 11250 [degrees/s]
2. At a voltage of 8V, the drive reaches a speed of 3000 rev/min ==> RATED_OUTVAL = 80%, RATED_VELO = 18000 [degrees/s]
3. At a voltage of 1.5V, the drive reaches a speed of 562.5 rev/min ==> RATED_OUTVAL = 15%, RATED_VELO = 3375 [degrees/s]

All three examples are possible for one and the same drive/converter. The ratio of both values is decisive; in all three examples it is the same.

MD RATED_OUTVAL and MD RATED_VELO describe physical characteristics of converter and drive; they can therefore only be determined by means of measurement or start-up instructions (converter, drive).

b.)
Scaling of the manipulated variable with digital PROFIBUS drives:
Default value "0" declares RATED_OUTVAL and RATED_VELO as invalid. Scaling of the manipulated variable is automatically determined and adjusted from the drive parameters instead (currently only applicable for SIMODRIVE 611U).
Otherwise (RATED_OUTVAL unequal to zero) scaling of the manipulated variable is not determined from the drive (for example non-Siemens PROFIBUS drives), but set via RATED_VELO und RATED_OUTVAL even for digital PROFIBUS drives. In this case the following applies:

Scaling of the manipulated variable on the drive = RATED_VELO / RATED_OUTVAL

During simultaneous operation of analog drives and PROFIBUS drives the settings for analog axes must be adjusted according to a.).

CTEQ					
-	1	80.0	-	-	7/2
710-2a2c	-	0.0	-	-	-/-
710-6a2c	-	0.0	-	-	-/-
710-12a2c	-	0.0	-	-	-/-
710-31a10c	-	0.0	-	-	-/-
840di-basic	-	0.0	-	-	-/-
840di-universal	-	0.0	-	-	-/-
840di-plus	-	0.0	-	-	-/-

32260	RATED_VELO		A01, A11		G2
rev/min	Rated motor speed		DOUBLE		NEW CONF
Only applies when: MD: RATED_OUTVAL is set higher than 0. The drive speed (scaled on the drive) must be entered into the MD that is reached with the speed setpoint in percent specified in MD: RATED_OUTVAL[n]. Related to: MD: RATED_VELO[n] only makes sense in combination with MD:RATED_OUTVAL[n].					
CTEQ					
-	1	3000.0	-	-	7/2

32300	MAX_AX_ACCEL		A11, A04, -		B2
m/s², rev/s²	maximum axis acceleration		DOUBLE		NEW CONF
Acceleration, i.e. change in setpoint velocity, which is to act upon the axis as a maximum. The value limits both the positive and negative axis acceleration. Depending on machine data $MA_IS_ROT_AX, the maximum angular or linear axis acceleration must be entered. If axes are interpolated linearly in a grouping, the grouping is limited in such a way that no axis is overloaded. With regard to contour accuracy, the control dynamic behavior has to be taken into account. MD irrelevant for error states that lead to rapid stop. Related to: MD 32210: MAX_ACCEL_OVL_FACTOR MD 32434: G00_ACCEL_FACTOR MD 32433: SOFT_ACCEL_FACTOR MD 20610: ADD_MOVE_ACCEL_RESERVE MD 20602: CURV_EFFECT_ON_PATH_ACCEL					
CTEQ					
-	5	1.0, 1.0, 1.0, 1.0, 1.0	1.0e-3	-	7/2

32310	MAX_ACCEL_OVL_FACTOR		A04		B1
-	Overload factor for axial velocity steps		DOUBLE		NEW CONF
The overload factor limits the velocity jump of the machine axis on block transition. The value entered refers to the value of MD: MAX_ AX_ ACCEL (axis acceleration) and states by how much the maximum acceleration for one IPO cycle can be exceeded. Related to: MD 32300: MAX_AX_ACCEL (axis acceleration) MD 10070: IPO_SYSCLOCK_TIME_RATIO (interpolator clock) There is an entry for each dynamic G code group.					
CTEQ					
-	5	1.2, 1.2, 1.2, 1.2, 1.2	-	-	3/3

32320	**DYN_LIMIT_RESET_MASK**			A05, A06, A10, A04	-
-	Reset behavior of dynamic response limitation.			DWORD	RESET
With MD $MA_DYN_LIMIT_RESET_MASK, the reset behavior of functions limiting the dynamic response can be set. The MD is bit-coded; currently only bit 0 (LSB) is assigned. Bit 0 == 0: Channel reset/M30 resets the programmed ACC to 100%. (compatibility: same response as before) Bit 0 == 1: Programmed ACC is maintained beyond channel reset/M30.					
CTEQ					
-	-	0	0	0x01	7/2

32400	**AX_JERK_ENABLE**			A07, A04, -	B2
-	Axial jerk limitation			BOOLEAN	NEW CONF
Enables the function of an axial jerk limitation. The limitation is set via a time constant; it is always active. The limitation works independently of the limitations "path-related maximum jerk", "knee-shaped acceleration characteristic" and the axial jerk limitation of the axes that are operated in JOG mode or positioning axis mode. Related to: MD 32410: AX_JERK_TIME (time constant for axial jerk limitation)					
CTEQ					
-	-	FALSE	-	-	7/2

32402	**AX_JERK_MODE**			A07, A04	B2,G2,B3
-	Filter type for axial jerk limitation			BYTE	POWER ON

```
Filter type for axial jerk limitation:
1: 2nd order filter (like SW 1 through 4)
2: Sliding-type averaging (SW 5 and higher)
3: Bandstop filter (SW 6 and higher)

Type 2 requires more computing time, but causes less contour errors at the
same smoothing effect, or smoother movements at the same accuracy.
Type 2 is recommended; type 1 is set as default value for reasons of compati-
bility.
The maximum jerk is set via time constant MD 32410: AX_JERK_TIME.
Recommended values for type 1:
   min. 0.03 s; max. 0.06s.
Recommended values for type 2:
   min. 1 position control cycle; max. 16 position control cycles
    At a position control cycle of 2ms this corresponds to 0.002 s through
    0.032 s.
Type 3 requires setting of AX_JERK_TIME, AX_JERK_FREQ and AX_JERK_DAMP.
For parameterization of a mere bandstop filter we recommend to set
    AX_JERK_TIME=0 which automatically sets "denominator frequency = numera-
    tor frequency = blocking frequency = AX_JERK_FREQ".
However, with AX_JERK_TIME>0 a specific denominator frequency is set, which
makes it possible to implement a bandstop filter with amplitude increase for
frequencies beyond the blocking frequency.

MD 32402: AX_JERK_MODE is only active, if MD 32400: AX_JERK_ENABLE has been
    set to 1.

Special cases, errors:
   The machine data must be same for all axes of an axis container.

Related to:
    MD 32400: AX_JERK_ENABLE
    MD 32410: AX_JERK_TIME
    as well as for type 3: AX_JERK_FREQ and AX_JERK_DAMP
```

CTEQ					
-	-	1	1	3	7/2

32410	**AX_JERK_TIME**			A07, A04	B2
s	Time constant for axial jerk filter			DOUBLE	NEW CONF
Time constant of the axial jerk filter which causes a smoother axis setpoint characteristic. The jerk filter will only be active, if the time constant is higher than a position control cycle. Not active in case of errors that cause a change in follow-up mode (for example EMERGENCY STOP99: Special cases: Machine axes that are supposed to be interpolating with one another, must have the same effective jerk filtering (for example the same time constant for tapping without compensating chuck). Related to: MD 32400: AX_JERK_ENABLE (axial jerk limitation)					
-					
-	-	0.001	-	-	7/2

32412	**AX_JERK_FREQ**			A07, A04	P6
-	Blocking frequency of axial jerk filter			DOUBLE	NEW CONF
Blocking frequency of axial jerk filter bandstop MD is only active if $MA_AX_JERK_MODE = 3					
-					
-	-	10.0	-	-	7/2

32414	**AX_JERK_DAMP**			A07, A04	P6
-	Damping of axial jerk filter			DOUBLE	NEW CONF
Damping of axial jerk filter bandstop: Input value 0 means complete blocking with $MA_AX_JERK_FREQ, input values >0 can attenuate the blocking effect. MD is only active if $MA_AX_JERK_MODE = 3					
-					
-	-	0.0	-	-	7/2

32420	**JOG_AND_POS_JERK_ENABLE**			A04	B2
-	Default setting of axis jerk limitation			BOOLEAN	RESET
Enables the function of the axis-specific jerk limitation for the operating modes JOG, REF and positioning axis mode. 1: Axial jerk limitation for JOG mode and positioning axis mode 0: No jerk limitation for JOG mode and positioning axis mode The maximum jerk occurring is defined in JOG_AND_POS_MAX_JERK. Related to: MD 32430: JOG_AND_POS_MAX_JERK (axial jerk)					
CTEQ					
-	-	FALSE	-	-	7/2

32430	**JOG_AND_POS_MAX_JERK**			A04	B2
m/s³, rev/s³	Axial jerk			DOUBLE	RESET
The jerk limit value limits the rate of change of axis acceleration in the JOG and REF modes and in positioning axis mode. The setting and time calculation are made as for MD 20600: MAX_PATH_JERK (path-related maximum jerk). MD irrelevant for: path interpolation and error states that lead to rapid stop. Related to: MD 32420: JOG_AND_POS_JERK_ENABLE (initial setting of axial jerk limitation)					
CTEQ					
-	-	1000.0	1.e-9	-	7/2

32431	**MAX_AX_JERK**			A04	B1
m/s³, rev/s³	maximum axial jerk for path movement			DOUBLE	NEW CONF
Maximum axial jerk for path movement Entry for each dynamic G code group.					
-					
-	5	1.e6, 1.e6, 1.e6, 1.e6, 1.e6	1.e-9	-	3/3

32432	**PATH_TRANS_JERK_LIM**			A04	B1
m/s³, rev/s³	maximum axial jerk at block transition in continuous-path mode			DOUBLE	NEW CONF
The control limits the jerk (acceleration jump) at a block transition between contour sections of different curvature to the value set. MD irrelevant for: Exact stop Related to: Continuous-path mode, SOFT type of acceleration					
CTEQ					
-	5	1.e6, 1.e6, 1.e6, 1.e6, 1.e6	-	-	3/3

32433	**SOFT_ACCEL_FACTOR**			A04, -	B1
-	Scaling of acceleration limitation with SOFT			DOUBLE	NEW CONF
Scaling acceleration limitation with SOFT. Relevant axial acceleration limitation for SOFT =: ($MA_SOFT_ACCEL_FACTOR[..] * $MA_MAX_AX_ACCEL[..]) There is an entry for each dynamic G code group.					
-					
-	5	1., 1., 1., 1., 1.	1e-9	-	3/3

32434	**G00_ACCEL_FACTOR**			A04, -	B1
-	Scaling of acceleration limitation with G00.			DOUBLE	NEW CONF
Scaling of acceleration limitation with G00. Relevant axial acceleration limitation for G00 =: ($MA_G00_ACCEL_FACTOR[..] * $MA_MAX_AX_ACCEL[..])					
-					
-	-	1.	1e-9	-	3/3

32435	**G00_JERK_FACTOR**			A04	B1
-	Scaling of jerk limitation with G00.			DOUBLE	NEW CONF
Scaling of jerk limitation with G00. Relevant axial jerk limitation for G00 =: ($MA_G00_JERK_FACTOR[..] * $MA_MAX_AX_JERK[..])					
-					
-	-	1.	1e-9	-	3/3

32440	**LOOKAH_FREQUENCY**			EXP, A04	B1
-	Smoothing frequency for Look Ahead			DOUBLE	NEW CONF
Acceleration procedures in continuous-path mode with Look Ahead which execute with a higher frequency than that parameterized in this MD are smoothed as a function of the parameterization in MD $MC_LOOKAH_SMOOTH_FACTOR. It is always the minimum of all the axes participating in the path which is determined. If vibrations are aroused in the mechanics of this axis and if their frequency is known, then this MD should be set to a lower value than this frequency.					
-					
-	-	10.	-	-	7/2

32450	**BACKLASH**			A09	K3
mm, degrees	Backlash			DOUBLE	NEW CONF
Backlash on reversal between positive and negative travel direction. Input of the compensation value is - positive, if the encoder is leading the machine part (normal situation) - negative, if the encoder is behind the machine part. Backlash compensation is not active when 0 is entered. Backlash compensation is always active after reference point approach in all operating modes. Special cases: For each measuring system, a specific backlash on reversal must be entered. Related to: MD: NUM_ENC (number of measuring systems) MD: ENC_CHANGE_TOL (maximum tolerance at actual position value change)					
-					
-	2	0.0, 0.0	-	-	7/2

32452	**BACKLASH_FACTOR**			A09	K3
-	Evaluation factor for backlash			DOUBLE	NEW CONF
Evaluation factor for backlash. The machine data enables the backlash defined in MD 32450: BACKLASH to be changed as a function of the parameter set, in order to take a gear stage dependent backlash into account, for example. Related to: MD 32450: BACKLASH[n]					
-					
-	6	1.0, 1.0, 1.0, 1.0, 1.0, 1.0	0.01	100.0	7/2

32460	**TORQUE_OFFSET**			A09	K3
%	Additional torque for electronic weight compensation			DOUBLE	NEW CONF
The additional torque for electronic counterweight is switched directly to the current controller and becomes immediately effective when the current controller is activated. This reduces a sag of vertical axes on servo enable setting, especially if the reset time of the speed controller is high. 100% correspond to the nominal torque of the axis drive. Definition of signs (prior to NCK.P6_48): A positive value would move the drive in positive travel direction when the speed controller is switched off (also see MD 32100: AX_MOTION_DIR). If, for example, the positive travel direction goes upwards (axis is lifted), a positive value will have to be entered for counterweight. If the positive travel direction goes downwards, a negative value will be required. Only active for axes with SIMODRIVE 611D drives. Special cases: See mutual effect with "Travel to fixed stop"					
-					
-	1	0.0	-100.0	100.0	7/2

32490	**FRICT_COMP_MODE**			A09	K3
-	Type of friction compensation			BYTE	POWER ON
0: No friction compensation 1: Friction compensation with constant injection value or adaptive characteristic 2: Friction compensation with learned characteristic via neural network					
-					
-	1	1	0	2	7/2

32500	**FRICT_COMP_ENABLE**			A09	K3
-	Friction compensation active			BOOLEAN	NEW CONF

```
1: Friction compensation is enabled for this axis.
   Depending on the setting of MD 32490: FRICT_COMP_MODE, either "friction
compensation with constant injected value" or "QEC with neural networks"
becomes active.

    In the case of neural QEC, the machine data should first be set to "1"
    when a valid characteristic has been "learnt".
   During the learning stage, the compensation values are injected indepen-
dently of the contents of this machine data.

0: Friction compensation is not enabled for this axis.
   Thus, no friction compensation values are injected.

Related to:
    MD 32490: FRICT_COMP_MODE
   Friction compensation type
    MD 32510: FRICT_COMP_ADAPT_ENABLE
   Friction compensation adaptation active
    MD 32520: FRICT_COMP_CONST_MAX
   Maximum friction compensation value
    MD 32540: FRICT_COMP_TIME
   Friction compensation time constant
    MD 38010: MM_QEC_MAX_POINTS
   Number of interpolation points for QEC with neural networks
```

-					
-	-	FALSE	-	-	7/2

32510	**FRICT_COMP_ADAPT_ENABLE**			EXP, A09	K3
-	Adaptation friction compensation active			BOOLEAN	NEW CONF
1: Friction compensation with amplitude adaptation is enabled for the axis. With friction compensation, quadrant errors on circular contours can be compensated. Often, the injection amplitude of the friction compensation value is not constant over the entire acceleration range. In this case, a smaller compensation value must be injected for optimum friction compensation for high accelerations than for small accelerations. The parameters of the adaptation curve must be determined and entered in the machine data. 0: Friction compensation with amplitude adaptation is not enabled for the axis. MD irrelevant for: MD 32500: FRICT_COMP_ENABLE = 0 MD 32490: FRICT_COMP_MODE = 2 Related to: MD 32500: FRICT_COMP_ENABLE Friction compensation active MD 32520: FRICT_COMP_CONST_MAX Maximum friction compensation value MD 32530: FRICT_COMP_CONST_MIN Minimum friction compensation value MD 32550: FRICT_COMP_ACCEL1 Adaptation acceleration value 1 MD 32560: FRICT_COMP_ACCEL2 Adaptation acceleration value 2 MD 32570: FRICT_COMP_ACCEL3 Adaptation acceleration value 3 MD 32540: FRICT_COMP_TIME Friction compensation time constant					
-					
-	1	FALSE	-	-	7/2

32520	FRICT_COMP_CONST_MAX	EXP, A09	K3
mm/min, rev/min	Maximum friction compensation value	DOUBLE	NEW CONF

```
With inactive adaption (MD32510=0), the maximum friction compensation is
injected all over the acceleration range.

With active adaption (MD32510=1), the maximum friction compensation is
injected according to the adaptation curve.

In the 1st acceleration range (           a <  MD32550), the injection ampli-
    tude = MD32520 * (a/MD32550)
In the 2nd acceleration range (MD32550 <= a <= MD32560), the injection ampli-
    tude = MD32520
In the 3rd acceleration range (MD32560 <  a <  MD32570), the injection ampli-
    tude = MD32520 * (1-(a-MD32560)/(MD32570-MD32560))
In the 4th acceleration range (MD32570 <= a           ), the injection ampli-
    tude = MD32530


MD irrelevant for:
    MD 32500: FRICT_COMP_ENABLE = 0
    MD 32490: FRICT_COMP_MODE = 2 (neural QEC)

Related to:
    MD 32500: FRICT_COMP_ENABLE
   Friction compensation active
    MD 32510: FRICT_COMP_ADAPT_ENABLE
   Friction compensation adaptation active
    MD 32530: FRICT_COMP_CONST_MIN
   Minimum friction compensation value
    MD 32550: FRICT_COMP_ACCEL1
   Adaptation acceleration value 1
    MD 32560: FRICT_COMP_ACCEL2
   Adaptation acceleration value 2
    MD 32570: FRICT_COMP_ACCEL3
   Adaptation acceleration value 3
    MD 32540: FRICT_COMP_TIME
   Friction compensation time constant
```

-					
-	1	0.0	-	-	7/2

32530	**FRICT_COMP_CONST_MIN**		EXP, A09	K3	
mm/min, rev/min	Minimum friction compensation value		DOUBLE	NEW CONF	
The minimum friction compensation value is active only if "Friction compensation with adaptation" (MD32510=1) is active. The amplitude of the friction compensation value is injected in the 4th acceleration range (MD32570 <= a). MD irrelevant for: MD 32510: FRICT_COMP_ADAPT_ENABLE = 0 MD 32490: FRICT_COMP_MODE = 2 (neural QEC) Special cases: In special cases, the value for FRICT_COMP_CONST_MIN may even be higher than for MD 32520: FRICT_COMP_CONST_MAX. Related to: MD 32500: FRICT_COMP_ENABLE Friction compensation active MD 32510: FRICT_COMP_ADAPT_ENABLE Friction compensation adaptation active MD 32520: FRICT_COMP_CONST_MAX Maximum friction compensation value MD 32550: FRICT_COMP_ACCEL1 Adaptation acceleration value 1 MD 32560: FRICT_COMP_ACCEL2 Adaptation acceleration value 2 MD 32570: FRICT_COMP_ACCEL3 Adaptation acceleration value 3 MD 32540: FRICT_COMP_TIME Friction compensation time constant					
-					
-	1	0.0	-	-	7/2

32540	**FRICT_COMP_TIME**		EXP, A09	K3	
s	Friction compensation time constant		DOUBLE	NEW CONF	
The friction compensation value is injected via a DT1 filter. The injection amplitude decays in accordance with the time constant. MD irrelevant for: MD 32500: FRICT_COMP_ENABLE = 0 Related to: MD 32500: FRICT_COMP_ENABLE Friction compensation active MD 32520: FRICT_COMP_CONST_MAX Maximum friction compensation value					
-					
-	1	0.015	-	-	7/2

32550	**FRICT_COMP_ACCEL1**			EXP, A09	K3
m/s², rev/s²	Adaptation acceleration value 1			DOUBLE	NEW CONF

```
The adaptation acceleration value is only required if "Friction compensation
    with adaptation" (MD32510=1) is active.
The adaptation acceleration values 1 to 3 are interpolation points for defin-
    ing the adaptation curve. The adaptation curve is subdivided into 4 sec-
    tions in which different friction compensation values apply.

For the 1st range (a < MD32550), the injection amplitude = a * MD32520/
    MD32550

MD irrelevant for:
    MD 32510: FRICT_COMP_ADAPT_ENABLE = 0
    MD 32490: FRICT_COMP_MODE = 2

Related to:
    MD 32500: FRICT_COMP_ENABLE
   Friction compensation active
    MD 32510: FRICT_COMP_ADAPT_ENABLE
   Friction compensation adaptation active
    MD 32520: FRICT_COMP_CONST_MAX
   Maximum friction compensation value
    MD 32530: FRICT_COMP_CONST_MIN
   Minimum friction compensation value
    MD 32550: FRICT_COMP_ACCEL2
   Adaptation acceleration value 2
    MD 32570: FRICT_COMP_ACCEL3
   Adaptation acceleration value 3
    MD 32540: FRICT_COMP_TIME
   Friction compensation time constant
```

-					
-	1	0.0	-	-	7/2

32560	FRICT_COMP_ACCEL2		EXP, A09		K3
m/s², rev/s²	Adaptation acceleration value 2		DOUBLE		NEW CONF

```
The adaptation acceleration value is only required if "Friction compensation
    with adaptation" (MD32510=1) is active.
The adaptation acceleration values 1 to 3 are interpolation points for defin-
    ing the adaptation curve. The adaptation curve is subdivided into 4 sec-
    tions in which different friction compensation values apply.

In the 1st acceleration range (           a <  MD32550), the injection ampli-
    tude = MD32520 * (a/MD32550)
In the 2nd acceleration range (MD32550 <= a <= MD32560), the injection ampli-
    tude = MD32520
In the 3rd acceleration range (MD32560 <  a <  MD32570), the injection ampli-
    tude = MD32520 * (1-(a-MD32560)/(MD32570-MD32560))
In the 4th acceleration range (MD32570 <= a           ), the injection ampli-
    tude = MD32530

MD irrelevant for:
    MD 32510: FRICT_COMP_ADAPT_ENABLE = 0
    MD 32490: FRICT_COMP_MODE = 2

Related to:
    MD 32500: FRICT_COMP_ENABLE
   Friction compensation active
    MD 32510: FRICT_COMP_ADAPT_ENABLE
   Friction compensation adaptation active
    MD 32520: FRICT_COMP_CONST_MAX
   Maximum friction compensation value
    MD 32530: FRICT_COMP_CONST_MIN
   Minimum friction compensation value
    MD 32550: FRICT_COMP_ACCEL1
   Adaptation acceleration value 1
    MD 32570: FRICT_COMP_ACCEL3
   Adaptation acceleration value 3
    MD 32540: FRICT_COMP_TIME
   Friction compensation time constant
```

-					
-	1	0.0	-	-	7/2

32570	**FRICT_COMP_ACCEL3**			EXP, A09	K3
m/s², rev/s²	Adaptation acceleration value 3			DOUBLE	NEW CONF
-					
-	1	0.0	-	-	7/2

```
The adaptation acceleration value is only required if "Friction compensation
    with adaptation" (MD32510=1) is active.
The adaptation acceleration values 1 to 3 are interpolation points for defin-
    ing the adaptation curve. The adaptation curve is subdivided into 4 sec-
    tions in which different friction compensation values apply.

In the 1st acceleration range (           a <  MD32550), the injection ampli-
    tude = MD32520 * (a/MD32550)
In the 2nd acceleration range (MD32550 <= a <= MD32560), the injection ampli-
    tude = MD32520
In the 3rd acceleration range (MD32560 <  a <  MD32570), the injection ampli-
    tude = MD32520 * (1-(a-MD32560)/(MD32570-MD32560))
In the 4th acceleration range (MD32570 <= a           ), the injection ampli-
    tude = MD32530

MD irrelevant for:
    MD 32510: FRICT_COMP_ADAPT_ENABLE = 0
    MD 32490: FRICT_COMP_MODE = 2

Related to:
    MD 32500: FRICT_COMP_ENABLE
   Friction compensation active
    MD 32510: FRICT_COMP_ADAPT_ENABLE
   Friction compensation adaptation active
    MD 32520: FRICT_COMP_CONST_MAX
   Maximum friction compensation value
    MD 32530: FRICT_COMP_CONST_MIN
   Minimum friction compensation value
    MD 32550: FRICT_COMP_ACCEL1
   Adaptation acceleration value 1
    MD 32570: FRICT_COMP_ACCEL2
   Adaptation acceleration value 2
    MD 32540: FRICT_COMP_TIME
   Friction compensation time constant
```

32580	**FRICT_COMP_INC_FACTOR**			A09	K3
%	Weighting factor of friction comp. value w/ short trav. movem.			DOUBLE	NEW CONF
The optimum friction compensation value determined by the circularity test can cause overcompensation of this axis if compensation is activated and axial positioning movements are short. In such cases, a better setting can be achieved by reducing the amplitude of the friction compensation value and acts on all positioning blocks that are made within an interpolation cycle of the control. The factor that has to be entered can be determined empirically and can be different from axis to axis because of the different friction conditions. The input range is between 0 and 100% of the value determined by the circularity test. The default setting is 0; so that no compensation is performed for short traversing movements. Related to: MD 32500: FRICT_COMP_ENABLE Friction compensation active					
-					
-	1	0.0	0	100.0	7/2

32610	**VELO_FFW_WEIGHT**			A07, A09	K3
-	Feedforward control factor f. velocity/speed feedforward control			DOUBLE	NEW CONF
Weighting factor for feedforward control. Is normally = 1.0 on digital drives, since these keep the setpoint speed exactly . On analog drives, this factor can be used to compensate the gain error of the drive actuator, so that the actual speed becomes exactly equal to the setpoint speed (this reduces the following error with feedforward control). On both drive types, the effect of the feedforward control can be continuously reduced with a factor of < 1.0, if the machine moves too abruptly and other measures (e.g. jerk limitation) are not to be used. This also reduces possibly existing overshoots; however, the error increases on curved contours, e.g. on a circle. With 0.0, you have a pure position controller without feedforward control. Contour monitoring takes into account factors < 1.0. In individual cases, it can, however, become necessary to increase MD CONTOUR_TOL.					
-					
-	6	1.0, 1.0, 1.0, 1.0, 1.0, 1.0	-	-	7/2

<table>
<tr><td>32620</td><td colspan="3">FFW_MODE</td><td>A07, A09</td><td>K3</td></tr>
<tr><td>-</td><td colspan="3">Feedforward control mode</td><td>BYTE</td><td>RESET</td></tr>
<tr><td colspan="6">FFW_MODE defines the feedforward control mode to be applied on an axis-specific basis:
0 = No feedforward control
1 = Speed feedforward control with PT1 balancing
2 = Torque feedforward control (only for 840D) with PT1 balancing
3 = Speed feedforward control with Tt balancing
4 = Torque feedforward control (only for 840D) with Tt balancing
The high-level language instructions FFWON and FFWOF are used to activate and deactivate the feedforward control for specific channels on all axes.
To prevent the feedforward control from being affected by these instructions on individual axes, you can define that it is always activated or always deactivated in machine data FFW_ACTIVATION_MODE (see also FFW_ACTIVATION_MODE).
The torque feedforward control must be activated via the global option data $ON_FFW_MODE_MASK.

If a feedforward control mode is selected (speed or torque feedforward control), it can be programmed additionally in MD 32630: FFW_ACTIVATION_MODE whether the feedforward control can be activated or deactivated by the part program.
Torque feedforward control is an option that must be enabled.

Related to:
MD 32630: FFW_ACTIVATION_MODE
MD 32610: VELO_FFW_WEIGHT
MD 32650: AX_INERTIA</td></tr>
<tr><td>-</td><td colspan="2"></td><td></td><td></td><td></td></tr>
<tr><td>-</td><td>-</td><td>1</td><td>0</td><td>4</td><td>7/2</td></tr>
</table>

32630	FFW_ACTIVATION_MODE		A07, A09	K3,PA1
-	Activate feedforward control from program		BYTE	RESET

With FFW_ACTIVATION_MODE you can define whether the feedforward control for this axis/spindle can be switched on and off by the part program.

0 = The feedforward control cannot be switched on or off by the high level elements FFWON or FFWOF.
For the axis/spindle the state specified with MD: FFW_MODE therefore always becomes effective.
1 = The feedforward control can be switched on or off by the part program with FFWON or FFWOF.
The default setting is specified with channel-specific MD 20150: GCODE_RESET_VALUES. This setting is valid, before the first NC block is executed.

The last valid state continues to be active even after Reset (and therefore also with JOG).
As the feedforward control is switched on or off by all axes of the channel with FFWON or FFWOF, MD:FFW_ACTIVATION_MODE should be set identical for interpolating axses.

Related to:
MD 32620: FFW_MODE
MD 20150: GCODE_RESET_VALUES

CTEQ					
-	-	1	-	-	7/2

32640	STIFFNESS_CONTROL_ENABLE		A01, A07	K3,FBA
-	Dynamic stiffness control		BOOLEAN	NEW CONF

Activate dynamic stiffness control, if bit is set.
With active stiffness control, higher servo gain factors are possible (MD 32200: POSCTRL_GAIN).

Note on SIMODRIVE 611D:
Due to the higher computational load in the SIMODRIVE 611D, the setting of the sampling cycles (current/drive module sampling time) should possibly be adjusted in the 611D. For a single-axis drive module, the standard setting (sampling time: 125 µs current, 125 µs speed controller) is sufficient; for double-axis modules, the speed controller should possibly be increased (to 250 µs).

CTEQ					
-	1	FALSE	-	-	7/2

32642	STIFFNESS_CONTROL_CONFIG		A01, A07	K3,FBA
-	Dynamic stiffness control configuration		BYTE	NEW CONF

Configuration of dynamic stiffness control (DSC):
0 = Standard case: DSC in drive works with indirect measuring system
1 = DSC in drive works with direct measuring system
Note:
Availability of this function depends on the drive used; it is not supported, for example, by SIMODRIVE 611D.

CTEQ					
-	1	0	0	1	7/2

32644	**STIFFNESS_DELAY_TIME**			A01, A07	K3,FBA
s	dynamic stiffness control: Delay			DOUBLE	POWER ON
Configuration of compensation dead time of the dynamic stiffness control (DSC) with optimized DP cycle (e.g. SIMODRIVE 611U), unit: seconds					
CTEQ					
-	1	0.0	-0.02	0.02	7/2

32650	**AX_INERTIA**			EXP, A07, A09	K3
kgm²	Inertia for torque feedforward control			DOUBLE	NEW CONF
Axis inertia. Required for torque feedforward control.					
-					
-	-	0.0	-	-	7/2

32652	**AX_MASS**			EXP, A07, A09	K3
kg	Axis mass for torque feedforward control			DOUBLE	NEW CONF
Mass of axis for torque feedforward control. This MD is used instead of AX_INERTIA on linear drives (DRIVE_TYPE=3).					
-					
-	-	0.0	-	-	7/2

32700	**ENC_COMP_ENABLE**			A09	K3
-	Encoder/spindle error compensation.			BOOLEAN	NEW CONF
1: LEC (leadscrew error compensation) is activated for the measuring system. Leadscrew errors and measuring system errors can thus be compensated. The function is not enabled internally until the relevant measuring system has been referenced (IS: "Referenced/synchronized" = 1). 0: LEC is not active for the axis/measuring system. Related to: MD: MM_ENC_COMP_MAX_POINTS number of interpolation points with LEC IS "Referenced/synchronized 1" IS "Referenced/synchronized 2"					
-					
-	2	FALSE, FALSE	-	-	7/2

32710	**CEC_ENABLE**		A09	K3	
-	Enable of sag compensation		BOOLEAN	NEW CONF	
1: Sag compensation is enabled for this axis. Inter-axis machine geometry errors (e.g. sag and angularity errors) can be compensated with sag compensation. The function is not activated in the control until the following conditions have been fulfilled: - Option "Interpolatory compensation" is set - Associated compensation tables have been loaded into the NC user memory and have been enabled (SD: CEC_TABLE_ENABLE[t] = 1) - The position measuring system required is referenced (IS "Referenced/synchronized" = 1). 0: Sag compensation is not enabled for the compensation axis. Related to: MD: MM_CEC_MAX_POINTS[t] Number of interpolation points for sag compensation SD: CEC_TABLE_ENABLE[t] Enable evaluation of sag compensation table t IS "Referenced/synchronized 1 or 2" DB31-48, DBX60.4 or 60.5					
-					
-	-	FALSE	-	-	7/2

32711	**CEC_SCALING_SYSTEM_METRIC**		A09	K3	
-	Measuring system of sag compensation		BOOLEAN	NEW CONF	
Compensation data exist in: 0: inch system 1: metric system					
-					
-	-	TRUE	-	-	7/2

32720	**CEC_MAX_SUM**			A09	K3
mm, degrees	Maximum compensation value for sag compensation			DOUBLE	NEW CONF

```
In sag compensation, the absolute value of the total compensation value (sum
    of compensation values of all active compensation relations) is monitored
    axially with machine data value CEC_MAX_SUM.

If the determined total compensation value is larger than the maximum value,
    alarm 20124 is triggered. Program processing is not interrupted. The com-
    pensation value output as the additional setpoint is limited to the maxi-
    mum value.

MD irrelevant for:
- MSEC
- Backlash compensation
- Temperature compensation

Related to:
   MD: CEC_ENABLE
   Enable sag compensation
   SD: CEC_TABLE_ENABLE[t]
   Enable evaluation of sag compensation table t
    IS "Referenced/synchronized 1 or 2"
   DB31-48, DBX60.4 or 60.5
```

-					
-	-	1.0	0	10.0	7/2

32730	**CEC_MAX_VELO**			EXP, A09, A04	K3
%	Change in velocity at 1			DOUBLE	NEW CONF

```
In sag compensation, modification of the total compensation value (sum of the
    compensation values of all active compensation relations) is limited axi-
    ally. The maximum change value is defined in this machine data as a per-
    centage of MD 32000: MAX_AX_VELO (maximum axis velocity).

If the change in the total compensation value is greater than the maximum
    value, alarm 20125 is output. Program processing is however continued. The
    path not covered because of the limitation is made up as soon as the com-
    pensation value is no longer subject to limitation.

MD irrelevant for:
- MSEC
- Backlash compensation
- Temperature compensation

Related to:
   MD: CEC_ENABLE
   Enable sag compensation
   MD: MAX_AX_VELO
   Maximum axis velocity
   SD: CEC_TABLE_ENABLE[t]
   Enable evaluation of sag compensation table t
    IS "Referenced/synchronized 1 or 2"
   DB31-48, DBX60.4 or 60.5
```

-					
-	-	10.0	0	100.0	7/2

32750	**TEMP_COMP_TYPE**			A09	K3,W1
-	Temperature compensation type			BYTE	POWER ON

```
The type of temperature compensation applicable to the machine axis is acti-
    vated in MD: TEMP_COMP_TYPE.
A distinction is made between the following types:

0: No temperature compensation active
1: Position-independent temperature compensation active
   (compensation value with SD: TEMP_COMP_ABS_VALUE)
2: Position-dependent temperature compensation active
   (compensation value with SD: TEMP_COMP_SLOPE and SD:
TEMP_COMP_REF_POSITION)
3: Position-dependent and position-independent temperature compensation active
   (compensation values with SD acc. to type 1 and 2)
Temperature compensation is an option that must be enabled.

Related to:
   SD: TEMP_COMP_ABS_VALUE
   Position-dependent temperature compensation value
   SD: TEMP_COMP_REF_POSITION
   Reference point for position-dependent temperature compensation
   SD: TEMP_COMP_SLOPE
   Gradient for position-dependent temperature compensation
   MD: COMP_ADD_VELO_FACTOR
   Excessive velocity  due to compensation
```

CTEQ					
-	-	0	0	7	7/2

32760	COMP_ADD_VELO_FACTOR	EXP, A09, A04	K3
-	Excessive velocity due to compensation	DOUBLE	POWER ON

```
The maximum distance that can be traversed because of temperature compensa-
    tion in one IPO cycle can be limited by axial MD: COMP_ADD_VELO_FACTOR.
If the resulting temperature compensation value is above this maximum, it is
    traversed over several IPO cycles. There is no alarm.
The maximum compensation value per IPO cycle is specified as a factor refer-
    ring to the maximum axis velocity (MD: MAX_AX_VELO).
The maximum gradient of the temperature compensation tanbmax is also limited
    with this machine data.
Example of calculation of the maximum gradient tanb(max):
1.  Calculation of the interpolator cycle time (see Description of Functions
    Velocities, Setpoint/Actual-Value Systems, Cycle Times (G2))
    Interpolator cycle time = Basic system clock rate * factor for interpola-
    tion cycle
    Interpolator cycle time = MD: SYSCLOCK_CYCLE_TIME * MD:
    IPO_SYSCLOCK_TIME_RATIO
    Example:
    MD: SYSCLOCK_CYCLE_TIME = 0.004 [s]
    MD: IPO_SYSCLOCK_TIME_RATIO = 3
    -> Interpolator cycle time = 0.004 * 3 = 0.012 [s]
2.  Calculation of the maximum velocity increase resulting from a change made
    to the temperature compensation parameter DvTmax

    DvTmax = MD: MAX_AX_VELO * MD: COMP_ADD_VELO_FACTOR

    Example:  MD: MAX_AX_VELO = 10 000 [mm/min ]

                  MD: COMP_ADD_VELO_FACTOR = 0.01
         -> DvTmax = 10 000 * 0.01 = 100 [mm/min]

3.  Calculation of the traverse distances per interpolator cycle

                                     0.012
     S1 (at vmax)      = 10 000 x  --------- = 2.0 [mm]
                                      60

                                      0.012
     ST (at DvTmax) =       100 x  --------- = 0.02 [mm]
                                       60
4.  Calculation of tanbmax
                         ST      0.02
           tanbmax  =   ----  = ------  = 0.01 (corresponds to value for
                         S1        2              COMP_ADD_VELO_FACTOR)

            -> bmax = arc tan 0.01 = 0.57 degrees
    With larger values of SD: TEMP_COMP_SLOPE, the maximum gradient (here 0.57
    degrees) for the position-dependent temperature compensation value is used
    internally. There is no alarm.
```

```
Note:
   Any additional excessive velocity resulting from temperature compensation
must be taken into account when defining the limit value for velocity monitor-
ing (MD: AX_VELO_LIMIT).
MD irrelevant for:
   TEMP_COMP_TYPE = 0, sag compensation, LEC, backlash compensation
Related to:
   MD: TEMP_COMP_TYPE
   Temperature compensation type
   SD: TEMP_COMP_ABS_VALUE
   Position-independent temperature compensation value
   SD: TEMP_COMP_SLOPE
   Gradient for position-dependent temperature compensation
   MD: MAX_AX_VELO
   Maximum axis velocity
   MD: AX_VELO_LIMIT
   Threshold value for velocity monitoring
   MD: IPO_SYSCLOCK_TIME_RATIO
   Ratio basic system clock rate to IPO cycle
   MD: SYSCLOCK_CYCLE_TIME
   Basic system clock rate
```

CTEQ					
-	-	0.01	0.	0.10	7/2

32800	**EQUIV_CURRCTRL_TIME**			EXP, A07, A09	K3,G2
s	Equiv. time const. current control loop for feedforward control			DOUBLE	NEW CONF

This time constant must be equal to the equivalent time constant of the closed current control loop.
It is used for parameterizing the torque feedforward control and for calculating the dynamic following error model (contour monitoring).
For a correctly set torque feedforward control, the equivalent time constant of the current control loop must be determined exactly by measuring the step response of the current control loop.
On SIMODRIVE 611D, the transient condition can be displayed by means of the startup tool.

With $MA_FFW_MODE=4, closed-loop control free of following errors can be set by means of negative values (overshoots during positioning might then possibly occur).
Delay values taken into account automatically by the software internally are thus compensated again until the actually active minimum symmetrizing time "0" is reached.
Any other negative input values have no further effect.
With $MA_FFW_MODE=2, negative input values are automatically converted to the input value "0" internally, which means that they are not active in this case.

Related to:
MD: FFW_MODE
Type of feedfoward control
MD: AX_INERTION
Moment of inertia for speed feedforward control
MD: CONTOUR_TOL
Tolerance band contour monitoring

-					
-	6	0.0005, 0.0005, 0.0005, 0.0005, 0.0005, 0.0005	-	-	7/2

32810	EQUIV_SPEEDCTRL_TIME		A07, A09	K3,G2	
s	Equiv. time constant speed control loop for feedforward control		DOUBLE	NEW CONF	
This time constant must be equal to the equivalent time constant of the closed current control loop. It is used for parameterizing the speed feedforward control and for calculating the dynamic following error model (contour monitoring). For a correctly set speed feedforward control, the equivalent time constant of the current control loop must be determined exactly by measuring the step response of the current control loop. On SIMODRIVE 611D, the transient condition can be displayed by means of the startup tool. With $MA_FFW_MODE=3, closed-loop control free of following errors can be set by means of negative values (overshoots during positioning might then possibly occur). Delay values taken into account automatically by the software internally are thus compensated again until the actually active minimum symmetrizing time "0" is reached. Any other negative input values have no further effect. With $MA_FFW_MODE=1, negative input values are automatically converted to the input value "0" internally, which means that they are not active in this case. Related to: MD: FFW_MODE Type of feedfoward control MD: VELO_FFW_WEIGHT Moment of inertia for speed feedforward control MD: CONTOUR_TOL Tolerance band contour monitoring					
-					
-	6	0.008, 0.008, 0.008, 0.008, 0.008, 0.008	-	-	7/2
840di-basic	-	0.004, 0.004, 0.004, 0.004, 0.004...	-	-	-/-
840di-universal	-	0.004, 0.004, 0.004, 0.004, 0.004...	-	-	-/-
840di-plus	-	0.004, 0.004, 0.004, 0.004, 0.004...	-	-	-/-

32900	DYN_MATCH_ENABLE		A07	G2	
-	Dynamic response adaptation		BOOLEAN	NEW CONF	
With dynamic response adaptation, axes with different servo gain factors can be set to the same following error with MD: DYN_MATCH_TIME. 1: Dynamic response adaptation active. 0: Dynamic response adaptation inactive. Related to: MD 32900: DYN_MATCH_TIME[n] (time constant of dyamic response adaptation)					
CTEQ					
-	-	FALSE	-	-	7/2

32910	DYN_MATCH_TIME		A07		G2
s	Time constant of dynamic response adaptation		DOUBLE		NEW CONF
The time constant of the dynamic response adaptation of an axis has to be entered in this MD. Axes interpolating with each other but having different dynamic responses can be adapted to the "slowest" control loop by means of this value. The difference of the equivalent time constant of the "slowest" control loop to the individual axis has to be entered here as the time constant of the dynamic response adaptation. The MD is only active if MD: DYN_MATCH_ENABLE = 1. Related to: MD 32900: DYN_MATCH_ENABLE (dynamic response adaptation)					
-					
-	6	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/2

32920	AC_FILTER_TIME		A10		S5,FBSY
s	Smoothing filter time constant for adaptive control		DOUBLE		POWER ON
With the main run variables $AA_LOAD, $AA_POWER, $AA_TORQUE and $AA_CURR, the following drive actual values can be measured: - Drive utilization - Drive active power - Drive torque setpoint value - Current actual value of the axis or spindle To compensate any peaks, the measured values can be smoothed with a PT1 filter. The filter time constant is defined via MD: AC_FILTER_TIME (filter smoothing time constant for adaptive control). When measuring the drive torque setpoint value or the current actual value, the filter is active in addition to the filters available in the drive. The two filters are connected in series, if both strongly and slightly smoothed values are required in the system. The filter is switched off when a smoothing time of 0 seconds is entered.					
-					
-	-	0.0	-	-	7/2

32930	POSCTRL_OUT_FILTER_ENABLE		A07		G2
-	Activation of low-pass filter at position controller output		BOOLEAN		NEW CONF
Activation of low-pass filter at position controller output. Activation of the low-pass filter is only enabled when the dynamic stiffness control is inactive MD32640=0.					
CTEQ					
-	-	FALSE	-	-	7/2

32940	POSCTRL_OUT_FILTER_TIME			A07	G2
s	Time constant of low-pass filter at position controller output			DOUBLE	NEW CONF
Time constant of low-pass filter at position controller output					
-					
-	-	0.0	-	-	7/2

32950	POSCTRL_DAMPING			EXP, A07	G2
%	Damping of the speed control circuit.			DOUBLE	NEW CONF
Factor for additional attenuation of the speed control loop Application: Attenuation of an oscillating axis through additional activation of a rotational speed difference, which is determined from the difference of the two measuring systems. One encoder must be connected directly, the other indirectly. Explanation of normalization by means of SIMODRIVE 611D: An input value of "100%" means: An additional torque is activated in accordance with drive MD 1725, if - a positional deviation of 1mm exists on linear motors - a load-side positional deviation of 360 degrees exists on rotary axes - a positional deviation corresponding to $MA_LEADSCREW_PITCH (e.g. 10mm as a standard) exists on linear axes (rot. drive).					
-					
-	-	0.0	-	-	7/2

32990	POSCTRL_DESVAL_DELAY_INFO			EXP, A01, A07	B3
s	Actual setpoint position delay			DOUBLE	NEW CONF
This MD shows the additional setpoint value delay of the position controller in the current controller structure. It is set automatically for NCU link with different position controller cycles and can be changed via MD $MN_POSCTRL_DESVAL_DELAY for the entire NCU. In index 0, the value is displayed without feedforward control. In index 1, the value is displayed with speed feedforward control. In index 2, the value is displayed with torque feedforward control. Related to: $MN_POSCTRL_DESVAL_DELAY					
READ					
-	3	0.0, 0.0, 0.0	-	-	7/0

33000	FIPO_TYPE		EXP, A07	G2
-	Fine interpolator type		BYTE	POWER ON
The type of the fine interpolator has to be entered in this MD: 1: differential FIPO 2: cubic FIPO 3: cubic FIPO, optimized for operation with feedforward control Calculation time required and contour quality increase with increasing type of FIPO. - The default setting is the cubic FIPO. - If no feedforward control is used in the position control loop, the use of the differential FIPO reduces the calculation time while slightly increasing the contour error. - If the position control cycle and the interpolation cycle are identical, fine interpolation does not take place, i.e. the different types of fine interpolator do not have different effects.				
CTEQ				
-	-	2	1	3	7/2

33050	LUBRICATION_DIST		A03, A10	A2
mm, degrees	Traversing path for lubrication from PLC		DOUBLE	NEW CONF
After the traversing path defined in the MD has been covered, the state of the axial IS "Lubrication pulse" is inverted with which an automatic lubrication device can be activated. The traversing path is summated after Power on. The "Lubrication pulse" can be used with axes and spindles. Application example(s): The machine bed lubrication can be carried out as a function of the relevant traversed path. Note: When 0 is entered, IS "Lubrication pulse" (DB31, ... DBX76.0) is set in every cycle. Related to: IS "Lubrication pulse" (DB31, ... DBX76.0)				
-				
-	-	1.0e8	-	-	7/2

33060	MAINTENANCE_DATA		A10	-
-	Configuration of maintenance data recording		DWORD	RESET
Configuration of axis maintenance data recording: Bit 0: Recording the entire traversing path, entire traversing time and number of axis traversing procedures Bit 1: Recording the entire traversing path, entire traversing time and number of traversing procedures at high axis speed Bit 2: Recording the total sum of axis jerks, the time in which the axis is traversed with jerk, and the number of traversing procedures with jerk.				
-				
-	-	1	-	-	7/2

33100	**COMPRESS_POS_TOL**			A10	K1,PGA
mm, degrees	Maximum deviation during compression			DOUBLE	NEW CONF
The value specifies the maximum permitted path deviation for each axis with compression. The larger the value, the more short blocks can be compressed into a long block.					
CTEQ					
-	-	0.1	1.e-9	-	7/7

1.5.4 Reference point approach

34000	**REFP_CAM_IS_ACTIVE**			A03, A11	R1
-	Axis with reference point cam			BOOLEAN	RESET
1: There is at least one reference point cam for this axis 0: This axis does not have a reference point cam (e.g. rotary axis) The referencing cycle starts immediately with phase 2 (see documentation) Machine axes that have only one zero mark over the whole travel range or rotary axes that have only one zero mark per revolution do not require an additional reference cam that selects the zero mark (select REF_CAM_IS_ACTIVE = 0). The machine axis marked this way accelerates to the velocity specified in MD 34040: REFP_VELO_SEARCH_MARKER (reference point creep velocity) when the plus/minus traversing key is pressed and synchronizes with the next zero mark.					
-					
-	-	TRUE	-	-	7/2

34010	REFP_CAM_DIR_IS_MINUS		A03, A11		R1
-	Approach reference point in minus direction		BOOLEAN		RESET

```
0: REF_CAM_DIR_IS_MINUS
   Reference point approach in plus direction

1: REF_CAM_DIR_IS_MINUS
   Reference point approach in minus direction

For incremental measuring systems:
If the machine axis is positioned in front of the reference cam, it acceler-
    ates, depending on the plus/minus traversing key pressed, to the velocity
    specified in MD 34020: REFP_VELO_SEARCH_CAM (reference point approach
    velocity) in the direction specified in MD: REFP_CAM_DIR_IS_MINUS. If the
    wrong traversing key is pressed, reference point approach is not started.

If the machine axis is positioned on the reference cam, it accelerates to the
    velocity specified in MD 34020: REFP_VELO_SEARCH_CAM and travels in the
    direction opposite to that specified in MD: REFP_CAM_DIR_IS_MINUS.

For linear measuring systems with distance-coded reference marks:
If the machine axis has a reference cam (linear measuring systems with dis-
    tance-coded reference marks do not necessarily require a reference cam)
    and the machine axis is positioned on the reference cam, it accelerates,
    independent of the plus/minus traversing key pressed, to the velocity
    specified in MD 34040: REFP_VELO_SEARCH_MARKER (reference point creep
    speed) in the direction opposite to that specified in MD:
    REFP_CAM_DIR_IS_MINUS.
```

-					
-	-	FALSE	-	-	7/2

34020	REFP_VELO_SEARCH_CAM		A03, A11, A04		R1
mm/min, rev/min	Reference point approach velocity		DOUBLE		RESET

```
The reference point approach velocity is the velocity at which the machine
    axis travels in the direction of the reference cam after the traversing
    key has been pressed (phase 1). This value should be set at a magnitude
    large enough for the axis to be stopped to 0 before it reaches a hardware
    limit switch.

MD irrelevant for:
   Linear measuring systems with distance-coded reference marks
```

-					
-	-	5000.00	-	-	7/2

34030	**REFP_MAX_CAM_DIST**			A03, A11	R1
mm, degrees	Maximum distance to reference cam			DOUBLE	RESET
If the machine axis travels a maximum distance defined in MD: REFP_MAX_CAM_DIST from the starting position in the direction of the reference cam, without reaching the reference cam (IS "Reference point approach delay" (DB31, ... DBX12.7) is reset), the axis stops and alarm 20000 "Reference cam not reached" is output. MD irrelevant for: Linear measuring systems with distance-coded reference marks					
-					
-	-	10000.0	-	-	7/2

34040	**REFP_VELO_SEARCH_MARKER**	A03, A11, A04	R1
mm/min, rev/min	Creep velocity	DOUBLE	RESET

1) For incremental measuring systems:

This is the velocity at which the axis travels in the time between initial detection of the reference cam and synchronization with the first zero mark (phase 2).

Traversing direction: Opposite to the direction specified for the cam search (MD 34010: REFP_CAM_DIR_IS_MINUS)

If MD 34050: REFP_SEARCH_MARKER_REVERSE (direction reversal on reference cam) is enabled, the axis, in the case of synchronization to a rising reference cam signal edge, travels to the cam at the velocity defined in MD 34020: REFP_VELO_SEARCH_CAM.

2) For linear measuring systems with distance-coded reference marks:

The axis crosses the two reference marks at this velocity. The max. velocity must be small enough that the time required to travel the smallest possible reference mark distance [(x(minimum)] on the linear measuring system is larger than one position controller cycle.

The formula

```
                     Basic dist.                  Meas.length
[x(minimum)] [mm] = ----------- * Grad.cycle - --------------
                          2                        Basic dist.

with    Basic distance [multiple of graduation cycle]
           Graduation cycle [mm]
           Measuring length [mm]     yields:

                               x(minimum) [mm]
     max. velocity [m/s] = --------------------------------
                               Position controller cycle  [ms]
```

This limiting value consideration also applies to the other measuring systems.

Traversing direction:

- as defined in MD: REFP_CAM_DIR_IS_MINUS;
- if the axis is already positioned on the cam, the axis is traversed in the opposite direction

3) Indirect measuring system with BERO on the load-side (preferred for spindles)

At this velocity, the zero mark associated with the BERO is searched for (zero mark selection per VDI signal). The zero mark is accepted if the actual velocity lies within the tolerance range defined in MD 35150: SPIND_DES_VELO_TOL as deviation from the velocity specified in MD 34040: REFP_VELO_SEARCH_MARKER[n].

-					
-	2	300.00, 300.00	-	-	7/2

34050	**REFP_SEARCH_MARKER_REVERSE**			A03, A11	R1
-	Direction reversal to reference cam			BOOLEAN	RESET

This MD can be used to set the direction of search for the zero mark:

REFP_SEARCH_MARKER_REVERSE = 0
Synchronization with falling reference cam signal edge
The machine axis accelerates to the velocity specified in MD 34040:
REFP_VELO_SEARCH_MARKER (reference point creep velocity) in the opposite direction to that specified in MD 34010: REFP_CAM_DIR_IS_MINUS (reference point approach in minus direction) .
When the axis leaves the reference cam (IS "Reference point approach delay" (DB31, ... DBX12.7) is reset) the control is synchronized with the first zero mark.

MD: REFP_SEARCH_MARKER_REVERSE = 1
Synchronization with rising reference cam signal edge
The machine axis accelerates to the velocity defined in MD 34020:
REFP_VELO_SEARCH_CAM (reference point creep velocity) in the opposite direction to that specified in the MD: REFP_CAM_DIR_IS_MINUS. When the axis leaves the reference cam (IS "Reference point approach delay" is reset), the machine axis decelerates to a halt and accelerates in the opposite direction towards the reference cam at the velocity specified in MD: REFP_VELO_SEARCH_MARKER. When the reference cam is reached (IS "Reference point approach delay" (DB31, ... DBX12.7) is enabled) the control is synchronized with the first zero mark.

MD irrelevant for:
Linear measuring systems with distance-coded reference marks

-					
-	2	FALSE, FALSE	-	-	7/2

34060	**REFP_MAX_MARKER_DIST**			A03, A11	R1
mm, degrees	maximum distance to reference mark			DOUBLE	RESET

For incremental measuring systems:
If, after leaving the reference cam (IS "Reference point approach delay" is reset), the machine axis travels a distance defined in MD: REFP_MAX_MARKER_DIST without detecting the zero mark, the axis stops and alarm 20002 "Zero mark missing" is output.

For linear measuring systems with distance-coded reference marks:
If the machine axis travels a distance defined in MD: REFP_MAX_MARKER_DIST from the starting position without crossing two zero marks, the axis stops and alarm 20004 "Reference mark missing" is output.

-					
-	2	20.0, 20.0	-	-	7/2

34070	REFP_VELO_POS			A03, A11, A04	R1
mm/min, rev/min	Reference point positioning velocity			DOUBLE	RESET
For incremental measuring systems: The axis travels at this velocity between the time of synchronization with the first zero mark and arrival at the reference point. For linear measuring systems with distance-coded reference marks: The axis travels at this velocity between the time of synchronization (crossing two zero marks) and arrival at the target point.					
-					
-	-	10000.00	-	-	7/2

34080	REFP_MOVE_DIST			A03, A11	R1
mm, degrees	Reference point distance			DOUBLE	NEW CONF
1. Standard measuring system (incremental with equidistant zero marks) Reference point positioning movement: 3rd phase of the reference point approach: The axis traverses from the position at which the zero mark is detected with the velocity REFP_AX_VELO_POS along the path REFP_MOVE_DIST + REFP_MOVE_DIST_CORR (relative to the marker). REFP_SET_POS is set as the current axis position at the target point. 2. Irrelevant for distance-coded measuring system. Override switch and selection jog/continuous mode (MD JOG_INC_MODE_IS_CONT) are active.					
-					
-	2	-2.0, -2.0	-	-	7/2

34090	REFP_MOVE_DIST_CORR		A03, A02, A08, A11	R1
mm, degrees	Reference point offset/absolute offset		DOUBLE	NEW CONF

```
- Incremental encoder with zero mark(s):
   After recognition of the zero mark, the axis is positioned away from the
zero mark by the distance specified in MD 34080: REFP_MOVE_DIST +
REFP_MOVE_DIST_CORR. After traversing this distance, the axis has reached the
reference point. MD 34100: REFP_SET_POS is transferred into the actual value.
   During traversing by REFP_MOVE_DIST+REFP_MOVE_DIST_CORR, the override
switch and MD : JOG_INC_MODE_IS_CONT (jog/continuous mode) are active

- Distance-coded measuring system:
   REFP_MOVE_DIST_CORR acts as an absolute offset. It describes the offset
between the machine zero and the first reference mark of the measuring sys-
tem. Messsystems.

- Absolute encoder:
   REFP_MOVE_DIST_CORR acts as an absolute offset.
    It describes the offset between the machine zero and the zero point of the
    absolute measuring system.

Note:
    In conjunction with absolute encoders, this MD is modified by the control
    during calibration processes and modulo offset!
   With rotary absolute encoders (on linear and rotary axes), the modifica-
tion frequency  also depends on the setting of MD34220 ENC_ABS_TURNS_MODULO.
   Manual input or modification of this MD via the part program should there-
fore be followed by a Power ON Reset to activate the new value and to ensure
that it will not be lost.

The following applies for NCU-LINK:
If a link axis uses an absolute encoder, every modification of MD34090 on the
    home NCU (servo physically available) is updated only locally and not
    beyond the limits of the NCU. The modification is therefore not visible
    for the link axis. Writing of MD34090 through the link axis is rejected
    with alarm 17070.
```

-, -					
-	2	0.0, 0.0	-1e15	1e15	7/2

34092	**REFP_CAM_SHIFT**			A03, A11	R1
mm, degrees	electronic cam offset for incremental measuring systems			DOUBLE	RESET
Electronic cam offset for incremental measuring systems with equidistant zero marks. When the reference cam signal occurs, the zero mark search does not start immediately but is delayed until after the distance from REFP_CAM_SHIFT. This ensures the reproducibility of the zero mark search through a defined selection of a zero mark, even with temperature-dependent expansion of the reference cam. Because the reference cam offset is calculated by the control in the interpolation cycle, the actual cam offset is at least REFP_CAM_SHIFT and at most REFP_CAM_SHIFT+(MD 34040: REFP_VELO_SEARCH_MARKER*interpolation cycle) The reference cam offset is effective in the search direction of the zero mark. The reference cam offset is only active if existing cam MD 34000: REFP_CAM_IS_ACTIVE=1.					
-					
-	2	0.0, 0.0	-	-	7/2

34093	**REFP_CAM_MARKER_DIST**			A03, A11	R1
mm, degrees	Reference cam/reference mark distance			DOUBLE	POWER ON
The value displayed corresponds to the distance between exiting the reference cam and the occurrence of the reference mark. If the values are too small, there is a risk of not being able to determine the reference point due to temperature reasons or varying operating times of the cam signal. The distance travelled may serve as a clue for setting the electronic reference cam offset. This machine data is a display data and can therefore not be changed.					
READ					
-	2	0.0, 0.0	-	-	7/2

34100	**REFP_SET_POS**			A03, A11	R1
mm, degrees	Reference point value/target point for distance-coded system			DOUBLE	RESET
- Incremental encoder with zero mark(s): The position value which is set as the current axis position after detection of the zero mark and traversal of the distance REFP_MOVE_DIST + REFP_MOVE_DIST_CORR (relative to zero mark). The REFP_SET_POS for the reference point number, which is set as the instant that the edge of the reference cam signal (IS DB31, ...DBX2.4-2.7) rises, is set as the axis position. - Distance-coded measuring system: Target position which is approached when REFP_STOP_AT_ABS_MARKER is set to 0 (FALSE) and two zero marks have been crossed. - Absolute encoder: REFP_SET_POS corresponds to the correct actual value at the calibration position. The reaction on the machine depends on the status of MD34210: ENC_REFP_STATE: When ENC_REFP_STATE = 1, the value of REFP_SET_POS is transferred as the absolute value. When ENC_REFP_STATE = 2 and REFP_STOP_AT_ABS_MARKER = 0 (FALSE), the axis approaches the target position stored in REFP_SET_POS. The value of REFP_SET_POS that has been set via (IS DB31, ...DBX2.4-2.7) is used. Related to: IS "Reference point value 1 to 4" (DB31, ... DBX2.4 -2.7)					
-					
-	4	0., 0., 0., 0.	-45000000	45000000	7/2

34102	**REFP_SYNC_ENCS**			A03, A02	R1
-	Calibration of measuring systems			BYTE	RESET
Calibrating the measuring system to the reference measuring system can be activated for all measuring systems of this axis with this machine data. The calibration procedure is made during reference point approach or when calibrated absolute encoders selected for the closed-loop control are switched on. Values: 0: No measuring system calibration, measuring systems must be referenced individually 1: Calibration of all measuring systems of the axis to the position of the reference measuring system In combination with MD30242 ENC_IS_INDEPENDENT = 2, the passive encoder is calibrated to the active encoder but NOT referenced.					
-					
-	-	0	0	1	7/2

34104	**REFP_PERMITTED_IN_FOLLOWUP**			A03, A02	-
-	Enable referencing in follow-up mode			BOOLEAN	RESET
An axis can also be referenced in the follow-up mode under JOG+REF mode by means of an external motion.					
-					
-	-	FALSE	-	-	7/2

34110	**REFP_CYCLE_NR**	A03	R1
-	Sequence of axes in channel-specific referencing	DWORD	POWER ON

```
MD: REFP_CYCLE_NR = 0 -----> axis-specific referencing
   Axis-specific referencing is started separately for each machine axis with
the IS "Plus/minus travel keys" (DB31, ... DBX4.7 and 4.6).
    Up to 8 axes on the 840D and up to 5 axes on the FM-NC/810D can be refer-
    enced simultaneously.
   The following alternatives are provided for referencing the machine axes in
a specific sequence:
- The operator observes the correct sequence on startup.
- The PLC checks the sequence on startup or defines the sequence itself.
- The channel-specific referencing function is used.

MD: REFP_CYCLE_NR = 1 -----> channel-specific referencing
   Channel-specific referencing is started with the IS "Activate referencing"
(DB21, ... DBX1.0). The control acknowledges a successful start with the IS
"Referencing active" (DB21, ... DBX33.0). Each machine axis assigned to the
channel can be referenced with channel-specific referencing (this is achieved
internally on the control by simulating the plus/minus traversing keys). The
axis-specific MD: REFP_CYCLE_NR can be used to define the sequence in which
the machine axes are referenced:
    -1 means:
   The machine axis is not started by channel-specific referencing  and NC
start is possible without referencing this axis.
    0 means:
   The machine axis is not started by channel-specific referencing and NC
start is not possible without referencing this axis.
    1 means:
   The machine axis is started by channel-specific referencing.
    2 means:
   The machine axis is started by channel-specific referencing if all machine
axes identified by a 1 in MD: REFP_CYCLE_NR are referenced.
    3 means:
   The machine axis is started by channel-specific referencing if all machine
axes identified by a 2 in MD: REFP_CYCLE_NR are referenced.
    4 to 8 :
    As above for further machine axes.

Setting the channel-specific MD 20700: REF_NC_START_LOCK (NC start disable
without reference point) to zero has the effect of entering -1 for all the
axes of a channel.
MD irrelevant for:
   Axis-specific referencing
Related to:
    IS "Activate referencing" (DB21, ... DBX1.0)
    IS "Referencing active" (DB21, ... DBX33.0)
```

-					
-	-	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18...	-1	31	7/2

34120	**REFP_BERO_LOW_ACTIVE**			A02	M5
-	BERO polarity change			BOOLEAN	POWER ON
With this MD, the electrical "polarity" of a BERO connected to the digital drive is indicated. REFP_BERO_LOW_ACTIVE = 0 means: Non-deflected state 0 V (low), deflected state 24 V (high) REFP_BERO_LOW_ACTIVE = 1 means: Non-deflected state 24 V (high), deflected state 0 V (low) The polarity is evaluated in the referencing mode ENC_REFP_MODE = 5. Note: The use of this MD is allowed only in conjunction with ENC_REFP_MODE = 5 and the following SIMODRIVE 611 closed-loop control modules: Performance 1 control module (1 axis) 6SN1118R0DG2*-0AA1 Performance 1 control module (2 axes) 6SN1118R0DH2*-0AA1 Performance 2 control module (2 axes) 6SN1118R0DK23-0AA0 Related to: ENC_REFP_MODE					
-					
-	-	FALSE	-	-	7/2

34200	ENC_REFP_MODE	A03, A02	R1
-	Referencing mode	BYTE	POWER ON

```
For referencing, the position measuring systems mounted can be set as follows
    via ENC_REFP_MODE:
- ENC_REFP_MODE = 0
    If absolute encoder available: MD 34100: REFP_SET_POS is taken over
    Other encoders: Reference point approach not possible (SW2.2 and higher)
- ENC_REFP_MODE = 1
    Referencing of incremental measuring systems:
    Incremental rotary measuring system
    Incremental linear measuring system (linear measuring system)
    Zero pulse on encoder track (not with absolute encoders)
- ENC_REF_MODE = 2 :
    BERO with 1-edge detection. Also possible with absolute encoder. After
    referencing, the absolute encoder is additionally marked as "calibrated".
- ENC_REFP_MODE = 3
    Referencing on linear measuring systems with distance-coded reference
    marks:
    Linear measuring system with distance-coded reference marks (Heidenhain)
- ENC_REF_MODE = 4 :
    BERO with 2-edge evaluation (relevant only for FM-NC)
    The positive and negative edges of the reference point are passed one
    after the other and the corresponding actual values recorded.
    The mean value generated thereof is the synchronization point.
    With the 2-edge evaluation, a possible drift or temperature-dependent
    expansion of the BERO can be compensated.
- ENC_REF_MODE = 5:
    When the BERO is passed, the zero mark search is started with the detec-
    tion of the edge, and referencing to the next detected zero mark takes
    place.
- ENC_REFP_MODE = 6
    Measuring system calibration to an encoder already referenced
    (not NCU570) (SW3.2 and higher)
- ENC_REFP_MODE = 7
    BERO with configured approach velocity for axis and spindle applications
    (SW3.6 and higher) (MD 34040: REFP_VELO_SEARCH_MARKER[n]
    (reference point creep velocity [enc. no.].
- ENC_REFP_MODE = 8
    Referencing for linear measuring systems with distance-coded reference
    marks:
    Linear measuring system with distance-coded reference marks over 4 zero
    marks (increased safety).

When the BERO is crossed in mode 5, zero mark search is started with the rec-
ognition of the negative BERO edge and synchronization with the next zero mark
in sequence takes place.

Mode 6 can be used as a direct measuring system in measuring system configura-
tions with incremental encoders and as an indirect measuring system in config-
urations with absolute encoders. The absolute measuring system is then already
referenced by the incremental encoder at the time of referencing,
The absolute position is taken over by the incremental encoder after travers-
    ing of the distance REFP_MOVE_DIST> of the measured backlash. Afterwards,
    the incremental encoder is referenced.
Caution:
   This mode is available only with 611D drives!
```

-				

-	2	1, 1	0	8	7/2

34210	**ENC_REFP_STATE**	A07, A03, A02	R1
-	Adjustment status of absolute encoder	BYTE	SOFORT

```
- Absolute encoder:
   This machine data contains the absolute encoder status
0: Encoder is not calibrated
1: Encoder calibration enabled (but not yet calibrated)
2: Encoder is calibrated
   Default setting for new startup: Encoder is not calibrated.
- Incremental encoder:
   This machine data contains the "Referenced status", which can be saved over
Power On:
0: Default setting: No automatic referencing
1: Automatic referencing enabled, but encoder not yet referenced
2: Encoder is referenced and at exact stop, automatic referencing active with
next encoder activation
   Default setting for new startup: No automatic referencing
```

-					
-	2	0, 0	0	2	7/4

34220	**ENC_ABS_TURNS_MODULO**			A03, A02	R2
-	Modulo range for rotary absolute encoder			DWORD	POWER ON

Number of encoder revolutions, which a rotary absolute encoder can resolve (cf. also maximum multiturn information of the absolute encoder, cf. encoder data sheet or, for example SIMODRIVE 611D-MD 1021 or 1031).

The absolute position of a rotary axis is reduced to this resolvable range when an absolute encoder is switched on:
That means that a MODULO transformation takes place, if the actual position sensed is larger than the position permitted by MD ENC_ABS_TURNS_MODULO.
0 degree <= position <= n*360 degrees, (with n = ENC_ABS_TURNS_MODULO)

Note:
With SW 2.2, the position is reduced to this range when the control/encoder is switched on. With SW 3.6 and higher, half of this value represents the maximum permissible travel distance with the control swiched off / the encoder inactive.

Special cases:
For SIMODRIVE 611D, only powers of two are permissible values (1, 2, 4, 8, 16, ..., 4096).
If other values are entered, these are "rounded down" up to SW < 4.1 without any further message. With SW 4.1 and higher, a rounded down value bcomes visible in the machine data and is indicated by alarm 26025.

This MD is relevant only for rotary encoders (on linear and rotary axes).

Important recommendation:
The default value "1 encoder revolution" has been changed for SW 3.6 and higher to "4096". The new value is a more robust setting for the most frequently used encoder types.
When an encoder with a smaller multiturn information (encoder data sheet!) is used or when singleturn encoders are used, the value must be reduced accordingly. In either case, the value should be adjusted with multiturn absolute encoders to the maximum variable supported by the encoder, in order to be able to utilize the definite maximum travel range (Please observe: This value also influences the permissible position offset with the encoder inactive/Power Off).

Related to:
SIMODRIVE 611D-MD 1021, ENC_ABS_TURNS_MOTOR,
SIMODRIVE 611D-MD 1031, ENC_ABS_TURNS_DIRECT

-					
-	2	4096, 4096	1	100000	7/2

34230	**ENC_SERIAL_NUMBER**			A02	R1
-	Encoder serial number			DWORD	POWER ON

The encoder serial number (from EnDat encoders) can be read out here.
"0" is supplied for encoders which do not have a serial number available.

Manipulating this MD normally causes an automatic absolute encoder maladjustment ($MA_ENC_REFP_MODE returns to "0").

-					
-	2	0, 0	-	-	7/2

34232	**EVERY_ENC_SERIAL_NUMBER**			A02	R1
-	Range of encoder serial number			BOOLEAN	POWER ON
With this MD, the working range of MD $MA_ENC_SERIAL_NUMBER can be set on the SIMODRIVE 611D: 0 = Only valid encoder serial number are entered in the MD, i.e. when the drive supplies a "0" (which corresponds to invalid or unknown) the last valid encoder serial number is retained in the MD (e.g. for add-on axes that are not permanently connected to the machine). 1 = (default, upward compatible): The value supplied by the drive for the encoder serial number is taken over into the MD with every control runup. A validity check is not carried out. Note for PROFIBUS drives: As not every drive can supply the relevant parameters at all or in good time, the functionality is coded permanently corresponding to "0". A "1" setting is therefore ineffective on the PROFIBUS.					
-					
-	2	TRUE, TRUE	-	-	7/2

34300	**ENC_REFP_MARKER_DIST**			A03, A02	R1
mm, degrees	Basic distance of reference marks of distance-coded encoders.			DOUBLE	POWER ON
In addition to the incremental encoder track, a further encoder track is available with distance-coded measuring systems to determine the absolute encoder position. This encoder track has reference marks at defined different distances. The basic distance between the fixed reference marks (that are the reference marks which are always at the same distance to each other) can be taken from the data sheet and directly transferred to the machine data MD 34300. With the basic distance between the fixed reference marks (MD 34300), the distance between two reference marks (MD 34310) and the number of encoder marks (MD 31020) on angular measuring systems or the graduation cycle (MD 31010) on linear measuring systems, the absolute encoder position can be determined already after crossing of two subsequent reference marks. MD 34300 is also used for a plausibility check of reference mark distances. Examples of application: For example: Heidenhain LS186 C MD 31010 = 0.02mm (graduation cycle) MD 34300 = 20.00mm (basic distance between the reference marks) MD 34310 = 0.02mm (distance between two reference marks corresponds to one graduation cycle). In addition to the incremental encoder track, a further encoder track is available with distance-coded measuring systems to determine the absolute encoder position. This encoder track has reference marks at defined different distances. The basic distance between the fixed reference marks (that are the reference marks which are always at the same distance to each other) can be taken from the data sheet and directly transferred to the machine data MD 34300.					
-					
-	2	10.0, 10.0	-	-	7/2

34310	**ENC_MARKER_INC**			A03, A02	R1
mm, degrees	Interval between two reference marks for distance-coded scales			DOUBLE	RESET
The distances between two reference marks are defined variably, so that the position of the crossed reference marks can be determined accurately in linear measuring systems with distance-coded reference marks. The difference between two reference mark distances is entered in MD: ENC_MARKER_INC. MD irrelevant for: Incremental measuring systems Special cases: On linear measuring systems with distance-coded reference marks supplied by Heidenhain, the interval between two reference marks is always equal to one graduation cycle.					
-					
-	2	0.02, 0.02	-	-	7/2

34320	**ENC_INVERS**		A03, A02	G2,R1
-	Length measuring system inverse to axis movement.		BOOLEAN	RESET

```
- MD has no meaning for an incremental measuring system

- In the case of a distance-coded measuring system:
When setting a reference point, the actual position (determined by the dis-
tance-coded reference marks) on the linear measuring system is assigned to an
exact machine axis position (referred to the machine zero point). The abso-
lute offset between the machine zero point and the position of the 1st refer-
ence mark on the linear measuring system must therefore be entered in MD
34090: REFP_MOVE_DIST_CORR (reference point/absolute offset). In addition, MD:
ENC_INVERS must be used to set whether the linear measuring system is con-
nected in the same or the opposite direction to the machine system.

MD irrelevant for:
   Incremental encoders without distance-coded reference marks.
```

-					
-	2	FALSE, FALSE	-	-	7/2

34330	**REFP_STOP_AT_ABS_MARKER**		A03	R1
-	Distance-coded linear measuring system without target point		BOOLEAN	RESET

```
- Distance-coded measuring system:
REFP_STOP_AT_ABS_MARKER = 0:
At the end of the reference cycle, the position entered in MD 34100:
    REFP_SET_POS is approached (normal case for phase 2).
REFP_STOP_AT_ABS_MARKER = 1:
The axis is braked after detection of the second reference mark (shortening of
    phase 2)

- Absolute encoder:
MD REFP_STOP_AT_ABS_MARKER defines the response of an axis with valid calibra-
    tion identifier (MD 34210: ENC_REFP_STATE = 2) with G74 or when a travers-
    ing key is actuated in JOG-REF:
REFP_STOP_AT_ABS_MARKER = 0:
Axis traverses to the position entered in MD: REFP_SET_POS
REFP_STOP_AT_ABS_MARKER = 1:
Axis does not traverse.

MD irrelevant for:
   Incremental encoders with zero mark (standard encoders)

Related to:
    MD 34100: REFP_SET_POS
   (reference point distance/target point for distance-coded system)
```

-					
-	2	TRUE, TRUE	-	-	7/2

34990	**ENC_ACTVAL_SMOOTH_TIME**			A02	V1
s	Smoothing time constant for actual values.			DOUBLE	RESET
Using low-resolution encoders, a more continuous motion of coupled path or axis motions can be achieved with smoothed actual values. The bigger the time constant, the better the smoothing of actual values and the larger the over-travel. Smoothed actual values are used for: - Thread-cutting (G33, G34, G35) - Revolutional feedrate (G95, G96, G97, FPRAON) - Display of actual position and velocity, or speed respectively.					
-					
-	2	0.0, 0.0	0.0	0.5	7/2

1.5.5 Spindles

35000	**SPIND_ASSIGN_TO_MACHAX**			A01, A06, A11	S1
-	Assignment of spindle to machine axis			BYTE	POWER ON
To ensure that the NCK/PLC application interface is the same for all axes and spindles, spindles are always internally mapped onto machine axes on the control. SPIND_ASSIGN_TO_MACHAX is used to enter the machine axis that is used as the spindle. Related to: MD 30300: IS_ROT_AX (rotary axis/spindle) MD 30310: ROT_IS_MODULO (modulo conversion for rotary axis/spindle) These machine data must be set, since otherwise the alarms 4210 "Rotary axis declaration missing" and 4215 "Modulo axis declaration missing" are out-put.					
-					
-	-	0	0	20	7/2

35010	**GEAR_STEP_CHANGE_ENABLE**	A06, A11	S1
-	Parameterize gear stage change	DWORD	RESET

```
Meaning of bit places:

Bit0=0 and bit1=0:
   There is an invariable gear ratio between motor and load. The MD of the
first gear stage are active.
   Gear stage change with M40 to M45 is not possible.
Bit0=1:
   Gear stage change at undefined change position. The gear can have up to 5
gear stages, which can be selected with M40, M41 to M45.
    To support the gear stage change, the motor can carry out oscillating
    movements, which must be
   enabled by the PLC program.
Bit1=1:
   Same meaning as for bit0=1, however, the gear stage change is carried out
at configured spindle position (SW 5.3 and higher). The change position is
configured in
    MD 35011 "GEAR_STEP_CHANGE_POSITION". The position is approached at the
    current gear stage before
   the gear stage change.
    If this bit is set, bit0 is not taken into account!
Bit2 reserved
Bit3=1:
   The gear stage change dialog between NCK and PLC is simulated. An NCK-
internal acknowledgement is given. PLC signals for the change
   are output, checkback signals from the PLC are ignored because of the NCK-
internal acknowledgement.
Bit4 reserved
Bit5=1:
   For tapping with G331/G332, the second gear stage data set is used. The bit
must be set for the
   master spindle used for tapping.
   Bit0 or bit1 must be set!

Related to:
MD 35090: NUM_GEAR_STEPS            (number of gear stages 1st data set, see
    bit5)
MD 35092: NUM_GEAR_STEPS2           (number of gear stages 2nd data set, see
    bit5)
MD 35110: GEAR_STEP_MAX_VELO     (max. speed for autom. gear stage change)
MD 35112: GEAR_STEP_MAX_VELO2    (max. speed for autom. gear stage change 2nd
    data set, see bit5)
MD 35120: GEAR_STEP_MIN_VELO     (min. speed for autom. gear stage change)
MD 35122: GEAR_STEP_MIN_VELO2    (min. speed for autom. gear stage change 2nd
    data set, see bit5)
```

CTEQ					
-	-	0x00	0	0x2B	7/2

35012	GEAR_STEP_CHANGE_POSITION			A06, A11	S1
mm, degrees	Gear stage change position			DOUBLE	NEW CONF
Gear stage change position. The value range must be within the configured modulo range. Related to: MD 35010: GEAR_STEP_CHANGE_ENABLE, bit 1 MD 30330: MODULO_RANGE					
CTEQ					
-	6	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/2

35014	GEAR_STEP_USED_IN_AXISMODE			A01, A06, A11	-
-	Gear stage for axis mode with M70			DWORD	NEW CONF
With this MD, a gear stage can be defined which can be loaded into the axis mode during the transition with M70. The parameter set zero used in axis mode is to be optimized on this gear stage. Significance of the values: 0: There is no implicit gear stage change with M70. The current gear stage is retained. 1 ... 5: There is a change into gear stage (1...5) during the execution of M70. During the transition into axis mode without M70, there is monitoring for this gear stage and alarm 22022 is issued if necessary. The condition for a gear stage change is the general release of the function in MD 35010 GEAR_STEP_CHANGE_ENABLE. Secondary conditions: When changing from axis mode into spindle mode, the configured gear stage continues to remain active. There is no automatic return to the last active gear stage in spindle mode.					
CTEQ					
-	-	0	0	5	7/2

35020	SPIND_DEFAULT_MODE			A06, A10	S1
-	Initial spindle setting			BYTE	RESET
SPIND_DEFAULT_MODE activates the operating mode of the spindle at the time specified in MD 35030: SPIND_DEFAULT_ACT_MASK. The appropriate spindle operating modes can be selected with the following values: 0 Speed mode, position control deselected 1 Speed mode, position control activated 2 Positioning mode 3 Axis mode Related to: MD 35030: SPIND_DEFAULT_ACT_MASK (activate initial spindle setting)					
CTEQ					
-	-	0	0	3	7/2

35030	SPIND_DEFAULT_ACT_MASK		A06, A10	S1	
-	Time at which initial spindle setting is effective		BYTE	RESET	
SPIND_DEFAULT_ACT_MASK specifies the time at which the operating mode defined in MD 35020: SPIND_DEFAULT_MODE becomes effective. The initial spindle setting can be assigned the following values at the following points in time: 0 POWER ON 1 POWER ON and NC program start 2 POWER ON and RESET (M2/M30) Special cases: If MD 35040: SPIND_ACTIVE_AFTER_RESET = 1, the following supplementary conditions are applicable: - SPIND_DEFAULT_ACT_MASK should be set to 0 - If this is not possible, the spindle must be at standstill prior to activation. Related to: MD 35020: SPIND_DEFAULT_MODE (initial spindle setting) MD 35040: SPIND_ACTIVE_AFTER_RESET (spindle active via reset)					
CTEQ					
-	-	0x00	0	0x03	7/2

35032	SPIND_FUNC_RESET_MODE		A06, A10	W4	
-	Reset response of individual spindle functions		DWORD	POWER ON	
This data allows the "GWPS in every operating mode" function to be selected/deselected. SPIND_FUNC_RESET_MODE, bit 0 = 0 : "GWPS in every operating mode" is deselected SPIND_FUNC_RESET_MODE, bit 0 = 1 : "GWPS in every operating mode" is selected					
CTEQ					
-	-	0x00	0	0x01	7/2

35035	**SPIND_FUNCTION_MASK**			A06, A10	S1
-	Spindle functions			DWORD	RESET

```
This MD allows spindle-specific functions to be set.
The MD is bit-coded, the following bits are assigned:
Bit 0 = 1: With activated DryRun function for
           block programming (M40, M41 to M45), programming via FC18
           and synchronized actions, gear stage changes are suppressed.
Bit 1 = 1: With activated Program test function
           for block programming (M40, M41 to M45), programming via
           FC18 and synchronized actions, gear stage changes are suppressed.
Bit 2 = 1: Gear stage change for programmed gear stage will finally be carried
           out after deselection of DryRun or Program test functions with
    REPOS.
Bit 3: reserved
Bit 4 = 1:
   The programmed speed is taken over into SD 43200 $SA_SPIND_S (incl. speed
default settings via FC18 and synchronized actions).
    S programmings, that are not speed programmings, are not written into the
    SD. These include, for example, S value with constant cutting speed (G96,
    G961), S value with revolution-related dwell time (G4).
Bit 5 = 1:
   The content of SD 43200 $SA_SPIND_S acts as speed setpoint for JOG. If the
content is zero, then other JOG speed default settings become active (s. SD
41200 JOG_SPIND_SET_VELO).
Bit 6: reserved
Bit 7: reserved
Bit 8 = 1:
   The programmed cutting speed is taken over into SD 43202
$SA_SPIND_CONSTCUT_S (incl. default settings via FC18 and synchronized
actions). S programmings, that are no cutting speed programmings, are not
written into the SD. These include, for example, S value beyond constant cut-
ting speed (G96, G961), S value with revolution-related dwell time (G4).
Bit 9: reserved

Bit 10 = 0:
    SD 43206 $SA_SPIND_SPEED_TYPE is not changed by part program or channel
    settings,
       = 1:
   For the master spindle, the value of the 15th G group (type of feedrate) is
taken over into SD 43206 $SA_SPIND_SPEED_TYPE. For all other spindles, the
corresponding SD remains unchanged.

Bit 11: reserved
Bit 12 = 1:
   Spindle override is active for zero mark search for M19, SPOS and SPOSA
       = 0:
   Previous behavior (default)

Related to:
   SPIND_ACTIVE_AFTER_RESET
   SPIND_DEFAULT_MODE
   SPIND_S
```

CTEQ					
-	-	0x510	0	0x1137	7/2

35040	**SPIND_ACTIVE_AFTER_RESET**			A06, A10	S1
-	Own spindle RESET			BYTE	POWER ON

```
SPIND_ACTIVE_AFTER_RESET defines the response of the spindle after reset
(DB21, ... DBX7.7) and program end (M2, M30). It is only active in the spin-
dle mode open-loop control mode.

SPIND_ACTIVE_AFTER_RESET = 0:

Control mode:
- Spindle stops, applies to M2/M30 and MCP reset
- Program is aborted, applies to M2/M30

Oscillation mode:
- Alarm 10640 "Spindle cannot stop during gear change"
- Oscillation is not aborted
- Axes are stopped
- Program is aborted after a gear stage change or spindle reset and the alarm
    is cleared.

Positioning mode:
- is stopped

Axis mode:
- is stopped

SPIND_ACTIVE_AFTER_RESET= 1:

Control mode:
- Spindle does not stop
- Program is aborted

Oscillation mode:
- Alarm 10640 "Spindle cannot stop during gear change"
- Oscillation is not aborted
- Axes are stopped
- Program is aborted after a gear stage change, thealarm is cleared and the
    spindle continues to rotate with the programmed M and S value.

Positioning mode:
- is stopped

Axis mode:
- is stopped

The IS "Spindle reset" (DB31, ... DBX2.2) is always effective, independent of
    SPIND_ACTIVE_AFTER_RESET.

MD irrelevant for:
   Spindle modes other than control mode

Related to:
    IS "Reset" (DB21, ... DBX7.7)
    IS "Spindle reset" (DB31, ... DBX2.2)
```

CTEQ					
-	-	0	0	2	7/2

35090	**NUM_GEAR_STEPS**	A06, A10	S1
-	Number of gear stages	DWORD	RESET

```
Determination of the number of set gear stages (GS) of the first gear stage
data set. Starting with the first GS, the upper limit is defined. The machine
data beyond this GS upper limit are not used.
The number of gear stages of the first and second gear stage data set must not
    be equal.
If no suitable gear stage is found for a programmed speed with M40, no gear
    stage change is carried out as previously.

Related MD:
    MD 35010: $MA_GEAR_STEP_CHANGE_ENABLE
   (gear stages available/functions)
    MD 35012 $MA_GEAR_STEP_CHANGE_POSITION
   (gear stage change position)
    MD 35014 $MA_GEAR_STEP_USED_IN_AXISMODE
   (gear stage for axis mode with M70)
    MD 35110: $MA_GEAR_STEP_MAX_VELO
   (max. speed for gear stage change)
    MD 35120: $MA_GEAR_STEP_MIN_VELO
   (min. speed for gear stage change)
    MD 35130 $MA_GEAR_STEP_MAX_VELO_LIMIT
   (max.  speed of gear stage)
    MD 35140: $MA_GEAR_STEP_MIN_VELO_LIMIT
   (min.  speed of gear stage)
    MD 35200 $MA_GEAR_STEP_SPEEDCTRL_ACCEL
   (acceleration in speed control mode)
    MD 35210 $MA_GEAR_STEP_POSCTRL_ACCEL
   (acceleration in position control mode)
    MD 35310 $MA_SPIND_POSIT_DELAY_TIME
   (positioning delay time)
    MD 35550 $MA_DRILL_VELO_LIMIT
   (maximum speeds for tapping)

    MD 35092 $MA_NUM_GEAR_STEPS2
   (number of gear stages 2nd gear stage data set)
```

-					
-	-	MAXNUM_GEAR_STEPS	1	5	2/2

35092	NUM_GEAR_STEPS2			A06, A10	S1
-	Number of gear stages of 2nd gear stage data set			DWORD	RESET
Determination of the number of set gear stages (GS) of the second gear stage data set. Starting with the first GS, the upper limit is defined. The machine data beyond this GS upper limit are not used. The number of gear stages of the first and second gear stage data set must not be equal. If no suitable gear stage is found for a programmed speed with M40, no gear stage change is carried out as previously. If '0' is entered, the second gear stage data set is inactive. In this case, the gear stages are selected with active M40 via the first gear stage data set, as previously. MD 35010 GEAR_STEP_CHANGE_ENABLE, bit 5 (on the master spindle) activates the second gear stage data set for the function Tapping with G331/G332. Related MD: MD 35010: $MA_GEAR_STEP_CHANGE_ENABLE (gear stages available/functions) MD 35112: $MA_GEAR_STEP_MAX_VELO2 (2nd gear stage data set: max. speed for gear stage change) MD 35122: $MA_GEAR_STEP_MIN_VELO2 (2nd gear stage data set: min. speed for gear stage change) MD 35212 $MA_GEAR_STEP_POSCTRL_ACCEL2 (2nd gear stage data set: acceleration in position control mode)					
-					
-	-	MAXNUM_GEAR_ STEPS	1	5	2/2

35100	SPIND_VELO_LIMIT			A06, A11, A04	S1
rev/min	Maximum spindle speed			DOUBLE	POWER ON
SPIND_VELO_LIMIT defines the maximum spindle speed, which the spindle (the spindle chuck with the workpiece or the tool) must not exceed. The NCK limits an excessive spindle setpoint speed to this value. If the maximum actual spindle speed is exceeded, even allowing for the spindle speed tolerance (MD 35150: SPIND_DES_VELO_TOL), there is a fault with the drive and the IS "Speed limit exceeded" (DB31, ... DBX83.0) is set. Alarm 22050 "Maximum speed reached" is also output and all axes and spindles on the channel are decelerated (provided the encoder is still functioning correctly). Related to: MD 35150: SPIND_DES_VELO_TOL (spindle speed tolerance) IS "Speed limit exceeded" (DB31, ... DBX83.0) Alarm 22050 "Maximum speed reached"					
CTEQ					
-	-	10000.0	1.0e-3	-	7/2

35110	**GEAR_STEP_MAX_VELO**		A06, A11, A04		S1
rev/min	Maximum speed for gear stage change		DOUBLE		NEW CONF

```
GEAR_STEP_MAX_VELO defines the maximum speed of the gear stage for automatic
gear stage change (M40). The gear stages must be defined by GEAR_STEP_MAX_VELO
and MD 35120: GEAR_STEP_MIN_VELO in a way that avoids gaps in the programma-
ble spindle speed range between the gear stages.

Incorrect
   GEAR_STEP_MAX_VELO [gear stage1] =1000
   GEAR_STEP_MIN_VELO [gear stage2]  =1200
Correct
   GEAR_STEP_MAX_VELO [gear stage1] =1000
   GEAR_STEP_MIN_VELO [gear stage2]  =  950

Related to:
    MD 35010: GEAR_STEP_CHANGE_ENABLE
   (gear stage change is possible)
    MD 35120: GEAR_STEP_MIN_VELO
   (min. speed for gear stage change)
    MD 35140: GEAR_STEP_MIN_VELO_LIMIT
   (min. speed of gear stage)
    MD 35130: GEAR_STEP_MAX_VELO_LIMIT
   (max. speed of gear stage)
```

CTEQ					
-	6	500., 500., 1000., 2000., 4000., 8000.	-	-	7/2

35112	**GEAR_STEP_MAX_VELO2**		A06, A11, A04		S1
rev/min	2nd data set: Maximum speed for gear stage change		DOUBLE		NEW CONF

```
With GEAR_STEP_MAX_VELO2, the 2nd data set for the max. speeds of the gear
stages for the automatic gear stage change (M40) is set. The gear stage must
be defined via GEAR_STEP_MAX_VELO2 and MD 35122: GEAR_STEP_MIN_VELO2 so that
there are no gaps between the gear stages in the programmable spindle speed
range.

Wrong
   GEAR_STEP_MAX_VELO2 [gear stage 1] =1000
   GEAR_STEP_MIN_VELO2 [gear stage 2] =1200
Right
   GEAR_STEP_MAX_VELO2 [gear stage 1] =1000
   GEAR_STEP_MIN_VELO2 [gear stage 2] =950

Related to:
    MD 35010: GEAR_STEP_CHANGE_ENABLE
   (gear stage change is possible)
    MD 35122: GEAR_STEP_MIN_VELO2
   (min. speed for gear stage change)
    MD 35140: GEAR_STEP_MIN_VELO_LIMIT
   (min.  speed of gear stage)
    MD 35130: GEAR_STEP_MAX_VELO_LIMIT
   (max. speed of gear stage)
```

CTEQ					
-	6	500., 500., 1000., 2000., 4000., 8000.	0	-	2/2

35120	**GEAR_STEP_MIN_VELO**			A06, A11, A04	S1
rev/min	Minimum speed for gear stage change			DOUBLE	NEW CONF
GEAR_STEP_MIN_VELO defines the minimum speed of the gear stage for the automatic gear stage change (M40). Refer to MD 35120: GEAR_STEP_MAX_VELO for more information. Related to: MD 35110: GEAR_STEP_MAX_VELO (maximum speed for gear stage change) MD 35010: GEAR_STEP_CHANGE_ENABLE (gear stage change is possible) MD 35140: GEAR_STEP_MIN_VELO_LIMIT (minimum speed of gear stage) MD 35130: GEAR_STEP_MAX_VELO_LIMIT (maximum speed of gear stage)					
CTEQ					
-	6	50., 50., 400., 800., 1500., 3000.	-	-	7/2

35122	**GEAR_STEP_MIN_VELO2**			A06, A11, A04	S1
rev/min	2nd data set: Minimum speed for gear stage change			DOUBLE	NEW CONF
With GEAR_STEP_MIN_VELO2, the 2nd data set for the min. speeds of the gear stages for the automatic gear stage change (M40) is set. For further description see MD 35122: GEAR_STEP_MAX_VELO2. Related to: MD 35112: GEAR_STEP_MAX_VELO2 (max. speed for gear stage change) MD 35010: GEAR_STEP_CHANGE_ENABLE (gear stage change is possible) MD 35140: GEAR_STEP_MIN_VELO_LIMIT (min. speed of the gear stage) MD 35130: GEAR_STEP_MAX_VELO_LIMIT (max. speed of the gear stage)					
CTEQ					
-	6	50., 50., 400., 800., 1500., 3000.	0	-	2/2

35130	**GEAR_STEP_MAX_VELO_LIMIT**		A06, A11, A04		S1
rev/min	Maximum speed of gear stage		DOUBLE		NEW CONF

```
GEAR_STEP_MAX_VELO_LIMIT defines the maximum speed for the gear stage.
This speed can never be exceeded in the currently engaged gear stage.

Special cases:
- If the position control is activated, the value is limited to 90% (control
    reserve)
- If an S value exceeding the maximum speed of the engaged gear stage is pro-
    grammed, the setpoint speed is limited to the maximum speed of the gear
    stage (with gear stage selection M41 to M45) and the IS "Programmed speed
    too high" is enabled.
- If an S value exceeding the maximum speed for the gear change is pro-
    grammed, a new gear stage is selected (with automatic gear stage selec-
    tion M40).
- If an S value exceeding the maximum speed of the highest gear stage is pro-
    grammed, the speed is limited to the maximum speed of the gear stage (with
    automatic gear stage selection M40).
- If an S value is programmed for which no suitable gear stage exists, a gear
    stage change is not triggered.

Related to:
    MD 35010: GEAR_STEP_CHANGE_ENABLE
   (gear stage change is possible)
    MD 35110: GEAR_STEP_MAX_VELO
   (maximum speed for gear stage change)
    MD 35120: GEAR_STEP_MIN_VELO
   (minimum speed for gear stage change)
    MD 35140: GEAR_STEP_MIN_VELO_LIMIT
   (minimum speed of gear stage)
```

CTEQ					
-	6	500., 500., 1000., 2000., 4000., 8000.	1.0e-3	-	7/2

35140	GEAR_STEP_MIN_VELO_LIMIT		A06, A11, A04	S1	
rev/min	Minimum speed of gear stage		DOUBLE	NEW CONF	
GEAR_STEP_MIN_VELO_LIMIT defines the minimum speed for the gear stage. The speed cannot drop below this value, even if an S value is programmed that is too low. The speed can only drop below this minimum value as a result of "Minimum/maximum speed of gear stage" signals/commands/states. MD irrelevant for: - Spindle oscillation mode - Spindle positioning mode, axis mode Related to: MD 35010: GEAR_STEP_CHANGE_ENABLE (gear stage change is possible) MD 35110: GEAR_STEP_MAX_VELO (maximum speed for gear stage change) MD 35120: GEAR_STEP_MIN_VELO (minimum speed for gear stage change) MD 35130: GEAR_STEP_MAX_VELO_LIMIT (maximum speed of gear stage)					
CTEQ					
-	6	5., 5., 10., 20., 40., 80.	-	-	7/2

35150	SPIND_DES_VELO_TOL		A03, A05, A06, A10, A04	S1	
-	Spindle speed tolerance		DOUBLE	RESET	
In spindle control mode, the set speed (programmed speed x spindle offset, allowing for limits) is compared with the actual speed. - If the actual speed deviates from the set speed by more than SPIND_DES_VELO_TOL, the IS "Spindle in setpoint range" (DB31, ... DBX83.5) is set to zero. - If the actual speed deviates from the set speed by more than SPIND_DES_VELO_TOL, the path feed is disabled (positioning axes continue traversing). - If the actual speed exceeds the maximum spindle speed (MD 35100: SPIND_VELO_LIMIT) by more than SPIND_DES_VELO_TOL the IS "Speed limit exceeded" (DB31, ... DBX83.0) is enabled and alarm 22050 "Maximum speed reached" is output. All axes and spindles on the channel are decelerated. MD irrelevant for: - Spindle oscillation mode - Spindle positioning mode Related to: MD 35500: SPIND_ON_SPEED_AT_IPO_START (feed enable for spindle in setpoint range) MD 35100: SPIND_VELO_LIMIT (maximum spindle speed) IS "Spindle in setpoint range" (DB31, ... DBX83.5) IS "Speed limit exceeded" (DB31, ... DBX83.0) Alarm 22050 "Maximum speed reached"					
-					
-	-	0.1	0.0	1.0	7/2

35160	**SPIND_EXTERN_VELO_LIMIT**			A06, A04	S1
rev/min	Spindle speed limitation from PLC			DOUBLE	NEW CONF
A limiting value for the spindle speed is entered in SPIND_EXTERN_VELO_UNIT, which is taken into account exactly when the IS "Velocity/speed limitation" (DB31, ... DBX3.6) is set. The NCK limits a spindle speed which is too high to this value.					
CTEQ					
-	-	1000.0	1.0e-3	-	7/2

35200	**GEAR_STEP_SPEEDCTRL_ACCEL**			A06, A11, A04, -	S1
rev/s²	Acceleration in speed control mode			DOUBLE	NEW CONF
If the spindle is in speed control mode, the acceleration is entered in GEAR_STEP_SPEEDCTRL_ACCEL. The spindle is in speed control mode with the function SPCOF. Special cases: The acceleration in speed control mode (GEAR_STEP_SPEEDCTRL_ ACCEL) can be set so that the electric current limit is reached. Related to: MD 35210: GEAR_STEP_POSCTRL_ACCEL (acceleration in position control mode) MD 35220: ACCEL_REDUCTION_SPEED_POINT (acceleration reduced by speed limit)					
CTEQ					
-	6	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	1.0e-3	-	7/2

35210	**GEAR_STEP_POSCTRL_ACCEL**			A06, A11, A04, -	S1
rev/s²	Acceleration in position control mode			DOUBLE	NEW CONF
The acceleration in position control mode must be set so that the electric current limit is not reached. Related to: MD 35200: GEAR_STEP_SPEEDCTRL_ACCEL MD 35212: GEAR_STEP_POSCTRL_ACCEL2					
CTEQ					
-	6	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	1.0e-3	-	7/2

35212	**GEAR_STEP_POSCTRL_ACCEL2**			A06, A11, A04, -	S1
rev/s²	2nd data set: Acceleration in position control mode			DOUBLE	NEW CONF
Second gear stage data set for maximum acceleration capability of the gear stages in position control mode. Activation of the 2nd data set for tapping with G331/G332 via MD 35010 GEAR_STEP_CHANGE_ENABLE, bit 5 for the master spindle. The acceleration in position control mode must be set so that the current limit is not reached. Related to: MD 35200: GEAR_STEP_SPEEDCTRL_ACCEL MD 35220: ACCEL_REDUCTION_SPEED_POINT					
CTEQ					
-	6	30.0, 30.0, 25.0, 20.0, 15.0, 10.0	1.0e-3	-	2/2

35220	**ACCEL_REDUCTION_SPEED_POINT**			A06, A04	S1,S6,B2
-	Speed for reduced acceleration			DOUBLE	RESET
This machine data defines the threshold speed/velocity for spindles/positioning axes from which the acceleration reduction is to start. The reference is the defined maximum speed/velocity. The starting point is a percentage of the maximum values. Example: MD: ACCEL_REDUCTION_SPEED_POINT = 0.7, the maximum speed is 3000 rpm. Acceleration reduction begins with v_on = 2100 rpm, i.e. the maximum acceleration capacity is utilized in the speed range 0...2099.99 rpm. From 2100 rpm to the maximum speed, operation is with reduced acceleration. Related to: MD 32000: MAX_AX_VELO (maximum axis velocity) MD 35130: GEAR_STEP_MAX_VELO_LIMIT (maximum gear stage speed) MD 35230: ACCEL_REDUCTION_FACTOR (reduced acceleration)					
-					
-	-	1.0	0.0	1.0	7/2

35230	**ACCEL_REDUCTION_FACTOR**			A06, A04	S1,S6,B2
-	Reduced acceleration			DOUBLE	RESET

```
The machine data contains the factor by which the acceleration of the spindle/
    positioning axes is reduced with reference to the maximum speed/velocity.
    The acceleration is reduced by the factor between the threshold speed/
    velocity defined in MD: ACCEL_REDUCTION_SPEED_POINT and the maximum speed/
    velocity.

Example:
 a= 10 rev/s², v_on = 2100 rpm, MD: ACCEL_REDUCTION_FACTOR = 0.3.
Acceleration and deceleration take place within the speed range 0...2099.99
rpm with an acceleration of 10 rev/s². From speed 2100 rpm up to the maximum
speed, the acceleration is reduced from 10 rev/s²  down to 7 rev/s².

MD irrelevant for:
   Errors that lead to rapid stop.

Related to:
    MD 32300: MAX_AX_ACCEL (axis acceleration)
    MD 35200: GEAR_STEP_SPEEDCTRL_ACCEL
   (acceleration in speed control mode)
    MD 35210: GEAR_STEP_POSCTRL_ACCEL
   (acceleration in position control mode)
    MD 35242: ACCEL_REDUCTION_SPEED_POINT
   (speed for reduced acceleration)
```

CTEQ					
-	-	0.0	0.0	0.95	7/2

35240	**ACCEL_TYPE_DRIVE**			A04	S6
-	Acceleration curve DRIVE for axes ON/OFF			BOOLEAN	RESET

```
Basic setting of the acceleration response for single-axis movements (posi-
tioning, oscillation, JOG):
FALSE: No acceleration reduction
TRUE:  Acceleration reduction active
MD is active only with JOG_AND_POS_JERK_ENABLE = FALSE.
For spindles (in spindle mode), the settings of MD 35220
    ACCEL_REDUCTION_SPEED_POINT and 35230 ACCEL_REDUCTION_FACTOR are always
    active.
```

CTEQ					
-	-	FALSE	-	-	7/2

35242	**ACCEL_REDUCTION_TYPE**			A04	S6
-	Type of acceleration reduction			BYTE	RESET

```
Shape of acceleration reduction characteristic with DRIVE velocity control
0: Constant
1: Hyperbolic
2: Linear
```

CTEQ					
-	-	1	0	2	7/2

35300	**SPIND_POSCTRL_VELO**			A06, A04	S1
rev/min	Position control activation speed			DOUBLE	NEW CONF
When positioning a spindle that is not in position control mode, the position control is not activated until the spindle has reached the velocity defined in MD: SPIND_POSCTRL_VELO. The velocity can be changed with FA[Sn] from the part program. Please refer to Section 2.1.3 Spindle Mode "Positioning Mode" for a description of spindle operating characteristics under various supplementary conditions (positioning from rotation, positioning from standstill). Related to: MD 35350: SPIND_POSITIONING_DIR (direction of rotation during positioning from standstill), if no synchronization is available.					
CTEQ					
-	-	500.0	-	-	7/2

35310	**SPIND_POSIT_DELAY_TIME**			A06, A04	S1
s	Positioning delay time			DOUBLE	NEW CONF
Positioning delay time After reaching the positioning end (exact stop fine), there is a waiting time equal to the time set in this MD. Selection of the position that matches the currently set gear stage. The delay time is activated for: - Gear stage change on defined spindle position. After reaching the position configured in MD 35011 GEAR_STEP_CHANGE_POSITION, there is a waiting period equal to the time specified here. After expiry of this time, the position control is switched off for an active direct measuring system and the interface signals DB31..,DBX82.3 "Change gear" and DB31..,DBX82.0..2 "Setpoint gear stage" are output. - Block search at output of an accumulated positioning block (SPOS, SPOSA, M19).					
CTEQ					
-	6	0.0, 0.05, 0.1, 0.2, 0.4, 0.8	-	-	7/2

35350	**SPIND_POSITIONING_DIR**			A06	S1
-	Direction of rotation when positioning			BYTE	RESET
When SPOS or SPOSA is programmed, the spindle is switched to position control mode and accelerates with the acceleration defined in MD 35210: GEAR_STEP_POSCTRL_ACCEL (acceleration in position control mode) if the spindle is not synchronized. The direction of rotation is defined by MD 35350: SPIND_POSITIONING_DIR (direction of rotation during positioning from standstill). SPIND_POSITIONING_DIR = 3 ---> Clockwise direction of rotation SPIND_POSITIONING_DIR = 4 ---> Counterclockwise direction of rotation Related to: MD 35300: SPIND_POSCTRL_VELO (position control activation speed)					
CTEQ					
-	-	3	3	4	7/2

35400	**SPIND_OSCILL_DES_VELO**			A06, A04	S1
rev/min	Oscillation speed			DOUBLE	NEW CONF

```
During oscillation, the IS "Oscillation speed" (DB31, ... DBX18.5) is used to
select a motor speed for the spindle motor. This motor speed is defined in MD:
SPIND_OSCILL_DES_VELO. The motor speed defined in this MD is independent of
the current gear stage. In the AUTOMATIC and MDI displays, the oscillation
speed is displayed in the "Spindle setpoint" window until the gear is changed.

MD irrelevant for:
   All spindle modes except oscillation mode

Special cases:
   The acceleration during oscillation (MD 35410: SPIND_OSCILL_ACCEL) is valid
for the oscillation speed defined in this MD.

Related to:
    MD 35410: SPIND_OSCILL_ACCEL (acceleration during oscillation)
    IS "Oscillation via PLC" (DB31, ... DBX18.4)
    IS "Oscillation speed" (DB31, ... DBX18.5)
```

CTEQ					
-	-	500.0	-	-	7/2

35410	**SPIND_OSCILL_ACCEL**			A06, A04, -	S1
rev/s²	Acceleration during oscillation			DOUBLE	NEW CONF

```
The acceleration specified here is only effective for the output of the oscil-
    lation speed (MD 35400: SPIND_OSCILL_DES_VELO) to the spindle motor. The
    oscillation speed is selected using the IS "Oscillation speed".

MD irrelevant for:
   All spindle modes except oscillation mode

Related to:
    MD 35400: SPIND_OSCILL_DES_VELO (oscillation speed)
    IS "Oscillation speed" (DB31, ... DBX18.5)
    IS "Oscillation via PLC" (DB31, ... DBX18.4)
```

CTEQ					
-	-	16.0	1.0e-3	-	7/2

35430	SPIND_OSCILL_START_DIR			A06	S1
-	Start direction during oscillation			BYTE	RESET

```
With the IS "Oscillation speed", the spindle motor accelerates to the speed
specified in MD 35400: SPIND_OSCILL_DES_VELO.

The start direction is defined by SPIND_OSCILL_START_DIR if IS "Oscillation
    via PLC" is not enabled.
SPIND_OSCILL_START_DIR = 0
   ---> Start direction same as the last direction of rotation
SPIND_OSCILL_START_DIR = 1
   ---> Start direction counter to the last direction of rotation
SPIND_OSCILL_START_DIR = 2
   ---> Start direction counter to the last direction of rotation
SPIND_OSCILL_START_DIR = 3 --->     Start direction is M3
SPIND_OSCILL_START_DIR = 4 --->     Start direction is M4

MD irrelevant for:
   All spindle modes except oscillation mode

Related to:
    MD 35400: SPIND_OSCILL_DES_VELO (oscillation speed)
    IS "Oscillation speed" (DB31, ... DBX18.5)
    IS "Oscillation via PLC" (DB31, ... DBX18.4)
```

CTEQ					
-	-	0	0	4	7/2

35440	SPIND_OSCILL_TIME_CW			A06	S1
s	Oscillation time for M3 direction			DOUBLE	NEW CONF

```
The oscillation time defined here is active in the M3 direction.

MD irrelevant for:
- All spindle modes except oscillation mode
- Oscillation via PLC (IS "Oscillation via PLC" (DB31, ... DBX18.4) enabled)

Related to:
    MD 35450: SPIND_OSCILL_TIME_CCW (oscillation time for M4 direction)
    MD 10070: IPO_SYSCLOCK_TIME_RATIO (interpolator cycle)
    IS "Oscillation speed" (DB31, ... DBX18.5)
    IS "Oscillation via PLC" (DB31, ... DBX18.4)
```

CTEQ					
-	-	1.0	-	-	7/2

35450	SPIND_OSCILL_TIME_CCW		A06	S1
s	Oscillation time for M4 direction		DOUBLE	NEW CONF

```
The oscillation time defined here is active in the M4 direction.

MD irrelevant for:
- All spindle modes except oscillation mode
- Oscillation via PLC (IS "Oscillation via PLC" (DB31, ... DBX18.4) enabled)

Related to:
    MD 35440: SPIND_OSCILL_TIME_CW (oscillation time for M3 direction)
    MD 10070: IPO_SYSCLOCK_TIME_RATIO (interpolator cycle)
    IS "Oscillation speed" (DB31, ... DBX18.5)
    IS "Oscillation by PLC" (DB31, ... DBX18.4)
```

CTEQ					
-	-	0.5	-	-	7/2

35500	SPIND_ON_SPEED_AT_IPO_START		A03, A06, A10	S1
-	Feedrate enable for spindle in the set range		BYTE	RESET

```
For SW 4.2 and higher:
Byte = 0:
   The path interpolation is not affected

Byte = 1:
   The path interpolation is not enabled (positioning axes continue travers-
ing) until the spindle has reached the specified speed. The tolerance range
can be set in MD 35150$MA_SPIND_DES_VELO_TOL. If a measuring system is active,
then the actual speed is monitored, otherwise the set speed. Path axes tra-
versing in continuous-path mode (G64) are not stopped.

Byte = 2:
    In addition to 1, traversing path axes are also stopped before machining
    begins, e.g. continuous-path mode (G64) and the change from rapid traverse
    (G0) to a machining block (G1, G2,..). The path is stopped at the last G0
    block and does not start traversing until the spindle is within the set
    speed range.
Restriction:
If the spindle is newly programmed by the PLC (FC18) or a synchronized action
    "shortly" before the end of the last G0 block, then the path decelerates
    taking the dynamic limitation into account. Because the spindle program-
    ming is asynchronous, a traverse can be made into the machining block if
    necessary. If the spindle has reached the setpoint speed range then
    machining starts from this point.

Byte  = 3:
    No longer available for SW 5.3 and higher.


Related to:
    MD 35150: SPIND_DES_VELO_TOL (spindle speed tolerance)
    IS "Spindle in setpoint range" (DB31, ... DBX83.5)
```

CTEQ					
-	-	1	0	2	7/2

35510	**SPIND_STOPPED_AT_IPO_START**			A03, A06, A10	S1
-	Feedrate enable for spindle stopped			BOOLEAN	RESET
When a spindle is stopped (M5), the path feed is disabled (positioning axes continue traversing) if MD: SPIND_STOPPED_AT_IPO_START is enabled and the spindle is in control mode. When the spindle has come to a standstill (IS "Axis/spindle stationary" (DB31, ... DBX61.4) enabled), the path feed is enabled. Related to: MD 35500: SPIND_ON_SPEED_AT_IPO_START (feed enable for spindle in setpoint range)					
CTEQ					
-	-	FALSE	-	-	7/2

35550	**DRILL_VELO_LIMIT**			A06, A11, A04	-
rev/min	Maximum speeds for tapping			DOUBLE	NEW CONF
Limit speed values for tapping without compensating chuck with G331/G332. The maximum speed of the linear motor characteristic range (constant acceleration capacity) must be specified depending on the gear stage.					
CTEQ					
-	6	10000., 10000., 10000., 10000., 10000., 10000.	1	-	7/2

35590	PARAMSET_CHANGE_ENABLE	EXP, A05	A2
-	Parameter set can be changed	BYTE	POWER ON

0: Parameter set changes cannot be controlled.
The first parameter set is always active. Exceptions: see below

1: The parameter set applied in the servo is specified via the VDI interface. Parameter sets 1 to 6 can be selected. Sets are selected by means of DB31 ff, DBB9, bits0..2 in the binary-coded value range 0...5. Values 6 and 7 select parameter set no. 6. Exceptions: see below.

For 0 and 1:
With G33, G34, G35, G331, G332, the number of the parameter set for the involved axes is ativated according to the master spindle gear stage, increased by one (corresponds to set of parameters number 2..6).
For spindles, parameter sets 2 to 6 are always active, depending on the set gear stage plus one.

Irrespective of these selections, the internal parameter set selection always has priority. This applies to spindles (no allowance for MD = 1), machine axes participating in tapping or thread cutting. The switchover response depends on whether the servo gain factor changes between the old and new parameter sets.

Secondary conditions:
Changing a parameter set at which the load gearbox factors differ between the active and the new parameter set, will result in a reset of the referenced signal, provided that the axis has an indirect measuring system.
If the load gearbox factors differ between the active and the new parameter set, while the axis position is unequal to zero and the position control is active, the parameter set cannot be changed and alarm 26050 for the corresponding axis is output. The problem must be resolved (change PLC control, etc.).
The axial machine data described below belong to the parameter set.
The parameter set contains the following axial machine data:
$MA_AX_VELO_LIMIT
$MA_POSCTRL_GAIN
$MA_EQUIV_CURRCTRL_TIME
$MA_EQUIV_SPEEDCTRL_TIME
$MA_DYN_MATCH_TIME
$MA_DRIVE_AX_RATIO_DENOM
$MA_DRIVE_AX_RATIO_NUMERA

Related to:
Interface signals DB31, ..., DBX9.0, 1 ,2 and DBX69.0, 1 ,2

References:
/FB/, H2, "Output of Auxiliary Functions to PLC"

CTEQ					
-	-	0	0	2	7/2

1.5.6 Monitoring functions

36000	**STOP_LIMIT_COARSE**			A05	B1
mm, degrees	Exact stop coarse			DOUBLE	NEW CONF

```
Treshold for exact stop coarse

An NC block is considered as terminated if the actual position of the path
    axes is away from the setpoint position by the value entered for the exact
    stop limit. If the actual position of a path axis is not within this
    limit, the NC block is considered as not terminated and further part pro-
    gram execution is not possible. The magnitude of the value entered influ-
    ences the transition to the next block. The larger the value, the earlier
    the block change is initiated.
If the specified exact stop limit is not reached
- the block is considered as not terminated,
- further traversing of the axis is not possible,
- alarm 25080 Positioning monitoring is output after expiry of the time speci-
    fied in MD: POSITIONING_TIME (monitoring time for exact stop fine),
- the direction of movement +/- is indicated for the axis in the positioning
    display. The exact stop window is also evaluated for spindles in position
    control mode (SPCON instruction).

Special cases:
   MD: STOP_LIMIT_COARSE must not be set smaller than MD: STOP_LIMIT_FINE
(exact stop fine). To achieve the identical block change behavior as with the
"exact stop fine" criterion, the window of exact stop coarse may be identical
to the band of exact stop fine. MD: STOP_LIMIT_COARSE must not be set equal to
or larger than MD: STANDSTIL_POS_TOL (standstill tolerance).

Related to:
    MD 36020: POSITIONING_TIME (delay time, exact stop fine)
```

-					
-	-	0.04	-	-	7/2

36010	**STOP_LIMIT_FINE**			A05	B1
mm, degrees	Exact stop fine			DOUBLE	NEW CONF

```
Threshold for exact stop fine

See MD: STOP_LIMIT_COARSE (exact stop coarse)

Special cases:
   MD: STOP_LIMT_FINE must not be set larger than MD: STOP_LIMIT_COARSE (exact
stop coarse).
   MD: STOP_LIMIT_FINE must not be set equal to or larger than MD:
STANDSTILL_POS_TOL (standstill tolerance).

Related to:
    MD 36020: POSITIONING_TIME (delay time, exact stop fine)
```

-					
-	-	0.01	-	-	7/2

36012	**STOP_LIMIT_FACTOR**			A05	B1
-	Factor for exact stop coarse/fine and standstill			DOUBLE	NEW CONF
With this factor, MD 36000: STOP_LIMIT_COARSE, MD 36010: STOP_LIMIT_FINE, MD 36030: STANDSTILL_POS_TOL can be newly assessed as a function of the parameter set. The relationship of these three values to each other always remains the same. Application examples: Matching the positioning behavior if the mass relationships noticeably change with a gear change, or if one wants to save on machine positioning time at the cost of accuracy in various operating conditions. Related to: MD 36000: STOP_LIMIT_COARSE, MD 36010: STOP_LIMIT_FINE, MD 36030: STANDSTILL_POS_TOL					
-					
-	6	1.0, 1.0, 1.0, 1.0, 1.0, 1.0	0.001	1000.0	7/2

36020	**POSITIONING_TIME**			A05	B1,A3
s	Delay time exact stop fine			DOUBLE	NEW CONF
After termination of a positioning process, the time starts within which the axis must reach the "exact stop fine". The current following error is therefore continuously monitored for the limit value MD 36010: STOP_LIMIT_FINE. In case of time-out, alarm 25080 "Positioning monitoring" is output and the axis stopped. The MD should be selected large enough to ensure that the monitoring function is not triggered under normal operating conditions taking into account any settling times. Related to: MD 36010: STOP_LIMIT_FINE (exact stop fine)					
-					
-	-	1.0	-	-	7/2

36030	STANDSTILL_POS_TOL			A05	A3
mm, degrees	Standstill tolerance			DOUBLE	NEW CONF
This MD serves as a tolerance band for the following monitoring functions: - After termination of a traversing block (position partial setpoint=0 at the end of the movement), the following error is monitored for reaching the limit value for STANDSTILL_POS_TOL (standstill tolerance) after the programmable STANDSTILL_DELAY_TIME (delay time, standstill monitoring). - After termination of a positioning action (exact stop fine reached), positioning monitoring is replaced by standstill monitoring. The axis is monitored for moving more than indicated in MD: STANDSTILL_POS_TOL (standstill tolerance) from its position. If the setpoint position is exceeded or undergone by the standstill tolerance, alarm 25040 "Standstill monitoring" is output and the axis stopped. Special cases: The standstill tolerance must be larger than the "exact stop limit coarse". Related to: MD 36040: STANDSTILL_DELAY_TIME (delay time, standstill monitoring)					
-					
-	-	0.2	-	-	7/2

36040	STANDSTILL_DELAY_TIME			A05	A3
s	Delay time for standstill monitoring			DOUBLE	NEW CONF
See MD 36030: STANDSTILL_POS_TOL (standstill tolerance) Related to: MD 36030: STANDSTILL_POS_TOL (standstill tolerance)					
-					
-	-	0.4	-	-	7/2

36042	FOC_STANDSTILL_DELAY_TIME			A05	F1
s	Delay time for standstill monit. w/ active torque or force lim.			DOUBLE	NEW CONF
Waiting time between the end of a movement and activation of standstill monitoring with active torque/force limitation. If the configurable end of block criterion occurs within this time, then standstill monitoring is activated.					
-					
-	-	0.4	-	-	7/2

36050	CLAMP_POS_TOL			A05	A3
mm, degrees	Clamping tolerance			DOUBLE	NEW CONF

```
With interface signal "Blocking action active" (DB31, ... DBX2.3), blocking
monitoring is activated. If the monitored axis is forced away from the set-
point position (exact stop limit) by more than the blocking tolerance, alarm
26000 "Blocking monitoring" is output and the axis stopped.
Threshold value for blocking tolerance (half width of window).

Special cases:
   The blocking tolerance must be larger than the "exact stop limit coarse".

Related to:
    IS "Blocking action active" (DB31, ... DBX2.3)
```

-					
-	-	0.5	-	-	7/2

36052	STOP_ON_CLAMPING			A10	-
-	Special functions with clamped axis			BYTE	NEW CONF

```
This MD defines how a blocked axis is taken into account.
Bit 0 =0:
    If a blocked axis is to be traversed again in continuous-path mode, it
    must be ensured via the part program that the path axes are stopped and
    that there is time for releasing the blockage.

Bit 0 =1:
    If a blocked axis is to be traversed again in continuous-path mode, the
    LookAhead function stops the path motion if required until the position
    controller is allowed to traverse the blocked axis again, i.e. until the
    controller enable is set again.

Bit 1 is relevant only if bit 0 is set:
Bit 1 =0:
    If a blocked axis is to be traversed again in continuous-path mode, the
    LookAhead function does not release the blockage.

Bit 1 =1:
    If a blocked axis is to be traversed again in continuous-path mode, a tra-
    versing command for the blocked axis is given in the preceding G0 blocks
    so that the PLC releases the axis blockage again.

Bit 2 =0:
    If an axis is to be blocked in continuous-path mode, it must be ensured in
    the part program that the path axes are stopped to make sure that there is
    time for setting the blockage.

Bit 2 =1:
    If an axis is to be blocked in continuous-path mode, the LookAhead func-
    tion stops the path motion prior to the next non-G0 block, if the axis has
    not yet been blocked by that time, i.e. the PLC has not yet set the fee-
    drate override to zero.
```

CTEQ					
-	-	0	0	0x07	2/1

36060	**STANDSTILL_VELO_TOL**			A05, A04	A2
mm/min, rev/min	Threshold velocity/speed 'Axis/spindle in stop'			DOUBLE	NEW CONF
This MD defines the standstill range for the axis velocity / spindle speed. If the current actual velocity of the axis or the actual speed of the spindle is smaller than the value entered in this MD, the interface signal "Axis/spindle stationary" is set. To bring the axis/spindle to a standstill under control, the pulse enable should be not be removed until the axis/spindle is at a standstill. Otherwise the axis would coast down. Related to: IS "Axis/spindle stationary" (DB31, ... DBX61.4)					
-					
-	-	5.00	-	-	7/2

36100	**POS_LIMIT_MINUS**			A03, A05, A11	A3
mm, degrees	1st software limit switch minus			DOUBLE	NEW CONF
Same meaning as 1st software limit switch plus, but the traversing range limitation is in the negative direction. The MD becomes active after reference point approach if PLC interface signal "2nd software limit switch minus" is not set. MD irrelevant: if axis is not referenced. Related to: IS "2nd software limit switch minus" (DB31, ... DBX12.2) The MD can be activated with SW release 5.3 newconf and later, i.e. a new setting of the MD via programming can be activated with NEWCONF.					
CTEQ					
-	-	-1.0e8	-	-	7/2

36110	**POS_LIMIT_PLUS**			A03, A05, A11	A3
mm, degrees	1st software limit switch plus			DOUBLE	NEW CONF
A software limit switch can be activated in addition to a hardware limit switch. The absolute position in the machine axis system of the positive range limit of each axis is entered. The MD is active after reference point approach if IS "2nd software limit switch plus" has not been set. MD irrelevant: if axis is not referenced. Related to: IS "2nd software limit switch plus" (DB31, ... DBX12.3) The MD can be activated with SW release 5.3 newconf and later, i.e. a new setting of the MD via programming can be activated with NEWCONF.					
CTEQ					
-	-	1.0e8	-	-	7/2

36120	**POS_LIMIT_MINUS2**			A03, A05	A3
mm, degrees	2nd software limit switch minus			DOUBLE	NEW CONF
Same meaning as 2nd software limit switch plus, but the traversing range limitation is in the negative direction. Whether software limit switch 1 or 2 is to be active can be selected by the PLC via interface signal. For example: DB31, DBB12 Bit 2 = 0"1st software limit switch minus" active for 1st axis Bit 2 = 1"2nd software limit switch minus" active for 1st axis MD irrelevant: if axis is not referenced. Related to: IS "2nd software limit switch minus" (DB31, ... DBX12.2) The MD can be activated with SW release 5.3 newconf and later, i.e. a new setting of the MD via programming can be activated with NEWCONF.					
CTEQ					
-	-	-1.0e8	-	-	7/2

36130	**POS_LIMIT_PLUS2**			A03, A05	A3
mm, degrees	2nd software limit switch plus			DOUBLE	NEW CONF
With this machine data, a 2nd software limit switch position in the positive direction can be defined. An interface signal from the PLC can select which of the two software limit switches 1 or 2 is to be active. For example: DB31, DBB12 Bit 3 = 0 "1st software limit switch plus" activefor 1st axis Bit 3 = 1 "2nd software limit switch plus" active for 1st axis MD irrelevant: if axis is not referenced. Related to: IS "2nd software limit switch plus" (DB31, ... DBX12.3) The MD can be activated with SW release 5.3 newconf and later, i.e. a new setting of the MD via programming can be activated with NEWCONF.					
CTEQ					
-	-	1.0e8	-	-	7/2

36200	AX_VELO_LIMIT			A05, A11, A04	A3,G2
mm/min, rev/min	Threshold value for velocity monitoring			DOUBLE	NEW CONF
The threshold value for actual velocity monitoring is entered in this machine data. If the axis has at least one active encoder and if this encoder is below its limit frequency, alarm 25030 "Actual velocity alarm limit" is triggered when the treshold value is exceeded and the axis stopped. Settings: - For axes, a value should be selected that is 10 to 15 % higher than that of MD: MAX_AX_VELO (maximum axis velocity). With active temperature compensation MD: TEMP_COMP_TYPE, the maximum axis velocity is increased by an additional factor which is determined by MD: COMP_ADD_VELO_FACTOR (velocity overshoot through compensation). The following should therefore apply to the velocity monitoring threshold value: MD: AX_VELO_LIMIT[n] > MD: MAX_AX_VELO * (1.1 ... 1.15 + MD: COMP_ADD_VELO_FACTOR) - For spindles, a value should be selected for each gear stage that is 10 to 15 % higher than that of MD: GEAR_STEP_MAX_VELO_LIMIT[n] (maximum speed of gear stage).					
CTEQ					
-	6	11500., 11500., 11500., 11500., 11500., 11500.	-	-	7/2

36210	CTRLOUT_LIMIT			EXP, A05	G2
%	Maximum speed setpoint			DOUBLE	NEW CONF
This MD defines the maximum speed setpoint in percent. 100 % means maximum speed setpoint (10 V for analog interface, maximum speed for SIMODRIVE 611D (settable via 611D MD 1401: MOTOR_MAX_SPEED) or for PROFIBUS drives). The maximum speed setpoint depends on possibly available setpoint limitations in the speed and current controller. An alarm is output and the axis stopped when the limit is exceeded. The limit is to be selected in such a way that the maximum velocity (rapid traverse) can be reached and an appropriate additional control margin is available.					
CTEQ					
-	1	110.0	0	200	7/2

36220	CTRLOUT_LIMIT_TIME			EXP, A05	A3
s	Delay time for speed setpoint monitoring			DOUBLE	NEW CONF
This MD defines how long the speed setpoint may be within the limit CTRLOUT_LIMIT[n] (max. speed setpoint) until the monitoring function is triggered. Monitoring (and with it also this machine data) is always active. Reaching the limit renders the position control loop non-linear, which results in contour errors provided that the speed setpoint limited axis is participating in contour generation. That is why this MD has default value 0, i.e. the monitoring function responds as soon as the speed setpoint reaches the limit.					
-					
-	1	0.0	-	-	7/2

36300	**ENC_FREQ_LIMIT**			EXP, A02, A05, A06	A3
-	Encoder limit frequency			DOUBLE	POWER ON

This MD is used to enter the encoder frequency, which,
in general, is a manufacturer specification (type plate, documentation).

If the limit frequency of the encoder is higher than that of the measuring circuit module, the limit is internally reduced to the value of the measuring circuit module.
This does not apply to encoders on the PROFIBUS; here, the limit values of the measuring circuit module are slave-dependent, i.e. known only by the slave. Therefore, it is the user who is responsible for taking into account the limit frequency of the measuring circuit module.

Special case SIMODRIVE 611D:
When asynchronous motors are used in conjunction with digital main spindle drives, all encoders are evaluated by the NC (in contrast to the drive) up to their configured limit frequency. Already at the changeover speed MD1465, the drive itself changes from HSA mode to "encoderless" AM mode.
If the evaluation of the motor encoder through the NC is to be interrupted also at this drive-end-configured changeover speed, MD36300 must be assigned for this encoder with the changeover speed MD1465 converted into [Hz] as the default value.
Conversion formula: MD36300 = MD31020 * MD1465 / 60.0

-					
-	2	3.0e5, 3.0e5	-	-	7/2

36302	**ENC_FREQ_LIMIT_LOW**			EXP, A02, A05, A06	A3
%	Encoder limit frequency for new encoder synchronization.			DOUBLE	NEW CONF
Encoder frequency monitoring uses a hysteresis. MD 36300: ENC_FREQ_LIMIT defines the encoder limit frequency. When this frequency is exceeded, the encoder is switched off. When the frequency defined in ENC_FREQ_LIMIT_LOW is undergone, the encoder is switched on again. ENC_FREQ_LIMIT is entered directly in Hertz. ENC_FREQ_LIMIT_LOW, however, is a fraction of ENC_FREQ_LIMIT in percent. MA_ENC_FREQ_LIMIT_LOW is therefore already correctly preset for most of the encoders used. Exception: In the case of absolute encoders with En-Dat interface, however, the limit frequency of the absolute track is considerably lower than the limit frequency of the incremental track. You can achieve that the encoder is not switched on again until the limit frequency of the absolute track is undergone and that it therefore does not reference until the absolute track allows it, by entering a small value in ENC_FREQ_LIMIT_LOW. For spindles, this referencing is carried out automatically. Example EQN 1325: Limit frequency of the electronics of the incremental track: 430 kHz ===> ENC_FREQ_LIMIT = 430 kHz Limit frequency of the absolute track approx. 2000 encoder revs/min at 2048 increments/encoder rev., i.e. encoder frequency 2000/60 * 2048 Hz = 68 kHz ===> ENC_FREQ_LIMIT_LOW = 68/430 = 15 %					
-					
-	2	99.9, 99.9	0	100	7/2

36310	**ENC_ZERO_MONITORING**			EXP, A02, A05	A3
-	Zero mark monitoring			DWORD	NEW CONF

This MD is used to activate zero mark monitoring.

0: No zero mark monitoring

100:
No zero mark monitoring and suppression of all encoder alarms (i.e. besides alarm 25020, alarms 25000, 25010, etc. are also completely suppressed)

>0:Incremental measuring systems:
Number of detected zero mark errors at which monitoring is to be triggered (alarm output)

>0:Absolute measuring systems ($MA_ENC_TYPE=4):
Permissible deviation in 1/2 coarse increments between the absolute and the incremental encoder track (one 1/2 coarse increment is sufficient).

Special case, only for SIMODRIVE 611D:
>0:Absolute SSI measuring systems ($MA_ENC_TYPE=5):
With SSI encoders, there is no zero mark monitoring in the actual sense.
However, there are encoder types with laser beam measurement, where an encoder error message can easily occur due to a beam interruption. To ensure that the control must not be switched off and on every time with such encoders, you can switch over to alarm 25010 (pollution of measuring system, reset alarm) instead of standard Power On alarm 25000 (i.e. zero mark monitoring is not possible with this MD on SSI encoders, but the MD is used for alarm reconfiguration in case of encoder errors).
Special case for Profibus:
>100:Weakened hardware error messages (encoder errors are not mapped on PowerOn alarm 25000 (25001) but on reset alarm 25010 (25011); and zero mark monitoring is active (permiss. deviation must be set for Profibus in the drive, *not* in the NC)

-					
-	2	0, 0	-	-	7/2

36400	**CONTOUR_TOL**			A05, A11	A3
mm, degrees	Tolerance band for contour monitoring			DOUBLE	NEW CONF

Tolerance band for axial contour monitoring (dynamic following error monitoring).
The permissible deviation between the real and the modelled following error is entered in this MD.
The input of the tolerance band is intended to avoid spurious tripping of the dynamic following error monitoring through slight speed fluctuations, which occur during normal closed-loop control operations (e.g. during first cut).
Following error modelling and thus the input of this MD depends on the position control gain MD: POSCTRL_GAIN and, in the case of precontrol or simulation, on the accuracy of the controlled system model MD: EQUIV_SPEEDCTRL_TIME (equivalent time constant for precontrol of speed control loop), as well as on the accelerations and velocities used.

-					
-	-	1.0	-	-	7/2

36500	ENC_CHANGE_TOL		A02, A05		G2
mm, degrees	Tolerance at actual position value change.		DOUBLE		NEW CONF
The permissible deviation between the actual values of the two measuring systems is entered in this MD. This difference must not be exceeded when switching over the measuring system used for closed-loop control, in order to avoid compensating processes that are too strong. Otherwise, the error message 25100 "Axis %1 Switchover of measuring system not possible" is generated and the switchover does not take place. MD irrelevant for: MD 30200: NUM_ENCS = 0 or 1.					
-					
-	-	0.1	-	-	7/2

36510	ENC_DIFF_TOL		A02, A05		G2
mm, degrees	Tolerance of measuring system synchronization		DOUBLE		NEW CONF
Permissible deviation between the actual values of the two measuring systems. This difference must not be exceeded during the cyclic comparison of the two measuring systems used, as otherwise an error message would be generated. The corresponding monitoring function is not active - with MD input value=0, - if 2 measuring systems are not active/available in the axis - or if the axis has not been referenced (at least act. closed-loop control meas. system). With modulo axes, it is always the absolute value of the shortest/direct position difference that is monitored.					
-					
-	-	0.0	-	-	7/2

36520	DES_VELO_LIMIT		A02, A05		DA
%	Threshold for setpoint velocity monitoring		DOUBLE		NEW CONF
Maximum permissible setpoint velocity in percent of the maximum axis/spindle velocity. With $MA_DES_VELO_LIMIT, the position setpoint is monitored for abrupt changes. If the permissible limit value is exceeded, alarm 1016 error code 550010 is output. With axes, this machine data refers to $MA_MAX_AX_VELO. With spindles, the MD refers to the smaller one of the set velocities $MA_GEAR_STEP_MAX_VELO_LIMIT of the current gear stage or $MA_SPIND_VELO_LIMIT.					
-					
-	-	125.0	-	-	7/2

36600	**BRAKE_MODE_CHOICE**		EXP, A05		A3
-	Deceleration response on hardware limit switch		BYTE		POWER ON

```
If a rising edge of the axis-specific hardware limit switch is detected while
    the axis is traversing, the axis is braked immediately.

The type of braking is determined via this machine data:

Value = 0:
   Controlled braking along the acceleration ramp defined by MD: MAX_AX_ACCEL
(axis acceleration).
Value = 1:
   Rapid braking (selection of setpoint = 0) with reduction of following
error.

Related to:
    IS "Hardware limit switch plus or minus" (DB31, ... DBX12.1 or DBX12.0)
```

CTEQ					
-	-	1	0	1	7/2

36610	**AX_EMERGENCY_STOP_TIME**		A05, -		A3
s	Maximum time for braking ramp in case of error.		DOUBLE		NEW CONF

```
This MD is used to enter the time of the braking ramp in case of errors (e.g.
emergency stop) that a spindle requires to brake from maximum speed to stand-
still. Axes are normally stopped abruptly with speed setpoint 0; in such
cases, values in the lower ms range are appropriate (default setting).

With interpolating axes, following of the contour is not ensured during the
braking phase.

Notice:
    If the time of the braking ramp in case of errors is set too large, con-
    troller enable will be removed although the axis/spindle is still moving.
    It will then be stopped abruptly with speed setpoint 0. That is why the
    time in MD: AX_EMERGENCY_STOP_TIME should be selected smaller than the
    time in MD: SERVO_DISABLE_DELAY_TIME (cutout delay, controller enable).
The MD is active only in speed mode (i.e. spindle in open-loop control mode).

Related to:
    MD 36620: SERVO_DISABLE_DELAY_TIME
   Cutout delay controller enable
    MD 36210: CTRLOUT_LIMIT
   Maximum speed setpoint
```

-					
-	-	0.05	-	-	7/2

36620	SERVO_DISABLE_DELAY_TIME		A05, -	A2
s	Cutout delay servo enable		DOUBLE	NEW CONF

```
Maximum time delay for removal of "controller enable" after faults. The speed
enable (controller enable) of the drive is removed within the control after
the set delay time at the latest.

The delay time entered is active as a result of the following events:
- in case of errors that lead to immediate stopping of the axes
- if the IS "Controller enable" is removed by the PLC

As soon as the actual speed reaches the standstill range (MD 36060:
    STANDSTILL_VELO_ TOL) the "controller enable" for the drive is removed.
    The time should be set large enough to enable the axis / spindle to brake
    down to standstill from maximum traversing velocity or maximum speed. If
    the axis / spindle is stationary, the "controller enable" for the drive is
    removed immediately (i.e. the time defined in MD: SERVO_DISABLE_DELAY_TIME
    is terminated ahead of schedule).
Application example(s):
Speed control of the drive should be retained long enough to enable the axis /
spindle to brake down to standstill from maximum traversing velocity or maxi-
mum speed.

Notice:
    If the cutout delay controller enable is set too small, controller enable
    will be removed although the axis/spindle is still moving. This axis/spin-
    dle then coasts down powerlessly (which might be reasonable with grinding
    wheels, for example); otherwise the time SERVO_DISABLE_DELAY_TIME should
    be set larger than the duration of the braking ramp in case of errors (MD:
    AX_EMERGENCY_STOP_TIME).

Related to:
    IS "Controller enable" (DB31, ... DBX2.1)
   MD: AX_EMERGENCY_STOP_TIME
```

-					
-	-	0.1	-	-	7/2

36690	AXIS_DIAGNOSIS		EXP, A08	-
-	Internal data for test purposes		DWORD	POWER ON

```
Internal data for test purposes

0:       :Basic setting
Bit 0 (LSB) = 1 :For test case task.exp (for alarm SCAL_WARN_VEL)
Bit 1       = 1 :For test case brake test
- ACT_POS_ABS for ENC-SIM on HOST
- Additional error information in $VA_FXS_INFO
Bit 2       = 1 :For travel to fixed stop - preliminary
- Allow rapid braking for linked axes
Bit 3       = 1 :For travel to fixed stop - preliminary
- Consider inversion of direction when switching off rapid braking for linked
    axes
```

NBUP					
-	-	0	-	-	0/0

36700	**DRIFT_ENABLE**			EXP, A07, A09	K3
-	Automatic drift compensation			BOOLEAN	NEW CONF
With MD: DRIFT_ENABLE, the automatic drift compensation is activated. 1: Automatic drift compensation active (only for position-controlled axes/ spindles). During automatic drift compensation, the control permanently calculates during axis standstill the additional drift value still required to ensure that the following error reaches value 0 (compensation criterion). The total drift value is therfore formed by the drift basic value (MD:DRIFT_VALUE) and the drift additional value. 0: Automatic drift compensation not active. The drift value is formed only from the drift basic value (MD: DRIFT_VALUE). MD irrelevant for: Non-position-controlled spindles Related to: MD: DRIFT_LIMIT drift limit value for automatic drift compensation MD: DRIFT_VALUE drift basic value					
-					
-	-	FALSE	-	-	1/1

36710	**DRIFT_LIMIT**			EXP, A07, A09	K3
%	Drift limit value for automatic drift compensation			DOUBLE	NEW CONF
With MD: DRIFT_LIMIT, the magnitude of the drift additional value calculated during automatic drift compensation can be limited. If the drift additional value exceeds the limit value entered in MD: DRIFT_LIMIT, alarm 25070 "Drift value too large" is output and the drift additional value is limited to this value. MD irrelevant for: MD: DRIFT_ENABLE = 0					
-					
-	1	0.0	0	1.e9	1/1

36720	**DRIFT_VALUE**			EXP, A07, A09	K3
%	Basic drift value			DOUBLE	NEW CONF

```
The value entered in MD: DRIFT_VALUE is always added as an offset to the
    manipulated variable. While the automatic drift compensation is active
    only for position-controlled axes, this machine data is always active.

Note: --> Digital drives have no drift!


The following rule applies for PROFIBUS:
The present MD can be used for "simple" drives on PROFIBUS systems, which face
    drift problems. To avoid erroneous settings, this drift compensation only
    becomes active on the Profibus if $MA_RATED_OUTVAL != 0 (i.e. the MD has
    no effect for automatic interface adjustment between the NC and the
    drive).

Standardization: The input value refers to the interface standardization
according to
$MA_RATED_OUTVAL,
$MA_RATED_VELO as well as
$MA_CTRLOUT_LIMIT.

Note:
    If the DSC function ($MA_STIFFNESS_CONTROL_ENABLE=1) is used, drift com-
    pensation is not allowed to be active on the PROFIBUS; otherwise, unex-
    pected speed oscillations will occur when DSC is enabled/disabled.
```

-					
-	1	0.0	-	-	1/1

36730	**DRIVE_SIGNAL_TRACKING**			A10	S5
-	Acquisition of additional drive actual values			BYTE	POWER ON

```
With MD: DRIVE_SIGNAL_TRACKING = 1, the acquisition of the following drive
actual values is activated:
- $AA_LOAD   Drive load
- $AA_POWER  Drive active power
- $AA_TORQUE Drive torque setpoint
- $AA_CURR   Smoothed current setpoint (q-axis current) of drive

Note:
   With SIMODRIVE 611D, the drive provides these values automatically. With
PROFIBUS drives, however, it must be ensured that the values are also trans-
mitted in the drive actual message frame (provide sufficient message frame
length on the bus, assign the values to the message frame contents in the
drive).

With MD: DRIVE_SIGNAL_TRACKING = 2, the acquisition of the following drive
actual values is activated (relevant/available only on PROFIBUS):
- $VA_DP_ACT_TEL shows actual value message frame words
```

-					
-	-	0	0	4	7/2

36750	**AA_OFF_MODE**			A10	FBSY
-	Effect of value assignment for axial override of synchr. action.			BYTE	POWER ON

```
Mode setting for axial offset $AA_OFF

Bit 0: Effect of value assignment within a synchronized action
0: Absolute value
1: Incremental value (integrator)

Bit 1: Response of $AA_OFF on RESET
0: $AA_OFF is deselected on RESET
1: $AA_OFF is retained beyond RESET

Bit 2: $AA_OFF in JOG mode
0: No superimposed motion due to $AA_OFF
1: A superimposed motion due to $AA_OFF is interpolated
```

CTEQ					
-	-	0	0	7	7/2

1.5.7 Safety Integrated

36901	SAFE_FUNCTION_ENABLE			A05, -	FBSI
-	Enable safety functions			DWORD	POWER ON

```
The safe operation functions can be enabled for an axis/spindle with this
    data.
For each axis, only as many axes/spindles can be enabled for safe operation as
    are enabled by the global option.
The more sub-functions are set, the more CPU time the safety functions need.

Bit  0: Enables safe velocity, safe operational stop
Bit  1: Enables safe limit switch
Bit  2: Reserved for functions with absolute references (such as SE/SN)
Bit  3: Enables actual value synchronization, 2 encoder system
Bit  4: Enables external ESR activation
Bit  5: Enables SG offset
Bit  6: Enables external stop requests
Bit  7: Enables cam synchronization
Bit  8: Enables safe cams, pair 1, cam +
Bit  9: Enables safe cams, pair 1, cam -
Bit 10: Enables safe cams, pair 2, cam +
Bit 11: Enables safe cams, pair 2, cam -
Bit 12: Enables safe cams, pair 3, cam +
Bit 13: Enables safe cams, pair 3, cam -
Bit 14: Enables safe cams, pair 4, cam +
Bit 15: Enables safe cams, pair 4, cam -

Special cases:
- When one of the bits from bit 1 is set then bit 0 must also be set because
    the control switches to safe operational stop with STOP C, D, E (parame-
    ter alarm 27033 is displayed if there is an error).
- If global option does not enable enough axes/spindles for safe operation
    then this data can be overwritten with the value 0 during power on.

Related to: Global option

References:           /FBSI/, SINUMERIK SAFETY INTEGRATED
```

-					
-	-	0	0	0xFFFB	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36902	SAFE_IS_ROT_AX			A01, A05, A06, -	FBSI
-	Rotary axis			BOOLEAN	POWER ON
States whether the axis for safe operation is a rotary axis/spindle or a linear axis. 0: Linear axis 1: Rotary axis/spindle The value in this MD must be equal to that in MD $MA_IS_ROT_AX. A parameterization error is displayed if there is a difference.					
-					
-	-	FALSE	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36903	**SAFE_CAM_ENABLE**			A05, -	-
-	Function enable safe cams			DWORD	POWER ON

```
Function enables of safe cams for "Safety Integrated".
Bit  0: Enables safe cams, pair 1, cam +
Bit  1: Enables safe cams, pair 1, cam -
Bit  2: Enables safe cams, pair 2, cam +
Bit  3: Enables safe cams, pair 2, cam -
Bit  4: Enables safe cams, pair 3, cam +
Bit  5: Enables safe cams, pair 3, cam -
Bit  6: Enables safe cams, pair 4, cam +
Bit  7: Enables safe cams, pair 4, cam -
Bit  8: Enables safe cams, pair 5, cam +
Bit  9: Enables safe cams, pair 5, cam -
Bit 10: Enables safe cams, pair 6, cam +
Bit 11: Enables safe cams, pair 6, cam -
Bit 12: Enables safe cams, pair 7, cam +
Bit 13: Enables safe cams, pair 7, cam -
Bit 14: Enables safe cams, pair 8, cam +
Bit 15: Enables safe cams, pair 8, cam -
Bit 16: Enables safe cams, pair 9, cam +
Bit 17: Enables safe cams, pair 9, cam -
Bit 18: Enables safe cams, pair 10, cam +
Bit 19: Enables safe cams, pair 10, cam -
Bit 20: Enables safe cams, pair 11, cam +
Bit 21: Enables safe cams, pair 11, cam -
Bit 22: Enables safe cams, pair 12, cam +
Bit 23: Enables safe cams, pair 12, cam -
Bit 24: Enables safe cams, pair 13, cam +
Bit 25: Enables safe cams, pair 13, cam -
Bit 26: Enables safe cams, pair 14, cam +
Bit 27: Enables safe cams, pair 14, cam -
Bit 28: Enables safe cams, pair 15, cam +
Bit 29: Enables safe cams, pair 15, cam -
```

-					
-	-	0	0	0x3FFFFFFF	7/2
710-2a2c	-	-	-	-	-1/-
710-6a2c	-	-	-	-	-1/-
710-12a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
840d-2a2c	-	-	-	-	-1/-
840d-4a1cg	-	-	-	-	-1/-
840d-6a2c	-	-	-	-	-1/-
840d-12a2c	-	-	-	-	-1/-
840d-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36905	SAFE_MODULO_RANGE			A02, -	FBSI
degrees	Modulo value Safe cams			DOUBLE	POWER ON
Actual value range in which the safe cams are calculated for rotary axes. The axis must be a rotary axis ($MA_SAFE_IS_ROT_AX = 1). 0: Modulo compensation after +/- 2048 revolutions (that is after 737,280 degrees) >0:And multiples of 360 degrees: Modulo compensation after this value, for example: value = 360 --> then the actual value range lies between 0 and 359.999 degrees. That is modulo compensation is made after each revolution. Special cases: - If the value of this data is not 0 or a multiple of 360 degrees then a corresponding alarm is issued during power on. - The parameterized actual value ranges of the cam positions are also checked during power on. A corresponding alarm is issued if there is a parameterization error. - The actual value ranges set by $MA_SAFE_MODULO_RANGE and $MA_MODULO_RANGE must be integers and divisible without a remainder. Related to: MD 30330: $MA_MODULO_RANGE MD 36935: $MA_SAFE_CAM_POS_PLUS[n] MD 36937: $MA_SAFE_CAM_POS_MINUS[n]					
-					
-	-	0.0	0.0	737280.0	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36906	SAFE_CTRLOUT_MODULE_NR			A01, A05, -	-
-	SI drive assignment			BYTE	POWER ON
Index into the data field $MN_SAFE_DRIVE_LOGIC_ADDRESS for assigning the drive for the SI motion monitoring. The drive assigned must be same as that selected via CTRLOUT_MODULE_NR and DRIVE_LOGIC_ADDRESS.					
-					
-	-	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18...	1	31	7/2
840d-2a2c	-	-	-	-	-1/-
840d-4a1cg	-	-	-	-	-1/-
840d-6a2c	-	-	-	-	-1/-
840d-12a2c	-	-	-	-	-1/-
840d-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36907	**SAFE_DRIVE_PS_ADDRESS**			A01, A05, -	-
-	PROFIsafe address of the drive			DWORD	POWER ON
This NCK MD contains the PROFIsafe address of the drive asigned to this axis. This MD is read out during the power on of the drive. This address must be unique across all axes. This MD cannot be written, the PROFIsafe address must be parameterized in the drive. The value of this MD is included in the calculation of MD $MA_SAFE_ACT_CHECKSUM[1].					
READ					
-	-	0	-	-	7/0
840d-2a2c	-	-	-	-	-1/-
840d-4a1cg	-	-	-	-	-1/-
840d-6a2c	-	-	-	-	-1/-
840d-12a2c	-	-	-	-	-1/-
840d-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36910	**SAFE_ENC_SEGMENT_NR**			EXP, A01, A02, A05, -	FBSI
-	Actual value assignment: type of drive			BYTE	POWER ON
Number of the bus segment over which the SI encoder is addressed. 0: Local bus 1: Drive bus 611D (1st DCM) 2: MERKUR local P-bus 3: Drive bus 611D (2nd DCM) 4: Reserved (virtual buses) 5: PROFIBUS DP Safety functions are only possible with 611D or suitable PROFIBUS drives, see also MD 30210					
-					
-	-	5	5	5	0/0
710-2a2c	-	-	-	-	-1/-
710-6a2c	-	-	-	-	-1/-
710-12a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
840d-2a2c	-	1	1	1	-1/-
840d-4a1cg	-	1	1	1	-1/-
840d-6a2c	-	1	1	1	-1/-
840d-12a2c	-	1	1	1	-1/-
840d-31a10c	-	1	1	1	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36911	**SAFE_ENC_MODULE_NR**			A01, A02, A05, -	FBSI
-	Actual value assignment: drive number/ measurement circuit number			BYTE	POWER ON

```
Module number within a segment by which the SI encoder is addressed.

The logical drive number of the drive assigned to the axis by
    $MN_DRIVE_LOGIC_NR must be entered here.

In the standard case with a 2 encoder system, the encoder for Safety Inte-
    grated is connected to the second encoder connection (lower input) of the
    same drive submodule.

Special cases:
Any actual value input in the 611D grouping can be used as the NC-side measur-
    ing system for the second encoder.

Related to:
    MD 36910: $MA_SAFE_ENC_SEGMENT_NR
    MD 36912: $MA_SAFE_ENC_INPUT_NR
    MD 13010: $MN_DRIVE_LOGIC_NR
```

-					
-	-	1,2,3,4,5,6,7,8,9,10, 11,12,13,14,15,16,1 7,18...	1	31	7/2
710-2a2c	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0, 0,0,0,0,0...	0	0	-1/-
710-6a2c	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0, 0,0,0,0,0...	0	0	-1/-
710-12a2c	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0, 0,0,0,0,0...	0	0	-1/-
710-31a10c	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0, 0,0,0,0,0...	0	0	-1/-
840di-basic	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0, 0,0,0,0,0...	0	0	-1/-
840di-universal	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0, 0,0,0,0,0...	0	0	-1/-
840di-plus	-	0,0,0,0,0,0,0,0,0,0,0 ,0,0,0,0,0,0,0,0,0,0, 0,0,0,0,0...	0	0	-1/-

36912	**SAFE_ENC_INPUT_NR**			A01, A02, A05, -	FBSI
-	Actual value assignm.: Input on drive module/meas. circuit board			BYTE	POWER ON
Number of the actual value input of a submodule over which the SI encoder is addressed. 1: SI encoder is connected to the upper input (motor encoder) 2: SI encoder is connected to the lower input (2nd encoder) In the standard case with a 2 encoder system, the encoder for Safety Integrated is connected to the second encoder connection (lower input) of the same drive submodule. Special cases: Any actual value input in the 611D grouping can be used as the NC-side measuring system for the second encoder. Related to: MD 36911: $MA_SAFE_ENC_MODULE_NR					
-					
-	-	1	1	3	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36914	**SAFE_SINGLE_ENC**			A01, A02, A05, -	-
-	SI single-encoder system			BOOLEAN	POWER ON
Identifier that SI is carried out with an encoder. This MD must be parameterized to 0 if different encoders are used for the Safety Integrated monitoring functions in the NCK and in the drive.					
-					
-	-	TRUE	-	-	7/2
840d-2a2c	-	-	-	-	-1/-
840d-4a1cg	-	-	-	-	-1/-
840d-6a2c	-	-	-	-	-1/-
840d-12a2c	-	-	-	-	-1/-
840d-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36915	SAFE_ENC_TYPE		A01, A02, A05, -	FBSI
-	Encoder type		BYTE	POWER ON

```
Definition of the type of SI encoder connected.

0: Simulation
1: Raw signal generator (voltage, current, EXE, etc.)  -> high resolution
2: Rectangular signal encoder (standard, quadruplication of increments)
3: Encoder for stepper motor (only for MERKUR)
4: EnDat absolute encoder
5: SSI encoder (synchronous serial interface) only for Merkur, see also MD
30240


-  The coding of the value corresponds to the data $MA_ENC_TYPE.

Related to:
   MD 30240: $MA_ENC_TYPE
```

-					
-	-	0	0	4	7/2
710-2a2c	-	-	-	-	-1/-
710-6a2c	-	-	-	-	-1/-
710-12a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36916	**SAFE_ENC_IS_LINEAR**		A02, A05, -	FBSI	
-	Linear scale		BOOLEAN	POWER ON	

```
Definition of whether a linear or a rotary encoder is connected.

0: Rotary encoder is connected, its resolution is defined by
$MA_SAFE_ENC_RESOL, and converted by $MA_SAFE_ENC_GEAR_PITCH,
$MA_SAFE_ENC_GEAR_DENOM[n] and $MA_SAFE_ENC_GEAR_NUMERA[n] on the load side.
MD $MA_SAFE_ENC_GRID_POINT_DIST has no significance.

1: Linear encoder is connected, its resolution is defined by
$MA_SAFE_ENC_GRID_POINT_DIST. MD $MA_SAFE_ENC_RESOL, $MA_SAFE_ENC_GEAR_PITCH,
$MA_SAFE_ENC_GEAR_DENOM[n] and $MA_SAFE_ENC_GEAR_NUMERA[n] have no signifi-
cance.

Related to:
With 0:
   $MA_SAFE_ENC_RESOL
   $MA_SAFE_ENC_GEAR_PITCH
   $MA_SAFE_ENC_GEAR_DENOM[n]
   $MA_SAFE_ENC_GEAR_NUMERA[n]

With 1:
   $MA_SAFE_ENC_GRID_POINT_DIST
```

-					
-	-	FALSE	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36917	**SAFE_ENC_GRID_POINT_DIST**		A02, A05, -	FBSI	
mm	Scale division for linear scale		DOUBLE	POWER ON	

```
Definition of the grid spacing of the linear scale used.

Not relevant for a rotary encoder.
```

-					
-	-	0.01	0.00001	8	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36918	**SAFE_ENC_RESOL**		A02, A05, -	FBSI	
-	Encoder lines per revolution		DWORD	POWER ON	

```
Definition of the lines per revolution for a rotary encoder.

Not relevant for a linear encoder.
```

-					
-	-	2048	1	100000	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36919	SAFE_ENC_PULSE_SHIFT			A02, A05, -	-
-	Shift factor of encoder multiplication			BYTE	POWER ON
Slide factor of the multiplication factor (high-resolution) of the encoder used for the Safety Integrated monitoring functions in the NCK. The encoder value must be divided by 2 the number of times needed to get the number of encoder lines. A slide factor of 11 corresponds to an encoder multiplication factor of 2048. If the drive provides this information, this MD is automatically assigned internally after power on of the drive. If the value changes during this process, alarm 27036 is triggered.					
-					
-	-	11	2	18	7/2
840d-2a2c	-	-	-	-	-1/-
840d-4a1cg	-	-	-	-	-1/-
840d-6a2c	-	-	-	-	-1/-
840d-12a2c	-	-	-	-	-1/-
840d-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36920	SAFE_ENC_GEAR_PITCH			A02, A05, -	FBSI
mm	Lead screw pitch			DOUBLE	POWER ON
Gear ratio between encoder and load for a linear axis with a rotary encoder.					
-					
-	-	10.0	0.1	10000.	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36921	SAFE_ENC_GEAR_DENOM			A02, A05, -	FBSI
-	Denominator of gearbox encoder/load			DWORD	POWER ON
Numerator of the gearbox between encoder and load, that is the numerator of the fraction: number of encoder revolutions / number of load revolutions n = 0, 1, ... , 7 stand for gear stages 1, 2, ... 8 The current value is selected via safety-relevant input signals (SGE). Related to: MD 36922: $MA_SAFE_ENC_GEAR_NUMERA[n]					
-					
-	8	1, 1, 1, 1, 1, 1, 1, 1	1	2147000000	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36922	**SAFE_ENC_GEAR_NUMERA**			A02, A05, -	FBSI
-	Numerator of gearbox encoder/load			DWORD	POWER ON
Numerator of the gearbox between encoder and load, that is the numerator of the fraction: number of encoder revolutions / number of load revolutions n = 0, 1, ... , 7 stand for gear stages 1, 2, ... 8 The current value is selected via safety-relevant input signals (SGE). Related to: MD 36921: $MA_SAFE_ENC_GEAR_DENOM[n]					
-					
-	8	1, 1, 1, 1, 1, 1, 1, 1	1	2147000000	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36923	**SAFE_INFO_ENC_RESOL**			A02, A05, -	-
mm, degrees	Safe encoder resolution			DOUBLE	POWER ON
Display data: Resolution of the encoder used in the relevant gear stage for the Safety Integrated monitoring functions. A single encoder system can monitor safe positions with this accuracy. This MD is 0 if different encoders are used in the drive and in the NCK for the Safety Integrated monitoring functions.					
READ					
-	8	0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0	-	-	7/0
840d-2a2c	-	-	-	-	-1/-
840d-4a1cg	-	-	-	-	-1/-
840d-6a2c	-	-	-	-	-1/-
840d-12a2c	-	-	-	-	-1/-
840d-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36925	**SAFE_ENC_POLARITY**			A02, A05, -	FBSI
-	Direction reversal of actual value			DWORD	POWER ON
A direction reversal of the actual value can be set with this data. -1:Direction reversal 0: No direction reversal or 1: No direction reversal					
-					
-	-	1	-1	1	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36926	SAFE_ENC_FREQ_LIMIT			A02, A05, -	FBSI
-	Encoder frequency limit for safe operation			DWORD	POWER ON
Encoder limit frequency above which amplitude monitoring is switched off. A speed corresponding to this frequency must not be exceeded in safe operation with a 1-encoder system. If this limit frequency is exceeded in safe operation (SBH or SG,), the drive is shut down by the stop response parameterized for active monitoring. This frequency can be set to more than 300kHz only for performance-2 control units High Standard und High Performance. Incorrect parameterizations are indicated by alarm 27033.					
-					
-	-	300000	300000	420000	7/2
710-2a2c	-	500000	500000	500000	-1/-
710-6a2c	-	500000	500000	500000	-1/-
710-12a2c	-	500000	500000	500000	-1/-
710-31a10c	-	500000	500000	500000	-1/-
840di-basic	-	500000	500000	500000	-1/-
840di-universal	-	500000	500000	500000	-1/-
840di-plus	-	500000	500000	500000	-1/-

36927	SAFE_ENC_MOD_TYPE			A02, A05, -	-
-	Encoder evaluation type			BYTE	POWER ON
Type of encoder evaluation used for Safety Integrated on this axis. This type is read out during power on by the encoder evaluation and compared with the last value stored here. This MD is then overwritten. The value of this MD is included in the calculation of MD $MA_SAFE_ACT_CHECKSUM[1].					
READ					
-	-	0	-	-	7/0
840d-2a2c	-	-	-	-	-1/-
840d-4a1cg	-	-	-	-	-1/-
840d-6a2c	-	-	-	-	-1/-
840d-12a2c	-	-	-	-	-1/-
840d-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36928	**SAFE_ENC_IDENT**			A02, A05, -	-
-	Encoder identification			DWORD	POWER ON
Identification of the encoder evaluation used for Safety Integrated on this axis. This identification is read out during power on by the encoder evaluation and compared with the last value stored here. This MD is then overwritten. The value of this MD is included in the calculation of MD $MA_SAFE_ACT_CHECKSUM[1].					
READ					
-	3	0, 0, 0	-	-	7/0
840d-2a2c	-	-	-	-	-1/-
840d-4a1cg	-	-	-	-	-1/-
840d-6a2c	-	-	-	-	-1/-
840d-12a2c	-	-	-	-	-1/-
840d-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36930	**SAFE_STANDSTILL_TOL**			A05, -	FBSI
mm, degrees	Standstill tolerance			DOUBLE	POWER ON
Definition of the tolerance for safe operational stop. The control triggers alarm 27010 with STOP B if the difference between position limit value und position actual value is greater than this tolerance when safe operational stop is selected. The position limit value is the position actual value at the time safe operational stop was selected. Related to: MD 36956: $MA_SAFE_PULSE_DISABLE_DELAY					
-					
-	-	1.	0.	100.	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36931	**SAFE_VELO_LIMIT**			A05, A04, -	FBSI
mm/min, rev/min	Limit value for safe velocity			DOUBLE	POWER ON
Definition of the limit values for the safe velocities 1, 2, 3 and 4. If SG1, SG2, SG3 or SG4 is selected and the current velocity exceeds this limit value, the control triggers alarm 27011 with the stop response configured in $MA_SAFE_VELO_STOP_MODE or $MA_SAFE_VELO_STOP_REACTION. n = 0, 1, 2, 3 stand for the limit values of SG1, SG2, SG3, SG4 Special cases: In a 1-encoder system with SBH/SG active, the velocity is monitored according to the encoder frequency set in MD $MA_SAFE_ENC_FREQ_LIMIT. A corresponding alarm is output if this is exceeded. Related to: MD 36961: $MA_SAFE_VELO_STOP_MODE MD 36963: $MA_SAFE_VELO_STOP_REACTION					
-					
-	4	2000., 2000., 2000., 2000.	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36932	**SAFE_VELO_OVR_FACTOR**			A05, -	FBSI
%	SG offset values			DOUBLE	POWER ON
Overrides for the limit values of safe velocities 2 and 4 can be selected via the SGEs, and the associated override value (percentage values) can be set with this MD. n = 0, 1, ... , 15 stand for overrides 0, 1, ... 15 Special cases: - The function "Override safe speed" is enabled by MD 36901 $MA_SAFE_FUNCTION_ENABLE. - This override is inactive for the limit values of velocities 1 and 3. Related to: MD 36978: $MA_SAFE_OVR_INPUT[n] MD 36931: $MA_SAFE_VELO_LIMIT[n]					
-					
-	16	100.0, 100.0, 100.0, 100.0, 100.0, 100.0, 100.0, 100.0, 100.0...	1.0	100.0	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36933	**SAFE_DES_VELO_LIMIT**			A05, A04, -	FBSI
%	SG setpoint speed limit			DOUBLE	RESET
Weighting factor for determining the setpoint limit from the current actual speed limit. The active SG limit value is weighted with this factor and defined as the setpoint limit for the interpolator. Setpoint 0 is defined when SBH is selected. An input of 100% limits the setpoint to the active SG stage The setpoint speed limit is inactive with an input of 0%. Special cases: - In order to take the drive dynamics into account, multiple changes may have to be made to set this MD optimally. "Reset" is defined as the effectivity criterion to avoid making this procedure unnecesarily complicated. - This data is not included in the cross-check with the drive. - This data is not included in the axial check sum $MA_SAFE_ACT_CHECKSUM, as this is a 1-channel function.					
-					
-	-	0.0	0	100	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36934	**SAFE_POS_LIMIT_PLUS**			A03, A05, -	FBSI
mm, degrees	Upper limit of safe end position			DOUBLE	POWER ON
Definition of the upper limit value for safe end positions 1 and 2. If SE1 or SE2 is selected and the current actual position is greater than this limit value, the control triggers alarm 27012 with the stop response configured in $MA_SAFE_POS_STOP_MODE and switches to SBH. Stop responses STOP B and A follow if SBH is violated. n = 0, 1 stand for the upper limit values of SE1, SE2 Related to: MD 36962: $MA_SAFE_POS_STOP_MODE MD 36935: $MA_SAFE_POS_LIMIT_MINUS[n] MD 36901: $MA_SAFE_FUNCTION_ENABLE Special cases: A parameterization error is displayed if a value is entered in MD: $MA_SAFE_POS_LIMIT_PLUS[n] which is less than or equal to that in MD: $MA_SAFE_POS_LIMIT_MINUS[n].					
-					
-	2	100000., 100000.	-2147000	2147000	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36935	SAFE_POS_LIMIT_MINUS		A03, A05, -	FBSI	
mm, degrees	Lower limit of safe end position		DOUBLE	POWER ON	

```
Definition of the lower limit value for safe end positions 1 and 2.

If SE1 or SE2 is selected and the current actual position is less than this
    limit value, the control triggers alarm 27012 with the stop response con-
    figured in  $MA_SAFE_POS_STOP_MODE and switches to SBH. Stop responses
    STOP B and A follow if SBH is violated.

n = 0, 1 stand for the lower limit values of SE1, SE2

Related to:
    MD 36962: $MA_SAFE_POS_STOP_MODE
    MD 36934: $MA_SAFE_POS_LIMIT_PLUS[n]

Special cases:
A parameterization error is displayed if a value is entered in MD:
    $MA_SAFE_POS_LIMIT_PLUS[n] which is less than or equal to that in MD:
    $MA_SAFE_POS_LIMIT_MINUS[n].
```

-					
-	2	-100000., -100000.	-2147000	2147000	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36936	SAFE_CAM_POS_PLUS		A03, A05, -	FBSI	
mm, degrees	Plus cam position for safe cams		DOUBLE	POWER ON	

```
Definition of the plus cam positions for safe cams SN1 +, SN2 +, SN3 + and SN4
+.

If, with activated safe cams, the actual position is greater than this value,
    the corresponding safety-relevant output signal (SGA) is set to 1. If the
    actual position falls below this value, the SGA is set to 0.

n = 0, 1, 2, 3 stand for plus cam positions of SN1 +, SN2 +, SN3 +, SN4 +

Related to:
    MD 36988: $MA_SAFE_CAM_PLUS_OUTPUT[n]
```

-					
-	4	10., 10., 10., 10.	-2147000	2147000	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36937	SAFE_CAM_POS_MINUS			A03, A05, -	FBSI
mm, degrees	Minus cam position for safe cams			DOUBLE	POWER ON
Definition of the minus cam positions for safe cams SN1 -, SN2 -, SN3 - and SN4 -. If, with activated safe cams, the actual position is greater than this value, the corresponding safety-relevant output signal (SGA) is set to 1. If the actual position falls below this value, the SGA is set to 0. n = 0, 1, 2, 3 stand for minus cam positions of SN1 -, SN2 -, SN3 -, SN4 - Related to: MD 36989: $MA_SAFE_CAM_MINUS_OUTPUT[n]					
-					
-	4	-10., -10., -10., -10.	-2147000	2147000	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36940	SAFE_CAM_TOL			A05, -	FBSI
mm, degrees	Tolerance for safe cams			DOUBLE	POWER ON
As a result of differing encoder mounting positions and differing cycle and run times, the cam signals of the two monitoring channels never switch at exactly the same position or at exactly the same time. This data defines the tolerance as a load-side path for all cams, within which the monitoring channels can have different signal states for the same cam without triggering alarm 27001. Recommendation: Enter a value equal to or slightly larger than that in MD 36942.					
-					
-	-	0.1	0.001	10	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36942	**SAFE_POS_TOL**			A05, -	FBSI
mm, degrees	Tolerance actual value cross-check			DOUBLE	POWER ON

Because of varying installation locations for the encoder, backlash, torsion, lead screw error etc, the two actual positions acquired by NCK and drive at the same time can differ from one another.

The tolerance for the cross-check of the actual positions in the two monitoring channels is entered in this data.

Special cases:
- The prime consideration for defining this tolerance is the "finger protection" (ca. 10 mm).

- If this tolerance is exceeded, stop reaction STOP F ensues.

-					
-	-	0.1	0.001	360	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36944	**SAFE_REFP_POS_TOL**			A05, -	FBSI
mm, degrees	Tolerance actual value check (referencing)			DOUBLE	POWER ON

This data defines the tolerance for checking the actual values after referencing (for an incremental encoder) or during power on (for an absolute encoder). Referencing determines an absolute actual position of the axis. A second absolute actual position is derived from the last stored standstill position before the control was switched off and the path traversed since power on. The control checks the actual values after referencing with these two absolute positions, the path traversed and this data.

The following influences must be taken into account when determining the tolerance values:
backlash, leadscrew error, compensations (max. compensation values with LEC, sag and temperature compensations), temperature errors, torsion (2-encoder system), gear tolerance in variable gears, coarser resolution (2-encoder system), oscillation distance with variable gears.

Special cases:
Given user agreement, if the two absolute actual positions differ by more than the value in this data, alarm 27001 is displayed with error code 1003, and renewed user agreement is required for referencing.

-					
-	-	0.01	0	36	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36946	SAFE_VELO_X			A05, -	FBSI
mm/min, rev/min	Velocity limit n_x			DOUBLE	POWER ON
This data defines the limit speed n_x for the SGA "n < nx". The SGA "n < nx" is set if this speed limit is undershot.					
-					
-	-	20.	0.	6000.	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36948	SAFE_STOP_VELO_TOL			A05, -	FBSI
mm/min, rev/min	Velocity tolerance for Safe braking ramp			DOUBLE	POWER ON
Tolerance of the actual velocity for the safe braking ramp (SBR). The actual velocity is given this tolerance after the safe braking ramp has been activated by triggering a Stop B or C. The actual velocity must not be greater than the limit defined thereby. Otherwise a Stop A is triggered. This reveals an aceleration of the drive as quickly as possible.					
-					
-	-	300.	0.	120000.	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36949	SAFE_SLIP_VELO_TOL			A05, -	FBSI
mm/min, rev/min	Slip velocity tolerance			DOUBLE	POWER ON
Difference in velocity between the motor and load sides tolerated by a 2-encoder system, without the data cross-check between 611D and NCK signaling an error. MD 36949 is only evaluated if MD $MA_SAFE_FUNCTION_ENABLE_, bit3 is set. Relating to: MD 1349: $MD_SAFE_SLIP_VELO_TOL					
-					
-	-	6.	0.	6000.	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36950	**SAFE_MODE_SWITCH_TIME**			A05, -	FBSI
s	Tolerance time for SGE switchover			DOUBLE	POWER ON
SGE switchovers are not active simultaneously because the data transfer runtimes of the SGEs differ in the two monitoring channels. The data cross-check would report an error in this case. This data defines the length of time after SGE switchovers during which the actual values and the monitoring results are not cross-checked (the machine data continue to be compared!). The selected monitoring continues to run uninterrupted in both monitoring channels. A safe function becomes active in a monitoring channel as soon as the selection or switchover is detected in this channel. The differing runtime is mainly determined by the PLC cycle time. System-related minimum tolerance time: 2 x PLC cycle time (maximum cycle) + 1 x IPO cycle time. The runtime differences must also be taken into account in the external circuit (e.g. relay switching times).					
-					
-	-	0.5	0	10.	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36951	**SAFE_VELO_SWITCH_DELAY**			A05, -	FBSI
s	Delay time for velocity changeover			DOUBLE	POWER ON
A timer is started with this value when transferring from a higher to a lower safe speed or when selecting safe operational stop with safe speed active. The parameterized value selected must be as low as possible. The last selected speed limit value continues to be monitored while the timer is running. During this time, the axle/spindle can be decelerated, for example via the PLC user program, without the monitoring reporting an error and triggering a stop reaction. Special cases: 1. The timer is aborted immediately on switching to a limit greater than or equal to the previously active SG limit. 2. The timer is aborted immediately on switching to "Non-safe operation" (SGE "Deselect SBH/SG=1). 3. The timer is retriggered (restarted) on switching to a limit less than the previously active SG limit or to SBH while the timer is running.					
-					
-	-	0.1	0	60	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36952	**SAFE_STOP_SWITCH_TIME_C**			A05, -	FBSI
s	Transition time STOP C to safe standstill			DOUBLE	POWER ON
This data defines the time after which a switch is made to safe operational stop when a STOP C has been triggered. The parameterized value selected must be as low as possible. Safe operational stop is monitored after this time has expired. STOP A or B is triggered if the axis/spindle could not be stopped.					
-					
-	-	0.1	0	10	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36953	**SAFE_STOP_SWITCH_TIME_D**			A05, -	FBSI
s	Transition time STOP D to safe standstill			DOUBLE	POWER ON
This data defines the time after which a switch is made to safe operational stop when a STOP D has been triggered. The parameterized value selected must be as low as possible. Safe operational stop is monitored after this time has expired. STOP B is triggered if the axis/spindle could not be stopped.					
-					
-	-	0.1	0	60	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36954	**SAFE_STOP_SWITCH_TIME_E**			A05, -	FBSI
s	Transitional period STOP E to safe standstill			DOUBLE	POWER ON
Time period after which a switch over takes place from STOP E to safe operational stop. The parameterized value selected must be as small as possible.					
-					
-	-	0.1	0	60	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36955	**SAFE_STOP_SWITCH_TIME_F**			A05, -	FBSI
s	Transition time STOP F to STOP B			DOUBLE	POWER ON
Time period after which a switch over takes place from stop F to stop B with active monitoring functions. The parameterized value selected must be as low as possible. During this time, another deceleration reaction can be activated, e.g. by means of synchronized actions. The switch over also takes place if a C/D/E stop occurs during this time.					
-					
-	-	0.0	0	60	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36956	**SAFE_PULSE_DISABLE_DELAY**			A05, -	FBSI
s	Delay time for pulse suppression			DOUBLE	POWER ON
On STOP B, deceleration is made with speed setpoint 0 at the current limit and changed to STOP A for pulse suppression after the delay time defined with this data. The parameterized value selected must be as low as possible. Special cases: The pulse suppression is performed earlier than defined in this data if the condition for pulse suppression is present via MD 36960: $MA_SAFE_STANDSTILL_VELO_TOL or via MD 36620: $MA_SERVO_DISABLE_DELAY_TIME. If the time is set in this data to ZERO, then on STOP B an immediate change is made to STOP A (immediate pulse suppression). Relating to: MD 36960: $MA_SAFE_STANDSTILL_VELO_TOL MD 36620: $MA_SERVO_DISABLE_DELAY_TIME MD 36060: $MA_STANDSTILL_VELO_TOL					
-					
-	-	0.1	0	10	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36957	SAFE_PULSE_DIS_CHECK_TIME		A05, -	FBSI	
s	Time for checking pulse suppression		DOUBLE	POWER ON	
Definiiton of the time after which pulses have to be disabled after a request to disable pulses. The time between deleting the SGA "Enable pulse" and detecting the disabling of pulses via the SGE "Status pulses disabled" must not exceed the value of this data. Special cases: STOP A is triggered if this time is exceeded.					
-					
-	-	0.1	0	10	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36958	SAFE_ACCEPTANCE_TST_TIMEOUT		A05, -	FBSI	
s	Time limit for acceptance test duration		DOUBLE	POWER ON	
On the NCK side, a time limit can be specified for the duration of an acceptance test. The NCK terminates the test if an acceptance test lasts longer than the time defined in MD 36958. The acceptance test status is set to zero on the NCK side. When the acceptance test status is reset, SI-power-ON-alarms are reset again from reset-acknowledgeable to power-ON-acknowledgeable on the NCK and drive sides. The NCK clears alarm 27007 and the drive clears alarm 300952. This MD is also used to limit the duration of an SE (safe limit position) acceptance test. After the programmed time has elapsed, the SE acceptance test is aborted and alarm 27008 deleted. The software limit positions then once again act as defined in the machine data.					
-					
-	-	40.0	5	100	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36960	**SAFE_STANDSTILL_VELO_TOL**			A05, A04, -	FBSI
mm/min, rev/min	Creep speed for pulse suppression			DOUBLE	POWER ON
Speed below which the axle/spindle is regarded as being at a standstill and the pulses are disabled with STOP B (through transition to STOP A). Related to: MD 36956: $MA_SAFE_PULSE_DISABLE_DELAY					
-					
-	-	0.0	0.0	6000.	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36961	**SAFE_VELO_STOP_MODE**			A05, -	FBSI
-	Stop reaction for safe velocity			BYTE	POWER ON

```
The stop reaction defined in this data is triggered if the limit value for the
    safe velocity 1, 2, 3 or 4
is exceeded.

= 0, 1, 2, 3 correspond to STOP A, B, C, D, common to each safe velocity stage
= 5 means that the stop reaction can be configured specifically for each safe
    velocity in MD 36963.
The units digit defines the selection of the stop reaction when the safe
    velocity is exceeded.
The tens digit defines the behavior in the case of a drive bus failure if a
    time greater than 0 is parameterized in $MN_SAFE_PULSE_DIS_TIME_BUSFAIL.

0: Stop A
1: Stop B
2: Stop C
3: Stop D
4: Stop E
5: SAFE_VELO_STOP_MODE invalid, stop reaction is parameterized via MD
SAFE_VELO_STOP_REACTION
10:Stop A, additionally, in the event of a drive bus failure, pulses are not
disabled immediately if safe velocity is active
11:Stop B, additionally, in the event of a drive bus failure, pulses are not
disabled immediately if safe velocity is active
12:Stop C, additionally, in the event of a drive bus failure, pulses are not
disabled immediately if safe velocity is active
13:Stop D, additionally, in the event of a drive bus failure, pulses are not
disabled immediately if safe velocity is active
14:Stop E, additionally, in the event of a drive bus failure, pulses are not
disabled immediately if safe velocity is active

Special cases:
- If the value in this MD is 5, the stop reaction for each safe velocity stage
    is defined selectively in $MA_SAFE_VELO_STOP_REACTION.

Related to:
    MD 36931: $MA_SAFE_VELO_LIMIT[n]
    MD 36963: $MA_SAFE_VELO_STOP_REACTION[n]
```

-					
-	-	5	0	14	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36962	**SAFE_POS_STOP_MODE**			A05, -	FBSI
-	Stop reaction for safe end position			BYTE	POWER ON

```
The stop reaction defined in this data is triggered if safe end position 1 or
    2 is overrun.

2: Stop C
3: Stop D
4: Stop E

Related to:
    MD 36934: $MA_SAFE_POS_LIMIT_PLUS[n]
    MD 36935: $MA_SAFE_POS_LIMIT_MINUS[n]
```

-					
-	-	2	2	4	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36963	SAFE_VELO_STOP_REACTION		A05, -	FBSI
-	Stop reaction for safe velocity		BYTE	POWER ON

```
The stop reaction defined in this data is triggered if the limit value for the
    safe velocity 1, 2, 3 or 4 is exceeded.

= 0, 1, 2, 3 stand for SG1, SG2, SG3, SG4

The units digit defines the selection of the stop reaction for each specific
    safe velocity when the safe velocity is exceeded.
The tens digit defines the behavior in the case of a drive bus failure for
    each specific safe velocity if a time greater than 0 has been parameter-
    ized in $MN_SAFE_PULSE_DIS_TIME_BUSFAIL.

Value    Meaning
 0: Stop A
 1: Stop B
 2: Stop C
 3: Stop D
 4: Stop E
10:Stop A, additionally, in the event of a drive bus failure, pulses are not
disabled immediately if this safe velocity stage is active
11:Stop B, additionally, in the event of a drive bus failure, pulses are not
disabled immediately if this safe velocity is active
12:Stop C, additionally, in the event of a drive bus failure, pulses are not
disabled immediately if this safe velocity is active
13:Stop D, additionally, in the event of a drive bus failure, pulses are not
disabled immediately if this safe velocity is active
14:Stop E, additionally, in the event of a drive bus failure, pulses are not
disabled immediately if this safe velocity is active

Special cases:
This MD is only active when MD 36961 and MD 1361 have the value 5.

Related to:
    MD 10089: $MN_SAFE_PULSE_DIS_TIME_BUSFAIL
    MD 36961: $MA_SAFE_VELO_STOP_MODE
```

-					
-	4	2, 2, 2, 2	0	14	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36964	**SAFE_IPO_STOP_GROUP**			A01, A05, -	FBSI
-	Safety-integrated IPO-response grouping			BYTE	RESET
This MD is only active with Safety Integrated axes and spindles. It influences the channel-wide IPO response distribution of Safety Integrated: 0 = Default: All other axes/spindles in the channel are informed of the IPO stop response of this axis. 1 = For internal stops, the axes and machining spindles interpolating with the axis in question are also influenced via the triggered safety alarms. Other axes/spindles in the channel, however, continue without disturbance. In the case of external stops (without an alarm) all other axes/spindles are not influenced by the safety axis/spindle stop. This allows, for example, the safe cancellation of the pulses of a spindle (using external Stop A) so that the spindle can be turned manually but still move the axes safely with monitoring. If the other axes/spindles stop together with the safety axis/spindle in certain machining situations, the user must implement this at his own responsibility using the PLC or synchronous action operations.					
-					
-	-	0	0	1	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36965	**SAFE_PARK_ALARM_SUPPRESS**			A01, -	FBSI
-	Alarm suppression on parking axis			BOOLEAN	POWER ON
This MD is only active for Safety Integrated axes/spindles. 0 = Default: Alarms 27000/300950 are displayed when parking is selected. 1 = Alarms 27000/300950 are not displayed when parking is selected. This is necessary for axes that are disconnected on the encoder side (e.g. dressing axes) during the machining process. The alarms are displayed when parking is deselected again.					
-					
-	-	FALSE	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36966	SAFE_BRAKETEST_TORQUE		A05, A10, -	FBSI
%	Holding torque for brake test		DOUBLE	POWER ON

```
Specification of the torque and force for the functional test of the brake
mechanism. The holding brake must be able to apply this torque without the
axis starting to slip.

This MD must be at least 10% above the current torque when the brake test is
selected, that is with the brake off. This ensures that the motor can brake
the axis again if the brake is defective. If this is not the case, the brake
test is aborted with alarm 20095. If the drive MD 1192 is not correctly param-
eterized and if bit 0 of MD $MA_SAFE_BRAKETEST_CONTROL is not set, the safety
reserve required is increased to double the difference between the actual
torque and the parameterization in MD 1192.
Specification of the torque and force for the functional test of the brake
mechanism.

The holding brake must be able to apply this torque without the axis starting
    to slip.
The corresponding test function is enabled by MD $MA_FIXED_STOP_MODE bit 1.

This MD must be at least 10% above the current torque when the brake test is
selected, (that is with the brake off). This ensures that the motor can brake
the axis again if the brake is defective. If this is not the case, the brake
test is aborted with alarm 20095.
If the drive MD 1192 is not correctly parameterized, the safety reserve
    required is increased to double the difference between the actual torque
    and the parameterization in MD 1192.
```

CTEQ					
-	-	5.0	0.0	800.0	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36967	SAFE_BRAKETEST_POS_TOL		A05, A10, -	FBSI
mm, degrees	Position tolerance for brake test		DOUBLE	POWER ON

```
Maximum position tolerance for the functional test of the brake mechanics.

The functional test of the brake mechanics is aborted if the axis position
    deviates
by more than this tolerance from the position at selection of the brake test.

The corresponding test function is enabled by
MD $MA_FIXED_STOP_MODE bit 1.
```

CTEQ					
-	-	1.0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36968	**SAFE_BRAKETEST_CONTROL**			A05, A10, -	-
-	Program check for the brake test			DWORD	POWER ON

```
Program check for the brake test.

Bit 0: Selection of the average value of the torque limit
= 0:Drive MD 1192 is used as the average value of the torque limit
= 1:The torque measured at the time of selection of the brake test is used as
    the average value of the torque limit
```

CTEQ					
-	-	0	0	1	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36970	**SAFE_SVSS_DISABLE_INPUT**			A01, A05, -	FBSI
-	Input assignment SBH/SG deselection			DWORD	POWER ON

```
This data defines the NCK input for selecting/deselectng the functions SBH and
SG.

Signal          Meaning
= 0 SG or SBH is selected
= 1 SG and SBH are deselected

Structure:

Special cases:
-  Entry of 0 means there is no existing assignment, the input remains fixed
at 0, SG and SBH cannot be deselected.
-  Entry of 80 00 00 00 means there is no existing assignment, the input
remains fixed at 1.

-  If a single output signal is placed on a terminal, the signal is processed
inverted if MD bit 31 is set.
-  If several output signals are placed on the same terminal, the signal con-
cerned is initially inverted if MD bit 31 is set.
    If MD bit 31 is set, the signal concerned is initially inverted. The (if
    applicable inverted) output signals are then AND-ed. The result is output
    on the terminal.

Related to:
    MD 10366: $MN_HW_ASSIGN_DIG_FASTIN
    MD 13010: $MN_DRIVE_LOGIC_NR

References:           /FB/, A4, Digital and Analog NCK I/Os
```

-					
-	-	0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36971	SAFE_SS_DISABLE_INPUT		A01, A05, -	FBSI
-	Input assignment SBH deselection		DWORD	POWER ON

```
Assignment of the NCK input for deselecting the function safe operational
stop.

Structure: See $MA_SAFE_SVSS_DISABLE_INPUT

Assignment of the terminal level for the safe functions if either safe veloc-
ity or safe operational stop  have been activated.

Signal           Meaning
= 0 Safe operational stop is selected
= 1 Safe operational stop is deselected (only if other functions have not
    triggered a STOP C, D or E)

Special cases:
-  The signal is processed inverted if MD bit 31 is set.
-  This input is irrelevant if SG and SBH have been deselected (see
$MA_SAFE_SVSS_DISABLE_INPUT).

Related to:
    MD 36970: $MA_SAFE_SVSS_DISABLE_INPUT
```

-					
-	-	0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36972	SAFE_VELO_SELECT_INPUT		A01, A05, -	FBSI
-	Input assignment SG selection		DWORD	POWER ON

```
This data defines the two inputs for selecting SG1, SG2, SG3 or SG4.

Structure: See $MA_SAFE_SVSS_DISABLE_INPUT

n = 1, 0 stand for bit 1, 0 for selecting SG1 to SG4

Assignment of the input bits to the safe velocities:

Bit 1            Bit 0              Selected SG
0                  0                    SG1
0                  1                    SG2
1                  0                    SG3
1                  1                    SG4

Special cases:
The signal is processed inverted if the MD bits 31 are set.
```

-					
-	2	0, 0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36973	**SAFE_POS_SELECT_INPUT**		A01, A05, -	FBSI
-	Input assignment SE selection		DWORD	POWER ON

```
This data defines the input for selecting safe limit positions 1 or 2.

Structure see: $MA_SAFE_SVSS_DISABLE_INPUT

Signal       Meaning
= 0 SE1 is active
= 1 SE2 is active

Special cases:
The signal is processed inverted if MD bit 31 is set.

Related to:
    MD 36970: $MA_SAFE_SVSS_DISABLE_INPUT.
```

-					
-	-	0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36974	**SAFE_GEAR_SELECT_INPUT**		A01, A05, -	FBSI
-	Input assignment speed ratio selection		DWORD	POWER ON

```
Assignment of the input terminals for selecting the gear ratio (gear stage).

Structure: See $MA_SAFE_SVSS_DISABLE_INPUT

n = 2, 1, 0 stand for bit 2, 1, 0 for selecting gear stages 1 to 8

Bit 2              Bit 1              Bit 0           Active gear stage
0                    0                  0                    Stage 1
0                    0                  1                    Stage 2
0                    1                  0                    Stage 3
...                 ...                ...                       ...
1                    1                  1                    Stage 8

Special cases:
The signals are processed inverted if the MD bits 31 are set.

Related to:
    MD 36970: $MA_SAFE_SVSS_DISABLE_INPUT
```

-					
-	3	0, 0, 0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36975	SAFE_STOP_REQUEST_INPUT		A01, A05, -		FBSI
-	Input assignment test stop selection		DWORD		POWER ON
This data defines the input for selecting the test stop. Structure see: $MA_SAFE_SVSS_DISABLE_INPUT Signal Meaning = 0 test stop is inactive = 1 test stop is executed Special cases: The signal is processed inverted if MD bit 31 is set.					
-					
-	-	0	-	-	7/2
710-2a2c	-	-	-	-	-1/-
710-6a2c	-	-	-	-	-1/-
710-12a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36976	SAFE_PULSE_STATUS_INPUT		A01, A05, -		FBSI
-	Input assignment status pulses suppressed		DWORD		POWER ON
This data defines the input for reading back the disabling of pulses. Structure see: $MA_SAFE_SVSS_DISABLE_INPUT Signal Meaning = 0 Pulses are enabled = 1 Pulses are disabled Special cases: - The signal is processed inverted if MD bit 31 is set. - This MD need not be parameterized. With the default value 0, the status of the disabling of pulses is determined internally. The old use of this MD with the wiring of the terminals AS1/AS2 is still permissible.					
-					
-	-	0	-	-	7/2
710-2a2c	-	-	-	-	-1/-
710-6a2c	-	-	-	-	-1/-
710-12a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36977	**SAFE_EXT_STOP_INPUT**			A01, A05, -	FBSI
-	Input assignment for external stop request			DWORD	POWER ON
This data defines the NCK inputs for selecting/deselecting the external brake requests. n = 0, 1, 2, 3 stand for the various braking modes n = 0: Assignment for "Deselect external stop A" (SH, disabling of pulses) n = 1: Assignment for "Deselect external stop C" (braking at the current limit) n = 2: Assignment for "Deselect external stop D" (path braking) n = 3: Assignment for "Deselect external stop E" (ESR + path braking) Structure: See $MA_SAFE_SVSS_DISABLE_INPUT Special cases: The signals are processed inverted if the MD bits 31 are set. The signal "Deselect external stop A" cannot be parameterized inverted. A parameter error is reported if there is an error.					
-					
-	4	0, 0, 0, 0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36978	**SAFE_OVR_INPUT**			A01, A05, -	FBSI
-	Input assignment for SG override			DWORD	POWER ON

```
Assignment of the NCK inputs for the override of the limit values of safe
velocities 2 and 4.

Structure: See $MA_SAFE_SVSS_DISABLE_INPUT

n = 3, 2, 1, 0 stand for the override selection bits 3, 2, 1, 0

Assignment of the input bits to the SG override values:

Bit 3        Bit 2         Bit 1        Bit 0
    0            0             0            0    Override 0 is selected

    0            0             0            1    Override 1 is selected

to ...

    1            1             1            1    Override 15 is selected

The following machine data defines the override factor itself (percentage
    value):
MD 36932: $MA_SAFE_VELO_OVR_FACTOR[n]

Special cases:
-  The function "Override safe velocity" is enabled by MD 36901
$MA_SAFE_FUNCTION_ENABLE.
-  The signals are processed inverted if the MD bits 31 are set.

Related to:
    MD 36932: $MA_SAFE_VELO_OVR_FACTOR[n]
```

-					
-	4	0, 0, 0, 0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36979	SAFE_STOP_REQUEST_EXT_INPUT		A01, A05, -	FBSI	
-	Input assignment for test of external shutdown		DWORD	POWER ON	

```
Assignment of the input terminal for selecting the test of the external switch
off.
This MD must be parameterized as soon as the internal pulse suppression is
used (bit 30 in $MA_SAFE_PULSE_ENABLE_OUTPUT=1)
Structure: see coding of input assignment
With each such machine data, a single input/output bit is assigned to a termi-
nal or a system variable. Otherwise the structure corresponds to machine data
36970 ff..
```

-					
-	-	0	-	-	7/2
710-2a2c	-	-	-	-	-1/-
710-6a2c	-	-	-	-	-1/-
710-12a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36980	SAFE_SVSS_STATUS_OUTPUT		A01, A05, -	FBSI	
-	Output assignment SBH/SG active		DWORD	POWER ON	

```
Assignment of the output for reporting the status of the functions safe veloc-
ity and safe operational stop.

Signal          Meaning
= 0 SG and SBH are not active
= 1 SG or SBH is active

Special cases:
-  Entry of 0 means
   there is no existing assignment, the output is not affected.
-  Entry of 80 00 00 00 means there is no existing assignment, the output
remains fixed at 1.
-  If a single output signal is placed on a terminal, the
   the signal is processed inverted if MD bit 31 is set.
-  If several output signals are placed on the same terminal, then
   the signal concerned is initially inverted if MD bit 31 is set. The (if
applicable inverted) output signals are then AND-ed. The result is output on
the terminal.

Related to:
    MD 10368: $MN_HW_ASSIGN_DIG_FASTOUT
    MD 13010: $MN_DRIVE_LOGIC_NR

References:           /FB/, A4, Digital and Analog NCK I/Os
```

-					
-	-	0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36981	**SAFE_SS_STATUS_OUTPUT**			A01, A05, -	FBSI
-	Output assignment SBH active			DWORD	POWER ON
This data defines the output or the system variable for the message "SBH active". Structure see: $MA_SAFE_EXT_STOP_INPUT Signal Meaning = 0 SBH is inactive = 1 SBH is active Special cases: The signal is processed inverted if MD bit 31 is set.					
-					
-	-	0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36982	**SAFE_VELO_STATUS_OUTPUT**			A01, A05, -	FBSI
-	Output assignment for active SG selection			DWORD	POWER ON
This data defines the outputs or the system variables for the messages "SBH active bit 0" and "SBH active bit 1". Structure see: $MA_SAFE_EXT_STOP_INPUT n = 1, 0 stand for SG active bits 1, 0 SG active Bit 1 Bit 0 Meaning: = 0 = 0 SG1 active if SBH/SG are active and SBH is not active SBH active if SBH/SG are active and SBH is active = 1 = 0 SG2 active = 0 = 1 SG3 active = 1 = 1 SG4 active Special cases: The signal is processed inverted if MD bit 31 is set.					
-					
-	2	0, 0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36984	**SAFE_EXT_PULSE_ENAB_OUTPUT**		A01, A05, -	FBSI	
-	Output assignment enable for pulses external		DWORD	POWER ON	
Assignment of the output terminal for the request "Enable pulses externally". This MD must be parameterized as soon as the internal pulse suppression is used (bit 30 in $MA_SAFE_PULSE_ENABLE_OUTPUT=1). Structure: see coding of input assignment. With each such machine data, a single input/output bit is assigned to a terminal or a system variable. Otherwise the structure corresponds to machine data 36970 ff..					
-					
-	-	0	-	-	7/2
710-2a2c	-	-	-	-	-1/-
710-6a2c	-	-	-	-	-1/-
710-12a2c	-	-	-	-	-1/-
710-31a10c	-	-	-	-	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36985	**SAFE_VELO_X_STATUS_OUTPUT**		A01, A05, -	FBSI	
-	Output assignment n < n_x		DWORD	POWER ON	
This data defines the output or the system variable for the message "n < nx". Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT Signal Meaning = 0 Actual speed is greater than the limit speed in $MA_SAFE_VELO_X = 1 Actual speed is less than or equal to the limit speed in $MA_SAFE_VELO_X Related to: $MA_SAFE_VELO_X Special cases: The signal is processed inverted if MD bit 31 is set.					
-					
-	-	0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36986	SAFE_PULSE_ENABLE_OUTPUT			A01, A05, -	FBSI
-	Output assignment enable pulses			DWORD	POWER ON

```
This data defines the output for the request "Enable pulses".

Structure: See $MA_SAFE_SVSS_STATUS_OUTPUT

Signal  Meaning
= 0 Request to disable pulses
= 1 Request to enable pulses

Special cases:
-  The signal is processed inverted if MD bit 31 is set.
-  Bit 30 is given the following special meaning:
    If bit 30 is set to 1, the pulse are switched internally via the drive bus
    (only permissible with 611 digital performance module). In this case, the
    MDs for external pulse enable must be parameterized as an additional safe-
    guard if the internal pulse disable fails ($MA_SAFE_EXT_PULSE_ENAB_OUTPUT
    and $MA_SAFE_STOP_REQUEST_EXT_INPUT)

Possible combinations for the most significant bits (30, 31) in this MD:

Bit 31    Bit 30    MD value      Meaning

0         0         0xxxxxxxxH    The  SGA "Enable Pulses" is output to the
    parameterized interface (SPL or I/Os).

0         1         4xxxxxxxxH    The pulses are disabled internally via the
    drive bus. The SGA "Enable Pulses" contains the same
information and is output inverted to the parameterized interface (SPL or I/
O).

1         0         8xxxxxxxxH    The SGA "Enable Pulses"  is output inverted
    to the parameterized interface.
1         1         CxxxxxxxxH    The pulses are  disabled internally via the
    drive bus. The SGA "Enable Pulses" contains the same information and is
    output inverted to the parameterized interface.
```

-					
-	-	0	0x0	0xFFFFFFFF	7/2
710-2a2c	-	-	-	0xCFFFFFFF	-1/-
710-6a2c	-	-	-	0xCFFFFFFF	-1/-
710-12a2c	-	-	-	0xCFFFFFFF	-1/-
710-31a10c	-	-	-	0xCFFFFFFF	-1/-
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36987	SAFE_REFP_STATUS_OUTPUT			A01, A05, -	FBSI
-	Output assignment axis safely referenced			DWORD	POWER ON

```
This data defines the output for the message "Axis safely referenced".

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

Signal       Meaning
= 0 Axis is not safely referenced (that is the safe limit monitoring is inac-
    tive!)
= 1 Axis is safely referenced

Special cases:
The signal is processed inverted if MD bit 31 is set.
```

-					
-	-	0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36988	SAFE_CAM_PLUS_OUTPUT			A01, A05, -	FBSI
-	Output assignment SN1 + to SN4 +			DWORD	POWER ON

```
This data defines the outputs for the cam signals SN1 + to SN4 +.

Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT

n = 0, 1, 2, 3 correspond to the assignments for plus cams SN1 +, SN2 +, SN3
    +, SN4 +

Signal       Meaning
= 0 Axis is left of the cam (actual value < cam position)
= 1 Axis is right of the cam (actual value > cam position)

Special cases:
The signal is processed inverted if MD bit 31 is set.
```

-					
-	4	0, 0, 0, 0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36989	**SAFE_CAM_MINUS_OUTPUT**			A01, A05, -	FBSI
-	Output assignment SN1 - to SN4 -			DWORD	POWER ON
This data defines the outputs for the minus cams SN1 - to SN4 -. Structure see: $MA_SAFE_SVSS_STATUS_OUTPUT n = 0, 1, 2, 3 correspond to the assignments for minus cams SN1 -, SN2 -, SN3 -, SN4 - Signal Meaning = 0 Axis is left of the cam (actual value < cam position) = 1 Axis is right of the cam (actual value > cam position) Special cases: - If a cam is negated and placed with another cam on an output, it is AND-ed and a single cam signal is generated for range recognition.					
-					
-	4	0, 0, 0, 0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36990	**SAFE_ACT_STOP_OUTPUT**			A01, A05, -	FBSI
-	Output assignment of active stop			DWORD	POWER ON
Assignment of the output terminals for displaying the currently active stop. Index 0: Assignment for "Stop A/B active" Index 1: Assignment for "Stop C active" Index 2: Assignment for "Stop D active" Index 3: Assignment for "Stop E active"					
-					
-	4	0, 0, 0, 0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36992	**SAFE_CROSSCHECK_CYCLE**			A01, A05, A08, -	FBSI
s	Display of axial cross-check cycle			DOUBLE	POWER ON
Display data for safety functions: Effective axial cross-check cycle in seconds. The cycle derives from INFO_SAFETY_CYCLE_TIME and the number of data to be cross-checked. The axial value displayed depends on the associated drive module as the length of cross-check lists varies between performance-1/standard-2 and performance-2 modules.					
READ					
-	-	0.0	-	-	7/0
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36993	**SAFE_CONFIG_CHANGE_DATE**			EXP, A07, A05, -	FBSI
-	Date/time of last change of SI-NCK MD			STRING	POWER ON
Display data for safety functions: Date and time of the last configuration change to safety related NCK machine data. Changes to the axial MD SAFE_... are recorded.					
READ					
-	7	"", "", "", "", "", "", ""	-	-	7/0
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36994	**SAFE_PREV_CONFIG**			EXP, A07, A05, -	FBSI
-	Data of previous safety configuration			DWORD	POWER ON
Intermediate buffer for storing previous safety configuration data Index [0]: Status flag for change history Index [1]: Previous value of function enable Index [2]: Previous value of set checksum Index [3]: Last value of function enable before standard data were loaded Index [4]: Last value of set checksum before standard data were loaded.					
READ					
-	7	0, 0, 0, 0, 0, 0, 0	-	-	0/0
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36995	**SAFE_STANDSTILL_POS**			A07, A05, -	FBSI
-	Standstill position			DWORD	POWER ON
This MD displays the current standstill position. In order to be able to test the referencing of the axis for plausibility at the next control Power ON, the current position of the axis is stored in non-volatile memory in the following cases: - On selection of safe operational stop (SBH) - Cyclically, if SE/SN are activated Special cases: If the MD is changed manually, this will be detected at the next Power ON and plausibility test. Another user agreement is required after referencing.					
-					
-	-	0	-	-	0/0
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36997	**SAFE_ACKN**			A07, A05, -	FBSI
-	User acknowledge			DWORD	POWER ON
This data displays the status of the user agreement. The user agreement can be given or withdrawn by the user by means of a corresponding screen. If the software detects internally that the reference to the machine has been lost, then it is "automatically" withdrawn (e.g. on changing gear or if the plausibility comparison with the stored standstill position fails during referencing). Special cases: If the MD is changed manually, then this will be detected at the next Power ON and plausibility test. Another user agreement is required after referencing.					
-					
-	-	0	-	-	7/2
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36998	**SAFE_ACT_CHECKSUM**			EXP, A07, A05, -	FBSI
-	Actual checksum			DWORD	POWER ON
The actual check sum calculated after POWER ON or on RESET is entered here over the current values of the safety relevant machine data.					
READ					
-	2	0, 0	-	-	7/0
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

36999	**SAFE_DES_CHECKSUM**			EXP, A07, A05, -	FBSI
-	Desired (expected) checksum			DWORD	POWER ON
In this data, the set check sum stored at the last machine acceptance appears above the current values of the safety relevant machine data.					
-					
-	2	0, 0	-	-	7/1
840di-basic	-	-	-	-	-1/-
840di-universal	-	-	-	-	-1/-
840di-plus	-	-	-	-	-1/-

1.5.8 Travel to fixed stop

37000	**FIXED_STOP_MODE**			A10, -	F1
-	Travel to fixed stop mode			BYTE	POWER ON
This machine data defines how the function "Travel to fixed stop" can be started. 0: Travel to fixed stop not available (option missing). 1: Travel to fixed stop can be started only from the NC program with command FXS[x]=1. 2: Control of function exclusively from PLC 3: NCK and PLC have equal priority (user ensures synchronization.)					
CTEQ					
-	-	0	0	3	7/2

37002	**FIXED_STOP_CONTROL**			A10	F1
-	Sequence control for travel to fixed stop			BYTE	POWER ON
Sequence control for travel to fixed stop. Bit 0: Behavior on pulse disable at fixed stop = 0: Travel to fixed stop is canceled = 1: Travel to fixed stop is interrupted, i.e. the drive is without power. As soon as the pulse disable is canceled again, the drive continues with the limited torque. The torque is applied in steps.					
-					
-	-	0	0	3	7/2

37010	**FIXED_STOP_TORQUE_DEF**			A10	F1
%	Default fixed stop clamping torque			DOUBLE	POWER ON
The clamping torque in % of the maximum motor torque (in the case of FDD this corresponds to % of max. current setpoint) is set in this machine data. The clamping torque becomes active as soon as the fixed stop is reached or IS "Acknowledge fixed stop reached" (DB31, ... DBX1.1) has been set. The entered value is a default and is active only as long as - no clamping torque has been programmed with command FXST[x] - the clamping torque set in SD 43510: FIXED_STOP_TORQUE was not changed (after fixed stop has been reached). In the case of "Travel to fixed stop" in an analog drive (611-A) and fixed clamping torque, the torque limit set in the drive should be the same as the limit entered in MD: FIXED_STOP_ANA_TORQUE. Related to: MD 37070: FIXED_STOP_ANA_TORQUE (torque limit on approach to fixed stop for analog drives) SD 43510: FIXED_STOP_TORQUE (clamping torque for travel to fixed stop)					
CTEQ					
-	-	5.0	0.0	100.0	7/2

37012	**FIXED_STOP_TORQUE_RAMP_TIME**			A10	F1
s	Time period until reaching the changed torque limit			DOUBLE	NEW CONF
Period in seconds until the changed torque limit is reached with function "Travel to fixed stop". The value 0.0 deactivates the ramp function. Default setting: 0 s					
-					
-	-	0.0	-	-	7/2

37014	**FIXED_STOP_TORQUE_FACTOR**			A10	F1
-	Adaption factor torque limit			DOUBLE	NEW CONF
Interface factor torque limit. With this factor, the torque limit of linked slave axes (MD 37250) can be weighted additionally. Even with different motors, the torque limits can be kept equal in all linked axes.					
-					
-	-	1.0	-	-	7/2

37020	**FIXED_STOP_WINDOW_DEF**			A05, A10	F1
mm, degrees	Default fixed-stop monitoring window			DOUBLE	POWER ON
This machine data is used to enter the default for the standstill monitoring window at fixed stop. Fixed stop monitoring becomes active as soon as the fixed stop is reached, i.e. IS "Fixed stop reached" (DB31, ... DBX62.5) is set. If the position at which the fixed stop is detected is left by more than the tolerance specified in MD: FIXED_STOP_WINDOW_DEF alarm 20093 "Fixed stop monitoring has responded" is output and the "FXS" function is deselcted. The value entered is a default setting and is active only as long as - no fixed stop monitoring window is programmed with command FXSW[x], - the fixed stop monitoring window is not changed via SD 43520: FIXED_STOP_WINDOW (after reaching of fixed stop). Related to: SD 43520: FIXED_STOP_WINDOW (fixed stop monitoring window)					
CTEQ					
-	-	1.0	-	-	7/2

37030	FIXED_STOP_THRESHOLD		A10, -	F1
mm, degrees	Threshold for fixed stop detection		DOUBLE	NEW CONF

```
Threshold value for fixed stop detection.
The contour deviation is checked for this threshold as a criterion for reach-
    ing the fixed stop. As a further condition for digital drives, reaching of
    the set torque limit is waited for.

This machine data is only active if MD: FIXED_STOP_BY_SENSOR = 0.
IS "Fixed stop reached" (DB31, ... DBX62.5) is set if the axial contour devia-
    tion exceeds the threshold value set in MD: FIXED_STOP_THRESHOLD.

MD irrelevant for:
    MD 37040: FIXED_STOP_BY_SENSOR = 1

Related to:
    IS "Fixed stop reached" (DB31, ... DBX62.5)
```

-					
-	-	2.0	-	-	7/2

37040	FIXED_STOP_BY_SENSOR		A10	F1
-	Fixed stop detection by sensor		BYTE	SOFORT

```
This machine data defines how the crtierion "Fixed stop reached" is deter-
mined.
A change of this machine data becomes active with the next selection of travel
    to fixed stop.

MD=0
   The criterion "Fixed stop reached" is determined internally on the basis of
the axial FIXED_STOP_THRESHOLD.
MD=1
   The criterion "Fixed stop reached" is determined via an external sensor and
signalled to the NC via IS "Sensor fixed stop" (DB31, ... DBX1.2).
MD=2
   The criterion "Fixed stop reached" is accepted, if either contour monitor-
ing (MD = 0) or the signal of the external sensor (MD = 1) has responded.
MD=3
   Triggering through movement analysis (only as an alternative to triggering
via sensor)

Related to:
    MD 37030: FIXED_STOP_THRESHOLD
   (threshold for fixed stop detection)
    IS "Sensor fixed stop" (DB31, ... DBX1.2)
```

CTEQ					
-	-	0	0	3	7/2

37050	FIXED_STOP_ALARM_MASK		A05, A10		F1
-	Enable of the fixed stop alarms		BYTE		NEW CONF
This machine data defines whether the alarms 20091 "Fixed stop not reached", 20094 "Fixed stop aborted" and 25042 "FOC: Standstill monitoring" are output. MD= 0 Suppression of alarm 20091 "Fixed stop not reached" MD= 2 Suppression of alarms 20091 "Fixed stop not reached" and 20094 "Fixed stop aborted" (SW 4 and higher) MD=3 Suppression of alarm 20094 "Fixed stop aborted" (SW 4 and higher) Add value 8 Suppression of alarm 25042 "FOC: Standstill monitoring" (SW 7 and higher) Independent of the setting of the alarm screen, errors during travel to fixed stop can be read out from the status variable $AA_FXS. Standard: 1 = Alarm 20091, 20094 and alarm 25042 are triggered					
-					
-	-	1	0	15	7/2

37052	FIXED_STOP_ALARM_REACTION		A05, A10		F1
-	Reaction with fixed stop alarms		BYTE		POWER ON
Behavior of VDI signal "Mode group ready" in case of fixed stop alarms: Bit value = 0: "Mode group ready" will be deleted (drives de-energized) Bit value = 1: "Mode group ready" remains active Bit0: Alarm 20090 Travel to fixed stop not possible Bit1: Alarm 20091 Fixed stop not reached Bit2: Alarm 20092 Travel to fixed stop still active Bit3: Alarm 20093 Standstill monitoring at fixed stop has triggered Bit4: Alarm 20094 Travel to fixed stop aborted All other bits without meaning. Standard: 0 = All alarms de-energize the drives					
-					
-	-	0	-	-	7/1

37060	FIXED_STOP_ACKN_MASK		A10	F1
-	Waiting for PLC acknowledgements during travel to fixed stop		BYTE	POWER ON

```
This machine data defines whether or not the NC waits for acknowledgement mes-
sages from the PLC when the "Travel to fixed stop" function is active.

Bit 0 = 0
   Once the NC has transmitted IS "Activate travel to fixed stop" (DB31, ...
DBX62.4) to the PLC, it starts the programmed traversing.

Bit 0 = 1
   After the NC has transferred IS "Activate travel to fixed stop" (DB31, ...
DBX62.4) to the PLC, it waits for the PLC to acknowledge with IS "Enable
travel to fixed stop" (DB31, ... DBX3.1) and then starts the programmed tra-
versing.
   Bit 0 should be set to 1 for analog drives so that the motion is not
started before the PLC has limited the torque in the drive.

Bit 1 = 0
   Once the NC has transferred IS "Fixed stop reached" (DB31, ... DBX62.5) to
the PLC, the program advances to the next block.

Bit 1 = 1
   After the NC has transferred IS "Fixed stop reached" (DB31, ... DBX62.5) to
the PLC, it waits for the PLC to acknowledge with IS "Acknowledge fixed stop
reached" (DB31, ... DBX1.1), outputs the programmed torque and then executes a
block change.

   Bit 1 should be set for analog drives so that the PLC can switch the drive
over to torque-controlled operation if a programmable clamping torque must be
specified.
   With digital drives (611-D), the "Travel to fixed stop" function can be
executed without any acknowledgements,
   thus allowing program run times to be reduced.

Related to:
    IS "Activate travel to fixed stop" (DB31, ... DBX62.4)
    IS "Enable travel to fixed stop" (DB31, ... DBX3.1)
    IS "Fixed stop reached" (DB31, ... DBX62.5)
    IS "Acknowledge fixed stop reached" (DB31, ... DBX1.1)
```

CTEQ					
-	-	0	0	3	7/2

37070	**FIXED_STOP_ANA_TORQUE**			A10	F1
%	Torque limit when approaching the fixed stop for analog drives			DOUBLE	POWER ON
This machine data defines an internal NC torque limit for analog drives. It is specified as a percentage of the maximum drive torque (corresponds to % of max. current setpoint with FDD). This torque limit is active in the NC from the start of the motion (acceleration torque) until the instant the fixed stop is reached. The torque limit must have the same effect as the torque limit set in the drive (611-A). This torque limit is required to ensure that - there are no step changes in torque during switchover from speed-controlled to current-controlled or torque-controlled operation, - the acceleration is reduced to the correct value in the NC. MD irrelevant for: SINUMERIK 840D with SIMODRIVE 611-D					
CTEQ					
-	-	5.0	0.0	100.0	7/2

37080	**FOC_ACTIVATION_MODE**			A10	F1
-	Initial setting of modal torque/force limitation			BYTE	POWER ON
The initial setting of the modal torque/force limitation is set with this MD after reset and PowerOn: Bit 0: Response after PowerON = 0 : FOCOF = 1 : FOCON (modal) Bit 1: Response after reset = 0 : FOCOF = 1 : FOCON (modal) Default setting: FOCOF after reset and PowerOn					
-					
-	-	0	0	3	7/2

37100	**GANTRY_AXIS_TYPE**			A01, A10	G1
-	Gantry axis definition			BYTE	POWER ON

```
General: HEX a b with
a
    0 = Leading axis
    1 = Synchronized axis

b
    0: No gantry axis
    1: Axis in gantry grouping 1
    2: Axis in gantry grouping 2
    3: Axis in gantry grouping 3
Examples:

   11: Axis is synchronized axis in gantry grouping 1
    2: Axis is leading axis in gantry grouping 2
   12: Axis is synchronized axis in gantry grouping 2
    3: Axis is leading axis in gantry grouping 3
   13: Axis is synchronized axis in gantry grouping 3

Special cases:
   Alarm 10650 "Incorrect gantry machine data" and 10651 "Gantry unit not
defined" in the case of incorrect gantry axis definition.

Related to:
    MD 37110: GANTRY_POS_TOL_WARNING
   gantry warning limit
    MD 37120: GANTRY_POS_TOL_ERROR
   gantry trip limit
    MD 37130: GANTRY_POS_TOL_REF
   gantry trip limit during referencing
```

CTEQ					
-	-	0	0	33	7/2

37110	**GANTRY_POS_TOL_WARNING**			A05, A10	G1
mm, degrees	Gantry warning limit			DOUBLE	RESET

```
Value > 0

   With gantry axes, the difference between the position actual values of the
leading and synchronized axes is constantly monitored.

   MD: GANTRY_POS_TOL_WARNING is used to define a limit value for the posi-
tion actual value difference; when the limit is exceeded, warning 10652 "Warn-
ing limit exceeded" is output. However, the gantry axes are not stopped
internally in the control. The warning threshold must therefore be selected
such that the machine can withstand the position actual value deviation
between the gantry axes without sustaining mechanical damage.

   Furthermore, the IS "Gantry warning limit exceeded" (DB31-48, DBX101.3) to
the PLC is set to "1". The PLC user program can thus initiate the necessary
measures (e.g. program interruption at block end) when the warning limit is
exceeded.

    As soon as the current position actual value difference has dropped below
    the warning limit again, the message is canceled and IS "Gantry warning
    limit exceeded" reset.

   Effect of gantry warning limit on gantry synchronization process:

   The position actual value difference between the leading and synchronized
axes is determined during gantry synchronization. If the deviation is lower
than the gantry warning limit, the synchronizing motion of the gantry axes is
automatically started internally in the control.

   The synchronizing motion must otherwise be initiated via the PLC interface
(IS "Start gantry synchronization process").

Value = 0

   Setting MD: GANTRY_POS_TOL_WARNING to 0 deactivates the monitoring for vio-
lation of the warning limit.

   Gantry synchronization is not initiated internally in the control.

MD irrelevant for:
   SINUMERIK FM-NC; SINUMERIK 840D with NCU 571
Special cases:
   Alarm 10652 "Warning limit exceeded" in response to violation of gantry
warning limit.
Related to:
    MD 37100: GANTRY_AXIS_TYPE Gantry axis definition
    MD 37120: GANTRY_POS_TOL_ERROR Gantry trip limit
    MD 37130: GANTRY_POS_TOL_REF
   Gantry trip limit during referencing
    IS "Gantry warning limit exceeded" (DB31-48, DBX101.3)
    IS "Start gantry synchronization" (DB31-48, DBX29.4)
```

-					
-	-	0.0	-	-	7/2

37120	**GANTRY_POS_TOL_ERROR**		A05, A10	G1	
mm, degrees	Gantry trip limit		DOUBLE	POWER ON	

```
With gantry axes, the difference between the position actual values of the
leading and synchronized axes is continuously monitored. The maximum permissi-
ble deviation in position actual value between the synchronized axis and the
leading axis in the gantry axis grouping must be defined with MD:
GANTRY_POS_TOL_ERROR. Monitoring for violation of this limit value takes place
only if the gantry axis grouping is already synchronized (IS "Gantry grouping
is synchronized" = 1); otherwise the value set in MD 37130: GANTRY_POS_TOL_REF
is used.

When the limit value is exceeded, alarm 10653 "Error limit exceeded" is out-
put. The gantry axes are immediately stopped internally in the control to pre-
vent any damage to the machine.

In addition, IS "Gantry trip limit exceeded" to the PLC is set to "1".

MD irrelevant for:
   SINUMERIK FM-NC; SINUMERIK 840D with NCU 571

Special cases:
   Alarm 10653 "Error limit exceeded" in response to violation of gantry trip
limit.

Related to:
    MD 37100: GANTRY_AXIS_TYPE Gantry axis definition
    MD 37110: GANTRY_POS_TOL_WARNING Gantry warning limit
    MD 37130: GANTRY_POS_TOL_REF
   Gantry trip limit during referencing
    IS "Gantry grouping is synchronized" (DB31-48, DBX101.5)
    IS "Gantry trip limit exceeded" (DB31-48, DBX101.2)
```

-					
-	-	0.0	-	-	7/2

37130	**GANTRY_POS_TOL_REF**			A05, A10	G1
mm, degrees	Gantry trip limit during referencing			DOUBLE	POWER ON
With gantry axes, the difference between the position actual values of the leading and synchronized axes is continuously monitored. The maximum permissible deviation in position actual values between the synchronized axis and the leading axis that is monitored if the gantry axis grouping is not yet synchronized (IS "Gantry grouping is synchronized" = "0") must be set in MD: GANTRY_POS_TOL_REF. When the limit value is exceeded, alarm 10653 "Error limit exceeded" is output. The gantry axes are immediately stopped internally in the control to prevent any damage to the machine. In addition, IS "Gantry trip limit exceeded" to the PLC is set to "1". MD irrelevant for: SINUMERIK FM-NC; SINUMERIK 840D with NCU 571 Special cases: Alarm 10653 "Error limit exceeded" in response to violation of gantry trip limit. Related to: MD 37100: GANTRY_AXIS_TYPE Gantry axis definition MD 37110: GANTRY_POS_TOL_WARNING Gantry warning limit MD 37120: GANTRY_POS_TOL_ERROR Gantry trip limit IS "Gantry grouping is synchronized" (DB31-48, DBX101.5) IS "Gantry trip limit exceeded" (DB31-48, DBX101.2)					
-					
-	-	0.0	-	-	7/2

37135	**GANTRY_ACT_POS_TOL_ERROR**			A05, A10	-
mm, degrees	Current gantry trip limit			DOUBLE	RESET
Actual value difference between master axis and slave axis in the case of alarm 10653. Leads to alarm 10657 after Power ON.					
-					
-	-	0.0	-	-	7/2

37140	**GANTRY_BREAK_UP**			EXP, A01, A10	G1
-	Invalidate gantry axis grouping			BOOLEAN	RESET

```
GANTRY_BREAK_UP = "0"
The forced coupling of the gantry axis grouping remains valid. Monitoring of
    violation of the gantry warning or trip limit is active!

GANTRY_BREAK_UP = "1"
This invalidates the forced coupling of the gantry grouping, thus allowing all
gantry axes in this grouping to be traversed individually in manual mode. The
monitoring for violation of the gantry warning or trip limit is deactivated.
IS "Gantry grouping is synchronized" is set to "0".

Notice:
    In cases where the gantry axes are still mechanically coupled, the machine
    may sustain damage in this operating state when the leading or synchro-
    nized axis is traversed!
The gantry axes cannot be referenced individually.

MD irrelevant for:
   SINUMERIK FM-NC; SINUMERIK 840D with NCU 571

Related to:
    MD 37100: GANTRY_AXIS_TYPE  Gantry axis definition
    MD 37110: GANTRY_POS_TOL_WARNING Gantry warning limit
    MD 37130: GANTRY_POS_TOL_REF
              Gantry trip limit during referencing
    IS "Gantry grouping is synchronized" (DB31-48, DBX101.5)
    IS "Gantry trip limit exceeded" (DB31-48, DBX101.2)
```

CTEQ					
-	-	FALSE	-	-	7/2

37150	**GANTRY_FUNCTION_MASK**			A10	-
-	Gantry functions			DWORD	RESET
Special gantry functions are set with this MD. The MD is bit-coded, the following bits are assigned: Bit 0 == 0: Extended monitoring of the actual value difference is inactive. An offset between master and slave axes occurring in the tracking or BREAK_UP is not taken into account in the monitoring of the actual value difference. Alarm 10657 is not output if alarm 10563 occurs before Power OFF. Bit 0 == 1: Extended monitoring of the actual value difference is active. An offset between master and slave axes occurring in the tracking or BREAK_UP is taken into account in the monitoring of the actual value difference. Prerequisite: The gantry grouping must be re-referenced or re-synchronized after starting of the control. Alarm 10657 is output if alarm 10563 occurs before Power OFF. Bit 1 == 0: Zero mark search direction of the slave axis analogous to MD 34010 Bit 1 == 1: Zero mark search direction of the slave axis same as for master axis					
-					
-	-	0x00	0	0x3	7/2

37160	**LEAD_FUNCTION_MASK**			A10	-
-	Functions for master value coupling			DWORD	NEW CONF
With this MD, special functions of master value coupling are set. The MD is bit-coded, the following bits are assigned: Bit 0 = 0: Dead time compensation is not active at actual value coupling. Bit 0 = 1: Dead time compensation is active at actual value coupling. During actual value coupling, a systematic position offset is created between master and following axis. It is caused by the IPO/position controller dead time between the actual values of master axis and following axis. For SW 6.4 and higher, this position offset can be compensated by a linear extrapolation of the master value. Possible velocity fluctuations in the master axis may have an increased impact on the following axis. The bit must be set for the relevant master axis.					
CTEQ					
-	-	0x01	0	0x1	1/1

37200	**COUPLE_POS_TOL_COARSE**			A05, A10	S3
mm, degrees	Threshold value for 'Synchronism coarse'			DOUBLE	NEW CONF

```
In synchronous mode, the positional difference between the leading and follow-
    ing spindles is monitored (only DV and AV mode).

IS "Synchronism coarse" is set if the current positional difference is within
    the tolerance band specified by the threshold value.

Furthermore, this threshold value represents the criterion for a block change
on activation of synchronous mode or on alteration of the transmission parame-
ters when the coupling is active in cases where "Synchronism coarse" is
selected as the block change response condition (see channel-specific MD:
COUPLE_BLOCK_CHANGE_CTRL_1 or language instruction COUPDEF).

If the value "0" is input, IS "Synchronism coarse" is always set to "1" in DV
    and AV mode.

Related to:
   Channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1
   (block change response in synchronous spindle mode)
    IS "Synchronism coarse" (DB31-48, DBX98.1)
```

-					
-	-	1.0	-	-	7/2

37210	**COUPLE_POS_TOL_FINE**			A05, A10	S3
mm, degrees	Threshold value for 'Synchronism fine'			DOUBLE	NEW CONF

```
In synchronous mode, the positional difference between the leading and follow-
    ing spindles is monitored (only DV and AV mode).

IS "Synchronism fine" is set if the current positional difference is within
    the tolerance band specified by the threshold value.

Furthermore, this threshold value represents the criterion for a block change
on activation of synchronous mode or on alteration of the transmission parame-
ters when the coupling is active in cases where "Synchronism fine" is selected
as the block change response condition (see channel-specific MD:
COUPLE_BLOCK_CHANGE_CTRL_1 or language instruction COUPDEF).

If the value "0" is input, IS "Synchronism fine" is always set to "1" in DV
    and AV mode.

Related to:
   Channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1
   (block change response in synchronous spindle mode)
    IS "Synchronism fine" (DB31-48, DBX98.0)
```

-					
-	-	0.5	-	-	7/2

37220	COUPLE_VELO_TOL_COARSE		A05, A10		S3
mm/min, rev/min	Velocity tolerance 'coarse'		DOUBLE		NEW CONF
In synchronous mode, the velocity difference between the leading and following spindles is monitored (VV mode only). IS "Synchronism coarse" is set if the current velocity difference is within the tolerance band specified by the threshold value. Furthermore, this threshold value represents the criterion for a block change on activation of synchronous mode or on alteration of the transmission parameters when the coupling is active in cases where "Synchronism coarse" is selected as the block change response condition (see channel specific MD: COUPLE_BLOCK_CHANGE_CTRL_1 or language instruction COUPDEF). If the value "0" is input, IS "Synchronism coarse" is always set to "1" in VV mode. Related to: Channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1 (block change response in synchronous spindle mode) IS "Synchronism coarse" (DB31-48, DBX98.1)					
-					
-	-	60.0	-	-	7/2

37230	COUPLE_VELO_TOL_FINE		A05, A10		S3
mm/min, rev/min	Velocity tolerance 'fine'		DOUBLE		NEW CONF
In synchronous mode, the velocity difference between the leading and following spindles is monitored (VV mode only). IS "Synchronism fine" is set if the current velocity difference is within the tolerance band specified by the threshold value. Furthermore, this threshold value represents the criterion for a block change on activation of synchronous mode or on alteration of the transmission parameters when the coupling is active in cases where "Synchronism fine" is selected as the block change response condition (see channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1 or language instruction COUPDEF). If the value "0" is input, IS "Synchronism fine" is always set to "1" in VV mode. Related to: Channel-specific MD: COUPLE_BLOCK_CHANGE_CTRL_1 (block change response in synchronous spindle mode) IS "Synchronism fine" (DB31-48, DBX98.0)					
-					
-	-	30.0	-	-	7/2

37250	**MS_ASSIGN_MASTER_SPEED_CMD**			A10	TE3
-	Master axis number for speed setpoint coupling			DWORD	POWER ON
A master/slave speed setpoint linkage is configured by indicating the machine axis number of the master axis belonging to this slave. Related to: $MA_MS_ASSIGN_MASTER_TORQUE_CTR					
-					
-	-	0	0	31	7/2
710-2a2c	-	-	-	2	-/-
840d-2a2c	-	-	-	2	-/-
840d-4a1cg	-	-	-	4	-/-

37252	**MS_ASSIGN_MASTER_TORQUE_CTR**			A10	TE3
-	Master axis number for torque control			DWORD	POWER ON
Torque control between the master and the slave axis is configured by indicating the machine axis number of the master axis belonging to the slave. By using the torque balance control, you can achieve a homogenous torque control. With default setting = 0, the same master axis is used for torque control as for speed setpoint linkage $MA_MS_ASSIGN_MASTER_SPEED_CMD. Related to: $MA_MS_ASSIGN_MASTER_SPEED_CMD $MA_MS_TORQUE_CTRL_MODE $MA_MS_TORQUE_CTRL_P_GAIN $MA_MS_TORQUE_CTRL_I_TIME $MA_MS_TORQUE_WEIGHT_SLAVE					
-					
-	-	0	0	31	7/2

37253	**MS_FUNCTION_MASK**			A10	-
-	Master/slave settings			DWORD	NEW CONF
Parameterizing master/slave link Bit 0 = 0: Scaling of MD 37256, MD 37260 is smaller by factor 1s/IPO cycle than described in the documentation. Bit 0 = 1: Scaling of MD 37256, MD 37260 corresponds to documentation.					
-					
-	-	0x0	-	-	7/2

37254	**MS_TORQUE_CTRL_MODE**			A10	TE3
-	Torque compensatory controller interconnection			DWORD	SOFORT
The output of the torque compensatory controller is connected to 0: Master and slave axis 1: Slave axis 2: Master axis 3: No axis when the torque control is active. Related to: $MA_MS_ASSIGN_MASTER_TORQUE_CTR $MA_MS_ASSIGN_MASTER_SPEED_CMD $MA_MS_TORQUE_CTRL_MODE					
-					
-	-	0	0	3	7/2

37255	**MS_TORQUE_CTRL_ACTIVATION**			A10	TE3
-	Torque compensatory controller activation			BYTE	NEW CONF
The torque compensatory controller can be switched ON and OFF by means of MD37254 or by means of the PLC (DB3x.DBX24.5). In the case of the PLC, MD37254 is only used for configuring the interconnection of the torque compensatory controller. 0: Switch ON/OFF via MD37254 1: Switch ON/OFF via DB3x.DBX24.5					
-					
-	-	0	0	1	7/2

37256	**MS_TORQUE_CTRL_P_GAIN**			A10	TE3
%	Torque compensatory controller gain factor			DOUBLE	NEW CONF
Gain factor of the torque compensatory controller The gain factor is entered in percent as a ratio of the maximum axis velocity of the slave axis on load side to the rated torque. The maximum axis velocity is derived from MD 32000, the rated torque from the product of drive machine data MD1725. Related to: $MA_MS_TORQUE_CTRL_MODE $MA_MS_TORQUE_CTRL_I_TIME $MA_MAX_AX_VELO					
-					
-	-	0.0	0.0	100.0	7/2

37258	**MS_TORQUE_CTRL_I_TIME**			A10	TE3
s	Torque compensatory controller integral action time			DOUBLE	NEW CONF
Integral time of torque compensatory controller The integral time does not become active until the P gain factor is greater than 0. Related to: $MA_MS_TORQUE_CTRL_MODE $MA_MS_TORQUE_CTRL_P_GAIN $MA_MAX_AX_VELO					
-					
-	-	0.0	0.0	100.0	7/2

37260	**MS_MAX_CTRL_VELO**			A10	TE3
%	Torque compensatory controller limit			DOUBLE	NEW CONF
Torque compensatory controller limitation The speed setpoint value calculated by the torque compensatory controller is limited. The limit that can be entered as a percentage refers to $MA_MAX_AX_VELO of the slave axis. Related to: $MA_MS_TORQUE_CTRL_MODE $MA_MS_TORQUE_CTRL_P_GAIN $MA_MS_TORQUE_CTRL_I_TIME $MA_MAX_AX_VELO					
-					
-	-	100.0	0.0	100.0	7/2

37262	**MS_COUPLING_ALWAYS_ACTIVE**			A10	TE3
-	Permanent master/slave link			BYTE	NEW CONF
Activation behavior of a master/slave link 0: Temporary link The link is activated/deactivated via PLC interface signals and language commands. 1: Permanent link This machine data activates the permanent link. PLC interface signals and language commands do not have any effect. Related to: $MA_MS_ASSIGN_MASTER_TORQUE_CTR $MA_MS_ASSIGN_MASTER_SPEED_CMD					
-					
-	-	0	0	1	7/2

37263	**MS_SPIND_COUPLING_MODE**			A10	-
-	Link response of a spindle			BYTE	NEW CONF
Link behavior of a speed-controlled spindle: 0: Link is closed/released in standstill only. 1: Link is closed/released already during motion. The configuration is valid both for activation/deactivation via DB3x.DBX24.5 and for MASLON, MASLOF, MASLOFs, MASLDEL					
-					
-	-	0	0	1	7/2

37264	**MS_TENSION_TORQUE**			A10	TE3
%	Master/slave tension torque			DOUBLE	SOFORT
A constant tension torque as a percentage of the rated drive torque of the slave axis can be entered between the master and the slave axis. Related to: $MA_MS_ASSIGN_MASTER_TORQUE_CTR $MA_MS_TENSION_TORQ_FILTER_TIME					
-					
-	-	0.0	-100.0	100.0	7/2

37266	**MS_TENSION_TORQ_FILTER_TIME**			A10	TE3
s	Filter time constant tension torque			DOUBLE	NEW CONF
The tension torque between master and slave axis can be activated via a PT1 filter. Any change of $MA_MS_TENSION_TORQUE is then travelled out with the time constant of the filter. As default, the filter is inactive; any torque change becomes active unfiltered. Related to: $MA_MS_TENSION_TORQUE					
-					
-	-	0.0	0.0	100.0	7/2

37268	**MS_TORQUE_WEIGHT_SLAVE**			A10	TE3
%	Torque weighting of slave axis			DOUBLE	NEW CONF
The torque share that the slave axis contributes to the total torque can be configured via the weighting. Different torque shares between the master and slave axis can thus be implemented. In the case of motors with the same rated torque, a 50% to 50% torque sharing is suggested. The torque share of the master axis results implicitly from 100% - MD37268. Related to: $MA_MS_ASSIGN_MASTER_TORQUE_CTR $MA_MS_TENSION_TORQ_FILTER_TIME					
-					
-	-	50.0	1.0	100.0	7/2

37270	**MS_VELO_TOL_COARSE**			A10	TE3
%	Master/slave speed tolerance coarse			DOUBLE	NEW CONF
Tolerance window, coarse, for the differential speed between the master and the slave. If the speed difference is within the tolerance window, the PLC interface signal DB3x.DBX96.4 is set. The tolerance value is entered as a percentage of $MA_MAX_AX_VELO.					
-					
-	-	5.0	-	-	7/2

37272	**MS_VELO_TOL_FINE**			A10	TE3
%	Master/slave speed tolerance fine			DOUBLE	NEW CONF
Tolerance window, fine, for the differential speed between the master and the slave. If the speed difference is within the tolerance window, the PLC interface signal DB3x.DBX96.3 is set. The tolerance value is entered as a percentage of $MA_MAX_AX_VELO.					
-					
-	-	1.0	-	-	7/2

37274	**MS_MOTION_DIR_REVERSE**			A10	TE3
-	Inverting traversing direction slave axis			BYTE	NEW CONF
Inverting the traversing direction of a slave axis in the linked status. 0: Equidirectional to the master axis 1: Inverse to the master axis					
-					
-	-	0	0	1	7/2

37400	**EPS_TLIFT_TANG_STEP**			A10	T3
mm, degrees	Tangent angle for corner recognition			DOUBLE	RESET
If TLIFT has been programmed and the axis is tracked tangentially, a step of the position setpoint larger than EPS_TLIFT_TANG_STEP causes an intermediate block to be inserted. The intermediate block traverses the axis to the position corresponding to the start tangent in the next block. MD irrelevant if: TLIFT not activated Related to: TLIFT instruction					
CTEQ					
-	-	5.0	-	-	7/2

37402	**TANG_OFFSET**			A10	T3
mm, degrees	Default angle for tangential correction			DOUBLE	RESET
Default offset (angle), which the tracked axis forms with the tangent. The angle acts in addition to the angle programmed in the TANGON block. MD irrelevant if tangential tracking not active. Related to: TANGON instruction					
CTEQ					
-	-	0.0	-	-	7/2

37500	**ESR_REACTION**			EXP, A01, A10, -	M3
-	Axial mode of "Extended Stop and Retract"			BYTE	NEW CONF
Selection of the response to be triggered via system variable "$AN_ESR_TRIGGER". 0 = No response Reaktion (or only external response through synchronized action programming of rapid digital outputs). 10 = Drive-autonomous generator axis 11 = Drive-autonomous retraction axis 12 = Drive-autonomous stopping axis 13 = Drive-autonomous generator axis with NC-controlled stopping 21 = NC-controlled retraction axis 22 = NC-controlled stopping axis Notes: - on 11 and 12: These are activated jointly in the drive - in the same way as with communication failure - through broadcast to all drives. - on 22: Parameter assignment "22" is also used for configuration of the corresponding drive-autonomous response in the case of communication failure or DC link undervoltage. - If the option data is missing, the MD is reset to "0".					
CTEQ					
-	-	0	0	22	7/2

37510	**AX_ESR_DELAY_TIME1**			EXP, A01, A10, -	-
s	Delay time ESR single axis			DOUBLE	NEW CONF
If, for example, an alarm occurs, the deceleration time can be delayed by means of this MD, e.g. to allow in case of gear hobbing the retraction from the tooth gap first.					
CTEQ					
-	-	0.0	-	-	7/2

37511	**AX_ESR_DELAY_TIME2**			EXP, A01, A10, -	-
s	ESR time for interpolatory deceleration of single axis			DOUBLE	NEW CONF
After expiry of time $MA_AX_ESR_DELAY_TIME1, the time for interpolatory braking specified here ($MA_AX_ESR_DELAY_TIME2) is still remaining. After expiry of time $MA_AX_ESR_DELAY_TIME2, rapid braking with subsequent tracking is initiated.					
CTEQ					
-	-	0.0	-	-	7/2

37550	**EG_VEL_WARNING**			A05, A10	M3
%	Threshold value for velocity warning threshold.			DOUBLE	NEW CONF
Threshold value for VDI signals If, with active EG axis link, the maximum velocities stored in MD 32000: $MA_MAX_AX_VELO have been reached for the current velocity of the axis by the percentage set here, a warning (signal) for velocity is output. Related to: MD 32000: MAX_AX_VELO					
-					
-	-	90.0	0	100	7/2

37560	**EG_ACC_TOL**			A05, A10	M3
%	Threshold value for 'Axis accelerating'			DOUBLE	NEW CONF
Threshold value for VDI signal "Axis accelerates" If, with active EU axis link, the maximum accelerations stored in MD 32300: $MA_MAX_AX_ACCEL have been reached for the current acceleration of the axis by the percentage set here, a warning (signal) for acceleration is output. Korrespondiert mit: MD 32300: MAX_AX_ACCEL					
-					
-	-	25.0	-	-	7/2

37600	**PROFIBUS_ACTVAL_LEAD_TIME**			EXP, A01, A02	G3
s	Actual value acquisition time (Profibus Ti)			DOUBLE	POWER ON
Machine data for setting the actual value acceptance time (Ti) of the encoder on the PROFIBUS. Unit: seconds; therefore default is 125μs (this is also the default which Step7 sets for a 611U). NOTICE: The actual Ti value is read directly from the PROFIBUS configuration or the drive, if possible. In this case, the machine data value is set to the read value and will only serve for display purposes.					
-					
-	-	0.000125	0.0	0.032	0/0

37602	PROFIBUS_OUTVAL_DELAY_TIME			EXP, A01, A02	G3
s	Setpoint delay time (Profibus To)			DOUBLE	POWER ON
Machine data for setting the setpoint acceptance time (To) on the PROFIBUS. Unit: seconds NOTICE: The actual To value is read directly from the PROFIBUS configuration or the drive, if possible. In this case, the value of the machine data is set to the read value and serves for display purposes only.					
-					
-	-	0.003	0.0	0.032	0/0

37610	PROFIBUS_CTRL_CONFIG			EXP, A01	K4
-	Profibus control bit configuration			BYTE	POWER ON
Machine data for setting special PROFIBUS control word functionality: 0 = default = no change of standard behavior 1 = STW2, bits 0-1 are set depending on mode of operation/rapid traverse suppressing the setting of defaults for the VDI control bits "Parameter set bit0/1" from the PLC. Bits 0-1 get the following combinations depending on the mode of operation, and controlled by NCK: 00 = Default (after Power-On) 01 = JOG (except for JOG-INC) or ((AUTOMATIC or MDI) and G0) 10 = ((AUTOMATIC or MDI) and not G0), other 11 = JOG-INC 2 = Combination of MD=0 (preset by VDI) and MD=1 (internally preset): MD=2 acts as MD=1, as long as there are no VDI control bits from the PLC, i.e. if the VDI control bits "Parameter set bit0/1" are both reset (0). MD=2 acts as MD=0, if the VDI control bits "Parameter set bit0/1" are set both or individually (!=0). In this case, the VDI control bits are transferred directly to the drive (priority of VDI signals higher than that of internally created signals).					
-					
-	-	0	0	2	7/2

37620	**PROFIBUS_TORQUE_RED_RESOL**		EXP, A01	-
%	Resolution Profibus torque reduction		DOUBLE	NEW CONF

Resolution of the torque reduction on the PROFIBUS (LSB significance)

The MD is only relevant for controls with PROFIBUS drives. For these controls, it defines the resolution of the cyclic interface data "Torque reduction value" (only exists for $MN_DRIVE_TELEGRAM_TYPE = 101 ff. or 201 ff.), which is required for the "Travel to fixed stop" functionality.

The 1% default value corresponds to the original significance. The torque limit is transferred on the PROFIBUS with increments of 1%; the value 100 in the corresponding PROFIBUS data cell corresponds to full torque reduction (i.e. without force).

By changing this MD to 0.005%, for example, the value can be entered in increments of 0.005%, i.e. the increments for the torque limit value become finer by the factor 200.
For the limitation to the rated torque, the value 0 is transmitted in this case; a complete torque reduction (i.e. without force) characterizes the transmittable value 10000.
To avoid misadaptation, the setting value of the MD must be selected to match the interpretation configured on the drive side or the firmly defined interpretation of the torque reduction value.

-					
-	-	1.0	0.005	10.0	7/2

37800	**OEM_AXIS_INFO**		A01, A11	-
-	OEM version information		STRING	POWER ON

A version information freely available to the user
(is indicated in the version screen)

-					
-	2	"", ""	-	-	7/2

1.5.9 Axis-specific memory settings

38000	**MM_ENC_COMP_MAX_POINTS**			A01, A09, A02	K3
-	Number of intermediate points for interpol. compensation (SRAM)			DWORD	POWER ON

```
For leadscrew error compensation, the number of interpolation points required
    per measuring system must be defined.
The required number can be calculated as follows using the defined parameters:
                                $AA_ENC_COMP_MAX - $AA_ENC_COMP_MIN
MD: MM_ENC_COMP_MAX_POINTS= ----------------------------------- + 1
                                           $AA_ENC_COMP_STEP

   $AA_ENC_COMP_MINInitial position (system variable)
   $AA_ENC_COMP_MAXEnd position (system variable)
   $AA_ENC_COMP_STEPDistance between interpolation points (system variable)

In selecting the number of interpolation points and/or the distances between
    them, it is important to take account of the size of the resulting compen-
    sation table and the space required in the backed-up NC user memory
    (SRAM). 8 bytes are required per compensation value (interpolation point).
The index [n] has the following coding: [encoder no.]: 0 or 1

Special cases:                        Notice:
   After any change in MD: MM_ENC_COMP_MAX_POINTS, the non-volatile NC user
memory is automatically re-allocated on system power-on.
   All data in the backed-up NC user memory are then lost (e.g. part pro-
grams, tool offsets etc.). Alarm 6020 "Machine data changed - memory reallo-
cated" is signaled.
    If reallocation of the NC user memory fails because the total memory
    capacity available is not sufficient, alarm 6000 "Memory allocation made
    with standard machine data" is signaled.
    In this case, the NC user memory division is allocated using the default
    values of the standard machine data.
References:
   /FB/, S7, "Memory Configuration"
   /DA/, "Diagnostics Guide"

Related to:
   MD: ENC_COMP_ENABLE[n]LEC active

References:
   /FB/, S7, "Memory Configuration"
```

-					
-	2	0, 0	0	5000	7/2

38010	**MM_QEC_MAX_POINTS**			A01, A09	K3
-	Number of values for quadrant error compens. with neural network			DWORD	POWER ON

```
In quadrant error compensation with neural networks (QEC) the number of
    required compensation values must be entered for every axis to be compen-
    sated.

The required number can be calculated as follows using the defined parame-
    ters: MM_QEC_MAX_POINTS _ - ($AA_QEC_COARSE_STEPS + 1) *
    $AA_QEC_FINE_STEPS

$AA_QEC_COARSE_STEPS     Coarse quantization of characteristic (system vari-
able)
$AA_QEC_FINE_STEPS       Fine quantization of characteristic (system variable)

For "direction-dependent" compensation the number must be greater than or
    equal to double the value of this product.

When selecting coarse or fine quantization, the resulting size of the compen-
sation table and the memory required for it in the non-volatile user memory
must be taken into account. 4 bytes are required for each compensation value.
If the value 0 is entered, no memory is reserved for the table; i.e. the table
does not exist and the function cannot therefore be activated.

Special cases:                     Caution!

    If MD: MM_QEC_MAX_POINTS is altered, the non-volatile NC user memory is
    automatically re-allocated on system power-on. This deletes all the user
    data in the non-volatile user memory (e.g. drive and HMI machine data,
    code, tool offsets, part programs etc.).

Note:
   Because the exact number of required interpolation points is not known dur-
ing the first start-up of the function, a large number should be chosen ini-
tially. As soon as the characteristics are recorded and saved, the number can
be reduced to the required size. After performing a power-on again, the saved
characteristics can be reloaded.

References:
   /FB/, S7, "Memory Configuration"
```

-					
-	1	0	0	1040	7/2

1.6 Setting data

Number	Identifier			Display filters	Reference
Unit	Name			Data type	Active
Description					
Attributes					
System	Dimension	Default value	Minimum value	Maximum value	Protection

1.6.1 General setting data

41010	**JOG_VAR_INCR_SIZE**			-	H1
-	Size of the variable increment for JOG			DOUBLE	SOFORT
This setting data defines the number of increments when variable increment (INCvar) is selected. This increment size is traversed by the axis in JOG mode whenever the traverse key is pressed or the handwheel is turned one detent position and variable increment is selected (PLC interface signal "Active machine function: INC variable" for machine or geometry axes is set to 1). The defined increment size also applies to DRF. Note: Please note that the increment size is active for incremental jogging and handwheel jogging. So if a large increment value is entered and the handwheel is turned the axis might cover a large distance (depends on setting in MD: JOG_INCR_WEIGHT). SD irrelevant for ...... JOG continuous Related to .... IS "Active machine function: INC variable" (DB21-28, DBX41.5 ff) or IS "Active machine function; INC variable" (DB31 - 48, DBX 69.5) MD: JOG_INCR_WEIGHT (weighting of an increment for INC/handwheel)					
-					
-	-	0.	-	-	7/7

41050	**JOG_CONT_MODE_LEVELTRIGGRD**			-	H1
-	Jog mode / continuous operation with continuous JOG			BOOLEAN	SOFORT
1: Jog mode for JOG continuous In jog mode (default setting) the axis traverses as long as the traverse key is held down and an axis limitation has not been reached. When the key is released the axis is decelerated to zero speed and the movement is considered complete. 0: Continuous operation for JOG continuous In continuous operation the traverse movement is started with the first rising edge of the traverse key and continues to move even after the key is released. The axis can be stopped again by pressing the traverse key again (second rising edge). SD irrelevant for ...... Incremental jogging (JOG INC) Reference point approach (JOG REF)					
-					
-	-	TRUE	-	-	7/7

41100	**JOG_REV_IS_ACTIVE**			-	H1
-	JOG mode: (1) revolutional feedrate / (0) feedrate			BOOLEAN	SOFORT
1: The axis (machine or geometry axis) is traversed in JOG mode with revolutional feedrate (G95) related to the assigned spindle ($SA_ASSIGN_FEED_PER_REV_SOURCE). The size of the revolutional feedrate can be set as follows: - with global SD: JOG_REV_SET_VELO (only active if SD does not equal 0) - with axial MD: JOG_REV_VELO - for rapid traverse override with axial MD: JOG_REV_VELO_RAPID 0: The axis is traversed in JOG mode with linear feedrate (G94). The size of the linear feedrate can be set as follows: - with global SD: JOG_SET_VELO (only active if SD does not equal 0) - with axial MD: JOG_VELO - for rapid traverse override with axial MD: JOG_VELO_RAPID SD irrelevant for ...... AUTOMATIC and MDI modes Related to .... SD: JOG_REV_SET_VELO (JOG velocity for G95) MD: JOG_REV_VELO (revolutional feedrate for JOG) MD: JOG_REV_VELO_RAPID (revolutional feedrate for JOG with rapid traverse override) SD: JOG_SET_VELO (JOG velocity for G94) MD: JOG_VELO (JOG axis velocity) MD: JOG_VELO_RAPID (rapid traverse in JOG mode).					
-					
-	-	FALSE	-	-	7/7

41110	**JOG_SET_VELO**			-	H1
mm/min	Axis velocity in JOG			DOUBLE	SOFORT

```
Value not equal to 0:
The velocity value entered applies to linear axes traversed in JOG mode if
    linear feedrate (G94) is active for the relevant axis (MD:
    JOG_REV_IS_ACTIVE = 0).
The axis velocity is active for
- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel traversing.
The value entered is valid for all linear axes and must not exceed the maxi-
    mum permissible axis velocity (MD: MAX_AX_VELO).
In the case of DRF, the velocity defined by SD: JOG_SET_VELO is reduced by
MD: HANDWH_VELO_OVERLAY_FACTOR.

Value = 0:
If 0 has been entered in the setting data, the active linear feedrate in JOG
    mode is
MD: JOG_VELO "Jog axis velocity". Each axis can be given its own JOG velocity
    with this MD (axial MD).

SD irrelevant for ......
- Linear axes if SD: JOG_REV_IS_ACTIVE = 1
- Rotary axes (SD: JOG_ROT_AX_SET_VELO is active here)

Application example(s)
The operator can thus define a JOG velocity for a specific application.

Related to ....
   Axial SD: JOG_REV_IS_ACTIVE (revolutional feedrate with JOG active)
   Axial MD: JOG_VELO (JOG axis velocity)
   Axial MD: MAX_AX_VELO (maximum axis velocity)
   Axial MD: HANDWH_VELO_OVERLAY_FACTOR (ratio of JOG velocity to handwheel
velocity (DRF))
   SD: JOG_ROT_AX_SET_VELO (JOG speed with rotary axes)
```

-					
-	-	0.0	-	-	7/7

41120	JOG_REV_SET_VELO		-		H1
mm/rev	Revolutional feedrate of axes in JOG mode		DOUBLE		SOFORT

```
Value not equal to 0:
The velocity value entered applies to axes traversed in JOG mode if revolu-
    tional feedrate (G95) is active for the relevant axis (MD:
    JOG_REV_IS_ACTIVE = 1). The axis velocity is active for
- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel traversing. The value entered is valid for all axes and must not
    exceed the maximum permissible axis velocity (MD: MAX_AX_VELO).

Value = 0:
If 0 has been entered in the setting data, the active revolutional feedrate in
    JOG mode is MD: JOG_REV_VELO "revolutional feedrate with JOG".
Each axis can be given its own revolutional feedrate with this MD (axial MD).

SD irrelevant for ......
- For axes if SD: JOG_REV_IS_ACTIVE = 0

Application example(s)
The operator can define a JOG velocity for a particular application.

Related to ....
   Axial SD: JOG_REV_IS_ACTIVE (revolutional feedrate for JOG active)
   Axial MD: JOG_REV_VELO (revolutional feedrate with JOG)
   Axial MD: MAX_AX_VELO (maximum axis velocity)
```

-					
-	-	0.0	-	-	7/7

41130	JOG_ROT_AX_SET_VELO		-		H1
rev/min	Axis velocity for rotary axes in JOG mode		DOUBLE		SOFORT

```
Value not equal to 0:
The velocity entered applies to rotary axes in JOG mode (in continuous mode,
    in incremental mode, in traversing with handwheel). The value entered is
    common to all rotary axes and must not exceed the maximum permissible axis
    velocity (MD: MAX_AX_VELO).

With DRF, the velocity set with SD: JOG_ROT_AX_SET_VELO must be reduced by the
MD: HANDWH_VELO_OVERLAY_FACTOR.

Value equal to 0:
If the value 0 is entered in the setting data, the velocity that applies to
    rotary axes in JOG mode is the axial MD: JOG_VELO (jog axis velocity). In
    this way, it is possible to define a separate JOG velocity for each axis.

Application example(s)
The operator can define a JOG velocity for a particular application.

Related to ....
   MD: JOG_VELO (JOG axis velocity)
   MD: MAX_AX_VELO (maximum axis velocity)
   MD: HANDWH_VELO_OVERLAY_FACTOR (ratio JOG velocity to handwheel velocity
(DRF)
```

-					
-	-	0.0	-	-	7/7

41200	**JOG_SPIND_SET_VELO**			-	H1
rev/min	Speed for spindle JOG mode			DOUBLE	SOFORT

Value not equal to 0:
The speed entered applies to spindles in JOG mode if they are traversed manually by the "Plus or minus traversing keys" or the handwheel. The speed is active for
- continuous jogging
- incremental jogging (INC1, ... INCvar)
- handwheel traversing. The value entered is valid for all spindles and must not exceed the maximum permissible speed (MD: MAX_AX_VELO).

Value = 0:
If 0 has been entered in the setting data, MD: JOG_VELO (JOG axis velocity) acts as the JOG velocity. Each axis can thus be given its own JOG velocity with this MD (axial MD).
The maximum speeds of the active gear stage (MD: GEAR_STEP_VELO_LIMIT) are taken into account when traversing the spindle with JOG.

SD irrelevant for ......
Application example(s). The operator can thus define a JOG speed for the spindles for a specific application.

Related to ....
Axial MD: JOG_VELO (JOG axis velocity)
MD: GEAR_STEP_MAX_VELO_LIMIT (maximum speed of the gear range)

-					
-	-	0.0	-	-	7/7

41300	**CEC_TABLE_ENABLE**			-	K3
-	Compensation table enable			BOOLEAN	SOFORT

```
1: The evaluation of the compensation table [t] is enabled.

   The compensation table is now included in the calculation of the compensa-
tion value for the compensation axis.
   The compensation axis $AN_CEC_OUTPUT_AXIS can be taken from the table con-
figuration.

   The effective total compensation value in the compensation axis can be
adapted to the current machining by the targeted activation of tables (from NC
part programm or PLC user program).

   The function does not become active until the following conditions have
been fulfilled:
- The option "Interpolatory compensation" is set
- The associated compensation tables in the NC user memory have been loaded
    and enabled (SD: CEC_TABLE_ENABLE[t] = 1)
- The current position measuring system is referenced (IS: "Referenced/Syn-
    chronized" =1).

0: The evaluation of the sag compensation table [t] is not enabled.

Related to ....
   MD: MM_CEC_MAX_POINTS[t]    Number of  interpolation points with sag com-
pensation
   SD: CEC_TABLE_ENABLE[t]     Evaluation of the sag compensation table t is
enabled
    IS "Referenced/Synchronized 1"   DB31-48, DBX60.4
    IS "Referenced/Synchronized 2"   DB31-48, DBX60.5
```

-					
-	62	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7

41310	CEC_TABLE_WEIGHT		-		K3
-	Weighting factor compensation table		DOUBLE		SOFORT
The compensation value stored in the table [t] is multiplied by the weighting factor. When selecting the weighting factor it should be ensured that the total compensation value in the compensation axis does not exceed the maximal value of (MD: CEC_MAX_SUM). With [t] = index of the compensation table (see MD: MM_CEC_MAX_POINTS) If, for example, the weight of the tools used on the machine or the workpieces to be machined are too different and this affects the error curve by changing the amplitude, this can be corrected by changing the weighting factor. In the case of sag compensation, the weighting factor in the table can be changed for specific tools or workpieces from the PLC user program or the NC program by overwriting the setting data. However, different compensation tables are to be used if the course of the error curve is substantially changed by the different weights. Related to .... SD: CEC_TABLE_ENABLE[t] Evaluation of the sag compensation table t is enabled MD: CEC_MAX_SUM Maximum compensation value for sag compensation					
-					
-	62	1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0,1.0...	-	-	7/7

41500	SW_CAM_MINUS_POS_TAB_1		-		N3
mm/inch, degrees	Trigger points at falling cam 1-8		DOUBLE		SOFORT
The cam positions of minus cams 1 - 8 are entered in this machine data. The positions are entered in the machine coordinate system. Index [n] of the setting data addresses the cam pair: n = 0, 1, ... , 7 corresponds to cam pair 1, 2, ... , 8 When the set switching points are overtraveled in the positive axis direction, the associated "minus" cam signals in the PLC interface (and any applied fast output signals) switch from 1 to 0.					
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41501	SW_CAM_PLUS_POS_TAB_1			-	N3
mm/inch, degrees	Trigger points at rising cam edge 1-8			DOUBLE	SOFORT
The cam positions of plus cams 1 - 8 are entered in this machine data. The positions are entered in the machine coordinate system. Index [n] of the setting data addresses the cam pair: n = 0, 1, ... , 7 corresponds to cam pair 1, 2, ... , 8 When the set switching points are overtraveled in the positive axis direction, the associated "plus" cam signals in the PLC interface (and any applied fast output signals) switch from 0 to 1.					
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41502	SW_CAM_MINUS_POS_TAB_2			-	N3
mm/inch, degrees	Trigger points at falling cam edge 9-16			DOUBLE	SOFORT
The cam positions of minus cams 9-16 are entered in this machine data. The positions are entered in the machine coordinate system. Index [n] of the setting data addresses the cam pair: n = 8, 9, ... , 15 corresponds to cam pair 9, 10, ... , 16 Switching points with falling edges of cams 9 - 16. When the set switching points are overtraveled in the positive axis direction, the associated "minus" cam signals in the PLC interface (and any applied fast output signals) switch from 1 to 0.					
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41503	SW_CAM_PLUS_POS_TAB_2			-	N3
mm/inch, degrees	Trigger points at rising cam edge 9-16			DOUBLE	SOFORT
The cam positions of plus cams 9-16 are entered in this machine data. The positions are entered in the machine coordinate system. Index [n] of the setting data addresses the cam pair: n = 8, 9, ... , 15 corresponds to cam pair 9, 10, ... , 16 Switching points with rising edges of cams 9 - 16. When the set switching points are overtraveled in the positive axis direction, the associated "plus" cam signals in the PLC interface (and any applied fast output signals) switch from 0 to 1.					
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41504	SW_CAM_MINUS_POS_TAB_3			-	N3
mm/inch, degrees	Trigger points at falling cam edge 17-24			DOUBLE	SOFORT
The cam positions of minus cams 17 - 24 are entered in this machine data. The positions are entered in the machine coordinate system. Index [n] of the setting data addresses the cam pair: n = 0, 1, ... , 7 corresponds to cam pair 17, 18, ... , 24 Switching points with falling edges of cams 17 - 24. When the set switching points are overtraveled in the positive axis direc- tion, the associated "minus" cam signals in the PLC interface (and any applied fast output signals) switch from 1 to 0.					
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41505	SW_CAM_PLUS_POS_TAB_3			-	N3
mm/inch, degrees	Trigger points at rising cam edge 17-24			DOUBLE	SOFORT
The cam positions of plus cams 17 - 24 are entered in this machine data. The positions are entered in the machine coordinate system. Index [n] of the setting data addresses the cam pair: n = 0, 1, ... , 7 corresponds to cam pair 17, 18, ... , 24 Switching points with rising edges of cams 17 - 24 When the set switching points are overtraveled in the positive axis direc- tion, the associated "plus" cam signals in the PLC interface (and any applied fast output signals) switch from 0 to 1.					
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41506	SW_CAM_MINUS_POS_TAB_4			-	N3
mm/inch, degrees	Trigger points at falling cam edge 25-32			DOUBLE	SOFORT
The cam positions of minus cams 25 - 32 are entered in this machine data. The positions are entered in the machine coordinate system. Index [n] of the setting data addresses the cam pair: n = 8, 9, ... , 15 corresponds to cam pair 25, 26, ... , 32 Switching points with falling edges of cams 25 - 32. When the set switching points are overtraveled in the positive axis direc- tion, the associated "minus" cam signals in the PLC interface (and any applied fast output signals) switch from 1 to 0.					
-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41507	**SW_CAM_PLUS_POS_TAB_4**		-		N3
mm/inch, degrees	Trigger points at rising cam edge 25-32		DOUBLE		SOFORT

```
The cam positions of plus cams 25 - 32 are entered in this machine data.
The positions are entered in the machine coordinate system.

Index [n] of the setting data addresses the cam pair:
n = 8, 9, ... , 15 corresponds to cam pair 25, 26, ... , 32

Switching points with rising edges of cams 25 - 32.
When the set switching points are overtraveled in the positive axis direc-
tion, the associated "plus" cam signals in the PLC interface ( and any applied
fast output signals ) switch from 0 to 1.
```

-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41520	**SW_CAM_MINUS_TIME_TAB_1**		-		N3
s	Rate time for '-' trigger points of cams 1-8		DOUBLE		SOFORT

```
A lead or delay time can be assigned to each cam 1-8 in this setting data to
    compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the
    time value entered.

Positive value:         Lead time
Negative value:         Delay time

Index [n] of the setting data addresses the cam pair:
n = 0, 1, ... , 7 corresponds to cam pair 1,  2, ... , 8

This setting data is added to MD: SW_CAM_MINUS_LEAD_TIME[n].

Related to ....
   MD: SW_CAM_MINUS_LEAD_TIME[n]  (lead or delay time on minus cams 1 - 16)
```

-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41521	**SW_CAM_PLUS_TIME_TAB_1**		-	N3	
s	Rate time for '+' trigger points of cams 1-8		DOUBLE	SOFORT	

```
A lead or delay time can be assigned to each plus cam 1-8 in this setting data
    to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the
    time value entered.

Positive value:           Lead time
Negative value:           Delay time

Index [n] of the setting data addresses the cam pair:
n = 0, 1, ... , 7 corresponds to cam pair 1, 2, ... , 8

This setting data is added to MD: SW_CAM_PLUS_LEAD_TIME[n].

Related to ....
   MD: SW_CAM_PLUS_LEAD_TIME[n] (lead or delay time on plus cams 1 - 16)
```

-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41522	**SW_CAM_MINUS_TIME_TAB_2**		-	N3	
s	Rate time for '-' trigger points of cams 9-16		DOUBLE	SOFORT	

```
A lead or delay time can be assigned to each minus cam 9 - 16 in this setting
    data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the
    time value entered.

Positive value:        Lead time
Negative value:        Delay time

Index [n] of the setting data addresses the cam pair:
n = 8, 9, ... , 15 corresponds to cam pair 9, 10, ... , 16

This setting data is added to MD: SW_CAM_MINUS_LEAD_TIME[n+8].

Related to ....
   MD: SW_CAM_MINUS_LEAD_TIME[n] (lead or delay time on minus cams 1 - 16)
```

-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41523	SW_CAM_PLUS_TIME_TAB_2			-	N3
s	Rate time for '+' trigger points of cams 9-16			DOUBLE	SOFORT

```
A lead or delay time can be assigned to each plus cam 9 - 16 in this setting
    data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the
    time value entered.

Positive value:            Lead time
Negative value:            Delay time

Index [n] of the setting data addresses the cam pair:
n = 8, 9, ... , 15 corresponds to cam pair 9, 10, ... , 16

This setting data is added to MD: SW_CAM_PLUS_LEAD_TIME[n+8].

Related to ....
   MD: SW_CAM_PLUS_LEAD_TIME[n] (lead or delay time on plus cams 1 - 16)
```

-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41524	SW_CAM_MINUS_TIME_TAB_3			-	N3
s	Rate time for '-' trigger points of cams 17-24			DOUBLE	SOFORT

```
A lead or delay time can be assigned to each minus cam 17-24 in this setting
    data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the
    time value entered.

Positive value:         Lead time
Negative value:         Delay time

Index [n] of the setting data addresses the cam pair:
n = 0, 1, ... , 7 corresponds to cam pair 17, 18, ... , 24

This setting data is added to MD: SW_CAM_MINUS_LEAD_TIME[n].

Related to ....
   MD: SW_CAM_MINUS_LEAD_TIME[n]  (lead or delay time on minus cams 1 - 16)
```

-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41525	SW_CAM_PLUS_TIME_TAB_3			-	N3
s	Rate time for '+' trigger points of cams 17-24			DOUBLE	SOFORT

```
A lead or delay time can be assigned to each plus cam 17-24 in this setting
    data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the
    time value entered.

Positive value:             Lead time
Negative value:             Delay time

Index [n] of the setting data addresses the cam pair:
n = 0, 1, ... , 7 corresponds to cam pair 17, 18, ... , 24

This setting data is added to MD: SW_CAM_PLUS_LEAD_TIME[n].

Related to ....
   MD: SW_CAM_PLUS_LEAD_TIME[n] (lead or delay time on plus cams 1 - 16)
```

-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41526	SW_CAM_MINUS_TIME_TAB_4			-	N3
s	Rate time for '-' trigger points of cams 25-32			DOUBLE	SOFORT

```
A lead or delay time can be assigned to each minus cam 25-32 in this setting
    data to compensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the
    time value entered.

Positive value:             Lead time
Negative value:             Delay time

Index [n] of the setting data addresses the cam pair:
n = 8, 9, ... , 15 corresponds to cam pair 25, 26, ... , 32

This setting data is added to MD: SW_CAM_MINUS_LEAD_TIME[n+8].

Related to ....
   MD: SW_CAM_MINUS_LEAD_TIME[n] (lead or delay time on minus cams 1 - 16)
```

-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41527	**SW_CAM_PLUS_TIME_TAB_4**			-	N3
s	Rate time for '+' trigger points of cams 25-32			DOUBLE	SOFORT

```
A lead or delay time can be assigned to each plus cam 25 - 32 in this setting
    data to com-pensate for delay times.

The switching edge of the associated cam signal is advanced or delayed by the
    time value entered.

Positive value:         Lead time
Negative value:         Delay time

Index [n] of the setting data addresses the cam pair:
n = 8, 9, ... , 15 corresponds to cam pair 25, 26, ... , 32

This setting data is added to MD: SW_CAM_PLUS_LEAD_TIME[n+8].

Related to ....
   MD: SW_CAM_PLUS_LEAD_TIME[n] (lead or delay time on plus cams 1 - 16)
```

-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41600	**COMPAR_THRESHOLD_1**			-	A4
-	Threshold value of the 1st comparator			DOUBLE	SOFORT

```
COMPAR_THRESHOLD_1[b] defines the threshold values for the individual input
bits [b] of comparator byte 1.

The output bit n of the 1st comparator is created by comparing the threshold
    value n according to the comparison type defined in bit n of
    COMPAR_TYPE_1.

For example:
   COMPAR_ASSIGN_ANA_INPUT_1[2] = 4
   COMPAR_TRESHOLD_1[2]         = 5000.0
   COMPAR_TYPE_1                = 5
   The 3rd output bit of comparator 1 is set if the input value at AnalogIn 4
is greater than or equal to 5 volts.

Index [b]: Bits 0 - 7

Related to ....
    MD 10530: COMPAR_ASSIGN_ANA_INPUT_1
    MD 10531: COMPAR_ASSIGN_ANA_INPUT_2
    MD 10540: COMPAR_TYPE_1 MD 10541: COMPAR_TYPE_2
```

-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41601	**COMPAR_THRESHOLD_2**			-	A4
-	Threshold value of the 2nd comparator			DOUBLE	SOFORT

```
COMPAR_THRESHOLD_1[b] defines the threshold values for the individual input
bits [b] of comparator byte 1.
The output bit n of the 1st comparator is created by comparing the threshold
    value n according to the comparison type defined in bit n of
    COMPAR_TYPE_2.


Index [b]: Bits 0 - 7

Related to ....
    MD 10530: COMPAR_ASSIGN_ANA_INPUT_1
    MD 10531: COMPAR_ASSIGN_ANA_INPUT_2
    MD 10540: COMPAR_TYPE_1
    MD 10541: COMPAR_TYPE_2
```

-					
-	8	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0	-	-	7/7

41700	**AXCT_SWWIDTH**			-	B3
-	Default rotation of axis container			DWORD	NEW CONF

```
The number of entries (slots) by which the entries in the axis container are
    advanced on execution of the rotation. The value is interpreted modulo of
    the actually existing entries. Negative values reverse the direction of
    rotation.

Related to the container rotation command, container axes.
This machine data is distribued via the NCU-link.

Contrary to the the definition for setting data, this SD is not immediately
active, but first with NEWCONF.
```

CTDE					
-	16	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-32	32	7/7

1.6.2 Channel-specific setting data

42000	**THREAD_START_ANGLE**			-	K1
degrees	Starting angle for thread			DOUBLE	SOFORT
In the case of multiple thread cutting, the offset of the individual threads can be programmed with the aid of this setting data. This SD can be changed by the part program with the command SF. Note: MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/7

42010	**THREAD_RAMP_DISP**			-	V1
mm	Acceleration behavior of axis when thread cutting			DOUBLE	SOFORT
The SD is active for thread cutting with G33 (G34, G35). It features two elements that define the behavior of the thread axis during runup (1st element) and during deceleration/smoothing (2nd element). The values have the same properties for thread run-in and thread run-out: <0: The thread axis is started/decelerated with configured acceleration. Jerk is according to the current programming of BRISK/SOFT. Behavior is compatible with MD 20650__THREAD_START_IS_HARD = FALSE used until now. 0: Starting/deceleration of the feed axis during thread cutting is stepped. Behavior is compatible with MD 20650__THREAD_START_IS_HARD = TRUE used until now. >0: The maximum thread starting or deceleration path is specified. The specified distance can lead to acceleration overload of the axis. The SD is written from the block when DITR (displacement thread ramp) is programmed. Note: MD 10710: PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)					
-					
-	2	-1., -1.,-1., -1.,-1., -1.,-1., -1....	-1.	999999.	7/7

42100	**DRY_RUN_FEED**			-	V1
mm/min	Dry run feedrate			DOUBLE	SOFORT
The feedrate for the active dry run is entered in this setting data. The setting data can be altered on the operator panel in the "Parameters" operating area. The entered dry run feedrate is always interpreted as a linear feed (G94). If the dry run feedrate is activated via the PLC interface, the dry run feedrate is used as the path feed after a reset instead of the programmed feed. The programmed velocity is used for traversing if the programmed velocity is greater than the velocity stored here. Application example(s) Program testing Related to .... IS "Activate dry run feedrate" (DB21, ... DBX0.6) IS "Dry run feedrate selected" (DB21, ... DBX24.6)					
-					
-	-	5000.,5000.,5000.,5000.,5000.,5000....	-	-	7/7

42101	**DRY_RUN_FEED_MODE**			-	V1
-	Mode for dry run velocity			BYTE	SOFORT
This MD can be used to set the method of operation of the dry run velocity specified by the setting data $SC_DRY_RUN_FEED. The following values are possible: 0: The maximum of setting data $SC_DRY_RUN_FEED and the programmed velocity become active. This is the standard setting and corresponds to the behavior up to SW 5. 1: The minimum of setting data $SC_DRY_RUN_FEED and the programmed velocity become active. 2: The setting data $SC_DRY_RUN_FEED becomes active directly irrespective of the programmed velocity. The values 3...9 are reserved for extensions. 10: As configuration 0 except thread cutting (G33, G34, G35) and tapping (G331, G332, G63). These functions are executed as programmed. 11: As configuration 1 except thread cutting (G33, G34, G35) and tapping (G331, G332, G63). These functions are executed as programmed. 12: As configuration 2 except thread cutting (G33, G34, G35) and tapping (G331, G332, G63). These functions are executed as programmed.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	12	7/7

42110	**DEFAULT_FEED**			-	V1,FBFA
mm/min	Path feed default value			DOUBLE	SOFORT
Default value for path feedrate, The setting data is evaluated when the part program starts taking into account the feedrate type active at this time (see $MC_GCODE_RESET_VALUES and $MC_EXTERN_GCODE_RESET_VALUES).					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/7

42120	**APPROACH_FEED**			-	-
mm/min	Path feedrate in approach blocks			DOUBLE	SOFORT
Default value for path feedrate in approach blocks (after repos., block search, SERUPRO etc). The contents of this settting data are only used when it is non-zero. It is evaluated like an F word programmed for G94.					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/7

42125	SERUPRO_SYNC_MASK	-	-
-	Ssynchronization in approach blocks	DWORD	SOFORT

A synchronized approach can be set for the search type SERUPRO with the setting data SERUPRO_SYNC_MASK.
SERUPRO uses the function REPOS to move from the current machine position to the target block of the search. A synchronization of the channels can be forced between the reapproach block and the target block via SERUPRO_SYNC_MASK which would correspond to the use of wait markers.

Note:
The user cannot program wait markers between reapproach block and target block in a part program.
SERUPRO_SYNC_MASK activates this intermal wait marker, and defines for which other channels this channel is to wait.

Example for channel 3: $SC_SERUPRO_SYNC_MASK= 0x55
A new block is now inserted in the Serupro approach between the reapproach block and the target block, the function of which corresponds to the following programming: WAITM(101, 1,3,5,7), i.e. a wait mark synchronizes the channels 1, 3, 5 and 7.

The wait marks used internally cannot be explicitly programmed by the user.

NOTICE:
Similarly to the part program, the user can make the error of not setting the mark in a channel, so that the other channels naturally wait for ever!

Comment: The bit mask can contain a channel that does not exist (channel gaps) without a
deadlock occurring.
Example for channel 3: $SC_SERUPRO_SYNC_MASK= 0x55 and channel 5 do not exist, so WAITM(101, 1,3,7) is set.
Note: The block content corresponds to "WAITM(101, 1,3,5,7)", the user does not see this block content, he sees REPOSA!
Note:
SERUPRO_SYNC_MASK is evaluated as soon as the part program command REPOSA is interpreted.
SERUPRO_SYNC_MASK can still be changed if SERUPRO is in the state "search target found".
If REPOSA has already been executed, a change to SERUPRO_SYNC_MASK can only become active if a new REPOS is set. This occurs, for example, by:
- Starting a new ASUB.
- STOP-JOG-AUTO-START
- STOP - select a new REPOS mode RMI/RMN/RME/RMB - START
Comment:
If one use the prog. event for search and if the NCK is at alarm 10208 then a change of SERUPRO_SYNC_MASK is not active unless one sets a new REPOS.
SERUPRO_SYNC_MASK == 0   A block is NOT inserted.
Note:
If the bit for the current channel is not set in $SC_SERUPRO_SYNC_MASK then a block is NOT inserted.
Example:
If $SC_SERUPRO_SYNC_MASK= 0xE is programmed in channel 1, then a block is NOT inserted.
This assignment is reserved for a future function!

-				

-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

42140	**DEFAULT_SCALE_FACTOR_P**	-	FBFA
-	Default scaling factor for address P	DWORD	SOFORT

```
The value in this machine data is active if no scaling factor P has been pro-
    grammed in the block.

Related to:
   WEIGHTING_FACTOR_FOR_SCALE
```

-					
-	-	1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	-	-	7/7

42150	**DEFAULT_ROT_FACTOR_R**	-	-
-	Default rotation factor for address R	DOUBLE	SOFORT

```
The value in this machine data is active if no factor for rotation R is pro-
    grammed in the block.
```

-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/7

42160	**EXTERN_FIXED_FEEDRATE_F1_F9**	-	FBFA
-	Fixed feedrates F1 - F9	DOUBLE	SOFORT

```
Fixed feedrate values for programming with F1 - F9. If the machine data
$MC_FEEDRATE_F1_F9_ON = TRUE is set with the programming of
F1 - F9, the feedrate values are read from the setting data
    $SC_EXTERN_FIXED_FEEDRATE_F1_F9[0] - $SC_EXTERN_FIXED_FEEDRATE_F1_F9[8],
    and activated as the machining feedrate.
The rapid traverse feedrate must be entered in
    $SC_EXTERN_FIXED_FEEDRATE_F1_F9[0].
```

-					
-	10	0., 0., 0., 0., 0., 0., 0., 0., 0., 0....	-	-	7/7

42162	**EXTERN_DOUBLE_TURRET_DIST**	-	FBFA
-	Double turret head tool distance	DOUBLE	SOFORT

```
Distance between both tools of a double turret head.
The distance is activated using G68 as additive zero point offset if
    $MN_EXTERN_DOUBLE_TURRET_ON is set to TRUE.
```

-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/7

42200	SINGLEBLOCK2_STOPRE		-	-	BA
-	Activate SBL2 debug mode			BOOLEAN	SOFORT
Value = TRUE: A preprocessing stop is made with every block if SBL2 (single block with stop after every block) is active. This suppresses the premachining of part program blocks. This variant of the SBL2 is not true-to-contour. This means that a different contour characteristic might be generated as a result of the preprocessing stop than without single block or with SBL1. Application: Debug mode for testing part programs.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7

42300	COUPLE_RATIO_1		-	-	-
-	Speed ratio for synchr. spindle mode, numerator, denominator			DOUBLE	SOFORT
This setting data defines the speed ratio parameters for the fixed coupling configuration defined with the channel-specific MD: COUPLE_AXIS_1[n]. The linear correlation between the leading and following spindles is determined by the speed ratio k_Ü. This ratio is defined by two speed ratio parameters in the form of a numerator [n=0] and a denominator [n=1]. This enables the speed ratio to be defined very precisely. k_Ü = Speed ratio parameter of numerator / Speed ratio parameter of denominator = $SC_COUPLE_RATIO[0] / $SC_COUPLE_RATIO[1] The speed ratio parameters can be altered in the NC part program with the language instruction COUPDEF provided that this is not locked by the channel-specific MD 21340: COUPLE_IS_WRITE_PROT_1. However, the parameterized values of SD: $SC_COUPLE_RATIO_1 are not changed. The calculation of k_Ü is initiated with POWER ON. SD irrelevant for ...... User-defined coupling Related to .... SD: $SC_COUPLE_RATIO_1 currently has the same action as a machine data (e.g. active after POWER ON). The SD data are therefore displayed and input in the same way as channel-specific machine data.					
-					
-	2	1.0, 1.0,1.0, 1.0,1.0, 1.0,1.0, 1.0...	-1.0e8	1.0e8	7/7

42400	**PUNCH_DWELLTIME**			-	N4
s	Dwell time for punching and nibbling			DOUBLE	SOFORT
This data sets the dwell time between reaching the position and triggering the stroke. The set value is rounded to an integer multiple of the interpolation cycle. (This means that the value set here can only differ slightly from that which is actually executed.) Note: MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be set so that the value written by the part program is transferred into the active file system on reset (i.e. the value is retained even after the reset).					
-					
-	-	1.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

42402	**NIBPUNCH_PRE_START_TIME**			-	N4
s	Delay time (punch/nibble) with G603			DOUBLE	SOFORT
This machine data has exactly the same effect as machine data NIBBLE_PRE_START_TIME. Its primary purpose is to allow the pre-start time to be altered from the NC program so that it can be adapted to different metal sheet sizes and thicknesses. However, the setting data is active only when the machine data has been set to zero. Related to .... NIBBLE_PRESTART_TIME					
-					
-	-	.02,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

42404	**MINTIME_BETWEEN_STROKES**			-	N4
s	Minimum time between 2 strokes in seconds			DOUBLE	SOFORT
Minimum time between 2 strokes in seconds					
-					
-	-	0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0...	-	-	7/7

42440	**FRAME_OFFSET_INCR_PROG**			-	K2
-	Traversing from zero offset with incr. programming			BOOLEAN	SOFORT
0: When incremental programming is used on an axis, only the programmed position delta is traversed after a frame change. Zero offsets in FRAMES are only traversed when an absolute position is specified. 1: When incremental programming is used on an axis, changes to zero offsets are traversed after a frame change (standard response up to software version 3). Related to .... SD 42442: TOOL_OFFSET_INCR_PROG					
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

42442	**TOOL_OFFSET_INCR_PROG**			-	W1
-	Traversing from zero offset with incr. programming			BOOLEAN	SOFORT
0: When incremental programming is used on an axis, only the programmed position delta is traversed after a frame change. Tool length offsets in FRAMES are only traversed when an absolute position is specified. 1: When incremental programming is used on an axis, changes to tool length offsets are traversed after a tool change (standard response up to SW version 3). Related to .... SD 42440: FRAME_OFFSET_INCR_PROG					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

42444	**TARGET_BLOCK_INCR_PROG**			-	BA
-	Set down mode after search run with calculation			BOOLEAN	SOFORT
If the first programming of an axis after "Search run with calculation to end of block" is incremental, the incremental value is added as a function of SD $SC_TARGET_BLOCK_INCR_PROG to the value accumulated up to the search target : SD = TRUE: Incremental value is added to accumulated position SD = FALSE: Incremental value is added to current actual value The setting data is evaluated on NC start for output of the action blocks.					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

42450	**CONTPREC**			-	B1,K6
mm	Contour accuracy			DOUBLE	SOFORT
Contour accuracy. This setting data can be used to define the accuracy to be maintained for the path of the geometry axes on curved contours. The lower the value and the lower the servogain factor of the geometry axes, the greater the reduction of path feed on curved contours. Related to .... $MC_CPREC_WITH_FFW $SC_MINFEED					
-					
-	-	0.1,0.1,0.1,0.1,0.1,0 .1,0.1,0.1,0.1...	0.000001	999999.	7/7

42460	**MINFEED**			-	B1,K6
mm/min	Minimum path feedrate for CPRECON			DOUBLE	SOFORT
Minimum path feedrate with the "Contour accuracy" function active. The fee-drate is not limited to below this value, unless a lower F value has been pro-grammed or the axis dynamics do not permit it. Related to .... $MC_CPREC_WITH_FFW $SC_CONTPREC					
-					
-	-	1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1.,1....	0.000001	999999.	7/7

42465	**SMOOTH_CONTUR_TOL**			-	B1
mm	maximum contour tolerance on smoothing			DOUBLE	SOFORT
This setting data defines the maximum tolerance of smoothing for the contour. Related to: $MC_SMOOTHING_MODE, $SC_SMOOTH_ORI_TOL					
-					
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	999999.	7/7

42466	**SMOOTH_ORI_TOL**			-	B1
degrees	Maximum deviation of tool orientation during smoothing.			DOUBLE	SOFORT
This setting data defines the maximum tool orientation tolerance during smoothing. The data determines the maximum angular displacement of the tool orientation. This data only applies if an orientation tranformation is active. Related to: $MC_SMOOTHING_MODE, $SC_SMOOTH_CONTUR_TOL					
-					
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	90.	7/7

42470	**CRIT_SPLINE_ANGLE**			-	W1,PGA
degrees	Corner limit angle for compressor			DOUBLE	SOFORT
The setting data defines the limit angle from which the compressor COMPCAD interprets a block transition as a corner. Practical values lie between 10 and 40 degrees. Values from 0 to 89 degrees inclusive are permitted. The angle only serves as an approximate measure for corner detection. The com-pressor can also classify flatter block transitions as corners and elimi-nate larger angles as outliers on account of plausibility considerations.					
-					
-	-	36.0,36.0,36.0,36.0,36.0,36.0,36.0...	0.0	89.0	7/7

42471	**MIN_CURV_RADIUS**			EXP, C09	-
mm	Minimum radius of curvature			DOUBLE	SOFORT
The setting data defines a typical tool radius. It is only evaluated in compressor COMPCAD. The lower the value, the greater the precision, but the slower the program execution.					
-					
-	-	3.0,3.0,3.0,3.0,3.0,3.0,3.0,3.0,3.0...	-	-	7/7

42475	**COMPRESS_CONTUR_TOL**			-	F2,PGA
mm	maximum contour deviation with compressor			DOUBLE	SOFORT
This setting data defines the maximum contour tolerance in the compressor.					
-					
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	999999.	7/7

42476	**COMPRESS_ORI_TOL**			-	F2,PGA
degrees	Maximum deviation of tool orientation with compressor			DOUBLE	SOFORT
This setting data defines the maximum tool orientation tolerance in the compressor. This data defines the maximum permissible angular displacement of the tool orientation. This data is active only if an orientation transformation is active.					
-					
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	90.	7/7

42477	**COMPRESS_ORI_ROT_TOL**			-	F2,PGA
degrees	Maximum deviation of tool rotation with compressor			DOUBLE	SOFORT
This setting data defines the maximum tolerance in the compressor for turning the tool orientation. This data defines the maximum permissible angular displacement of the tool rotation. This data is only active if an orientation transformation is active. Turning the tool orientation is only possible with 6-axis machines.					
-					
-	-	0.05,0.05,0.05,0.05,0.05,0.05,0.05...	0.000001	90.	7/7

42480	**STOP_CUTCOM_STOPRE**			-	W1
-	Alarm response with tool radius compensation and preproc. stop			BOOLEAN	SOFORT
If this setting data is TRUE, block execution is stopped by preprocessing stop and active tool radius compensation, and does not resume until after a user acknowledgement (START). If it is FALSE, machining is not interrupted at such a program point.					
-					
-	-	TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE...	-	-	7/7

42490	**CUTCOM_G40_STOPRE**			-	W1
-	Retraction behavior of tool radius compensation with prep. stop			BOOLEAN	SOFORT

FALSE:
If there is a preprocessing stop (either programmed or generated internally by the control) before the deselection block (G40) when tool radius compensation is active, then firstly the starting point of the deselection block is approached from the last end point before the preprocessing stop. The deselection block itself is then executed, i.e. the deselection block is usually replaced by two traversing blocks. Tool radius compensation is no longer active in these blocks. The behavior is thus identical with that before the introduction of this setting data.
TRUE:
If there is a preprocessing stop (either programmed or generated internally by the control) before the deselection block (G40) when tool radius compensation is active, the end point of the deselection point is traversed in a straight line from the last end point before the preprocessing stop.

-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7

42494	CUTCOM_ACT_DEACT_CTRL	-	W1
-	Approach & retraction behavior with 2-1/2D tool radius compens.	DWORD	SOFORT

```
This setting data controls the approach and retraction behavior with tool
radius compensation if the activation or deactivation block does not contain
any traversing information. It is only evaluated with 2-1/2D TRC
(CUT2D or CUT2DF).
The decimal coding is as follows:
N N N N
|   |   |   |____  Approach behavior for tools with tool point direction
|   |   |            (turning tools)
|   |   |______ Approach behavior for tools without tool point direction
|   |             (milling tools)
|   |________  Retract behavior for tools with tool point direction
|               (turning tools)
|__________   Retract behavior for tools without tool point direction
             (milling tools)
If the position in question contains a 1, approach or retraction is always
    performed, even if G41/G42 or G40 stands alone in a block.
 For example:
   N100 x10 y0
   N110 G41
   N120 x20

If we assume a tool radius of 10mm in the above example, position x10y10 is
    approached in block N110.
If the position in question contains the value 2, the approach or retraction
    movement is only performed if at least one axis of the offset plane is
    programmed in the activation/deactivation block. To obtain the same
    results as the above example with this setting, the program must be
    altered as follows:

   N100 x10 y0
   N110 G41 x10
   N120 x20

If axis information x10 is missing in block N110, activation of TRC is delayed
    by one block, i.e. the activation block would now be N120.
If the position in question contains a value other than 1 or 2, i.e. in par-
    ticular the value 0, an approach or retraction movement is not performed
    in a block that does not contain any traversing information.
About the term "Tools with tool point direction":
These are tools with tool  numbers between 400 and 599 (turning and grinding
tools), whose tool point direction has a value between 1 and 8. Turning and
grinding tools with tool point direction 0 or 9 or other undefined values are
treated like milling tools.

Note:
    If the value of this setting data is changed within a program, we recom-
    mend programming a preprocessing stop (stopre) before the description to
    avoid the new value being used in program sections before that point. The
    reverse case is not serious, i.e. if the setting data is written, subse-
    quent NC blocks will definitely access the new value.
```

-					
-	-	2222,2222,2222,2222,2222,2222,2222...	-	-	7/7

42496	**CUTCOM_CLSD_CONT**			-	-
-	Tool radius compensation behavior with closed contour			BOOLEAN	SOFORT
FALSE: If two intersections are created on correction of the inner side of an (almost) closed contour consisting of two successive circle blocks or a circle and a linear block, the intersection that lies on the first part contour nearer to the block end will be selected as per the default behavior. A contour will be considered as (almost) closed if the distance between the starting point of the first block and the end point of the second block is smaller than 10% of the active compensation radius, but not larger than 1000 path increments (corresponds to 1mm to 3 decimal places). TRUE: Under the same condition as described above, the intersection that lies on the first part contour nearer to block start is selected.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7

42500	**SD_MAX_PATH_ACCEL**			-	B2
m/s²	maximum path acceleration			DOUBLE	SOFORT
Setting data for additional limitation of (tangential) path acceleration Related to ... MD 32300: MAX_AX_ACCEL SD 42502: IS_SD_MAX_PATH_ACCEL					
-					
-	-	10000.,10000.,10000.,10000.,10000....	1.0e-3	-	7/7

42502	**IS_SD_MAX_PATH_ACCEL**			-	B2
-	Evaluate SD SC_SD_MAX_PATH_ACCEL			BOOLEAN	SOFORT
Setting data SD_MAX_PATH_ACCEL is included in the limit calculations if SD: IS_SD_MAX_PATH_ACCEL=TRUE Related to ... SD 42500: SD_MAX_PATH_ACCEL					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7

42510	SD_MAX_PATH_JERK			-	B2
m/s³	maximum path-related jerk as setting data			DOUBLE	SOFORT
As well as MD: MAX_PATH_JERK, the maximum path-related jerk can also limit the jerk. Related to ... MD 20600: MAX_PATH_JERK SD 42510: IS_SD_MAX_PATH_JERK					
-					
-	-	100000.,100000.,100000.,100000....	1.e-9	-	7/7

42512	IS_SD_MAX_PATH_JERK			-	B2
-	Evaluate SD SD_MAX_PATH_JERK			BOOLEAN	SOFORT
Setting data SD_MAX_PATH_JERK is included in the limit calculations if SD: IS_SD_MAX_PATH_JERK=TRUE Related to ... SD 42510: SD_MAX_PATH_JERK (SD for additional limitation of (tangential) path jerk)					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7

42520	CORNER_SLOWDOWN_START			-	-
mm	Start of feed reduction at G62.			DOUBLE	SOFORT
Traverse path distance from which the feed is reduced before the corner with G62.					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7

42522	CORNER_SLOWDOWN_END			-	-
mm	End of feed reduction at G62.			DOUBLE	SOFORT
Traverse path distance up to which the feed remains reduced after a corner with G62.					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7

42524	CORNER_SLOWDOWN_OVR			-	-
%	Feed override reduction at G62			DOUBLE	SOFORT
Override used to multiply the feed at the corner with G62.					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0.,0....	-	-	7/7

42526	CORNER_SLOWDOWN_CRIT			-	-
degrees	Corner detection at G62			DOUBLE	SOFORT
Angle from which a corner is taken into account when reducing the feed with G62. For example: CORNER_SLOWDOWN_CRIT = 90 means that all corners of 90 degrees or a more acute angle are traversed slower with G62.					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	-	-	7/7

42528	CUTCOM_DECEL_LIMIT			-	-
-	Feed lowering on circles with tool radius compensation			DOUBLE	SOFORT
The setting data limits feed lowering of the tool center point on concave circle segments with tool radius compensation active and CFC or CFIN selected. With CFC, the feed is defined at the contour. On concave circular arcs, feed lowering of the tool center point is created by the ratio of the contour curvature to the tool center point path curvature. The setting data is limiting this effect, reducing backing off and overheating of the tool. For contours with varying curvatures, a mid-range curvature is used. 0: Provides the previous behavior: If the ratio between contour radius and tool center point path radius is less than or equal to 0.01 the feed is applied to the tool center point path. Less pronounced feed reductions are executed. >0:Feed lowering is limited to the programmed factor. At 0.01, this means that the feed of the tool center point path is possibly only 1 percent of the programmed feed value. 1: On concave contours, the tool center point feed equals the programmed feed (the behavior then corresponds to CFTCP).					
-					
-	-	0.,0.,0.,0.,0.,0.,0.,0., 0.,0.,0.,0.,0....	0.	1.	7/7

42600	JOG_FEED_PER_REV_SOURCE		-		V1
-	Control revolutional feedrate in JOG		DWORD		SOFORT
The revolutional feedrate in JOG mode for geometry axes on which a frame with rotation acts. 0= No revolutional feedrate is active. >0= Machine axis index of the rotary axis/spindle from which the revolutional feedrate is derived. -1=The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active. -2=The revolutional feedrate is derived from the axis with machine axis index == 0. -3=The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active. No revolutional feedrate is active if the master spindle is at a standstill. Related to .... SD 43300: ASSIGN_FEED_PER_REV_SOURCE (revolutional feedrate for position axes/spindles)					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-3	31	7/7

42650	CART_JOG_MODE			-	H1
-	Coordinate system for Cartesian jog traverse			DWORD	SOFORT

```
This SD can be used to set the reference coordinate system for Cartesian man-
ual travel, with bits 0 to 7 provided for selecting the coordinate system for
translation, bits 8 to 15 for selecting the reference system for orientation.

Cartesian manual travel will not be enabled if no bit is set or if just one
bit is set for translation or for orientation. This means that one bit must
always be set for translation and one for orientation. Cartesian manual travel
will also not be enabled if more than one bit is set for translation or orien-
tation.

The meaning of the individual bits is defined as follows :

Bit  0 : Translation in Basic Coordinate System
Bit  1 : Translation in Workpiece Coordinate System
Bit  2 : Translation in Tool Coordinate System
Bit  3 : reserved
Bit  4 : reserved
Bit  5 : reserved
Bit  6 : reserved
Bit  7 : reserved

Bit  8 : Orientation in Basic Coordinate System
Bit  9 : Orientation in Workpiece Coordinate System
Bit 10 : Orientation in Tool Coordinate System
Bit 11 : reserved
Bit 12 : reserved
Bit 13 : reserved
Bit 14 : reserved
Bit 15 : reserved
```

-					
-	-	0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0,0x0...	0	0x0404	7/7

42660	ORI_JOG_MODE			-	-
-	Definition of virtual kinematics for JOG			DWORD	SOFORT
This SD can be used to define virtual kinematics, which become active for the manual travel of orientations. This setting data is evaluated only by the generic 5/6-axis transformation. This data has no meaning for OEM transformations. The following setting options are available: 0: The virtual kinematics are defined by the transformation. 1: Euler angles are traversed during jog, that is the 1st axis turns round the Z direction, the 2nd axis turns around the X direction and, if present, the 3rd axis turns aound the new Z direction. 2: RPY angles are traversed during jog with the turning sequence XYZ, that is the 1st axis turns around the x direction, the 2nd axis turns around the Y direction and, if present, the 3rd axis turns around the new Z direction. 3: RPY angles are traversed during jog with the turning sequence ZYX, that is the 1st axis turns around the Z direction, the 2nd axis turns around the Y direction and, if present, the 3rd axis turns around the new X direction. 4: The turning sequence of the rotary axes is set by means of MD $MC_ORIAX_TURN_TAB_1. 5: The turning sequence of the rotary axes is set by means of MD $MC_ORIAX_TURN_TAB_2.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	0	5	7/7

42670	ORIPATH_SMOOTH_DIST			-	-
mm, degrees	Path for smoothing the orientation			DOUBLE	SOFORT
Displacement by which a jump in the tool orientation is smoothed with ORIPATH path-relative orientation interpolation. There is a deviation within this displacement from the relation of the orientation to the path tangent and the surface normal vector programmed with LEAD/TILT. If zero is entered for this path length ($SC_ORIPATH_SMOOTH_DIST = 0.0), an intermediate block is inserted for smoothing the orientation. This means that the path motion remains at a stop in a corner and the orientation is then turned separately.					
-					
-	-	0.05,0.05,0.05,0.05, 0.05,0.05,0.05...	0.0	-	7/7

42672	ORIPATH_SMOOTH_TOL			-	-
degrees	Tolerance for smoothing the orientation			DOUBLE	SOFORT
Maximum angle (in degrees) for the deviation of the tool orientation with ORIPATH path-relative orientation interpolation. This angular tolerance is used for smoothing a "kink" in the orientation path.					
-					
-	-	0.05,0.05,0.05,0.05, 0.05,0.05,0.05...	0.000001	-	7/7

42700	**EXT_PROG_PATH**			-	K1
-	Program path for external subroutine call EXTCALL			STRING	SOFORT
The total path results from the string chaining of $SC_EXT_PROG_PATH + the programmed subprogram identifier.					
-					
-	-		-	-	7/7

42750	**ABSBLOCK_ENABLE**			-	K1
-	Enable base block display			BOOLEAN	SOFORT
Value 0: Disable block display with absolute values (basic block display) Value 1: Enable block display with absolute values (basic block display)					
-					
-	-	TRUE,TRUE,TRUE, TRUE,TRUE,TRUE, TRUE...	-	-	7/7

42800	**SPIND_ASSIGN_TAB**			-	S1
-	Spindle number converter.			BYTE	SOFORT
The spindle converter converts the programmed (= logical) spindle number to the physical (= internal, configured) spindle number. The index of the setting data (SD) corresponds to the programmed spindle number or the programmed address extension. The SD contains the physical spindle which actually exists. Special cases, errors, ... Notes: - The zero index (SPIND_ASSIGN_TAB[0]) is only used to display the master spindle selected in the channel and must not be overwritten. - Changes to the spindle converter take effect immediately. It is therefore not advisable to change the spindle converter for spindles used in a part program from the MMC or PLC while a part program is running. - After "delete SRAM", the numbers of the logical and physical spindles are identical.					
-					
-	21	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17...	0	21	7/7

42900	**MIRROR_TOOL_LENGTH**			-	W1
-	Sign change of tool length with mirror image machining			BOOLEAN	SOFORT
TRUE: If a frame with mirror image machining is active, the tool components ($TC_DP3[..., ...] to $TC_DP5[..., ...]) and the components of the base dimensions ($TC_DP21[..., ...] to $TC_DP23[..., ...]) whose associated axes are mirrored, are also mirrored, i.e. their sign is inverted. The wear values are not mirrored. If the wear values are to be mirrored too, setting data $SC_MIRROR_TOOL_WEAR must be set. FALSE: The sign for tool length components is unaffected by whether a frame with mirror image machining is active.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7

42910	**MIRROR_TOOL_WEAR**			-	W1
-	Sign change of tool wear with mirror image machining			BOOLEAN	SOFORT
TRUE: If a frame with mirror image machining is activated, the signs of the wear values of the components in question are inverted. The wear values of the components that are not assigned to mirrored axes remain unchanged. FALSE: The signs for wear values are unaffected by whether a frame with mirror image machining is active.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7

42920	WEAR_SIGN_CUTPOS		-		W1
-	Sign of tool wear depending on tool point direction		BOOLEAN		SOFORT

```
TRUE:
In the case of tools with a relevant tool point direction (turning and grind-
    ing tools), the sign for wear of the tool length components depends on the
    tool point direction.
The sign is inverted in the following cases (marked with an X):
Tool point direction    Length 1          Length 2
1
2                              X
3                              X                 X
4                                                X
5
6
7                              X
8                                                X
9
The sign for wear value of length 3 is not influenced by this setting data.
The setting data WEAR_SIGN acts in addition to this setting data.

FALSE:
The sign for wear of the tool length components is unaffected by the tool
    point direction.
```

-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7

42930	WEAR_SIGN		-		W1
-	Sign of wear		BOOLEAN		SOFORT

```
TRUE:
The sign for wear of the tool length components and the tool radius are
    inverted, i.e. if a positive value in entered, the total dimension is
    decreased.

FALSE:
The sign for wear of the tool length components and the tool radius is not
    inverted.
```

-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE,FALSE...	-	-	7/7

42935	**WEAR_TRANSFORM**			-	W1,W4
-	Transformations for tool components			DWORD	SOFORT

```
This setting data is bit-coded.
It determines which of the three wear components

wear
($TC_DP12 - $TC_DP14),

additive offsets fine ($TC_SCPx3 - $TC_SCPx5),

and additive offsets coarse ($TC_ECPx3 - $TC_ECPx5)

are subject to adapter transformation and transformation by an orientable tool
    holder, if one of the two G codes TOWMCS or TOWWCS from G code group 56 is
    active. If initial-setting G code TOWSTD is active, this setting data will
    not become active.

Then, the following assignment is valid:
Bit 0 = TRUE: Do not apply transformations to $TC_DP12 - $TC_DP14.
Bit 1 = TRUE: Do not apply transformations to $TC_SCPx3 - $TC_SCPx5.
Bit 2 = TRUE: Do not apply transformations to $TC_ECPx3 - $TC_ECPx5.
The bits not mentioned here are (currently) not assigned.
```

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

42940	**TOOL_LENGTH_CONST**	-	W1
-	Change of tool length components with change of active plane	DWORD	SOFORT

If this setting data is not equal to 0, the assignment of tool length components (length, wear, base dimensions) to geometry axes is not changed when the machining plane (G17 - G19) is changed.
The assignment of tool length components to geometry axes can be derived from the value of the setting data acc. to the following tables.
A distinction is made between turning and grinding tools (tool types 400 to 599) and other tools (typically milling tools) in the assignment.
Representation of this information in tables assumes that geometry axes 1 to 3 are called X, Y and Z. For assignment of an offset to an axis, not the axis identifier but the axis sequence is relevant.

Assignment for turning tools and grinding tools (tool types 400 to 599):

Content	Length 1	Length 2	Length 3
17	Y	X	Z
18*	X	Z	Y
19	Z	Y	X
-17	X	Y	Z
-18	Z	X	Y
-19	Y	Z	X

* Any value which is not 0 and is not one of the six values listed, is treated as value 18.
For values that are the same but with a different sign, assignment of length 3 is always the same, lengths 1 and 2 are reversed. Assignment for all tools which are neither turning nor grinding tools (tool types < 400 or > 599):

Content	Length 1	Length 2	Length 3
17*	Z	Y	X
18	Y	X	Z
19	X	Z	Y
-17	Z	X	Y
-18	Y	Z	X
-19	X	Y	Z

* Any value which is not 0 and is not one of the six values listed, is treated as value 17.
For values that are the same but with a different sign, assignment of length 1 is always the same, lengths 2 and 3 are reversed.

-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

42950	**TOOL_LENGTH_TYPE**			-	W1
-	Assignment of tool length compensation independent of tool type			DWORD	SOFORT
This setting data defines the assignment of the tool length components to the geometry axes independently of the tool type. It can assume any value between 0 and 2. Any other value is interpreted as 0. Value 0: Assignment as standard. A distinction is made between turning and grinding tools (tool types 400 to 599) and other tools (milling tools). 1: The assignment of the tool length components is independent of the actual tool type, always as for milling tools. 2. The assignment of the tool length components is independent of the actual tool type, always as for turning tools. The setting data also affects the wear values assigned to the length components. If setting data SC_TOOL_LENGTH_CONST is set, the tables defined there access the table for milling and turning tools defined by SC_TOOL_LENGTH_TYPE irrespective of the actual tool type, if the value of the table is not equal to 0.					
-					
-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-	-	7/7

42960	**TOOL_TEMP_COMP**			-	W1
-	Temperature compensation for tool			DOUBLE	SOFORT
Temperature compensation value for the tool. The compensation value acts as vector according to the current rotation of the tool direction. This setting data will only be evaluated, if temperature compensation has been activated for tools with MD 20390: $MC_TOOL_TEMP_COMP_ON. Apart from that, the temperature compensation type must be set in bit 2 for the "Compensation in tool direction" MD 32750: TEP_COMP_TYPE. The "Temperature compensation" is an option that has to be previously enabled.					
-					
-	3	0.0, 0.0, 0.0,0.0, 0.0, 0.0...	-	-	7/7

42970	TOFF_LIMIT		-	-	F2
mm	Upper limit of correction value via $AA_TOFF			DOUBLE	SOFORT
Upper limit of the offset value which can be defined by means of synchronized actions via the $AA_TOFF system variable. This limit value influences the absolutely effective amount of offset through $AA_TOFF. Whether the offset value is within the limit range can be checked via the $AA_TOFF_LIMIT system variable.					
-					
-	3	100000000.0, 100000000.0, 100000000.0...	-	-	7/7

42974	TOCARR_FINE_CORRECTION			C08	-
-	Fine offset TCARR ON / OFF			BOOLEAN	SOFORT
TRUE: On activating an orientable tool holder, the fine offset values are considered. FALSE: On activating an orientable tool holder, the fine offset are not considered.					
-					
-	-	FALSE,FALSE,FALSE,FALSE,FALSE, FALSE...	-	-	7/7

42980	**TOFRAME_MODE**			-	K2
-	Frame definition at TOFRAME, TOROT and PAROT			DWORD	SOFORT

This setting data defines the direction of the X or Y axis in the case of frame definition by means of TOFRAME, TOROT or PAROT.
In the case of these frame definitions, the Z direction is uniquely defined, the rotation around the Z axis is free at first.
This free rotation can be defined by this setting data so that the newly defined frame deviates as little as possible from a previously active frame.
In all cases in which the setting data is not zero, an active frame remains unchanged if the Z directions of the old and the new frame are the same.
0: The orientation of the coordinate system is determined by the value of the machine data X_AXIS_IN_OLD_X_Z_PLANE.

1: The new X direction is selected so that it lies in the X-Z plane of the old coordinate system. The angular difference between the old and new Y axes is minimal with this setting.

2: The new Y direction is selected so that it lies in the Y-Z plane of the old coordinate system. The angular difference between the old and new X axes is minimal with this setting.

3: The average of the two settings resulting from 1 and 2 is selected.

Addition of 100:
In the case of a plane change from G17 to G18 or G19, a tool matrix is generated, in which the new axis directions are parallel to the old directions. The axes are correspondingly swapped cyclically(standard transformation with plane changes). If the hundreds digit equals zero, a matrix is supplied in the cases of G18 and G19 which is derived from the unit matrix by simply rotating through 90 degrees around the X axis (G18) or through 90 degrees around the Y axis (G19). Thus in each case one axis is antiparallel to an initial axis. This setting is required to remain compatible with old software versions.

Addition of 1000:
The tool-frame is linked to any active basic frames and settable frames. The response is thus compatible with earlier software versions (before 5.3). If the thousands digit is not set, the tool frame is calculated so that any active basic frames and settable frames are taken into account.

Addition of 2000:
The tool frame is still correctly formed if the frames in the frame chain after the TOOLFRAME contain any values (rotations and translations). This mode is only possible if the system frame for the tool frame is present. The machine data X_AXIS_IN_OLD_X_Z_PLANE is no longer evaluated. All values in the units digit of this setting data that are not equal to 1 or 2 are handled as if the value was three. In particular, the behavior with 2000 is identical to that with 2003. TOFRAME sets the zero point of the workpiece coordinate system to the current position.

-					
-	-	1000,1000,1000,1000,1000,1000,1000...	-	-	7/7

42984	CUTDIRMOD		C08	-
-	Modification of $P_AD[2] or $P_AD[11]		STRING	SOFORT
States whether the tool point direction and cutting direction are to be modified on reading the corresponding system variables $P_AD[2] and $P_AD[11]. Modification is made by rotating the vector of the tool point direction or cutting direction by a specific angle in the active machining plane (G17-G19). The resulting output value is always the tool point direction or cutting direction created by the rotation or to which the rotated value is closest. the angle of rotation can be defined by one of the following six options: 1: The string is empty. The stated data are output unchanged. 2: The contents of the string is "P_TOTFRAME". The resulting rotation is determined from the total frame. 3: The contents of the string is a valid frame name (e.g. $P_NCBFRAME[3]). The resulting rotation is then calculated from this frame. 4: The contents of the string has the form "Frame1 : Frame2". The resulting rotation is determined from the part frame chain that is created by chaining all frames from Frame1 to Frame2 (in each case inclusive). Frame1 and Frame2 are valid frame names such as $P_PFRAME or $P_CHBFRAME[5]" 5: The contents of the frame is the valid name of a rotary axis (machine axis). The resulting rotation is determined from the programmed end position of this rotary axis. Additionally, an offset can be stated (in degrees, e.g. "A+90). 6: The rotation is programmed explicitly (in degrees). Optionally, the first character of the string can be written as sign (+ or -). A plus sign will not have any effect on the angle calculation, but a minus sign will invert the sign of the calculated angle.				
-				
-	-		-	-	7/7

42990	MAX_BLOCKS_IN_IPOBUFFER		-	K1
-	maximum number of blocks in IPO buffer		DWORD	SOFORT
This setting data can be used to delimit the maximum number of blocks in the interpolation buffer by the maximum number specified in MD MM_IPO_BUFFER_SIZE. A negative value means that no limitation of the number of blocks is active in the interpolation buffer, and the number of blocks is determined solely by the MD MM_IPO_BUFFER_SIZE (default setting).				
-				

-	-	-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1...	-	-	7/7

42995	CONE_ANGLE		-	-
-	Taper angle		DOUBLE	SOFORT
This setting data writes the taper angle for taper turning. This setting data is written via the operator interface.				
-				

-	-	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	-90	90	7/7

1.6.3 Axis-specific setting data

43100	**LEAD_TYPE**			-	M3
-	Defines what is used as master value			DWORD	RESET
Defines which value is to be used as master value: 0: Actual value 1: Setpoint 2: Simulated master value					
CTEQ					
-	-	1	0	2	7/7

43102	**LEAD_OFFSET_IN_POS**			-	M3
-	Offset of master value if coupled to this axis			DOUBLE	RESET
Offset of the master value before use on the coupling. If this axis is a master value coupled following axis with CTABP as the curve table and X as the master value, then its position setpoint is calculated from LEAD_OFFSET_OUT_POS + LEAD_SCALE_OUT_POS * CTABP(LEAD_OFFSET_IN_POS + LEAD_SCALE_IN_POS * X) Related to .... SD 43104: LEAD_SCALE_IN_POS SD 43106: LEAD_OFFSET_OUT_POS SD 43108: LEAD_SCALE_OUT_POS					
-					
-	-	0.0	-	-	7/7

43104	**LEAD_SCALE_IN_POS**			-	M3
-	Scaling of master value if coupled to this axis			DOUBLE	RESET
Scaling of the master value before use on the coupling. If this axis is a master value coupled following axis with CTABP as the curve table and X as the master value, then its position setpoint is calculated from LEAD_OFFSET_OUT_POS + LEAD_SCALE_OUT_POS * CTABP(LEAD_OFFSET_IN_POS + LEAD_SCALE_IN_POS * X) Related to .... SD 43102: LEAD_OFFSET_IN_POS SD 43106: LEAD_OFFSET_OUT_POS SD 43108: LEAD_SCALE_OUT_POS					
-					
-	-	1.0	-	-	7/7

43106	**LEAD_OFFSET_OUT_POS**			-	M3
mm, degrees	Offset of the functional value of the curve table			DOUBLE	RESET

```
Offset of the master value before use on the coupling.

If this axis is a master value coupled following axis with CTABP as the curve
    table and X as the master value, then its position setpoint is calculated
    from LEAD_OFFSET_OUT_POS + LEAD_SCALE_OUT_POS * CTABP( LEAD_OFFSET_IN_POS
    + LEAD_SCALE_IN_POS * X)

Related to ....
    SD 43102: LEAD_OFFSET_IN_POS
    SD 43104: LEAD_SCALE_IN_POS
    SD 43108: LEAD_SCALE_OUT_POS
```

-					
-	-	0.0	-	-	7/7

43108	**LEAD_SCALE_OUT_POS**			-	M3
-	Scaling of functional value of the curve table			DOUBLE	RESET

```
Scaling of the function value before use of the curve table.

If this axis is a master value coupled following axis with CTABP as the curve
    table and X as the master value, then its position setpoint is calculated
    from LEAD_OFFSET_OUT_POS + LEAD_SCALE_OUT_POS * CTABP( LEAD_OFFSET_IN_POS
    + LEAD_SCALE_IN_POS * X)

Related to ....
    SD 43102: LEAD_OFFSET_IN_POS
    SD 43104: LEAD_SCALE_IN_POS
    SD 43106: LEAD_OFFSET_OUT_POS
```

-					
-	-	1.0	-	-	7/7

43120	**DEFAULT_SCALE_FACTOR_AXIS**			-	FBFA
-	Axial default scaling factor with G51 active			DWORD	SOFORT

```
If no axial scaling factor I, J, or K is programmed in the G51 block,
    DEFAULT_SCALEFACTOR_AXIS is active. The scaling factor is only active if
    MD AXES_SCALE_ENABLE is set.

Related to:
   AXES_SCALE_ENABLE,
   WEIGHTING_FACTOR_FOR_SCALE
```

-					
-	-	1	-	-	7/7

43200	SPIND_S		-		S1
rev/min	Speed for spindle start by VDI		DOUBLE		SOFORT
Spindle speed at spindle start by VDI interface signals DB31,...DBB30.1 and DB31,...DBB30.2. Example: $SA_SPIND_S[S1] = 600 Spindle 1 is started at a speed of 600 rpm upon detection of the positive edge of one of the above mentioned VDI starting signals. Speed programming values are entered in the SD by setting bit 4=1 in MD 35035 SPIND_FUNCTION_MASK. The SD becomes active in JOG as a default speed by setting bit 5=1 in MD 35035 SPIND_FUNCTION_MASK (exception: the value is zero). Related to: SPIND_FUNCTION_MASK					
-					
-	-	0.0	-	-	7/7

43202	SPIND_CONSTCUT_S		-		S1
m/min	Const cut speed for spindle start by VDI		DOUBLE		SOFORT
Definition of the constant cutting speed for the master spindle. The setting data is evaluated at spindle start by the VDI interface signals DB31,...DBB30.1 and DB31,...DBB30.2. Cutting speed programming values are entered in the SD by setting bit 8=1 in MD 35035 SPIND_FUNCTION_MASK. Related to: SPIND_FUNCTION_MASK					
-					
-	-	0.0	-	-	7/7

43206	SPIND_SPEED_TYPE		A06		-
-	Spindle speed type for spindle start through VDI		DWORD		SOFORT
Definition of the spindle speed type for the master spindle. The setting data is evaluated via the DBB30 interface at spindle start. The range of values and the functionality correspond to the 15th G group "feed type". Permissible values are the G values: 93, 94, 95, 96, 961, 97, and 971. With the stated values, a functional distinction has to be made between the following variants: ==>93, 94, 95, 97 and 971: The spindle is started at the speed in SD 43200 $SA_SPIND_S. ==>96 und 961: The speed of the spindle is derived from the cutting speed of SD 43202 $SA_SPIND_CONSTCUT_S and the radius of the transverse axis. The default value is 94 (corresponds to G94). The default value becomes active if the SD is written with impermissible values.					
-					
-	-	94	93	972	7/7

43210	**SPIND_MIN_VELO_G25**			-	S1
rev/min	Programmed spindle speed limitation G25			DOUBLE	SOFORT
A minimum spindle speed limit below which the spindle must not fall is entered in SPIND_MIN_VELO_G25. The NCK limits the set spindle speed to this value if it is too low. The spindle speed may only fall below the minimum for the following: - Spindle offset 0% - M5 - S0 - IS "Spindle stop" (DB31, ... DBX8.3) - IS "Cancel servo enable" (DB31, ... DBX2.1) - IS "Reset" (DB21, ... DBX35.7) - IS "Spindle reset" (DB31, ... DBX2.2) - IS "Oscillation speed" (DB31, ... DBX18.5) - Cancel S value SD irrelevant for ...... other spindle modes used in open-loop control mode (SPOS, M19, SPOSA) Related to: MD 10710: PROG_SD_RESET_SAVE_TAB (from SW 5.3)					
-					
-	-	0.0	-	-	7/7

43220	**SPIND_MAX_VELO_G26**			-	S1
rev/min	Programmed spindle speed limitation G26			DOUBLE	SOFORT
A maximum spindle speed is entered in SPIND_MAX_VELO_G26, which the spindle must not exceed. The NCK limits an excessive spindle speed setpoint to this value. SD irrelevant for ...... all spindle modes except open-loop control mode. Special cases, errors, ... The value in SD: SPIND_MIN_VELO_G26 can be altered by means of: - G26 S.... in the part program - Operator commands via HMI The value in SPIND_MIN_VELO_G26 is retained after a reset or Power Off. Related to .... SD 43210: SPIND_MIN_VELO_G25 (programmed spindle speed limit G25) SD 43230: SPIND_MAX_VELO_LIMS (programmed spindle speed limit G96/961) MD 10710: PROG_SD_RESET_SAVE_TAB					
-					
-	-	1000.0	-	-	7/7

43230	SPIND_MAX_VELO_LIMS		-		S1
rev/min	Spindle speed limitation with G96		DOUBLE		SOFORT
Limits the spindle speed with G96, G961, G97 to the stated maximum value [degrees/second]. This setting data can be written from the block with LIMS. Note: MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be set so that the value written by the part program is transferred into the active file system on reset (that is the value is retained after reset) Related to .... SD 43220: SPIND_MAX_VELO_G26 (maximum spindle speed) SD 43210: SPIND_MIN_VELO_G25 (minimum spindle speed) MD 10710: PROG_SD_RESET_SAVE_TAB (from SW 5.3)					
-					
-	-	100.0	-	-	7/7

43240	M19_SPOS		-, A12		S1
degrees	Spindle position for spindle positioning with M19.		DOUBLE		SOFORT
Spindle position in [DEGREES] for spindle positioning with M19. The position approach mode is defined in $SA_M19_SPOSMODE. Default positions must lie in the range 0 <= pos < $MA_MODULO_RANGE. Path defaults ($SA_M19_SPOSMODE = 2) can be positive or negative and are only limited by the input format.					
-					
-	-	0.0	-10000000.0	10000000.0	7/7

43250	M19_SPOSMODE		-, A12		S1
-	Spindle position approach mode for spindle positioning with M19.		DWORD		SOFORT
Spindle position approach mode for spindle positioning with M19. In which signify: 0: DC (default) approach position on the shortest path. 1: AC approach position normally. 2: IC approach incrementally (as path), sign gives the traversing direction 3: DC approach position on the shortest path. 4: ACP approach position from the positive direction. 5: ACN approach position from the negative direction.					
-					
-	-	0	0	5	7/7

43300	**ASSIGN_FEED_PER_REV_SOURCE**			-	V1,P2,S1
-	Revolutional feedrate for positioning axes/spindles			DWORD	SOFORT
0= No revolutional feedrate is active. >0=Machine axis index of the rotary axis/spindle, from which the revolutional feedrate is derived. -1=The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active -2=The revolutional feedrate is derived from the axis with machine axis index == 0 or the axis with an index in $MN_AXCONF_LOGIC_MACHAX_TAB == 0. -3=The revolutional feedrate is derived from the master spindle of the channel in which the axis/spindle is active. No revolutional feedrate is active if the master spindle is at a standstill. Axis/spindle is active. Related to .... SD 42600: JOG_FEED_PER_REV_SOURCE (revolutional feedrate for geometry axes on which a frame with rotation acts in JOG mode.)					
CTEQ					
-	-	0	-3	31	7/7

43340	**EXTERN_REF_POSITION_G30_1**			-, A12	FBFA
-	Reference point position for G30.1			DOUBLE	SOFORT
Reference point position for G30.1. This setting data will be evaluated in CYCLE328.					
-					
-	-	0.0	-	-	7/7

43350	**AA_OFF_LIMIT**			-	S5,FBSY
mm, degrees	Upper limit of offset value $AA_OFF with clearance control			DOUBLE	POWER ON
The upper limit of the offset value, which can be defined by means of synchronized actions via the variable $AA_OFF. This limit value acts on the absolutely effective amount of offset by means of $AA_OFF. It is used for clearance control in laser machining: The offset value is limited so that the laser head cannot get caught in the plate recesses. Whether the offset value lies within the limit range can be queried via system variable $AA_OFF_LIMIT.					
CTEQ					
-	-	100000000.0	-	-	7/7

43400	**WORKAREA_PLUS_ENABLE**			-	A3
-	Working area limitation active in positive direction			BOOLEAN	SOFORT
1: The working area limitation of the axis concerned is active in the positive direction. 0: The working area limitation of the axis concerned is switched off in the positive direction. The setting data is parameterized via the operator panel in the operating area "Parameters" by activating/deactivating the working area limitation. SD irrelevant for ...... G code: WALIMOF					
CTEQ					
-	-	FALSE	-	-	7/7

43410	**WORKAREA_MINUS_ENABLE**			-	A3
-	Working area limitation active in the negative direction			BOOLEAN	SOFORT
1: The working area limitation of the axis concerned is active in the negative direction. 0: The working area limitation of the axis concerned is switched off in the negative direction. The setting data is parameterized via the operator panel in the operating area "Parameters" by activating/deactivating the working area limitation. SD irrelevant for ...... G code: WALIMOF					
CTEQ					
-	-	FALSE	-	-	7/7

43420	**WORKAREA_LIMIT_PLUS**			-	A3
mm, degrees	Working area limitation plus			DOUBLE	SOFORT
The working area as defined in the basic coordinate system in the positive direction of the axis concerned can be limited with axial working area limitation. The setting data can be changed on the operator panel in the operating area "Parameters". The positive working area limitation can be changed in the program with G26. SD irrelevant for ...... G code: WALIMOF Related to .... SD 43400: WORKAREA_PLUS_ENABLE					
-					
-	-	1.0e+8	-	-	7/7

43430	**WORKAREA_LIMIT_MINUS**			-	A3
mm, degrees	Working area limitation minus			DOUBLE	SOFORT
The working area as defined in the basic coordinate system in the negative direction of the axis concerned can be limited with axial working area limitation. The setting data can be changed on the operator panel in the operating area "Parameters". The negative working area limitation can be changed in the program with G25. SD irrelevant for ...... G code: WALIMOF Related to .... SD 43410: WORKAREA_MINUS_ENABLE					
-					
-	-	-1.0e+8	-	-	7/7

43500	**FIXED_STOP_SWITCH**			-	F1
-	Selection of travel to fixed stop			BYTE	SOFORT
The "Travel to fixed stop" function to be selected and deselected with this setting data. SD=0 Deselect "Travel to fixed stop" SD=1 Select "Travel to fixed stop" The setting data can only be overwritten by the part program with the command FXS[x]=1/0 when software version 2.x is installed. The status of the setting data is indicated on the operator panel in the "Parameters" area.					
-					
-	-	0	0	1	7/7

43510	**FIXED_STOP_TORQUE**	-	F1
%	Fixed stop clamping torque	DOUBLE	SOFORT

```
The clamping torque is entered in this setting data as a % of the maximum
    motor torque (corresponds to % of max. current value with FDD).

The setting data is active only if the fixed stop has been reached.

The fixed stop is considered reached when,
- with MD: FIXED_STOP_ACKN_MASK, bit 1 = 0 (no acknowledgment required) IS
    "Fixed stop reached" (DB31, ... DBX62.5) is set by the NC
- with MD: FIXED_STOP_ACKN_MASK, bit 1 = 1 (acknowledgment required) IS "Fixed
    stop reached" (DB31, ... DBX62.5) is set by the NC and acknowledged by IS
    "Acknowledge fixed stop reached" (DB31, ... DBX1.1)

The status of the setting data is indicated on the operator panel in the
    "Parameters" area.

The FXST[x] command effects a block-synchronous change to this setting data.
    It can also be changed by the user or via the PLC. The value is otherwise
    transferred from MD: FIXED_STOP_TORQUE_DEF to the setting data when
    "Travel to fixed stop" is active.

Related to ....
    MD 37010: FIXED_STOP_TORQUE_DEF (default setting for clamping torque)
```

-					
-	-	5.0	0.0	800.0	7/7

43520	**FIXED_STOP_WINDOW**			-	F1
mm, degrees	Fixed stop monitoring window			DOUBLE	SOFORT

```
The fixed stop monitoring window is entered in this setting data.

The setting data is active only if the fixed stop has been reached.

The fixed stop is considered reached when,
- with MD: FIXED_STOP_ACKN_MASK, bit 1 = 0 (no acknowledgment required) IS
    "Fixed stop reached" (DB31, ... DBX62.5) is set by the NC
- with MD: FIXED_STOP_ACKN_MASK, bit 1 = 1 (acknowledgment required) IS "Fixed
    stop reached" (DB31, ... DBX62.5) is set by the NC and acknowledged by IS
    "Acknowledge fixed stop reached" (DB31, ... DBX1.1)

If the position at which the fixed stop was detected leaves the tolerance band
    by more than the amount specified in SD 43520: FIXED_STOP_WINDOW, then
    alarm 20093 "Fixed stop monitoring has responded" is output and the "FXS"
    function deselected.

The status of the setting data is indicated on the operator panel in the
    "Parameters" area.

The FXSW[x] command effects a block-synchronous change to this setting data.
    It can also be changed by the user or via the PLC.

The value is otherwise transferred from MD: FIXED_STOP_WINDOW_DEF to the set-
    ting data when "Travel to fixed stop" is active.

Related to ....
    MD 37020: FIXED_STOP_WINDOW_DEF (default setting for fixed stop monitor-
    ing window)
```

-					
-	-	1.0	-	-	7/7

43600	**IPOBRAKE_BLOCK_EXCHANGE**			A06, A10	K1
%	Block change criterion 'braking ramp'			DOUBLE	SOFORT

```
Specifies the application time at single axis interpolation for the block
change criterion braking ramp: At 100%, the block change criterion is ful-
filled at the time of application of the braking ramp. At 0%, the block change
criterion is identical with IPOENDA.

Note:
MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be set so that the value written by
    the part program is transferred into the active file system on reset (i.e.
    the value is retained even after reset).
```

-					
-	-	0.0	0	100.0	7/7

43610	**ADISPOSA_VALUE**			A06, A10	P2
mm, degrees	Tolerance window 'braking ramp'			DOUBLE	SOFORT
In case of single-axis interpolation, this value defines the size of the tolerance window which the axis must have reached in order to enable a block change in case of the block-change criterion 'braking ramp with tolerance window valid' and when reaching the corresponding % value of the braking ramp ($SA_IPOBRAKE_BLOCK_EXCHANGE). Note: By means of the MD 10710 $MN_PROG_SD_RESET_SAVE_TAB, the user can specify that the value written by the part program is transferred into the active file system in case of a reset (i.e. the value is retained even after the reset).					
-					
-	-	0.0	-	-	7/7

43700	**OSCILL_REVERSE_POS1**			-	P5
mm, degrees	Oscillation reversal point 1			DOUBLE	SOFORT
Position of the oscillating axis at reversal point 1. Note: MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after RESET.) Application example(s) NC language: OSP1[Axis]=Position Related to .... OSCILL_REVERSE_POS2					
-					
-	-	0.0	-	-	7/7

43710	**OSCILL_REVERSE_POS2**			-	P5
mm, degrees	Oscillation reversal point 2			DOUBLE	SOFORT
Position of the oscillating axis at reversal point 2. Note: MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.) Application example(s) NC language: OSP2[Axis]=Position Related to .... OSCILL_REVERSE_POS1					
-					
-	-	0.0	-	-	7/7

43720	OSCILL_DWELL_TIME1		-	P5
s	Hold time at oscillation reversal point 1		DOUBLE	SOFORT

```
Hold time of the oscillating axis at reversal point 1.

Note:
    MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value writ-
    ten by the part program is transferred to the active file system on reset
    (that is the value is retained after RESET.)

Application example(s)
    NC language:      OST1[Axis]=Position

Related to ....
   OSCILL_DWELL_TIME2
```

-					
-	-	0.0	-	-	7/7

43730	OSCILL_DWELL_TIME2		-	P5
s	Hold time at oscillation reversal point 2		DOUBLE	SOFORT

```
Hold time of the oscillating axis at reversal point 2.

Note:
    MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value writ-
    ten by the part program is transferred to the active file system on reset
    (that is the value is retained after RESET.)

Application example(s)
    NC language:      OST2[Axis]=Position

Related to ....
   OSCILL_DWELL_TIME1
```

-					
-	-	0.0	-	-	7/7

43740	OSCILL_VELO		-	P5
mm/min, rev/min	Feedrate of reciprocating axis		DOUBLE	SOFORT

```
Feed rate of the oscillating axis

Note:
    MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value writ-
    ten by the part program is transferred to the active file system on reset
    (that is the value is retained after RESET.)

Application example(s)
    NC language:      FA[Axis]=F value
```

-					
-	-	0.0	-	-	7/7

43750	OSCILL_NUM_SPARK_CYCLES			-	P5
-	Number of spark-out strokes			DWORD	SOFORT
Number of sparking-out strokes performed after ending the oscillating movement Application example(s) NC language: OSNSC[Axis]=Stroke number Note: MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.)					
-					
-	-	0	-	-	7/7

43760	OSCILL_END_POS			-	P5
mm, degrees	End position of the reciprocating axis			DOUBLE	SOFORT
Position the oscillating axis travels to after ending the sparking-out strokes. Note: MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value written by the part program is transferred to the active file system on reset (that is the value is retained after reset.) Application example(s) NC language: OSE[Axis]=Position					
-					
-	-	0.0	-	-	7/7

43770	**OSCILL_CTRL_MASK**	-	P5
-	Oscillation sequence control mask	DWORD	SOFORT

```
Bit mask:
Bit no.        | Meaning in OSCILL_CTRL_MASK
-------------------------------------------------------------------------------
0(LSB)-1      | 0: Stop at the next reversal point if the
              |    oscillating movement is switched off
              |
              | 1: Stop at reversal point 1 if the
              |    oscillating movement is switched off
              | 2: Stop at reversal point 2 if the
              |    oscillating movement is switched of
              | 3: Do not approach a reversal point when the oscillating move-
    ment is switched off
              |    if no sparking-out strokes are programmed
-------------------------------------------------------------------------------
2             | 1: Approach end position after sparking out
-------------------------------------------------------------------------------
3             | 1: If the oscillating movement is aborted by delete distance-
    to-go,
              |    then the sparking-out strokes are to be executed afterwards
              |    and the end position approached if necessary
-------------------------------------------------------------------------------
4             | 1: If the oscillating movement is aborted by delete distance-
    to-go,
              |    then the corresponding reversal point
              |    is approached on switch off
-------------------------------------------------------------------------------
5             | 1: Changed feedrate does not become active until the next
    reversal point
-------------------------------------------------------------------------------
6             | 1: Path override is active if the feed rate is 0,
              |    otherwise speed override is active
-------------------------------------------------------------------------------
7             | 1: In the case of rotary axes DC (shortest path)
-------------------------------------------------------------------------------
8             | 1: Execute sparking-out stroke as single stroke not as double
    stroke
-------------------------------------------------------------------------------
9             | 1: On starting, first approach the starting position, see
              |    $SA_OSCILL_START_POS
-------------------------------------------------------------------------------

Application example(s)
NC language:       OSCTRL[Axis]=(setting options, reset options)
```

-					
-	-	0	-	-	7/7

43780	**OSCILL_IS_ACTIVE**			-	P5
-	Activate oscillation movement			BOOLEAN	SOFORT

```
Switching the oscillating movement on and off

Note:
    MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value writ-
    ten by the part program is transferred to the active file system on reset
    (that is the value is retained after reset.)

Application example(s)
    NC language:      OS[Axis]=1, OS[Axis]=0
```

-					
-	-	FALSE	-	-	7/7

43790	**OSCILL_START_POS**			-	-
mm, degrees	Start position of reciprocating axis			DOUBLE	SOFORT

```
Position approached by the oscillating axis at the start of oscillation if
this is set in $SA_OSCILL_CTRL_MASK.

Note:
    MD 10710 $MN_PROG_SD_RESET_SAVE_TAB can be be set so that the value writ-
    ten by the part program is transferred to the active file system on reset
    (that is the value is retained after reset.)
```

-					
-	-	0.0	-	-	7/7

43900	**TEMP_COMP_ABS_VALUE**			-	K3
-	Position-independent temperature compensation value			DOUBLE	SOFORT

```
The position-independent temperature compensation value is defined by SD:
    TEMP_COMP_ABS_VALUE.
This value is to be defined by the PLC (user program) as a function of the
current temperature.
The machine axis traverses this additional compensation value as soon as the
    position-independent temperature compensation has been activated (MD:
    TEMP_COMP_TYPE = 1 or 3).

SD irrelevant for ......
   MD: TEMP_COMP_TYPE = 0 or 2

Related to ....
   MD: TEMP_COMP_TYPE             Temperature compensation type
   MD: COMP_ADD_VELO_FACTOR       Velocity overshoot caused by compensation
```

-					
-	-	0.0	-	-	7/7

43910	**TEMP_COMP_SLOPE**		-		K3
-	Lead angle for position-dependent temperature compensation		DOUBLE		SOFORT

In the case of position-dependent temperature compensation, the error curve characteristic of the temperature-dependent actual-value deviation can often be approximated by a straight line. This straight line is defined by a reference point P_0 and a lead tanß.
SD: TEMP_COMP_SLOPE defines the lead tanß. This lead can be changed by the PLC user program as a function of the current temperature.
The axis traverses additionally the compensation value calculated for the current actual position as soon as the position-dependent temperature compensation becomes active (MD: TEMP_COMP_TYPE = 2 or 3).
MD: COMP_ADD_VELO_FACTOR limits the maximum lead angle tanß_max of the error curve. This maximum lead angle cannot be exceeded.

SD irrelevant for ......
MD: TEMP_COMP_TYPE = 0 or 1

Special cases, errors, ...
When TEMP_COMP_SLOPE is greater than tanß_max , the lead tanß_max is used to calculate the position-dependent temperature compensation value internally. No alarm is output.

Related to ....
MD: TEMP_COMP_TYPE Temperature compensation type

SD: TEMP_COMP_REF_POSITION Reference position for position-dependent temperature compensation

MD: COMP_ADD_VELO_FACTOR Velocity overshoot caused by compensation

-					
-	-	0.0	-	-	7/7

43920	**TEMP_COMP_REF_POSITION**			-	K3
-	Ref. position of position-dependent temperature compensation			DOUBLE	SOFORT

```
In the case of position-dependent temperature compensation, the error curve
    characteristic of the temperature-dependent actual-value deviation can
    often be approximated by a straight line. This straight line is defined by
    a reference point P_0 and a lead tanß.
SD: TEMP_COMP_REF_POSITION defines the position of the reference point P_0.
    This reference position can be changed by the PLC user program as a func-
    tion of the current temperature.
The axis traverses additionally the compensation value calculated for the cur-
    rent actual position as soon as the position-dependent temperature compen-
    sation becomes active (MD: TEMP_COMP_TYPE = 2 or 3).

SD irrelevant for ......
   MD: TEMP_COMP_TYPE = 0 or 1

Related to ....
   MD: TEMP_COMP_TYPE            Temperature compensation type
   SD: TEMP_COMP_SLOPE           Lead angle for position-dependent tempera-
ture compensation
```

-					
-	-	0.0	-	-	7/7

Machine Data SIMODRIVE 2

2.1 Drive machine data

Number	Identifier			Display filter	Reference
Unit	Name			Data type	Active
Description					
			Type		Rot/Lin
System		Default value	Minimal value	Maximum value	Protection
					/

1000	CURRCTRL_CYCLE_TIME			D01, D05, EXP	CR: DS1
31,25us	Current controller cycle			UNS. WORD	PowerOn
The basic module cycle is derived from the current controller cycle of the axis: Current controller cycle = basic module cycle. Additional cycles are derived per software from this basic cycle. This machine data is used in the controller data calculation. Note It is not permissible to exceed the computation time in the current controller cycle level, this would cause the drive to shutdown (system error). All the drives of a control unit must be parameterized with the same current controller cycle.					
			VSA/HSA		ROT/LIN
840D		4	2	4	2/4

1000	CURRCTRL_CYCLE_TIME				CR: DS1
31,25us	Current controller cycle			UNS. WORD	PowerOn
The basic module cycle is derived from the current controller cycle of the axis: Current controller cycle = basic module cycle. Additional cycles are derived per software from this basic cycle. This machine data is used in the controller data calculation. Note It is not permissible to exceed the computation time in the current controller cycle level, this would cause the drive to shutdown (system error). All the drives of a control unit must be parameterized with the same current controller cycle.					
			VSA/HSA		-
810D		5	2	8	2/4

1000	**CURRCTRL_CYCLE_TIME**			D01, D05, EXP	**CR:** DS1
31,25 us	Current controller cycle			UNS.WORD	Power On

The basic module cycle is derived from the current controller cycle of the axis: Current controller cycle = basic module cycle. Additional cycles are derived per software from this basic cycle. This machine data is used in the controller data calculation.

Note

It is not permissible to exceed the computation time in the current controller cycle level, this would cause the drive to shutdown (system error). All the drives of a control unit must be parameterized with the same current controller cycle.

			HSA SLM VSA		-
P2		-	-	-	2/4
P2 810D		5	2	5	2/4
P2 840D		4	1	4	2/4

1001	SPEEDCTRL_CYCLE_TIME	D01, D05, EXP	CR: DD2
31,25us	Speed controller cycle	UNS. WORD	PowerOn

This machine data is used in the controller data calculation.

For normal applications, use the standard setting. The dynamic performance can be further increased by reducing the cycle times. The speed controller cycle is derived from the current controller cycle of the axis:

Current controller cycle <= Speed controller cycle.

For 810D:

Possible input values for FDD and MSD are: 2 ex m x MD1000 m=1,2,3

Note:

It is not permissible to exceed the computation time in the speed controller clock level, and if it is exceeded, the drive will be shut down (system fault). Machine data MD1000 and MD1001 must be identical for all the axes of one control unit.

Possible speed and current controller cycle combinations:

Column I: Control type and drive control

Column II: Current controller cycle MD 1000 CURRCTRL_CYCLE_TIME

Column III: Speed controller cycle MD 1001 SPEEDCTRL_CYCLE_TIME

Column IV: Remarks

I:	II:	III:	IV:
810D 810R	5 (156.25µs)	10 (312.5µs)	standard value
810D 810R	4 (125µs)	8 (250µs)	minimum value only possible with less than four axes
840D with 611D 1-axis performance control	4 (125µs)	4 (125µs)	standard value
840D with 611D 1-axis performance control	2 (62.5µs)	2 (62.5µs)	minimum
840D with 611D 1-axis performance control	2 (62.5µs)	8 (250µs)	as from SW 4.2
840D with 611D 1-axis performance control	2 (62.5µs)	16 (500µs)	as from SW 4.2
840D with 611D 2-axis performance control	4 (125µs)	4 (125µs)	standard value + minimum
840D with 611D 2-axis performance control 1 axis equipped	2 (62.5µs)	2 (62.5µs)	minimum
840D with 611D standard control	4 (125µs)	16 (500µs)	standard value
840D with 611D standard control, only 1 axis operated	4 (125µs)	4 (125µs)	standard value + minimum

			VSA/HSA		ROT/LIN
840D		4	2	16	2/4

1001	**SPEEDCTRL_CYCLE_TIME**		**CR:** DD2
31,25us	Speed controller cycle	UNS. WORD	PowerOn

This machine data is used in the controller data calculation.

For normal applications, use the standard setting. The dynamic performance can be further increased by reducing the cycle times. The speed controller cycle is derived from the current controller cycle of the axis:

Current controller cycle <= Speed controller cycle.

For 810D:

Possible input values for FDD and MSD are: 2 ex m x MD1000 m=1,2,3

Note:

It is not permissible to exceed the computation time in the speed controller clock level, and if it is exceeded, the drive will be shut down (system fault). Machine data MD1000 and MD1001 must be identical for all the axes of one control unit.

Possible speed and current controller cycle combinations:

Column I: Control type and drive control

Column II: Current controller cycle MD 1000 CURRCTRL_CYCLE_TIME

Column III: Speed controller cycle MD 1001 SPEEDCTRL_CYCLE_TIME

Column IV: Remarks

I:	II:	III:	IV:
810D 810R	5 (156.25µs)	10 (312.5µs)	standard value
810D 810R	4 (125µs)	8 (250µs)	minimum value only possible with less than four axes
840D with 611D 1-axis performance control	4 (125µs)	4 (125µs)	standard value
840D with 611D 1-axis performance control	2 (62.5µs)	2 (62.5µs)	minimum
840D with 611D 1-axis performance control	2 (62.5µs)	8 (250µs)	as from SW 4.2
840D with 611D 1-axis performance control	2 (62.5µs)	16 (500µs)	as from SW 4.2
840D with 611D 2-axis performance control	4 (125µs)	4 (125µs)	standard value + minimum
840D with 611D 2-axis performance control 1 axis equipped	2 (62.5µs)	2 (62.5µs)	minimum
840D with 611D standard control	4 (125µs)	16 (500µs)	standard value
840D with 611D standard control, only 1 axis operated	4 (125µs)	4 (125µs)	standard value + minimum

			VSA/HSA		-
810D		10	2	32	2/4

1001	**SPEEDCTRL_CYCLE_TIME**	D01, D05, EXP	**CR:** DD2
31,25 us	Speed controller cycle	UNS.WORD	Power On

This machine data is used in the controller data calculation.

For normal applications, use the standard setting. The dynamic performance can be further increased by reducing the cycle times. The speed controller cycle is derived from the current controller cycle of the axis:

Current controller cycle <= Speed controller cycle.

For 810D:

Possible input values for FDD and MSD are: 2 ex m x MD1000 m=1,2,3

Note:

It is not permissible to exceed the computation time in the speed controller clock level, and if it is exceeded, the drive will be shut down (system fault). Machine data MD 1000 and MD 1001 must be identical for all the axes of one control unit.

Possible speed and current controller cycle combinations:

Column I: Control type and drive control

Column II: Current controller cycle MD 1000 CURRCTRL_CYCLE_TIME

Column III: Speed controller cycle MD 1001 SPEEDCTRL_CYCLE_TIME

Column IV: Remarks

I:	II:	III:	IV:
810D 810R	5 (156.25µs)	10 (312.5µs)	standard value
810D 810R	4 (125µs)	8 (250µs)	minimum value only possible with less than four axes
840D with 611D 1-axis performance control	4 (125µs)	4 (125µs)	standard value
840D with 611D 1-axis performance control	2 (62.5µs)	2 (62.5µs)	minimum
840D with 611D 1-axis performance control	2 (62.5µs)	8 (250µs)	as from SW 4.2
840D with 611D 1-axis performance control	2 (62.5µs)	16 (500µs)	as from SW 4.2
840D with 611D 2-axis performance control	4 (125µs)	4 (125µs)	standard value + minimum
840D with 611D 2-axis performance control 1 axis equipped	2 (62.5µs)	2 (62.5µs)	minimum
840D with 611D stan- dard control	4 (125µs)	16 (500µs)	standard value
840D with 611D stan- dard control, only 1 axis operated	4 (125µs)	4 (125µs)	standard value + minimum

			HSA SLM VSA		-
P2 810D		10	2	40	2/4
P2 840D		4	1	16	2/4
P2		-	-	-	2/4

1002	**MONITOR_CYCLE_TIME**				**CR:** DB1
31,25us	Monitoring cycle			UNS. WORD	PowerOn

810D: The relay functions, heatsink and motor temperature monitoring are calculated in this cycle. The value entered must be a multiple integral of 32 x MD 1000 (otherwise parameterization error). The standard value means a 20 ms monitoring time.

MD 1002 = K x 32 x MD 1000 K = 1, 2, 3,...

840D/611D: The heatsink and motor temperature monitoring are calculated in this cycle. The relay functions are calculated in the position controller cycle.

The value entered must be a multiple of 4 ms (otherwise parameterization error).

The standard value means a 100 ms monitoring time.

MD 1002 = K x 128 K = 1, 2, 3,...25

Note:

It is not permissible to exceed the calculation time at the interrupt level as this would cause the drive to be shut down (system error). The machine data must be the same in all axes of a control unit, i.e. for 810D, the same value must be entered in all axes, for a 611D double-axis module, in both axes of the module.

			VSA/HSA		-
810D		640	128	3200	2/4

1002	**MONITOR_CYCLE_TIME**			D05, D02, EXP	**CR:** DB1
31,25us	Monitoring cycle			UNS. WORD	PowerOn

810D: The relay functions, heatsink and motor temperature monitoring are calculated in this cycle. The value entered must be a multiple integral of 32 x MD 1000 (otherwise parameterization error). The standard value means a 20 ms monitoring time.

MD 1002 = K x 32 x MD 1000 K = 1, 2, 3,...

840D/611D: The heatsink and motor temperature monitoring are calculated in this cycle. The relay functions are calculated in the position controller cycle.

The value entered must be a multiple of 4 ms (otherwise parameterization error).

The standard value means a 100 ms monitoring time.

MD 1002 = K x 128 K = 1, 2, 3,...25

Note:

It is not permissible to exceed the calculation time at the interrupt level as this would cause the drive to be shut down (system error). The machine data must be the same in all axes of a control unit, i.e. for 810D, the same value must be entered in all axes, for a 611D double-axis module, in both axes of the module.

			VSA/HSA		ROT/LIN
840D		3200	128	3200	2/4

1002	**MONITOR_CYCLE_TIME**			D02, D05, EXP	**CR:** DB1
31,25 us	Monitoring cycle			UNS.WORD	Power On

810D: The relay functions, heatsink and motor temperature monitoring are calculated in this cycle. The value entered must be a multiple integral of 32 x MD 1000 (otherwise parameterization error). The standard value means a 20 ms monitoring time.

MD 1002 = K x 32 x MD 1000 K = 1, 2, 3,...

840D/611D: The heatsink and motor temperature monitoring are calculated in this cycle. The relay functions are calculated in the position controller cycle.

The value entered must be a multiple of 4 ms (otherwise parameterization error).

The standard value means a 100 ms monitoring time.

MD 1002 = K x 128 K = 1, 2, 3,...25

Note:

It is not permissible to exceed the calculation time at the interrupt level as this would cause the drive to be shut down (system error). The machine data must be the same in all axes of a control unit, i.e. for 810D, the same value must be entered in all axes, for a 611D double-axis module, in both axes of the module.

			HSA SLM VSA		-
P2		3200	128	3200	2/4

1003	**STS_CONFIG**			EXP	**CR:** DS1
HEX	Configuration STS			UNS. WORD	PowerOn

Important:

This machine data is only relevant for Siemens' internal purposes and must not be changed.

This machine data is used for configuring the command register of the gating unit-ASICS (submodule specific).

This machine data is used in the controller data calculation.

Depending upon the current controller cycle, there is a standard operating frequency and an alternative frequency. The alternative frequency is selected via MD 1003, bit11. The alternative frequency impairs the overall performance of the current controller and therefore should only be used in exceptional circumstances.

Current controller cycle	Operating frequency	Alternative frequency
125 µs	4 kHz	3.2 kHz
156.25 µs	3.2 kHz	2.56 kHz
187.5 µs	2.66 kHz	2.13 kHz

Because with an MSD a pulse rate of 4 kHz is only possible with reduced

power, the alternative frequency must be set for the MSD with a current controller cycle of 125 µs. This setting is automatically performed by the drive when the controller data is calculated (first start-up).

			VSA/HSA		ROT/LIN
840D		330	0	7f0	0/0

1003	**STS_CONFIG**				**CR:** DS1
HEX	Configuration STS			UNS. WORD	PowerOn

Important:

This machine data is only relevant for Siemens' internal purposes and must not be changed.

This machine data is used for configuring the command register of the gating unit-ASICS (submodule specific).

This machine data is used in the controller data calculation.

Depending upon the current controller cycle, there is a standard operating frequency and an alternative frequency. The alternative frequency is selected via MD 1003, bit11. The alternative frequency impairs the overall performance of the current controller and therefore should only be used in exceptional circumstances.

Current controller cycle	Operating frequency	Alternative frequency
125 µs	4 kHz	3.2 kHz
156.25 µs	3.2 kHz	2.56 kHz
187.5 µs	2.66 kHz	2.13 kHz

Because with an MSD a pulse rate of 4 kHz is only possible with reduced

power, the alternative frequency must be set for the MSD with a current controller cycle of 125 µs. This setting is automatically performed by the drive when the controller data is calculated (first start-up).

			VSA/HSA		-
810D		330	0	ffff	2/4

1003	**STS_CONFIG**			EXP	**CR:** DS1
-	Configuration STS			UNS.WORD	Power On

Important:

This machine data is only relevant for Siemens' internal purposes and must not be changed.

This machine data is used for configuring the command register of the gating unit-ASICS (submodule specific).

This machine data is used in the controller data calculation.

Depending upon the current controller cycle, there is a standard operating frequency and an alternative frequency. The alternative frequency is selected via MD 1003, bit11. The alternative frequency impairs the overall performance of the current controller and therefore should only be used in exceptional circumstances.

Current controller cycle	Operating frequency	Alternative frequency
125 µs	4 kHz	3.2 kHz
156.25 µs	3.2 kHz	2.56 kHz
187.5 µs	2.66 kHz	2.13 kHz

Because with an MSD a pulse rate of 4 kHz is only possible with reduced

power, the alternative frequency must be set for the MSD with a current controller cycle of 125 µs. This setting is automatically performed by the drive when the controller data is calculated (first start-up).

			HSA SLM VSA		-
P2		0x0330	0x0000	0x07f0	0/0

1004	**CTRL_CONFIG**	EXP	**CR:** DD2
HEX	Configuration structure	UNS. WORD	PowerOn

Enter the configuration for control structures, speed measuring systems and functionality with reference to the SIMODRIVE system 611 D.

Configuration structure

Bit I Significance / 0 = ... , 1 = ...

---

0 I Speed-torque precontrol 0 = Not active 1 = Active

---

1 I Not assigned

---

2 I Higher dynamic performance (single-axis module)
I 1 = Speed before current control

---

3 I Reserved

---

4 I Integrator control / 0 = Integrator controller in n controller active
I The integrator is stopped on the one side
I if the torque, current or voltage controller
I are limited.
I *) 1 = Integrator control in the n controller not
I active. The integrator is not stopped;
| rather, the absolute value is limited to
I twice the torque limit.

---

5 - 7 | Not assigned

---

8 | 1 = Follow NC setpoints with ESR
(Extended Stop and Retract)

---

9 - 11 | Not assigned

---

12 | lin. Interpolation v_soll 0 = inactive
| 1 = After setting Bit 12, the speed setpoint
| (n_soll_lr) output by the NC in the
| position controller cycle is interpolated
| linear by the drive.

---

13 | 1 = Skip mid-frequency error for axis

14-15 | Not assigned

Note:

*) When travelling to the fixed stop, the integrator controller is always active.

Important

Speed before current control is only possible for one active axis on the module! The default is: current before speed control (bit 2 = 0).

			VSA/HSA		ROT/LIN
840D		0	0	2115	2/4

1004	CTRL_CONFIG	EXP	CR: DD2
-	Configuration structure	UNS.WORD	Power On

Enter the configuration for control structures, speed measuring systems and functionality with reference to the SIMODRIVE system 611 D.

Configuration structure

```
Bit          I   Significance             / 0 = ... , 1 = ...
--------------------------------------------------------------------------------
0            I   Speed-torque precontrol 0 = Not active 1 = Active
--------------------------------------------------------------------------------
1            I   Not assigned
--------------------------------------------------------------------------------
2            I   Higher dynamic performance (single-axis module)
             I                    1 = Speed before current control
--------------------------------------------------------------------------------
3            I   Reserved
--------------------------------------------------------------------------------
4            I   Integrator control / 0 = Integrator controller in n controller active
             I                          The integrator is stopped on the one side
             I                          if the torque, current or voltage controller
             I                          are limited.
             I      *)                1 = Integrator control in the n controller not
             I                          active. The integrator is not stopped;
             |                          rather, the absolute value is  limited to
             I                          twice the torque limit.
--------------------------------------------------------------------------------
8            |                        1 = Follow NC setpoints with ESR
                                          (Extended Stop and Retract)
--------------------------------------------------------------------------------
13           |                        1 = Skip mid-frequency error for axis
--------------------------------------------------------------------------------
12           | lin. Interpolation v_soll   0 = inactive
             |                        1 = After setting Bit 12, the speed setpoint
             |                            (n_soll_lr) output by the NC in the
             |                            position controller cycle is interpolated
             |                            linear by the drive.
--------------------------------------------------------------------------------
 5-11,13-15  | Not assigned
--------------------------------------------------------------------------------
```

Note:
*) When travelling to the fixed stop, the integrator controller is always active.

Important
Speed before current control is only possible for one active axis on the module! The default is: current before speed control (bit 2 = 0).

			HSA SLM VSA		-
P2		0x0000	0x0000	0x3115	2/4

1005	**ENC_RESOL_MOTOR**			D06	**CR:** DG1, DM1
-	Motor measuring system encoder increments			UNS. WORD	PowerOn
Enter the encoder increments per motor revolution of the motor measuring system. The machine data is parameterized via "motor selection". Note: The actual value assignment of the motor measuring system for FDD/MSD must be the same as the drive configuration (axis-specific MD 31020 [0]: ENC_RESOL).					
			VSA/HSA		ROT/LIN
840D		2048	1	65535	2/4

1005	**ENC_RESOL_MOTOR**				**CR:** DG1, DM1
-	Motor measuring system encoder increments			UNS. WORD	PowerOn
Enter the encoder increments per motor revolution of the motor measuring system. The machine data is parameterized via "motor selection". Note: The actual value assignment of the motor measuring system for FDD/MSD must be the same as the drive configuration (axis-specific MD 31020 [0]: ENC_RESOL).					
			VSA/HSA		-
810D		2048	1	8192	2/4

1005	**ENC_RESOL_MOTOR**			D06	**CR:** DG1, DM1
-	Motor measuring system encoder increments			UNS.WORD	Power On
Enter the encoder increments per motor revolution of the motor measuring system. The machine data is parameterized via "motor selection". Note: The actual value assignment of the motor measuring system for FDD/MSD must be the same as the drive configuration (axis-specific MD 31020 [0]: ENC_RESOL).					
			HSA SLM VSA		-
P2		2048	1	65535	2/4

1007	**ENC_RESOL_DIRECT**				**CR:** DG1
-	Encoder increments of the direct measuring system			UNS. WORD	PowerOn
Enter the encoder increments per revolution for a direct linear or rotary measuring system. Note: This machine data is not being used at present.					
			VSA/HSA		-
810D		0	0	65535	2/4

1007	**ENC_RESOL_DIRECT**			D06	**CR:** DG1
-	Encoder increments of the direct measuring system			UNS. DWORD	PowerOn
Enter the encoder increments per revolution for a direct linear or rotary measuring system. Note: This machine data is not being used at present.					
			VSA/HSA		ROT/LIN

840D		0	0	2147483647	2/4

1007	**ENC_RESOL_DIRECT**			D06	**CR:** DG1
-	Encoder increments of the direct measuring system			UNS.DWORD	Power On
Enter the encoder increments per revolution for a direct linear or rotary measuring system. Note: This machine data is not being used at present.					
			HSA SLM VSA		-
P2		0	0	2147483647	2/4

1008	**ENC_PHASE_ERROR_CORRECTION**			EXP, D06	**CR:** DG1
Grad	Encoder phase error compensation IM			FLOAT	sofort
The phase error of the motor measuring system is compensated using this machine data. For raw signal encoders (e. g. ERN 1387), phase errors can occur between tracks A and B. They are manifested by a noisier actual speed value, i. e. a noise signal with twice the encoder pulse frequency is superimposed on the actual value. Especially for toothed-wheel encoders, The phase errors can achieve a size which influences the closed-loop control quality. Enter n set = 30 rpm. Monitor n act on an oscilloscope (via the D/A converter). The ripple is reduced by varying the correction angle. Find the minimum by trial and error. Note: This machine data is switched active using bit 1 of the machine data MD 1011: ACTUAL_VALUE_CONFIG.					
			VSA/HSA		ROT/LIN
840D		0.0000	-20.0000	20.0000	2/4

1008	**ENC_PHASE_ERROR_CORRECTION**			D06, EXP	**CR:** DG1
degrees	Encoder phase error compensation IM			FLOAT	Immediately
The phase error of the motor measuring system is compensated using this machine data. For raw signal encoders (e. g. ERN 1387), phase errors can occur between tracks A and B. They are manifested by a noisier actual speed value, i. e. a noise signal with twice the encoder pulse frequency is superimposed on the actual value. Especially for toothed-wheel encoders, The phase errors can achieve a size which influences the closed-loop control quality. Enter n set = 30 rpm. Monitor n act on an oscilloscope (via the D/A converter). The ripple is reduced by varying the correction angle. Find the minimum by trial and error. Note: This machine data is switched active using bit 1 of the machine data MD 1011: ACTUAL_VALUE_CONFIG.					
			HSA SLM VSA		-
P2		0.000000	-20.000000	20.000000	2/4

1011	ACTUAL_VALUE_CONFIG		CR: DG1
HEX	Configuration of the actual value sensing IM	UNS. WORD	PowerOn

Enter the configuration for the motor measuring system.
The machine data is parameterized via "motor selection".

```
Bit No.| Significance                         |  Note
-----------------------------------------------------------------------------------------------------------------------
0      | Adapt the direction of rotation when |   0 = Pos. motor direction of
       | mounting a toothed-wheel encoder     |       rotation (clockwise)
       |                                      |   1 = Neg. motor direction of
       |                                      |       rotation (counter-clockwise)
1      | Phase error correction               |   0 = Not active
       |                                      |   1 =  Active
2      |  Reserved                            |
3      |  Encoder type                        |   0 = Incremental encoder
       |                                      |   1 = Absolute encoder with
       |                                      |       EnDat interface
4      |  Linear measuring system             |   0 = Not available
       |                                      |   1 = Linear measuring system
5      | Motor measuring system (only 840D)   |   0 = Available
       |                                      |   1 = Not available
6      | C/D track for electrical changeover  |   0 = Available
       |                                      |   1 = Not available
7      | Spacer-coded linear measurement      |   0 = No spacer-coded
       |  system                              |       reference markers
       |                                      |   1 = Not available
8      | Selection of the zero marker by the NC   0 = No selection by NC
       |                                      |   1 = Selection by NC, the
       |                                      |   drive does not activate the
       |                                      |   the fine synchronization
       |                                      |   for start-up and after parking
       |                                      |   axis. The NC must activate
       |                                      |   fine synchronization during
       |                                      |   referencing.
9-11   | Not assigned                         |
12     | Identify coarse position             |   0 = Not active
       |                                      |   1 = Basic and fine
       |                                      |       synchronization are
       |                                      |       replaced by the rotor
       |                                      |       position identification,
       |                                      |       independently of bit 12.
13     | Identify fine position               |   0 = Not active
       |                                      |   1 = Basic and fine
       |                                      |       synchronization are
       |                                      |       replaced by the rotor
       |                                      |       position identification
       |                                      |       independently of bit 12.
```

```
14-15  |  Data transfer rate, EnDat       |   00 = 100 kHz (Standard)
       |                                  |   01 = 500 kHz
       |                                  |   10 = 1 MHz
       |                                  |   11 = 2 MHz
       |                                  | - For rotating encoders, the
       |                                  |   value of MD 1005 is
       |                                  |   compared with the
       |                                  |   increments output from the
       |                                  |   EnDat encoder and alarm
       |                                  |   300799 "Save Boot" is set
       |                                  |   if there is a deviation.
       |                                  | - For linear scales with EnDat,
       |                                  |   the output grid spacing value
       |                                  |   is written directly into the
       |                                  |   MD 1005.
```

Note
The configuration is set in the start-up tool (MMC 102/103) in display "Measuring system data".

			VSA/HSA		-
810D		0	0	ffff	2/4

1011	**ACTUAL_VALUE_CONFIG**	D06	**CR:** DG1
HEX	Configuration of the actual value sensing IM	UNS. WORD	PowerOn

Enter the configuration for the motor measuring system.
The machine data is parameterized via "motor selection".

```
Bit No.| Significance                          |  Note
---------------------------------------------------------------------------
0      | Adapt the direction of rotation when |   0 = Pos. motor direction of
       | mounting a toothed-wheel encoder     |       rotation (clockwise)
       |                                      |   1 = Neg. motor direction of
       |                                      |       rotation (counter-clockwise)
1      | Phase error correction               |   0 = Not active
       |                                      |   1 =  Active
2      |  Reserved                            |
3      |  Encoder type                        |   0 = Incremental encoder
       |                                      |   1 = Absolute encoder with
       |                                      |       EnDat interface
4      |  Linear measuring system             |   0 = Not available
       |                                      |   1 = Linear measuring system
5      | Motor measuring system (only 840D)   |   0 = Available
       |                                      |   1 = Not available
6      | C/D track for electrical changeover  |   0 = Available
       |                                      |   1 = Not available
7      | Spacer-coded linear measurement      |   0 = No spacer-coded
       |  system                              |       reference markers
       |                                      |   1 = Not available
8      | Selection of the zero marker by the NC   0 = No selection by NC
       |                                      |   1 = Selection by NC, the
       |                                      |       drive does not activate the
       |                                      |       the fine synchronization
       |                                      |       for start-up and after parking
       |                                      |       axis. The NC must activate
       |                                      |       fine synchronization during
       |                                      |       referencing.
9-11   | Not assigned                         |
12     | Identify coarse position             |   0 = Not active
       |                                      |   1 = Basic and fine
       |                                      |       synchronization are
       |                                      |       replaced by the rotor
       |                                      |       position identification,
       |                                      |       independently of bit 12.
13     | Identify fine position               |   0 = Not active
       |                                      |   1 = Basic and fine
       |                                      |       synchronization are
       |                                      |       replaced by the rotor
       |                                      |       position identification
       |                                      |       independently of bit 12.
```

```
14-15  |  Data transfer rate, EnDat        |     00 = 100 kHz (Standard)
       |                                   |     01 = 500 kHz
       |                                   |     10 = 1 MHz
       |                                   |     11 = 2 MHz
       |                                   |  -  For rotating encoders, the
       |                                   |     value of MD 1005 is
       |                                   |     compared with the
       |                                   |     increments output from the
       |                                   |     EnDat encoder and alarm
       |                                   |     300799 "Save Boot" is set
       |                                   |     if there is a deviation.
       |                                   |  -  For linear scales with EnDat,
       |                                   |     the output grid spacing value
       |                                   |     is written directly into the
       |                                   |     MD 1005.
```

Note
The configuration is set in the start-up tool (MMC 102/103) in display "Measuring system data".

			VSA/HSA		ROT/LIN
840D		0	0	f1ff	2/4

1011	**ACTUAL_VALUE_CONFIG**	D06	**CR:** DG1
-	Configuration of the actual value sensing IM	UNS.WORD	Power On

Enter the configuration for the motor measuring system.
The machine data is parameterized via "motor selection".

Bit No.	Significance	Note
0	Adapt the direction of rotation when mounting a toothed-wheel encoder	0 = Pos. motor direction of rotation (clockwise) 1 = Neg. motor direction of rotation (counter-clockwise)
1	Phase error correction	0 = Not active 1 = Active
2	Reserved	
3	Encoder type	0 = Incremental encoder 1 = Absolute encoder with EnDat interface
4	Linear measuring system	0 = Not available 1 = Linear measuring system
5	Motor measuring system (only 840D)	0 = Available 1 = Not available
6	C/D track for electrical changeover	0 = Available 1 = Not available
7	Spacer-coded linear measurement system	0 = No spacer-coded reference markers 1 = Not available
8	Selection of the zero marker by the NC	0 = No selection by NC 1 = Selection by NC, the drive does not activate the the fine synchronization for start-up and after parking axis. The NC must activate fine synchronization during referencing.
9-11	Not assigned	
12	Identify coarse position	0 = Not active 1 = Basic and fine synchronization are replaced by the rotor position identification, independently of bit 12.
13	Identify fine position	0 = Not active 1 = Basic and fine synchronization are replaced by the rotor position identification independently of bit 12.

```
14-15  |  Data transfer rate, EnDat          |      00 = 100 kHz (Standard)
       |                                     |      01 = 500 kHz
       |                                     |      10 = 1 MHz
       |                                     |      11 = 2 MHz
       |                                     |  -  For rotating encoders, the
       |                                     |     value of MD 1005 is
       |                                     |     compared with the
       |                                     |     increments output from the
       |                                     |     EnDat encoder and alarm
       |                                     |     300799 "Save Boot" is set
       |                                     |     if there is a deviation.
       |                                     |  -  For linear scales with EnDat,
       |                                     |     the output grid spacing value
       |                                     |     is written directly into the
       |                                     |     MD 1005.
```

Note
The configuration is set in the start-up tool (MMC 102/103) in display "Measuring system data".

			HSA SLM VSA		-
P2		0x0000	0x0000	0xf1ff	2/4

1012	**FUNC_SWITCH**		**CR:** DB1
HEX	Function switch	UNS. WORD	sofort

Entering the configuration for the power-up functionality.

```
Bit No.      |      Significance                          |  Note
------------------------------------------------------------------------------------------
Bit 0        |                                            |
only 840D    |  Ramp-function generator tracking          |   0 = Not active
             |                                            |   1 = Active
..........................................................................................
Bit 2        |  Drive ready                               |   0 = The drive is ready if
             |                                            |   no alarms are present
             |                                            |   1 = The drive is ready if
             |                                            |  the following conditions
             |                                            |  are simultaneously
             |                                            |  present:
             |                                            |   - no alarm
             |                                            |   - term. 663 = 1
             |                                            |   (810D)/(611D module)
..........................................................................................
Bit 3        | Relay functions, active                    | 0 = Disable relay function
             |  (always active in 840D)                   | 1 = Enable relay function
             | For 810D CCU2 the function is              |
             | available from software version 2.4,       |
             | not for 810DE CCU1)                        |
..........................................................................................
Bit 4        | Parameterization error                     | 0 = parameterization errors
             |                                            | are not supported
from SW 3.1  |                                            | (presetting).
only 840D    |                                            |  A parameterization error
             |                                            | results in a trip (controller
             |                                            | inhibit).
             |                                            | 1 = parameterization errors
             |                                            | are supported. A
             |                                            | parameterization error results
             |                                            | in an alarm message on the
             |                                            | screen.
..........................................................................................
Bit 7        | setting precontrol speed to default        | 0 = The drive accelerates
             |  value                                     | the motor directly to the
             |   (IM)                                     | the setpoint speed
             |                                            | 1 = The drive brakes the
             |                                            | motor towards zero speed,
             |                                            | and then it accelerates it
             |                                            | to the setpoint speed.
..........................................................................................
```

			VSA/HSA		-
810D		4	0	ffff	2/4

1012	**FUNC_SWITCH**	D01, D02, D03	**CR:** DB1
HEX	Function switch	UNS. WORD	sofort

Entering the configuration for the power-up functionality.

Bit No.	Significance	Note
Bit 0 only 840D	Ramp-function generator tracking	0 = Not active 1 = Active
Bit 2	Drive ready	0 = The drive is ready if no alarms are present 1 = The drive is ready if the following conditions are simultaneously present: - no alarm - term. 663 = 1 (810D)/(611D module)
Bit 3	Relay functions, active (always active in 840D) For 810D CCU2 the function is available from software version 2.4, not for 810DE CCU1)	0 = Disable relay function 1 = Enable relay function
Bit 4 from SW 3.1 only 840D	Parameterization error	0 = parameterization errors are not supported (presetting). A parameterization error results in a trip (controller inhibit). 1 = parameterization errors are supported. A parameterization error results in an alarm message on the screen.
Bit 7	setting precontrol speed to default value (IM)	0 = The drive accelerates the motor directly to the the setpoint speed 1 = The drive brakes the motor towards zero speed, and then it accelerates it to the setpoint speed.

			VSA/HSA		ROT/LIN
840D		0	0	01B5	2/4

1012	**FUNC_SWITCH**			D01, D02, D03	**CR:** DB1
-	Function switch			UNS.WORD	Immediately

Entering the configuration for the power-up functionality.

```
Bit No.       |       Significance                        |  Note
--------------------------------------------------------------------------------
Bit 0         |                                           |
only 840D     |  Ramp-function generator tracking         |   0 = Not active
              |                                           |   1 = Active
................................................................................
Bit 2         |  Drive ready                               |   0 = The drive is ready if
              |                                           |   no alarms are present
              |                                           |   1 = The drive is ready if
              |                                           |  the following conditions
              |                                           |  are simultaneously
              |                                           |  present:
              |                                           |   - no alarm
              |                                           |   - term. 663 = 1
              |                                           |   (810D)/(611D module)
................................................................................
Bit 3         | Relay functions, active                   |  0 = Disable relay function
              |  (always active in 840D)                  |  1 = Enable relay function
              | For 810D CCU2 the function is             |
              | available from software version 2.4,      |
              | not for 810DE CCU1)                       |
................................................................................
Bit 4         |  Parameterization error                   |  0 = parameterization errors
              |                                           | are not supported
from SW 3.1   |                                           | (presetting).
only 840D     |                                           |  A parameterization error
              |                                           | results in a trip (controller
              |                                           | inhibit).
              |                                           | 1 = parameterization errors
              |                                           | are supported. A
              |                                           | parameterization error results
              |                                           | in an alarm message on the
              |                                           | screen.
................................................................................
Bit 7         |  setting precontrol speed to default      |  0 = The drive accelerates
              |   value                                   |  the motor directly to the
              |    (IM)                                   |  the setpoint speed
              |                                           |  1 = The drive brakes the
              |                                           |  motor towards zero speed,
              |                                           |  and then it accelerates it
              |                                           |  to the setpoint speed.
................................................................................
Bit 8         I i2t motor monitoring active               I 0 = i2t motor monitoring deactivated
              I                                           I 1 = i2t motor monitoring activated
```

			HSA SLM VSA		-
P2		0x0004	0x0000	0x01b5	2/4

1013	**ENABLE_STAR_DELTA**			D05	**CR:** DE1
-	Enable star/delta changeover			UNS. WORD	PowerOn

Star/delta changeover is available with MD 1013, bit 0. The motor windings are changed over via contactors, which are controlled from the PLC.

For the closed-loop control in the drive, it is necessary to be able to separately adjust specific machine data for star and delta operation.

The motor-dependent MSD machine data MD1xxx are valid for star operation (1st motor) and MD2xxx for delta operation (2nd motor).

Bit 0 Enable motor changeover

Bit 1 Enable motor changeover without pulse suppression

Bit 2 Enable motor changeover with speed threshold

Enter speed threshold in MD 1247

Note:

The machine data for the 2nd motor must be parameterized in order to be able to enable star/delta changeover. The drive considers the 2nd motor as having been parameterized,

if MD 2102: MOTOR_CODE_M2 does not contain the value 0.

			HSA		ROT
840D		0	0	7	2/4

1013	**ENABLE_STAR_DELTA**			D05	**CR:** DE1
-	Enable star/delta changeover			UNS.WORD	Power On

Star/delta changeover is available with MD 1013, bit 0. The motor windings are changed over via contactors, which are controlled from the PLC.

For the closed-loop control in the drive, it is necessary to be able to separately adjust specific machine data for star and delta operation.

The motor-dependent MSD machine data MD1xxx are valid for star operation (1st motor) and MD2xxx for delta operation (2nd motor).

Bit 0 Enable motor changeover

Bit 1 Enable motor changeover without pulse suppression

Bit 2 Enable motor changeover with speed threshold

Enter speed threshold in MD 1247

Note:

The machine data for the 2nd motor must be parameterized in order to be able to enable star/delta changeover. The drive considers the 2nd motor as having been parameterized,

if MD 2102: MOTOR_CODE_M2 does not contain the value 0.

			HSA SLM VSA		-
P2		0	0	7	2/4

1014	**UF_MODE_ENABLE**			EXP, D04	**CR:** DE1
-	Activate V/f operation			UNS. WORD	PowerOn

Activates V/f operation for FDD/MSD. The frequency set-point is entered as speed setpoint via the digital setpoint interface.

			VSA/HSA		ROT/LIN
840D		0	0	1	2/4

1014	**UF_MODE_ENABLE**			D04	**CR:** DE1
-	Activate V/f operation			UNS.WORD	Power On
Activates V/f operation for FDD/MSD. The frequency set-point is entered as speed setpoint via the digital setpoint interface.					
			HSA SLM VSA		-
P2		0	0	1	2/4

1015	**PEMSD_MODE_ENABLE**			-	**CR:** DE1
-	Activate PE-MSD			UNS. WORD	PowerOn
Bit 0 PE-MSD function 0: Function inactive 1: Function active					
			VSA		ROT/LIN
840D		0	0	1	2/4

1015	**PEMSD_MODE_ENABLE**			-	**CR:** DE1
-	Activate PE-MSD			UNS.WORD	Power On
Bit 0 PE-MSD function 0: Function inactive 1: Function active					
			VSA SLM		-
P2		0	0	1	2/4

1016	**COMMUTATION_ANGLE_OFFSET**			-	**CR:** DL1
Grad	Commutating angle offset			FLOAT	PowerOn
For linear motors: The machine data are set so that, in the case of the motor being positively offset, the positive zero crossover of the induced phase voltage Uu (phase U to star point) coincides with the zero crossover of the internal rotor position.					
			VSA		ROT/LIN
840D		0.0000	-360.0000	360.0000	2/4

1016	**COMMUTATION_ANGLE_OFFSET**			-	**CR:** DL1
degrees	Commutating angle offset			FLOAT	Power On
For linear motors: The machine data are set so that, in the case of the motor being positively offset, the positive zero crossover of the induced phase voltage Uu (phase U to star point) coincides with the zero crossover of the internal rotor position.					
			VSA SLM		-
P2		0.000000	-360.000000	360.000000	2/4

1017	**STARTUP_ASSISTANCE**			D04	**CR:** DL1
-	Setting-up aid			WORD	sofort

For linear motors:
define commutating angle offset

```
Bit 0 I         Note
------------------------------------------------------------------------------------------------------------
0     I   0     No function
      I   1     The setting-up function for defining the MD 1016 is activated..
                After executing this action, MD 1017, bit 0 is reset.
Encoder types:

Type                       I  MD 1017, bit 0 = 1
------------------------------------------------------------------------------------------------------------
Incremental encoder    I  Alarm 300507 is concealed. The
MD 1011, bit 3 = 0     I  fine synchronisation writes
                       I  MD 1016: COMMUTATION_ANGLE_OFFSET.
                       I  The bit is reset after execution.
------------------------------------------------------------------------------------------------------------
EnDat-Encoder          I   The rotor position identification is initiated and writes
MD 1011, bit 3 = 1     I  in MD 1016: COMMUTATION_ANGLE_OFFSET.
                       I  The bit is reset after execution.
------------------------------------------------------------------------------------------------------------
```

			VSA		ROT/LIN
840D		0	-1	1	2/4

1017	**STARTUP_ASSISTANCE**			D04	**CR:** DL1
-	Setting-up aid			WORD	Immediately

For linear motors:
define commutating angle offset

```
Bit 0 I         Note
------------------------------------------------------------------------------------------------------------
0     I   0     No function
      I   1     The setting-up function for defining the MD 1016 is activated..
                After executing this action, MD 1017, bit 0 is reset.
Encoder types:

Type                       I  MD 1017, bit 0 = 1
------------------------------------------------------------------------------------------------------------
Incremental encoder    I  Alarm 300507 is concealed. The
MD 1011, bit 3 = 0     I  fine synchronisation writes
                       I  MD 1016: COMMUTATION_ANGLE_OFFSET.
                       I  The bit is reset after execution.
------------------------------------------------------------------------------------------------------------
EnDat-Encoder          I   The rotor position identification is initiated and writes
MD 1011, bit 3 = 1     I  in MD 1016: COMMUTATION_ANGLE_OFFSET.
                       I  The bit is reset after execution.
------------------------------------------------------------------------------------------------------------
```

			VSA SLM		-

P2		0	-1	1	2/4

1019	**CURRENT_ROTORPOS_IDENT**			-	**CR:** DM1
%	Current rotor position identification			FLOAT	sofort

The percentage entered for MD 1019 refers to MD 1104:

MOTOR_MAX_CURRENT

The rotor position identification is carried out at the current entered. The current must be selected so that a clear signal is produced for the motor that is used.

Warning:

Increasing the current enhances the accuracy of the measurement but also increases the rotation of the motor.

To obtain an optimum setting for MD 1019, we recommend that you start the measurement with MD 1736: TEST_ROTORPOS_IDENT and check the accuracy in MD 1737: DIFF_ROTORPOS_IDENT.

			VSA		ROT
840D		50.0000	0.0000	100.0000	2/4

1019	**CURRENT_ROTORPOS_IDENT**			-	**CR:**
%	Current rotor position identification			FLOAT	sofort

The percentage entered for MD 1019 refers to MD 1104:

MOTOR_MAX_CURRENT

The rotor position identification is carried out at the current entered. The current must be selected so that a clear signal is produced for the motor that is used.

Warning:

Increasing the current enhances the accuracy of the measurement but also increases the motor turn.

To obtain an optimum setting for MD 1019, we recommend that you start the measurement with MD 1736: TEST_ROTORPOS_IDENT and check the accuracy in MD 1737: DIFF_ROTORPOS_IDENT.

			VSA		LIN
840D		12.0000	0.0000	100.0000	2/4

1019	**CURRENT_ROTORPOS_IDENT**			-	**CR:** DM1
%	Current rotor position identification			FLOAT	Immediately

The percentage entered for MD 1019 refers to MD 1104:

MOTOR_MAX_CURRENT

The rotor position identification is carried out at the current entered. The current must be selected so that a clear signal is produced for the motor that is used.

Warning:

Increasing the current enhances the accuracy of the measurement but also increases the rotation of the motor.

To obtain an optimum setting for MD 1019, we recommend that you start the measurement with MD 1736: TEST_ROTORPOS_IDENT and check the accuracy in MD 1737: DIFF_ROTORPOS_IDENT.

			VSA SLM		-
P2		50.000000	0.000000	100.000000	2/4

1020	**MAX_MOVE_ROTORPOS_IDENT**			-	**CR:**
mm	Maximum move of rotor position identification			FLOAT	sofort
The rotor position identification can cause a considerably large turn in non-braked motors. If the rotation is greater than the value entered in the machine data, alarm 300611, impermissible movement for rotor position identification, is issued.					
			VSA		LIN
840D		5.0000	0.0000	30.0000	2/4

1020	**MAX_TURN_ROTORPOS_IDENT**			-	**CR:** DM1
Grad	Maximum rotation of rotor position identification			FLOAT	sofort
The rotor position identification can cause a considerably large rotation in non-braked motors. If the rotation is greater than the value entered in the machine data, alarm 300611, impermissible movement for rotor position identification, is issued.					
			VSA		ROT
840D		10.0000	0.0000	90.0000	2/4

1020	**MAX_TURN_ROTORPOS_IDENT**			-	**CR:** DM1
degrees	Maximum rotation of rotor position identification			FLOAT	Immediately
The rotor position identification can cause a considerably large rotation in non-braked motors. If the rotation is greater than the value entered in the machine data, alarm 300611, impermissible movement for rotor position identification, is issued.					
			VSA SLM		-
P2		10.000000	0.000000	90.000000	2/4

1021	**ENC_ABS_TURNS_MOTOR**			D06	**CR:** DG1
-	Multiturn resolution absolute value encoder motor			UNS. WORD	PowerOn
Number of revolutions of the absolute value encoder, motor measuring system which can be represented. The value is read only.					
			VSA/HSA		ROT/LIN
840D		4096	0	65535	2/4

1021	**ENC_ABS_TURNS_MOTOR**			D06	**CR:** DG1
-	Multiturn resolution absolute value encoder motor			UNS.WORD	Power On
Number of revolutions of the absolute value encoder, motor measuring system which can be represented. The value is read only.					
			HSA SLM VSA		-
P2		4096	0	65535	2/4

1022	**ENC_ABS_RESOL_MOTOR**			D06	**CR:** DG1
-	Measuring steps of the motor absolute track			UNS. DWORD	PowerOn
Motor absolute encoder resolution in measuring pulses per revolution. The value is read only.					
			VSA/HSA		ROT/LIN
840D		8192	0	2147483647	2/4

1022	**ENC_ABS_RESOL_MOTOR**				**CR:** DG1
-	Measuring steps of the motor absolute track			UNS. WORD	PowerOn
Motor absolute encoder resolution in measuring pulses per revolution. The value is read only.					
			VSA/HSA		-
810D		8192	512	65535	2/4

1022	**ENC_ABS_RESOL_MOTOR**			D06	**CR:** DG1
-	Measuring steps of the motor absolute track			UNS.DWORD	Power On
Motor absolute encoder resolution in measuring pulses per revolution. The value is read only.					
			HSA SLM VSA		-
P2		8192	0	2147483647	2/4

1023	**ENC_ABS_DIAGNOSIS_MOTOR**		D06	**CR:** DG1
-	Diagnosis measuring circuit motor absolute track		UNS. WORD	sofort

Diagnostic bits of the absolute value encoder, motor measuring system:

No. | Significance (Note)
....
0 | Opto system failed
1 | Signal amplitude too low
2 | Erroneous position value
3 | Overvoltage
4 | Undervoltage
5 | Overcurrent
6 | Battery change required
7 | Control check error (from SW 4.2, synchronous linear motor)
8 | EnDat encoder: incorrect overlap (from SW 4.2, synchronous linear motor)
9 | C/D track for ERN1387 encoder faulty, or EQN encoder connected | or not correctly parameterized (not to EQN, MD 1011)
10 | Protocol cannot be interrupted or old HW
11 | SSI level identified on the data line or no encoder connected or | incorrect encoder cable (ERN instead of EQN)
12 | TIMEOUT for measured value read function
13 | CRC error
14 | Incorrect IPU submodule for the direct measuring signal | (only for 611D expansion)
15 | Defective encoder
....

Note:

If the parameterization or the encoder systems are interchanged, ERN 1387 (previous incremental system) and EQN 1325 (absolute value system), this is acknowledged by the system and the measured value acquisition is aborted. The following erroneous combinations are possible:

ERN 1387 used, EQN 1325 parameterized:

Aborted when the missing EnDat interface for ERN1387 is detected (MD1023 bit 11 or bit 12 set)

Only for 810D/FDD:

EQN 1325 used, ERN 1387 parameterized:

Aborted when the missing C/D tracks for EQN1325 (MD 1023, bit 9 set) are identifie

			VSA/HSA		ROT/LIN
840D		0	0	49151	2/4

1023	**ENC_ABS_DIAGNOSIS_MOTOR**		**CR:** DG1
-	Diagnosis measuring circuit motor absolute track	UNS. WORD	sofort

Diagnostic bits of the absolute value encoder, motor measuring system:

No. | Significance (Note)

....

0 | Opto system failed
1 | Signal amplitude too low
2 | Erroneous position value
3 | Overvoltage
4 | Undervoltage
5 | Overcurrent
6 | Battery change required
7 | Control check error (from SW 4.2, synchronous linear motor)
8 | EnDat encoder: incorrect overlap (from SW 4.2, synchronous linear motor)
9 | C/D track for ERN1387 encoder faulty, or EQN encoder connected
| or not correctly parameterized (not to EQN, MD 1011)
10 | Protocol cannot be interrupted or old HW
11 | SSI level identified on the data line or no encoder connected or
| incorrect encoder cable (ERN instead of EQN)
12 | TIMEOUT for measured value read function
13 | CRC error
14 | Incorrect IPU submodule for the direct measuring signal
| (only for 611D expansion)
15 | Defective encoder

....

Note:

If the parameterization or the encoder systems are interchanged, ERN 1387 (previous incremental system) and EQN 1325 (absolute value system), this is acknowledged by the system and the measured value acquisition is aborted. The following erroneous combinations are possible:

ERN 1387 used, EQN 1325 parameterized:

Aborted when the missing EnDat interface for ERN1387 is detected (MD1023 bit 11 or bit 12 set)

Only for 810D/FDD:

EQN 1325 used, ERN 1387 parameterized:

Aborted when the missing C/D tracks for EQN1325 (MD 1023, bit 9 set) are identifie

			VSA/HSA		-
810D		0	0	65535	2/4

1023	ENC_ABS_DIAGNOSIS_MOTOR		D06	CR: DG1
-	Diagnosis measuring circuit motor absolute track		UNS.WORD	Immediately

Diagnostic bits of the absolute value encoder, motor measuring system:

No. | Significance (Note)

....

0 | Opto system failed
1 | Signal amplitude too low
2 | Erroneous position value
3 | Overvoltage
4 | Undervoltage
5 | Overcurrent
6 | Battery change required
7 | Control check error (from SW 4.2, synchronous linear motor)
8 | EnDat encoder: incorrect overlap (from SW 4.2, synchronous linear motor)
9 | C/D track for ERN1387 encoder faulty, or EQN encoder connected
| or not correctly parameterized (not to EQN, MD 1011)
10 | Protocol cannot be interrupted or old HW
11 | SSI level identified on the data line or no encoder connected or
| incorrect encoder cable (ERN instead of EQN)
12 | TIMEOUT for measured value read function
13 | CRC error
14 | Incorrect IPU submodule for the direct measuring signal
| (only for 611D expansion)
15 | Defective encoder

....

Note:

If the parameterization or the encoder systems are interchanged, ERN 1387 (previous incremental system) and EQN 1325 (absolute value system), this is acknowledged by the system and the measured value acquisition is aborted. The following erroneous combinations are possible:

ERN 1387 used, EQN 1325 parameterized:

Aborted when the missing EnDat interface for ERN1387 is detected (MD 1023 bit 11 or bit 12 set)

Only for 810D/FDD:

EQN 1325 used, ERN 1387 parameterized:

Aborted when the missing C/D tracks for EQN1325 (MD 1023, bit 9 set) are identifie

			HSA SLM VSA		-
P2		0	0	49151	2/4

1024	DIVISION_LIN_SCALE		-	CR:
nm	Grid spacing, motor measuring system		UNS. DWORD	PowerOn

Grid spacing, motor measuring system (not 810D)

The grid spacing entered by the user is compared with the grid spacing read out directly from the encoder. In the case of differences, error 300799 "Save boot" is output.

			VSA		LIN
840D		20000	0	2147483647	2/4

1024	**DIVISION_LIN_SCALE**			-	**CR:** DG1
nm	Grid spacing motor measuring system			UNS.DWORD	Power On
Grid spacing of the motor measuring system (not 810D)					
			VSA SLM		-
P2		20000	0	2147483647	2/4

1025	**SERIAL_NO_ENCODER**			D06, EXP	**CR:** DG1
-	Serial number motor measuring system			UNS. DWORD	PowerOn
Serial number for the motor measuring system The serial number of the indirect absolute measuring system is read out of the encoder during startup in set state 3 and entered in MD 1025 (ecept linear encoder). If the system is provided with an incremental measuring system, 0 is entered in MD 1025. By means of this encoder ID, the NC knows whether the encoder was replaced and will accept the adjustment ID. On linear encoders, the serial number of the encoder is compared with the number entered in MD 1025 during startup, as was the case until now. If these numbers do not coincide, rotor position identification is initiated and 0 entered in MD 1025. When rotor position identification has been performed successfully in startup state 5, the serial number of the encoder is entered in MD 1025 and storing of the boot file is initiated.					
			VSA/HSA		ROT/LIN
840D		0	0	2147483647	1/1

1025	**SERIAL_NO_ENCODER**			D06, EXP	**CR:** DG1
-	Serial number motor measuring system			UNS.DWORD	Power On
Serial number for the motor measuring system The serial number of the indirect absolute measuring system is read out of the encoder during startup in set state 3 and entered in MD 1025 (ecept linear encoder). If the system is provided with an incremental measuring system, 0 is entered in MD 1025. By means of this encoder ID, the NC knows whether the encoder was replaced and will accept the adjustment ID. On linear encoders, the serial number of the encoder is compared with the number entered in MD 1025 during startup, as was the case until now. If these numbers do not coincide, rotor position identification is initiated and 0 entered in MD 1025. When rotor position identification has been performed successfully in startup state 5, the serial number of the encoder is entered in MD 1025 and storing of the boot file is initiated.					
			HSA SLM VSA		-
P2		0	0	4294967295	1/1

1027	**ENC_CONFIG**			D06	**CR:** DG1
-	Configuration for encoder IM			UNS. WORD	PowerOn

BIT:9 Reserved
BIT10 SSI encoder: measuring value code
0: Gray code
1: Dual code (=binary code)
Bit 11 SSI encoder: right justified/tree format
0: right justified
1: tree format
Bit 12 SSI encoder: parity active
0: no
1: yes
Bit 13 SSI encoder: even/uneven parity
0: uneven parity
1: even parity
Bit 14 SSI encoder: alarm bit active
0: no alarm bit existing
1: alarm bit existing
Bit 15 SSI encoder: active
0: no SSI encoder: existing
1: SSI encoder: existing

			VSA/HSA		ROT/LIN
840D		0	0	ffff	2/4

1027	**ENC_CONFIG**			D06	**CR:** DG1
-	Configuration for encoder IM			UNS.WORD	Power On

BIT:9 Reserved
BIT10 SSI encoder: measuring value code
0: Gray code
1: Dual code (=binary code)
Bit 11 SSI encoder: right justified/tree format
0: right justified
1: tree format
Bit 12 SSI encoder: parity active
0: no
1: yes
Bit 13 SSI encoder: even/uneven parity
0: uneven parity
1: even parity
Bit 14 SSI encoder: alarm bit active
0: no alarm bit existing
1: alarm bit existing
Bit 15 SSI encoder: active
0: no SSI encoder: existing
1: SSI encoder: existing

			HSA SLM VSA		-
P2		0x0000	0x0000	0xffff	2/4

1028	**NO_TRANSMISSION_BITS**			D06	**CR:** DG1
-	IM frame langth SSI			UNS. WORD	PowerOn
Exact description: The length designates the whole frame length transferred including all parity and alarm bits. If you enter e.g. 24 bits plus 1 alarm bit, 25 must be entered here. Each manufacturer of encoders has his own name for the alarm bit. Some name it e.g. power failure bit.					
			VSA/HSA		ROT/LIN
840D		25	0	25	2/4

1028	**NO_TRANSMISSION_BITS**			D06	**CR:** DG1
-	IM frame langth SSI			UNS.WORD	Power On
Exact description: The length designates the whole frame length transferred including all parity and alarm bits. If you enter e.g. 24 bits plus 1 alarm bit, 25 must be entered here. Each manufacturer of encoders has his own name for the alarm bit. Some name it e.g. power failure bit.					
			HSA SLM VSA		-
P2		25	0	25	2/4

1029	**DELAY_ROTORPOS_IDENT**			-	**CR:** FBU
ms	Meas. delay rotor position identification			FLOAT	sofort
This MD defines the additional delay time between the 60 individual measuring pulses for rotot position identification. Note: Refer also to keyword PE spindle or linear motor					
			VSA		ROT/LIN
840D		0.0000	0.0000	100.0000	2/4

1029	**DELAY_ROTORPOS_IDENT**			-	**CR:** FBU
ms	Meas. delay rotor position identification			FLOAT	Immediately
This MD defines the additional delay time between the 60 individual measuring pulses for rotot position identification. Note: Refer also to keyword PE spindle or linear motor					
			VSA SLM		-
P2		0	0	100.0	2/4

1030	**ACTUAL_VALUE_CONFIG_DIRECT**				**CR:** DG1
HEX	Configuration actual-value sensing DM			UNS. WORD	PowerOn

Enter the configuration of the actual value function referred to the SIMODRIVE system 611 D, direct measuring system.

Actual value sensing, direct measuring system

```
Bit No.      |  Significance               |     Note
.............................................................................................................................
Bit 0-2      |  Reserved                   |
Bit 3        |  Encoder type               | 0 = Incremental encoder
             |                             | 1 = Absolute encoder with EnDat interface
Bit 4        |  Mechanical measuring       | 0 = Rotary measuring system
             |  system design              |  1 = Linear measuring system
Bit 5-13     |  Not assigned               |
Bit 14 -15   |                             |
from SW 4.2 | Data transfer rate, EnDat    |  00 = 100 kHz (standard)
             |                             |  01 = 500 kHz
             |                             | 10 = 1 MHz
             |                             |  11 = 2 MHz
             |                             |- For rotating encoders, encoders,
             |                             |  the value of MD 1005 is compared
             |                             | with the increments output from the
             |                             | EnDat encoder and alarm 300799
             |                             | "Save Boot" is set if there is a
             |                             | deviation.
             |                             | - For linear scales with EnDat, the
             |                             | the grid spacing output value is
             |                             | written directly into the MD 1005.
----------------------------------------------------------------------------------------------------------------------------
```

			VSA/HSA		-
810D		0	0	ffff	2/4

1030	**ACTUAL_VALUE_CONFIG_DIRECT**			D06	**CR:** DG1
HEX	Configuration actual-value sensing DM			UNS. WORD	PowerOn

Enter the configuration of the actual value function referred to the SIMODRIVE system 611 D, direct measuring system.

Actual value sensing, direct measuring system

```
Bit No.        |  Significance               |      Note
..........................................................................................................................
Bit 0-2        |  Reserved                   |
Bit 3          |  Encoder type               | 0 = Incremental encoder
               |                             | 1 = Absolute encoder with EnDat interface
Bit 4          |  Mechanical measuring       | 0 = Rotary measuring system
               |  system design              |  1 = Linear measuring system
Bit 5-13       |  Not assigned               |
Bit 14 -15     |                             |
from SW 4.2 |  Data transfer rate, EnDat  |  00 = 100 kHz (standard)
               |                             |  01 = 500 kHz
               |                             | 10 = 1 MHz
               |                             |  11 = 2 MHz
               |                             |- For rotating encoders, encoders,
               |                             |  the value of MD 1005 is compared
               |                             | with the increments output from the
               |                             | EnDat encoder and alarm 300799
               |                             | "Save Boot" is set if there is a
               |                             | deviation.
               |                             | - For linear scales with EnDat, the
               |                             | the grid spacing output value is
               |                             | written directly into the MD 1005.
--------------------------------------------------------------------------------------------------------------------------------
```

			VSA/HSA		ROT/LIN

840D		0	0	c018	2/4

1030	ACTUAL_VALUE_CONFIG_DIRECT			D06	CR: DG1
-	Configuration actual-value sensing DM			UNS.WORD	Power On

Enter the configuration of the actual value function referred to the SIMODRIVE system 611 D, direct measuring system.

Actual value sensing, direct measuring system

```
Bit No.       |  Significance              |     Note
..................................................................................................................
Bit 0-2       |  Reserved                  |
Bit 3         |  Encoder type              | 0 = Incremental encoder
              |                            | 1 = Absolute encoder with EnDat interface
Bit 4         |  Mechanical measuring      | 0 = Rotary measuring system
              |  system design             |  1 = Linear measuring system
Bit 5-13      |  Not assigned              |
Bit 14 -15    |                            |
from SW 4.2 | Data transfer rate, EnDat    | 00 = 100 kHz (standard)
              |                            |  01 = 500 kHz
              |                            | 10 = 1 MHz
              |                            |  11 = 2 MHz
              |                            |- For rotating encoders, encoders,
              |                            |  the value of MD 1005 is compared
              |                            | with the increments output from the
              |                            | EnDat encoder and alarm 300799
              |                            | "Save Boot" is set if there is a
              |                            | deviation.
              |                            | - For linear scales with EnDat, the
              |                            | the grid spacing output value is
              |                            | written directly into the MD 1005.
----------------------------------------------------------------------------------------------------------------------------------
```

			HSA SLM VSA		-
P2		0x0000	0x0000	0xc018	2/4

1031	ENC_ABS_TURNS_DIRECT			D06	CR: DG1
-	Multiturn resolution of the absolute encoder DM			UNS. WORD	PowerOn

Number of revolutions of the absolute value encoder which can be represented, direct measuring system. The value is read only.

			VSA/HSA		ROT/LIN
840D		4096	0	65535	2/4

1031	ENC_ABS_TURNS_DIRECT			D06	CR: DG1
-	Multiturn resolution of the absolute encoder DM			UNS.WORD	Power On

Number of revolutions of the absolute value encoder which can be represented, direct measuring system. The value is read only.

			HSA SLM VSA		-
P2		4096	0	65535	2/4

1032	**ENC_ABS_RESOL_DIRECT**			D06	**CR:** DG1
-	Measuring steps of the absolute track DM			UNS. DWORD	PowerOn
Resolution of the position measuring system in measuring pulses per revolution. The value is read only.					
			VSA/HSA		ROT/LIN
840D		8192	0	2147483647	2/4

1032	**ENC_ABS_RESOL_DIRECT**				**CR:** DG1
-	Measuring steps of the absolute track DM			UNS. WORD	PowerOn
Resolution of the position measuring system in measuring pulses per revolution. The value is read only.					
			VSA/HSA		-
810D		8192	0	65535	2/4

1032	**ENC_ABS_RESOL_DIRECT**			D06	**CR:** DG1
-	Measuring steps of the absolute track DM			UNS.DWORD	Power On
Resolution of the position measuring system in measuring pulses per revolution. The value is read only.					
			HSA SLM VSA		-
P2		8192	0	2147483647	2/4

1033	**ENC_ABS_DIAGNOSIS_DIRECT**			D06	**CR:** DG1
-	Diagnosis dir. measuring system absolute track			UNS. WORD	sofort
Evaluation of the absolute value encoder diagnostic bits, direct measuring system, as for MD1023: ENC_ABS_DIAGNOSIS_MOTOR.					
			VSA/HSA		ROT/LIN
840D		0	0	64767	2/4

1033	**ENC_ABS_DIAGNOSIS_DIRECT**				**CR:** DG1
-	Diagnosis dir. measuring system absolute track			UNS. WORD	sofort
Evaluation of the absolute value encoder diagnostic bits, direct measuring system, as for MD1023: ENC_ABS_DIAGNOSIS_MOTOR.					
			VSA/HSA		-
810D		0	0	65535	2/4

1033	**ENC_ABS_DIAGNOSIS_DIRECT**			D06	**CR:** DG1
-	Diagnosis dir. measuring system absolute track			UNS.WORD	Immediately
Evaluation of the absolute value encoder diagnostic bits, direct measuring system, like for MD 1023: ENC_ABS_DIAGNOSIS_MOTOR. SSI encoder monitoring (only with SIDA C): If an absolute encoder with an SSI interface is used as direct measuring system, it is constantly checked if the communication between the drive and the encoder works correctly. Two monitoring methods were installed: - Neutral level monitoring : Checks if the data line is "high" when no data traffic takes place - Zero level monitoring (active level monitoring): Checks if the data line is "low" after the telegram during the monoflop time. Both monitoring methods (data, CLK, supply) can also detect a core breakage. In case of an error, the Power-On error 300505 "Measuring circuit error absolute track" is displayed. The cause of the error is displayed in MD 1033: Bit 12 and 15: Error SSI zero level monitoring Bit 14 and 15: Error SSI neutral level monitoring					
			HSA SLM VSA		-
P2		0	0	64767	2/4

1034	**DIVISION_LIN_SCALE_DM**			-	**CR:**
nm	Grid spacing, direct measuring system			UNS. DWORD	PowerOn
Grid spacing, direct measuring system (not 810D) The drive reads automatically the grid spacing and enters it in MD 1034.					
			VSA		LIN
840D		20000	0	2147483647	2/4

1034	**DIVISION_LIN_SCALE_DM**			-	**CR:** DG1
nm	Grid spacing direct measuring system			UNS.DWORD	Power On
Grid spacing of the direct measuring system (not 810D)					
			VSA SLM		-
P2		20000	0	2147483647	2/4

1037	**ENC_CONFIG_DIRECT**			D06	**CR:** DG1
-	Configuration for encoder DM			UNS. WORD	PowerOn

BIT:9 SSI encoder without incremental traces
0: SSI encoder with incremental traces
1: SSI encoderr without incremental traces
BIT10 SSI encoder: measuring value code
0: Gray code
1: Dual code (=binary code)
Bit 11 SSI encoder: right justified/tree format
0: right justified
1: tree format
Bit 12 SSI encoder: parity active
0: no
1: yes
Bit 13 SSI encoder: even/uneven parity
0: uneven parity
1: even parity
Bit 14 SSI encoder: alarm bit active
0: no alarm bit existing
1: alarm bit existing
Bit 15 SSI encoder: active
0: no SSI encoder: existing
1: SSI encoder: existing

			VSA/HSA		ROT/LIN
840D		0	0	ffff	2/4

1037	**ENC_CONFIG_DIRECT**			D06	**CR:** DG1
-	Configuration for encoder DM			UNS.WORD	Power On

BIT:9 SSI encoder without incremental traces
0: SSI encoder with incremental traces
1: SSI encoderr without incremental traces
BIT10 SSI encoder: measuring value code
0: Gray code
1: Dual code (=binary code)
Bit 11 SSI encoder: right justified/tree format
0: right justified
1: tree format
Bit 12 SSI encoder: parity active
0: no
1: yes
Bit 13 SSI encoder: even/uneven parity
0: uneven parity
1: even parity
Bit 14 SSI encoder: alarm bit active
0: no alarm bit existing
1: alarm bit existing
Bit 15 SSI encoder: active
0: no SSI encoder: existing
1: SSI encoder: existing

			HSA SLM VSA		-

P2		0x0000	0x0000	0xffff	2/4

1038	**SERIAL_NO_ENCODER_DM**			D06, EXP	**CR:** DG1
-	Serial no. for direct meas. System			UNS. DWORD	PowerOn
Serial no. for direct meas. system During startup into setpoint status 3, the serial no. for the direct absolute measuring system is read out of the encoder and entered in MD 1038. If there is an incremental measuring system, one 0 is entered in MD 1038.					
			VSA/HSA		ROT/LIN
840D		0	0	2147483647	1/1

1038	**SERIAL_NO_ENCODER_DM**			D06, EXP	**CR:** DG1
-	Serial no. for direct meas. System			UNS.DWORD	Power On
Serial no. for direct meas. system During startup into setpoint status 3, the serial no. for the direct absolute measuring system is read out of the encoder and entered in MD 1038. If there is an incremental measuring system, one 0 is entered in MD 1038.					
			HSA SLM VSA		-
P2		0	0	4294967295	1/1

1041	**NO_TRANSMISSION_BITS_DM**			D06	**CR:** DG1
-	DM frame length SSI			UNS. WORD	PowerOn
The length designates the whole frame length transferred including all parity or alarm bits. If e.g. 24 bits plus 1 power failure bit is stated, you must enter 25 here.					
			VSA/HSA		ROT/LIN
840D		25	0	25	2/4

1041	**NO_TRANSMISSION_BITS_DM**			D06	**CR:** DG1
-	DM frame length SSI			UNS.WORD	Power On
The length designates the whole frame length transferred including all parity or alarm bits. If e.g. 24 bits plus 1 power failure bit is stated, you must enter 25 here.					
			HSA SLM VSA		-
P2		25	0	25	2/4

1049	**EMF_BREAK_ENABLE**			-	**CR:** DM1
-	Activate EMF brake			UNS.WORD	Power On
Activation of the EMF brake in case of an encoder failure.					
			HSA SLM VSA		-
P2		0	0	2	0/0

1055	**MARKER_DIST**			D06	**CR:** DM1
degrees	Distance of the reference markers			FLOAT	Power On
Input of the reference mark distance with distance-coded measuring system. Note: MD 1055 corresponds to the NC machine data MD 34300 with MD 1055 on the motor side and MD 34300 on the load side.					
			SLM VSA		-
P2		20.000000	0.000000	90.000000	2/4

1056	**MARKER_DIST_DIFF**			D06	**CR:** DM1
degrees	Difference between distances			FLOAT	Power On
Input of the different reference mark distances with distance-coded measuring system. Note: MD 1056 corresponds to the NC machine data MD 34310 with MD 1056 on the motor side and MD 34310 on the load side.					
			SLM VSA		-
P2		0.020000	0.000000	45.000000	2/4

1060	**ACTIVATE_BRAKE_CONTROL**			D02	**CR:** DM1
-	Activation of brake control			UNS.WORD	Immediately
Activates/deactivates the brake sequence control of this axis. 1 Brake sequence control activated 0 Brake sequence control deactivated Note: Pulse suppression control via MD 1403 (pulse suppression creep speed) and MD 1404 (pulse suppression timer) inactive with active motor holding brake.					
			HSA SLM VSA		-
P2 840D		0	0	1	2/4

1061	**BRAKE_RELEASE_TIME**			D02	**CR:** DM1
ms	Brake release time			FLOAT	Immediately
The setpoint transfer after initiating "servo enable" is delayed by this time. During this time, speed control internal with n-set = 0 is already active to prevent any axis motions during brake release. After this time, speed control is active and setpoints can be transferred.					
			HSA SLM VSA		-
P2 840D		600.000000	10.000000	10000.000000	2/4

1062	**BREAK_CLOSE_SPEED**			D02	**CR:** DM1
1/min	Speed close holding brake			FLOAT	Immediately
MD 1062 and MD 1063 are the criterium for closing the motor holding brake. After deactivating the "servo enable", the drive decelerates with n-set = 0. With active brake sequence control, the output signal "Open holding brake" is reset, if: - |n-act < speed close holding brake MD 1062) or -Brake delay time (MD 1063) elapsed					
			HSA SLM VSA		-
P2 840D		500.000000	0.000000	100000.000000	2/4

1063	**BRAKE_DELAY_TIME**			D02	**CR:** DM1
ms	Brake delay time			FLOAT	Immediately
MD 1062 and MD 1063 define when the motor holding brake is applied. After cancelation of the "servo enable", the drive brakes with n-set = 0. With active brake processing, the output signal "Open holding brake" is reset with the following: - |n-act| < speed, apply holding brake (MD 1062) or - Brake delay time (MD 1063) elapsed					
			HSA SLM VSA		-
P2 840D		400.000000	10.000000	600000.000000	2/4

1064	**CONTROLLER_DISABLE_TIME**			D02	**CR:** DM1
ms	Servo disable time			FLOAT	Immediately
If the output signal "Open holding brake" is deactivated, the drive is controlled actively with n-set = 0 until the servo disable time (MD 11064) has expired (internal servo enable). This gives the brake enough time to close thus preventing, for example, sagging of a vertical axis. The pulses will be suppressed only then.					
			HSA SLM VSA		-
P2 840D		600.000000	10.000000	10000.000000	2/4

1070	**RLI_RAMP_TIME**			-	**CR:** DM1
ms	RLI current setpoint ramp time			FLOAT	Immediately
Input of the current setpoint rise time with rotor position identification with MD 1075 = 6. To reduce the mechanical load, the current setpoint is increased in the form of ramps.					
			VSA SLM		-
P2		500	0.0	10000.0	1/1

1071	**RLI_WAIT_TIME**			-	**CR:** DM1
ms	RLI waiting time			FLOAT	Immediately
Input of the waiting time with rotor position identification with MD 1075 = 6. The system waits during this period of time between two measurements to prevent resonances.					
			VSA SLM		-
P2		20	0.0	10000.0	1/1

1072	**RLI_AMOUNT**			-	**CR:** DM1
-	RLI numer of measurements			UNS.WORD	Immediately
Input of the number of measurements with rotor position identification with MD 1075 = 6.					
			VSA SLM		-
P2		12	6	60	1/1

1073	**POSS_TURN_ROTORPOS_IDENT**			-	**CR:** DM1
degrees	Perm. turn of rotor position ident			FLOAT	Immediately
Input of the permissible rotation with rotor position identification with MD 1075 = 6.					
			SLM VSA		-
P2		1.000000	0.000000	90.000000	2/4

1074	**ROTORPOS_OFFSET**			-	**CR:** DM1
degrees	Rotor position adaption			FLOAT	Immediately
After being changed over by the offset value in MD 1074, the rotor position is adapted to the winding as follows: New rotor position = old position - offset value [old motor] + offset value [new motor] The user must enter the winding-dependent offset values in MD 1074 "Adaptation of the rotor position". Star connection: offset value = 0 deg. (default value) Delta connection: offset value = 30 deg.					
			HSA VSA SLM		-
P2		0.000000	0.000000	360.000000	2/4

1075	**ALGORITHM_ROTORPOS_IDENT**			-	**CR:** IAD, DM1
-	Rotor position identification procedure			UNS. WORD	sofort
The motion-based rotor position identification procedure has only been released for 1FN3 linear motors and for 1FE1 spindle motors. It is selected via the drive machine data P1075: P1075 = 1: Rotor position identification with inductance P1075 = 3: Rotor position identification with movement If rotor position identification has been performed successfully, the content of P1075 is copied to P1734 to be diagnosed. Note: P1075 is effective immediately. Please note that - while the drive is waiting for servo enable to perform a rotor position identification - any change of P1075 will only be effective upon the next trial (the identification routine is already running in the waiting state). With each "Calculate controller data", P1075 is set as follows: 1FN3 and 1FE motors: P1075 = 3 All other motors: P1075 = 1					
			VSA		ROT/LIN
840D		1	1	3	1/1

1075	**ALGORITHM_ROTORPOS_IDENT**			-	**CR:** IAD, DM1
-	Rotor position identification procedure			UNS.WORD	Immediately
The motion-based rotor position identification procedure has only been released for 1FN3 linear motors and for 1FE1 spindle motors. It is selected via the drive machine data MD 1075: MD 1075 = 1: Rotor position identification with inductance MD 1075 = 3: Rotor position identification with movement MD 1075 = 6: Rotor position identification with applied brake If rotor position identification has been performed successfully, the content of MD 1075 is copied to MD 1734 to be diagnosed. Note: MD 1075 is effective immediately. Please note that - while the drive is waiting for servo enable to perform a rotor position identification - any change of MD 1075 will only be effective upon the next trial (the identification routine is already running in the waiting state). With each "Calculate controller data", MD 1075 is set as follows: 1FN3 and 1FE motors: MD 1075 = 3 All other motors: MD 1075 = 1					
			VSA SLM		-
P2		1	1	6	1/1

1076	**FACTOR_MASS**			D05	**CR:**
kg	Load mass factor			FLOAT	sofort
In order to set the controller parameters of the procedure, you must know the parameters of the load mass. For this, you can parameterize a factor in the drive machine data P1076 which is integrated by the RLI procedure as additional mass in the calculation: The minimum movement during the identification is achieved by setting P1076 to optimum values. However, you must take into account that the optimum setting of P1076 changes with the load. We therefore recommend that you parameterize a generally valid value for all configurations. P1075 and P1076 have been protected by the manufacturer with a password.					
			VSA		LIN
840D		0.0000	0.0000	10000.0000	1/1

1076	**FACTOR_INERTIA**			D05	**CR:** DM1
kgm2	Load moment of inertia factor			FLOAT	sofort
In order to set the controller parameters of the procedure, you must know the order of magnitude of the load moment of inertia. For this, you can parameterize a factor in the drive machine data P1076 which is included by the RLI procedure as additional moment of inertia in the calculation: The minimum movement during the identification is achieved by setting P1076 to optimum values. However, you must take into account that the optimum setting of P1076 changes according to the load. We therefore recommend that you parameterize a generally valid value for all configurations. The manufacturer has protected P1075 and P1076 with a password.					
			VSA		ROT
840D		0.0000	0.0000	500.0000	1/1

1076	**FACTOR_INERTIA**			D05	**CR:** DM1
kgm²	Load moment of inertia factor			FLOAT	Immediately
In order to set the controller parameters of the procedure, you must know the order of magnitude of the load moment of inertia. For this, you can parameterize a factor in the drive machine data MD 1076 which is included by the RLI procedure as additional moment of inertia in the calculation: The minimum movement during the identification is achieved by setting MD 1076 to optimum values. However, you must take into account that the optimum setting of MD 1076 changes according to the load. We therefore recommend that you parameterize a generally valid value for all configurations. The manufacturer has protected MD 1075 and MD 1076 with a password. As from Version 6.8.5, you can enter a negative value here. In this case, you can reduce the proportional gain with poor encoder resolution. The overall moment of inertia, however, can only be reduced until 10% of the machine moment of inertia is reached.					
			VSA SLM		-
P2		0.0	-500.0	500.0	1/1

1077	**RLI_INTEGRATOR_TIME**			-	**CR:**
ms	Integral action time for RLI controller			FLOAT	sofort
The integral action time for the RLI controller is entered by means of this MD. If the MD is set to 0, the I component is deactivated When the function "Calculate controller data" is selected, MD 1077 is recalculated and preset.					
			VSA		ROT/LIN

840D		3.7000	0.0000	500.0000	1/1

1077	**RLI_INTEGRATOR_TIME**	-	**CR:** DM!
ms	Integral action time for RLI controller	FLOAT	Immediately

The integral action time for the RLI controller is entered by means of this MD.

If the MD is set to 0, the I component is deactivated.

When the function "Calculate controller data" is selected, MD 1077 is recalculated and preset.

			VSA SLM		-
P2		3.7	0.0	500.0	1/1

1078	**MAX_TIME_ROTORPOS_ID**	-	**CR:**
ms	Time monitoring of rotor position ID	FLOAT	sofort

The maximum duration of single measurement in ms is entered via this MD.

			VSA		ROT/LIN
840D		800.0000	100.0000	10000.0000	1/1

1078	**MAX_TIME_ROTORPOS_ID**	-	**CR:** DM1
ms	Time monitoring of rotor position ID	FLOAT	Immediately

The maximum duration of single measurement in ms is entered at this MD.

			VSA SLM		-
P2		800.0	100.0	10000.0	1/1

1096	**RED_TORQUE_LIMIT_GS_ACTIV**	D02, D05	**CR:** DE1
-	Red. max. torque at gen. stop active	UNS.WORD	Immediately

Input of the configuration required to reduce the motor limit with regenerative braking.

Bit I Meaning / 0 = ... , 1=

---0 I

Torque limit reduction with regenerative braking

| / 0 = inactive (except for EMF braking)

| / 1 = active

---1 I

Speed controller monitoring at the stop with torque reduction

| / 0 = active (except for EMF braking)

| / 1 = inactive

2-15 | not assigned

Note:The factor used to reduce the torque limit with regenerative braking is set in MD 1097.

With EMF braking, the torque limit reduction is always activated independently of MD 1096.If, with regenerative braking, the torque limit reduction is activated in bit 0, it is effective in the following cases:

- Regenerative stop
- Safety Stop C
- Safety Stop B
- Emergency retraction- Regenerating

The speed controller monitoring at the stop can be deactivated when the torque is reduced in Bit 1 in order to prevent that the prolonged regenerative braking is aborted prematurely by this monitoring as a result of the reduced torque.

With EMF braking, the speed controller monitoring at the stop is always deactivated independently of MD 1096.

			HSA SLM VSA		-
P2		0	0	3	2/4

1097	**RED_TORQUE_LIMIT_GENSTOP**			D02, D05	**CR:** DE1
%	Red. max. torque at gen. Stop			WORD	Immediately
Factor used to reduce the torque limit with regenerative braking [%]. With regenerative braking, the torque limit reduction is activated/deactivated in MD 1096. With EMF braking, the torque limit reduction is always activated independently of MD 1096.					
			HSA VSA SLM		-
P2		80	0	100	2/4

1098	**INVERTER_MAX_CURR_DERAT**			D05	**CR:** DM1
A	PS derating limit current			FLOAT	sofort
The maximum current of the power section limited by derating can be read out in the display data MD 1098 [A_eff].					
			VSA/HSA		ROT/LIN
840D		200.0000	0.0000	500.0000	2/4

1098	**INVERTER_MAX_CURR_DERAT**			D05	**CR:** DM1
A	PS derating limit current			FLOAT	Immediately
The maximum current of the power section limited by derating can be read out in the display data MD 1098 [A_eff].					
			HSA SLM VSA		-
P2		200.0	0.0	500.0	2/4

1099	**INVERTER_DERATING_FACT**			D05	**CR:** DE1, DM1
%	PS limit current derating factor			FLOAT	sofort
The currently effective derating factor is calculated during run-up depending on the pulse rate and derating factor X1. It can be read out in the display data MD 1099. Also see: MD 1178 MD 1179					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	100.0000	2/4

1099	**INVERTER_DERATING_FACT**			D05	**CR:** DE1, DM1
%	PS limit current derating factor			FLOAT	Immediately
The currently effective derating factor is calculated during run-up depending on the pulse rate and derating factor X1. It can be read out in the display data MD 1099. Also see: MD 1178 MD 1179					
			HSA SLM VSA		-
P2		0.000000	0.000000	100.000000	2/4

1100	**PWM_FREQUENCY**			D01, D05, EXP	**CR:** DS1
Hz	Pulse-width modulation frequency			FLOAT	PowerOn

Using this machine data, the sampling frequency is determined in the PWM inverter. The standard preassignment (default) is dependent on the motor type (FDD = 4000, MSD = 3200) and is configured by the drive configuration at start-up. The frequency value setting is realized on the MMC side (refer to the attached table).

Although various intermediate stages can be set, only the following frequencies are practical: 2000, 2666, 3200, 4000, 5333, 8000 Hz.

If possible, the synchronous switching frequencies should be selected (4000, 8000 Hz). If a frequency greater than the standard frequency is used, then it must be taken into account that the current loading capability of the drive converter is decreased (refer to the Planning Guide for the de-rating characteristic).

It is practical to increase the switching frequency for low-leakage or high-speed third-party drives (motor frequency > 500 Hz), and this must already be taken into account when the power module is dimensioned. Further, it may be practical to modify the standard switching frequency in order to reduce motor noise.

Pulse-width modulation frequency

```
Standard value          f_PBM in Hz        T_PBM in µs
------------------------------------------------------------------------------------------------------------------------MSD
3200                 312.5
FDD                         4000               250.0
  -                         5333.3....          187.5
  -                         8000               125
------------------------------------------------------------------------------------------------------------------------
```

Note:

The pulse frequency can only be entered in the value steps specified above in the table. Other frequencies are rounded-off to the next value in the table (e.g. 3150 Hz becomes 3200 Hz).

			VSA/HSA		ROT/LIN
840D		4000.0000	2000.0000	8000.0000	2/4

1100	**PWM_FREQUENCY**			D01, D05, EXP	**CR:** DS1
Hz	Pulse-width modulation frequency			FLOAT	Power On

Using this machine data, the sampling frequency is determined in the PWM inverter. The standard preassignment (default) is dependent on the motor type (FDD = 4000, MSD = 3200) and is configured by the drive configuration at start-up. The frequency value setting is realized on the MMC side (refer to the attached table).

Although various intermediate stages can be set, only the following frequencies are practical: 2000, 2666, 3200, 4000, 5333, 8000 Hz.

If possible, the synchronous switching frequencies should be selected (4000, 8000 Hz). If a frequency greater than the standard frequency is used, then it must be taken into account that the current loading capability of the drive converter is decreased (refer to the Planning Guide for the de-rating characteristic).

It is practical to increase the switching frequency for low-leakage or high-speed third-party drives (motor frequency > 500 Hz), and this must already be taken into account when the power module is dimensioned. Further, it may be practical to modify the standard switching frequency in order to reduce motor noise.

Pulse-width modulation frequency

```
Standard value          f_PBM in Hz        T_PBM in µs
----------------------------------------------------------------------------------------------------------------------MSD
3200               312.5
FDD                        4000                250.0
  -                        5333.3....          187.5
  -                        8000                125
----------------------------------------------------------------------------------------------------------------------
```

Note:

The pulse frequency can only be entered in the value steps specified above in the table. Other frequencies are rounded-off to the next value in the table (e.g. 3150 Hz becomes 3200 Hz).

			HSA SLM VSA		-
P2		4000.000000	2000.000000	8000.000000	2/4

1101	**CTRLOUT_DELAY**			D01, D05, EXP	**CR:** DS1
us	Computation deadtime of the current control loop			WORD	PowerOn

The computation deadtime is the time between the start of a current control cycle (current setpoint input) and the activation of the control voltage setpoints on the gating unit ASIC. The standard preassignment is automatically loaded during first start-up in MD 1102: MOTOR_CODE. In order to simultaneously switch all of the setpoints on the power modules into the valid status (to unify the dynamic performance), the time required for the axis requiring the most computation is entered (double axis).

Setting value (worst case) run time: 50 µs

Note

Computation deadtime limits (intercepted via system error):

MD 1101 < MD 1000 x 31.25 µs (= current controller cycle)

MD 1101 < (1 / (4 x MD 1100)) = T_PBM / 4 for 611 D HW (62 µs)

MD 1101 < (1 / MD 1100) = T_ PBM for 611 D performance HW (62 µs)
standard hardware (100 µs)

From drive firmware 2.60, the default value is assigned via the softkey "Calculate controller data." function of the HW.

		VSA/HSA		ROT/LIN

840D		62	0	124	2/4

1101	**CTRLOUT_DELAY**		D01, D05, EXP	**CR:** DS1
us	Computation deadtime of the current control loop		WORD	Power On

The computation deadtime is the time between the start of a current control cycle (current setpoint input) and the activation of the control voltage setpoints on the gating unit ASIC. The standard preassignment is automatically loaded during first start-up in MD 1102: MOTOR_CODE. In order to simultaneously switch all of the setpoints on the power modules into the valid status (to unify the dynamic performance), the time required for the axis requiring the most computation is entered (double axis).

Setting value (worst case) run time: 50 µs

Note

Computation deadtime limits (intercepted via system error):

MD 1101 < MD 1000 x 31.25 µs (= current controller cycle)

MD 1101 < (1 / (4 x MD 1100)) = T_PBM / 4 for 611 D HW (62 µs)

MD 1101 < (1 / MD 1100) = T_ PBM for 611 D performance HW (62 µs)
standard hardware (100 µs)

From drive firmware 2.60, the default value is assigned via the softkey "Calculate controller data." function of the HW.

			HSA SLM VSA		-
P2 840D		32	-	-	2/4
P2 810D		110	-	-	2/4
P2		-	0	124	2/4

1102	**MOTOR_CODE**		D04, D05	**CR:** DM1
-	Motor code number		UNS. WORD	PowerOn

Enter the motor code number corresponding to the motor MLFB (machine-readable product designation for Siemens motors). The motor code number is automatically generated from the MFLB when using the start-up tool. The user does not have to make any manual entries (also refer to MD 1106: INVERTER_CODE). For the start-up tool/MMC 102/103, the following motor data are automatically transferred from an internal motor table using the motor code number. If you do not have a start-up tool/MMC102/103 at your disposal, you can enter data manually.

Note

If a valid motor MLFB (code number) is not specified in MD 1102 (e. g. "0" --> third-party motors), then all of the machine data must be entered manually.

			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1102	**MOTOR_CODE**			D04	**CR:** DM1
-	Motor code number			UNS.WORD	Power On
Enter the motor code number corresponding to the motor MLFB (machine-readable product designation for Siemens motors). The motor code number is automatically generated from the MFLB when using the start-up tool. The user does not have to make any manual entries (also refer to MD 1106: INVERTER_CODE). For the start-up tool/MMC 102/103, the following motor data are automatically transferred from an internal motor table using the motor code number. If you do not have a start-up tool/MMC102/103 at your disposal, you can enter data manually. Note If a valid motor MLFB (code number) is not specified in MD 1102 (e. g. "0" --> third-party motors), then all of the machine data must be entered manually.					
			HSA SLM VSA		-
P2		0	0	65535	2/4

1103	**MOTOR_NOMINAL_CURRENT**			D05	**CR:** DM1, DÜ1
A	Motor rated current			FLOAT	PowerOn
Enter the rated current (RMS value), which is drawn by the motor when operated at rated torque and rated motor speed. The input is made using the motor data sheet (third-party motor) or using automatic parameterization with the input and transfer of the motor code number in MD 1102: MOTOR_CODE.					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	500.0000	2/4

1103	**MOTOR_NOMINAL_CURRENT**			D05	**CR:** DM1, DÜ1
A	Motor rated current			FLOAT	Power On
Enter the rated current (RMS value), which is drawn by the motor when operated at rated torque and rated motor speed. The input is made using the motor data sheet (third-party motor) or using automatic parameterization with the input and transfer of the motor code number in MD 1102: MOTOR_CODE.					
			HSA SLM VSA		-
P2		0.000000	0.000000	500.000000	2/4

1104	**MOTOR_MAX_CURRENT**			D05	**CR:** DM1, DÜ1
A	Maximum motor current			FLOAT	PowerOn
Enter the maximum permissible motor current (RMS value) from the motor data sheet (third-party motor), or using automatic parameterization with the input and transfer of the motor code number in MD 1102: MOTOR_CODE. This machine data should not be reduced for reasons relating to safe, reliable monitoring and limiting (also refer to MD 1105). The maximum current is entered when the motor is selected. The maximum current is the current which can be impressed at rated speed. Thus, constant acceleration is possible over the complete speed range. If reduced torque at higher speed is possible (lower speed range or jerk limiting), the current can be increased up to the peak current. If the maximum motor current is increased, the torque limit (MD 1230 = MD 1104/MD 1118 * 100) and the power limit (MD 1235 = MD 1104/MD 1118 * 100) must be adapted. This MD is included in the controller data calculation.					
			VSA		ROT/LIN
840D		0.0400	0.0000	500.0000	2/4

1104	**MOTOR_MAX_CURRENT**				**CR:** DM1, DÜ1
A	Maximum motor current			FLOAT	PowerOn
Enter the maximum permissible motor current (RMS value) from the motor data sheet (third-party motor), or using automatic parameterization with the input and transfer of the motor code number in MD 1102: MOTOR_CODE. This machine data should not be reduced for reasons relating to safe, reliable monitoring and limiting (also refer to MD 1105). The maximum current is entered when the motor is selected. The maximum current is the current which can be impressed at rated speed. Thus, constant acceleration is possible over the complete speed range. If reduced torque at higher speed is possible (lower speed range or jerk limiting), the current can be increased up to the peak current. If the maximum motor current is increased, the torque limit (MD 1230 = MD 1104/MD 1118 * 100) and the power limit (MD 1235 = MD 1104/MD 1118 * 100) must be adapted. This MD is included in the controller data calculation.					
			VSA		-
810D		0.0000	0.0000	500.0000	2/4

1104	**MOTOR_MAX_CURRENT**			D05	**CR:** DM1, DÜ1
A	Maximum motor current			FLOAT	Power On
Enter the maximum permissible motor current (RMS value) from the motor data sheet (third-party motor), or using automatic parameterization with the input and transfer of the motor code number in MD 1102: MOTOR_CODE. This machine data should not be reduced for reasons relating to safe, reliable monitoring and limiting (also refer to MD 1105). The maximum current is entered when the motor is selected. The maximum current is the current which can be impressed at rated speed. Thus, constant acceleration is possible over the complete speed range. If reduced torque at higher speed is possible (lower speed range or jerk limiting), the current can be increased up to the peak current. If the maximum motor current is increased, the torque limit (MD 1230 = MD 1104/MD 1118 * 100) and the power limit (MD 1235 = MD 1104/MD 1118 * 100) must be adapted. This MD is included in the controller data calculation.					
			VSA SLM		-
P2		0.040000	0.000000	500.000000	2/4

1105	**MOTOR_MAX_CURRENT_REDUCTION**			D05, D02	**CR:** DÜ1
%	Reducing the maximum motor current			WORD	sofort
Reference value for the percentage input is MD 1104: MOTOR_MAX_CURRENT. If the motor current is at its limit as a result of torque/power limits which are too high, then the monitoring intervenes with MD 1605 / MD1606.					
			VSA		ROT/LIN
840D		100	0	100	2/4

1105	**MOTOR_MAX_CURRENT_REDUCTION**			D02, D05	**CR:** DÜ1
%	Reducing the maximum motor current			WORD	Immediately
Reference value for the percentage input is MD 1104: MOTOR_MAX_CURRENT. If the motor current is at its limit as a result of torque/power limits which are too high, then the monitoring intervenes with MD 1605 / MD 1606.					
			VSA SLM		-
P2		100	0	100	2/4

1106	**INVERTER_CODE**			D05, D04	**CR:** DM1
HEX	Power section code number			UNS. WORD	PowerOn
The MLFB is converted into a code number (the user does not have to enter anything) by entering the power module MLFB (machine-readable product designation for Siemens power modules) when the drive is started-up with the start-up tool/MMC102/103. The following machine data (power module data) are automatically transferred from an internal power module table by the entry of the code number: 1107 Transistor limiting current, power module for FDD/MSD 1108 Thermal limiting current, power module for FDD/MSD 1109 Max. S6 current, power module for MSD 1111 Rated current, power module for FDD/MSD					
			VSA/HSA		ROT/LIN
840D		0	0	ffff	2/4

1106	**INVERTER_CODE**			D04	**CR:** DM1
-	Power section code number			UNS.WORD	Power On
The MLFB is converted into a code number (the user does not have to enter anything) by entering the power module MLFB (machine-readable product designation for Siemens power modules) when the drive is started-up with the start-up tool/MMC102/103. The following machine data (power module data) are automatically transferred from an internal power module table by the entry of the code number: 1107 Transistor limiting current, power module for FDD/MSD 1108 Thermal limiting current, power module for FDD/MSD 1109 Max. S6 current, power module for MSD 1111 Rated current, power module for FDD/MSD					
			HSA SLM VSA		-
P2		0x0000	0x0000	0xffff	2/4

1107	**INVERTER_MAX_CURRENT**			D05	**CR:** DM1
A	Transistor limiting current			FLOAT	PowerOn
Enter the maximum transistor limiting current for the power module as peak value. Siemens power modules are automatically parameterized for this machine data using MD 1106: INVERTER_CODE. Example Power module 50A FDD: 18/36A MSD: 24/32/32A Power module 50A MD 1107: INVERTER_MAX_CURRENT for MSD and FDD FDD 18/xxA MD 1111: INVERTER_RATED_CURRENT FDD xx/36A MD 1108: INVERTER_MAX_THERMINAL_CURRENT MSD 24/xx/xxA MD 1111: INVERTER_RATED_CURRENT MSD xx/32/xxA MD 1109: INTERNER_MAX_S6_CURRENT MSD xx/xx/32A MD 1108: INVERTER_MAX_THERMINAL_CURRENT Important This data is used as the normalization basis for the current actual value sensing and the user must not change it after automatic preassignment.					
			VSA/HSA		ROT/LIN
840D		200.0000	1.0000	500.0000	2/4

1107	**INVERTER_MAX_CURRENT**			D05	**CR:** DM1
A	Transistor limiting current			FLOAT	Power On
Enter the maximum transistor limiting current for the power module as peak value. Siemens power modules are automatically parameterized for this machine data using MD 1106: INVERTER_CODE. Example Power module 50A FDD: 18/36A MSD: 24/32/32A Power module 50A MD 1107: INVERTER_MAX_CURRENT for MSD and FDD FDD 18/xxA MD 1111: INVERTER_RATED_CURRENT FDD xx/36A MD 1108: INVERTER_MAX_THERMINAL_CURRENT MSD 24/xx/xxA MD 1111: INVERTER_RATED_CURRENT MSD xx/32/xxA MD 1109: INTERNER_MAX_S6_CURRENT MSD xx/xx/32A MD 1108: INVERTER_MAX_THERMINAL_CURRENT Important This data is used as the normalization basis for the current actual value sensing and the user must not change it after automatic preassignment.					
			HSA SLM VSA		-
P2		200.000000	1.000000	500.000000	2/4

1108	**INVERTER_MAX_THERMAL_CURR**			D05	**CR:** DM1
A	Power module limiting current			FLOAT	PowerOn
Enter the maximum permissible power module current as an RMS value. Siemens power modules are automatically parameterized for this machine data using MD 1106: INVERTER_CODE. Important This data is the upper limit of the thermal loading and the user must not change it after automatic preassignment.					
			VSA/HSA		ROT/LIN

840D		200.0000	1.0000	500.0000	2/4

1108	**INVERTER_MAX_THERMAL_CURR**	D05	**CR:** DM1
A	Power module limiting current	FLOAT	Power On

Enter the maximum permissible power module current as an RMS value. Siemens power modules are automatically parameterized for this machine data using MD 1106: INVERTER_CODE.

Important

This data is the upper limit of the thermal loading and the user must not change it after automatic preassignment.

		HSA SLM VSA		-

P2		200.000000	1.000000	500.000000	2/4

1109	**INVERTER_MAX_S6_CURRENT**	D05	**CR:** DM1
A	Power module limiting current S6	FLOAT	PowerOn

This machine data is used to enter the maximum permissible power module current for an S6 load duty cycle (intermittent operation). The value is an RMS value. Siemens power modules are automatically parameterized for this machine data using MD 1106: INVERTER_CODE.

Important

The user must not change this value after automatic preassignment.

		HSA		ROT

840D		200.0000	1.0000	500.0000	2/4

1109	**INVERTER_MAX_S6_CURRENT**	D05	**CR:** DM1
A	Power module limiting current S6	FLOAT	Power On

This machine data is used to enter the maximum permissible power module current for an S6 load duty cycle (intermittent operation). The value is an RMS value. Siemens power modules are automatically parameterized for this machine data using MD 1106: INVERTER_CODE.

Important

The user must not change this value after automatic preassignment.

		HSA		-

P2		200.000000	1.000000	500.000000	2/4

1111	**INVERTER_RATED_CURRENT**	D05	**CR:** DM1
A	Rated power module current	FLOAT	PowerOn

The machine data is used to enter the maximum permissible power module continuous current. The RMS value must be input. Siemens power modules are automatically parameterized for this machine data using MD 1106: INVERTER_CODE.

Important

The user must not change this value after automatic preassignment.

		VSA/HSA		ROT/LIN

840D		200.0000	1.0000	500.0000	2/4

1111	**INVERTER_RATED_CURRENT**			D05	**CR:** DM1
A	Rated power module current			FLOAT	Power On
The machine data is used to enter the maximum permissible power module continuous current. The RMS value must be input. Siemens power modules are automatically parameterized for this machine data using MD 1106: INVERTER_CODE. Important The user must not change this value after automatic preassignment.					
			HSA SLM VSA		-
P2		200.000000	1.000000	500.000000	2/4

1112	**NUM_POLE_PAIRS**				**CR:** DM1
-	Motor pole pair number			UNS. WORD	PowerOn
Enter the motor pole pair number from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is input and transferred in MD 1102: MOTOR_CODE. Pole pair number 0 is entered when an attempt is made to load motor-power module combinations which have not been released.					
			VSA		-
810D		0	0	4	2/4

1112	**NUM_POLE_PAIRS**			D05	**CR:** DM1
-	Motor pole pair number			UNS. WORD	PowerOn
Enter the motor pole pair number from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is input and transferred in MD 1102: MOTOR_CODE. Pole pair number 0 is entered when an attempt is made to load motor-power module combinations which have not been released.					
			VSA		ROT/LIN
840D		0	0	4096	2/4

1112	**NUM_POLE_PAIRS**			D05	**CR:** DM1
-	Motor pole pair number			UNS.WORD	Power On
Enter the motor pole pair number from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is input and transferred in MD 1102: MOTOR_CODE. Pole pair number 0 is entered when an attempt is made to load motor-power module combinations which have not been released.					
			VSA SLM		-
P2		0	0	4096	2/4

1113	**FORCE_CURRENT_RATIO**			D05	**CR:**
N/A	Force constant			FLOAT	PowerOn
Enter the force constant from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number in MD 1102: MOTOR_CODE. The force constant is the quotient of rated power/rated current (RMS) for synchronous linear motors.					
			VSA		LIN
840D		0.0000	0.0000	2000.0000	2/4

1113	**TORQUE_CURRENT_RATIO**				**CR:** DM1
Nm/A	Torque constant			FLOAT	PowerOn
Enter the torque constant from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. The torque constant is the quotient of rated torque/rated current (RMS) for permanent-magnet synchronous motors.					
			VSA		-
810D		0.0000	0.0000	5.0000	2/4

1113	**TORQUE_CURRENT_RATIO**			D05	**CR:** DM1
Nm/A	Torque constant			FLOAT	PowerOn
Enter the torque constant from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. The torque constant is the quotient of rated torque/rated current (RMS) for permanent-magnet synchronous motors.					
			VSA		ROT
840D		0.0000	0.0000	300.0000	2/4

1113	**TORQUE_CURRENT_RATIO**			D05	**CR:** DM1
Nm/A	Torque constant			FLOAT	Power On
Enter the torque constant from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. The torque constant is the quotient of rated torque/rated current (RMS) for permanent-magnet synchronous motors.					
			VSA SLM		-
P2		0.000000	0.000000	300.000000	2/4

1114	**EMF_VOLTAGE**				**CR:** DM1
V	Voltage constant			FLOAT	PowerOn
Enter the voltage constant from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. The voltage constant is measured as induced voltage (EMF) under no-load conditions at n = 1000 RPM as RMS value at the motor terminals (phase-to-phase).					
			VSA		-
810D		0.0000	0.0000	300.0000	2/4

1114	**EMF_VOLTAGE**			D05	**CR:** DM1
V	Voltage constant			FLOAT	PowerOn
Enter the voltage constant from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. The voltage constant is measured as induced voltage (EMF) under no-load conditions at n = 1000 RPM as RMS value at the motor terminals (phase-to-phase).					
			VSA		ROT
840D		0.0000	0.0000	10000.0000	2/4

1114	**EMF_VOLTAGE**			D05	**CR:**
Vs/m	Voltage constant			FLOAT	PowerOn
Enter the voltage constant from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number in MD 1102: MOTOR_CODE.					
			VSA		LIN
840D		0.0000	0.0000	10000.0000	2/4

1114	**EMF_VOLTAGE**			D05	**CR:** DM1
V	Voltage constant			FLOAT	Power On
Enter the voltage constant from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. The voltage constant is measured as induced voltage (EMF) under no-load conditions at n = 1000 RPM as RMS value at the motor terminals (phase-to-phase).					
			VSA SLM		-
P2		0.000000	0.000000	10000.000000	2/4

1115	**ARMATURE_RESISTANCE**				**CR:** DM1
Ohm	Armature resistance			FLOAT	PowerOn
Enter the ohmic resistance of the armature winding (phase value) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			VSA		-
810D		0.0000	0.0000	20.0000	2/4

1115	**ARMATURE_RESISTANCE**			D05	**CR:** DM1
Ohm	Armature resistance			FLOAT	PowerOn
Enter the ohmic resistance of the armature winding (phase value) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			VSA		ROT/LIN
840D		0.0000	0.0000	1000.0000	2/4

1115	**ARMATURE_RESISTANCE**			D05	**CR:** DM1
Ohm	Armature resistance			FLOAT	Power On
Enter the ohmic resistance of the armature winding (phase value) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			VSA SLM		-
P2		0.000000	0.000000	1000.000000	2/4

1116	**ARMATURE_INDUCTANCE**				**CR:** DM1
mH	Armature inductance			FLOAT	PowerOn
Enter the armature rotating field inductance from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			VSA		-
810D		0.0000	0.0000	100.0000	2/4

1116	**ARMATURE_INDUCTANCE**			D05	**CR:** DM1
mH	Armature inductance			FLOAT	PowerOn
Enter the armature rotating field inductance from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			VSA		ROT/LIN
840D		0.0000	0.0000	300.0000	2/4

1116	**ARMATURE_INDUCTANCE**			D05	**CR:** DM1
mH	Armature inductance			FLOAT	Power On
Enter the armature rotating field inductance from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			VSA SLM		-
P2		0.000000	0.000000	300.000000	2/4

1117	**MOTOR_MASS**			D05	**CR:**
kg	Motor mass			FLOAT	sofort
Enter the motor mass from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number in MD 1102: MOTOR_CODE is entered . Note: If the primary part is fixed and the secondary part is moved the mass of secondary part must be entered. This MD is included in the controller data calculation.					
			VSA		LIN
840D		0.0000	0.0000	500.0000	2/4

1117	**MOTOR_INERTIA**				**CR:** DM1
kgm2	Motor moment of inertia			FLOAT	PowerOn
Enter the motor moment of inertia from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE (for motors without holding brake). This MD is included in the controller data calculation.					
			VSA/HSA		-
810D		0.0000	0.0000	32.0000	2/4

1117	**MOTOR_INERTIA**			D05	**CR:** DM1
kgm2	Motor moment of inertia			FLOAT	sofort
Enter the motor moment of inertia from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE (for motors without holding brake). This MD is included in the controller data calculation.					
			VSA/HSA		ROT
840D		0.0000	0.0000	32.0000	2/4

1117	**MOTOR_INERTIA**			D05	**CR:** DM1
kgm²	Motor moment of inertia			FLOAT	Immediately
Enter the motor moment of inertia from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE (for motors without holding brake). This MD is included in the controller data calculation.					
			HSA SLM VSA		-
P2		0.000000	0.000000	32.000000	2/4

1118	**MOTOR_STANDSTILL_CURRENT**			D05	**CR:** DM1
A	Motor standstill current			FLOAT	PowerOn
Enter the motor standstill current (RMS) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This machine data corresponds to the thermally permissible continuous current when the motor is at a standstill, with an overtemperature of 100 Kelvin. This MD is included in the controller data calculation.					
			VSA		ROT/LIN
840D		0.0000	0.0000	500.0000	2/4

1118	**MOTOR_STANDSTILL_CURRENT**			D05	**CR:** DM1
A	Motor standstill current			FLOAT	Power On
Enter the motor standstill current (RMS) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This machine data corresponds to the thermally permissible continuous current when the motor is at a standstill, with an overtemperature of 100 Kelvin. This MD is included in the controller data calculation.					
			VSA SLM		-
P2		0.000000	0.000000	500.000000	2/4

1119	**SERIES_INDUCTANCE**			D05	**CR:** DM1
mH	Inductance of the series reactor			FLOAT	PowerOn
For special high-speed asynchronous motors or low leakage asynchronous motors, a series reactor is generally required to ensure stable current controller operation. The inductance of the reactor is taken into account in the current model.					
			HSA		ROT
840D		0.0000	0.0000	65.0000	2/4

1119	**SERIES_INDUCTANCE**			D05	**CR:** DM1
mH	Inductance of the series reactor			FLOAT	Power On
For special high-speed asynchronous motors or low leakage asynchronous motors, a series reactor is generally required to ensure stable current controller operation. The inductance of the reactor is taken into account in the current model.					
			HSA		-
P2		0.000000	0.000000	65.000000	2/4

1120	**CURRCTRL_GAIN**			D01, EXP	**CR:** DS1
V/A	Current controller proportional gain			FLOAT	sofort
Enter the current controller proportional gain or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function (from the motor and power module data).					
			VSA/HSA		ROT/LIN
840D		10.0000	0.0000	10000.0000	2/4

1120	**CURRCTRL_GAIN**			D01, EXP	**CR:** DS1
V/A	Current controller proportional gain			FLOAT	Immediately
Enter the current controller proportional gain or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function (from the motor and power module data).					
			HSA SLM VSA		-

P2		10.000000	0.000000	10000.000000	2/4

1121	**CURRCTRL_INTEGRATOR_TIME**	D01, EXP	**CR:** DS1
us	Current controller integral action time	FLOAT	sofort

Enter the current controller integral action time or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function.

Note

The integral component can be disabled by entering TN = 0.

			VSA/HSA		ROT/LIN
840D		2000.0000	0.0000	8000.0000	2/4

1121	**CURRCTRL_INTEGRATOR_TIME**	D01, EXP	**CR:** DS1
us	Current controller integral action time	FLOAT	Immediately

Enter the current controller integral action time or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function.

Note

The integral component can be disabled by entering TN = 0.

			HSA SLM VSA		-
P2		2000.000000	0.000000	8000.000000	2/4

1122	**MOTOR_LIMIT_CURRENT**	D05	**CR:** DS1
A	Motor limit current	FLOAT	PowerOn

Refer to 1104

			VSA		ROT/LIN
840D		0.0000	0.0000	500.0000	2/4

1122	**MOTOR_LIMIT_CURRENT**	D05	**CR:** DS1
A	Motor limit current	FLOAT	Power On

Refer to 1104

			VSA SLM		-
P2		0.0	0.0	500.0	2/4

1124	**CURRCTRL_REF_MODEL_DELAY**		**CR:** DS1
-	Balancing the reference model current	FLOAT	sofort

Important

This machine data is only relevant for Siemens internal purposes and must not be changed.

Enter the balancing of the current control loop reference model. This machine data simulates the computation deadtime of the current control loop. This allows the characteristics of the computation model to be adapted to the behaviour of the control system of the closed P-controlled current control.

			VSA/HSA		-
810D		0.0000	0.0000	1.0000	2/4

1124	**CURRCTRL_REF_MODEL_DELAY**			D01, EXP	**CR:** DS1
-	Balancing the reference model current			FLOAT	sofort
Important This machine data is only relevant for Siemens internal purposes and must not be changed. Enter the balancing of the current control loop reference model. This machine data simulates the computation deadtime of the current control loop. This allows the characteristics of the computation model to be adapted to the behaviour of the control system of the closed P-controlled current control.					
			VSA/HSA		ROT/LIN
840D		0.5000	0.0000	1.0000	2/4

1124	**CURRCTRL_REF_MODEL_DELAY**			D01, EXP	**CR:** DS1
-	Balancing the reference model current			FLOAT	Immediately
Important This machine data is only relevant for Siemens internal purposes and must not be changed. Enter the balancing of the current control loop reference model. This machine data simulates the computation deadtime of the current control loop. This allows the characteristics of the computation model to be adapted to the behaviour of the control system of the closed P-controlled current control.					
			HSA SLM VSA		-
P2		0.500000	0.000000	1.000000	2/4

1125	**UF_MODE_RAMP_TIME_1**			D04, EXP	**CR:** DE1
s	Ramp-up time 1 in V/f operation			FLOAT	sofort
If V/f operation is selected (MD 1014), this is the time, in which the speed set-point is changed from 0 to the maximum motor speed (MD 1146). Either time 1 or time 2 (MD1126) can be selected via IS "ramp-up time" DB31, ... DBX 20.0.					
			VSA/HSA		ROT/LIN
840D		5.0000	0.0100	100.0000	2/4

1125	**UF_MODE_RAMP_TIME_1**			D04	**CR:** DE1
s	Ramp-up time 1 in V/f operation			FLOAT	Immediately
If V/f operation is selected (MD 1014), this is the time, in which the speed set-point is changed from 0 to the maximum motor speed (MD 1146). Either time 1 or time 2 (MD1126) can be selected via IS "ramp-up time" DB31, ... DBX 20.0.					
			HSA SLM VSA		-
P2		5.000000	0.010000	100.000000	2/4

1126	**UF_MODE_RAMP_TIME_2**			D04, EXP	**CR:** DE1
s	Ramp-up time 2 in V/f operation			FLOAT	sofort
If V/f operation is selected (MD 1014), this is the time, in which the speed set-point is changed from 0 to the maximum motor speed (MD 1146). Either time 1 or time 2 (MD1126) can be selected via IS "ramp-up time" DB31, ... DBX 20.0.					
			VSA/HSA		ROT/LIN
840D		5.0000	0.0100	100.0000	2/4

1126	**UF_MODE_RAMP_TIME_2**			D04	**CR:** DE1
s	Ramp-up time 2 in V/f operation			FLOAT	Immediately
If V/f operation is selected (MD 1014), this is the time, in which the speed set-point is changed from 0 to the maximum motor speed (MD 1146). Either time 1 or time 2 (MD1126) can be selected via IS "ramp-up time" DB31, ... DBX 20.0.					
			HSA SLM VSA		-
P2		5.000000	0.010000	100.000000	2/4

1127	**UF_VOLTAGE_AT_F0**			D04, D05, EXP	**CR:** DE1
V	Voltage at f=0 in V/f operation			FLOAT	sofort
When V/f operation is selected (MD1014), and at frequency 0, the voltage to be output is increased by this value. The MD is set as default by the operator initiating the "Calculate controller data" function.					
			HSA		ROT
840D		2.0000	0.0000	20.0000	2/4

1127	**UF_VOLTAGE_AT_F0**			D04	**CR:** DE1
V	Voltage at f=0 in V/f operation			FLOAT	Immediately
When V/f operation is selected (MD1014), and at frequency 0, the voltage to be output is increased by this value. The MD is set as default by the operator initiating the "Calculate controller data" function.					
			HSA		-
P2		2.000000	0.000000	20.000000	2/4

1128	**OPT_LOAD_ANGEL**			EXP, D05	**CR:** FBU, POS3
Grad	Optimum load angle			FLOAT	sofort
In the case of synchronous motors without dynamically balanced rotors, the additional reluctance torque can be used to increase the torque. The optimum load angle indicates at which load angle the torque reaches its maximum value with a 1.5-fold rated current. Note: Refer to MD 1149 (reluctance torque constant) Synchronous motors without dynamically balanced rotor: e.g. 1FE motors Travel with reluctance torque: MD 1128 and MD 1149 unequal to default Travel without reluctance torque: MD 1128 and MD1149 equal to default					
			VSA		ROT/LIN
840D		90.0000	90.0000	135.0000	2/4

1128	**OPT_LOAD_ANGEL**			EXP, D05	**CR:** FBU, POS3
degrees	Optimum load angle			FLOAT	Immediately
In the case of synchronous motors without dynamically balanced rotors, the additional reluctance torque can be used to increase the torque. The optimum load angle indicates at which load angle the torque reaches its maximum value with a 1.5-fold rated current. Note: Refer to MD 1149 (reluctance torque constant) Synchronous motors without dynamically balanced rotor: e.g. 1FE motors Travel with reluctance torque: MD 1128 and MD 1149 unequal to default Travel without reluctance torque: MD 1128 and MD 1149 equal to default					
			VSA SLM		-
P2		90.000000	90.000000	135.000000	2/4

1129	**POWER_FACTOR_COS_PHI**			D05	**CR:** DM1
-	Cos phi power factor			FLOAT	PowerOn
Cos phi is required to calculate the equivalent circuit diagram data from the rating plate data.					
			HSA		ROT
840D		0.8000	0.0000	1.0000	2/4

1129	**POWER_FACTOR_COS_PHI**			D05	**CR:** DM1
-	Cos phi power factor			FLOAT	Power On
Cos phi is required to calculate the equivalent circuit diagram data from the rating plate data.					
			HSA		-
P2		0.800000	0.000000	1.000000	2/4

1130	**MOTOR_NOMINAL_POWER**			D05	**CR:** DM1
kW	Rated motor output			FLOAT	PowerOn
Enter the rated motor output from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			HSA		ROT
840D		0.0000	0.0000	1500.0000	2/4

1130	**MOTOR_NOMINAL_POWER**			D05	**CR:** DM1
kW	Rated motor output			FLOAT	Power On
Enter the rated motor output from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			HSA		-
P2		0.000000	0.000000	1500.000000	2/4

1132	**MOTOR_NOMINAL_VOLTAGE**				**CR:** DM1
V	Rated motor voltage			FLOAT	PowerOn
Enter the rated motor voltage from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			HSA		-
810D		0.0000	0.0000	5000.0000	2/4

1132	**MOTOR_NOMINAL_VOLTAGE**			D05	**CR:** DM1
V	Rated motor voltage			FLOAT	PowerOn
Enter the rated motor voltage from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			HSA		ROT
840D		380.0000	0.0000	5000.0000	2/4

1132	**MOTOR_NOMINAL_VOLTAGE**			D05	**CR:** DM1
V	Rated motor voltage			FLOAT	Power On
Enter the rated motor voltage from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			HSA		-
P2		380.000000	0.000000	5000.000000	2/4

1134	**MOTOR_NOMINAL_FREQUENCY**			D05	**CR:** DM1
Hz	Rated motor frequency			FLOAT	PowerOn
Enter the rated motor frequency from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			HSA		ROT
840D		50.0000	0.0000	3000.0000	2/4

1134	**MOTOR_NOMINAL_FREQUENCY**				**CR:** DM1
Hz	Rated motor frequency			FLOAT	PowerOn
Enter the rated motor frequency from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			HSA		-
810D		0.0000	0.0000	3000.0000	2/4

1134	**MOTOR_NOMINAL_FREQUENCY**			D05	**CR:** DM1
Hz	Rated motor frequency			FLOAT	Power On
Enter the rated motor frequency from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			HSA		-
P2		50.000000	0.000000	3000.000000	2/4

1135	**MOTOR_NOLOAD_VOLTAGE**			D05	**CR:** DM1
V	Motor no-load voltage			FLOAT	sofort
Enter the motor no-load voltage from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			HSA		ROT
840D		0.0000	0.0000	500.0000	2/4

1135	**MOTOR_NOLOAD_VOLTAGE**			D05	**CR:** DM1
V	Motor no-load voltage			FLOAT	Immediately
Enter the motor no-load voltage from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			HSA		-
P2		0.000000	0.000000	500.000000	2/4

1136	**MOTOR_NOLOAD_CURRENT**			D05	**CR:** DM1
A	Motor no-load current			FLOAT	sofort
Enter the motor no-load current (RMS) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. The no-load current is assigned when the motor is selected from the list of motors or set according to the data sheet of the motor manufacturer. If the manufacturer of the motor has not specified the no-load current, the following formula may be used to calculate the value: MD 1136 = MD 1114 x 60 [sec] / (1000 x sq-root (3) x MD 1112 x MD 1116) MD 1112: NUM_POLE_PAIRS MD 1114: EMF_VOLTAGE MD 1116: ARMATURE_INDUCTANCE					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	500.0000	2/4

1136	**MOTOR_NOLOAD_CURRENT**			D05	**CR:** DM1
A	Motor no-load current			FLOAT	Immediately
Enter the motor no-load current (RMS) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. The no-load current is assigned when the motor is selected from the list of motors or set according to the data sheet of the motor manufacturer. If the manufacturer of the motor has not specified the no-load current, the following formula may be used to calculate the value: MD 1136 = MD 1114 x 60 [sec] / (1000 x sq-root (3) x MD 1112 x MD 1116) MD 1112: NUM_POLE_PAIRS MD 1114: EMF_VOLTAGE MD 1116: ARMATURE_INDUCTANCE					
			HSA SLM VSA		-
P2		0.000000	0.000000	500.000000	2/4

1137	**STATOR_COLD_RESISTANCE**			D05	**CR:** DM1
Ohm	Cold stator resistance			FLOAT	sofort
Enter the stator resistance (cold condition) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			HSA		ROT
840D		0.0000	0.0000	120.0000	2/4

1137	**STATOR_COLD_RESISTANCE**			D05	**CR:** DM1
Ohm	Cold stator resistance			FLOAT	Immediately
Enter the stator resistance (cold condition) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			HSA		-
P2		0.000000	0.000000	120.000000	2/4

1138	**ROTOR_COLD_RESISTANCE**			D05	**CR:** DM1
Ohm	Cold rotor resistance			FLOAT	sofort
Enter the rotor resistance (cold condition) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			HSA		ROT
840D		0.0000	0.0000	120.0000	2/4

1138	**ROTOR_COLD_RESISTANCE**			D05	**CR:** DM1
Ohm	Cold rotor resistance			FLOAT	Immediately
Enter the rotor resistance (cold condition) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			HSA		-
P2		0.000000	0.000000	120.000000	2/4

1139	**STATOR_LEAKAGE_REACTANCE**			D05	**CR:** DM1
Ohm	Stator leakage reactance			FLOAT	sofort
Enter the stator leakage reactance from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			HSA		ROT
840D		0.0000	0.0000	100.0000	2/4

1139	**STATOR_LEAKAGE_REACTANCE**			D05	**CR:** DM1
Ohm	Stator leakage reactance			FLOAT	Immediately
Enter the stator leakage reactance from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			HSA		-
P2		0.000000	0.000000	100.000000	2/4

1140	**ROTOR_LEAKAGE_REACTANCE**			D05	**CR:** DM1
Ohm	Rotor leakage reactance			FLOAT	sofort
Enter the rotor leakage reactance from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			HSA		ROT
840D		0.0000	0.0000	100.0000	2/4

1140	**ROTOR_LEAKAGE_REACTANCE**			D05	**CR:** DM1
Ohm	Rotor leakage reactance			FLOAT	Immediately
Enter the rotor leakage reactance from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			HSA		-
P2		0.000000	0.000000	100.000000	2/4

1141	**MAGNETIZING_REACTANCE**			D05	**CR:** DM1
Ohm	Magnetizing reactance			FLOAT	sofort
Enter the magnetizing reactance from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			HSA		ROT
840D		0.0000	0.0000	1000.0000	2/4

1141	**MAGNETIZING_REACTANCE**			D05	**CR:** DM1
Ohm	Magnetizing reactance			FLOAT	Immediately
Enter the magnetizing reactance from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			HSA		-
P2		0.000000	0.000000	1000.000000	2/4

1142	**FIELD_WEAKENING_SPEED**			D05	**CR:** DM1, DD2
1/min	Threshold speed for field weakening			FLOAT	sofort
Enter the threshold speed for field weakening from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. In the field-weakening range, the magnetizing inductance L_h linearly increases from the saturated value at the threshold speed for the field weakening up to the non-saturated value at the higher speed of the L_h characteristic. If the manufacturer of the motor has not specified the threshold speed, it can be calculated using the following formula: MD 1142 = 380 V x 1000 [rpm] / MD 1114 MD 1114: EMF_VOLTAGE This MD is included in the controller data calculation.					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	100000.0000	2/4

1142	**FIELD_WEAKENING_SPEED**				**CR:** DM1, DD2
1/min	Threshold speed for field weakening			FLOAT	PowerOn
Enter the threshold speed for field weakening from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. In the field-weakening range, the magnetizing inductance L_h linearly increases from the saturated value at the threshold speed for the field weakening up to the non-saturated value at the higher speed of the L_h characteristic. If the manufacturer of the motor has not specified the threshold speed, it can be calculated using the following formula: MD 1142 = 380 V x 1000 [rpm] / MD 1114 MD 1114: EMF_VOLTAGE This MD is included in the controller data calculation.					
			HSA		-
810D		0.0000	0.0000	50000.0000	2/4

1142	**FIELD_WEAKENING_SPEED**			D05	**CR:** DM1, DD2
1/min	Threshold speed for field weakening			FLOAT	Immediately
Enter the threshold speed for field weakening from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. In the field-weakening range, the magnetizing inductance L_h linearly increases from the saturated value at the threshold speed for the field weakening up to the non-saturated value at the higher speed of the L_h characteristic. If the manufacturer of the motor has not specified the threshold speed, it can be calculated using the following formula: MD 1142 = 380 V x 1000 [rpm] / MD 1114 MD 1114: EMF_VOLTAGE This MD is included in the controller data calculation.					
			HSA SLM VSA		-
P2		0.000000	0.000000	100000.000000	2/4

1143	**LH_CURVE_UPPER_SPEED**			-	**CR:** DM1, DD2
1/min	Upper speed for the L_h characteristic			FLOAT	PowerOn
Enter the upper speed for the L_h characteristic (main field inductance L_h) using the motor data sheet (third-party motor) or automatically parameterized when the motor code number is entered and transferred in MD1102: MOTOR_CODE. The magnetizing inductance in the field-weakening range increases linearly from the saturated value at the threshold speed for field weakening up to the unsaturated value at the upper speed of the L_h characteristic (see graphical representation of MD 1144).					
			HSA		ROT
840D		0.0000	0.0000	100000.0000	2/4

1143	**LH_CURVE_UPPER_SPEED**				**CR:** DM1, DD2
1/min	Upper speed for the L_h characteristic			FLOAT	PowerOn
Enter the upper speed for the L_h characteristic (main field inductance L_h) using the motor data sheet (third-party motor) or automatically parameterized when the motor code number is entered and transferred in MD1102: MOTOR_CODE. The magnetizing inductance in the field-weakening range increases linearly from the saturated value at the threshold speed for field weakening up to the unsaturated value at the upper speed of the L_h characteristic (see graphical representation of MD 1144).					
			HSA		-
810D		0.0000	0.0000	50000.0000	2/4

1143	**LH_CURVE_UPPER_SPEED**			-	**CR:** DM1, DD2
1/min	Upper speed for the L_h characteristic			FLOAT	Power On
Enter the upper speed for the L_h characteristic (main field inductance L_h) using the motor data sheet (third-party motor) or automatically parameterized when the motor code number is entered and transferred in MD1102: MOTOR_CODE. The magnetizing inductance in the field-weakening range increases linearly from the saturated value at the threshold speed for field weakening up to the unsaturated value at the upper speed of the L_h characteristic (see graphical representation of MD 1144).					
			HSA		-
P2		0.000000	0.000000	100000.000000	2/4

1144	**LH_CURVE_GAIN**			-	**CR:** DM1, DD2
%	Gain factor of the L_h characteristic			FLOAT	PowerOn
Enter the gain factor (L_h2 /L_h1) of the L_h characteristic (magnetizing inductance) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. In the field-weakening range, the magnetizing inductance L_h linearly increases from the saturated value at the threshold speed of field weakening to the non-saturated value at the upper speed of the L_h characteristic. Note 100 % should be entered if the value is not known, so that the magnetizing inductance is constant over the complete speed range.					
			HSA		ROT
840D		100.0000	100.0000	500.0000	2/4

1144	**LH_CURVE_GAIN**			-	**CR:** DM1, DD2
%	Gain factor of the L_h characteristic			FLOAT	Power On
Enter the gain factor (L_h2 /L_h1) of the L_h characteristic (magnetizing inductance) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. In the field-weakening range, the magnetizing inductance L_h linearly increases from the saturated value at the threshold speed of field weakening to the non-saturated value at the upper speed of the L_h characteristic. Note 100 % should be entered if the value is not known, so that the magnetizing inductance is constant over the complete speed range.					
			HSA		-
P2		100.000000	100.000000	500.000000	2/4

1145	**STALL_TORQUE_REDUCTION**			D05	**CR:** DM1, DÜ1
%	Stall torque reduction factor			FLOAT	sofort
Enter the stall torque factor from the motor data sheet. The stall torque limit application point is changed using this machine data. For settings greater than 100 %, the application point is increased, and for less than 100 %, the application point is decreased.					
			VSA/HSA		ROT/LIN
840D		100.0000	5.0000	1000.0000	2/4

1145	**STALL_TORQUE_REDUCTION**			D05	**CR:** DM1, DÜ1
%	Stall torque reduction factor			FLOAT	Immediately
Enter the stall torque factor from the motor data sheet. The stall torque limit application point is changed using this machine data. For settings greater than 100 %, the application point is increased, and for less than 100 %, the application point is decreased.					
			HSA SLM VSA		-
P2		100.000000	5.000000	1000.000000	2/4

1146	**MOTOR_MAX_ALLOWED_SPEED**			D05	**CR:** DM1, DÜ1
1/min	Maximum motor speed			FLOAT	PowerOn

Enter the maximum motor speed using the motor data sheet (third-party motor) or using automatic parameterization with the input and transfer of the motor code number in MD 1102: MOTOR_CODE.

This MD is included in the controller data calculation.

If the actual speed value exceeds the speed limit (MD 1147) by more than 4 percent, the torque limit (motoring) is internally set to 0, i.e. further acceleration is prevented.

If the motor actual speed falls below the value of MD 1146 + 2%, the torque limit is also reset to its original value.

With an appropriate setting, it is possible that the "speed controller at its limit" monitoring responds (response threshold MD 1606 > MD 1146 and response time > MD1605).

Reference: /IAD/Start-up Guide SINUMERIK 840D

			VSA/HSA		ROT
840D		0.0000	0.0000	100000.0000	2/4

1146	**MOTOR_MAX_ALLOWED_SPEED**				**CR:** DM1, DÜ1
1/min	Maximum motor speed			FLOAT	PowerOn

Enter the maximum motor speed using the motor data sheet (third-party motor) or using automatic parameterization with the input and transfer of the motor code number in MD 1102: MOTOR_CODE.

This MD is included in the controller data calculation.

If the actual speed value exceeds the speed limit (MD 1147) by more than 4 percent, the torque limit (motoring) is internally set to 0, i.e. further acceleration is prevented.

If the motor actual speed falls below the value of MD 1146 + 2%, the torque limit is also reset to its original value.

With an appropriate setting, it is possible that the "speed controller at its limit" monitoring responds (response threshold MD 1606 > MD 1146 and response time > MD1605).

Reference: /IAD/Start-up Guide SINUMERIK 840D

			VSA/HSA		-
810D		0.0000	0.0000	50000.0000	2/4

1146	**MOTOR_MAX_ALLOWED_SPEED**			D05	**CR:**
m/min	Maximum motor speed			FLOAT	PowerOn

Enter the maximum motor speed using the motor data sheet (third-party motor) or using automatic parameterization with the input and transfer of the motor code number in MD 1102: MOTOR_CODE.

This MD is included in the controller data calculation.

If the speed actual value exceeds the speed limit (MD 1147) by more than 4 percent, the force limit (motoring) is internally set to 0, i.e. the drive cannot accelerate.

If the motor actual speed value falls below the value of MD 1146 + 2%, the force limit is also reset to its original value.

With an appropriate setting, it is possible that the "speed controller at its limit" responds (response threshold MD 1606 > MD 1146 and response time > MD1605).

			VSA		LIN
840D		0.0000	0.0000	100000.0000	2/4

1146	**MOTOR_MAX_ALLOWED_SPEED**			D05	**CR:** DM1, DÜ1
1/min	Maximum motor speed			FLOAT	Power On

Enter the maximum motor speed using the motor data sheet (third-party motor) or using automatic parameterization with the input and transfer of the motor code number in MD 1102: MOTOR_CODE.

This MD is included in the controller data calculation.

If the actual speed value exceeds the speed limit (MD 1147) by more than 4 percent, the torque limit (motoring) is internally set to 0, i.e. further acceleration is prevented.

If the motor actual speed falls below the value of MD 1146 + 2%, the torque limit is also reset to its original value.

With an appropriate setting, it is possible that the "speed controller at its limit" monitoring responds (response threshold MD 1606 > MD 1146 and response time > MD 1605).

Reference: /IAD/Start-up Guide SINUMERIK 840D

			HSA SLM VSA		-
P2		0.000000	0.000000	100000.000000	2/4

1147	**SPEED_LIMIT**			D02, D05	**CR:**
m/min	Maximum permissible motor speed			FLOAT	sofort

Enter the maximum permissible motor speed or automatic parameterization (initialization) via calculate contr. MD using the machine data

- FDD: MD 1400: MOTOR_RATED_SPEED x 110 %

If the speed actual value exceeds the speed limit (MD 1147) by more than 4 percent, the force limit (motoring) is internally set to 0, i.e. the drive cannot accelerate.

If the motor actual speed value falls below the value of MD 1147 + 2%, the force limit is also reset to its original value.

With an appropriate setting, it is possible that the "speed controller at its limit" responds (response threshold MD 1606 > MD 1147 and response time > MD1605).

			VSA		LIN
840D		120.0000	0.0000	100000.0000	2/4

1147	**SPEED_LIMIT**			D02, D05	**CR:** DÜ1
1/min	Motor speed limit			FLOAT	sofort

Enter the maximum permissible motor speed or automatic parameterization (initialization) is performed by the operator initiating the "Calculate controller data" function using the machine data.

- FDD: MD 1400: MOTOR_RATED_SPEED x 110 %
- MSD: MD 1146: MOTOR_MAX_ALLOWED_SPEED

If the actual speed value exceeds the speed limit (MD 1147) by more than 4 percent, the torque limit (motoring) is internally set to 0, i.e. further acceleration is prevented.

If the motor actual value falls below the value of MD 1147 + 2%, the torque limit is also reset to its original value.

With an appropriate setting, it is possible that the "speed controller at its limit" monitoring responds (response threshold MD 1606 > MD 1147 and response time > MD1605).

			VSA/HSA		ROT
840D		7000.0000	0.0000	100000.0000	2/4

1147	**SPEED_LIMIT**				**CR:** DÜ1
1/min	Motor speed limit			FLOAT	sofort
Enter the maximum permissible motor speed or automatic parameterization (initialization) is performed by the operator initiating the "Calculate controller data" function using the machine data. - FDD: MD 1400: MOTOR_RATED_SPEED x 110 % - MSD: MD 1146: MOTOR_MAX_ALLOWED_SPEED If the actual speed value exceeds the speed limit (MD 1147) by more than 4 percent, the torque limit (motoring) is internally set to 0, i.e. further acceleration is prevented. If the motor actual value falls below the value of MD 1147 + 2%, the torque limit is also reset to its original value. With an appropriate setting, it is possible that the "speed controller at its limit" monitoring responds (response threshold MD 1606 > MD 1147 and response time > MD1605).					
			VSA/HSA		-
810D		7000.0000	0.0000	50000.0000	2/4

1147	**SPEED_LIMIT**			D02, D05	**CR:** DÜ1
1/min	Motor speed limit			FLOAT	Immediately
Enter the maximum permissible motor speed or automatic parameterization (initialization) is performed by the operator initiating the "Calculate controller data" function using the machine data. - FDD: MD 1400: MOTOR_RATED_SPEED x 110 % - MSD: MD 1146: MOTOR_MAX_ALLOWED_SPEED If the actual speed value exceeds the speed limit (MD 1147) by more than 4 percent, the torque limit (motoring) is internally set to 0, i.e. further acceleration is prevented. If the motor actual value falls below the value of MD 1147 + 2%, the torque limit is also reset to its original value. With an appropriate setting, it is possible that the "speed controller at its limit" monitoring responds (response threshold MD 1606 > MD 1147 and response time > MD 1605).					
			HSA SLM VSA		-
P2		7000.000000	0.000000	100000.000000	2/4

1148	**ACTUAL_STALL_POWER_SPEED**			D04	**CR:** DD1
1/min	Threshold speed of pull-out power			FLOAT	sofort
Display of speed from which the torque characteristic drops according to the function 1/n ² .					
			HSA		ROT
840D		0.0000	-100000.0000	100000.0000	2/4

1148	**ACTUAL_STALL_POWER_SPEED**			D04	**CR:** DD1
1/min	Threshold speed of pull-out power			FLOAT	Immediately
Display of speed from which the torque characteristic drops according to the function 1/n ² .					
			HSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1149	**RELUCT_TORQUE_RATIO**			D05	**CR:** FBU
mH	Reluctance torque constant			FLOAT	sofort
In the case of synchronous motors without dynamically balanced rotors, the additional reluctance torque can be used to increase the torque. On the basis of the reluctance torque, the reluctance torque constant multiplied with the torque-producing and fault-producing current yields an increased torque. Note: Refer to MD 1128 (optimum load angle) Synchronous motors without dynamically balanced rotor: e.g. 1FE motors Travel with reluctance torque: MD 1128 and MD 1149 unequal to default Travel without reluctance torque: MD 1128 and MD1149 equal to default					
			VSA		ROT/LIN
840D		0.0000	0.0000	300.0000	2/4

1149	**RELUCT_TORQUE_RATIO**			EXP, D05	**CR:** FBU
mH	Reluctance torque constant			FLOAT	Immediately
In the case of synchronous motors without dynamically balanced rotors, the additional reluctance torque can be used to increase the torque. On the basis of the reluctance torque, the reluctance torque constant multiplied with the torque-producing and fault-producing current yields an increased torque. Note: Refer to MD 1128 (optimum load angle) Synchronous motors without dynamically balanced rotor: e.g. 1FE motors Travel with reluctance torque: MD 1128 and MD 1149 unequal to default Travel without reluctance torque: MD 1128 and MD1149 equal to default					
			VSA SLM		-
P2		0.000000	0.000000	300.000000	2/4

1150	**FIELDCTRL_GAIN**			D01, EXP	**CR:** DS1
A/(Vs)	Flux controller P-gain			FLOAT	sofort
Enter the flux controller proportional gain or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function.					
			HSA		ROT
840D		400.0000	0.0000	100000.0000	2/4

1150	**FIELDCTRL_GAIN**			D01, EXP	**CR:** DS1
A/(Vs)	Flux controller P-gain			FLOAT	Immediately
Enter the flux controller proportional gain or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function.					
			HSA SLM VSA		-
P2		400.000000	0.000000	100000.000000	2/4

1151	**FIELDCTRL_INTEGRATOR_TIME**			D01, EXP	**CR:** DS1
ms	Flux controller integral-action time			FLOAT	sofort
Enter the flux controller integral-action time or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function.					
			HSA		ROT
840D		10.0000	0.0000	500.0000	2/4

1151	**FIELDCTRL_INTEGRATOR_TIME**			D01, EXP	**CR:** DS1
ms	Flux controller integral-action time			FLOAT	Immediately
Enter the flux controller integral-action time or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function.					
			HSA SLM VSA		-
P2		10.000000	0.000000	500.000000	2/4

1159	**FLUX_MODEL_CORRECTION**			D01, EXP, D04	**CR:** DS1
-	Flow model correction			UNS.WORD	Immediately
The flow model for the asynchronous machine was extended: In case of excess sampling (e.g. current controller cycle 62.5 µs, switching frequency 4 kHz) more than two current measurements are performed during half a switching period. The evaluation is no longer restricted to the last two current values, but also considers older measured values. This also influences the model leakage inductance. This change ensures a better adaptation between the flow models for lower and higher speeds. The difference regarding the no-load current below and above the limit of use (MD 1160) becomes smaller, the calculated flow value becomes smoother and more precise. This correction is activated by default with MD 1159=1. The former statis can still be set with MD 1159=0. Also in case of decimal values (e.g. 5.33 kHz, 62.5 µs), the no-load current difference will be improved.					
			HSA SLM VSA		-
P2		1	0	1	2/4

1160	**FLUX_AQUISITION_SPEED**				**CR:** DS1
1/min	Threshold speed for flux sensing			FLOAT	sofort
Enter the threshold speed for flux sensing or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function. Important: This machine data is only relevant for Siemens internal purposes and may not be changed.					
			HSA		-
810D		1500.0000	200.0000	50000.0000	2/4

1160	**FLUX_ACQUISITION_SPEED**			D01, EXP	**CR:** DS1
1/min	Threshold speed for flux sensing			FLOAT	sofort
Enter the threshold speed for flux sensing or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function. Important: This machine data is only relevant for Siemens internal purposes and may not be changed.					
			HSA		ROT
840D		1500.0000	200.0000	100000.0000	2/4

1160	**FLUX_ACQUISITION_SPEED**			D01, EXP	**CR:** DS1
1/min	Threshold speed for flux sensing			FLOAT	Immediately
Enter the threshold speed for flux sensing or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function. Important: This machine data is only relevant for Siemens internal purposes and may not be changed.					
			HSA		-
P2		1500.000000	200.000000	100000.000000	2/4

1161	**FIXED_LINK_VOLTAGE**			D02	**CR:** DS1
V	Fixed DC link voltage			UNS. WORD	sofort
By specifying a fixed DC link voltage > 0 V, the DC link measurement is deactivated, i.e. the MD 1701: LINK_VOLTAGE (DC link voltage display) is inactive (display: "#"). The voltage reference is used in the following instead of the measurement: - DC link adaptation - Flux sensing (main spindle drives) - Field weakening and stall torque (only for main spindle drives) It is monitored as to whether it is permissible to activate the DC link measurement (MD 1161 = 0) as a function of the hardware expansion level (parameterized error). The DC link is measured in the I/R module, and is transferred as an analog signal to the 611 D modules via the drive bus. Only this signal is evaluated in the drive module. Note: From SW 4.2, changing the default value from 600 V to 0 V activates measurement of the DC link voltage by default. To allow correct start-up of older HW that has no DC link measurement, these HW versions are set to MD 1161 = 600 V by "Calculate controller data".					
			VSA/HSA		ROT/LIN
840D		0	0	700	2/4

1161	**FIXED_LINK_VOLTAGE**			D02	**CR:** DS1
V	Fixed DC link voltage			UNS.WORD	Immediately
By specifying a fixed DC link voltage > 0 V, the DC link measurement is deactivated, i.e. the MD 1701: LINK_VOLTAGE (DC link voltage display) is inactive (display: "#"). The voltage reference is used in the following instead of the measurement: - DC link adaptation - Flux sensing (main spindle drives) - Field weakening and stall torque (only for main spindle drives) It is monitored as to whether it is permissible to activate the DC link measurement (MD 1161 = 0) as a function of the hardware expansion level (parameterized error). The DC link is measured in the I/R module, and is transferred as an analog signal to the 611 D modules via the drive bus. Only this signal is evaluated in the drive module. Note: From SW 4.2, changing the default value from 600 V to 0 V activates measurement of the DC link voltage by default. To allow correct start-up of older HW that has no DC link measurement, these HW versions are set to MD 1161 = 600 V by "Calculate controller data".					
			HSA SLM VSA		-
P2		0	0	700	2/4

1162	LINK_VOLTAGE_MIN			D02	CR: DE1
V	Minimum DC link voltage			UNS.WORD	Immediately
This machine data defines the permissible lower limit for the dc link voltage. Note: This machine data is only effective if dynamic power management is set to a value of 1 (see MD 1165).					
			HSA SLM VSA		-
P2		0	0	800	2/4

1163	LINK_VOLTAGE_MAX			D02	CR: DE1
V	Maximum DC link voltage			UNS.WORD	Immediately
This machine data defines the permissible upper limit for the dc link voltage. If this limit is exceeded, alarm 603 is output. Note: This machine data is only effective if dynamic power management is set to a value of 1 (see MD 1165).					
			HSA SLM VSA		-
P2		800	0	800	2/4

1165	DYN_MANAG_ENABLE			D02	CR: DE1
-	Dyn. energy management active			UNS.WORD	Immediately
Bit 0 dynamic power management function 0: Function inactive 1: Function active Note: This dc link voltage monitoring is only effective with regenerative braking.The thresholds which can be set are listed in MD 1162/MD 1163.					
			HSA SLM VSA		-
P2		0	0	1	2/4

1166	MOTDIAG_GROUND_PROTECTION			D02	CR: DE1, DM1
-	Pole pair pitch			UNS.WORD	Immediately
Activate ground fault detection Bit 0= 0 Automatic motor ground fault detection deactivated after ramp-up Bit 0= 1 Automatic motor ground fault detection activated after ramp-up Bit 1= 1 Start: Activate motor ground fault detection during operation (Bit1 is automatically reset after ground fault detection => that means, activation is via edge 0->1).					
			HSA SLM VSA		-
P2		0	0	3	2/4

1167	CURRENT_GROUND_IDENT			-	CR: DE1, DM1
%	Pole pair pitch			FLOAT	Immediately
Response threshold for ground fault detection, referring to the minimum value resulting from the power unit / motor current limits.					
			HSA SLM VSA		-
P2		5.000000	5.000000	15.000000	2/4

1168	**MAX_TURN_MOTORIDENT**			-	**CR:** DE1, DM1
degrees	Pole pair pitch			FLOAT	Immediately
Input of permissible movement with ground fault detection					
			HSA SLM VSA		-
P2		10.000000	0.000000	30.000000	2/4

1169	**DIAG_MOTORIDENT**			-	**CR:** DE1, DM1
-	Pole pair pitch			WORD	Immediately
A positive value designates that the ground fault detection has been completed successfully. 0: Function has not been selected or not yet terminated 1: Ground fault detection completed successfully -1: Measurement could not be started due to missing pulse enable -2: Measurement could not be started, motor/spindle rotating -3: Current response threshold exceeded -4: The motor has performed more movements during the measurement procedure than permitted in MD1168 -5: The current could not be reduced in time during the measurement procedure (no measurement possible). -6: Ground fault detection cannot be started with v/f control.					
			HSA SLM VSA		-
P2		0	-6	1	2/4

1170	**POLE_PAIR_PITCH**			D05	**CR:**
mm	Pole pair pitch			FLOAT	PowerOn
Pole pair pitch (not 810D) Enter the pole pair pitch of secondary part of synchronous linear motor.					
			VSA		LIN
840D		72.0000	0.0000	1000.0000	2/4

1170	**POLE_PAIR_PITCH**			D05	**CR:** DE1, DM1
mm	Pole pair pitch			FLOAT	Power On
Pole pair pitch (not 810D)					
			VSA SLM		-
P2		72.000000	0.000000	1000.000000	2/4

1175	**INVERTER_THERM_CURR_ASYN**			D05	**CR:** DE1, DM1
A	Power section ASYN limit current			FLOAT	PowerOn
Power section data for PE-MSD mode (MD 1015=1) Corresponds to MD 1108 with drive type ARM					
			VSA		ROT/LIN
840D		0.0000	0.0000	500.0000	2/4

1175	**INVERTER_THERM_CURR_ASYN**			D05	**CR:** DE1, DM1
A	Power section ASYN limit current			FLOAT	Power On
Power section data for PE-MSD mode (MD 1015=1) Corresponds to MD 1108 with drive type ARM					
			VSA SLM		-
P2		200.000000	0.000000	500.000000	2/4

1176	**INVERTER_MAX_S6_CURR_ASYN**			D05	**CR:** DE1, DM1
A	Power section S6 ASYN limit current			FLOAT	PowerOn
Power section data for PE-MSD mode (MD 1015=1) In order to ensure compatibility with 611D drive SW 6, we have introduced the power section data P:1176. When starting up a new system, this data is preset and will be required in 611D drive SW 6 for I²-t monitoring in PE-MSD mode. This data is not used in drive SW 5. Corresponds to MD 1109 with drive type ARM					
			VSA		ROT/LIN
840D		0.0000	0.0000	500.0000	2/4

1176	**INVERTER_MAX_S6_CURR_ASYN**			D05	**CR:** DE1, DM1
A	Power section S6 ASYN limit current			FLOAT	Power On
Power section data for PE-MSD mode (MD 1015=1) In order to ensure compatibility with 611D drive SW 6, we have introduced the power section data P:1176. When starting up a new system, this data is preset and will be required in 611D drive SW 6 for I²-t monitoring in PE-MSD mode. This data is not used in drive SW 5. Corresponds to MD 1109 with drive type ARM					
			VSA SLM		-
P2		200.000000	0.000000	500.000000	2/4

1177	**INVERTER_RATED_CURR_ASYN**			D05	**CR:** DE1, DM1
A	Power section ASYN rated current			FLOAT	PowerOn
Power section data for PE-MSD mode (MD 1015=1) Corresponds to MD 1111 with drive type ARM					
			VSA		ROT/LIN
840D		0.0000	0.0000	500.0000	2/4

1177	**INVERTER_RATED_CURR_ASYN**			D05	**CR:** DE1, DM1
A	Power section ASYN rated current			FLOAT	Power On
Power section data for PE-MSD mode (MD 1015=1) Corresponds to MD 1111 with drive type ARM					
			VSA SLM		-
P2		200.000000	0.000000	500.000000	2/4

1178	**INVERTER_DERATING_SYN**	D05	**CR:** DE1, DM1
%	Power section derating SYN	FLOAT	PowerOn

If the pulse rate f1 (MD 1100) exceeds the frequency f0 (with FDD: 4 kHz, with MSD: 3.2 kHz), the maximum permissible current of the power section (MD 1108 or MD 1175) is reduced linearly according to a characteristic. The increase of this characteristic is determined by the derating factor X1 belonging to the pulse rate 8 kHz. The derating factor X1 depends on the operating mode of the power section and is located as follows:

with FDD (MD 1015 = 0) in MD 1178

with PE-MSD (MD 1015 = 1) and with MSD in MD 1179

Upon a new installation, the derating factor X1 is preset when selecting a power section. MD 1178 and MD 1179 are preset on a FDD power section, MD 1179 is preset on a MSD power section.

During startup, the currently effective derating factor is calculated depending on the pulse rate and the derating factor X1. It can be read out in the display data MD 1099.

If you detect during startup that MD 1178 or MD 1179 is not preset (equal to zero), the drive alarm 301719 "Incomplete power section data" is output.

The derating factor influences the following currents:

with MSD: MD 1108, MD 1109 and MD 1111

with FDD: MD 1108 and MD 1111

with PE-MSD: MD 1175, MD 1176 and MD 1177

Upon a new installation, the derating factor X1 is preset when selecting a power section. MD 1178 and MD 1179 are preset on a FDD power section, MD 1179 is preset on a MSD power section.

			VSA		ROT/LIN
840D		0.0000	0.0000	100.0000	2/4

1178	**INVERTER_DERATING_SYN**	-	**CR:** DE1, DM1
%	Power section derating SYN	FLOAT	Power On

If the pulse rate f1 (MD 1100) exceeds the frequency f0 (with FDD: 4 kHz, with MSD: 3.2 kHz), the maximum permissible current of the power section (MD 1108 or MD 1175) is reduced linearly according to a characteristic. The increase of this characteristic is determined by the derating factor X1 belonging to the pulse rate 8 kHz. The derating factor X1 depends on the operating mode of the power section and is located as follows:

with FDD (MD 1015 = 0) in MD 1178

with PE-MSD (MD 1015 = 1) and with MSD in MD 1179

Upon a new installation, the derating factor X1 is preset when selecting a power section. MD 1178 and MD 1179 are preset on a FDD power section, MD 1179 is preset on a MSD power section.

During startup, the currently effective derating factor is calculated depending on the pulse rate and the derating factor X1. It can be read out in the display data MD 1099.

If you detect during startup that MD 1178 or MD 1179 is not preset (equal to zero), the drive alarm 301719 "Incomplete power section data" is output.

The derating factor influences the following currents:

with MSD: MD 1108, MD 1109 and MD 1111

with FDD: MD 1108 and MD 1111

with PE-MSD: MD 1175, MD 1176 and MD 1177

Upon a new installation, the derating factor X1 is preset when selecting a power section. MD 1178 and MD 1179 are preset on a FDD power section, MD 1179 is preset on a MSD power section.

			VSA SLM		-
P2		0.0	0.0	100.0	2/4

1179	**INVERTER_DERATING_ASYN**			D05	**CR:** DE1, DM1
%	Power section derating ASYN			FLOAT	PowerOn

If the pulse rate f1 (MD 1100) exceeds the frequency f0 (with FDD: 4 kHz, with MSD: 3.2 kHz), the maximum permissible current of the power section (MD 1108 or MD 1175) is reduced linearly according to a characteristic. The increase of this characteristic is determined by the derating factor X1 belonging to the pulse rate 8 kHz. The derating factor X1 depends on the operating mode of the power section and is located as follows:

with FDD (MD 1015 = 0) in MD 1178

with PE-MSD (MD 1015 = 1) and with MSD in MD 1179

The derating factor influences the following currents:

with MSD: MD 1108, MD 1109 and MD 1111

with FDD: MD 1108 and MD 1111

with PE-MSD: MD 1175, MD 1176 and MD 1177

Upon a new installation, the derating factor X1 is preset when selecting a power section. MD 1178 and MD 1179 are preset on a FDD power section, MD 1179 is preset on a MSD power section.

During startup, the currently effective derating factor is calculated depending on the pulse rate and the derating factor X1. It can be read out in the display data MD 1099.

If you detect during startup that MD 1178 or MD 1179 is not preset (equal to zero), the drive alarm 301719 "Incomplete power section data" is output.

			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	100.0000	2/4

1179	**INVERTER_DERATING_ASYN**			-	**CR:** DE1, DM1
%	Power section derating ASYN			FLOAT	Power On

If the pulse rate f1 (MD 1100) exceeds the frequency f0 (with FDD: 4 kHz, with MSD: 3.2 kHz), the maximum permissible current of the power section (MD 1108 or MD 1175) is reduced linearly according to a characteristic. The increase of this characteristic is determined by the derating factor X1 belonging to the pulse rate 8 kHz. The derating factor X1 depends on the operating mode of the power section and is located as follows:

with FDD (MD 1015 = 0) in MD 1178

with PE-MSD (MD 1015 = 1) and with MSD in MD 1179

The derating factor influences the following currents:

with MSD: MD 1108, MD 1109 and MD 1111

with FDD: MD 1108 and MD 1111

with PE-MSD: MD 1175, MD 1176 and MD 1177

Upon a new installation, the derating factor X1 is preset when selecting a power section. MD 1178 and MD 1179 are preset on a FDD power section, MD 1179 is preset on a MSD power section.

During startup, the currently effective derating factor is calculated depending on the pulse rate and the derating factor X1. It can be read out in the display data MD 1099.

If you detect during startup that MD 1178 or MD 1179 is not preset (equal to zero), the drive alarm 301719 "Incomplete power section data" is output.

			VSA HSA SLM		-
P2		0.0	0.0	100.0	2/4

1180	**CURRCTRL_ADAPT_CURRENT_1**				**CR:** FBU, DS1
%	Lower current limit adaptation			FLOAT	sofort

With the current controller adaptation (MD 1180, MD 1181 and MD 1182), it is possible to reduce the P gain of the current controller (MD 1120) depending on the current.

MD 1180 determines the lower current value as from which the adaptation reduces linearly the P gain up to the upper current value (MD 1181).

The adaptation straight line is determined by the current values MD 1180 and MD 1181 and also by MD 1182 (current controller adaptation factor).

			VSA		ROT/LIN
840D		0.0000	0.0000	100.0000	2/4

1180	**CURRCTRL_ADAPT_CURRENT_1**			-	**CR:** FBU, DS1
%	Lower current limit adaptation			FLOAT	Immediately

With the current controller adaptation (MD 1180, MD 1181 and MD 1182), it is possible to reduce the P gain of the current controller (MD 1120) depending on the current.

MD 1180 determines the lower current value as from which the adaptation reduces linearly the P gain up to the upper current value (MD 1181).

The adaptation straight line is determined by the current values MD 1180 and MD 1181 and also by MD 1182 (current controller adaptation factor).

			VSA SLM		-
P2		0.000000	0.000000	100.000000	2/4

1181	**CURRCTRL_ADAPT_CURRENT_2**				**CR:** FBU, DS1
%	Upper current limit adaptation			FLOAT	sofort

With the current controller adaptation (MD 1180, MD 1181 and MD 1182), it is possible to reduce the P gain of the current controller (MD 1120) depending on the current.

MD 1180 determines the lower current value as from which the adaptation reduces linearly the P gain up to the upper current value (MD 1181).

The adaptation straight line is determined by the current values MD 1180 and MD 1181 and also by MD 1182 (current controller adaptation factor).

			VSA		ROT/LIN
840D		100.0000	0.0000	100.0000	2/4

1181	**CURRCTRL_ADAPT_CURRENT_2**			-	**CR:** FBU, DS1
%	Upper current limit adaptation			FLOAT	Immediately

With the current controller adaptation (MD 1180, MD 1181 and MD 1182), it is possible to reduce the P gain of the current controller (MD 1120) depending on the current.

MD 1180 determines the lower current value as from which the adaptation reduces linearly the P gain up to the upper current value (MD 1181).

The adaptation straight line is determined by the current values MD 1180 and MD 1181 and also by MD 1182 (current controller adaptation factor).

			VSA SLM		-
P2		100.000000	0.000000	100.000000	2/4

1182	**REDUCE_ARMATURE_INDUCTANCE**				**CR:** FBU, DS1
%	Current controller adaptation factor			FLOAT	sofort
With the current controller adaptation (MD 1180, MD 1181 and MD 1182), it is possible to reduce the P gain of the current controller (MD 1120) depending on the current. MD 1180 determines the lower current value as from which the adaptation reduces linearly the P gain up to the upper current value (MD 1181). The adaptation straight line is determined by the current values MD 1180 and MD 1181 and also by MD 1182 (current controller adaptation factor).					
			VSA		ROT/LIN
840D		100.0000	1.0000	100.0000	2/4

1182	**REDUCE_ARMATURE_INDUCTANCE**			-	**CR:** FBU, DS1
%	Current controller adaptation factor			FLOAT	Immediately
With the current controller adaptation (MD 1180, MD 1181 and MD 1182), it is possible to reduce the P gain of the current controller (MD 1120) depending on the current. MD 1180 determines the lower current value as from which the adaptation reduces linearly the P gain up to the upper current value (MD 1181). The adaptation straight line is determined by the current values MD 1180 and MD 1181 and also by MD 1182 (current controller adaptation factor).					
			VSA SLM		-
P2		100.000000	1.000000	100.000000	2/4

1183	**CURRCTRL_ADAPT_ENABLE**			-	**CR:** DS1
-	Current controller adaptation ON			UNS. WORD	PowerOn
MD 1183 allows to overlay the code in the current controller in order to save runtime for "Current controller adaptation OFF". 1: Current controller adaptation ON --> w/o overlay: IREG code is not recopied, since already in P-RAM 0: Current controller adaptation OFF --> with overlay: IREG code is recopied from the buffer into the P-RAM and the checksum adapted. Runtime difference: Extended by 10 commands in the current controller cycle during adaptation.					
			VSA		ROT/LIN
840D		0	0	1	2/4

1183	**CURRCTRL_ADAPT_ENABLE**			-	**CR:** DS1
-	Current controller adaptation ON			UNS.WORD	Power On
MD 1183 allows to overlay the code in the current controller in order to save runtime for "Current controller adaptation OFF". 1: Current controller adaptation ON --> w/o overlay: IREG code is not recopied, since already in P-RAM 0: Current controller adaptation OFF --> with overlay: IREG code is recopied from the buffer into the P-RAM and the checksum adapted. Runtime difference: Extended by 10 commands in the current controller cycle during adaptation.					
			VSA SLM		-
P2		1	0	1	2/4

1185	**STARTUP_FACT_CURRCTRL**			-	**CR:**
%	Startup factor P-IREG			FLOAT	sofort
Startup factor P-IREG: The MD is preset after selecting the motor.					
			HSA		ROT
840D		100.0000	0.0000	10000.0000	2/4

1185	**STARTUP_FACT_CURRCTRL**			-	**CR:** DÜ1
%	Startup factor P-IREG			FLOAT	Immediately
Startup factor P-IREG: The MD is preset according to the motor selection.					
			HSA		-
P2		100.0	0.0	10000.0	2/4

1190	**TORQUE_LIMIT_FROM_NC**			D02, EXP	**CR:** DÜ1
Nm	Evaluation of torque limit			FLOAT	sofort
This machine data is not relevant for SINUMERIK 840D/810D; it is not permissible to change the standard value.					
			VSA/HSA		ROT/LIN
840D		100.0000	0.0000	10000.0000	2/4

1190	**TORQUE_LIMIT_FROM_NC**			D02, EXP	**CR:** DÜ1
Nm	Evaluation of torque limit			FLOAT	Immediately
This machine data is not relevant for SINUMERIK 840D/810D; it is not permissible to change the standard value.					
			HSA SLM VSA		-
P2		100.000000	0.000000	10000.000000	2/4

1191	**TORQUE_LIMIT_ADAPT_SERVO**			D02, EXP	**CR:** DÜ1
-	Adapting servo torque limit			FLOAT	sofort
This machine data is not relevant for SINUMERIK 840D/810D; it is not permissible to change the standard value.					
			VSA/HSA		ROT/LIN
840D		1.0000	0.0000	100.0000	2/4

1191	**TORQUE_LIMIT_ADAPT_SERVO**			D02, EXP	**CR:** DÜ1
-	Adapting servo torque limit			FLOAT	Immediately
This machine data is not relevant for SINUMERIK 840D/810D; it is not permissible to change the standard value.					
			HSA SLM VSA		-
P2		1.000000	0.000000	100.000000	2/4

1192	**FORCE_LIMIT_WEIGHT**			D02, EXP	**CR:**
%	Weight force			FLOAT	sofort
The weight force and the torque corresponding to the weight force is set in MD 1192, the torque/force limit of NC acts in a symmetric direction upwards and downwards around this weight torque/force. MD 1192 uses the same unit as the NC machine data (MD 32460) for electronic counterweight, i.e. percentage for static torque/force (=kT*I0, for synchronous motors) or rated torque (asynchronous motors). MD 1728 facilitates the setting by displaying the current torque/force setpoint in the same format as MD 1192 and MD 32460. When only the weight force is effective, you can read off the suitable value and enter it in MD 1192 and MD 32460.					
			VSA		LIN

840D		0.0000	-100.0000	100.0000	2/4

1192	**TORQUE_LIMIT_WEIGHT**	D02, EXP	**CR:** F1
%	Weight torque	FLOAT	sofort

The weight force and the torque corresponding to the weight force is set in MD 1192, the torque/force limit of NC acts in a symmetric direction upwards and downwards around this weight torque/force. MD 1192 uses the same unit as the NC machine data (MD 32460) for electronic counterweight, i.e. percentage for static torque/force (=kT*I0, for synchronous motors) or rated torque (asynchronous motors). MD 1728 facilitates the setting by displaying the current torque/force setpoint in the same format as MD 1192 and MD 32460.

			VSA/HSA		ROT
840D		0.0000	-100.0000	100.0000	2/4

1192	**TORQUE_LIMIT_WEIGHT**	D02, EXP	**CR:** F1
%	Weight torque	FLOAT	Immediately

The weight force and the torque corresponding to the weight force is set in MD 1192, the torque/force limit of NC acts in a symmetric direction upwards and downwards around this weight torque/force. MD 1192 uses the same unit as the NC machine data (MD 32460) for electronic counterweight, i.e. percentage for static torque/force (=kT*I0, for synchronous motors) or rated torque (asynchronous motors). MD 1728 facilitates the setting by displaying the current torque/force setpoint in the same format as MD 1192 and MD 32460.

			HSA SLM VSA		-
P2		0.000000	-100.000000	100.000000	2/4

1193	**BALANCE_BY_STOP_C**	D06	**CR:**
-	Counterweight at Stop C	UNS. WORD	PowerOn

			VSA/HSA		ROT/LIN
840D		0	0	1	2/4

1193	**BALANCE_BY_STOP_C**	D06	**CR:** DD2
-	Number of current setpoint filters	UNS.WORD	Power On

Enter the number of current setpoint filters. 2nd order bandstop and low-pass filters can be selected which can be set via the machine data MD 1201: CURRENT_FILTER_CONFIG.

Selecting the number of current setpoint filters

No. | Significance
----
0 | No current setpoint filter active
1 | Filter 1 active
2 | Filters 1 and 2 active
3 | Filters 1, 2 and 3 active
4 | Filters 1, 2, 3 and 4 active
5 | Filter 1, 2, 3, 4 and 5 active
6 | Filter 1, 2, 3, 4, 5 and 6 active

....

			HSA SLM VSA		-
P2		0x0000	0x0000	0x0001	2/4

1200	**NUM_CURRENT_FILTERS**			D01	**CR:** DD2
-	Number of current setpoint filters			UNS. WORD	sofort

Enter the number of current setpoint filters. 2nd order bandstop and low-pass filters can be selected which can be set via the machine data MD 1201: CURRENT_FILTER_CONFIG.

Selecting the number of current setpoint filters

No. | Significance
----
0 | No current setpoint filter active
1 | Filter 1 active
2 | Filters 1 and 2 active
3 | Filters 1, 2 and 3 active
4 | Filters 1, 2, 3 and 4 active
....

			VSA/HSA		ROT/LIN
840D		1	0	4	2/4

1200	**NUM_CURRENT_FILTERS**				**CR:** DD2
-	Number of current setpoint filters			UNS. WORD	sofort

Enter the number of current setpoint filters. 2nd order bandstop and low-pass filters can be selected which can be set via the machine data MD 1201: CURRENT_FILTER_CONFIG.

Selecting the number of current setpoint filters

No. | Significance
----
0 | No current setpoint filter active
1 | Filter 1 active
2 | Filters 1 and 2 active
3 | Filters 1, 2 and 3 active
4 | Filters 1, 2, 3 and 4 active
....

			VSA/HSA		-
810D		0	0	4	2/4

1200	**NUM_CURRENT_FILTERS**			D01	**CR:** DD2
-	Number of current setpoint filters			UNS.WORD	Immediately

Enter the number of current setpoint filters. 2nd order bandstop and low-pass filters can be selected which can be set via the machine data MD 1201: CURRENT_FILTER_CONFIG.

Selecting the number of current setpoint filters

No. | Significance
----
0 | No current setpoint filter active
1 | Filter 1 active
2 | Filters 1 and 2 active
3 | Filters 1, 2 and 3 active
4 | Filters 1, 2, 3 and 4 active
5 | Filter 1, 2, 3, 4 and 5 active
6 | Filter 1, 2, 3, 4, 5 and 6 active

....

			HSA SLM VSA		-
P2		1	0	4	2/4
P2 840D		-	-	6	2/4

1201	**CURRENT_FILTER_CONFIG**			D01	**CR:** DD2
HEX	Type of current setpoint filter			UNS. WORD	sofort

Enter the configuration for 4 current setpoint filters. Bandstop and low-pass filters can be selected. The settable filter parameters are entered in the associated machine data.

Note
Before configuring the filter type, the appropriate filter machine data should be assigned.

Type of current setpoint filter
----
bit 0 1st filter | 0 = Low-pass (refer to MD 1202/1203)
| 1 = Bandstop (refer to MD 1210/1211/1212)

bit 1 2nd filter | 0 = Low-pass (refer to MD 1204/1205)
| 1 = Bandstop (refer to MD 1213/1214/1215)

bit 2 3rd filter | 0 = Low-pass (refer to MD 1206/1207)
| 1 = Bandstop (refer to MD 1216/1217/1218)

bit 3 4th filter | 0 = Low-pass (refer to MD 1208/1209)
| 1 = Bandstop (refer to MD 1219/1220/1221)
----
bit 4 - 15 | no function

			VSA/HSA		ROT/LIN
840D		0	0	800f	2/4

1201	**CURRENT_FILTER_CONFIG**			**CR:** DD2
HEX	Type of current setpoint filter		UNS. WORD	sofort

Enter the configuration for 4 current setpoint filters. Bandstop and low-pass filters can be selected. The settable filter parameters are entered in the associated machine data.

Note

Before configuring the filter type, the appropriate filter machine data should be assigned.

Type of current setpoint filter

----

bit 0 1st filter | 0 = Low-pass (refer to MD 1202/1203)
| 1 = Bandstop (refer to MD 1210/1211/1212)

bit 1 2nd filter | 0 = Low-pass (refer to MD 1204/1205)
| 1 = Bandstop (refer to MD 1213/1214/1215)

bit 2 3rd filter | 0 = Low-pass (refer to MD 1206/1207)
| 1 = Bandstop (refer to MD 1216/1217/1218)

bit 3 4th filter | 0 = Low-pass (refer to MD 1208/1209)
| 1 = Bandstop (refer to MD 1219/1220/1221)

----

bit 4 - 15 | no function

			VSA/HSA		-
810D		0	0	ffff	2/4

1201	**CURRENT_FILTER_CONFIG**			D01	**CR:** DD2
-	Type of current setpoint filter			UNS.WORD	Immediately

Enter the configuration for 4 current setpoint filters. Bandstop and low-pass filters can be selected. The settable filter parameters are entered in the associated machine data.

Note
Before configuring the filter type, the appropriate filter machine data should be assigned.

Type of current setpoint filter

1st filter bit 0 / 0 = Low-pass (refer to MD 1202/1203)
1 = Bandstop (refer to MD 1210/1211/1212)
2nd filter bit 1 / 0 = Low-pass (refer to MD 1204/1205)
1 = Bandstop (refer to MD 1213/1214/1215)
3rd filter bit 2 / 0 = Low-pass (refer to MD 1206/1207)
1 = Bandstop (refer to MD 1216/1217/1218)
4th filter bit 3 / 0 = Low-pass (refer to MD 1208/1209)
1 = Bandstop (refer to MD 1219/1220/1221)
5th filter bit 4 / 0 = Low-pass (see MD 1272/1273)
1 = Bandstop (refer to MD 1274/1275/1276/1277)
6th filter bit 5 / 0 = Low-pass (refer to MD 1278/1279)
1 = Bandstop (refer to MD 1280/1281/1282/1283)

			HSA SLM VSA		-
P2 840D		-	-	0x803f	2/4
P2		0x0000	0x0000	0x800f	2/4

1202	**CURRENT_FILTER_1_FREQUENCY**			D01	**CR:** DD2
Hz	Natural frequency for current setpoint filter 1			FLOAT	sofort

Enter the natural frequency for current setpoint filter 1 (PT2 low-pass filter). Entries with a value < 10 Hz for the low-pass filter natural frequency disable the filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.

			VSA/HSA		ROT/LIN
840D		2000.0000	0.0000	8000.0000	2/4

1202	**CURRENT_FILTER_1_FREQUENCY**				**CR:** DD2
Hz	Natural frequency for current setpoint filter 1			FLOAT	sofort

Enter the natural frequency for current setpoint filter 1 (PT2 low-pass filter). Entries with a value < 10 Hz for the low-pass filter natural frequency disable the filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.

			VSA/HSA		-
810D		0.0000	0.0000	3999.0000	2/4

1202	**CURRENT_FILTER_1_FREQUENCY**			D01	**CR:** DD2
Hz	Natural frequency for current setpoint filter 1			FLOAT	Immediately
Enter the natural frequency for current setpoint filter 1 (PT2 low-pass filter). Entries with a value < 10 Hz for the low-pass filter natural frequency disable the filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		2000.000000	0.000000	8000.000000	2/4

1203	**CURRENT_FILTER_1_DAMPING**				**CR:** DD2
-	Damping for current setpoint filter 1			FLOAT	sofort
Enter the damping for current setpoint filter 1 (PT2 low-pass). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		-
810D		1.0000	0.0500	5.0000	2/4

1203	**CURRENT_FILTER_1_DAMPING**			D01	**CR:** DD2
-	Damping for current setpoint filter 1			FLOAT	sofort
Enter the damping for current setpoint filter 1 (PT2 low-pass). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		0.7000	0.0500	5.0000	2/4

1203	**CURRENT_FILTER_1_DAMPING**			D01	**CR:** DD2
-	Damping for current setpoint filter 1			FLOAT	Immediately
Enter the damping for current setpoint filter 1 (PT2 low-pass). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		0.700000	0.050000	5.000000	2/4

1204	**CURRENT_FILTER_2_FREQUENCY**				**CR:** DD2
Hz	Natural frequency for current setpoint filter 2			FLOAT	sofort
Enter the natural frequency for current setpoint filter 2 (PT2 low-pass filter). Entries with a value < 10 Hz for the low-pass filter natural frequency disable the filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		-
810D		0.0000	0.0000	1999.0000	2/4

1204	**CURRENT_FILTER_2_FREQUENCY**			D01	**CR:** DD2
Hz	Natural frequency for current setpoint filter 2			FLOAT	sofort
Enter the natural frequency for current setpoint filter 2 (PT2 low-pass filter). Entries with a value < 10 Hz for the low-pass filter natural frequency disable the filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	8000.0000	2/4

1204	**CURRENT_FILTER_2_FREQUENCY**			D01	**CR:** DD2
Hz	Natural frequency for current setpoint filter 2			FLOAT	Immediately
Enter the natural frequency for current setpoint filter 2 (PT2 low-pass filter). Entries with a value < 10 Hz for the low-pass filter natural frequency disable the filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		0.000000	0.000000	8000.000000	2/4

1205	**CURRENT_FILTER_2_DAMPING**			D01	**CR:** DD2
-	Damping for current setpoint filter 2			FLOAT	sofort
Enter the damping for current setpoint filter 2 (PT2 low-pass). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		1.0000	0.0500	5.0000	2/4

1205	**CURRENT_FILTER_2_DAMPING**			D01	**CR:** DD2
-	Damping for current setpoint filter 2			FLOAT	Immediately
Enter the damping for current setpoint filter 2 (PT2 low-pass). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		1.000000	0.050000	5.000000	2/4

1206	**CURRENT_FILTER_3_FREQUENCY**			D01	**CR:** DD2
Hz	Natural frequency for current setpoint filter 3			FLOAT	sofort
Enter the natural frequency for current setpoint filter 3 (PT2 low-pass filter). Entries with a value < 10 Hz for the low-pass filter natural frequency disable the filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	8000.0000	2/4

1206	**CURRENT_FILTER_3_FREQUENCY**				**CR:** DD2
Hz	Natural frequency for current setpoint filter 3			FLOAT	sofort
Enter the natural frequency for current setpoint filter 3 (PT2 low-pass filter). Entries with a value < 10 Hz for the low-pass filter natural frequency disable the filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		-
810D		0.0000	0.0000	1999.0000	2/4

1206	**CURRENT_FILTER_3_FREQUENCY**			D01	**CR:** DD2
Hz	Natural frequency for current setpoint filter 3			FLOAT	Immediately
Enter the natural frequency for current setpoint filter 3 (PT2 low-pass filter). Entries with a value < 10 Hz for the low-pass filter natural frequency disable the filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		0.000000	0.000000	8000.000000	2/4

1207	**CURRENT_FILTER_3_DAMPING**			D01	**CR:** DD2
-	Damping for current setpoint filter 3			FLOAT	sofort
Enter the damping for current setpoint filter 3 (PT2 low-pass filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		1.0000	0.0500	5.0000	2/4

1207	**CURRENT_FILTER_3_DAMPING**			D01	**CR:** DD2
-	Damping for current setpoint filter 3			FLOAT	Immediately
Enter the damping for current setpoint filter 3 (PT2 low-pass filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		1.000000	0.050000	5.000000	2/4

1208	**CURRENT_FILTER_4_FREQUENCY**				**CR:** DD2
Hz	Natural frequency for current setpoint filter 4			FLOAT	sofort
Enter the natural frequency for current setpoint filter 4 (PT2 low-pass filter). Entries with a value < 10 Hz for the low-pass filter natural frequency disable the filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		-
810D		0.0000	0.0000	1999.0000	2/4

1208	**CURRENT_FILTER_4_FREQUENCY**			D01	**CR:** DD2
Hz	Natural frequency for current setpoint filter 4			FLOAT	sofort
Enter the natural frequency for current setpoint filter 4 (PT2 low-pass filter). Entries with a value < 10 Hz for the low-pass filter natural frequency disable the filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	8000.0000	2/4

1208	**CURRENT_FILTER_4_FREQUENCY**			D01	**CR:** DD2
Hz	Natural frequency for current setpoint filter 4			FLOAT	Immediately
Enter the natural frequency for current setpoint filter 4 (PT2 low-pass filter). Entries with a value < 10 Hz for the low-pass filter natural frequency disable the filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		0.000000	0.000000	8000.000000	2/4

1209	**CURRENT_FILTER_4_DAMPING**			D01	**CR:** DD2
-	Damping for current setpoint filter 4			FLOAT	sofort
Enter the damping for current setpoint filter 4 (PT2 low-pass filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		1.0000	0.0500	5.0000	2/4

1209	**CURRENT_FILTER_4_DAMPING**			D01	**CR:** DD2
-	Damping for current setpoint filter 4			FLOAT	Immediately
Enter the damping for current setpoint filter 4 (PT2 low-pass filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		1.000000	0.050000	5.000000	2/4

1210	**CURRENT_FILTER_1_SUPPR_FREQ**				**CR:** DD2
Hz	Blocking frequency for current setpoint filter 1			FLOAT	sofort
Enter the blocking frequency for current setpoint filter 1 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		-
810D		1600.0000	1.0000	3999.0000	2/4

1210	**CURRENT_FILTER_1_SUPPR_FREQ**			D01	**CR:** DD2
Hz	Blocking frequency for current setpoint filter 1			FLOAT	sofort
Enter the blocking frequency for current setpoint filter 1 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		3500.0000	1.0000	7999.0000	2/4

1210	**CURRENT_FILTER_1_SUPPR_FREQ**			D01	**CR:** DD2
Hz	Blocking frequency for current setpoint filter 1			FLOAT	Immediately
Enter the blocking frequency for current setpoint filter 1 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		3500.000000	1.000000	7999.000000	2/4

1211	**CURRENT_FILTER_1_BANDWIDTH**			D01	**CR:** DD2
Hz	Bandwidth for current setpoint filter 1			FLOAT	sofort
Enter the -3 dB bandwidth for current setpoint filter 1 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG. If 0 is entered for the bandwidth, the filter is disabled.					
			VSA/HSA		ROT/LIN
840D		500.0000	5.0000	7999.0000	2/4

1211	**CURRENT_FILTER_1_BANDWIDTH**				**CR:** DD2
Hz	Bandwidth for current setpoint filter 1			FLOAT	sofort
Enter the -3 dB bandwidth for current setpoint filter 1 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG. If 0 is entered for the bandwidth, the filter is disabled.					
			VSA/HSA		-
810D		400.0000	5.0000	3999.0000	2/4

1211	**CURRENT_FILTER_1_BANDWIDTH**			D01	**CR:** DD2
Hz	Bandwidth for current setpoint filter 1			FLOAT	Immediately
Enter the -3 dB bandwidth for current setpoint filter 1 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG. If 0 is entered for the bandwidth, the filter is disabled.					
			HSA SLM VSA		-
P2		500.000000	5.000000	7999.000000	2/4

1212	**CURRENT_FILTER_1_BW_NUM**			D01, EXP	**CR:** DD2
Hz	Bandwidth numerator for current setpoint filter 1			FLOAT	sofort
Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as a non-damped bandstop filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	7999.0000	2/4

1212	**CURRENT_FILTER_1_BW_NUM**				**CR:** DD2
Hz	Bandwidth numerator for current setpoint filter 1			FLOAT	sofort
Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as a non-damped bandstop filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		-
810D		0.0000	0.0000	3999.0000	2/4

1212	**CURRENT_FILTER_1_BW_NUM**			D01, EXP	**CR:** DD2
Hz	Bandwidth numerator for current setpoint filter 1			FLOAT	Immediately
Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as a non-damped bandstop filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		0.000000	0.000000	7999.000000	2/4

1213	**CURRENT_FILTER_2_SUPPR_FREQ**				**CR:** DD2
Hz	Blocking frequency for current setpoint filter 2			FLOAT	sofort
Enter the blocking frequency for current setpoint filter 2 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		-
810D		1200.0000	1.0000	1999.0000	2/4

1213	**CURRENT_FILTER_2_SUPPR_FREQ**			D01	**CR:** DD2
Hz	Blocking frequency for current setpoint filter 2			FLOAT	sofort
Enter the blocking frequency for current setpoint filter 2 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		3500.0000	1.0000	7999.0000	2/4

1213	**CURRENT_FILTER_2_SUPPR_FREQ**			D01	**CR:** DD2
Hz	Blocking frequency for current setpoint filter 2			FLOAT	Immediately
Enter the blocking frequency for current setpoint filter 2 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		3500.000000	1.000000	7999.000000	2/4

1214	**CURRENT_FILTER_2_BANDWIDTH**				**CR:** DD2
Hz	Bandwidth for current setpoint filter 2			FLOAT	sofort
Enter the -3 dB bandwidth for current setpoint filter 2 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG. If 0 is entered for the bandwidth, the filter is disabled.					
			VSA/HSA		-
810D		400.0000	5.0000	1999.0000	2/4

1214	**CURRENT_FILTER_2_BANDWIDTH**			D01	**CR:** DD2
Hz	Bandwidth for current setpoint filter 2			FLOAT	sofort
Enter the -3 dB bandwidth for current setpoint filter 2 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG. If 0 is entered for the bandwidth, the filter is disabled.					
			VSA/HSA		ROT/LIN
840D		500.0000	5.0000	7999.0000	2/4

1214	**CURRENT_FILTER_2_BANDWIDTH**			D01	**CR:** DD2
Hz	Bandwidth for current setpoint filter 2			FLOAT	Immediately
Enter the -3 dB bandwidth for current setpoint filter 2 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG. If 0 is entered for the bandwidth, the filter is disabled.					
			HSA SLM VSA		-
P2		500.000000	5.000000	7999.000000	2/4

1215	**CURRENT_FILTER_2_BW_NUM**			D01, EXP	**CR:** DD2
Hz	Bandwidth numerator for current setpoint filter 2			FLOAT	sofort
Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as a non-damped bandstop filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	7999.0000	2/4

1215	**CURRENT_FILTER_2_BW_NUM**				**CR:** DD2
Hz	Bandwidth numerator for current setpoint filter 2			FLOAT	sofort
Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as a non-damped bandstop filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		-
810D		0.0000	0.0000	1999.0000	2/4

1215	**CURRENT_FILTER_2_BW_NUM**			D01, EXP	**CR:** DD2
Hz	Bandwidth numerator for current setpoint filter 2			FLOAT	Immediately
Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as a non-damped bandstop filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		0.000000	0.000000	7999.000000	2/4

1216	**CURRENT_FILTER_3_SUPPR_FREQ**			D01	**CR:** DD2
Hz	Blocking frequency for current setpoint filter 3			FLOAT	sofort
Enter the blocking frequency for current setpoint filter 3 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		3500.0000	1.0000	7999.0000	2/4

1216	**CURRENT_FILTER_3_SUPPR_FREQ**				**CR:** DD2
Hz	Blocking frequency for current setpoint filter 3			FLOAT	sofort
Enter the blocking frequency for current setpoint filter 3 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		-
810D		1200.0000	1.0000	1999.0000	2/4

1216	**CURRENT_FILTER_3_SUPPR_FREQ**			D01	**CR:** DD2
Hz	Blocking frequency for current setpoint filter 3			FLOAT	Immediately
Enter the blocking frequency for current setpoint filter 3 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		3500.000000	1.000000	7999.000000	2/4

1217	**CURRENT_FILTER_3_BANDWIDTH**				**CR:** DD2
Hz	Bandwidth for current setpoint filter 3			FLOAT	sofort
Enter the -3dB bandwidth for current setpoint filter 3 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		-
810D		400.0000	5.0000	1999.0000	2/4

1217	**CURRENT_FILTER_3_BANDWIDTH**			D01	**CR:** DD2
Hz	Bandwidth for current setpoint filter 3			FLOAT	sofort
Enter the -3dB bandwidth for current setpoint filter 3 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		500.0000	5.0000	7999.0000	2/4

1217	**CURRENT_FILTER_3_BANDWIDTH**			D01	**CR:** DD2
Hz	Bandwidth for current setpoint filter 3			FLOAT	Immediately
Enter the -3dB bandwidth for current setpoint filter 3 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		500.000000	5.000000	7999.000000	2/4

1218	**CURRENT_FILTER_3_BW_NUM**			D01, EXP	**CR:** DD2
Hz	Bandwidth numerator for current setpoint filter 3			FLOAT	sofort
Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as a non-damped bandstop filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	7999.0000	2/4

1218	**CURRENT_FILTER_3_BW_NUM**				**CR:** DD2
Hz	Bandwidth numerator for current setpoint filter 3			FLOAT	sofort
Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as a non-damped bandstop filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		-
810D		0.0000	0.0000	1999.0000	2/4

1218	**CURRENT_FILTER_3_BW_NUM**			D01, EXP	**CR:** DD2
Hz	Bandwidth numerator for current setpoint filter 3			FLOAT	Immediately
Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as a non-damped bandstop filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		0.000000	0.000000	7999.000000	2/4

1219	**CURRENT_FILTER_4_SUPPR_FREQ**			D01	**CR:** DD2
Hz	Blocking frequency for current setpoint filter 4			FLOAT	sofort
Enter the blocking frequency for current setpoint filter 4 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		3500.0000	1.0000	7999.0000	2/4

1219	**CURRENT_FILTER_4_SUPPR_FREQ**				**CR:** DD2
Hz	Blocking frequency for current setpoint filter 4			FLOAT	sofort
Enter the blocking frequency for current setpoint filter 4 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		-
810D		1200.0000	1.0000	1999.0000	2/4

1219	**CURRENT_FILTER_4_SUPPR_FREQ**			D01	**CR:** DD2
Hz	Blocking frequency for current setpoint filter 4			FLOAT	Immediately
Enter the blocking frequency for current setpoint filter 4 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		3500.000000	1.000000	7999.000000	2/4

1220	**CURRENT_FILTER_4_BANDWIDTH**			D01	**CR:** DD2
Hz	Bandwidth for current setpoint filter 4			FLOAT	sofort
Enter the -3dB bandwidth for current setpoint filter 4 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG. If 0 is entered for the bandwidth, the filter is disabled.					
			VSA/HSA		ROT/LIN
840D		500.0000	5.0000	7999.0000	2/4

1220	**CURRENT_FILTER_4_BANDWIDTH**				**CR:** DD2
Hz	Bandwidth for current setpoint filter 4			FLOAT	sofort
Enter the -3dB bandwidth for current setpoint filter 4 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG. If 0 is entered for the bandwidth, the filter is disabled.					
			VSA/HSA		-
810D		400.0000	5.0000	1999.0000	2/4

1220	**CURRENT_FILTER_4_BANDWIDTH**			D01	**CR:** DD2
Hz	Bandwidth for current setpoint filter 4			FLOAT	Immediately
Enter the -3dB bandwidth for current setpoint filter 4 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG. If 0 is entered for the bandwidth, the filter is disabled.					
			HSA SLM VSA		-
P2		500.000000	5.000000	7999.000000	2/4

1221	**CURRENT_FILTER_4_BW_NUM**				**CR:** DD2
Hz	Bandwidth numerator for current setpoint filter 4			FLOAT	sofort
Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as a non-damped bandstop filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		-
810D		0.0000	0.0000	1999.0000	2/4

1221	**CURRENT_FILTER_4_BW_NUM**			D01, EXP	**CR:** DD2
Hz	Bandwidth numerator for current setpoint filter 4			FLOAT	sofort
Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as a non-damped bandstop filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	7999.0000	2/4

1221	**CURRENT_FILTER_4_BW_NUM**			D01, EXP	**CR:** DD2
Hz	Bandwidth numerator for current setpoint filter 4			FLOAT	Immediately
Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as a non-damped bandstop filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		0.000000	0.000000	7999.000000	2/4

1222	**CURRENT_FILTER_1_BS_FREQ**			D01, EXP	**CR:** DD2
%	Natural BSF frequ. current setp. f. 1			FLOAT	sofort
Natural BSF frequ. current setp. f. 1 [Drive parameter set]: 0 ... 7 Input of the natural frequency, general band-stop filter for current setpoint filter 1. MD 1222 enables to lower the amplitude for frequencies exceeding the blocking frequency for current setpoint filter 1. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		100.0000	1.0000	100.0000	2/4

1222	**CURRENT_FILTER_1_BS_FREQ**			D01, EXP	**CR:** DD2
%	Natural BSF frequ. current setp. f. 1			FLOAT	Immediately
Natural BSF frequ. current setp. f. 1 [Drive parameter set]: 0 ... 7 Input of the natural frequency, general band-stop filter for current setpoint filter 1. MD 1222 enables to lower the amplitude for frequencies exceeding the blocking frequency for current setpoint filter 1. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2		100.000000	1.000000	100.000000	2/4

1223	**CURRENT_FILTER_2_BS_FREQ**			D01, EXP	**CR:** DD2
%	Natural BSF frequ. current setp. f. 2			FLOAT	sofort
Natural BSF frequ. current setp. f. 2 [Drive parameter set]: 0 ... 7 Input of the natural frequency, general band-stop filter for current setpoint filter 2. MD 1223 enables to lower the amplitude for frequencies exceeding the blocking frequency for current setpoint filter 2. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			VSA/HSA		ROT/LIN
840D		100.0000	1.0000	100.0000	2/4

1223	**CURRENT_FILTER_2_BS_FREQ**			D01, EXP	**CR:** DD2
%	Natural BSF frequ. current setp. f. 2			FLOAT	Immediately

Natural BSF frequ. current setp. f. 2 [Drive parameter set]: 0 ... 7

Input of the natural frequency, general band-stop filter for current setpoint filter 2.

MD 1223 enables to lower the amplitude for frequencies exceeding the blocking frequency for current setpoint filter 2. The filter is activated via

MD 1200: NUM_CURRENT_FILTERS and

MD 1201: CURRENT_FILTER_CONFIG.

			HSA SLM VSA		-
P2		100.000000	1.000000	100.000000	2/4

1224	**CURRENT_FILTER_3_BS_FREQ**			D01, EXP	**CR:** DD2
%	Natural BSF frequ. current setp. f. 3			FLOAT	sofort

Natural BSF frequ. current setp. f. 3 [Drive parameter set]: 0 ... 7

Input of the natural frequency, general band-stop filter for current setpoint filter 3.

MD 1224 enables to lower the amplitude for frequencies exceeding the blocking frequency for current setpoint filter 3. The filter is activated via

MD 1200: NUM_CURRENT_FILTERS and

MD 1201: CURRENT_FILTER_CONFIG.

			VSA/HSA		ROT/LIN
840D		100.0000	1.0000	100.0000	2/4

1224	**CURRENT_FILTER_3_BS_FREQ**			D01, EXP	**CR:** DD2
%	Natural BSF frequ. current setp. f. 3			FLOAT	Immediately

Natural BSF frequ. current setp. f. 3 [Drive parameter set]: 0 ... 7

Input of the natural frequency, general band-stop filter for current setpoint filter 3.

MD 1224 enables to lower the amplitude for frequencies exceeding the blocking frequency for current setpoint filter 3. The filter is activated via

MD 1200: NUM_CURRENT_FILTERS and

MD 1201: CURRENT_FILTER_CONFIG.

			HSA SLM VSA		-
P2		100.000000	1.000000	100.000000	2/4

1225	**CURRENT_FILTER_4_BS_FREQ**			D01, EXP	**CR:** DD2
%	Natural BSF frequ. current setp. f. 4			FLOAT	sofort

Natural BSF frequ. current setp. f. 4 [Drive parameter set]: 0 ... 7

Input of the natural frequency, general band-stop filter for current setpoint filter 4.

MD 1225 enables to lower the amplitude for frequencies exceeding the blocking frequency for current setpoint filter 4. The filter is activated via

MD 1200: NUM_CURRENT_FILTERS and

MD 1201: CURRENT_FILTER_CONFIG.

			VSA/HSA		ROT/LIN
840D		100.0000	1.0000	100.0000	2/4

1225	**CURRENT_FILTER_4_BS_FREQ**			D01, EXP	**CR:** DD2
%	Natural BSF frequ. current setp. f. 4			FLOAT	Immediately

Natural BSF frequ. current setp. f. 4 [Drive parameter set]: 0 ... 7

Input of the natural frequency, general band-stop filter for current setpoint filter 4.

MD 1225 enables to lower the amplitude for frequencies exceeding the blocking frequency for current setpoint filter 4. The filter is activated via

MD 1200: NUM_CURRENT_FILTERS and

MD 1201: CURRENT_FILTER_CONFIG.

			HSA SLM VSA		-
P2		100.000000	1.000000	100.000000	2/4

1230	**FORCE_LIMIT_1**			D02, EXP	**CR:**
%	1 st force threshold			FLOAT	sofort

Enter the maximum force referred to the Stall force (feed drive) or rated motor force (MSD).

- FDD: Stall force = MD 1118 x MD 1113
  MD 1118: MOTOR_STANDSTILL_CURRENT
  MD 1113: FORCE_CURRENT_RATIO

The minimum force and stall force limiting is always effective.

For feed drives, it is realized via the calculate controller MD, whereby the value is obtained from the following formula:

VSA : MD 1230 = (MD 1104 / MD 1118) x 100 %

As the current limit (FDD - MD 1104) additionally limits the maximum force which can be entered, if the force limit is increased more force is only available, if a higher current can also flow. It may be necessary to then additionally adapt the current limit.

Important

If the motor is overloaded for a longer period of time, its temperature rise may be inadmissible (shutdown with motor overtemperature), and the motor could be destroyed.

			VSA		LIN
840D		100.0000	5.0000	900.0000	2/4

1230	**TORQUE_LIMIT_1**			D02, EXP	**CR:** DÜ1
%	1st torque limit			FLOAT	sofort

Enter the maximum torque referred to the stall torque (FDD) or rated motor torque (MSD).

- FDD: Stall torque = MD 1118 x MD 1113
  MD 1118: MOTOR_STANDSTILL_CURRENT
  MD 1113: TORQUE_CURRENT_RATIO
- MSD: Rated motor torque = 9549 x MD 1130 / MD 1400
  MD 1130: MOTOR_NOMINAL_POWER
  MD 1400: MOTOR_RATED_SPEED

The minimum torque, power and stall torque limiting is always effective. The standard preassignment for MSD is 100%. For FDD, it is realized by the operator initiating the "Calculate controller data" function, whereby the value is obtained from the following formula:

FDD : MD 1230 = (MD 1104 / MD 1118) x 100%

As the current limit (MSD - MD 1238, FDD - MD 1104) additionally limits the maximum torque which can be entered, if the torque limit is increased more torque is only available, if a high current can also flow. It may then also be necessary to adapt the current limit.

For MSD, the following is especially valid: in order to achieve significantly shorter accelerating times up to the maximum speed, the output and current limits must also be increased.

Note

If the motor is overloaded for a lengthy period of time, it may lead to impermissible overheating (shutdown with motor overtemperature), and the motor could even be destroyed.

			VSA/HSA		ROT
840D		100.0000	5.0000	900.0000	2/4

1230	**TORQUE_LIMIT_1**			D02, EXP	**CR:** DÜ1
%	1st torque limit			FLOAT	Immediately
Enter the maximum torque referred to the stall torque (FDD) or rated motor torque (MSD). - FDD: Stall torque = MD 1118 x MD 1113 MD 1118: MOTOR_STANDSTILL_CURRENT MD 1113: TORQUE_CURRENT_RATIO - MSD: Rated motor torque = 9549 x MD 1130 / MD 1400 MD 1130: MOTOR_NOMINAL_POWER MD 1400: MOTOR_RATED_SPEED The minimum torque, power and stall torque limiting is always effective. The standard preassignment for MSD is 100%. For FDD, it is realized by the operator initiating the "Calculate controller data" function, whereby the value is obtained from the following formula: FDD : MD 1230 = (MD 1104 / MD 1118) x 100% As the current limit (MSD - MD 1238, FDD - MD 1104) additionally limits the maximum torque which can be entered, if the torque limit is increased more torque is only available, if a high current can also flow. It may then also be necessary to adapt the current limit. For MSD, the following is especially valid: in order to achieve significantly shorter accelerating times up to the maximum speed, the output and current limits must also be increased. Note If the motor is overloaded for a lengthy period of time, it may lead to impermissible overheating (shutdown with motor overtemperature), and the motor could even be destroyed.					
			HSA SLM VSA		-
P2		100.000000	5.000000	900.000000	2/4

1231	**FORCE_LIMIT_2**			D02, EXP	**CR:**
%	2nd force threshold			FLOAT	sofort
The force limit input is the reduction factor referred the 1st force limit (MD 1230). It is only effective, if the 2nd force limit is selected via IS ("torque limit 2" DB31, ... DBX20.2, and the motor speed exceeds the value set in MD 1232: FORCE_LIMIT_SWITCH_SPEED with hysteresis (MD 1234).					
			VSA		LIN
840D		100.0000	5.0000	100.0000	2/4

1231	**TORQUE_LIMIT_2**			D02, EXP	**CR:** DÜ1
%	2nd torque limit			FLOAT	sofort
The 2nd torque limit input is the reduction factor referred to the 1st torque limit (MD 1230). It is only effective if the 2nd torque limit is selected via IS "torque limit 2" DB31, ... DBX20.2, and the motor speed exceeds the value set in MD 1232: TORQUE_LIMIT_SWITCH_SPEED with hysteresis (MD 1234).					
			VSA/HSA		ROT
840D		100.0000	5.0000	100.0000	2/4

1231	**TORQUE_LIMIT_2**			D02, EXP	**CR:** DÜ1
%	2nd torque limit			FLOAT	Immediately
The 2nd torque limit input is the reduction factor referred to the 1st torque limit (MD 1230). It is only effective if the 2nd torque limit is selected via IS "torque limit 2" DB31, ... DBX20.2, and the motor speed exceeds the value set in MD 1232: TORQUE_LIMIT_SWITCH_SPEED with hysteresis (MD 1234).					
			HSA SLM VSA		-

P2		100.000000	5.000000	100.000000	2/4

1232	**FORCE_LIMIT_SWITCH_SPEED**	D02, EXP	**CR:**
m/min	Changeover speed from MD 1230 to MD 1231	FLOAT	sofort

Enter the changeover speed, above which, the 2nd force limit (MD 1231) can be selected. With the changeover, an adjustable hysteresis becomes effective (MD 1234). The 2nd force limit is only effective, if the motor speed exceeds the speed threshold with hysteresis, and the 2nd force limit was selected via IS "torque limit 2" DB31, ... DBX20.2.

			VSA		LIN
840D		120.0000	0.0000	100000.0000	2/4

1232	**TORQUE_LIMIT_SWITCH_SPEED**	D02, EXP	**CR:** DÜ1
1/min	Changeover speed from MD 1230 to MD 1231	FLOAT	sofort

Enter the changeover speed, above which the 2nd torque limit (MD 1231) can be selected. With the changeover, an adjustable hysteresis becomes effective (MD 1234). The 2nd torque limit is only effective if the motor speed exceeds the speed threshold with hysteresis, and the 2nd torque limit was selected via IS "torque limit 2" DB31, ... DBX20.2.

			VSA/HSA		ROT
840D		6000.0000	0.0000	100000.0000	2/4

1232	**TORQUE_LIMIT_SWITCH_SPEED**	D02, EXP	**CR:** DÜ1
1/min	Changeover speed from MD 1230 to MD 1231	FLOAT	Immediately

Enter the changeover speed, above which the 2nd torque limit (MD 1231) can be selected. With the changeover, an adjustable hysteresis becomes effective (MD 1234). The 2nd torque limit is only effective if the motor speed exceeds the speed threshold with hysteresis, and the 2nd torque limit was selected via IS "torque limit 2" DB31, ... DBX20.2.

			HSA SLM VSA		-
P2		6000.000000	0.000000	100000.000000	2/4

1233	**LIMIT_GENERATOR**	D02, EXP	**CR:**
%	Generator force limiting	FLOAT	sofort

This machine data limits the force when braking (generator force limiting). The limiting is realized, referred to the maximum motor force MD 1230: TORQFORCE_LIMIT_1.

If the 2nd force limit is active, the reference value is obtained from MD 1230: FORCE_LIMIT_1 and MD 1231: FORCE_LIMIT_2.

			VSA		LIN
840D		100.0000	5.0000	100.0000	2/4

1233	**TORQUE_LIMIT_GENERATOR**	D02, EXP	**CR:** DÜ1
%	Regenerative limiting	FLOAT	sofort

This machine data limits the torque when braking (regenerative torque limiting). The limiting is realized, referred to the maximum motor torque

MD 1230: TORQUE_LIMIT_1.

If the 2nd torque limit is active, the reference value is obtained from

MD 1230: TORQUE_LIMIT_1 and MD 1231: TORQUE_LIMIT_2.

			VSA/HSA		ROT
840D		100.0000	5.0000	100.0000	2/4

1233	**TORQUE_LIMIT_GENERATOR**			D02, EXP	**CR:** DÜ1
%	Regenerative limiting			FLOAT	Immediately
This machine data limits the torque when braking (regenerative torque limiting). The limiting is realized, referred to the maximum motor torque MD 1230: TORQUE_LIMIT_1. If the 2nd torque limit is active, the reference value is obtained from MD 1230: TORQUE_LIMIT_1 and MD 1231: TORQUE_LIMIT_2.					
			HSA SLM VSA		-
P2		100.000000	5.000000	100.000000	2/4

1234	**FORCE_LIMIT_SWITCH_HYST**			D02, EXP	**CR:**
m/min	Hysteresis MD 1232			FLOAT	sofort
Enter the hysteresis for the changeover speed set in MD 1232: FORCE_LIMIT_SWITCH_SPEED.					
			VSA		LIN
840D		3.0000	0.0000	1000.0000	2/4

1234	**TORQUE_LIMIT_SWITCH_HYST**			D02, EXP	**CR:** DÜ1
1/min	Hysteresis MD 1232			FLOAT	sofort
Enter the hysteresis for the changeover speed set in MD 1232: TORQUE_LIMIT_SWITCH_SPEED.					
			VSA/HSA		ROT
840D		50.0000	0.0000	1000.0000	2/4

1234	**TORQUE_LIMIT_SWITCH_HYST**			D02, EXP	**CR:** DÜ1
1/min	Hysteresis MD 1232			FLOAT	Immediately
Enter the hysteresis for the changeover speed set in MD 1232: TORQUE_LIMIT_SWITCH_SPEED.					
			HSA SLM VSA		-
P2		50.000000	0.000000	1000.000000	2/4

1235	**POWER_LIMIT_1**			D02, EXP	**CR:** DÜ1
%	1st power limit			FLOAT	sofort

Enter the maximum permitted power referred to the motor output (FDD) respective to the rated motor output

(MSD - MD 1130: MOTOR_NOMINAL_POWER).

Motor output [kW] (FDD) = 1 / 9549 * (MD 1118 * MD 1113) * MD 1400

MD 1118: MOTOR_STANDSTILL_CURRENT

MD 1113: TORQUE_CURRENT_RATIO

MD 1400: MOTOR_RATED_SPEED

Using the power limiting (constant power) the torque is limited

(P=2 pi x M x n; with P = const. ==> M ~ 1/n) . The minimum torque, output and stall torque limits are always effective.

The standard assignment for MSD is 100%.

For feed drives, this machine data is automatically set to the default value by the operator initiating the "Calculate controller data" function, whereby the value is obtained from the following formula:

FDD : MD 1235 = (MD 1104 / MD 1118) x 100%

The following is especially valid for MSD: If the threshold speed for field weakening is greater than the rated speed, then the accelerating times can be shortened and the power yield increased, if only the power limit is increased (the current limit remains the same). As the current limit (MD1238) can additionally limit the maximum torque which can be entered, this results in a further increase in the power limit. However, an increased torque may only be possible if the current limit can also be increased.

Note

If the motor is overloaded for a lengthy period of time, it can lead to impermissible overheating (shutdown with motor temperature) and can even destroy the motor. Corresponding machine data are MD 1104, MD 1145 and MD 1231 to MD 1239.

			VSA/HSA		ROT/LIN
840D		100.0000	5.0000	900.0000	2/4

1235	**POWER_LIMIT_1**			D02, EXP	**CR:** DÜ1
%	1st power limit			FLOAT	Immediately

Enter the maximum permitted power referred to the motor output (FDD) respective to the rated motor output
(MSD - MD 1130: MOTOR_NOMINAL_POWER).
Motor output [kW] (FDD) = 1 / 9549 * (MD 1118 * MD 1113) * MD 1400
MD 1118: MOTOR_STANDSTILL_CURRENT
MD 1113: TORQUE_CURRENT_RATIO
MD 1400: MOTOR_RATED_SPEED

Using the power limiting (constant power) the torque is limited
(P=2 pi x M x n; with P = const. ==> M ~ 1/n) . The minimum torque, output and stall torque limits are always effective.
The standard assignment for MSD is 100%.
For feed drives, this machine data is automatically set to the default value by the operator initiating the "Calculate controller data" function, whereby the value is obtained from the following formula:

FDD : MD 1235 = (MD 1104 / MD 1118) x 100%

The following is especially valid for MSD: If the threshold speed for field weakening is greater than the rated speed, then the accelerating times can be shortened and the power yield increased, if only the power limit is increased (the current limit remains the same). As the current limit (MD1238) can additionally limit the maximum torque which can be entered, this results in a further increase in the power limit. However, an increased torque may only be possible if the current limit can also be increased.

Note
If the motor is overloaded for a lengthy period of time, it can lead to impermissible overheating (shutdown with motor temperature) and can even destroy the motor. Corresponding machine data are MD 1104, MD 1145 and MD 1231 to MD 1239.

			HSA SLM VSA		-
P2		100.000000	5.000000	900.000000	2/4

1236	**POWER_LIMIT_2**			D02, EXP	**CR:** DÜ1
%	2nd power limit			FLOAT	sofort

The 2nd power limit input is the reduction factor referred to the 1st power limit (MD1236). It is only effective if the 2nd torque limit is selected via IS "torque limit 2" DB31, ... DBX20.2, and the motor speed exceeds the value set in MD1232: TORQUE_LIMIT_SWITCH_SPEED with hysteresis (MD 1234).

			VSA/HSA		ROT/LIN
840D		100.0000	5.0000	100.0000	2/4

1236	**POWER_LIMIT_2**			D02, EXP	**CR:** DÜ1
%	2nd power limit			FLOAT	Immediately

The 2nd power limit input is the reduction factor referred to the 1st power limit (MD1236). It is only effective if the 2nd torque limit is selected via IS "torque limit 2" DB31, ... DBX20.2, and the motor speed exceeds the value set in MD1232: TORQUE_LIMIT_SWITCH_SPEED with hysteresis (MD 1234).

			HSA SLM VSA		-
P2		100.000000	5.000000	100.000000	2/4

1237	**POWER_LIMIT_GENERATOR**				**CR:** DÜ1
kW	Maximum regenerative power			FLOAT	sofort
This machine data allows the regenerative power for the infeed/regenerative feedback module to be limited. An appropriately small value should be entered here especially when using an uncontrolled infeed/regenerative feed-back unit.					
			VSA/HSA		-
810D		100.0000	0.3000	500.0000	2/4

1237	**POWER_LIMIT_GENERATOR**			D02, EXP	**CR:** DÜ1
kW	Maximum regenerative power			FLOAT	sofort
This machine data allows the regenerative power for the infeed/regenerative feedback module to be limited. An appropriately small value should be entered here especially when using an uncontrolled infeed/regenerative feed-back unit.					
			VSA/HSA		ROT/LIN
840D		100.0000	0.1000	500.0000	2/4

1237	**POWER_LIMIT_GENERATOR**			D02, EXP	**CR:** DÜ1
kW	Maximum regenerative power			FLOAT	Immediately
This machine data allows the regenerative power for the infeed/regenerative feedback module to be limited. An appropriately small value should be entered here especially when using an uncontrolled infeed/regenerative feed-back unit.					
			HSA SLM VSA		-
P2		100.000000	0.100000	500.000000	2/4

1238	**CURRENT_LIMIT**			D02	**CR:** DÜ1
%	Motor current limit			FLOAT	sofort
Enter the maximum permissible motor current referred to the rated motor current, MD 1103: MOTOR_NOMINAL_CURRENT. In order to shorten the ramp-up times, it may be practical to set the current limit to values > 100 % and to additionally increase the power and torque limits (MD 1230, MD 1235). If the motor current is at its limit as a result of torque and power limits which are too high, the monitoring intervenes with MD1605 / MD1606. Important If the motor is overloaded for a lengthy period of time, it may lead to inadmissible overheating (shutdown with motor overtemperature), and the motor could even be destroyed.					
			HSA		ROT
840D		150.0000	0.0000	400.0000	2/4

1238	**CURRENT_LIMIT**				**CR:** DÜ1
%	Motor current limit			FLOAT	sofort
Enter the maximum permissible motor current referred to the rated motor current, MD 1103: MOTOR_NOMINAL_CURRENT. In order to shorten the ramp-up times, it may be practical to set the current limit to values > 100 % and to additionally increase the power and torque limits (MD 1230, MD 1235). If the motor current is at its limit as a result of torque and power limits which are too high, the monitoring intervenes with MD1605 / MD1606. Important If the motor is overloaded for a lengthy period of time, it may lead to inadmissible overheating (shutdown with motor overtemperature), and the motor could even be destroyed.					
			HSA		-
810D		150.0000	0.0000	300.0000	2/4

1238	**CURRENT_LIMIT**			D02	**CR:** DÜ1
%	Motor current limit			FLOAT	Immediately
Enter the maximum permissible motor current referred to the rated motor current, MD 1103: MOTOR_NOMINAL_CURRENT. In order to shorten the ramp-up times, it may be practical to set the current limit to values > 100 % and to additionally increase the power and torque limits (MD 1230, MD 1235). If the motor current is at its limit as a result of torque and power limits which are too high, the monitoring intervenes with MD 1605 / MD 1606. Important If the motor is overloaded for a lengthy period of time, it may lead to inadmissible overheating (shutdown with motor overtemperature), and the motor could even be destroyed.					
			HSA		-
P2		150.000000	0.000000	400.000000	2/4

1239	**FORCE_LIMIT_FOR_SETUP**			D02	**CR:**
%	Force limit in setting-up operation			FLOAT	sofort
The force limit in setting-up operation refers to the stall (standstill) force (FDD) of the motor (calculation, referred to MD 1230). MD 1239 is ineffective in standard operation. For setting-up operation, the minimum from the limit values of standard operation and the value set in this machine data is effective as force limit. Setting-up operation is selected via terminal 112 of the infeed/regenerative feedback unit.					
			VSA		LIN
840D		1.0000	0.5000	100.0000	2/4

1239	**TORQUE_LIMIT_FOR_SETUP**			D02	**CR:** DÜ1
%	Torque limit in setting-up operation			FLOAT	sofort
The torque limit value in setting-up operation refers to the rated torque (MSD) or the stall torque (FDD) of the motor (calculation, see MD 1230). MD 1239 is ineffective in standard operation. For setting-up operation, the minimum from the limit values of standard operation and the value set in this machine data is effective as a torque limit (see diagram for MD 1230). Setting-up operation is selected via terminal 112 of the infeed/regenerative feedback unit. As from 611 D SW 5.01.01, the torque limit for setting-up operation (MD 1239) is effective around the weight even symmetrically. The system selects the minimum limit values from NC and setting-up operation if setting-up operation is active.					
			VSA/HSA		ROT

840D		1.0000	0.5000	100.0000	2/4

1239	**TORQUE_LIMIT_FOR_SETUP**	D02	**CR:** DÜ1
%	Torque limit in setting-up operation	FLOAT	Immediately

The torque limit value in setting-up operation refers to the rated torque (MSD) or the stall torque (FDD) of the motor (calculation, see MD 1230).

MD 1239 is ineffective in standard operation. For setting-up operation, the minimum from the limit values of standard operation and the value set in this machine data is effective as a torque limit (see diagram for MD 1230). Setting-up operation is selected via terminal 112 of the infeed/regenerative feedback unit.

As from 611 D SW 5.01.01, the torque limit for setting-up operation (MD 1239) is effective around the weight even symmetrically. The system selects the minimum limit values from NC and setting-up operation if setting-up operation is active.

			HSA SLM VSA		-
P2		1.000000	0.500000	100.000000	2/4

1245	**CURRENT_SMOOTH_SPEED**	EXP	**CR:** DD2
1/min	Threshold speed dep. on M setpoint smoothing	FLOAT	sofort

Enter the speed, above which the torque setpoint smoothing, switched-in with the 2nd filter (low-pass filter) in MD 1201: CURRENT_FILTER_CONFIG is activated. The user can reduce the speed ripple at higher speeds using this speed-dependent torque setpoint smoothing (MSD).

The filter remains active as a low-pass filter over the complete speed range if 0 is entered as the threshold value. For other values, two changeover speeds are calculated from MD1245 and MD1246: CURRENT_SMOOTH_HYSTERESIS:

n_top = n_threshold + n_hysteresis = MD 1245 + MD 1246

n_bottom = n_threshold - n_hysteresis = MD 1245 - MD 1246

Functionality

Changeover from bypass to low-pass characteristics if the absolute actual speed value exceeds the value n_top (|n act| >= n_top). Vice versa, bypass is selected instead of low-pass filter if the absolute actual speed is less than n_bottom (In_actI < n_bottom). If 0 is selected for the hysteresis, then both changeover speeds are the same.

Note

The speed threshold is only effective if filter 2 is configured as a low-pass filter. This machine data has no effect on the closed-loop control.

			VSA/HSA		ROT
840D		0.0000	0.0000	100000.0000	2/4

1245	**CURRENT_SMOOTH_SPEED**			EXP	**CR:**
m/min	Threshold speed dependend F-setpoint smoothing			FLOAT	sofort

Enter the speed, above which the power setpoint smoothing, switched-in with the 2nd filter (low-pass filter) in MD 1201: CURRENT_FILTER_CONFIG is activated. The user can reduce the speed ripple at higher speeds using this speed-dependent power setpoint smoothing (MSD).

The filter remains active as low-pass filter over the complete speed range if 0 is entered as threshold value. Two changeover speeds are calculated from MD1245 and MD1246: CURRENT_SMOOTH_HYSTERESIS:

v_top = v_threshold + v_hysteresis = MD 1245 + MD 1246

v_bottom = v_threshold - v_hysteresis = MD 1245 - MD 1246

Functionality

Changeover from straight through to low-pass characteristics, if the absolute speed actual value exceeds the value v_top (|v act| >= v_top). Vice versa, straight through is selected instead of low-pass filter characteristics if the absolute actual speed is less than v_bottom (Iv act I < v_bottom). If 0 is selected for the hysteresis, then both changeover speeds are the same.

Note

The speed threshold is only effective, if filter 2 is configured as low-pass filter. This machine data has no effect on the closed-loop control.

			VSA		LIN
840D		0.0000	0.0000	100000.0000	2/4

1245	**CURRENT_SMOOTH_SPEED**			EXP	**CR:** DD2
1/min	Threshold speed dep. on M setpoint smoothing			FLOAT	Immediately

Enter the speed, above which the torque setpoint smoothing, switched-in with the 2nd filter (low-pass filter) in MD 1201: CURRENT_FILTER_CONFIG is activated. The user can reduce the speed ripple at higher speeds using this speed-dependent torque setpoint smoothing (MSD).

The filter remains active as a low-pass filter over the complete speed range if 0 is entered as the threshold value. For other values, two changeover speeds are calculated from MD1245 and MD1246: CURRENT_SMOOTH_HYSTERESIS:

n_top = n_threshold + n_hysteresis = MD 1245 + MD 1246

n_bottom = n_threshold - n_hysteresis = MD 1245 - MD 1246

Functionality

Changeover from bypass to low-pass characteristics if the absolute actual speed value exceeds the value n_top (|n act| >= n_top). Vice versa, bypass is selected instead of low-pass filter if the absolute actual speed is less than n_bottom (In_actI < n_bottom). If 0 is selected for the hysteresis, then both changeover speeds are the same.

Note

The speed threshold is only effective if filter 2 is configured as a low-pass filter. This machine data has no effect on the closed-loop control.

			HSA SLM VSA		-
P2		0.000000	0.000000	100000.000000	2/4

1246	**CURRENT_SMOOTH_HYSTERESIS**			EXP	**CR:** DD2
1/min	Hysteresis speed dep. M setpoint smoothing			FLOAT	sofort

Enter the hysteresis for the selected switch-in speed in MD1245: CURRENT_SMOOTH_SPEED.

			VSA/HSA		ROT
840D		50.0000	0.0000	1000.0000	2/4

1246	**CURRENT_SMOOTH_HYSTERESIS**			EXP	**CR:**
m/min	Hysteresis speed dependend F-setpoint smoothing			FLOAT	sofort
Enter the hysteresis for the selected switch-in speed in MD1245: CURRENT_SMOOTH_SPEED.					
			VSA		LIN
840D		3.0000	0.0000	1000.0000	2/4

1246	**CURRENT_SMOOTH_HYSTERESIS**			EXP	**CR:** DD2
1/min	Hysteresis speed dep. M setpoint smoothing			FLOAT	Immediately
Enter the hysteresis for the selected switch-in speed in MD1245: CURRENT_SMOOTH_SPEED.					
			HSA SLM VSA		-
P2		50.000000	0.000000	1000.000000	2/4

1247	**MOTOR_SWITCH_SPEED**			EXP	**CR:** DE1
1/min	Speed threshold for motor changeover			FLOAT	sofort
Above the speed entered plus 5% hysteresis, the second motor data set is selected (MD 2xxx). Below the speed entered minus 5% hysteresis, the first motor data set is selected.					
			HSA		ROT
840D		100000.0000	0.0000	100000.0000	2/4

1247	**MOTOR_SWITCH_SPEED1**			EXP	**CR:** DE1
1/min	Speed threshold for motor changeover			FLOAT	Immediately
Above the speed entered plus 5% hysteresis, the second motor data set is selected (MD 2xxx). Below the speed entered minus 5% hysteresis, the first motor data set is selected.					
			HSA SLM VSA		-
P2		100000.000000	0.0	100000.000000	2/4

1248	**MOTOR_SWITCH_SPEED2**			EXP	**CR:** DE1
1/min	Speed threshold 2 motor switchover			FLOAT	Immediately

The fourth motor data block (MD 4xxx) is selected above the entered speed value plus 5% hysteresis (MD 4xxx).

The third motor data block (MD 3xxx) is entered below the speed value minus 5% hysteresis.

The following cases result:
Motor bit1 = 0; Actual speed < 95% of MD 1247
--> Motor bit0 = 0 --> Motor 1, data block 1 (MD 1xxx)
Motor bit1 = 0; Actual speed > 95% and < 105% of MD 1247
--> Motor bit0 = const. --> Motor 1, data block 1 or 2 (depending on which one is active)

Motor bit1 = 0; Actual speed > 105% of MD 1247
--> Motor bit0 = 1 --> Motor 1, data block 2 (MD 2xxx)

Motor bit1 = 1; Actual speed < 95% of MD 1248
--> Motor bit0 = 0 --> Motor 2, data block 3 (MD 3xxx)

Motor bit1 = 1; Actual speed > 95% and < 105% of MD 1248 –>
--> Motor bit0 = const. --> Motor 2, data block 3 or 4

Motor bit1 = 1; Actual speed > 105% of MD 1248
--> Motor bit0 = 1 --> Motor 2, data block 4 (MD 4xxx)

			HSA SLM VSA		-
P2		100000.000000	0.0	100000.000000	2/4

1250	**ACTUAL_CURRENT_FILTER_FREQ**				**CR:** DB1
Hz	Transition frequency for actual current smoothing			FLOAT	sofort

Enter the 3dB transition frequency f_o of the quadrate current actual value smoothing (PT1 low pass filter) for the display. The time constant T1 of the PT1 filter is obtained from the formula T1 = 1 /(2 pi f_o).
It is displayed in the machine data MD 1708: ACTUAL_CURRENT.
This machine data has no effect on the closed-loop control.
Note
The filter is disabled when values < 1 Hz are entered.

			VSA/HSA		-
810D		100.0000	0.0000	3999.0000	2/4

1250	**ACTUAL_CURRENT_FILTER_FREQ**			D04	**CR:** DB1
Hz	Transition frequency for actual current smoothing			FLOAT	sofort

Enter the 3dB transition frequency f_o of the quadrate current actual value smoothing (PT1 low pass filter) for the display. The time constant T1 of the PT1 filter is obtained from the formula T1 = 1 /(2 pi f_o).
It is displayed in the machine data MD 1708: ACTUAL_CURRENT.
This machine data has no effect on the closed-loop control.
Note
The filter is disabled when values < 1 Hz are entered.

			VSA/HSA		ROT/LIN
840D		100.0000	0.0000	8000.0000	2/4

1250	**ACTUAL_CURRENT_FILTER_FREQ**			D04	**CR:** DB1
Hz	Transition frequency for actual current smoothing			FLOAT	Immediately
Enter the 3dB transition frequency f_o of the quadrate current actual value smoothing (PT1 low pass filter) for the display. The time constant T1 of the PT1 filter is obtained from the formula T1 = 1 /(2 pi f_o). It is displayed in the machine data MD 1708: ACTUAL_CURRENT. This machine data has no effect on the closed-loop control. Note The filter is disabled when values < 1 Hz are entered.					
			HSA SLM VSA		-
P2		100.000000	0.000000	8000.000000	2/4

1251	**LOAD_SMOOTH_TIME**			-	**CR:** DD1
ms	Time constant for load smoothing			FLOAT	sofort
Smoothing produces a better display of the motor load (MD 1722) on the MMC. The filter calculation is made in the position controller cycle. Note Enter "0" to deactivate the filter.					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	1000.0000	2/4

1251	**LOAD_SMOOTH_TIME**			-	**CR:** DD1
ms	Time constant for load smoothing			FLOAT	Immediately
Smoothing produces a better display of the motor load (MD 1722) on the MMC. The filter calculation is made in the position controller cycle. Note Enter "0" to deactivate the filter.					
			HSA SLM VSA		-
P2		0.000000	0.000000	1000.000000	2/4

1252	**FORCE_FILTER_FREQUENCY**			D04	**CR:**
Hz	Transition freq. for the force setpoint smoothing			FLOAT	sofort
Enter the 3dB transition frequency f_o of the force setpoint smoothing (PT1 low pass filter) for the display. The time constant T1 of the PT1 filter is obtained from the formula T1 = 1 /(2 pi f_o). This machine data has no effect on the closed-loop control. Note The filter is disabled when values < 1 Hz are entered.					
			VSA		LIN
840D		100.0000	0.0000	8000.0000	2/4

1252	**TORQUE_FILTER_FREQUENCY**			D04	**CR:** DB1
Hz	Transition frequency of torque setpoint smoothing			FLOAT	sofort

Enter the 3dB transition frequency f_o of the torque setpoint smoothing (PT1 low pass filter) for the display. The time constant T1 of the PT1 filter is obtained from the formula T1 = 1 /(2 pi f_o).

The filter calculation is made in the position controller cycle.

This machine data has no effect on the closed-loop control.

Note

The filter is disabled when values < 1 Hz are entered.

			VSA/HSA		ROT
840D		100.0000	0.0000	8000.0000	2/4

1252	**TORQUE_FILTER_FREQUENCY**				**CR:** DB1
Hz	Transition frequency of torque setpoint smoothing			FLOAT	sofort

Enter the 3dB transition frequency f_o of the torque setpoint smoothing (PT1 low pass filter) for the display. The time constant T1 of the PT1 filter is obtained from the formula T1 = 1 /(2 pi f_o).

The filter calculation is made in the position controller cycle.

This machine data has no effect on the closed-loop control.

Note

The filter is disabled when values < 1 Hz are entered.

			VSA/HSA		-
810D		100.0000	0.0000	3999.0000	2/4

1252	**TORQUE_FILTER_FREQUENCY**			D04	**CR:** DB1
Hz	Transition frequency of torque setpoint smoothing			FLOAT	Immediately

Enter the 3dB transition frequency f_o of the torque setpoint smoothing (PT1 low pass filter) for the display. The time constant T1 of the PT1 filter is obtained from the formula T1 = 1 /(2 pi f_o).

The filter calculation is made in the position controller cycle.

This machine data has no effect on the closed-loop control.

Note

The filter is disabled when values < 1 Hz are entered.

			HSA SLM VSA		-
P2		100.000000	0.000000	8000.000000	2/4

1254	**CURRENT_MONITOR_FILTER_TIME**			D02, EXP	**CR:** DÜ1
ms	Time constant for current monitoring			FLOAT	sofort

Enter the time constant T 1 to smooth the absolute current value (PT_1 low-pass filter). The transition frequency f_0 of the PT_1 filter is obtained in accordance with f_0 = 1 / (2pi T_1).

Secondary conditions

The smoothed absolute current actual value is used as input quantity for a maximum value monitoring of the absolute current actual value vector

$|i\_RZ| = + \mathrm{sqrt}(i\_d^2 + i\_q^2)$.

When the monitoring function responds, alarm 300607, "current controller output limited" is output.

			VSA/HSA		ROT/LIN
840D		0.5000	0.0000	2.0000	2/4

1254	**CURRENT_MONITOR_FILTER_TIME**			D02, EXP	**CR:** DÜ1
ms	Time constant for current monitoring			FLOAT	Immediately

Enter the time constant T 1 to smooth the absolute current value (PT_1 low-pass filter). The transition frequency f_0 of the PT_1 filter is obtained in accordance with f_0 = 1 / (2pi T_1).

Secondary conditions

The smoothed absolute current actual value is used as input quantity for a maximum value monitoring of the absolute current actual value vector

|i_RZ |= + sqrt (i_d² + i_q ²).

When the monitoring function responds, alarm 300607, "current controller output limited" is output.

			HSA SLM VSA		-
P2		0.500000	0.000000	2.000000	2/4

1260	**I2T_S6_REDUCTION**			D02, EXP	**CR:** DM1
%	i2t limit., limit current power module S6			FLOAT	Immediately

This MD is preset for protecting the power module. By means of a reduction of the parameter values, it is perhaps also possible to protect the motor from permanent overload.

			HSA SLM VSA		-
P2		100.0	25.0	100.0	2/4

1261	**I2T_NOMINAL_REDUCTION**			D02, EXP	**CR:** DM1
%	i2t limit. rated current power module			FLOAT	Immediately

This MD is preset for the protection of the power module. By means of a reduction of the parameter values, the motor may perhaps also be protected from permanent overload.

The maximum value of MD 1261 is

- for 1FT6, 1FK6 and 1FNx = 110%,
- for 1PHx and 1FE1 = 100%.

The maximum value is also always set as default value.

For FE1 it is in principle possible to enter values between 100% and 110%. However, the values are limited internally to 100%.

			HSA SLM VSA		-
P2		110.0	25.0	110.0	2/4

1262	**DIAGNOSIS_I2T**			D04	**CR:** DM1
s	i2t time in limitation			FLOAT	Immediately

MD for diagnostic purposes

i2t time in limitation

			HSA SLM VSA		-
P2		0.0	0.0	100000.0	2/4

1263	**LIMIT_I2T**			D04	**CR:** DM1
%	i2t actual limitation factor			FLOAT	Immediately

MD for diagnostic purposes

i2t actual limitation factor

			HSA SLM VSA		-

P2		0.0	0.0	100.0	2/4

1264	**LOAD_I2T**			D04	**CR:** DM1
%	i2t Current utilization factor			FLOAT	Immediately

MD for diagnosis
i2t current utilization factor

MD 1264 indicates the actual utilization for the i2t power section limitation.
The difference to 100% indicates how much reserve capacity is available.
If the utilization is 100%, the current limit is reduced.
The MDs 1262, 1263 and 1264 describe the actual status as follows:

Status	Time MD 1262	Current lim. MD 1263	Utilization MD 1264
not limited	constant	100%	< 100%
limited	runs	< 100%	100%

			HSA SLM VSA		-
P2		0.0	0.0	100.0	2/4

1265	**PERMCURR_FACTOR_I2TMOT**			D02, EXP	**CR:**
%	I2t compensation factor			FLOAT	sofort

Factor used to adapt the i2t motor model. This MD has been predefined to thermally protect the motor.
When this factor is increased, the KTY value stated in MD 1702 will be affected less.

			VSA/HSA		ROT/LIN
840D		90.0	50.0	100.0	2/4

1265	**PERMCURR_FACTOR_I2TMOT**			D02, EXP	**CR:** FBSI
%	Natural frequency for current setpoint filter 5			FLOAT	Immediately

Factor used to adapt the i2t motor model. This MD has been predefined to thermally protect the motor.
When this factor is increased, the KTY value stated in MD 1702 will be affected less.

			HSA SLM VSA		-
P2 840D		90.0	50.0	100.0	2/4

1268	**TAU_TIME**			D02, D05	**CR:**
s	Winding time constant			UNS. WORD	PowerOn

Input of the winding time constant -
the time elapsing until the motor is heated to 63% of 105K (=66K) with the motor current entered in MD 1118 (FDD/SLM) resp. MD 1103 (MSD).
When a fault occurs, the alarm 300613 "Maximum permissible motor temperature exceeded" is output.

			VSA/HSA		ROT/LIN
840D		0	0	5000	2/4

1268	**TAU_TIME**			D02, D05	**CR:** FBSI
s	Natural frequency for current setpoint filter 5			FLOAT	Power On
Input of the winding time constant - the time elapsing until the motor is heated to 63% of 105K (=66K) with the motor current entered in MD 1118 (FDD/SLM) resp. MD 1103 (MSD). When a fault occurs, the alarm 300613 "Maximum permissible motor temperature exceeded" is output.					
			HSA SLM VSA		-
P2 840D		0	0	2000	2/4

1272	**CURRENT_FILTER_5_FREQUENCY**			D01	**CR:** FBSI
Hz	Natural frequency for current setpoint filter 5			FLOAT	Immediately
Enter the natural frequency for current setpoint filter 5 (PT2 low-pass). Entering values < 10 Hz for the low-pass filter natural frequency switches the filter off. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2 840D		2000.000000	0.000000	8000.000000	2/4

1273	**CURRENT_FILTER_5_DAMPING**			D01	**CR:** FBSI
-	Damping for current setpoint filter 5			FLOAT	Immediately
Enter the damping for current setpoint filter 5 (PT2 low-pass). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2 840D		0.700000	0.050000	5.000000	2/4

1274	**CURRENT_FILTER_5_SUPPR_FREQ**			D01	**CR:** FBSI
Hz	Blocking frequency for current setpoint filter 5			FLOAT	Immediately
Enter the blocking frequency for current setpoint filter 5 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2 840D		3500.000000	1.000000	7999.000000	2/4

1275	**CURRENT_FILTER_5_BANDWIDTH**			D01	**CR:** FBSI
Hz	-3dB bandwidth for current setpoint filter 5			FLOAT	Immediately
Enter the -3dB bandwidth for current setpoint filter 5 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG. An input value 0 for the bandwidth switches the filter off.					
			HSA SLM VSA		-
P2 840D		500.000000	5.000000	7999.000000	2/4

1276	**CURRENT_FILTER_5_BW_NUM**			D01, EXP	**CR:** FBSI
Hz	Numerator bandwidth for damped bandwidth f. 5			FLOAT	Immediately
Enter the numerator bandwidth for the damped bandwidth. Entering the value 0 initializes the filter as an undamped bandstop. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG					
			HSA SLM VSA		-
P2 840D		0.000000	0.000000	7999.000000	2/4

1277	**CURRENT_FILTER_5_BS_FREQ**			D01, EXP	**CR:** FBSI
%	BSF-natural frequ. current setpoint filter 5			FLOAT	Immediately
BSF-natural frequ. current setpoint 5 [drive parameter set]: 0 ... 7 Enter the natural frequency general bandstop for current setpoint filter 1. MD 1277 allows to lower the amplitude for frequencies above the blocking frequency for current setpoint filter 5 The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2 840D		100.000000	1.000000	100.000000	2/4

1278	**CURRENT_FILTER_6_FREQUENCY**			D01	**CR:** FBSI
Hz	Natural frequency for current setpoint filter 6			FLOAT	Immediately
Enter the natural frequency for current setpoint filter 6 (PT2 low-pass). Entering values < 10 Hz for the low-pass filter natural frequency switches the filter off. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2 840D		2000.000000	0.000000	8000.000000	2/4

1279	**CURRENT_FILTER_6_DAMPING**			D01	**CR:** FBSI
-	Damping for current setpoint filter 6			FLOAT	Immediately
Enter the damping for current setpoint filter 6 (PT2 low-pass). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2 840D		0.700000	0.050000	5.000000	2/4

1280	**CURRENT_FILTER_6_SUPPR_FREQ**			D01	**CR:** FBSI
Hz	Blocking frequency for current setpoint filter 6			FLOAT	Immediately
Enter the blocking frequency for current setpoint filter 6 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2 840D		3500.000000	1.000000	7999.000000	2/4

1281	**CURRENT_FILTER_6_BANDWIDTH**			D01	**CR:** FBSI
Hz	-3dB bandwidth for current setpoint filter 6			FLOAT	Immediately
Enter the -3dB bandwidth for current setpoint filter 6 (bandstop filter). The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG. The input value 0 for the bandwidth switches the filter off.					
			HSA SLM VSA		-
P2 840D		500.000000	5.000000	7999.000000	2/4

1282	**CURRENT_FILTER_6_BW_NUM**			D01, EXP	**CR:** FBSI
Hz	Numerator bandwidth for damped bandstop filter 6			FLOAT	Immediately
Enter the numerator bandwidth for the damped bandstop filter. Entering the value 0 initializes the filter as an undamped bandstop filter. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-

P2 840D		0.000000	0.000000	7999.000000	2/4

1283	**CURRENT_FILTER_6_BS_FREQ**			D01, EXP	**CR:** FBSI
%	BSF natural freq. current setpoint 6			FLOAT	Immediately
BSF natural freq. current setpoint 6 [drive parameter set]: 0 ... 7 Enter the natural frequency / general bandstop filter for current setpoint filter 1. MD 1283 allows to lower the amplitude for frequencies above the blocking frequency of current setpoint filter 5. The filter is activated via MD 1200: NUM_CURRENT_FILTERS and MD 1201: CURRENT_FILTER_CONFIG.					
			HSA SLM VSA		-
P2 840D		100.000000	1.000000	100.000000	2/4

1300	**SAFETY_CYCLE_TIME**			D07	**CR:** FBSI
31,25us	SI monitoring cycle			UNS. WORD	PowerOn
This data sets the monitoring cycle for safe operation. Position control cycle <= monitoring cycle <= 25ms The monitoring cycle defines the reaction time of the monitoring functions. It must be noted that the load on the CPU is increased when a short monitoring cycle is set.					
			VSA/HSA		ROT/LIN
840D		384	16	800	2/4

1300	**SAFETY_CYCLE_TIME**			D07	**CR:** FBSI
31,25 us	SI monitoring cycle			UNS.WORD	Power On
This data sets the monitoring cycle for safe operation. Position control cycle <= monitoring cycle <= 25ms The monitoring cycle defines the reaction time of the monitoring functions. It must be noted that the load on the CPU is increased when a short monitoring cycle is set.					
			HSA SLM VSA		-
P2 840D		384	16	800	2/4

1301	**SAFE_FUNCTION_ENABLE**			D07	**CR:** FBSI
HEX	Enable safety functions			UNS. WORD	PowerOn
This data enables the partial functions for safe operation on an axis-specific or spindle-specific basis. The bit assignment is as follows: Bit I Significance -- 0 I SBH/SG enable 1 I SE " 2 I reserved, must be 0 3 I reserved, must be 0 4 I reserved, must be 0 5 I Correction of safe velocity enable (840D from SW 4.2) 6 I Stop via SGE " 7 I Cam synchronisation " -- 8 I SN1 + Enable safe cams 9 I SN1 - 10 I SN2 + 11 I SN2 - 12 I SN3 + 13 I SN3 - 14 I SN4 + 15 I SN4 - --					
			VSA/HSA		ROT/LIN
840D		0	0	fffb	2/4

1301	**SAFE_FUNCTION_ENABLE**			D07	**CR:** FBSI
-	Enable safety functions			UNS.WORD	Power On

This data enables the partial functions for safe operation on an axis-specific or spindle-specific basis. The bit assignment is as follows:

Bit I Significance
----
0 I SBH/SG enable
1 I SE "
2 I reserved, must be 0
3 I reserved, must be 0
4 I reserved, must be 0
5 I Correction of safe velocity enable (840D from SW 4.2)
6 I Stop via SGE "
7 I Cam synchronisation "
----
8 I SN1 + Enable safe cams
9 I SN1 -
10 I SN2 +
11 I SN2 -
12 I SN3 +
13 I SN3 -
14 I SN4 +
15 I SN4 -

			HSA SLM VSA		-
P2 840D		0x0000	0x0000	0xfffb	2/4

1302	**SAFE_IS_ROT_AX**	D07	**CR:** FBSI
-	Axis-specific bits of safety functions	UNS. WORD	PowerOn

Axis and encoder specific bits of the safety functions.

Bit I Significance

----

0 I Axis type 0 = linear axis, 1 = rotary axis/spindle
1 I Inch system 0 = metric system, 1 = inch system
2 I reserved must be 0
3 I reserved must be 0
4 I reserved must be 0
5 I reserved must be 0
6 I reserved must be 0
7 I reserved must be 0

----

8 I reserved must be 0
9 I reserved must be 0
10 I reserved must be 0
11 I reserved must be 0
12 I reserved must be 0
13 I reserved must be 0
14 I reserved must be 0
15 I reserved must be 0

			VSA/HSA		ROT/LIN
840D		0	0	3	2/4

1302	**SAFE_IS_ROT_AX**			D07	**CR:** FBSI
-	Axis-specific bits of safety functions			UNS.WORD	Power On

Axis and encoder specific bits of the safety functions.

Bit I Significance

---

0 I Axis type 0 = linear axis, 1 = rotary axis/spindle
1 I Inch system 0 = metric system, 1 = inch system
2 I reserved must be 0
3 I reserved must be 0
4 I reserved must be 0
5 I reserved must be 0
6 I reserved must be 0
7 I reserved must be 0

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8 I reserved must be 0
9 I reserved must be 0
10 I reserved must be 0
11 I reserved must be 0
12 I reserved must be 0
13 I reserved must be 0
14 I reserved must be 0
15 I reserved must be 0

			HSA SLM VSA		-
P2 840D		0x0000	0x0000	0x0003	2/4

1305	**SAFE_MODULO_RANGE**			D07	**CR:** FBSI
mGrad	Actual value range for SN for rotary axes			UNS. DWORD	PowerOn

Actual value range within which safe cams for rotary axes are calculated. The axis must be a rotary axis ($MA_/$MD_SAFE_IS_ROT_AX = 1).

Setting = 0: Modulo correction after +/- 2048 revolutions
(i.e. after 737 280 000 mdegrees)
Setting > 0 and multiples of 360 000 mdegrees:
Modulo correction after this setting (e.g. setting = 360 --> the actual value range is between 0 and 359.999 degrees, i.e. a modulo correction is carried out after every revolution.

Related machine data:
MD 36905: $MA_SAFE_MODULO_RANGE
MD 36936/1336: $MA_/$MD_SAFE_CAM_POS_PLUS[n]
MD 36937/1337: $MA_/$MD_SAFE_CAM_POS_MINUS[n]

			VSA/HSA		ROT/LIN
840D		0	0	737280000	2/4

1305	**SAFE_MODULO_RANGE**			D07	**CR:** FBSI
mGrad	Actual value range for SN for rotary axes			UNS.DWORD	Power On

Actual value range within which safe cams for rotary axes are calculated. The axis must be a rotary axis ($MA_/$MD_SAFE_IS_ROT_AX = 1).

Setting = 0: Modulo correction after +/- 2048 revolutions
(i.e. after 737 280 000 mdegrees)
Setting > 0 and multiples of 360 000 mdegrees:
Modulo correction after this setting (e.g. setting = 360 --> the actual value range is between 0 and 359.999 degrees, i.e. a modulo correction is carried out after every revolution.

Related machine data:
MD 36905: $MA_SAFE_MODULO_RANGE
MD 36936/1336: $MA_/$MD_SAFE_CAM_POS_PLUS[n]
MD 36937/1337: $MA_/$MD_SAFE_CAM_POS_MINUS[n]

			HSA SLM VSA		-
P2 840D		0	0	737280000	2/4

1316	**SAFE_ENC_CONFIG**			D07	**CR:** FBSI
-	Motor encoder configuration of safety functions			UNS. WORD	PowerOn

Safety-function bits that are specific to axis and encoder.

Bit | Significance

Bit 0 | Motor encoder (IMS) 0 = Rotary motor enc., 1 = Linear motor encoder
Bit 1 | Sign change 0 = None, 1 = Sign change
Bit 2 | 2-encoder system 0 = 1-encoder system, 1 = 2-encoder system
Bit 3 | reserved
Bit 4 | reserved
Bit 5 | reserved
Bit 6 | reserved
Bit 7 | reserved

Bit 8 | reserved
Bit 9 | reserved
Bit 10 | reserved
Bit 11 | reserved
Bit 12 | reserved
Bit 13 | reserved
Bit 14 | reserved
Bit 15 | reserved

			VSA/HSA		ROT/LIN
840D		0	0	7	2/4

1316	**SAFE_ENC_CONFIG**			D07	**CR:** FBSI
-	Motor encoder configuration of safety functions			UNS.WORD	Power On

Safety-function bits that are specific to axis and encoder.

Bit | Significance

Bit 0 | Motor encoder (IMS) 0 = Rotary motor enc., 1 = Linear motor encoder
Bit 1 | Sign change 0 = None, 1 = Sign change
Bit 2 | 2-encoder system 0 = 1-encoder system, 1 = 2-encoder system
Bit 3 | reserved
Bit 4 | reserved
Bit 5 | reserved
Bit 6 | reserved
Bit 7 | reserved

Bit 8 | reserved
Bit 9 | reserved
Bit 10 | reserved
Bit 11 | reserved
Bit 12 | reserved
Bit 13 | reserved
Bit 14 | reserved
Bit 15 | reserved

			HSA SLM VSA		-
P2 840D		0x0000	0x0000	0x0007	2/4

1317	**SAFE_ENC_GRID_POINT_DIST**			D07	**CR:** FBSI
um,mGrad	Grid spacing of linear scale			FLOAT	PowerOn
Grid spacing of encoder (only applies to linear encoders)					
			VSA/HSA		ROT/LIN
840D		10.0000	0.0100	8000.0000	2/4

1317	**SAFE_ENC_GRID_POINT_DIST**			D07	**CR:** FBSI
µm, mGrad	Grid spacing of linear scale			FLOAT	Power On
Grid spacing of encoder (only applies to linear encoders)					
			HSA SLM VSA		-
P2 840D		10.000000	0.010000	8000.000000	2/4

1318	**SAFE_ENC_RESOL**			D07	**CR:** FBSI
-	Encoder lines per revolution			UNS. DWORD	PowerOn
Number of lines per encoder revolution (only applies to rotary encoders)					
			VSA/HSA		ROT/LIN
840D		2048	1	100000	2/4

1318	**SAFE_ENC_RESOL**			D07	**CR:** FBSI
-	Encoder lines per revolution			UNS.DWORD	Power On
Number of lines per encoder revolution (only applies to rotary encoders)					
			HSA SLM VSA		-
P2 840D		2048	1	100000	2/4

1320	**SAFE_ENC_GEAR_PITCH**			D07	**CR:** FBSI
mm/U	Spindle pitch			FLOAT	PowerOn
Gear ratio of gear unit between encoder and load (applies to a linear axis with a rotary encoder)					
			VSA/HSA		ROT/LIN
840D		10.0000	0.1000	8388.0000	2/4

1320	**SAFE_ENC_GEAR_PITCH**			D07	**CR:** FBSI
mm/rev	Spindle pitch			FLOAT	Power On
Gear ratio of gear unit between encoder and load (applies to a linear axis with a rotary encoder)					
			HSA SLM VSA		-
P2 840D		10.000000	0.100000	8388.000000	2/4

1321	**SAFE_ENC_GEAR_DENOM**			D07	**CR:** FBSI
-	Denominator of gear unit encoder / load			UNS. DWORD	PowerOn
Denominator of gear unit between encoder and load, i.e. the denominator of the fraction "No. of encoder revolutions / No. of load revolutions" There are a total of 8 values (n = 0 ... 7); the current value is selected by means of SGEs.					
			VSA/HSA		ROT/LIN
840D		1	1	8388607	2/4

1321	**SAFE_ENC_GEAR_DENOM**			D07	**CR:** FBSI
-	Denominator of gear unit encoder / load			UNS.DWORD	Power On
Denominator of gear unit between encoder and load, i.e. the denominator of the fraction "No. of encoder revolutions / No. of load revolutions" There are a total of 8 values (n = 0 ... 7); the current value is selected by means of SGEs.					
			HSA SLM VSA		-
P2 840D		1	1	8388607	2/4

1322	**SAFE_ENC_GEAR_NUMERA**			D07	**CR:** FBSI
-	Numerator of gear unit encoder / load			UNS. DWORD	PowerOn
Numerator of gear unit between encoder and load, i.e. the numerator of the fraction "No. of encoder revolutions / No. of load revolutions" There are a total of 8 values (n = 0 ... 7); the current value is selected by means of SGEs.					
			VSA/HSA		ROT/LIN
840D		1	1	8388607	2/4

1322	**SAFE_ENC_GEAR_NUMERA**			D07	**CR:** FBSI
-	Numerator of gear unit encoder / load			UNS.DWORD	Power On
Numerator of gear unit between encoder and load, i.e. the numerator of the fraction "No. of encoder revolutions / No. of load revolutions" There are a total of 8 values (n = 0 ... 7); the current value is selected by means of SGEs.					
			HSA SLM VSA		-
P2 840D		1	1	8388607	2/4

1326	**SAFE_ENC_FREQ_LIMIT**			D07	**CR:** DB1
Hz	Encoder limit frequency			UNS.DWORD	Power On
The machine datum exists in NCK 840D and in the drive and is integrated in the cross-checking. The encoder limit frequency on the Performance 2 control is monitored in the same way as on the Performance 1 control.					
			HSA SLM VSA		-
P2 840D		300000	300000	420000	2/4

1330	**SAFE_STANDSTILL_TOL**			D07	**CR:** FBSI
um,mGrad	Standstill tolerance (SBH)			DWORD	PowerOn
Limit value for safe standstill monitoring. This machine data positions the standstill tolerance window for the SBH monitoring function. The actual value must remain within this window or else an alarm (tolerance band for safe operational stop exceeded) is output and the drive is switched to a safe operational stop.					
			VSA/HSA		ROT/LIN
840D		1000	1	100000	2/4

1330	**SAFE_STANDSTILL_TOL**			D07	**CR:** FBSI
µm, mGrad	Standstill tolerance (SBH)			DWORD	Power On
Limit value for safe standstill monitoring. This machine data positions the standstill tolerance window for the SBH monitoring function. The actual value must remain within this window or else an alarm (tolerance band for safe operational stop exceeded) is output and the drive is switched to a safe operational stop.					
			HSA SLM VSA		-
P2 840D		1000	1	100000	2/4

1331	**SAFE_VELO_LIMIT**			D07	**CR:** FBSI
mm/min,U/min	Limit values for SG			FLOAT	PowerOn
Limit values for safe monitoring of speed n = 0, 1, 2, 3, stand for limit values of SG1, 2, 3, 4 If the current actual speed exceeds this limit value, the drive activates a stop reaction (that can be parameterized in MD 1361: $MD_SAFE_VELO_STOP_MODE) and then switches to safe operational stop mode. With active SBH/SG and a 1-encoder system, the speed is monitored on the basis of an encoder limit frequency of 200 kHz (300 kHz, 840D from SW3.6). The parameterized stop reaction is triggered when the limit is exceeded.					
			VSA/HSA		ROT/LIN

840D		2000.0000	0.0000	1000000.0000	2/4

1331	**SAFE_VELO_LIMIT**			D07	**CR:** FBSI
mm/min, rev/min	Limit values for SG			FLOAT	Power On
Limit values for safe monitoring of speed n = 0, 1, 2, 3, stand for limit values of SG1, 2, 3, 4 If the current actual speed exceeds this limit value, the drive activates a stop reaction (that can be parameterized in MD 1361: $MD_SAFE_VELO_STOP_MODE) and then switches to safe operational stop mode. With active SBH/SG and a 1-encoder system, the speed is monitored on the basis of an encoder limit frequency of 200 kHz (300 kHz, 840D from SW3.6). The parameterized stop reaction is triggered when the limit is exceeded.					
			HSA SLM VSA		-
P2 840D		2000.000000	0.000000	1000000.000000	2/4

1332	**SAFE_VELO_OVR_FACTOR**			D07	**CR:** FBSI
%	Override factor for SG			UNS. WORD	PowerOn
It is possible to select overrides via SGEs for safe speeds 2 and 4 and to set the associated override value (percentage) in this machine data. n = 0, 1, ... , 15 stand for overrides 0, 1, ... 15 The "Override for safe speed" function is enabled via MD 36901(MD 1301): $MA($MD)_SAFE_FUNCTION_ENABLE					
			VSA/HSA		ROT/LIN
840D		100	1	100	2/4

1332	**SAFE_VELO_OVR_FACTOR**			D07	**CR:** FBSI
%	Override factor for SG			UNS.WORD	Power On
It is possible to select overrides via SGEs for safe speeds 2 and 4 and to set the associated override value (percentage) in this machine data. n = 0, 1, ... , 15 stand for overrides 0, 1, ... 15 The "Override for safe speed" function is enabled via MD 36901(MD 1301): $MA($MD)_SAFE_FUNCTION_ENABLE					
			HSA SLM VSA		-
P2 840D		100	1	100	2/4

1334	**SAFE_POS_LIMIT_PLUS**			D07	**CR:** FBSI
um,mGrad	Upper limit value for SE			DWORD	PowerOn
Upper (positive) limit value for safe monitoring of the limit position. n = 0, 1 stand for the safe limit positions 1, 2 When the active upper limit value is exceeded, the drive activates an alarm (that can be parameterized in MD 1362: $MD_SAFE_POS_STOP_MODE) and then switches to safe operational stop mode.					
			VSA/HSA		ROT/LIN
840D		100000000	-2147000000	2147000000	2/4

1334	**SAFE_POS_LIMIT_PLUS**			D07	**CR:** FBSI
µm, mGrad	Upper limit value for SE			DWORD	Power On
Upper (positive) limit value for safe monitoring of the limit position. n = 0, 1 stand for the safe limit positions 1, 2 When the active upper limit value is exceeded, the drive activates an alarm (that can be parameterized in MD 1362: $MD_SAFE_POS_STOP_MODE) and then switches to safe operational stop mode.					
			HSA SLM VSA		-
P2 840D		100000000	-2147000000	2147000000	2/4

1335	**SAFE_POS_LIMIT_MINUS**			D07	**CR:** FBSI
um,mGrad	Lower limit value for SE			DWORD	PowerOn
Lower (negative) limit value for safe monitoring of limit position. n = 0, 1 stand for the safe limit positions 1, 2 When the active lower limit value is exceeded, the drive activates an alarm (that can be parameterized in MD 1362: $MD_SAFE_POS_STOP_MODE) and then switches to safe operational stop mode.					
			VSA/HSA		ROT/LIN
840D		-100000000	-2147000000	2147000000	2/4

1335	**SAFE_POS_LIMIT_MINUS**			D07	**CR:** FBSI
µm, mGrad	Lower limit value for SE			DWORD	Power On
Lower (negative) limit value for safe monitoring of limit position. n = 0, 1 stand for the safe limit positions 1, 2 When the active lower limit value is exceeded, the drive activates an alarm (that can be parameterized in MD 1362: $MD_SAFE_POS_STOP_MODE) and then switches to safe operational stop mode.					
			HSA SLM VSA		-
P2 840D		-100000000	-2147000000	2147000000	2/4

1336	**SAFE_CAM_POS_PLUS**			D07	**CR:** FBSI
um,mGrad	Plus cam position SN			DWORD	PowerOn
Operating threshold for positive cams. n = 0, 1, 2, 3 stand for positive cams SN1 +, SN2 +, SN3 +, SN4 + If the safe actual position exceeds the position set in the machine data, then the SGA assigned to the relevant cam is set to 1.					
			VSA/HSA		ROT/LIN
840D		10000	-2147000000	2147000000	2/4

1336	**SAFE_CAM_POS_PLUS**			D07	**CR:** FBSI
µm, mGrad	Plus cam position SN			DWORD	Power On
Operating threshold for positive cams. n = 0, 1, 2, 3 stand for positive cams SN1 +, SN2 +, SN3 +, SN4 + If the safe actual position exceeds the position set in the machine data, then the SGA assigned to the relevant cam is set to 1.					
			HSA SLM VSA		-
P2 840D		10000	-2147000000	2147000000	2/4

1337	**SAFE_CAM_POS_MINUS**			D07	**CR:** FBSI
um,mGrad	Minus cam position SN			DWORD	PowerOn
Operating threshold for negative cams. n = 0, 1, 2, 3 stand for negative cams SN1 -, SN2 -,SN3 -, SN4 - If the safe actual position exceeds the position set in the machine data, then the SGA assigned to the relevant cam is set to 1.					
			VSA/HSA		ROT/LIN
840D		-10000	-2147000000	2147000000	2/4

1337	**SAFE_CAM_POS_MINUS**			D07	**CR:** FBSI
µm, mGrad	Minus cam position SN			DWORD	Power On
Operating threshold for negative cams. n = 0, 1, 2, 3 stand for negative cams SN1 -, SN2 -,SN3 -, SN4 - If the safe actual position exceeds the position set in the machine data, then the SGA assigned to the relevant cam is set to 1.					
			HSA SLM VSA		-
P2 840D		-10000	-2147000000	2147000000	2/4

1340	**SAFE_CAM_TOL**			D07	**CR:** FBSI
um,mGrad	Tolerance for safe cams			DWORD	PowerOn
Tolerance threshold for all cams. As a result of minimal measuring, computational and transit-time deviations, the two monitoring channels (NC and drive) rarely detect the crossing of a cam position at exactly the same time and in exactly the same position. This machine data creates a tolerance window within which cam results in the two monitoring channels may deviate without causing an error alarm.					
			VSA/HSA		ROT/LIN
840D		100	1	10000	2/4

1340	**SAFE_CAM_TOL**			D07	**CR:** FBSI
µm, mGrad	Tolerance for safe cams			DWORD	Power On
Tolerance threshold for all cams. As a result of minimal measuring, computational and transit-time deviations, the two monitoring channels (NC and drive) rarely detect the crossing of a cam position at exactly the same time and in exactly the same position. This machine data creates a tolerance window within which cam results in the two monitoring channels may deviate without causing an error alarm.					
			HSA SLM VSA		-
P2 840D		100	1	10000	2/4

1342	**SAFE_POS_TOL**			D07	**CR:** FBSI
um,mGrad	Actual value tolerance for the cross-check			DWORD	PowerOn
Tolerance threshold for the cross-check of the position actual value between the NC and drive. This machine data creates a tolerance window within which the position actual values of the NC and drive may deviate from one another. "Finger protection" (about 10 mm) is the primary consideration when setting this tolerance value. If the deviation between the position actual values is greater than the tolerance window, an alarm with error code is output.					
			VSA/HSA		ROT/LIN
840D		100	1	360000	2/4

1342	**SAFE_POS_TOL**			D07	**CR:** FBSI
µm, mGrad	Actual value tolerance for the cross-check			DWORD	Power On
Tolerance threshold for the cross-check of the position actual value between the NC and drive. This machine data creates a tolerance window within which the position actual values of the NC and drive may deviate from one another. "Finger protection" (about 10 mm) is the primary consideration when setting this tolerance value. If the deviation between the position actual values is greater than the tolerance window, an alarm with error code is output.					
			HSA SLM VSA		-
P2 840D		100	1	360000	2/4

1344	**SAFE_REFP_POS_TOL**			D07	**CR:** FBSI
um,mGrad	Actual value tolerance safe axis position			DWORD	PowerOn
Tolerance threshold for the actual value check after referencing. A second absolute actual position is calculated from the last standstill position to be stored prior to encoder power OFF and the distance traversed since power ON. These two actual positions must be within the tolerance window or else the axis cannot be referenced without "user agreement". If this agreement has not been given, an alarm with error code is output. The following factors must be taken into consideration when calculating tolerance values: Backlash, leadscrew errors, temperature errors, torsion with 2-encoder system, gear play on shift gearboxes, lower resolution with 2-encoder system, oscillating distance for shift gearboxes.					
			VSA/HSA		ROT/LIN
840D		10	0	36000	2/4

1344	**SAFE_REFP_POS_TOL**			D07	**CR:** FBSI
µm, mGrad	Actual value tolerance safe axis position			DWORD	Power On
Tolerance threshold for the actual value check after referencing. A second absolute actual position is calculated from the last standstill position to be stored prior to encoder power OFF and the distance traversed since power ON. These two actual positions must be within the tolerance window or else the axis cannot be referenced without "user agreement". If this agreement has not been given, an alarm with error code is output. The following factors must be taken into consideration when calculating tolerance values: Backlash, leadscrew errors, temperature errors, torsion with 2-encoder system, gear play on shift gearboxes, lower resolution with 2-encoder system, oscillating distance for shift gearboxes.					
			HSA SLM VSA		-
P2 840D		10	0	36000	2/4

1346	**SAFE_VELO_X**			D07	**CR:** FBSI
mm/min,U/min	Speed limit nx			FLOAT	PowerOn
This data defines the speed limit nx for SGA "n < nx". Setting 0 means: n < nx is not active.					
			VSA/HSA		ROT/LIN
840D		20.0000	0.0000	1000.0000	2/4

1346	**SAFE_VELO_X**			D07	**CR:** FBSI
mm/min, rev/min	Speed limit nx			FLOAT	Power On
This data defines the speed limit nx for SGA "n < nx". Setting 0 means: n < nx is not active.					
			HSA SLM VSA		-
P2 840D		20.000000	0.000000	1000.000000	2/4

1348	**SAFE_STOP_VELO_TOL**			D07	**CR:** FBSI
mm/min,U/min	Actual speed tolerance for SBR			FLOAT	PowerOn
After the safe braking ramp has been activated, the current speed plus the speed tolerance set in this machine data are applied as a speed limit.					
			VSA/HSA		ROT/LIN
840D		300.0000	0.0000	20000.0000	2/4

1348	**SAFE_STOP_VELO_TOL**			D07	**CR:** FBSI
mm/min, rev/min	Actual speed tolerance for SBR			FLOAT	Power On
After the safe braking ramp has been activated, the current speed plus the speed tolerance set in this machine data are applied as a speed limit.					
			HSA SLM VSA		-
P2 840D		300.000000	0.000000	20000.000000	2/4

1349	**SAFE_SLIP_VELO_TOL**			D07	**CR:** FBSI
mm/min,U/min	Tolerance 2 encoder drift/slip			FLOAT	PowerOn
Permissible tolerance between 2 installed encoders.					
			VSA/HSA		ROT/LIN

840D		6.0000	0.0000	1000.0000	2/4

1349	**SAFE_SLIP_VELO_TOL**			D07	**CR:** FBSI
mm/min, rev/min	Tolerance 2 encoder drift/slip			FLOAT	Power On
Permissible tolerance between 2 installed encoders.					
			HSA SLM VSA		-
P2 840D		6.000000	0.000000	1000.000000	2/4

1350	**SAFE_MODE_SWITCH_TIME**			D07	**CR:** FBSI
ms	Tolerance time for SGE changeover			FLOAT	PowerOn
Time for SGE changes timer. The timer is started every time new SGEs are accepted. The new monitoring functions are immediately active, but the cross-check of time-variable data (i.e. actual values and result lists) must be postponed for a short period since the two monitoring channels do not detect the SGE changes at exactly the same time. Note System-dependent minimum tolerance time: 2 x PLC cycle time (maximum cycle) + 1 x IPO cycle time Furthermore: The variations in transit times in the external circuitry (e.g. relay operating times) must also be taken into account.					
			VSA/HSA		ROT/LIN
840D		500.0000	0.0000	10000.0000	2/4

1350	**SAFE_MODE_SWITCH_TIME**			D07	**CR:** FBSI
ms	Tolerance time for SGE changeover			FLOAT	Power On
Time for SGE changes timer. The timer is started every time new SGEs are accepted. The new monitoring functions are immediately active, but the cross-check of time-variable data (i.e. actual values and result lists) must be postponed for a short period since the two monitoring channels do not detect the SGE changes at exactly the same time. Note System-dependent minimum tolerance time: 2 x PLC cycle time (maximum cycle) + 1 x IPO cycle time Furthermore: The variations in transit times in the external circuitry (e.g. relay operating times) must also be taken into account.					
			HSA SLM VSA		-
P2 840D		500.000000	0.000000	10000.000000	2/4

1351	**SAFE_VELO_SWITCH_DELAY**			D07	**CR:** FBSI
ms	Delay time for SG changeover			FLOAT	PowerOn
The timer is started on transition from the safe speed function to SBH mode or when the speed monitoring limit is reduced to a lower speed. During this period, the last selected safe speed limit remains active.					
			VSA/HSA		ROT/LIN
840D		100.0000	0.0000	10000.0000	2/4

1351	**SAFE_VELO_SWITCH_DELAY**			D07	**CR:** FBSI
ms	Delay time for SG changeover			FLOAT	Power On
The timer is started on transition from the safe speed function to SBH mode or when the speed monitoring limit is reduced to a lower speed. During this period, the last selected safe speed limit remains active.					
			HSA SLM VSA		-
P2 840D		100.000000	0.000000	60000.000000	2/4

1352	**SAFE_STOP_SWITCH_TIME_C**			D07	**CR:** FBSI
ms	Transition time from STOP C to SBH			FLOAT	PowerOn
On expiry of the time set in this data, the system switches from STOP C mode (initiated by the SG or SE monitoring function) to SBH mode. After the time period has elapsed, the axis/spindle is monitored for safe operational stop. If it has still not reached zero speed, a STOP A or STOP B is initiated.					
			VSA/HSA		ROT/LIN
840D		100.0000	0.0000	10000.0000	2/4

1352	**SAFE_STOP_SWITCH_TIME_C**			D07	**CR:** FBSI
ms	Transition time from STOP C to SBH			FLOAT	Power On
On expiry of the time set in this data, the system switches from STOP C mode (initiated by the SG or SE monitoring function) to SBH mode. After the time period has elapsed, the axis/spindle is monitored for safe operational stop. If it has still not reached zero speed, a STOP A or STOP B is initiated.					
			HSA SLM VSA		-
P2 840D		100.000000	0.000000	10000.000000	2/4

1353	**SAFE_STOP_SWITCH_TIME_D**			D07	**CR:** FBSI
ms	Transition time from STOP D to SBH			FLOAT	PowerOn
On expiry of the time set in this data, the system switches from STOP D mode (initiated by the SG or SE monitoring function) to SBH mode. After the time period has elapsed, the axis/spindle is monitored for safe operational stop. If it has still not reached zero speed, a STOP A or STOP B is initiated.					
			VSA/HSA		ROT/LIN
840D		100.0000	0.0000	10000.0000	2/4

1353	**SAFE_STOP_SWITCH_TIME_D**			D07	**CR:** FBSI
ms	Transition time from STOP D to SBH			FLOAT	Power On
On expiry of the time set in this data, the system switches from STOP D mode (initiated by the SG or SE monitoring function) to SBH mode. After the time period has elapsed, the axis/spindle is monitored for safe operational stop. If it has still not reached zero speed, a STOP A or STOP B is initiated.					
			HSA SLM VSA		-
P2 840D		100.000000	0.000000	60000.000000	2/4

1354	**SAFE_STOP_SWITCH_TIME_E**			D07	**CR:** FBSI
ms	Transition time from STOP E to SBH			FLOAT	PowerOn
On expiry of the time set in this data, the system switches from STOP E mode (initiated by the SG or SE monitoring function) to SBH mode. After the time period has elapsed, the axis/spindle is monitored for safe operational stop. If it has still not reached zero speed, a STOP A or STOP B is initiated.					
			VSA/HSA		ROT/LIN
840D		100.0000	0.0000	10000.0000	2/4

1354	**SAFE_STOP_SWITCH_TIME_E**			D07	**CR:** FBSI
ms	Transition time from STOP E to SBH			FLOAT	Power On
On expiry of the time set in this data, the system switches from STOP E mode (initiated by the SG or SE monitoring function) to SBH mode. After the time period has elapsed, the axis/spindle is monitored for safe operational stop. If it has still not reached zero speed, a STOP A or STOP B is initiated.					
			HSA SLM VSA		-
P2 840D		100.000000	0.000000	60000.000000	2/4

1355	**SAFE_STOP_SWITCH_TIME_F**			D07	**CR:** FBSI
ms	Transition time from STOP F to Stop B			FLOAT	PowerOn
Preparation for SI with ESR					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	10000.0000	2/4

1355	**SAFE_STOP_SWITCH_TIME_F**			D07	**CR:** FBSI
ms	Transition period from STOP F to STOP B			FLOAT	Power On
Preparation for SI with ESR					
			HSA SLM VSA		-
P2 840D		0.000000	0.000000	60000.000000	2/4

1356	**SAFE_PULSE_DISABLE_DELAY**			D07	**CR:** FBSI
ms	Delay time for pulse suppression			FLOAT	PowerOn
Delay time for suppressing pulses after activation of a STOP B. The pulses are suppressed earlier than defined in this data if the condition for pulse suppression is defined in MD 1360: $MD_SAFE_STANDSTILL_VELO_TOL. If the time in this data is set to zero, STOP A (immediate pulse suppression) is activated immediately from STOP B mode.					
			VSA/HSA		ROT/LIN
840D		100.0000	0.0000	10000.0000	2/4

1356	**SAFE_PULSE_DISABLE_DELAY**			D07	**CR:** FBSI
ms	Delay time for pulse suppression			FLOAT	Power On
Delay time for suppressing pulses after activation of a STOP B. The pulses are suppressed earlier than defined in this data if the condition for pulse suppression is defined in MD 1360: $MD_SAFE_STANDSTILL_VELO_TOL. If the time in this data is set to zero, STOP A (immediate pulse suppression) is activated immediately from STOP B mode.					
			HSA SLM VSA		-
P2 840D		100.000000	0.000000	10000.000000	2/4

1357	**SAFE_PULSE_DIS_CHECK_TIME**			D07	**CR:** FBSI
ms	Time for testing pulse suppression			FLOAT	PowerOn
On expiry of the time set in this data, the drive pulses must be suppressed if requested by the SGE "Test stop selection". If this time is exceeded, a STOP A is activated.					
			VSA/HSA		ROT/LIN
840D		100.0000	0.0000	10000.0000	2/4

1357	**SAFE_PULSE_DIS_CHECK_TIME**			D07	**CR:** FBSI
ms	Time for testing pulse suppression			FLOAT	Power On
On expiry of the time set in this data, the drive pulses must be suppressed if requested by the SGE "Test stop selection". If this time is exceeded, a STOP A is activated.					
			HSA SLM VSA		-
P2 840D		100.000000	0.000000	10000.000000	2/4

1358	**SAFE_ACC_TEST_TIMEOUT**			D07	**CR:** FBSI
ms	Acceptance test monitoring			FLOAT	PowerOn
Preparation for SI with acceptance test					
			VSA/HSA		ROT/LIN
840D		40000.0000	5000.0000	100000.0000	2/4

1358	**SAFE_ACC_TEST_TIMEOUT**			D07	**CR:** FBSI
ms	SI acceptance test timer			FLOAT	Power On
Preparation for SI with acceptance test					
			HSA SLM VSA		-
P2 840D		40000.0	5000.0	100000.0	2/4

1360	**SAFE_STANDSTILL_VELO_TOL**			D07	**CR:** FBSI
mm/min,U/min	Creep speed pulse suppression			FLOAT	PowerOn
When the axis speed drops below this limit, it is judged to be at a "standstill". The pulses are then suppressed in STOP B mode (through transition to STOP A mode). MD 1356: $MD_SAFE_PULSE_DISABLE_DELAY must be noted. If the delay time expires before the speed drops below the speed limit, then the drive pulses are suppressed prematurely.					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	1000.0000	2/4

1360	**SAFE_STANDSTILL_VELO_TOL**			D07	**CR:** FBSI
mm/min, rev/min	Creep speed pulse suppression			FLOAT	Power On
When the axis speed drops below this limit, it is judged to be at a "standstill". The pulses are then suppressed in STOP B mode (through transition to STOP A mode). MD 1356: $MD_SAFE_PULSE_DISABLE_DELAY must be noted. If the delay time expires before the speed drops below the speed limit, then the drive pulses are suppressed prematurely.					
			HSA SLM VSA		-
P2 840D		0.000000	0.000000	1000.000000	2/4

1361	**SAFE_VELO_STOP_MODE**			D07	**CR:** FBSI
-	Stop reaction with SG			UNS. WORD	PowerOn
If a selected limit value for safe speed 1, 2, 3 or 4 is exceeded, the stop reaction set in this data is initiated. = 0, 1, 2, 3 correspond to STOP A, B, C, D as error reactions. = 5 means that the stop reaction can be configured for specific SGs in MD 36963/1363.					
			VSA/HSA		ROT/LIN
840D		5	0	14	2/4

1361	**SAFE_VELO_STOP_MODE**			D07	**CR:** FBSI
-	Stop reaction with SG			UNS.WORD	Power On
If a selected limit value for safe speed 1, 2, 3 or 4 is exceeded, the stop reaction set in this data is initiated. = 0, 1, 2, 3 correspond to STOP A, B, C, D as error reactions. = 5 means that the stop reaction can be configured for specific SGs in MD 36963/1363.					
			HSA SLM VSA		-
P2 840D		5	0	14	2/4

1362	**SAFE_POS_STOP_MODE**			D07	**CR:** FBSI
-	Stop reaction with SE			UNS. WORD	PowerOn
When the activated safe limit position 1 or 2 is exceeded, the stop reaction specified in this data is initiated. = 2, 3, 4 stand for STOP C, D and E respectively, they are initiated in response to an error.					
			VSA/HSA		ROT/LIN
840D		2	2	4	2/4

1362	**SAFE_POS_STOP_MODE**			D07	**CR:** FBSI
-	Stop reaction with SE			UNS.WORD	Power On
When the activated safe limit position 1 or 2 is exceeded, the stop reaction specified in this data is initiated. = 2, 3, 4 stand for STOP C, D and E respectively, they are initiated in response to an error.					
			HSA SLM VSA		-
P2 840D		2	2	4	2/4

1363	**SAFE_VELO_STOP_REACTION**			D07	**CR:** FBSI
-	Specific SG stop reaction			UNS. WORD	PowerOn
The stop reaction programmed in this data is initiated when a selected limit value for safe speed 1, 2, 3 or 4 is exceeded. n = 0, 1, 2, 3 stand for SG1, SG2, SG3, SG4 Value = 0, 1, 2, 3 correspond to STOP A, B, C, D This function is only active if MD 36961 and MD 1361 have been set to 5.					
			VSA/HSA		ROT/LIN
840D		2	0	14	2/4

1363	**SAFE_VELO_STOP_REACTION**			D07	**CR:** FBSI
-	Specific SG stop reaction			UNS.WORD	Power On
The stop reaction programmed in this data is initiated when a selected limit value for safe speed 1, 2, 3 or 4 is exceeded. n = 0, 1, 2, 3 stand for SG1, SG2, SG3, SG4 Value = 0, 1, 2, 3 correspond to STOP A, B, C, D This function is only active if MD 36961 and MD 1361 have been set to 5.					
			HSA SLM VSA		-
P2 840D		2	0	14	2/4

1370	**SAFE_TEST_MODE**			D07	**CR:** FBSI
-	Acceptance test mode			UNS. WORD	sofort
Preparation for SI with acceptance test					
			VSA/HSA		ROT/LIN
840D		0	0	ac	2/4

1370	**SAFE_TEST_MODE**			D07	**CR:** FBSI
-	SI acceptance test mode			UNS.WORD	Immediately
Preparation for SI with acceptance test					
			HSA SLM VSA		-
P2 840D		0	0	0x00AC	2/4

1371	**SAFE_TEST_STATE**			D07	**CR:** FBSI
-	Acceptance test state			UNS. WORD	sofort
Preparation for SI with acceptance test					
			VSA/HSA		ROT/LIN
840D		0	0	ac	2/4

1371	**SAFE_TEST_STATE**			D07	**CR:** FBSI
-	SI acceptance test status			UNS.WORD	Immediately
Preparation for SI with acceptance test					
			HSA SLM VSA		-
P2 840D		0	0	0x00AC	2/4

1380	**SAFE_PULSE_DIS_TIME_FAIL**			D07	**CR:** FBSI
ms	Time remaining until pulse suppression			FLOAT	PowerOn
Preparation for SI with ESR					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	1000.0000	2/4

1380	**SAFE_PULSE_DIS_TIME_FAIL**			D07	**CR:** FBSI
ms	Time until pulse suppression			FLOAT	Power On
Preparation for SI with ESR					
			HSA SLM VSA		-
P2 840D		0.000000	0.000000	800.000000	2/4

1390	**SAFE_FIRMWARE_VERSION**			D07	**CR:** FBSI
-	Firmware			UNS. DWORD	sofort
Firmware release of the drive firmware in respect of the safety integrated scope of available functions					
			VSA/HSA		ROT/LIN
840D		0	0	2147483647	2/4

1390	**SAFE_FIRMWARE_VERSION**			D07	**CR:** FBSI
-	Firmware			UNS.DWORD	Immediately
Firmware release of the drive firmware in respect of the safety integrated scope of available functions					
			HSA SLM VSA		-
P2 840D		0	0	4294967295	2/4

1391	SAFE_DIAG_NC_RESULTLIST1	D07	CR: FBSI
-	Diagnostics: NC result list 1	UNS. DWORD	sofort

These machine data are used to decode errors in result list 1.

Bit | Function
----
0 | SBH
1 | SBH
2 | SE1
3 | SE1
4 | SE2
5 | SE2
6 | SG1
7 | SG1
8 | SG2
9 | SG2
10 | SG3
11 | SG3
12 | SG4
13 | SG4
14-31 | -

The bits assigned to SI functions have an identical status in error-free operation, but have different statuses when an error has occurred.

In the case of a difference between 1391 and 1392, an error has occurred in the SI function that is assigned to this bit.

Example:

MD 1391 = 0000 1556Hex = 0000 0000 0000 0000 0001 0101 0101 0110 binary

MD 1392 = 0000 1557Hex = 0000 0000 0000 0000 0001 0101 0101 0111 binary

--> bit 0 is different --> error in result cross-check of safe operational stop (SBH function. All data that are relevant for the safe operational stop function must be checked in the NCK and drive channels.

			VSA/HSA		ROT/LIN
840D		0	0	2147483647	2/4

1391	**SAFE_DIAG_NC_RESULTLIST1**			D07	**CR:** FBSI
-	Diagnostics: NC result list 1			UNS.DWORD	Immediately

These machine data are used to decode errors in result list 1.

Bit | Function
----

0 | SBH
1 | SBH
2 | SE1
3 | SE1
4 | SE2
5 | SE2
6 | SG1
7 | SG1
8 | SG2
9 | SG2
10 | SG3
11 | SG3
12 | SG4
13 | SG4
14-31 | -

The bits assigned to SI functions have an identical status in error-free operation, but have different statuses when an error has occurred.

In the case of a difference between 1391 and 1392, an error has occurred in the SI function that is assigned to this bit.

Example:

MD 1391 = 0000 1556Hex = 0000 0000 0000 0000 0001 0101 0101 0110 binary

MD 1392 = 0000 1557Hex = 0000 0000 0000 0000 0001 0101 0101 0111 binary

--> bit 0 is different --> error in result cross-check of safe operational stop (SBH function. All data that are relevant for the safe operational stop function must be checked in the NCK and drive channels.

			HSA SLM VSA		-
P2 840D		0	0	4294967295	2/4

1392	SAFE_DIAG_611D_RESULTLIST1			D07	**CR:** FBSI
-	Diagnostics: 611D result list 1			UNS. DWORD	sofort

These machine data, together with MD 1391, are used to decode errors in result list 1.

Bit | Function
----
0 I SBH
1 I SBH
2 I SE1
3 I SE1
4 I SE2
5 I SE2
6 I SG1
7 I SG1
8 I SG2
9 I SG2
10 I SG3
11 I SG3
12 I SG4
13 I SG4
14 - 31 I -

The bits assigned to SI functions have an identical status in error-free operation, but have different statuses when an error has occurred.

In the case of a difference between 1391 and 1392, an error has occurred in the SI function that is assigned to this bit.

Example:
MD 1391 = 0000 1556Hex = 0000 0000 0000 0000 0001 0101 0101 0110 binary
MD 1392 = 0000 1557Hex = 0000 0000 0000 0000 0001 0101 0101 0111 binary

--> bit 0 is different --> error in result cross-check of safe operational stop (SBH function. All data that are relevant for the safe operational stop function must be checked in the NCK and drive channels.

			VSA/HSA		ROT/LIN
840D		0	0	2147483647	2/4

1392	**SAFE_DIAG_611D_RESULTLIST1**			D07	**CR:** FBSI
-	Diagnostics: 611D result list 1			UNS.DWORD	Immediately

These machine data, together with MD 1391, are used to decode errors in result list 1.

Bit | Function
----
0 I SBH
1 I SBH
2 I SE1
3 I SE1
4 I SE2
5 I SE2
6 I SG1
7 I SG1
8 I SG2
9 I SG2
10 I SG3
11 I SG3
12 I SG4
13 I SG4
14 - 31 I -

The bits assigned to SI functions have an identical status in error-free operation, but have different statuses when an error has occurred.

In the case of a difference between 1391 and 1392, an error has occurred in the SI function that is assigned to this bit.

Example:
MD 1391 = 0000 1556Hex = 0000 0000 0000 0000 0001 0101 0101 0110 binary
MD 1392 = 0000 1557Hex = 0000 0000 0000 0000 0001 0101 0101 0111 binary

--> bit 0 is different --> error in result cross-check of safe operational stop (SBH function. All data that are relevant for the safe operational stop function must be checked in the NCK and drive channels.

			HSA SLM VSA		-
P2 840D		0	0	4294967295	2/4

1393	SAFE_DIAG_NC_RESULTLIST2	D07	CR: FBSI
-	Diagnostics: NC result list 2	UNS. DWORD	sofort

These machine data, together with MD 1394, are used to decode errors in result list 2.

Bit | Function

----

0 I SN1 +
1 I SN1 +
2 I SN1 -
3 I SN1 -
4 I SN2 +
5 I SN2 +
6 I SN2 -
7 I SN2 -

----

8 I SN3 +
9 I SN3 +
10 I SN3 -
11 I SN3 -
12 I SN4 +
13 I SN4 +
14 I SN4 -
15 I SN4 -

----

16 I n_x upper limit
17 I n_x upper limit
18 I n_x lower limit
19 I n_x lower limit
20 I Cam modulo range
21 I Cam modulo range
22-31 I -

The bits assigned to SI functions have an identical status in error-free operation, but have different statuses when an error has occurred.

In the case of a difference between 1393 and 1394, an error has occurred in the SI function that is assigned to this bit.

Example:
MD 1393 = 0000 1547Hex = 0000 0000 0000 0000 0001 0101 0100 0111 binary
MD 1394 = 0000 1557Hex = 0000 0000 0000 0000 0001 0101 0101 0111 binary
--> Bit 4 is different --> error in result cross-check of safe cam (SN2 +). All data that are relevant for this cam must be checked in the NCK and drive channels.

			VSA/HSA		ROT/LIN
840D		0	0	2147483647	2/4

1393	SAFE_DIAG_NC_RESULTLIST2	D07	CR: FBSI
-	Diagnostics: NC result list 2	UNS.DWORD	Immediately

These machine data, together with MD 1394, are used to decode errors in result list 2.

Bit | Function
----
0 I SN1 +
1 I SN1 +
2 I SN1 -
3 I SN1 -
4 I SN2 +
5 I SN2 +
6 I SN2 -
7 I SN2 -
----
8 I SN3 +
9 I SN3 +
10 I SN3 -
11 I SN3 -
12 I SN4 +
13 I SN4 +
14 I SN4 -
15 I SN4 -
----
16 I n_x upper limit
17 I n_x upper limit
18 I n_x lower limit
19 I n_x lower limit
20 I Cam modulo range
21 I Cam modulo range
22-31 I -

The bits assigned to SI functions have an identical status in error-free operation, but have different statuses when an error has occurred.

In the case of a difference between 1393 and 1394, an error has occurred in the SI function that is assigned to this bit.

Example:
MD 1393 = 0000 1547Hex = 0000 0000 0000 0000 0001 0101 0100 0111 binary
MD 1394 = 0000 1557Hex = 0000 0000 0000 0000 0001 0101 0101 0111 binary
--> Bit 4 is different --> error in result cross-check of safe cam (SN2 +). All data that are relevant for this cam must be checked in the NCK and drive channels.

			HSA SLM VSA		-
P2 840D		0	0	4294967295	2/4

1394	SAFE_DIAG_611D_RESULTLIST2	D07	CR: FBSI
-	Diagnostics: 611D result list 2	UNS. DWORD	sofort

These machine data, together with MD 1393, are used to decode errors in result list 2.

Bit | Function
----
0 I SN1 +
1 I SN1 +
2 I SN1 -
3 I SN1 -
4 I SN2 +
5 I SN2 +
6 I SN2 -
7 I SN2 -
----
8 I SN3 +
9 I SN3 +
10 I SN3 -
11 I SN3 -
12 I SN4 +
13 I SN4 +
14 I SN4 -
15 I SN4 -
----
16 I n_x upper limit
17 I n_x upper limit
18 I n_x lower limit
19 I n_x lower limit
20 I Cam modulo range
21 I Cam modulo range
22-31 I -

The bits assigned to SI functions have an identical status in error-free operation, but have different statuses when an error has occurred.

In the case of a difference between 1393 and 1394, an error has occurred in the SI function that is assigned to this bit.

Example:

MD 1393 = 0000 1547Hex = 0000 0000 0000 0000 0001 0101 0100 0111 binary

MD 1394 = 0000 1557Hex = 0000 0000 0000 0000 0001 0101 0101 0111 binary

--> Bit 4 is different --> error in result cross-check of safe cam (SN2 +). All data that are relevant for this cam must be checked in the NCK and drive channels.

			VSA/HSA		ROT/LIN
840D		0	0	2147483647	2/4

1394	SAFE_DIAG_611D_RESULTLIST2	D07	CR: FBSI
-	Diagnostics: 611D result list 2	UNS.DWORD	Immediately

These machine data, together with MD 1393, are used to decode errors in result list 2.

Bit | Function
----
0 I SN1 +
1 I SN1 +
2 I SN1 -
3 I SN1 -
4 I SN2 +
5 I SN2 +
6 I SN2 -
7 I SN2 -
----
8 I SN3 +
9 I SN3 +
10 I SN3 -
11 I SN3 -
12 I SN4 +
13 I SN4 +
14 I SN4 -
15 I SN4 -
----
16 I n_x upper limit
17 I n_x upper limit
18 I n_x lower limit
19 I n_x lower limit
20 I Cam modulo range
21 I Cam modulo range
22-31 I -

The bits assigned to SI functions have an identical status in error-free operation, but have different statuses when an error has occurred.

In the case of a difference between 1393 and 1394, an error has occurred in the SI function that is assigned to this bit.

Example:

MD 1393 = 0000 1547Hex = 0000 0000 0000 0000 0001 0101 0100 0111 binary

MD 1394 = 0000 1557Hex = 0000 0000 0000 0000 0001 0101 0101 0111 binary

--> Bit 4 is different --> error in result cross-check of safe cam (SN2 +). All data that are relevant for this cam must be checked in the NCK and drive channels.

			HSA SLM VSA		-
P2 840D		0	0	4294967295	2/4

1395	**SAFE_STOP_F_DIAGNOSIS**			D07	**CR:** FBSI
-	Diagnostics for STOP F			WORD	sofort

The fine diagnosis for the following alarms is displayed in this data:
On 840D Alarm 27001 "Defect in a monitoring channel"
On 611D Alarm 300911 "Defect in a monitoring channel"

With error code = 1: Evaluate fine error coding in MDs 1391 and 1392
With error code = 2: Evaluate fine error coding in MD 1393 and 1394

The error code is output with the alarm display on the SINUMERIK 840D.

The error code is output with the alarm display on the 611D.

			VSA/HSA		ROT/LIN
840D		32767	0	32767	2/4

1395	**SAFE_STOP_F_DIAGNOSIS**			D07	**CR:** FBSI
-	Diagnostics for STOP F			WORD	Immediately

The fine diagnosis for the following alarms is displayed in this data:
On 840D Alarm 27001 "Defect in a monitoring channel"
On 611D Alarm 300911 "Defect in a monitoring channel"

With error code = 1: Evaluate fine error coding in MDs 1391 and 1392
With error code = 2: Evaluate fine error coding in MD 1393 and 1394

The error code is output with the alarm display on the SINUMERIK 840D.

The error code is output with the alarm display on the 611D.

			HSA SLM VSA		-
P2 840D		32767	0	32767	2/4

1396	**SAFE_ACKN_WRITE**			D07	**CR:** FBSI
HEX	User agreement			UNS. WORD	sofort

The user must input his agreement manually to switch the axis from the "Axis referenced" (IS) state to the "Axis safely referenced" (SGA) state.

User agreement does not have to be given when the axis is referenced again provided that the comparison of the standstill position and the "reference position" that is automatically made during power-up produces a positive result.

Bit 15 ... 0 | Meaning

= 00AC | Agreement set
= 0 | Agreement not set

			VSA/HSA		ROT/LIN
840D		0	0	ffff	2/4

1396	**SAFE_ACKN_WRITE**			D07	**CR:** FBSI
-	User agreement			UNS.WORD	Immediately
The user must input his agreement manually to switch the axis from the "Axis referenced" (IS) state to the "Axis safely referenced" (SGA) state. User agreement does not have to be given when the axis is referenced again provided that the comparison of the standstill position and the "reference position" that is automatically made during power-up produces a positive result. Bit 15 ... 0 | Meaning -- = 00AC | Agreement set = 0 | Agreement not set					
			HSA SLM VSA		-
P2 840D		0x0000	0x0000	0xffff	2/4

1397	**SAFE_ACKN_READ**			D07	**CR:** FBSI
HEX	611D internal agreement			UNS. WORD	sofort
Display data indicating that an axis is in the "Axis safely referenced" state after user agreement has been set. Bit 15 ... 0 | Meaning -- = 00AC | Agreement set = 0 | Agreement not set					
			VSA/HSA		ROT/LIN
840D		0	0	ffff	2/4

1397	**SAFE_ACKN_READ**			D07	**CR:** FBSI
-	611D internal agreement			UNS.WORD	Immediately
Display data indicating that an axis is in the "Axis safely referenced" state after user agreement has been set. Bit 15 ... 0 | Meaning -- = 00AC | Agreement set = 0 | Agreement not set					
			HSA SLM VSA		-
P2 840D		0x0000	0x0000	0xffff	2/4

1398	**SAFE_ACT_CHECKSUM**			D07	**CR:** FBSI
-	Display of SI-MD check sum			UNS. DWORD	sofort
This machine data contains the actual checksum of the current values of the SI machine data that is calculated after POWER ON. If the actual checksum is not the same as the setpoint checksum in MD 1399: $MD_SAFE_DES_CHECKSUM, then the alarm 300744 "Checksum error safety monitors" is displayed.					
			VSA/HSA		ROT/LIN
840D		0	0	2147483647	2/4

1398	**SAFE_ACT_CHECKSUM**			D07	**CR:** FBSI
-	Display of SI-MD check sum			UNS.DWORD	Immediately
This machine data contains the actual checksum of the current values of the SI machine data that is calculated after POWER ON. If the actual checksum is not the same as the setpoint checksum in MD 1399: $MD_SAFE_DES_CHECKSUM, then the alarm 300744 "Checksum error safety monitors" is displayed.					
			HSA SLM VSA		-
P2 840D		0	0	4294967295	2/4

1399	**SAFE_DES_CHECKSUM**			D07	**CR:** FBSI
-	SI-MD check sum			UNS. DWORD	PowerOn
This data contains the setpoint checksum of the current values of the SI machine data that was stored during the last acceptance test. The actual checksum is calculated after POWER ON, entered in MD 1398: $MD_SAFE_ACT_CHECKSUM and compared with the setpoint checksum stored in this data. When the values are not identical, the data have either been changed or there is an error present and alarm 300744 "Checksum error safety monitors" is displayed.					
			VSA/HSA		ROT/LIN
840D		0	0	2147483647	2/4

1399	**SAFE_DES_CHECKSUM**			D07	**CR:** FBSI
-	SI-MD check sum			UNS.DWORD	Power On
This data contains the setpoint checksum of the current values of the SI machine data that was stored during the last acceptance test. The actual checksum is calculated after POWER ON, entered in MD 1398: $MD_SAFE_ACT_CHECKSUM and compared with the setpoint checksum stored in this data. When the values are not identical, the data have either been changed or there is an error present and alarm 300744 "Checksum error safety monitors" is displayed.					
			HSA SLM VSA		-
P2 840D		0	0	4294967295	2/4

1400	**MOTOR_RATED_SPEED**			D05	**CR:**
m/min	Rated motor speed			FLOAT	PowerOn
Enter the rated motor speed from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number in MD 1102: MOTOR_CODE. This MD is used in the controller data calculation.					
			VSA		LIN
840D		0.0000	0.0000	100000.0000	2/4

1400	**MOTOR_RATED_SPEED**			D05	**CR:** DM1
1/min	Rated motor speed			FLOAT	PowerOn
Enter the rated motor speed from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is used in the controller data calculation.					
			VSA/HSA		ROT

840D		0.0000	0.0000	100000.0000	2/4

1400	**MOTOR_RATED_SPEED**				**CR:** DM1
1/min	Rated motor speed			FLOAT	PowerOn
Enter the rated motor speed from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is used in the controller data calculation.					
			VSA/HSA		-
810D		0.0000	0.0000	25000.0000	2/4

1400	**MOTOR_RATED_SPEED**			D05	**CR:** DM1
1/min	Rated motor speed			FLOAT	Power On
Enter the rated motor speed from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is used in the controller data calculation.					
			HSA SLM VSA		-
P2		0.000000	0.000000	100000.000000	2/4

1401	**MOTOR_MAX_SPEED**			D02, D05	**CR:**
m/min	Maximum motor operating speed			FLOAT	PowerOn
The machine data defines the maximum motor operating speed. It serves as reference value of the speed setpoint interface as well as for machine data MD 1405: MOTOR_SPEED_LIMIT. The pre-assignment (default) is calculated via the operator control procedure calculate controller with the rated motor speed according to the motor data sheet.					
			VSA		LIN
840D		0.0000	0.0000	100000.0000	2/4

1401	**MOTOR_MAX_SPEED**				**CR:** DD1
1/min	Maximum usable motor speed			FLOAT	PowerOn
The machine data defines the maximum motor operating speed. It serves as reference value of the speed setpoint interface as well as for machine data MD 1405: MOTOR_SPEED_LIMIT. The preassignment is calculated by the operator initiating the "Calculate controller data" function for FDD with the rated motor speed according to the motor data sheet, and for MSD with the maximum speed.					
			VSA/HSA		-
810D		0.0000	0.0000	50000.0000	2/4

1401	**MOTOR_MAX_SPEED**			D02, D05	**CR:** DD1
1/min	Maximum usable motor speed			FLOAT	PowerOn
The machine data defines the maximum motor operating speed. It serves as reference value of the speed setpoint interface as well as for machine data MD 1405: MOTOR_SPEED_LIMIT. The preassignment is calculated by the operator initiating the "Calculate controller data" function for FDD with the rated motor speed according to the motor data sheet, and for MSD with the maximum speed.					
			VSA/HSA		ROT
840D		0.0000	0.0000	100000.0000	2/4

1401	**MOTOR_MAX_SPEED**			D02, D05	**CR:** DD1
1/min	Maximum usable motor speed			FLOAT	Power On
The machine data defines the maximum motor operating speed. It serves as reference value of the speed setpoint interface as well as for machine data MD 1405: MOTOR_SPEED_LIMIT. The preassignment is calculated by the operator initiating the "Calculate controller data" function for FDD with the rated motor speed according to the motor data sheet, and for MSD with the maximum speed.					
			HSA SLM VSA		-
P2		0.000000	0.000000	100000.000000	2/4

1403	**PULSE_SUPPRESSION_SPEED**			D02	**CR:** DB1
1/min	Shut down speed pulse suppression			FLOAT	sofort
The standard assignment is dependent on the motor type (FDD = 0, MSD = 2) and is parameterized at start-up using the drive configuration. The standard value 0 means that the machine data is switched inactive. Pulses are now exclusively suppressed via MD 1404: PULSE_SUPPRESSION_DELAY. When the drive controller enable is disabled (this is possible using terminal 64, from the NC or when a fault develops), the drives brake along their torque limit. If the absolute actual speed value falls below the specified speed threshold during shut down, the pulse enable is suppressed and the drives coast down. The pulses are suppressed before this if the time set in MD 1404 has expired. MD1403 has to be functional if an overshoot is to be suppressed when zero speed is reached after the drive controller enable signal has been disabled. Note When the PLC disables the controller enable interface signal, the NC- and drives are sequentially shut down with different, adjustable delay times. Axis-specific MD 36620: SERVO_DISABLE_DELAY_TIME and MD 36060 STANDSTILL_VELO_TOL. If the drive develops a fault or terminal 64 is disabled, then the drive is shut down with MD 1403 and MD 1404 only.					
			VSA/HSA		ROT
840D		0.0000	0.0000	7200.0000	2/4

1403	**PULSE_SUPPRESSION_SPEED**			D02	**CR:**
m/min	Switch-off speed for cancelling of pulses			FLOAT	sofort
The standard assignment (default) is dependent on the motor type (feed drive corresponds to 0, main spindle drive corresponds to 2) and is parameterized at start-up using the drive configuration. The standard value 0 means that the machine data is switched inactive. Pulses are now exclusively canceled via the machine data MD 1404: PULSE_SUPPRESSION_DELAY. When the drive controller enable is withdrawn (this is possible using terminal 64, from the NC or when a fault develops), the drives brake along their force limit. If the absolute speed actual value falls below the specified threshold during shut down, the pulse enable is canceled and the drives coast down. The pulses are deleted before this, if the timer, set in MD 1404, has expired. The functionality of machine data MD1403 is necessary, if the overshoot is to be supressed when zero speed is reached after the drive controller enable signal has been withdrawn. Note When the PLC withdraws the controller enable interface signal, the NC- and drives are sequentially shut down with different, adjustable delay time. Axis-specific MD 36620: SERVO_DISABLE_DELAY_TIME and MD 36060 STANDSTILL_VELO_TOL. If the drive develops a fault or terminal 64 is energized, then the drive is only shut down with MD 1403 and MD 1404. Reference: / FB/, A2, Function description					
			VSA		LIN
840D		0.0000	0.0000	7200.0000	2/4

1403	**PULSE_SUPPRESSION_SPEED**			D02	**CR:** DB1
1/min	Shut down speed pulse suppression			FLOAT	Immediately

The standard assignment is dependent on the motor type (FDD = 0, MSD = 2) and is parameterized at start-up using the drive configuration. The standard value 0 means that the machine data is switched inactive. Pulses are now exclusively suppressed via

MD 1404: PULSE_SUPPRESSION_DELAY.

When the drive controller enable is disabled (this is possible using terminal 64, from the NC or when a fault develops), the drives brake along their torque limit. If the absolute actual speed value falls below the specified speed threshold during shut down, the pulse enable is suppressed and the drives coast down.

The pulses are suppressed before this if the time set in MD 1404 has expired.

MD1403 has to be functional if an overshoot is to be suppressed when zero speed is reached after the drive controller enable signal has been disabled.

Note

When the PLC disables the controller enable interface signal, the NC- and drives are sequentially shut down with different, adjustable delay times.

Axis-specific MD 36620: SERVO_DISABLE_DELAY_TIME and MD 36060 STANDSTILL_VELO_TOL.

If the drive develops a fault or terminal 64 is disabled, then the drive is shut down with MD 1403 and MD 1404 only.

			HSA SLM VSA		-
P2		0.000000	0.000000	7200.000000	2/4

1404	**PULSE_SUPPRESSION_DELAY**			D02	**CR:** DB1
ms	Timer impulse suppression			FLOAT	sofort

The standard assignment depends on the motor type (FDD = 100, MSD = 5000) and is parameterized during start-up using the drive configuration.

Enter the time for pulse suppression (pulse enable = 0). After the drive controller enable signal has been disabled (this is possible using terminal 64, from the NC or when a fault condition develops), the firing pulses of the power module transistors are suppressed on the drive side after the adjustable delay.

The pulses are suppressed before this, if the speed has fallen below the threshold, set in MD 1403: PULSE_SUPPRESSION_SPEED .

Note

When the PLC disables the controller enable interface signal, the NCs and drives are sequentially shut down with different, adjustable delay times.

MD 1605 > MD 1404 should be selected, as otherwise, when the drive controller enable is disabled, this would result in alarm "300608 speed controller output limited".

Axis-specific MD 36620: SERVO_DISABLE_DELAY_TIME and MD 36060 STANDSTILL_VELO_TOL.

If the drive develops a fault or terminal 64 is disabled, then the drive is shut down with MD 1403 and MD 1404 only.

			VSA/HSA		ROT/LIN
840D		100.0000	0.0000	100000.0000	2/4

1404	**PULSE_SUPPRESSION_DELAY**			D02	**CR:** DB1
ms	Timer impulse suppression			FLOAT	Immediately

The standard assignment depends on the motor type (FDD = 100, MSD = 5000) and is parameterized during start-up using the drive configuration.

Enter the time for pulse suppression (pulse enable = 0). After the drive controller enable signal has been disabled (this is possible using terminal 64, from the NC or when a fault condition develops), the firing pulses of the power module transistors are suppressed on the drive side after the adjustable delay.

The pulses are suppressed before this, if the speed has fallen below the threshold, set in MD 1403: PULSE_SUPPRESSION_SPEED .

Note:

When the PLC disables the controller enable interface signal, the NCs and drives are sequentially shut down with different, adjustable delay times.

MD 1605 > MD 1404 should be selected, as otherwise, when the drive controller enable is disabled, this would result in alarm "300608 speed controller at limit".

Axis-specific MD 36620: SERVO_DISABLE_DELAY_TIME and MD 36060 STANDSTILL_VELO_TOL.

If the drive develops a fault or terminal 64 is disabled, then the drive is shut down with MD 1403 and MD 1404 only.

			HSA SLM VSA		-
P2		100.000000	0.000000	100000.000000	2/4

1405	**MOTOR_SPEED_LIMIT**			D02, D05	**CR:** DÜ1
%	Monitoring motor speed			FLOAT	sofort

The maximum permissible speed setpoint is entered as a percentage. The reference value used is MD 1401: MOTOR_MAX_SPEED. If the speed setpoint is exceeded, it is limited to the specified value.

The MD is parameterized by the operator initiating the "Calculate controller data" function.

FDD: 110%

MSD: 100%

Note

From SW 4.2:

For limiting the speed setpoint for MSD/IM, in addition to MD 1405, the SPEED_LIMIT parameterized speed limit in MD 1147: SPEED_LIMIT is also taken into account .

The speed setpoint limit can then be defined as follows:

N max1 = 1.02 x (minimum of MD 1146, MD 1147)

M max2 = MD 1401 x MD 1405

N setmax = Minimum of N max1 , N max2

			VSA/HSA		ROT
840D		110.0000	100.0000	110.0000	2/4

1405	**MOTOR_SPEED_LIMIT**			D02, D05	**CR:**
%	Monitoring speed of motor			FLOAT	sofort

The maximum permissible speed setpoint is entered as percentage. The reference value is MD 1401: MOTOR_MAX_SPEED. If the speed setpoint is exceeded, it is limited to the specified value.

The MD is parameterized using calculate controller MD.

			VSA		LIN
840D		110.0000	100.0000	110.0000	2/4

1405	**MOTOR_SPEED_LIMIT**			D02, D05	**CR:** DÜ1
%	Monitoring motor speed			FLOAT	Immediately

The maximum permissible speed setpoint is entered as a percentage. The reference value used is MD 1401: MOTOR_MAX_SPEED. If the speed setpoint is exceeded, it is limited to the specified value.

The MD is parameterized by the operator initiating the "Calculate controller data" function.

FDD: 110%

MSD: 100%

Note

From SW 4.2:

For limiting the speed setpoint for MSD/IM, in addition to MD 1405, the SPEED_LIMIT parameterized speed limit in MD 1147: SPEED_LIMIT is also taken into account .

The speed setpoint limit can then be defined as follows:

N max1 = 1.02 x (minimum of MD 1146, MD 1147)

M max2 = MD 1401 x MD 1405

N setmax = Minimum of N max1 , N max2

			HSA SLM VSA		-
P2		110.000000	100.000000	110.000000	2/4

1406	**SPEEDCTRL_TYPE**			EXP	**CR:** DD2
-	Speed controller type			UNS. WORD	PowerOn

Enter the speed controller type MD 1406 = 1

- PI speed controller (PI)
- PI speed controller (PI) with reference model (PIR)

Set the above controller data using MD 1407 ... MD 1416

Important

This machine data is only relevant for Siemens internal purposes.

			VSA/HSA		ROT/LIN
840D		1	1	1	0/0

1406	**SPEEDCTRL_TYPE**			EXP	**CR:** DD2
-	Speed controller type			UNS.WORD	Power On

Enter the speed controller type MD 1406 = 1

- PI speed controller (PI)
- PI speed controller (PI) with reference model (PIR)

Set the above controller data using MD 1407 ... MD 1416

Important

This machine data is only relevant for Siemens internal purposes.

			HSA SLM VSA		-
P2		1	1	1	0/0

1407	**SPEEDCTRL_GAIN_1**				**CR:** DD2
Nms/rad	P gain of speed controller			FLOAT	sofort
Enter the speed control loop P gain over the complete speed control range (exception: with adaptation enabled, refer to MD1413) or automatic parameterization (initialization) by the operator initiating the "Calculate controller data" function. Note When entering a P gain of 0, the associated integral component (MD 1409) is automatically de-activated.					
			VSA/HSA		-
810D		0.3000	0.0000	100000.0000	2/4

1407	**SPEEDCTRL_GAIN_1**			D01, D08	**CR:** DD2
Nms/rad	P gain of speed controller			FLOAT	sofort
Enter the speed control loop P gain over the complete speed control range (exception: with adaptation enabled, refer to MD1413) or automatic parameterization (initialization) by the operator initiating the "Calculate controller data" function. Note When entering a P gain of 0, the associated integral component (MD 1409) is automatically de-activated.					
			VSA/HSA		ROT
840D		0.3000	0.0000	1000000.0000	2/4

1407	**SPEEDCTRL_GAIN_1**			D01, D08	**CR:**
Ns/m	P gain speed control			FLOAT	sofort
Enter the speed control circuit P gain over the complete speed control range (exception: with adaptation enabled, refer to MD1413) and automatic parameterization (initialization) through calculate contr. MD. Note When entering a P gain of 0, the associated integral component (MD 1409) is automatically de-activated.					
			VSA		LIN
840D		2000.0000	0.0000	1000000.0000	2/4

1407	**SPEEDCTRL_GAIN_1**			D01, D08	**CR:** DD2
Nms/rad	P gain of speed controller			FLOAT	Immediately
Enter the speed control loop P gain over the complete speed control range (exception: with adaptation enabled, refer to MD 1413) or automatic parameterization (initialization) by the operator initiating the "Calculate controller data" function. Note When entering a P gain of 0, the associated integral component (MD 1409) is automatically de-activated.					
			HSA SLM VSA		-
P2		0.300000	0.000000	1000000.000000	2/4

1408	**SPEEDCTRL_GAIN_2**			D01, EXP	**CR:**
Ns/m	P gain upper adaption speed			FLOAT	sofort

The speed control loop P gain is entered in the upper speed range (n > MD 1412: SPEEDCTRL_ADAPT_SPEED_2) or is automatically parameterized (initialization) using calculate contr. MD. The gains in the lower speed range (MD 1407) and in the upper speed range (MD 1408) are not mutually restricted.

Note

When entering a P gain of 0, the associated integral component (MD 1409) is automatically de-activated.

MD 1408 is not active when the speed controller adaptation is disabled (MD 1413 = 0).

			VSA		LIN
840D		2000.0000	0.0000	1000000.0000	2/4

1408	**SPEEDCTRL_GAIN_2**				**CR:** DD2
Nms/rad	P gain of upper adaptation speed			FLOAT	sofort

The speed control loop P gain is entered in the upper speed range (n > MD 1412: SPEEDCTRL_ADAPT_SPEED_2) or is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. The gains in the lower speed range (MD 1407) and in the upper speed range (MD 1408) are not mutually restricted.

Note

When entering a P gain of 0, the associated integral component (MD 1409) is automatically de-activated.

MD 1408 is not active when the speed controller adaptation is disabled (MD 1413 = 0).

			VSA/HSA		-
810D		0.3000	0.0000	100000.0000	2/4

1408	**SPEEDCTRL_GAIN_2**			D01, EXP	**CR:** DD2
Nms/rad	P gain of upper adaptation speed			FLOAT	sofort

The speed control loop P gain is entered in the upper speed range (n > MD 1412: SPEEDCTRL_ADAPT_SPEED_2) or is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. The gains in the lower speed range (MD 1407) and in the upper speed range (MD 1408) are not mutually restricted.

Note

When entering a P gain of 0, the associated integral component (MD 1409) is automatically de-activated.

MD 1408 is not active when the speed controller adaptation is disabled (MD 1413 = 0).

			VSA/HSA		ROT
840D		0.3000	0.0000	1000000.0000	2/4

1408	**SPEEDCTRL_GAIN_2**			D01, EXP	**CR:** DD2
Nms/rad	P gain of upper adaptation speed			FLOAT	Immediately

The speed control loop P gain is entered in the upper speed range (n > MD 1412: SPEEDCTRL_ADAPT_SPEED_2) or is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. The gains in the lower speed range (MD 1407) and in the upper speed range (MD 1408) are not mutually restricted.

Note

When entering a P gain of 0, the associated integral component (MD 1409) is automatically de-activated.

MD 1408 is not active when the speed controller adaptation is disabled (MD 1413 = 0).

			HSA SLM VSA		-
P2		0.300000	0.000000	1000000.000000	2/4

1409	**SPEEDCTRL_INTEGRATOR_TIME_1**			D01, D08	**CR:**
ms	Integral action time of speed controller			FLOAT	sofort

Enter the speed control loop integral action time over the complete speed range (exception: with adaptation enabled, refer to MD1413) and automatic parameterization (initialization) through calculate contr. MD.

Note

If an integral action time of 0 is entered, the I component is disabled for the appropriate speed range (if the integral gain and the integrator contents are deleted = > torque jumps cannot be completely excluded).

Important

If the adaptation is active, the integral component should not be deactivated for just one speed (MD 1409 = 0 and MD 1410 = 0 or vice versa) (problem due to torque jumps when resetting the integral value at the transition from the adapta-tion range to the constant range).

			VSA		LIN
840D		10.0000	0.0000	500.0000	2/4

1409	**SPEEDCTRL_INTEGRATOR_TIME_1**			D01, D08	**CR:** DD2
ms	Integral action time of speed controller			FLOAT	sofort

Enter the speed control loop integral action time over the complete speed range (exception: with adaptation enabled, refer to MD1413) and automatic parameterization (initialization) by the operator initiating the "Calculate controller data" function.

Note

Entering an integral action time of 0 disables the I component for the appropriate speed range (if the integral gain and the integrator contents are deleted = > torque jumps cannot be excluded).

Important

If the adaptation is active, the integral component should not be deactivated for just one speed (MD 1409 = 0 and MD 1410 = 0 or vice versa) (problem due to torque jumps when resetting the integral value at the transition from the adaptation range to the constant range).

			VSA/HSA		ROT
840D		10.0000	0.0000	500.0000	2/4

1409	**SPEEDCTRL_INTEGRATOR_TIME_1**			D01, D08	**CR:** DD2
ms	Integral action time of speed controller			FLOAT	Immediately

Enter the speed control loop integral action time over the complete speed range (exception: with adaptation enabled, refer to MD 1413) and automatic parameterization (initialization) by the operator initiating the "Calculate controller data" function.

Note

Entering an integral action time of 0 disables the I component for the appropriate speed range (if the integral gain and the integrator contents are deleted = > torque jumps cannot be excluded).

Important

If the adaptation is active, the integral component should not be deactivated for just one speed (MD 1409 = 0 and MD 1410 = 0 or vice versa) (problem due to torque jumps when resetting the integral value at the transition from the adaptation range to the constant range).

			HSA SLM VSA		-
P2		10.000000	0.000000	500.000000	2/4

1410	**SPEEDCTRL_INTEGRATOR_TIME_2**			D01, EXP	**CR:** DD2
ms	Integral action time of upper adaptation speed			FLOAT	sofort
The speed control loop integral action time is entered in the upper speed range (n > MD 1412: SPEEDCTRL_ADAPT_SPEED_2) or is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. The integral action times in the lower speed range (MD 1409) and in the upper speed range (MD 1410) are not subject to any mutual restriction. Important If the adaptation is active, the integral component should not be deactivated for just one speed (MD 1409 = 0 and MD 1410 = 0 or vice versa) (problem due to torque jumps when resetting the integral value at the transition from the adaptation range to the constant range). Note When an integral action time of 0 is entered, the integral component for the range, which is greater than MD1412: SPEEDCTRL_ADAPT_SPEED_2, is de-activated (refer to the information in MD 1409). MD 1410 is not active when speed adaptation is cancelled (MD 1413 = 0).					
			VSA/HSA		ROT
840D		10.0000	0.0000	500.0000	2/4

1410	**SPEEDCTRL_INTEGRATOR_TIME_2**			D01, EXP	**CR:**
ms	Integral action time of upper adaption speed			FLOAT	sofort
The speed control loop integral action time is entered in the upper speed range (n > MD 1412: SPEEDCTRL_ADAPT_SPEED_2) or is automatically parameterized (initialization) using calculate contr. MD. The integral action times in the lower speed range (MD 1409) and in the upper speed range (MD 1410) are not subject to any mutual restriction. Important If the adaptation is active, the integral component should not be deactivated for just one speed (MD 1409 = 0 and MD 1410 = 0 or vice versa) (problem due to torque jumps when resetting the integral value at the transition from the adapta-tion range to the constant range). Note When an integral action time of 0 is entered, the integral component for the range, which is greater than the machine data MD1412: SPEEDCTRL_ADAPT_SPEED_2, is de-activated (refer to the information in MD 1409).MD 1410 is not active when speed adaptation is canceled (MD 1413 = 0).					
			VSA		LIN
840D		10.0000	0.0000	500.0000	2/4

1410	**SPEEDCTRL_INTEGRATOR_TIME_2**			D01, EXP	**CR:** DD2
ms	Integral action time of upper adaptation speed			FLOAT	Immediately
The speed control loop integral action time is entered in the upper speed range (n > MD 1412: SPEEDCTRL_ADAPT_SPEED_2) or is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. The integral action times in the lower speed range (MD 1409) and in the upper speed range (MD 1410) are not subject to any mutual restriction. Important If the adaptation is active, the integral component should not be deactivated for just one speed (MD 1409 = 0 and MD 1410 = 0 or vice versa) (problem due to torque jumps when resetting the integral value at the transition from the adaptation range to the constant range). Note When an integral action time of 0 is entered, the integral component for the range, which is greater than MD1412: SPEEDCTRL_ADAPT_SPEED_2, is de-activated (refer to the information in MD 1409). MD 1410 is not active when speed adaptation is cancelled (MD 1413 = 0).					
			HSA SLM VSA		-
P2		10.000000	0.000000	500.000000	2/4

1411	**SPEEDCTRL_ADAPT_SPEED_1**				**CR:** DD2
1/min	Lower adaptation speed			FLOAT	sofort
Enter the lower speed threshold to adapt the speed controller machine data, or it is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. If adaptation is active, for speeds n < MD 1411, the control machine data MD 1407 and MD 1409 are active. The characteristic between the two control machine data sets is linearly interpolated in the adaptation range MD 1411 < n < MD 1412.					
			VSA/HSA		-
810D		0.0000	0.0000	50000.0000	2/4

1411	**SPEEDCTRL_ADAPT_SPEED_1**			D01, EXP	**CR:** DD2
1/min	Lower adaptation speed			FLOAT	sofort
Enter the lower speed threshold to adapt the speed controller machine data, or it is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. If adaptation is active, for speeds n < MD 1411, the control machine data MD 1407 and MD 1409 are active. The characteristic between the two control machine data sets is linearly interpolated in the adaptation range MD 1411 < n < MD 1412.					
			VSA/HSA		ROT
840D		0.0000	0.0000	100000.0000	2/4

1411	**SPEEDCTRL_ADAPT_SPEED_1**			D01, EXP	**CR:**
m/min	Lower adaption speed threshold			FLOAT	sofort
Enter the lower speed threshold to adapt the speed controller machine data, or it is automatically parameterized (initialization) using calculate contr. MD. If adaptation is active, for speeds v < MD 1411, the control machine data MD 1407 and MD 1409 are active. The characteristic between the two control machine data sets is linearly interpolated in the adaptation range MD 1411 < v < MD 1412.					
			VSA		LIN
840D		0.0000	0.0000	100000.0000	2/4

1411	**SPEEDCTRL_ADAPT_SPEED_1**			D01, EXP	**CR:** DD2
1/min	Lower adaptation speed			FLOAT	Immediately
Enter the lower speed threshold to adapt the speed controller machine data, or it is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. If adaptation is active, for speeds n < MD 1411, the control machine data MD 1407 and MD 1409 are active. The characteristic between the two control machine data sets is linearly interpolated in the adaptation range MD 1411 < n < MD 1412.					
			HSA SLM VSA		-
P2		0.000000	0.000000	100000.000000	2/4

1412	**SPEEDCTRL_ADAPT_SPEED_2**				**CR:** DD2
1/min	Upper adaptation speed			FLOAT	sofort
Enter the upper speed threshold to adapt the speed controller machine data, or it is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. If adaptation is active, for speeds n > MD 1412, the control machine data MD 1408 and MD 1410 are active. The characteristic between the two control machine data sets is linearly interpolated in the center range MD 1411 < n < MD 1412.					
			VSA/HSA		-
810D		0.0000	0.0000	50000.0000	2/4

1412	**SPEEDCTRL_ADAPT_SPEED_2**			D01, EXP	**CR:** DD2
1/min	Upper adaptation speed			FLOAT	sofort
Enter the upper speed threshold to adapt the speed controller machine data, or it is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. If adaptation is active, for speeds n > MD 1412, the control machine data MD 1408 and MD 1410 are active. The characteristic between the two control machine data sets is linearly interpolated in the center range MD 1411 < n < MD 1412.					
			VSA/HSA		ROT
840D		0.0000	0.0000	100000.0000	2/4

1412	**SPEEDCTRL_ADAPT_SPEED_2**			D01, EXP	**CR:**
m/min	Upper adaption speed threshold			FLOAT	sofort
Enter the upper speed threshold to adapt the speed controller machine data, or it is automatically parameterized (initialization) using calculate contr. MD. If adaptation is active, for speeds v > MD 1412, the control machine data MD 1408 and MD 1410 are active. The characteristic between the two control machine data sets is linearly interpolated in the center range MD 1411 < v < MD 1412.					
			VSA		LIN
840D		0.0000	0.0000	100000.0000	2/4

1412	**SPEEDCTRL_ADAPT_SPEED_2**			D01, EXP	**CR:** DD2
1/min	Upper adaptation speed			FLOAT	Immediately
Enter the upper speed threshold to adapt the speed controller machine data, or it is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. If adaptation is active, for speeds n > MD 1412, the control machine data MD 1408 and MD 1410 are active. The characteristic between the two control machine data sets is linearly interpolated in the center range MD 1411 < n < MD 1412.					
			HSA SLM VSA		-
P2		0.000000	0.000000	100000.000000	2/4

1413	**SPEEDCTRL_ADAPT_ENABLE**			D01, EXP	**CR:** DD2
-	Select adaptation speed controller			UNS. WORD	sofort

Using this machine data, the adaptation of the speed controller machine data can be controlled as a function of the speed.

Input 0

The adaptation is not active. The speed controller settings (MD 1407 and MD 1409) are valid over the complete speed range. Machine data MD 1408 and MD 1410 are not taken into account.

Input 1

Adaptation is active. For a description, refer to machine data MD 1408, MD 1410, MD 1411 and MD 1412.

Note

For MSD, the adaptation is automatically activated by the operator initiating the "Calculate controller data" function.

			VSA/HSA		ROT
840D		0	0	1	2/4

1413	**SPEEDCTRL_ADAPT_ENABLE**			D01, EXP	**CR:**
-	Select adaptation speed controller			UNS. WORD	sofort

Using this machine data, the speed controller machine data can be adapted as a function of the speed.

Input 0

The adaptation is not active. The speed controller settings (MD 1407 and MD 1409) are valid over the complete speed range. Machine data MD 1408 and MD 1410 are not taken into account.

Input 1

Adaptation is active. For a description, refer to machine data MD 1408 and MD 1410, MD 1411 and MD 1412.

Note

For main spindle drives, the adaptation is automatically activated using calculate contr. MD.

			VSA		LIN
840D		0	0	1	2/4

1413	**SPEEDCTRL_ADAPT_ENABLE**			D01, EXP	**CR:** DD2
-	Select adaptation speed controller			UNS.WORD	Immediately

Using this machine data, the adaptation of the speed controller machine data can be controlled as a function of the speed.

Input 0

The adaptation is not active. The speed controller settings (MD 1407 and MD 1409) are valid over the complete speed range. Machine data MD 1408 and MD 1410 are not taken into account.

Input 1

Adaptation is active. For a description, refer to machine data MD 1408, MD 1410, MD 1411 and MD 1412.

Note

For MSD, the adaptation is automatically activated by the operator initiating the "Calculate controller data" function.

			HSA SLM VSA		-
P2		0	0	1	2/4

1414	**SPEEDCTRL_REF_MODEL_FREQ**			D01, EXP	**CR:** DD2
Hz	Natural frequency for the reference model speed			FLOAT	sofort
Enter the natural frequency for the reference model speed control loop. The filter is de-activated by entering a value < 10 Hz (proportional element with gain 1). Note For interpolating axes, machine data MD 1414 must have the same value for all axes. This also applies to MD 1415 and MD 1416.					
			VSA/HSA		ROT
840D		0.0000	0.0000	8000.0000	2/4

1414	**SPEEDCTRL_REF_MODEL_FREQ**			D01, EXP	**CR:**
Hz	Natural frequency for the reference model speed			FLOAT	sofort
Enter the natural frequency for the reference model, speed control loop. The filter is de-activated by entering a value < 10 Hz (proportional element with gain 1). Note For interpolating axes, machine data MD 1414, must have the same value for all axes. This is also valid for MD 1415 and MD 1416.					
			VSA		LIN
840D		0.0000	0.0000	8000.0000	2/4

1414	**SPEEDCTRL_REF_MODEL_FREQ**			D01, EXP	**CR:** DD2
Hz	Natural frequency for the reference model speed			FLOAT	Immediately
Enter the natural frequency for the reference model speed control loop. The filter is de-activated by entering a value < 10 Hz (proportional element with gain 1). Note For interpolating axes, machine data MD 1414 must have the same value for all axes. This also applies to MD 1415 and MD 1416.					
			HSA SLM VSA		-
P2		0.000000	0.000000	8000.000000	2/4

1415	**SPEEDCTRL_REF_MODEL_DAMPING**			D01, EXP	**CR:** DD2
-	Damping of reference model speed			FLOAT	sofort
Enter the damping for the reference model speed control loop. In this case, it involves a reference model (PT2) for the speed control loop for PIR controller types. The damping increases with an increasing input value. Note For interpolating axes machine data MD 1415 must have the same value for all axes. This also applies to MD 1414 and MD 1416.					
			VSA/HSA		ROT
840D		1.0000	0.5000	5.0000	2/4

1415	SPEEDCTRL_REF_MODEL_DAMPING			D01, EXP	CR:
-	Damping of reference model speed			FLOAT	sofort
Enter the damping for the reference model speed control loop. In this case, it involves a reference model (PT2) for the speed control loop for PIR controller types. The damping increases with an increasing input value. Note For interpolating axes machine data MD 1415, must have the same value for all axes. This is also valid for MD 1414 and MD 1416.					
			VSA		LIN
840D		1.0000	0.5000	5.0000	2/4

1415	SPEEDCTRL_REF_MODEL_DAMPING			D01, EXP	CR: DD2
-	Damping of reference model speed			FLOAT	Immediately
Enter the damping for the reference model speed control loop. In this case, it involves a reference model (PT2) for the speed control loop for PIR controller types. The damping increases with an increasing input value. Note For interpolating axes machine data MD 1415 must have the same value for all axes. This also applies to MD 1414 and MD 1416.					
			HSA SLM VSA		-
P2		1.000000	0.500000	5.000000	2/4

1416	SPEEDCTRL_REF_MODEL_DELAY			D01, EXP	CR: DD2
-	Balancing the reference model speed			FLOAT	sofort
Enter the balancing capability for the reference model, speed control loop. This machine data forms the computation deadtime of the speed control loop. The simulation is computed as an approximation of an interrupted deadtime. The deadtime adaptation of the reference model to the behaviour of the control system of the closed P-controlled speed control loop (actual speed value sensing) can be realized by increasing MD 1416. Typical values are approx. 0.5. A check can be made by comparing the DAC signals - actual speed value and - speed setpoint reference model The speed control loop integrator can then be enabled (entries not equal to 0 in the integral action time parameters MD 1409, MD 1410). Note For interpolating axes, machine data MD 1416 must have the same value for all axes. This also applies to MD 1415 and MD 1415.					
			VSA/HSA		ROT
840D		0.0000	0.0000	1.0000	2/4

1416	**SPEEDCTRL_REF_MODEL_DELAY**			D01, EXP	**CR:**
-	Balancing the reference model speed			FLOAT	sofort

Enter the balancing capability for the reference model, speed control loop. This machine data forms the computation deadtime of the speed control loop. The simulation is computed as an approximation of an interrupted deadtime; refer to Fig. 2–9 for a graphic representation.

The deadtime adaptation of the reference model to the loop characteristics of the closed P-controlled speed controlled circuit (speed actual value sensing) can be realized by increasing MD 1416. Typical values are approx. 0.5. A check can be made by comparing the DAC signals

- speed actual value and
- speed setpoint reference model

The speed control circuit integrator can then be enabled (entries 0 in the integral action time parameters MD 1409, MD 1410).

Note

For interpolating axes, machine data MD 1416 must have the same value for all axes. This is also valid for MD 1415 and MD 1415.

			VSA		LIN
840D		0.0000	0.0000	1.0000	2/4

1416	**SPEEDCTRL_REF_MODEL_DELAY**			D01, EXP	**CR:** DD2
-	Balancing the reference model speed			FLOAT	Immediately

Enter the balancing capability for the reference model, speed control loop. This machine data forms the computation deadtime of the speed control loop. The simulation is computed as an approximation of an interrupted deadtime.

The deadtime adaptation of the reference model to the behaviour of the control system of the closed P-controlled speed control loop (actual speed value sensing) can be realized by increasing MD 1416. Typical values are approx. 0.5. A check can be made by comparing the DAC signals

- actual speed value and
- speed setpoint reference model

The speed control loop integrator can then be enabled (entries not equal to 0 in the integral action time parameters MD 1409, MD 1410).

Note

For interpolating axes, machine data MD 1416 must have the same value for all axes. This also applies to MD 1415 and MD 1415.

			HSA SLM VSA		-
P2		0.000000	0.000000	1.000000	2/4

1417	**SPEED_THRESHOLD_X**			D03	**CR:** DB1
1/min	Signal n_x for 'n_act < n_x'			FLOAT	sofort

The speed threshold is entered for monitoring purposes. If the actual speed falls below the selected speed threshold (absolute value), then the signal is sent to the PLC (IS "n_act <n_x" DB 31-48 DBX 94.5).

			VSA/HSA		ROT
840D		6000.0000	0.0000	100000.0000	2/4

1417	**SPEED_THRESHOLD_X**				**CR:** DB1
1/min	Signal n_x for 'n_act < n_x'			FLOAT	sofort

The speed threshold is entered for monitoring purposes. If the actual speed falls below the selected speed threshold (absolute value), then the signal is sent to the PLC (IS "n_act <n_x" DB 31-48 DBX 94.5).

			VSA/HSA		-
810D		6000.0000	0.0000	50000.0000	2/4

1417	**SPEED_THRESHOLD_X**			D03	**CR:**
m/min	v_x for "v_act < v_x" signal			FLOAT	sofort
The speed threshold is entered for monitoring purposes. If the absolute actual speed falls below the selected speed threshold (absolute value), then the signal is sent to the PLC (IS "v_act < v_x" DB 31-48 DBX 94.5).					
			VSA		LIN
840D		120.0000	0.0000	100000.0000	2/4

1417	**SPEED_THRESHOLD_X**			D03	**CR:** DB1
1/min	Signal n_x for 'n_act < n_x'			FLOAT	Immediately
The speed threshold is entered for monitoring purposes. If the actual speed falls below the selected speed threshold (absolute value), then the signal is sent to the PLC (IS "n_act <n_x" DB 31, ... DBX 94.5).					
			HSA SLM VSA		-
P2		6000.000000	0.000000	100000.000000	2/4

1418	**SPEED_THRESHOLD_MIN**				**CR:** DB1
1/min	Signal n_min for 'act_n < n_min'			FLOAT	sofort
The speed threshold is entered for monitoring purposes. If the actual speed falls below the set speed threshold (absolute value), then the signal is sent to PLC, IS "|n_act| < n_min" DB 31, ... DBX 94.4.					
			VSA/HSA		-
810D		5.0000	0.0000	25000.0000	2/4

1418	**SPEED_THRESHOLD_MIN**			D03	**CR:** DB1
1/min	Signal n_min for 'act_n < n_min'			FLOAT	sofort
The speed threshold is entered for monitoring purposes. If the actual speed falls below the set speed threshold (absolute value), then the signal is sent to PLC, IS "|n_act| < n_min" DB 31, ... DBX 94.4.					
			VSA/HSA		ROT
840D		5.0000	0.0000	100000.0000	2/4

1418	**SPEED_THRESHOLD_MIN**			D03	**CR:**
m/min	v_min for "v_act < v_min" signal			FLOAT	sofort
The speed threshold is entered for monitoring purposes. If the actual speed falls below the set speed threshold (absolute value), then the signal is sent to PLC, IS "|v_act |<v_min" DB 31, ... DBX 94.4.					
			VSA		LIN
840D		0.3000	0.0000	100000.0000	2/4

1418	**SPEED_THRESHOLD_MIN**			D03	**CR:** DB1
1/min	Signal n_min for 'act_n < n_min'			FLOAT	Immediately
The speed threshold is entered for monitoring purposes. If the actual speed falls below the set speed threshold (absolute value), then the signal is sent to PLC, IS "|n_act| < n_min" DB 31, ... DBX 94.4.					
			HSA SLM VSA		-
P2		5.000000	0.000000	100000.000000	2/4

1420	**MOTOR_MAX_SPEED_SETUP**			D02	**CR:** DÜ1
1/min	Max. motor speed, setting-up operation			FLOAT	sofort
For setting-up operation (terminal 112), the absolute speed setpoint is limited to the specified value.					
			VSA/HSA		ROT

840D		30.0000	0.0000	100000.0000	2/4

1420	**MOTOR_MAX_SPEED_SETUP**			**CR:** DÜ1
1/min	Max. motor speed, setting-up operation		FLOAT	sofort
For setting-up operation (terminal 112), the absolute speed setpoint is limited to the specified value.				
		VSA/HSA		-

810D		30.0000	0.0000	50000.0000	2/4

1420	**MOTOR_MAX_SPEED_SETUP**		D02	**CR:**
m/min	Maximum speed in setting-up operation		FLOAT	sofort
For setting-up operation (terminal 112), the absolute speed setpoint is limited to the specified value.				
		VSA		LIN

840D		2.0000	0.0000	100000.0000	2/4

1420	**MOTOR_MAX_SPEED_SETUP**		D02	**CR:** DÜ1
1/min	Max. motor speed, setting-up operation		FLOAT	Immediately
For setting-up operation (terminal 112), the absolute speed setpoint is limited to the specified value.				
		HSA SLM VSA		-

P2		30.000000	0.000000	100000.000000	2/4

1421	**SPEEDCTRL_INTEGRATOR_FEEDBK**		D01	**CR:** DD1
ms	Time constant integrator feedback		FLOAT	sofort
The speed controller loop integrator is reduced using a weighted feedback element through a 1st order low-pass filter characteristics with the configured time constant. Effect: The integrator output of the speed controller is limited to a value proportional to the setpoint-actual value difference (steady-state proportional characteristics). Applications: Motion at zero position setpoint and dominant stiction can be suppressed but results in a remaining position setpoint-actual value difference, e.g. the position control axis oscillates at standstill (stick-slip effect) or overshoots with mm steps. Prevents stressing of rigidly mechanically coupled axes or spindles (synchronous spindle). Setting instructions: This data should be optimized, starting from high values until an optimum compromise is reached. Note The integrator feedback becomes active from the value MD 1421 >= 1.0 Using this machine data (input: computation deadtime referred to the speed controller cycle), the setpoint characteristics for the reference model can be adapted to the behaviour of the control system of the closed speed control loop.				
		VSA/HSA		ROT/LIN

840D		0.0000	0.0000	1000.0000	2/4

1421	**SPEEDCTRL_INTEGRATOR_FEEDBK**			D01	**CR:** DD1
ms	Time constant integrator feedback			FLOAT	Immediately

The speed controller loop integrator is reduced using a weighted feedback element through a 1st order low-pass filter characteristics with the configured time constant.

Effect:

The integrator output of the speed controller is limited to a value proportional to the setpoint-actual value difference (steady-state proportional characteristics).

Applications:

Motion at zero position setpoint and dominant stiction can be suppressed but results in a remaining position setpoint-actual value difference, e.g. the position control axis oscillates at standstill (stick-slip effect) or overshoots with mm steps.

Prevents stressing of rigidly mechanically coupled axes or spindles (synchronous spindle).

Setting instructions:

This data should be optimized, starting from high values until an optimum compromise is reached.

Note

The integrator feedback becomes active from the value MD 1421 >= 1.0

Using this machine data (input: computation deadtime referred to the speed controller cycle), the setpoint characteristics for the reference model can be adapted to the behaviour of the control system of the closed speed control loop.

			HSA SLM VSA		-
P2		0.000000	0.000000	1000.000000	2/4

1424	**SPEED_FFW_FILTER_TIME**			D01, EXP	**CR:**
us	Balancing the speed precontrol channel			FLOAT	sofort

Enter the time constant of the 1st order balancing filter in the speed pre-control channel of the speed-torque pre-control. Using this time, the setpoint characteristics of the closed current control loop can be adapted. The higher-level speed control loop is thus balanced. When initializing the balancing filter, the time constants of the active current setpoint filter (only low pass) are taken into account.

Note

The filter is de-activated (proportional element with gain 1) when 0 is entered, if no low-pass filters are active as current setpoint filter.

			VSA		LIN
840D		0.0000	0.0000	50000.0000	2/4

1424	**SPEED_FFW_FILTER_TIME**			D01, EXP	**CR:** DS1
us	Balancing the speed precontrol channel			FLOAT	sofort

Enter the time constant of the 1st order balancing filter in the speed precontrol channel of the speed-torque pre-control. Using this time, the setpoint characteristics of the closed current control loop can be adapted. The higher-level speed control loop is thus balanced. When initializing the balancing filter, the time constants of the active current setpoint filter (only low pass) are automatically taken into account.

Note

When 0 is entered, the filter is only de-activated (proportional element with gain 1) if no low-pass filters are active as current setpoint filters.

			VSA/HSA		ROT
840D		0.0000	0.0000	50000.0000	2/4

1424	**SPEED_FFW_FILTER_TIME**			D01, EXP	**CR:** DS1
us	Balancing the speed precontrol channel			FLOAT	Immediately
Enter the time constant of the 1st order balancing filter in the speed precontrol channel of the speed-torque precontrol. Using this time, the setpoint characteristics of the closed current control loop can be adapted. The higher-level speed control loop is thus balanced. When initializing the balancing filter, the time constants of the active current setpoint filter (only low pass) are automatically taken into account. Note When 0 is entered, the filter is only de-activated (proportional element with gain 1) if no low-pass filters are active as current setpoint filters.					
			HSA SLM VSA		-
P2		0.000000	0.000000	50000.000000	2/4

1425	**SPEED_FFW_DELAY**			D01, EXP	**CR:** DS1
-	Balancing computation deadtime I-controller			FLOAT	sofort
Select a filter in the speed precontrol channel which simulates the computation deadtime of the current control loop. The simulation in this case is calculated as an approximation of an interrupted deadtime (see diagram for MD 1416). It is only effective for active speed-torque precontrol. Using this machine data (input: computation deadtime referred to the speed controller cycle), the setpoint characteristics in the speed precontrol channel of the speed controller can be adapted to the behaviour of the control system of the closed speed control loop; the higher-level speed control loop is thus balanced.					
			VSA/HSA		ROT/LIN
840D		0.0000	0.0000	1.0000	2/4

1425	**SPEED_FFW_DELAY**			D01, EXP	**CR:** DS1
-	Balancing computation deadtime I-controller			FLOAT	Immediately
Select a filter in the speed precontrol channel which simulates the computation deadtime of the current control loop. The simulation in this case is calculated as an approximation of an interrupted deadtime (see diagram for MD 1416). It is only effective for active speed-torque precontrol. Using this machine data (input: computation deadtime referred to the speed controller cycle), the setpoint characteristics in the speed precontrol channel of the speed controller can be adapted to the behaviour of the control system of the closed speed control loop; the higher-level speed control loop is thus balanced.					
			HSA SLM VSA		-
P2		0.000000	0.000000	1.000000	2/4

1426	**SPEED_DES_EQ_ACT_TOL**			D03	**CR:**
m/min	Tolerance bandwidth for "v_set = v_act" signal			FLOAT	sofort
The response value for the tolerance bandwidth of the PLC status signals is entered IS "v_act = v_set" DB 31, ... DBX 94.6 and IS "ramp-up function completed" DB 31-48 DBX 94.2. The "v_act = v_set" signal becomes active, if the speed actual value enters the selected tolerance bandwidth associated with the speed setpoint, and remains within this bandwidth for a minimum of the delay time (MD 1427). The signal becomes immediately inactive when the tolerance bandwidth is exited. The "ramp-up function completed" signal becomes simultaneously active with the "n_act = n_set" signal, however, it is latched in the active state up to the next setpoint change, even if the speed actual value exits the tolerance bandwidth. The "ramp-function completed" signal becomes immediately inactive, if the setpoint changes.					
			VSA		LIN
840D		1.0000	0.0000	10000.0000	2/4

1426	**SPEED_DES_EQ_ACT_TOL**			D03	**CR:** DB1
1/min	Tolerance bandwidth for 'n_set = n_act' signal			FLOAT	sofort

The response value for the tolerance bandwidth of the PLC status signals is entered:

IS "n_act = n_set" DB 31, ... DBX 94.6 and

IS "ramp-up function completed" DB 31-48 DBX 94.2.

The "n_act = n_set" signal becomes active, if the speed actual value enters the selected tolerance bandwidth associated with the speed setpoint, and remains within this bandwidth for a minimum of the delay time (MD 1427). The signal becomes immediately inactive when the tolerance bandwidth is exited.

The "ramp-up function completed" signal becomes simultaneously active with the "n_act = n_set" signal, however, it is latched in the active state up to the next setpoint change, even if the actual speed value exits the tolerance bandwidth. The "ramp-up function completed" signal becomes immediately inactive if the setpoint changes.

Functionality from SW 3.40/04

As soon as the controller signals adjustment of the speed setpoint, the tolerance bandwidth is "frozen" at the last setpoint value. The message is deleted when the setpoint moves outside the tolerance bandwidth. Thus, no messages are produced for setpoint value changes within the tolerance bandwidth.

See also "ramp-up timing", MD 1723: ACTUAL_RAMP_TIME.

			VSA/HSA		ROT
840D		20.0000	0.0000	10000.0000	2/4

1426	**SPEED_DES_EQ_ACT_TOL**				**CR:** DB1
1/min	Tolerance bandwidth for 'n_set = n_act' signal			FLOAT	sofort

The response value for the tolerance bandwidth of the PLC status signals is entered:

IS "n_act = n_set" DB 31, ... DBX 94.6 and

IS "ramp-up function completed" DB 31-48 DBX 94.2.

The "n_act = n_set" signal becomes active, if the speed actual value enters the selected tolerance bandwidth associated with the speed setpoint, and remains within this bandwidth for a minimum of the delay time (MD 1427). The signal becomes immediately inactive when the tolerance bandwidth is exited.

The "ramp-up function completed" signal becomes simultaneously active with the "n_act = n_set" signal, however, it is latched in the active state up to the next setpoint change, even if the actual speed value exits the tolerance bandwidth. The "ramp-up function completed" signal becomes immediately inactive if the setpoint changes.

Functionality from SW 3.40/04

As soon as the controller signals adjustment of the speed setpoint, the tolerance bandwidth is "frozen" at the last setpoint value. The message is deleted when the setpoint moves outside the tolerance bandwidth. Thus, no messages are produced for setpoint value changes within the tolerance bandwidth.

See also "ramp-up timing", MD 1723: ACTUAL_RAMP_TIME.

			VSA/HSA		-
810D		20.0000	0.0000	10000.0000	2/4

1426	**SPEED_DES_EQ_ACT_TOL**			D03	**CR:** DB1
1/min	Tolerance bandwidth for 'n_set = n_act' signal			FLOAT	Immediately

The response value for the tolerance bandwidth of the PLC status signals is entered:

IS "n_act = n_set" DB 31, ... DBX 94.6 and

IS "ramp-up function completed" DB 31, ... DBX 94.2.

The "n_act = n_set" signal becomes active, if the speed actual value enters the selected tolerance bandwidth associated with the speed setpoint, and remains within this bandwidth for a minimum of the delay time (MD 1427). The signal becomes immediately inactive when the tolerance bandwidth is exited.

The "ramp-up function completed" signal becomes simultaneously active with the "n_act = n_set" signal, however, it is latched in the active state up to the next setpoint change, even if the actual speed value exits the tolerance bandwidth. The "ramp-up function completed" signal becomes immediately inactive if the setpoint changes.

Functionality from SW 3.40/04

As soon as the controller signals adjustment of the speed setpoint, the tolerance bandwidth is "frozen" at the last setpoint value. The message is deleted when the setpoint moves outside the tolerance bandwidth. Thus, no messages are produced for setpoint value changes within the tolerance bandwidth.

See also "ramp-up timing", MD 1723: ACTUAL_RAMP_TIME.

			HSA SLM VSA		-
P2		20.000000	0.000000	10000.000000	2/4

1427	**SPEED_DES_EQ_ACT_DELAY**			D03	**CR:**
ms	Delay time signal 'n_set = n_act'			FLOAT	sofort

The delay time after which the "n_act = n_set" signal should respond after the tolerance bandwidth (MD 1426) is entered here.

			VSA		LIN
840D		200.0000	0.0000	500.0000	2/4

1427	**SPEED_DES_EQ_ACT_DELAY**			D03	**CR:** DB1
ms	Delay time signal 'n_set = n_act'			FLOAT	sofort

The delay time after which the "n_act = n_set" signal should respond after the tolerance bandwidth (MD 1426) is entered here.

			VSA/HSA		ROT
840D		200.0000	0.0000	500.0000	2/4

1427	**SPEED_DES_EQ_ACT_DELAY**			D03	**CR:** DB1
ms	Delay time signal 'n_set = n_act'			FLOAT	Immediately

The delay time after which the "n_act = n_set" signal should respond after the tolerance bandwidth (MD 1426) is entered here.

			HSA SLM VSA		-
P2		200.000000	0.000000	500.000000	2/4

1428	FORCE_THRESHOLD_X			D03	**CR:**
%	Threshold force Fdx			FLOAT	sofort
The machine data specifies the force limit which when exceeded deactivates the PLC signal, interface signal "F_d < F_dx" DB 31-48 DBX 94.3. The entered value refers to the actual force limit. Analog to this value, above the rated speed in the constant-power range (field-weakening operation), the maximum permissible force is dependent on the operating point. Thus, a decreasing threshold force characteristic is obtained as a function of 1/n; from the stall force onwards, this becomes a 1/n² characteristic. The "F_d < F_dx" signal is latched in the active state until the interface signal "ramp-up function completed" DB31-48 DBX 94.2 becomes active. When the "ramp-up function completed" signal is active, the system waits during the delay time (MD 1429). The "F_d < F_dx" signal can become inactive only then					
			VSA		LIN
840D		90.0000	0.0000	100.0000	2/4

1428	TORQUE_THRESHOLD_X			D03	**CR:** DB1
%	Threshold force M_dx			FLOAT	sofort
The machine data specifies the torque limit which when exceeded deactivates the PLC message, IS "M_d < M_dx" DB 31-48 DBX 94.3. The entered value refers to the actual torque limit. Analog to this value, above the rated speed in the constant-power range (field-weakening operation), the maximum permissible torque is dependent on the operating point. Thus, a decreasing threshold torque characteristic is obtained as a function of 1/n, from the stall torque onwards this becomes a 1/n² characteristic. Note For SINUMERIK 810D CCU2, the relay function must be activated via MD 1012 bit 3.					
			VSA/HSA		ROT
840D		90.0000	0.0000	100.0000	2/4

1428	TORQUE_THRESHOLD_X			D03	**CR:** DB1
%	Threshold force M_dx			FLOAT	Immediately
The machine data specifies the torque limit which when exceeded deactivates the PLC message, IS "M_d < M_dx" DB 31, ... DBX 94.3. The entered value refers to the actual torque limit. Analog to this value, above the rated speed in the constant-power range (field-weakening operation), the maximum permissible torque is dependent on the operating point. Thus, a decreasing threshold torque characteristic is obtained as a function of 1/n, from the stall torque onwards this becomes a 1/n² characteristic. Note For SINUMERIK 810D CCU2, the relay function must be activated via MD 1012 bit 3.					
			HSA SLM VSA		-
P2		90.000000	0.000000	100.000000	2/4

1429	TORQUE_THRESHOLD_X_DELAY			D03	**CR:**
ms	Delay time 'Fd < Fdx' signal			FLOAT	sofort
The delay time is entered, which must expire before the signal "F_d < F_dx" can become inactive after the "ramp-up function completed" signal. As long as the "ramp-up function completed" is not active and the delay time has still not expired, the "F_d < F_dx" signal is set to "HIGH", independently of the force.					
			VSA		LIN
840D		800.0000	0.0000	1000.0000	2/4

1429	**TORQUE_THRESHOLD_X_DELAY**			D03	**CR:** DB1
ms	Delay time signal 'Md < Mdx'			FLOAT	sofort
Entry of the delay time which must expire before the signal "M_d < M_dx" can become inactive after the "ramp-up function completed" signal. As long as the "ramp-up function completed" is not active and the delay time has still not expired, the "M_d < M_dx" signal is set to "HIGH" independently of the torque.					
			VSA/HSA		ROT
840D		800.0000	0.0000	1000.0000	2/4

1429	**TORQUE_THRESHOLD_X_DELAY**			D03	**CR:** DB1
ms	Delay time signal 'Md < Mdx'			FLOAT	Immediately
Entry of the delay time which must expire before the signal "M_d < M_dx" can become inactive after the "ramp-up function completed" signal. As long as the "ramp-up function completed" is not active and the delay time has still not expired, the "M_d < M_dx" signal is set to "HIGH" independently of the torque.					
			HSA SLM VSA		-
P2		800.000000	0.000000	1000.000000	2/4

1451	**SPEEDCTRL_GAIN_1_AM**			D01	**CR:** DE1
Nms/rad	P gain of speed control loop IM			FLOAT	sofort
Enter the P gain of the speed control loop in the induction motor mode or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function.					
			HSA		ROT
840D		0.3000	0.0000	100000.0000	2/4

1451	**SPEEDCTRL_GAIN_1_AM**			D01	**CR:** DE1
Nms/rad	P gain of speed control loop IM			FLOAT	Immediately
Enter the P gain of the speed control loop in the induction motor mode or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function.					
			HSA		-
P2		0.300000	0.000000	100000.000000	2/4

1453	**SPDCTRL_INTEGR_TIME_1_AM**			D01	**CR:** DE1
ms	Integral action time of speed control loop IM			FLOAT	sofort
Enter the integral action time of the speed control loop in the induction motor mode or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function.					
			HSA		ROT
840D		140.0000	0.0000	6000.0000	2/4

1453	**SPDCTRL_INTEGR_TIME_1_AM**			D01	**CR:** DE1
ms	Integral action time of speed control loop IM			FLOAT	Immediately
Enter the integral action time of the speed control loop in the induction motor mode or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function.					
			HSA		-
P2		140.000000	0.000000	6000.000000	2/4

1458	**DES_CURRENT_OPEN_LOOP_AM**			D01	**CR:** DE1
%	Current setpoint controlled range IM			FLOAT	sofort
In the pure IM mode (MD 1465 = 0), the drive operates in the current-frequency open-loop controlled mode below the changeover speed (MD 1466). In order to accept a high load torque, the motor current in this range can be increased using MD 1458. The input is a percentage referred to the rated motor current (MD1103). The current is limited to 90% of the current limit value (MD 1238).					
			HSA		ROT
840D		90.0000	0.0000	150.0000	2/4

1458	**DES_CURRENT_OPEN_LOOP_AM**			D01	**CR:** DE1
%	Current setpoint controlled range IM			FLOAT	Immediately
In the pure IM mode (MD 1465 = 0), the drive operates in the current-frequency open-loop controlled mode below the changeover speed (MD 1466). In order to accept a high load torque, the motor current in this range can be increased using MD 1458. The input is a percentage referred to the rated motor current (MD1103). The current is limited to 90% of the current limit value (MD 1238).					
			HSA		-
P2		90.000000	0.000000	150.000000	2/4

1459	**TORQUE_SMOOTH_TIME_AM**			D01	**CR:** DE1
ms	Torque smoothing time constant IM			FLOAT	sofort
In IM operation, a precontrol for the speed torque frequency is implemented on account of the low dynamics. The precontrol value for the torque is smoothed using MD 1459.					
			HSA		ROT
840D		4.0000	0.0000	100.0000	2/4

1459	**TORQUE_SMOOTH_TIME_AM**			D01	**CR:** DE1
ms	Torque smoothing time constant IM			FLOAT	Immediately
In IM operation, a precontrol for the speed torque frequency is implemented on account of the low dynamics. The precontrol value for the torque is smoothed using MD 1459.					
			HSA		-
P2		4.000000	0.000000	100.000000	2/4

1465	**SWITCH_SPEED_MSD_AM**			D01, D06	**CR:** DE1
1/min	Changeover speed MSD/IM			FLOAT	sofort
Above the speed set here, the drive operates in IM mode . n = 0 pure IM operation 0 < n < n max mixed MSD/IM operation n > n max only MSD operation If IM operation is selected, only pulse frequencies (MD 1100) of 4 kHz and 8 kHz are permissible. MD 1465 is set to default 0 by the operator initiating the "Calculate controller data" function if a "no" is entered in MD 1011.5 motor measuring system available.					
			HSA		ROT
840D		100000.0000	0.0000	100000.0000	2/4

1465	**SWITCH_SPEED_MSD_AM**			D01, D05, EXP	**CR:** DE1
1/min	Changeover speed MSD/IM			FLOAT	Immediately

Above the speed set here, the drive operates in IM mode .
n = 0 pure IM operation
0 < n < n max mixed MSD/IM operation
n > n max only MSD operation

If IM operation is selected, only pulse frequencies (MD 1100) of 4 kHz and 8 kHz are permissible. MD 1465 is set to default 0 by the operator initiating the "Calculate controller data" function if a "no" is entered in MD 1011.5 motor measuring system available.

			HSA		-
P2		100000.000000	0.000000	100000.000000	2/4

1466	**SWITCH_SPD_OPEN_LOOP_AM**			D01	**CR:** DE1
1/min	Changeover speed closed/open loop IM			FLOAT	sofort

For pure IM operation (MD 1465=0) below the speed set here, current-frequency, open-loop controlled mode is used. MD1466 is set as default by the operator initiating the "Calculate controller data" function.

			HSA		ROT
840D		300.0000	150.0000	100000.0000	2/4

1466	**SWITCH_SPD_OPEN_LOOP_AM**			D01	**CR:** DE1
1/min	Changeover speed closed/open loop IM			FLOAT	Immediately

For pure IM operation (MD 1465=0) below the speed set here, current-frequency, open-loop controlled mode is used. MD1466 is set as default by the operator initiating the "Calculate controller data" function.

			HSA SLM VSA		-
P2		300.000000	150.000000	100000.000000	2/4

1500	**NUM_SPEED_FILTERS**				**CR:** DD2
-	Number of speed setpoint filters			UNS. WORD	sofort

Enter the number of speed setpoint filters
810D: PT1 low-pass filter
840D/611D: PT1 low-pass filter, PT2 low-pass filter or bandstop filter

Selecting the number of speed setpoint filters
Value | Significance
----
0 | No speed setpoint filter active
1 | Filter 1 active
2 | Filters 1 and 2 active (only 840D)

The 1st filter as PT1 or PT2 is only effective after first being activated from the PLC. The speed setpoint filter is included in the FFT measurement - speed controller loop. If the 1st filter (if active) is parameterized as bandstop filter, this is always effective, independent of the PLC message.

Note
For 840D/611D, filter 1 is additionally selected via an interface signal. IS "speed setpoint smoothing" DB 31 - 48.DBX 20.3

Reference /FB/, A2, "Various interface signals"

			VSA/HSA		-

810D		0	0	1	2/4

1500	**NUM_SPEED_FILTERS**			D01	**CR:**
-	Number of speed setpoint filters			UNS. WORD	sofort

Enter the number of speed setpoint filters 810D:

PT1 low-pass filter 840D/611D: PT1 low-pass filter,

PT2 low-pass filter or bandstop filter

Selecting the number of speed setpoint filters

----

0 | No speed setpoint filter active

1 | Filter 1 active

2 | Filters 1 and 2 active (only 840D)

The 1st filter as PT1 or PT2 is only effective after first being activated from the PLC. The speed setpoint filter is included in the FFT measurement - speed controller loop. If the 1st filter (if active) is parameterized as bandstop filter, this is always effective, independent of the PLC signal.

Note

For 840D/611D, filter 1 is additionally selected via an interface signal. IS "speed setpoint smoothing" DB 31 - 48.DBX 20.3

Reference /FB/, A2, "Various interface signals"

			VSA		LIN
840D		0	0	2	2/4

1500	**NUM_SPEED_FILTERS**			D01	**CR:** DD2
-	Number of speed setpoint filters			UNS. WORD	sofort

Enter the number of speed setpoint filters

810D: PT1 low-pass filter

840D/611D: PT1 low-pass filter, PT2 low-pass filter or bandstop filter

Selecting the number of speed setpoint filters

Value | Significance

----

0 | No speed setpoint filter active

1 | Filter 1 active

2 | Filters 1 and 2 active (only 840D)

The 1st filter as PT1 or PT2 is only effective after first being activated from the PLC. The speed setpoint filter is included in the FFT measurement - speed controller loop. If the 1st filter (if active) is parameterized as bandstop filter, this is always effective, independent of the PLC message.

Note

For 840D/611D, filter 1 is additionally selected via an interface signal. IS "speed setpoint smoothing" DB 31 - 48.DBX 20.3

Reference /FB/, A2, "Various interface signals"

			VSA/HSA		ROT
840D		0	0	2	2/4

1500	**NUM_SPEED_FILTERS**	D01	**CR:** DD2
-	Number of speed setpoint filters	UNS.WORD	Immediately

Enter the number of speed setpoint filters

810D: PT1 low-pass filter

840D/611D: PT1 low-pass filter, PT2 low-pass filter or bandstop filter

Selecting the number of speed setpoint filters

Value | Significance

----

0 | No speed setpoint filter active

1 | Filter 1 active

2 | Filters 1 and 2 active (only 840D)

The 1st filter as PT1 or PT2 is only effective after first being activated from the PLC. The speed setpoint filter is included in the FFT measurement - speed controller loop. If the 1st filter (if active) is parameterized as bandstop filter, this is always effective, independent of the PLC message.

Note

For 840D/611D, filter 1 is additionally selected via an interface signal. IS "speed setpoint smoothing" DB 31, ... DBX 20.3

Reference /FB/, A2, "Various interface signals"

		HSA SLM VSA		-

P2		0	0	2	2/4

1501	**SPEED_FILTER_TYPE**	D01	**CR:**
-	Speed setpoint filter type	UNS. WORD	sofort

Enter the configuration of 2 speed setpoint filters. Bandstop and low-pass filters are available (PT2/PT1). The adjustable filter parameters are entered in the associated machine data.

Applications:

Damping mechanical resonant frequencies in the position control loop (bandstop filter). Depending on the particular application, the "bandstop" function can be set in three configurations:

- simple bandstop filter. MD 1514/MD 1517 and MD 1515/MD 1518.
- bandstop filter with adjustable damping of the amplitude characteristic, additionally MD 1516/MD 1519
- bandstop with adjustable damping of the amplitude characteristics and increase or decrease of the amplitude characteristic after the block frequency. Additionally, MD 1520/MD 1521.

Interpolation of speed setpoint steps - the speed setpoints are output in the position controller clock cycle, which can be selected to be significantly higher than the speed controller clock cycle (low-pass filter).

Type of speed setpoint filter

	filter	Bit	0/1	
Low pass/bandstop	1st	0	0	Low-pass filter
			1	Bandstop filter
	2nd	1	0	Low-pass filter
			1	Bandstop filter
PT2/PT1 for low pass filter	1st	8	0	PT2 low-pass filter
			1	PT1 low-pass filter
	2nd	9	0	PT2 low-pass filter
			1	PT1 low-pass filter

Note

Before configuring the filter type, the appropriate filter machine data should be assigned.

			VSA		LIN
840D		0	0	8303	2/4

1501	**SPEED_FILTER_TYPE**	D01	**CR:** DD2
-	Speed setpoint filter type	UNS. WORD	sofort

Enter the configuration of 2 speed setpoint filters. Bandstop and low-pass filters (PT2/PT1) are available. The adjustable filter parameters are entered in the associated machine data.

Applications:

Damping mechanical resonant frequencies in the position control loop (bandstop filter). Depending on the particular application, the "bandstop" function can be set in three configurations:

- simple bandstop filter. MD 1514/MD 1517 and MD 1515/MD 1518.
- bandstop filter with adjustable damping of the amplitude characteristic, additionally MD1516/MD 1519
- bandstop with adjustable damping of the amplitude characteristics and increase or decrease of the amplitude characteristic according to the blocking frequency, additionally, MD 1520/MD 1521.

Interpolation of speed setpoint steps - the speed setpoints are output in the position controller cycle which can be selected to be significantly higher than the speed controller cycle (low-pass filter).

Type of speed setpoint filter

Type	Filter	Bit	0/1	MD
Low pass/bandstop	1st	0	0	Low-pass filter (see MD 1502/1506/1507)
			1	Bandstop filter (see MD 1514/1515/1516)
	2nd	1	0	Low-pass filter (see MD 1502/1508/1509)
			1	Bandstop filter (see MD 1517/1518/1519)
PT2/PT1 for low pass filter	1st	8	0	PT2 low-pass filter (see MD 1506/1507)
			1	PT1 low-pass filter (see MD 1502)
	2nd	9	0	PT2 low-pass filter (see MD 1508/1509)
			1	PT1 low-pass filter (see MD 1503)

Note

Assign the relevant filter machine data before configuring the filter type,

			VSA/HSA		ROT
840D		0	0	8303	2/4

1501	SPEED_FILTER_TYPE		D01	CR: DD2
-	Speed setpoint filter type		UNS.WORD	Immediately

Enter the configuration of 2 speed setpoint filters. Bandstop and low-pass filters (PT2/PT1) are available. The adjustable filter parameters are entered in the associated machine data.

Applications:

Damping mechanical resonant frequencies in the position control loop (bandstop filter). Depending on the particular application, the "bandstop" function can be set in three configurations:

- simple bandstop filter. MD 1514/MD 1517 and MD 1515/MD 1518.
- bandstop filter with adjustable damping of the amplitude characteristic, additionally MD1516/MD 1519
- bandstop with adjustable damping of the amplitude characteristics and increase or decrease of the amplitude characteristic according to the blocking frequency, additionally, MD 1520/MD 1521.

Interpolation of speed setpoint steps - the speed setpoints are output in the position controller cycle which can be selected to be significantly higher than the speed controller cycle (low-pass filter).

Type of speed setpoint filter

Type	Filter	Bit	0/1	MD
Low pass/bandstop	1st	0	0	Low-pass filter (see MD 1502/1506/1507)
			1	Bandstop filter (see MD 1514/1515/1516)
	2nd	1	0	Low-pass filter (see MD 1502/1508/1509)
			1	Bandstop filter (see MD 1517/1518/1519)
PT2/PT1 for low pass filter	1st	8	0	PT2 low-pass filter (see MD 1506/1507)
			1	PT1 low-pass filter (see MD 1502)
	2nd	9	0	PT2 low-pass filter (see MD 1508/1509)
			1	PT1 low-pass filter (see MD 1503)

Note

Assign the relevant filter machine data before configuring the filter type,

			HSA SLM VSA		-
P2		0x0000	0x0000	0x8303	2/4

1502	SPEED_FILTER_1_TIME		D01	CR:
ms	Time constant for speed setpoint filter 1		FLOAT	sofort

Enter the time constant for the speed setpoint filter 1 (PT1 low-pass filter). The filter is de-activated when a 0 is entered.

Note

For 840D/611D, filter 1 is additionally selected via an interface signal.

IS "speed setpoint smoothing" DB31, ... DBX 20.3

Reference /FB/, A2, "Various interface signals"

			VSA		LIN
840D		0.0000	0.0000	500.0000	2/4

1502	**SPEED_FILTER_1_TIME**			D01	**CR:** DD2
ms	Time constant for speed setpoint filter 1			FLOAT	sofort
Enter the time constant for the speed setpoint filter 1 (PT1 low-pass filter). The filter is de-activated when a 0 is entered. Note For 840D/611D, filter 1 is additionally selected via an interface signal. IS "speed setpoint smoothing" DB31, ... DBX 20.3 Reference /FB/, A2, "Various interface signals"					
			VSA/HSA		ROT
840D		0.0000	0.0000	500.0000	2/4

1502	**SPEED_FILTER_1_TIME**				**CR:** DD2
ms	Time constant for speed setpoint filter 1			FLOAT	sofort
Enter the time constant for the speed setpoint filter 1 (PT1 low-pass filter). The filter is de-activated when a 0 is entered. Note For 840D/611D, filter 1 is additionally selected via an interface signal. IS "speed setpoint smoothing" DB31, ... DBX 20.3 Reference /FB/, A2, "Various interface signals"					
			VSA/HSA		-
810D		0.0000	0.0000	150.0000	2/4

1502	**SPEED_FILTER_1_TIME**			D01	**CR:** DD2
ms	Time constant for speed setpoint filter 1			FLOAT	Immediately
Enter the time constant for the speed setpoint filter 1 (PT1 low-pass filter). The filter is de-activated when a 0 is entered. Note For 840D/611D, filter 1 is additionally selected via an interface signal. IS "speed setpoint smoothing" DB31, ... DBX 20.3 Reference /FB/, A2, "Various interface signals"					
			HSA SLM VSA		-
P2		0.000000	0.000000	500.000000	2/4

1503	**SPEED_FILTER_2_TIME**			D01	**CR:** DD2
ms	Time constant for speed setpoint filter 2			FLOAT	sofort
Enter the time constant for the speed setpoint filter 2 (PT1 low-pass filter). The filter is de-activated when a 0 is entered.					
			VSA/HSA		ROT
840D		0.0000	0.0000	500.0000	2/4

1503	**SPEED_FILTER_2_TIME**			D01	**CR:**
ms	Time constant for speed setpoint filter 2			FLOAT	sofort
Enter the time constant for the speed setpoint filter 2 (PT1 low-pass filter). The filter is de-activated when a 0 is entered.					
			VSA		LIN

840D		0.0000	0.0000	500.0000	2/4

1503	**SPEED_FILTER_2_TIME**			D01	**CR:** DD2
ms	Time constant for speed setpoint filter 2			FLOAT	Immediately
Enter the time constant for the speed setpoint filter 2 (PT1 low-pass filter). The filter is de-activated when a 0 is entered.					
			HSA SLM VSA		-
P2		0.000000	0.000000	500.000000	2/4

1506	**SPEED_FILTER_1_FREQUENCY**			D01, EXP	**CR:**
Hz	Natural frequency for speed setpoint filter 1			FLOAT	sofort
Enter the natural frequency for speed setpoint filter 1 (PT2 low-pass filter). Values < 10 Hz entered for the low-pass filter natural frequency initializes the filter independently of the associated damping as proportional element with gain 1. The filter is activated via IS "Speed setpoint smoothing" DB 31 - 48.DBX 20.3. Note For interpolating axes, the associated speed setpoint filter should be parameterized the same.					
			VSA		LIN
840D		2000.0000	10.0000	8000.0000	2/4

1506	**SPEED_FILTER_1_FREQUENCY**			D01, EXP	**CR:** DD2
Hz	Natural frequency for speed setpoint filter 1			FLOAT	sofort
Enter the natural frequency for speed setpoint filter 1 (PT2 low-pass filter). Entering values < 10 Hz for the low-pass filter natural frequency initializes the filter independently of the associated damping as proportional element with gain 1. The filter is activated via IS "Speed setpoint smoothing" DB 31 - 48.DBX 20.3. Note For interpolating axes, the associated speed setpoint filters should be parameterized the same.					
			VSA/HSA		ROT
840D		2000.0000	10.0000	8000.0000	2/4

1506	**SPEED_FILTER_1_FREQUENCY**			D01, EXP	**CR:** DD2
Hz	Natural frequency for speed setpoint filter 1			FLOAT	Immediately
Enter the natural frequency for speed setpoint filter 1 (PT2 low-pass filter). Entering values < 10 Hz for the low-pass filter natural frequency initializes the filter independently of the associated damping as proportional element with gain 1. The filter is activated via IS "Speed setpoint smoothing" DB 31, ... DBX 20.3. Note For interpolating axes, the associated speed setpoint filters should be parameterized the same.					
			HSA SLM VSA		-
P2		2000.000000	10.000000	8000.000000	2/4

1507	**SPEED_FILTER_1_DAMPING**			D01, EXP	**CR:**
-	Damping for speed setpoint filter 1			FLOAT	sofort

Enter the damping for speed setpoint filter 1 (PT2 low-pass filter). An entry with a value < 10 Hz of the natural frequency of the low-pass filter initializes the filter independently of the associated dampening as proportional element with gain 1.

The filter is activated via IS "Speed setpoint smoothing" DB 31 - 48.DBX 20.3.

Note

For interpolating axes, the associated speed setpoint filter should be parame-terized the same.

If damping values are entered in the range of the minimum input limit, this can result in overshoot in the time range up to a factor < 2. For two configured low-pass filters with the same setting parameters, this effect is significantly in-creased. In the small signal range, these filters continue to operate linearly. In the large signal range, in individual cases, the filter statuses could be limited by the maximum numerical format (defined by the processor register width). The filter characteristic is non-linear over short periods of time. Overflows or unsta-ble responses do not occur.

			VSA		LIN
840D		0.7000	0.2000	5.0000	2/4

1507	**SPEED_FILTER_1_DAMPING**			D01, EXP	**CR:** DD2
-	Damping for speed setpoint filter 1			FLOAT	sofort

Entering the natural frequency for speed setpoint filter 1 (PT2 low-pass filter). Entering a value < 10 Hz for the natural frequency of the low pass filter initialises the filter as a proportional element with gain 1, independently of the associated damping.

The filter is activated via IS "Speed setpoint smoothing" DB 31 - 48.DBX 20.3.

Note

For interpolating axes, the associated speed setpoint filters should be parameterized the same.

If damping values are entered in the range of the minimum input limit, this can result in overshoot in the time range up to a factor <= 2. This effect is significantly increased in the case of two configured low-pass filters with the same setting parameters. These filters continue to operate linearly in the small signal range. In isolated cases in the large signal range, the filter statuses could be limited by the maximum numerical format (defined by the processor register width). The filter characteristic becomes non-linear for a short time. Overflows or unstable responses do not occur.

			VSA/HSA		ROT
840D		0.7000	0.2000	5.0000	2/4

1507	**SPEED_FILTER_1_DAMPING**			D01, EXP	**CR:** DD2
-	Damping for speed setpoint filter 1			FLOAT	Immediately
Entering the natural frequency for speed setpoint filter 1 (PT2 low-pass filter). Entering a value < 10 Hz for the natural frequency of the low pass filter initialises the filter as a proportional element with gain 1, independently of the associated damping. The filter is activated via IS "Speed setpoint smoothing" DB 31, ...DBX 20.3. Note For interpolating axes, the associated speed setpoint filters should be parameterized the same. If damping values are entered in the range of the minimum input limit, this can result in overshoot in the time range up to a factor <= 2. This effect is significantly increased in the case of two configured low-pass filters with the same setting parameters. These filters continue to operate linearly in the small signal range. In isolated cases in the large signal range, the filter statuses could be limited by the maximum numerical format (defined by the processor register width). The filter characteristic becomes non-linear for a short time. Overflows or unstable responses do not occur.					
			HSA SLM VSA		-
P2		0.700000	0.200000	5.000000	2/4

1508	**SPEED_FILTER_2_FREQUENCY**			D01, EXP	**CR:**
Hz	Natural frequency for speed setpoint filter 2			FLOAT	sofort
Enter the natural frequency for speed setpoint filter 2 (PT2 low-pass filter). Values < 10 Hz entered for the low-pass filter natural frequency initializes the filter independently of the associated damping as proportional element with gain 1. Note For interpolating axes, the associated speed setpoint filter should be parame-terized the same.					
			VSA		LIN
840D		2000.0000	10.0000	8000.0000	2/4

1508	**SPEED_FILTER_2_FREQUENCY**			D01, EXP	**CR:** DD2
Hz	Natural frequency for speed setpoint filter 2			FLOAT	sofort
Entering the natural frequency for speed setpoint filter 2 (PT2 low-pass filter). Entering a value < 10 Hz for the low-pass filter natural frequency initializes the filter as proportional element with gain 1, independently of the associated damping. Note For interpolating axes, the associated speed setpoint filters should be parameterized the same.					
			VSA/HSA		ROT
840D		2000.0000	10.0000	8000.0000	2/4

1508	**SPEED_FILTER_2_FREQUENCY**			D01, EXP	**CR:** DD2
Hz	Natural frequency for speed setpoint filter 2			FLOAT	Immediately
Entering the natural frequency for speed setpoint filter 2 (PT2 low-pass filter). Entering a value < 10 Hz for the low-pass filter natural frequency initializes the filter as proportional element with gain 1, independently of the associated damping. Note For interpolating axes, the associated speed setpoint filters should be parameterized the same.					
			HSA SLM VSA		-

P2		2000.000000	10.000000	8000.000000	2/4

1509	**SPEED_FILTER_2_DAMPING**			D01, EXP	**CR:**
-	Damping for speed setpoint filter 2			FLOAT	sofort

Enter the damping for speed setpoint filter 2 (PT2 low-pass filter).

Note

For interpolating axes, the associated speed setpoint filter should be parame-terized the same. If damping values are entered in the range if the minimum input limit, this can result in overshoot in the time range up to a factor < 2. For two configured low-pass filters with the same setting parameters, this effect is significantly in-creased. In the small signal range, these filters continue to operate linearly. In the large signal range, in individual cases, the filter statuses could be limited by the maximum numerical format (defined by the processor register width). The filter characteristic is non-linear over short periods of time. Overflows or unstable responses do not occur.

			VSA		LIN
840D		0.7000	0.2000	5.0000	2/4

1509	**SPEED_FILTER_2_DAMPING**			D01, EXP	**CR:** DD2
-	Damping for speed setpoint filter 2			FLOAT	sofort

Enter the damping for speed setpoint filter 2 (PT2 low-pass filter).

Note

For interpolating axes, the associated speed setpoint filters should be parameterized the same.

If damping values are entered in the range of the minimum input limit, this can result in overshoot in the time range up to a factor <= 2. This effect is significantly increased in the case of two configured low-pass filters with the same setting parameters. These filters continue to operate linearly in the small signal range. In isolated cases in the large signal range, the filter statuses could be limited by the maximum numerical format (defined by the processor register width). The filter characteristic becomes non-linear for a short time. Overflows or unstable responses do not occur.

			VSA/HSA		ROT
840D		0.7000	0.2000	5.0000	2/4

1509	**SPEED_FILTER_2_DAMPING**			D01, EXP	**CR:** DD2
-	Damping for speed setpoint filter 2			FLOAT	Immediately

Enter the damping for speed setpoint filter 2 (PT2 low-pass filter).

Note

For interpolating axes, the associated speed setpoint filters should be parameterized the same.

If damping values are entered in the range of the minimum input limit, this can result in overshoot in the time range up to a factor <= 2. This effect is significantly increased in the case of two configured low-pass filters with the same setting parameters. These filters continue to operate linearly in the small signal range. In isolated cases in the large signal range, the filter statuses could be limited by the maximum numerical format (defined by the processor register width). The filter characteristic becomes non-linear for a short time. Overflows or unstable responses do not occur.

			HSA SLM VSA		-
P2		0.700000	0.200000	5.000000	2/4

1514	SPEED_FILTER_1_SUPPR_FREQ			D01, EXP	CR:
Hz	Blocking frequency for speed setpoint filter 1			FLOAT	sofort

Enter the block frequency for speed setpoint filter 1 (bandstop). If filter 1 is parameterized as bandstop filter, it is always effective, independent of IS "speed setpoint smoothing".

Note

The max. block frequency input is limited by the sampling frequency of the closed-loop control (MD 1001) (parameterized error).

MD 1514 < 1 / (2 x T_Abtast)   =   1 / (2 x MD 1001)

MD 1001 = T_Abtast = 62.5 µs = > MD 1514 < 8000 Hz
125.0 µs => MD 1514 < 4000 Hz

			VSA		LIN
840D		3500.0000	1.0000	7999.0000	2/4

1514	SPEED_FILTER_1_SUPPR_FREQ			D01, EXP	CR: DD2
Hz	Blocking frequency for speed setpoint filter 1			FLOAT	sofort

Enter the blocking frequency for speed setpoint filter 1 (bandstop). If filter 1 is parameterized as a bandstop filter, it is always effective, independent of IS "speed setpoint smoothing".

Note

The max. blocking frequency input is limited by the sampling frequency of the closed-loop control (MD 1001) (parameterized error).

MD 1514 < 1 / (2 x T_sample)   =   1 / (2 x MD 1001)

MD 1001 = T_sample = 62.5 µs = > MD 1514 < 8000 Hz
125.0 µs = > MD 1514 < 4000 Hz

			VSA/HSA		ROT
840D		3500.0000	1.0000	7999.0000	2/4

1514	SPEED_FILTER_1_SUPPR_FREQ			D01, EXP	CR: DD2
Hz	Blocking frequency for speed setpoint filter 1			FLOAT	Immediately

Enter the blocking frequency for speed setpoint filter 1 (bandstop). If filter 1 is parameterized as a bandstop filter, it is always effective, independent of IS "speed setpoint smoothing".

Note

The max. blocking frequency input is limited by the sampling frequency of the closed-loop control (MD 1001) (parameterized error).

MD 1514 < 1 / (2 x T_sample)   =   1 / (2 x MD 1001)

MD 1001 = T_sample = 62.5 µs = > MD 1514 < 8000 Hz
125.0 µs = > MD 1514 < 4000 Hz

			HSA SLM VSA		-
P2		3500.000000	1.000000	7999.000000	2/4

1515	**SPEED_FILTER_1_BANDWIDTH**			D01, EXP	**CR:**
Hz	Bandwidth for speed setpoint filter 1			FLOAT	sofort
Enter the -3dB bandwidth for speed setpoint filter (bandstop filter). Note When 0 is entered for the bandwidth, this parameterizes the filter as propor-tional element with gain 1. The bandwidth must be less than or equal to 2 x MD 1514 x MD 1520.					
			VSA		LIN
840D		500.0000	5.0000	7999.0000	2/4

1515	**SPEED_FILTER_1_BANDWIDTH**			D01, EXP	**CR:** DD2
Hz	Bandwidth for speed setpoint filter 1			FLOAT	sofort
Enter the -3dB bandwidth for speed setpoint filter 1 (bandstop filter). Note When 0 is entered for the bandwidth, this parameterizes the filter as a proportional element with gain 1. The bandwidth must be less than or equal to 2 x MD 1514 x MD 1520.					
			VSA/HSA		ROT
840D		500.0000	5.0000	7999.0000	2/4

1515	**SPEED_FILTER_1_BANDWIDTH**			D01, EXP	**CR:** DD2
Hz	Bandwidth for speed setpoint filter 1			FLOAT	Immediately
Enter the -3dB bandwidth for speed setpoint filter 1 (bandstop filter). Note When 0 is entered for the bandwidth, this parameterizes the filter as a proportional element with gain 1. The bandwidth must be less than or equal to 2 x MD 1514 x MD 1520.					
			HSA SLM VSA		-
P2		500.000000	5.000000	7999.000000	2/4

1516	**SPEED_FILTER_1_BW_NUMERATOR**			D01, EXP	**CR:** DD2
Hz	Bandwidth numerator for speed setpoint filter 1			FLOAT	sofort
Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as non-damped bandstop filter. Note The value of MD 1516: SPEED_FILTER_1_BW_NUM may only be a maximum of twice MD 1515: SPEED_FILTER_1_BANDWIDTH.					
			VSA/HSA		ROT
840D		0.0000	0.0000	7999.0000	2/4

1516	**SPEED_FILTER_1_BW_NUMERATOR**			D01, EXP	**CR:**
Hz	Bandwidth numerator for speed setpoint filter 1			FLOAT	sofort

Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as non-damped bandstop filter.

Note

The value of MD 1516: SPEED_FILTER_1_BW_NUM may only be a maximum of twice MD 1515: SPEED_FILTER_1_BANDWIDTH.

			VSA		LIN
840D		0.0000	0.0000	7999.0000	2/4

1516	**SPEED_FILTER_1_BW_NUMERATOR**			D01, EXP	**CR:** DD2
Hz	Bandwidth numerator for speed setpoint filter 1			FLOAT	Immediately

Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as non-damped bandstop filter.

Note

The value of MD 1516: SPEED_FILTER_1_BW_NUM may only be a maximum of twice MD 1515: SPEED_FILTER_1_BANDWIDTH.

			HSA SLM VSA		-
P2		0.000000	0.000000	7999.000000	2/4

1517	**SPEED_FILTER_2_SUPPR_FREQ**			D01, EXP	**CR:** DD2
Hz	Blocking frequency for speed setpoint filter 2			FLOAT	sofort

Enter the blocking frequency for speed setpoint filter 2 (bandstop).

Note

The max. blocking frequency input is limited by the sampling frequency of the closed-loop control (MD 1001) (parameterized error).

MD 1514 < 1 / (2 x T_sample) = 1 / (2 x MD 1001)

MD 1001 = T_sample = 62.5 µs = > MD 1514 < 8000 Hz
125.0 µs = > MD 1514 < 4000 Hz

			VSA/HSA		ROT
840D		3500.0000	1.0000	7999.0000	2/4

1517	**SPEED_FILTER_2_SUPPR_FREQ**			D01, EXP	**CR:**
Hz	Blocking frequency for speed setpoint filter 2			FLOAT	sofort

Enter the block frequency for speed setpoint filter 2 (bandstop).

Note

The max. block frequency input is limited by the sampling frequency of the closed-loop control (MD 1001) (parameterized error).

MD 1514 < 1 / (2 x T_Abtast) = 1 / (2 x MD 1001)

MD 1001 = T_Abtast = 62.5 µs = > MD 1514 < 8000 Hz
125.0 µs = > MD 1514 < 4000 Hz

			VSA		LIN

840D		3500.0000	1.0000	7999.0000	2/4

1517	**SPEED_FILTER_2_SUPPR_FREQ**	D01, EXP	**CR:** DD2
Hz	Blocking frequency for speed setpoint filter 2	FLOAT	Immediately

Enter the blocking frequency for speed setpoint filter 2 (bandstop).

Note

The max. blocking frequency input is limited by the sampling frequency of the closed-loop control (MD 1001) (parameterized error).

MD 1514 < 1 / (2 x T_sample) = 1 / (2 x MD 1001)

MD 1001 = T_sample = 62.5 µs = > MD 1514 < 8000 Hz
125.0 µs = > MD 1514 < 4000 Hz

			HSA SLM VSA		-
P2		3500.000000	1.000000	7999.000000	2/4

1518	**SPEED_FILTER_2_BANDWIDTH**	D01, EXP	**CR:**
Hz	Bandwidth for speed setpoint filter 2	FLOAT	sofort

Enter the -3dB bandwidth for speed setpoint filter (bandstop filter).

Note

When 0 is entered for the bandwidth, this parameterizes the filter as propor-tional element with gain 1.

The bandwidth must be less than or equal to 2 x MD 1514 x MD 1520.

			VSA		LIN
840D		500.0000	5.0000	7999.0000	2/4

1518	**SPEED_FILTER_2_BANDWIDTH**	D01, EXP	**CR:** DD2
Hz	Bandwidth for speed setpoint filter 2	FLOAT	sofort

Enter the -3dB bandwidth for speed setpoint filter 2 (bandstop filter).

Note

When 0 is entered for the bandwidth, this parameterizes the filter as a proportional element with gain 1.

The bandwidth must be less than or equal to 2 x MD 1517 x MD 1521.

			VSA/HSA		ROT
840D		500.0000	5.0000	7999.0000	2/4

1518	**SPEED_FILTER_2_BANDWIDTH**	D01, EXP	**CR:** DD2
Hz	Bandwidth for speed setpoint filter 2	FLOAT	Immediately

Enter the -3dB bandwidth for speed setpoint filter 2 (bandstop filter).

Note

When 0 is entered for the bandwidth, this parameterizes the filter as a proportional element with gain 1.

The bandwidth must be less than or equal to 2 x MD 1517 x MD 1521.

			HSA SLM VSA		-
P2		500.000000	5.000000	7999.000000	2/4

1519	SPEED_FILTER_2_BW_NUMERATOR		D01, EXP	CR: DD2
Hz	Bandwidth numerator for speed setpoint filter 2		FLOAT	sofort

Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as non-damped bandstop filter.

Note

The value of MD 1519: SPEED_FILTER_1_BW_NUM may only be a maximum of twice MD 1518: SPEED_FILTER_1_BANDWIDTH.

			VSA/HSA		ROT
840D		0.0000	0.0000	7999.0000	2/4

1519	SPEED_FILTER_2_BW_NUMERATOR		D01, EXP	CR:
Hz	Bandwidth numerator for speed setpoint filter 2		FLOAT	sofort

Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as non-damped bandstop filter.

Note

The value of MD 1519: SPEED_FILTER_1_BW_NUM may only be a maximum of twice MD 1518: SPEED_FILTER_1_BANDWIDTH.

			VSA		LIN
840D		0.0000	0.0000	7999.0000	2/4

1519	SPEED_FILTER_2_BW_NUMERATOR		D01, EXP	CR: DD2
Hz	Bandwidth numerator for speed setpoint filter 2		FLOAT	Immediately

Enter the bandwidth numerator for the damped bandstop filter. If a 0 is entered, the filter is initialized as non-damped bandstop filter.

Note

The value of MD 1519: SPEED_FILTER_1_BW_NUM may only be a maximum of twice MD 1518: SPEED_FILTER_1_BANDWIDTH.

			HSA SLM VSA		-
P2		0.000000	0.000000	7999.000000	2/4

1520	SPEED_FILTER_1_BS_FREQ		D01, EXP	CR:
%	BSF natural frequency for speed setpoint filter 1		FLOAT	sofort

Enter the natural frequency as a percentage for the general bandstop, referred to MD 1514 (block frequency).

For MD 1520 = 100%, the filter is initialized as damped bandstop filter.

If the resulting natural frequency is exceeded (MD 1520 * MD 1514), by the Shannon frequency specified by the speed controller sampling time, then the input is rejected with parameterized error.

Other information, refer to MD 1521: SPEED_FILTER_2_BS_FREQ

			VSA		LIN
840D		100.0000	1.0000	141.0000	2/4

1520	**SPEED_FILTER_1_BS_FREQ**			D01, EXP	**CR:** DD2
%	BSF natural frequency for speed setpoint filter 1			FLOAT	sofort
Enter the natural frequency as a percentage for the general bandstop, referred to MD 1514 (blocking frequency). For MD 1520 = 100%, the filter is initialized as a damped bandstop filter. If the resulting natural frequency exceeds (MD 1520 * MD 1514) the Shannon frequency specified by the speed controller sampling time, then the input is rejected with parameterized error. Other information, refer to MD 1521: SPEED_FILTER_2_BS_FREQ					
			VSA/HSA		ROT
840D		100.0000	1.0000	141.0000	2/4

1520	**SPEED_FILTER_1_BS_FREQ**			D01, EXP	**CR:** DD2
%	BSF natural frequency for speed setpoint filter 1			FLOAT	Immediately
Enter the natural frequency as a percentage for the general bandstop, referred to MD 1514 (blocking frequency). For MD 1520 = 100%, the filter is initialized as a damped bandstop filter. If the resulting natural frequency exceeds (MD 1520 * MD 1514) the Shannon frequency specified by the speed controller sampling time, then the input is rejected with parameterized error. Other information, refer to MD 1521: SPEED_FILTER_2_BS_FREQ					
			HSA SLM VSA		-
P2		100.000000	1.000000	141.000000	2/4

1521	**SPEED_FILTER_2_BS_FREQ**			D01, EXP	**CR:** DD2
%	BSF natural frequency for speed setpoint filter 2			FLOAT	sofort
The natural frequency is entered as a percentage for the general bandstop filter, referred to MD 1517 (blocking frequency). For MD 1521 = 100%, the filter is initialized as a damped bandstop filter. If the resulting natural frequency (MD 1521 x MD 1517) exceeds the Shannon frequency specified by the speed controller clock cycle, the input is rejected with parameterized error.					
			VSA/HSA		ROT
840D		100.0000	1.0000	141.0000	2/4

1521	**SPEED_FILTER_2_BS_FREQ**			D01, EXP	**CR:**
%	BSF natural frequency for speed setpoint filter 2			FLOAT	sofort
The natural frequency is entered as a percentage for the general bandstop filter, referred to MD 1517 (block frequency). For MD 1521 = 100%, the filter is initialized as damped bandstop filter. If the resulting natural frequency (MD 1521 * MD 1517) exceeds the Shannon frequency specified by the speed controller clock cycle, the input is rejected with parameterized error.					
			VSA		LIN
840D		100.0000	1.0000	141.0000	2/4

1521	**SPEED_FILTER_2_BS_FREQ**			D01, EXP	**CR:** DD2
%	BSF natural frequency for speed setpoint filter 2			FLOAT	Immediately
The natural frequency is entered as a percentage for the general bandstop filter, referred to MD 1517 (blocking frequency). For MD 1521 = 100%, the filter is initialized as a damped bandstop filter. If the resulting natural frequency (MD 1521 x MD 1517) exceeds the Shannon frequency specified by the speed controller clock cycle, the input is rejected with parameterized error.					
			HSA SLM VSA		-
P2		100.000000	1.000000	141.000000	2/4

1522	**ACT_SPEED_FILTER_TIME**			D01	**CR:** DD2
-	Time const. actual speed value filter			UNS. WORD	PowerOn
Time const. actual speed value filter This machine data is not used in SW 5.2.					
			VSA/HSA		ROT/LIN
840D		0	0	0	2/4

1522	**ACT_SPEED_FILTER_TIME**			D01	**CR:** DD2
ms	Time const. actual speed value filter			FLOAT	Immediately
Time const. actual speed value filter This machine data is not used in SW 5.2.					
			HSA SLM VSA		-
P2		0.000000	0.000000	500.000000	2/4

1523	**ACT_SPEED_FILTER_TIME_RLI**			D01	**CR:** DÜ1
ms	Reference value accel. sensor f. 1V			FLOAT	Immediately
Time const. speed actual value filter during rotor position identification, procedure 3 This machine data will be active with Version 6.8.5 or later.					
			SLM VSA		-
P2		0.000000	0.000000	500.000000	2/4

1550	**ACC_SENS_REF**			D01	**CR:** DÜ1
-	Reference value accel. sensor f. 1V			FLOAT	Immediately
The acceleration value delivering a 1 V differential signal of the sensor is set here. The 611 D hardware (Onyx) can evaluate a 2.5 V differential signal. A negative sign means a sign conversion during evaluation.					
			HSA SLM VSA		-
P2		1000.000000	-1000000.000000	1000000.000000	2/4

1560	**ACC_MODE**			D01	**CR:** DÜ1
-	Acceleration evaluation mode			UNS.WORD	Immediately

Bit0=1:

Acceleration sensor evaluation for speed model

(not relevant for vibration damping)

Bit1=1:

Actual speed value from integrated acceleration model

(not relevant for vibration damping)

Bit4=1: Evaluation of the direct measuring system in the drive

Bit5=1:

Activate active damping. If Bit6=0, the acceleration is generated by means of a differentiation from the position of the direct measuring system and (after filtering) switched to the speed setpoint. Bit4 and Bit 5 must be set and MD 1562 must be preassigned accordingly.

Bit6=1:

Instead of the acceleration value differentiated from the position of the direct measuring system, the value of the acceleration sensor is fed back (incl. high pass). Bit4 and Bit 5 must be set and MD 1550 must be preassinged accordingly.

Bit8=1:

The speed controller function generator is switched ot the input of the acceleration filter. The filter frequency responses are measured in this way.

Bit9=1:

The acceleration filter output is not switched to the speed setpoint. This serves for measuring the filter frequency responses.

Bit10=1:

The speed difference (actual load speed value - motor speed setpoint) - and not the acceleration - is used as an input of the acceleration filter. If sufficient phase reserve is available for settling the natural vibration excess, the excess can be eliminated by means of control with a filter which strongly increases only this frequency.

Bit11=1:

Pulse decoupling

The speed of the direct measuring system is used as an acutal value for the motor speed control. This is e.g. necessary for the

"Pulse decoupling" function. Bit4 must be set and MD 1562

must be preassigned accordingly.

Bit 12=1:

DSC with direct measuring system

If the "DSC" function is activated, the direct measuring system is evaluated for the position feedback, and not the motor measuring system. Bit4 must be set and MD 1562 must be preassigned accordingly.

			HSA SLM VSA		-
P2		0x0000	0x0000	0x7FFF	2/4

1561	**ACC_SENS_RESOL**			D01	**CR:** DÜ1
-	Accel. sensor resolution bits			UNS.WORD	Power On

Performance-2 includes an analog input for each axis (range ±2.5 V). This input is intended for evaluating the acceleration sensor. The actual acceleration value can be used to measure a speed value by means of integration. This value should provide for a favorable revolution / reduced measuring noise.

The user must first set the resolution of the acceleration sensor in MD 1550 (the acceleration which leads to a 1 V differential signal is set here).

If this value is not known, it can also be determined by means of tests.

In this case, the desired resolution gain must be set in bits in MD 1561. As this value changes the speed normalization, this datum is effective during Power On.

			HSA SLM VSA		-
P2		0	0	12	2/4

1562	**FACTOR_MM_DM**	D01	**CR:** DÜ1
-	Ratio motor : DM	FLOAT	Immediately

The vibration damping can base on a direct measuring system or on an acceleration sensor read in by means of an analog input. If the direct measuring system is used as a basis, MD 1562 must be set accordingly. Furthermore, the evaluation of the direct measuring system must be activated with MD 1560, Bit 4.

The ratio is indicated as a factor with which the pulse frequency of the direct measuring system must be multiplied in case of stationary motion, to maintain the pulse frequency of the motor measuring system. Both the resolution differences of the measuring systems and perhaps existing gears or measuring gears are considered in this context. A different direction of rotation is expressed by means of a negative sign.

Example 1:

Rotating motor 2048 pulses/rev., with ball screw spindle pitch 10

mm/rev., direct measuring system 20 µm.

Conversion on the motor side: (10 mm/U)/(20 µm)= 500 pulses per motor revolution on the load side; factor: 2048/500 = 4.096

Example 2:

Rotating motor 2048 pulses/rev., gear on the load side with 25:1 ratio,

load rotating with load measuring system 8192 pulses/rev.

Conversion on the motor side: 8192 / 25 pulses per motor revolution on the

load side; factor: 2048/ 8192*25= 6.25

Example 3:

Rotating motor 2048 pulses/rev., load directly coupled to direct measuring system 1024 pulses/rev.

Conversion on the motor side: 1024 pulses per motor revolution on the load side;

Factor: 2048/1024 = 2.0

Also refer to MD 1560.

			HSA SLM VSA		-
P2		1.000000	-1000000.000000	1000000.000000	2/4

1563	**ACC_HIGH_PASS_TIME**	D01	**CR:** DÜ1
ms	Time const. accel. high pass	FLOAT	Immediately

The high pass filter has the transmission function:

$$\frac{s\,T[gl]}{1 + s\,T[gl]}$$

The smoothing time should be selected at least 4 times higher than the vibration period. In case of multi-mass oscillators, it can be useful to set another value for the smoothing time.

Attention:

If the smoothing time is set to 0, the derived signal is always output, which corresponds to the differentiated acceleration signal in case of the acceleration sensor.

			HSA SLM VSA		-
P2		1000.0	0.000000	5000.000000	2/4

1564	**LOAD_SPEEDCTL_DIFF_TIME**			D01	**CR:** DÜ1
ms	Lead time for load speed controller			FLOAT	Immediately

Calculation:

2 * (Dw - Dstr)
Tv = -- 1000 ms
2 pi fres root_of(1 + vp)

, if Bit7=0
with
pi: circular constant,
TV: MD 1564,
vp=MD 1565,
Dw: desired attenuation
Dstr: path attenuation,
fres: resonant frequency
The formula only applies if the smoothing/filtering can be neglected.

			HSA SLM VSA		-
P2		0.000000	-1000.000000	1000.000000	2/4

1565	**LOAD_SPEEDCTL_GAIN**			D01	**CR:** DÜ1
-	P gain of load speed controller			FLOAT	Immediately
P gain load speed controller.					
			HSA SLM VSA		-
P2		0.000000	-256.000000	256.000000	2/4

1566	**LOAD_SPEEDCTL_LIMIT**			D01	**CR:** DÜ1
1/min	Limitation of load speed controller			FLOAT	Immediately
Limitation of the load speed controller					
			HSA SLM VSA		-
P2		500.000000	0.000000	100000.000000	2/4

1567	**LOAD_SPEEDCTL_DIFF_TIME2**			D01	**CR:** DÜ1
ms	Differentiation time of load speed controller 2			FLOAT	Immediately
Derivative-action time load speed controller 2					
			HSA SLM VSA		-
P2		0.000000	-1000.000000	1000.000000	2/4

1569	**ACC_FIL_DOWNSCAN**			D01	**CR:** DÜ1
-	Sub-sampling accel. filter			UNS.WORD	Immediately
The factor of the sub-sampling for the first two acceleration filters is set here. 1 means no sub-sampling (default).					
			HSA SLM VSA		-
P2		1	1	64	2/4

1570	**ACC_FILTER_TYPE**			D01	**CR:** DÜ1
-	Type of acceleration filter			UNS.WORD	Immediately
Bit0= 0/1: low pass (PT1/PT2) / general bandstop filter 1st filter Bit1= 0/1: low pass (PT1/PT2) / general bandstop filter 2nd filter Bit8= 0/1: PT2 low pass/ PT1 low pass if low pass is selected, 1st filter Bit9= 0/1: PT2 low pass / PT1 low pass if low pass is selected, 2nd filter					
			HSA SLM VSA		-
P2		0x0000	0x0000	0x1B1F	2/4

1571	**ACC_FILTER_TIME1**			D01	**CR:** DÜ1
ms	Time constant acceleration f.1			FLOAT	Immediately
If PT1 is selected, the time constant is set here. Also refer to MD 1570.					
			HSA SLM VSA		-
P2		1.000000	0.000000	500.000000	2/4

1572	**ACC_DENOM_FILTER_FREQU1**			D01, EXP	**CR:** DÜ1
Hz	Natural denominator freq. accel. filter 1			FLOAT	Immediately
If PT2 or a general bandstop filter is seleted, the natural denominator frequency is set here.					
			HSA SLM VSA		-
P2		2000.000000	2.000000	8000.000000	2/4

1573	**ACC_DENOM_FILTER_DAMP1**			D01, EXP	**CR:** DÜ1
-	Denominator attenuation, accel. filter 1"			FLOAT	Immediately
If PT2 or a general bandstop filter is selected, the denominator attenuation is set here.					
			HSA SLM VSA		-
P2		0.500000	0.000000	10.000000	2/4

1574	**ACC_NOM_FILTER_FREQU1**			D01, EXP	**CR:** DÜ1
Hz	Natural numerator frequ. accel. filter 1			FLOAT	Immediately
If a general bandstop filter is selected, the natural numerator frequency is set here.					
			HSA SLM VSA		-
P2		2000.000000	2.000000	8000.000000	2/4

1575	**ACC_NOM_FILTER_DAMP1**			D01, EXP	**CR:** DÜ1
-	Numerator attenuation accel. filter 1			FLOAT	Immediately
If a general bandstop filter is selected, the numerator attenuation is set here.					
			HSA SLM VSA		-
P2		0.500000	0.000000	10.000000	2/4

1576	**ACC_FILTER_TIME2**			D01	**CR:** DÜ1
ms	Time constant accel. f.2			FLOAT	Immediately
If PT1 is selected, the time constant is set here.					
			HSA SLM VSA		-

P2		1.000000	0.000000	500.000000	2/4

1577	**ACC_DENOM_FILTER_FREQU2**			D01, EXP	**CR:** DÜ1
Hz	Natural denominator freq., accel. filter 2			FLOAT	Immediately
If PT2 or a general bandstop filter is selected, the natural denominator frequency is set here.					
			HSA SLM VSA		-
P2		2000.000000	2.000000	8000.000000	2/4

1578	**ACC_DENOM_FILTER_DAMP2**			D01, EXP	**CR:** DÜ1
-	Denominator attenuation, accel. filter 2			FLOAT	Immediately
If PT2 or a general bandstop filter is selected, the denominator attenuation is set here.					
			HSA SLM VSA		-
P2		0.500000	0.000000	10.000000	2/4

1579	**ACC_NOM_FILTER_FREQU2**			D01, EXP	**CR:** DÜ1
Hz	Natural numerator frequ., accel. filter 2			FLOAT	Immediately
If a general bandstop filter is selected, the natural numerator frequency is set here.					
			HSA SLM VSA		-
P2		2000.000000	2.000000	8000.000000	2/4

1580	**ACC_NOM_FILTER_DAMP2**			D01, EXP	**CR:** DÜ1
-	Numerator attenuation, accel. filter 2			FLOAT	Immediately
If a general bandstop filter is selected, the numerator attenuation is set here.					
			HSA SLM VSA		-
P2		0.500000	0.000000	10.000000	2/4

1581	**ACC_DENOM_FILTER_FREQU3**			D01, EXP	**CR:** DÜ1
Hz	Natural denominator frequ., accel. filter 3			FLOAT	Immediately
If PT2 or a general bandstop filter is selected, the natural denominator frequency is set here.					
			HSA SLM VSA		-
P2		2000.000000	2.000000	8000.000000	2/4

1582	**ACC_DENOM_FILTER_DAMP3**			D01, EXP	**CR:** DÜ1
-	Denominator attenuation, accel. filter 3			FLOAT	Immediately
If PT2 or a general bandstop filter is selected, the denominator attenuation is set here.					
			HSA SLM VSA		-
P2		0.500000	0.000000	10.000000	2/4

1583	**ACC_NOM_FILTER_FREQU3**			D01, EXP	**CR:** DÜ1
Hz	Natural numerator frequ., accel. filter 3			FLOAT	Immediately
If a general bandstop filter is selected, the natural numerator frequency is set here.					
			HSA SLM VSA		-
P2		2000.000000	2.000000	8000.000000	2/4

1584	**ACC_NOM_FILTER_DAMP3**			D01, EXP	**CR:** DÜ1
-	Numerator attenuation, accel. filter 3			FLOAT	Immediately
If a general bandstop filter is selected, the numerator attenuation is set here. Note The input as frequency and attenuation values complies with the setting instructions. For this reason, the former bandwidth and overshoot concept is no longer used. The maximum increase (in combination with the gain of the acceleration feedforward) can be up to 217 in the internal format. Numerical problems may occur if low frequency values are set (below 20 Hz). This may cause that the filters do not work anly longer with low signals or that major resolution losses occur. The speed controller sampling time must be increased if such problems occur.					
			HSA SLM VSA		-
P2		0.500000	0.000000	10.000000	2/4

1585	**ACC_FILTER_TIME4**			D01	**CR:** DS1
ms	Time constant of acc. filter 4			FLOAT	Immediately
If PT1 is selected, the time constant is set here.					
			HSA SLM VSA		-
P2		1.000000	0.000000	500.000000	2/4

1586	**ACC_DENOM_FILTER_FREQU4**			D01, EXP	**CR:** DS1
Hz	Denominator natural frequency acc. filter 4			FLOAT	Immediately
If PT2 or general bandstop filter is selected, the natural frequency of the denominator is set here.					
			HSA SLM VSA		-
P2		2000.000000	2.000000	8000.000000	2/4

1587	**ACC_DENOM_FILTER_DAMP4**			D01, EXP	**CR:** DS1
-	Denominator damping acc. filter 4			FLOAT	Immediately
If PT2 or general bandstop filter is selected, the denominator attenuation is set here.					
			HSA SLM VSA		-
P2		0.500000	0.000000	10.000000	2/4

1588	**ACC_NOM_FILTER_FREQU4**			D01, EXP	**CR:** DS1
Hz	Numerator natural frequency acc. filter 4			FLOAT	Immediately
If general bandstop filter is selected, the natural frequency of the numerator is set here.					
			HSA SLM VSA		-
P2		2000.000000	2.000000	8000.000000	2/4

1589	**ACC_NOM_FILTER_DAMP4**			D01, EXP	**CR:** DS1
-	Numerator damping acc. filter 4			FLOAT	Immediately
If general bandstop filter is selected, the numerator attenuation is set here.					
			HSA SLM VSA		-
P2		0.500000	0.000000	10.000000	2/4

1590	**ACC_FILTER_TIME5**			D01	**CR:** DS1
ms	Time constant of acc. filter 5			FLOAT	Immediately
If PT1 is selected, the time constant is set here.					
			HSA SLM VSA		-
P2		1.000000	0.000000	500.000000	2/4

1591	**ACC_DENOM_FILTER_FREQU5**			D01, EXP	**CR:** DS1
Hz	Denominator natural frequency acc. filter 5			FLOAT	Immediately
If PT2 or general bandstop filter is selected, the natural frequency of the denominator is set here.					
			HSA SLM VSA		-
P2		2000.000000	2.000000	8000.000000	2/4

1592	**ACC_DENOM_FILTER_DAMP5**			D01, EXP	**CR:** DS1
-	Denominator damping acc. filter 5			FLOAT	Immediately
If PT2 or general bandstop filter is selected, the denominator attenuation is set here					
			HSA SLM VSA		-
P2		0.500000	0.000000	10.000000	2/4

1593	**ACC_NOM_FILTER_FREQU5**			D01, EXP	**CR:** DS1
Hz	Numerator natural frequency acc. filter 5			FLOAT	Immediately
If general bandstop filter is selected, the natural frequency of the numerator is set here.					
			HSA SLM VSA		-
P2		2000.000000	2.000000	8000.000000	2/4

1594	**ACC_NOM_FILTER_DAMP5**			D01, EXP	**CR:** DS1
-	Numerator damping acc. filter 5			FLOAT	Immediately
If general bandstop filter is selected, the numerator attenuation is set here.					
			HSA SLM VSA		-
P2		0.500000	0.000000	10.000000	2/4

1600	ALARM_MASK_POWER_ON			**CR:** DB1
HEX	Suppressible alarms (Power-On)		UNS. WORD	sofort

Power-on alarms can be suppressed using this machine data. If the appropriate bit = 0, then the corresponding monitoring function is active. All the monitoring functions are active as standard.

Bit No.	Significance	Alarm No.
0	Internal error - cannot be suppressed	
1	Measuring circuit error, absolute current value	300501
2 (840D)	Measuring circuit error, phase current R	300502
3 (840D)	Measuring circuit error, phase current S	300503
4	Measuring circuit error, measuring system	300504
5	Measuring circuit error, measuring system,	
	optical encoder	300505
6	-	
7	Synchronizing error, rotor position	300507
8	Zero mark monitoring, motor measuring system	300508
9	Drive converter limiting frequency exceeded	300509
10	Error in the centre frequency measurement	
	cannot be suppressed	300510
11	Measured value memory active	
	cannot be suppressed	300511
12-14		
15	Heatsink temperature exceeded	300515

Important
Suppressing power-on alarms can lead to destruction of the power module or the machine mechanics.

			VSA/HSA		-
810D		0	0	ffff	2/4

1600	**ALARM_MASK_POWER_ON**			D02, EXP	**CR:** DB1
HEX	Suppressible alarms (Power-On)			UNS. WORD	sofort

Power-on alarms can be suppressed using this machine data. If the appropriate bit = 0, then the corresponding monitoring function is active. All the monitoring functions are active as standard.

Bit No.	Significance	Alarm No.
0	Internal error - cannot be suppressed	
1	Measuring circuit error, absolute current value	300501
2 (840D)	Measuring circuit error, phase current R	300502
3 (840D)	Measuring circuit error, phase current S	300503
4	Measuring circuit error, measuring system	300504
5	Measuring circuit error, measuring system,	
	optical encoder	300505
6	-	
7	Synchronizing error, rotor position	300507
8	Zero mark monitoring, motor measuring system	300508
9	Drive converter limiting frequency exceeded	300509
10	Error in the centre frequency measurement	
	cannot be suppressed	300510
11	Measured value memory active	
	cannot be suppressed	300511
12-14		
15	Heatsink temperature exceeded	300515

Important

Suppressing power-on alarms can lead to destruction of the power module or the machine mechanics.

			VSA/HSA		ROT/LIN
840D		0	0	83be	2/4

1600	**ALARM_MASK_POWER_ON**			D02, EXP	**CR:** DB1
-	Suppressible alarms (Power-On)			UNS.WORD	Immediately

Power-on alarms can be suppressed using this machine data. If the appropriate bit = 0, then the corresponding monitoring function is active. All the monitoring functions are active as standard.

```
Bit No.   |  Significance                                        |  Alarm No.
-------------------------------------------------------------------------------------------------------------------
 0        |  Internal error - cannot be suppressed               |
 1        |  Measuring circuit error, absolute current value     |  300501
 2 (840D) |  Measuring circuit error, phase current R            |  300502
 3 (840D) |  Measuring circuit error, phase current S            |  300503
 4        |  Measuring circuit error, measuring system           |  300504
 5        |  Measuring circuit error, measuring system,          |
          |  optical encoder                                     |  300505
 6        |   -                                                  |
 7        |  Synchronizing error, rotor position                 |  300507
 8        |  Zero mark monitoring, motor measuring system        |  300508
 9        |  Drive converter limiting frequency exceeded         |  300509
10        |  Error in the centre frequency measurement           |
          |  cannot be suppressed                                |  300510
11        |  Measured value memory active                        |
          |  cannot be suppressed                                |  300511
12        I -                                                    I
13        I Ground fault detected                                I  300513
14        I -                                                    I
15        | Heatsink temperature exceeded                        |  300515
-------------------------------------------------------------------------------------------------------------------
```

Important
Suppressing power-on alarms can lead to destruction of the power module or the machine mechanics.

			HSA SLM VSA		-
P2		0x0000	0x0000	0x83be	2/4

1601	**ALARM_MASK_RESET**	D02, EXP	**CR:** DB1
HEX	Suppressible alarms (reset)	UNS. WORD	sofort

Reset alarms can be suppressed or disabled using this machine data. The alarm is active if the corresponding bit = 0.

All the alarms are active as standard.

Bit No.	Significance	Alarm No.
0	Cannot be suppressed, SW interlock	
1 - 5	-	
6 (840D)	Flux controller output limited	300606
7 (840D)	Current controller output limited	300607
8	Speed controller output limited	300608
9	Encoder limiting frequency exceeded	300609
10 -12	-	
13	Max. permissible motor temperature exceeded	300613
14	Motor temperature exceeded	300614
15	-	

Important

The power module could be destroyed if the reset alarms are suppressed.

Note

Reset alarms can be acknowledged via the reset button.

			VSA/HSA		ROT/LIN
840D		0	0	ffff	2/4

1601	**ALARM_MASK_RESET**	D02, EXP	**CR:** DB1
-	Suppressible alarms (reset)	UNS.WORD	Immediately

Reset alarms can be suppressed or disabled using this machine data. The alarm is active if the corresponding bit = 0.

All the alarms are active as standard.

Bit No.	Significance	Alarm No.
0	Cannot be suppressed, SW interlock	
1 - 5	-	
6 (840D)	Flux controller output limited	300606
7 (840D)	Current controller output limited	300607
8	Speed controller at stop	300608
9	Encoder limiting frequency exceeded	300609
10 -12	-	
13	Max. permissible motor temperature exceeded	300613
14	Motor temperature exceeded	300614
15	-	

Important

The power module could be destroyed if the reset alarms are suppressed.

Note

			HSA SLM VSA		-
P2		0x0000	0x0000	0xFFFF	2/4

1602	**MOTOR_TEMP_WARN_LIMIT**			D02, D05	**CR:** DÜ1
ŸC	Motor temperature alarm threshold			UNS. WORD	sofort
Enter the thermal steady-state permissible motor temperature or automatic parameterization with the input and transfer of the motor code no. in MD 1102: MOTOR_CODE. The motor temperature is sensed using a temperature sensor (KTY84) and is evaluated on the drive side. When the alarm limit is reached, a signal is issued to the PLC (IS "temperature pre-alarm, motor", DB31, ... DBX94.0) (also refer to MD 1603 and MD 1607). Terminal 5.x on the I/R module is energized, independent of MD 1601, bit 14: ALARM_MASK_RESET and signals the motor overtemperature condition.					
			VSA/HSA		ROT/LIN
840D		120	0	200	2/4

1602	**MOTOR_TEMP_WARN_LIMIT**			D02, D05	**CR:** DÜ1
degrees C	Motor temperature alarm threshold			UNS.WORD	Immediately
Enter the thermal steady-state permissible motor temperature or automatic parameterization with the input and transfer of the motor code no. in MD 1102: MOTOR_CODE. The motor temperature is sensed using a temperature sensor (KTY84) and is evaluated on the drive side. When the alarm limit is reached, a signal is issued to the PLC (IS "temperature pre-alarm, motor", DB31, ... DBX94.0) (also refer to MD 1603 and MD 1607). Terminal 5.x on the I/R module is energized, independent of MD 1601, bit 14: ALARM_MASK_RESET and signals the motor overtemperature condition.					
			HSA SLM VSA		-
P2		120	0	200	2/4

1603	**MOTOR_TEMP_ALARM_TIME**			D02, D05	**CR:** DÜ1
s	Time for motor temperature alarm			UNS. WORD	sofort
Enter the time for the motor temperature alarm. When MD 1602: MOTOR_TEMP_WARN_LIMIT is exceeded, a signal is issued to the PLC, and the time monitoring function is started. If the time expires but the motor temperature still hasn't fallen below the temperature alarm threshold, the drive generates a configurable reset alarm (refer to MD 1601, bit 14). If the fault is not suppressed, the "300614 axis %1, drive %2 motor temperature exceeded" alarm is output. Depending upon the configured response (MD 1613, bit 14) to the alarm, the unit is shut down: - The pulse enable is immediately suppressed and the drive coasts down. or - The controller enable is cancelled. In this case, the drive brakes along the torque limit until MD 1404: PULSE_SUPPRESSION_DELAY or MD 1403: PULSE_SUPPRESSION_SPEED becomes active and the pulse enable is cancelled. Note Changing the time has no influence on an already running time monitoring. It becomes valid if the motor temperature lies below the temperature alarm threshold.					
			VSA/HSA		ROT/LIN
840D		240	0	600	2/4

1603	**MOTOR_TEMP_ALARM_TIME**			D02, D05	**CR:** DÜ1
s	Time for motor temperature alarm			UNS.WORD	Immediately

Enter the time for the motor temperature alarm.

When MD 1602: MOTOR_TEMP_WARN_LIMIT is exceeded, a signal is issued to the PLC, and the time monitoring function is started.

If the time expires but the motor temperature still hasn’t fallen below the temperature alarm threshold, the drive generates a configurable reset alarm (refer to MD 1601, bit 14). If the fault is not suppressed, the "300614 axis %1, drive %2 motor temperature exceeded" alarm is output. Depending upon the configured response (MD 1613, bit 14) to the alarm, the unit is shut down:

- The pulse enable is immediately suppressed and the drive coasts down.

or

- The controller enable is cancelled. In this case, the drive brakes along the torque limit until MD 1404: PULSE_SUPPRESSION_DELAY or MD 1403: PULSE_SUPPRESSION_SPEED becomes active and the pulse enable is cancelled.

Note

Changing the time has no influence on an already running time monitoring. It becomes valid if the motor temperature lies below the temperature alarm threshold.

			HSA SLM VSA		-
P2		240	0	600	2/4

1604	**LINK_VOLTAGE_WARN_LIMIT**			D02, EXP	**CR:** DÜ1
V	DC-link undervoltage alarm threshold			UNS. WORD	sofort

If the voltage falls below the limit, a signal is issued to the PLC

(IS "V dc link < alarm threshold" DB31,... DBX95.0).

Note

The DC link voltage is only detected by the power supply module or a monitoring module. It is made available to the drive modules via the drive bus as an analog signal (0- 10 V).

			VSA/HSA		ROT/LIN
840D		200	0	680	2/4

1604	**LINK_VOLTAGE_WARN_LIMIT**				**CR:** DÜ1
V	DC-link undervoltage alarm threshold			UNS. WORD	sofort

If the voltage falls below the limit, a signal is issued to the PLC

(IS "V dc link < alarm threshold" DB31,... DBX95.0).

Note

The DC link voltage is only detected by the power supply module or a monitoring module. It is made available to the drive modules via the drive bus as an analog signal (0- 10 V).

			VSA/HSA		-
810D		200	0	600	2/4

1604	**LINK_VOLTAGE_WARN_LIMIT**	D02, EXP	**CR:** DÜ1
V	DC-link undervoltage alarm threshold	UNS.WORD	Immediately

If the voltage falls below the limit, a signal is issued to the PLC
(IS "V dc link < alarm threshold" DB31,... DBX95.0).

Note
The DC link voltage is only detected by the power supply module or a monitoring module. It is made available to the drive modules via the drive bus as an analog signal (0- 10 V).

			HSA SLM VSA		-
P2		200	0	680	2/4

1605	**SPEEDCTRL_LIMIT_TIME**	D02	**CR:** DÜ1
ms	Time n-controller at limit stop	FLOAT	sofort

The speed controller output (torque setpoint) is monitored.

If the output is longer than the time for the torque, power, stall or current limits

and

if the absolute actual speed is less than the value set in MD 1606,

then alarm "300608 axis %1, drive %2 speed controller output limited" is initiated and the motor pulses are suppressed.

Important
When MD 1605 < MD 1404: PULSE_SUPPRESSION_DELAY then regenerative braking can be aborted with the fault message "300608 axis %1, drive %2 speed controller output limited", whereby the drive then coasts down.

			VSA/HSA		ROT/LIN
840D		200.0000	20.0000	10000.0000	2/4

1605	**SPEEDCTRL_LIMIT_TIME**	D02	**CR:** DÜ1
ms	Time n-controller at limit stop	FLOAT	Immediately

The speed controller output (torque setpoint) is monitored.

If the output is longer than the time for the torque, power, stall or current limits

and

if the absolute actual speed is less than the value set in MD 1606,

then alarm "300608 Axis %1 drive %2 speed controller at limit" is initiated and the motor pulses are suppressed.

Important
When MD 1605 < MD 1404: PULSE_SUPPRESSION_DELAY then regenerative braking can be aborted with the fault message "300608 Axis %1 drive %2 speed controller at limit", whereby the drive then coasts down.

			HSA SLM VSA		-
P2		200.000000	20.000000	10000.000000	2/4

1606	**SPEEDCTRL_LIMIT_THRESHOLD**			D02	**CR:** DÜ1
1/min	Threshold n-controller at limit stop			FLOAT	sofort
Enter the speed threshold for alarm 300608 "speed controller output limited" (also refer to MD 1605). The standard preassignment is dependent on the motor type (FDD corresponds to 8000, MSD corresponds to 30) and is parameterized at start-up by the drive configuration. This means that the monitoring function is active over the complete speed range for FDD.					
			VSA/HSA		ROT
840D		90000.0000	0.0000	100000.0000	2/4

1606	**SPEEDCTRL_LIMIT_THRESHOLD**				**CR:** DÜ1
1/min	Threshold n-controller at limit stop			FLOAT	sofort
Enter the speed threshold for alarm 300608 "speed controller output limited" (also refer to MD 1605). The standard preassignment is dependent on the motor type (FDD corresponds to 8000, MSD corresponds to 30) and is parameterized at start-up by the drive configuration. This means that the monitoring function is active over the complete speed range for FDD.					
			VSA/HSA		-
810D		8000.0000	0.0000	50000.0000	2/4

1606	**SPEEDCTRL_LIMIT_THRESHOLD**			D02	**CR:**
m/min	Threshold speed controller limit			FLOAT	sofort
Enter the speed threshold for alarm 300608 "speed controller output limited" (also refer to MD 1605). The monitoring function is active over the complete speed range.					
			VSA		LIN
840D		500.0000	0.0000	100000.0000	2/4

1606	**SPEEDCTRL_LIMIT_THRESHOLD**			D02	**CR:** DÜ1
1/min	Threshold n-controller at limit stop			FLOAT	Immediately
Enter the speed threshold for alarm 300608 "speed controller at limit" (also refer to MD 1605). The standard preassignment is dependent on the motor type (FDD corresponds to 8000, MSD corresponds to 30) and is parameterized at start-up by the drive configuration. This means that the monitoring function is active over the complete speed range for FDD.					
			HSA SLM VSA		-
P2		8000.000000	0.000000	100000.000000	2/4

1607	**MOTOR_TEMP_SHUTDOWN_LIMIT**			D02, D05	**CR:** DÜ1
ŸC	Motor temperature shutdown limit			UNS. WORD	sofort

The motor temperature is sensed by the temperature sensor and evaluated on the drive side. When the shutdown limit is reached, the drive generates a configurable reset alarm (refer to MD 1601, bit 13). If the fault is not suppressed, the "300613 axis %1, drive %2 max. permissible motor temperature exceeded" alarm is output. Depending upon the configured response (MD 1613, bit 13) to the alarm, the unit is shut down

- The pulse enable is immediately suppressed and the drive coasts down.

or

- The controller enable is cancelled. In this case, the drive brakes along the torque limit until MD 1404: PULSE_SUPPRESSION_DELAY or MD 1403: PULSE_SUPPRESSION_SPEED becomes active and the pulse enable is cancelled.

Note

The temperature monitoring function (alarm MD 1602 + time MD 1603 or MD 1607) are not subject to any mutual restrictions. This means that MD 1607 can be < MD 1602. In this case, there is no alarm before shutdown.

The motor temperature sensing accuracy lies in the range 3-5 %.

Terminal 5.x at the power supply module is only influenced by MD 1602.

			VSA/HSA		ROT/LIN
840D		155	0	200	2/4

1607	**MOTOR_TEMP_SHUTDOWN_LIMIT**			D02, D05	**CR:** DÜ1
degrees C	Motor temperature shutdown limit			UNS.WORD	Immediately

The motor temperature is sensed by the temperature sensor and evaluated on the drive side. When the shutdown limit is reached, the drive generates a configurable reset alarm (refer to MD 1601, bit 13). If the fault is not suppressed, the "300613 axis %1, drive %2 max. permissible motor temperature exceeded" alarm is output. Depending upon the configured response (MD 1613, bit 13) to the alarm, the unit is shut down

- The pulse enable is immediately suppressed and the drive coasts down.

or

- The controller enable is cancelled. In this case, the drive brakes along the torque limit until MD 1404: PULSE_SUPPRESSION_DELAY or MD 1403: PULSE_SUPPRESSION_SPEED becomes active and the pulse enable is cancelled.

Note

The temperature monitoring function (alarm MD 1602 + time MD 1603 or MD 1607) are not subject to any mutual restrictions. This means that MD 1607 can be < MD 1602. In this case, there is no alarm before shutdown.

The motor temperature sensing accuracy lies in the range 3-5 %.

Terminal 5.x at the power supply module is only influenced by MD 1602.

			HSA SLM VSA		-
P2		155	0	200	2/4

1608	**MOTOR_FIXED_TEMPERATURE**			D02, D05	**CR:** DÜ1
ŸC	Fixed temperature			UNS. WORD	sofort

If a value > 0 is entered, the temperature-dependent adaptation of the rotor resistor is executed with this fixed temperature.

Note

The motor temperature monitoring set using MD 1602: MOTOR_TEMP_WARN_LIMIT and MD 1607: MOTOR_TEMP_SHUTDOWN_LIMIT are then no longer effective.

			VSA/HSA		ROT/LIN
840D		0	0	200	2/4

1608	**MOTOR_FIXED_TEMPERATURE**			D02, D05	**CR:** DÜ1
degrees C	Fixed temperature			UNS.WORD	Immediately
If a value > 0 is entered, the temperature-dependent adaptation of the rotor resistor is executed with this fixed temperature. Note The motor temperature monitoring set using MD 1602: MOTOR_TEMP_WARN_LIMIT and MD 1607: MOTOR_TEMP_SHUTDOWN_LIMIT are then no longer effective.					
			HSA SLM VSA		-
P2		0	0	200	2/4

1610	**DIAGNOSIS_ACTIVATION_FLAGS**			D04, EXP	**CR:** DD1
-	Diagnostic functions			UNS. WORD	PowerOn
Diagnostic functions can be activated using this machine data. If the appropriate bit = 1, then the function is active. If the function is active, then when required, it can be suppressed using MD 1601, bit 8 = 1. Diagnostic functions Bit | Significance -- 0 | Load test monitoring = dn/dt monitoring (setting in MD 1611) 1 | Monitor smooth running operation 2-15 | Not assigned --					
			VSA/HSA		ROT/LIN
840D		0	0	3	2/4

1610	**DIAGNOSIS_ACTIVATION_FLAGS**			D04	**CR:** DD1
-	Diagnostic functions			UNS.WORD	Power On
Diagnostic functions can be activated using this machine data. If the appropriate bit = 1, then the function is active. If the function is active, then when required, it can be suppressed using MD 1601, bit 8 = 1. Diagnostic functions Bit | Significance -- 0 | Load test monitoring = dn/dt monitoring (setting in MD 1611) 1 | Monitor smooth running operation 2-15 | Not assigned --					
			HSA SLM VSA		-
P2		0x0000	0x0000	0x0003	2/4

1611	**DNDT_THRESHOLD**			D04, EXP	**CR:** DD1
%	Response threshold dn/dt			UNS. WORD	sofort
Entry of the response threshold of the dn/dt monitoring, which can be activated using MD 1610: DIAGNOSIS_ACTVATION_FLAGS, bit 0 = 1.					
			VSA/HSA		ROT/LIN

840D		800	0	1600	2/4

1611	**DNDT_THRESHOLD**	D04	**CR:** DD1
%	Response threshold dn/dt	UNS.WORD	Immediately

Entry of the response threshold of the dn/dt monitoring, which can be activated using MD 1610: DIAGNOSIS_ACTVATION_FLAGS, bit 0 = 1.

			HSA SLM VSA		-
P2		800	0	1600	2/4

1612	**ALARM_REACTION_POWER_ON**		**CR:** DB1
HEX	Configuring shutdown response to PO alarms	UNS. WORD	sofort

Input bit field to changeover the actual power-on alarm. The following can be selected: shutdown response "pulse inhibit", bit = 1 or "controller inhibit" bit = 0 (shut down via MD 1403/MD 1404). The standard preassignment is dependent upon the motor type (feed drive (FDD to DB2, MSD corresponds to FFFF) and is parameterized during start-up by the drive configuration.

Important

It is possible to disable or suppress the alarms via the machine data MD 1600 ALARM_MASK_POWER_ON; which means that they are then no longer active.

Bit No	Significance	Alarm No.
0	Pulse inhibit for system error	
1	Not configurable (measuring circuit error,	300501
	absolute current)	
2-3	-	
4	Not configurable (measuring circuit error, motor	300504
	measuring system)	
5	Not configurable (measuring circuit error, motor	
	measuring system)	300505
6	Pulse inhibit NC sign of life	300500
		(from SW 4.2
		300506)
7	Synchronizing error, rotor position:	
	For 810D: not configurable	300507
	For 840D: pulse inhibit up to SW2)	
8	Pulse inhibit for zero mark monitoring,	300508
	motor measuring system	
9	Pulse inhibit for converter limiting frequency	
	exceeded	300509
10	Not configurable (speed too high when accelerating)	
11	Not configurable (trace ran during acceleration)	
12-14	-	
15	Pulse inhibit for heatsink temperature exceeded	300515

			VSA/HSA		-
810D		db2	0	ffff	2/4

1612	**ALARM_REACTION_POWER_ON**	D02	**CR:** DB1
HEX	Configuring shutdown response to PO alarms	UNS. WORD	sofort

Input bit field to changeover the actual power-on alarm. The following can be selected: shutdown response "pulse inhibit", bit = 1 or "controller inhibit" bit = 0 (shut down via MD 1403/MD 1404). The standard preassignment is dependent upon the motor type (feed drive (FDD to DB2, MSD corresponds to FFFF) and is parameterized during start-up by the drive configuration.

Important

It is possible to disable or suppress the alarms via the machine data MD 1600 ALARM_MASK_POWER_ON; which means that they are then no longer active.

Bit No	Significance	Alarm No.
0	Pulse inhibit for system error	
1	Not configurable (measuring circuit error,	300501
	absolute current)	
2-3	-	
4	Not configurable (measuring circuit error, motor	300504
	measuring system)	
5	Not configurable (measuring circuit error, motor	
	measuring system)	300505
6	Pulse inhibit NC sign of life	300500
		(from SW 4.2
		300506)
7	Synchronizing error, rotor position:	
	For 810D: not configurable	300507
	For 840D: pulse inhibit up to SW2)	
8	Pulse inhibit for zero mark monitoring,	300508
	motor measuring system	
9	Pulse inhibit for converter limiting frequency	
	exceeded	300509
10	Not configurable (speed too high when accelerating)	
11	Not configurable (trace ran during acceleration)	
12-14	-	
15	Pulse inhibit for heatsink temperature exceeded	300515

			VSA/HSA		ROT/LIN
840D		fbc	0	ffff	2/4

1612	**ALARM_REACTION_POWER_ON**			D02	**CR:** DB1
-	Configuring shutdown response to PO alarms			UNS.WORD	Immediately

Input bit field to changeover the actual power-on alarm. The following can be selected: shutdown response "pulse inhibit", bit = 1 or "controller inhibit" bit = 0 (shut down via MD 1403/MD 1404). The standard preassignment is dependent upon the motor type (feed drive (FDD to DB2, MSD corresponds to FFFF) and is parameterized during start-up by the drive configuration.

Important

It is possible to disable or suppress the alarms via the machine data MD 1600 ALARM_MASK_POWER_ON; which means that they are then no longer active.

```
Bit No |   Significance                                        |  Alarm No.
-----------------------------------------------------------------------------------------------
0      |  Pulse inhibit for system error                       |
1      |  Not configurable (measuring circuit error,           |  300501
       |  absolute current)                                    |
2-3    |  -                                                    |
4      |  Not configurable (measuring circuit error, motor     |  300504
       |  measuring system)                                    |
5      |  Not configurable (measuring circuit error, motor     |
       |  measuring system)                                    |  300505
6      |  Pulse inhibit NC sign of life                        |  300500
       |                                                       |  (from SW 4.2
       |                                                       |  300506)
7      |  Synchronizing error, rotor position:                 |
       |  For 810D: not configurable                           |  300507
       |  For 840D: pulse inhibit up to SW2)                   |
8      |  Pulse inhibit for zero mark monitoring,              |  300508
       |  motor measuring  system                              |
9      |  Pulse inhibit for converter limiting frequency       |
       |  exceeded                                             |  300509
10     |  Not configurable (speed too high when accelerating)  |
11     |  Not configurable (trace ran during acceleration)     |
12-14  |  -                                                    |
15     |  Pulse inhibit for heatsink temperature exceeded      |  300515
-----------------------------------------------------------------------------------------------
```

			HSA SLM VSA		-
P2		0x0fbc	0x0000	0xffff	2/4

1613	**ALARM_REACTION_RESET**			D02	**CR:** DB1
HEX	Configuring shutdown response to RESET alarms			UNS. WORD	sofort

Input bit field for changeover of the 611D reset alarm. The following shut down responses can be selected: Pulse inhibit (bit = 1) or controller inhibit (bit = 0) (shut down via MD 1403/MD 1404). The default assignment is dependent on the motor type (FDD corresponds to 8 0100, MSD corresponds to 8 FFFF) and is parameterized during start-up by the drive configuration.

Important

It is possible to disable or suppress the alarms via the machine data MD 1601: ALARM_MASK_RESET; which means that they are then no longer active.

```
Bit No.     | Significance                                       | Alarm No.
-------------------------------------------------------------------------------------
 0          | Pulse inhibit for configuring error                | 3007xx
 1-5        |    -                                               |
 6  (840D)  | Not configurable (flux controller output limited)  | 300606
 7  (840D)  | Not configurable (current controller output limited) | 300607
 8          | speed controller output limited                    | 300608
 9          | Not configurable (speed controller output)         | 300609
10-12       |   -                                                |
13          | Pulse inhibit when an alarm occurs: maximum        |
            | permissible motor temperature exceeded             | 300613
14          | Pulse inhibit when an alarm occurs: motor          |
            | temperature exceeded                               | 300614
15          |   -                                                |
-------------------------------------------------------------------------------------
```

			VSA/HSA		ROT/LIN
840D		100	0	ffff	2/4

1613	**ALARM_REACTION_RESET**			D02	**CR:** DB1
-	Configuring shutdown response to RESET alarms			UNS.WORD	Immediately

Input bit field for changeover of the 611D reset alarm. The following shut down responses can be selected: Pulse inhibit (bit = 1) or controller inhibit (bit = 0) (shut down via MD 1403/MD 1404). The default assignment is dependent on the motor type (FDD corresponds to 8 0100, MSD corresponds to 8 FFFF) and is parameterized during start-up by the drive configuration.

Important

It is possible to disable or suppress the alarms via the machine data MD 1601: ALARM_MASK_RESET; which means that they are then no longer active.

```
Bit No.     | Significance                                       | Alarm No.
-------------------------------------------------------------------------------------
 0          | Pulse inhibit for configuring error                | 3007xx
 1-5        |    -                                               |
 6  (840D)  | Not configurable (flux controller output limited)  | 300606
 7  (840D)  | Not configurable (current controller output limited) | 300607
 8          | speed controller output limited                    | 300608
 9          | Not configurable (speed controller output)         | 300609
10-12       |   -                                                |
13          | Pulse inhibit when an alarm occurs: maximum        |
            | permissible motor temperature exceeded             | 300613
14          | Pulse inhibit when an alarm occurs: motor          |
            | temperature exceeded                               | 300614
15          |   -                                                |
-------------------------------------------------------------------------------------
```

			HSA SLM VSA		-

P2		0x0100	0x0000	0xffff	2/4

1615	**SMOOTH_RUN_TOL**			EXP	**CR:** DD1
1/min	Smooth running monitoring tolerance			FLOAT	sofort
Load test: Setting the tolerance bandwidth for the smooth running monitoring. If the tolerance bandwidth is exceeded or fallen below, the "diagnostics, smooth running monitoring" counter MD 1724 is incremented by the actual speed.					
			VSA/HSA		ROT
840D		2.0000	0.0000	100.0000	0/0

1615	**SMOOTH_RUN_TOL**				**CR:** DD1
1/min	Smooth running monitoring tolerance			FLOAT	sofort
Load test: Setting the tolerance bandwidth for the smooth running monitoring. If the tolerance bandwidth is exceeded or fallen below, the "diagnostics, smooth running monitoring" counter MD 1724 is incremented by the actual speed.					
			VSA/HSA		-
810D		2.0000	0.0000	100.0000	2/4

1615	**SMOOTH_RUN_TOL**			EXP	**CR:**
m/min	Tolerance bandwidth for the smooth running monit.			FLOAT	sofort
Load test: Sets the tolerance bandwidth for the smooth running monitoring. When the tolerance bandwidth is violated (exceeded or fallen below), the "diagnostics, smooth running monitoring" MD 1724 counter is incremented by the actual speed.					
			VSA		LIN
840D		0.2000	0.0000	100.0000	0/0

1615	**SMOOTH_RUN_TOL**			EXP	**CR:** DD1
1/min	Smooth running monitoring tolerance			FLOAT	Immediately
Load test: Setting the tolerance bandwidth for the smooth running monitoring. If the tolerance bandwidth is exceeded or fallen below, the "diagnostics, smooth running monitoring" counter MD 1724 is incremented by the actual speed.					
			HSA SLM VSA		-
P2		2.000000	0.000000	100.000000	0/0

1620	**PROG_SIGNAL_FLAGS**	D03	**CR:** DD1
HEX	Variable message function bits	UNS. WORD	sofort

Input bit field to control the variable signalling function.

Bits | Message function / 0=... 1=...

----

0 | Variable message function / 0 = Not active, 1 = Active
1 | Segment, variable message function / 0 = Address space X,
| 1 = Address space Y
2 | Comparison, variable message function / 0 = Comparison signed
| 1 = Comparison unsigned

Note

Bit 1 is only effective if signal number 0 is selected in MD 1621: PROG_SIGNAL_NR.

For the variable message function, any memory cell from address space X or address space Y in the data RAM is monitored to identify if it exceeds a threshold which can be specified. A tolerance bandwidth can be selected for this threshold value, which is calculated-in when interrogating as to whether the threshold value has been exceeded or has been fallen below. Using a message, a PLC is signalled when this threshold is exceeded or fallen below. The message can be logically combined with a pickup or dropout delay time. The message function runs in a 4 ms clock cycle.

The quantity to be monitored is either selected by entering a signal number or a physical address, where the physical address is only of significance for Siemens service activities.

Corresponding machine data to this machine data are:
MD 1621: PROG_SIGNAL_NR
MD 1622: PROG_SIGNAL_ADDRESS
MD 1623: PROG_SIGNAL_THRESHOLD
MD 1624: PROG_SIGNAL_HYSTERESIS
MD 1625: PROG_SIGNAL_ON_DELAY
MD 1626: PROG_SIGNAL_OFF_DELAY

Note

Changes entered in machine data MD 1621 to MD 1624, while the monitoring function is already active (MD 1620, bit 0 = 1), do not automatically result in the PLC message being re-initialized, i.e. reset to 0. If this is required, the monitoring must be disabled and enabled using MD1620 bit 0 after the machine data has been changed.

		VSA/HSA		ROT/LIN

840D		0	0	7	2/4

1620	**PROG_SIGNAL_FLAGS**	D03	**CR:** DD1
-	Variable message function bits	UNS.WORD	Immediately

Input bit field to control the variable signalling function.

Bits | Message function / 0=... 1=...

---

0 | Variable message function / 0 = Not active, 1 = Active
1 | Segment, variable message function / 0 = Address space X,
| 1 = Address space Y
2 | Comparison, variable message function / 0 = Comparison signed
| 1 = Comparison unsigned

Note
Bit 1 is only effective if signal number 0 is selected in MD 1621: PROG_SIGNAL_NR.

For the variable message function, any memory cell from address space X or address space Y in the data RAM is monitored to identify if it exceeds a threshold which can be specified. A tolerance bandwidth can be selected for this threshold value, which is calculated-in when interrogating as to whether the threshold value has been exceeded or has been fallen below. Using a message, a PLC is signalled when this threshold is exceeded or fallen below. The message can be logically combined with a pickup or dropout delay time. The message function runs in a 4 ms clock cycle.

The quantity to be monitored is either selected by entering a signal number or a physical address, where the physical address is only of significance for Siemens service activities.

Corresponding machine data to this machine data are:
MD 1621: PROG_SIGNAL_NR
MD 1622: PROG_SIGNAL_ADDRESS
MD 1623: PROG_SIGNAL_THRESHOLD
MD 1624: PROG_SIGNAL_HYSTERESIS
MD 1625: PROG_SIGNAL_ON_DELAY
MD 1626: PROG_SIGNAL_OFF_DELAY

Note
Changes entered in machine data MD 1621 to MD 1624, while the monitoring function is already active (MD 1620, bit 0 = 1), do not automatically result in the PLC message being re-initialized, i.e. reset to 0. If this is required, the monitoring must be disabled and enabled using MD1620 bit 0 after the machine data has been changed.

			HSA SLM VSA		-
P2		0x0000	0x0000	0x000f	2/4

1621	**PROG_SIGNAL_NR**	D03	**CR:** DD1
-	Signal number, variable message function	UNS. WORD	sofort

Input of the memory cell signal number, which is to be monitored using the variable signal function.

Signal number | Signal designation / Normalization (Unit)

----

0 | Physical address/-
1 | - / -
2 | Current I_R / MD 1710
3 | Current I_S / MD 1710
4 | Current I_d / MD 1710
5 | Current I_q / MD 1710
6 | Current setpoint I_q (limited after the filter) / MD 1710
7 | Current setpoint I_q before the filter / MD 1710
8 | Actual speed value, motor / MD 1711
9 | Speed setpoint / MD 1711
10 | Speed setpoint, reference model (only 840D) / MD 1711
11 | Torque setpoint (speed controller output) / MD 1713
12 | Torque setpoint limit / MD 1713
13 | Utilization (m set / m set (limit)) / 8000H = 100 %
14 | Active power / 0.01kW
15 | Rotor flux setpoint / MD 1712
16 | Rotor flux actual value / MD 1712
17 | Quadrature voltage V q / MD 1709 × V dc link /2
18 | Direct voltage V d / MD 1709 × V dc link /2
19 | Current setpoint I d / MD 1710
20 | Motor temperature / 0.1 C
21 | DC link voltage / 1 V
22 | Zero mark signal, motor measuring system (only 840D) / -
23 | Bero signal (only 840D) / -
24 | Absolute speed actual value / MD 1711
25 | Slip frequency setpoint (2000 x 2Pi) / (800000H x 1s ex -1)
26 | Rotor position (electrical) (only 840D) / MD 1714
27 | Torque setpoint, speed controller (only 840D) / MD 1713
28 | precontrol torque / MD 1713
29 | Control voltage Q injection / MD 1709 × V dc link /2
30 | Control voltage D injection / MD 1709 × V dc link /2

			VSA/HSA		ROT/LIN
840D		0	0	100	2/4

1621	PROG_SIGNAL_NR			D03	CR: DD1
-	Signal number, variable message function			UNS.WORD	Immediately

Input of the memory cell signal number, which is to be monitored using the variable signal function.

Signal number | Signal designation / Normalization (Unit)
----
0 | Physical address/-
1 | - / -
2 | Current I_R / MD 1710
3 | Current I_S / MD 1710
4 | Current I_d / MD 1710
5 | Current I_q / MD 1710
6 | Current setpoint I_q (limited after the filter) / MD 1710
7 | Current setpoint I_q before the filter / MD 1710
8 | Actual speed value, motor / MD 1711
9 | Speed setpoint / MD 1711
10 | Speed setpoint, reference model (only 840D) / MD 1711
11 | Torque setpoint (speed controller output) / MD 1713
12 | Torque setpoint limit / MD 1713
13 | Utilization (m set / m set (limit)) / 8000H = 100 %
14 | Active power / 0.01kW
15 | Rotor flux setpoint / MD 1712
16 | Rotor flux actual value / MD 1712
17 | Quadrature voltage V q / MD 1709 × V dc link /2
18 | Direct voltage V d / MD 1709 × V dc link /2
19 | Current setpoint I d / MD 1710
20 | Motor temperature / 0.1 C
21 | DC link voltage / 1 V
22 | Zero mark signal, motor measuring system (only 840D) / -
23 | Bero signal (only 840D) / -
24 | Absolute speed actual value / MD 1711
25 | Slip frequency setpoint (2000 x 2Pi) / (800000H x 1s ex -1)
26 | Rotor position (electrical) (only 840D) / MD 1714
27 | Torque setpoint, speed controller (only 840D) / MD 1713
28 | precontrol torque / MD 1713
29 | Control voltage Q injection / MD 1709 × V dc link /2
30 | Control voltage D injection / MD 1709 × V dc link /2

			HSA SLM VSA		-
P2		0	0	100	2/4

1622	PROG_SIGNAL_ADDRESS			D03	CR: DD1
-	Address, variable message function			UNS. WORD	sofort

Input the memory cell address which is to be monitored via the variable message function.

Note
This machine data is only effective, if the signal number is set to 0 (refer to MD 1621).

			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1622	**PROG_SIGNAL_ADDRESS**			D03	**CR:** DD1
-	Address, variable message function			UNS.WORD	Immediately

Input the memory cell address which is to be monitored via the variable message function.

Note

This machine data is only effective, if the signal number is set to 0 (refer to MD 1621).

			HSA SLM VSA		-
P2		0	0	65535	2/4

1623	**PROG_SIGNAL_THRESHOLD**			D03	**CR:** DD1
-	Threshold, variable message function			UNS. DWORD	sofort

Enter the threshold for the memory cell address, entered in MD 1622: PROG_SIGNAL_ADDRESS, which is to be monitored via the variable message function. Together with MD 1624: PROG_SIGNAL_HYSTERESIS, the actual value to be checked is obtained for the monitoring (refer to the graphic representation MD 1620).

Note

The numerical value entered in MD 1623 is interpreted as a function of machine data MD 1620: PROG_SIGNAL_FLAGS, bit 2 unsigned (bit 2 = 0) or signed (bit 2 = 1).

			VSA/HSA		ROT/LIN
840D		0	0	16777215	2/4

1623	**PROG_SIGNAL_THRESHOLD**			D03	**CR:** DD1
-	Threshold, variable message function			UNS.DWORD	Immediately

Enter the threshold for the memory cell address, entered in MD 1622: PROG_SIGNAL_ADDRESS, which is to be monitored via the variable message function. Together with MD 1624: PROG_SIGNAL_HYSTERESIS, the actual value to be checked is obtained for the monitoring (refer to the graphic representation MD 1620).

Note

The numerical value entered in MD 1623 is interpreted as a function of machine data MD 1620: PROG_SIGNAL_FLAGS, bit 2 unsigned (bit 2 = 0) or signed (bit 2 = 1).

			HSA SLM VSA		-
P2		0	0	16777215	2/4

1624	**PROG_SIGNAL_HYSTERESIS**			D03	**CR:** DD1
-	Hysteresis, variable message function			UNS. DWORD	sofort

Input the hysteresis (tolerance bandwidth) for the memory cell address, entered in MD 1622: PROG_SIGNAL_ADDRESS, which is to be monitored via the variable message function. Together with MD 1623: PROG_SIGNAL_THRESHOLD, the actual value to be checked is obtained for the monitoring (refer to the graphic representation MD 1620).

Note

The numerical value entered in MD 1624 is interpreted as a function of MD 1620: PROG_SIGNAL_FLAGS, bit 2 unsigned (bit 2 = 0) or signed (bit 2 = 1).

			VSA/HSA		ROT/LIN
840D		0	0	16777215	2/4

1624	PROG_SIGNAL_HYSTERESIS			D03	CR: DD1
-	Hysteresis, variable message function			UNS.DWORD	Immediately

Input the hysteresis (tolerance bandwidth) for the memory cell address, entered in MD 1622: PROG_SIGNAL_ADDRESS, which is to be monitored via the variable message function. Together with MD 1623: PROG_SIGNAL_THRESHOLD, the actual value to be checked is obtained for the monitoring (refer to the graphic representation MD 1620).

Note

The numerical value entered in MD 1624 is interpreted as a function of MD 1620: PROG_SIGNAL_FLAGS, bit 2 unsigned (bit 2 = 0) or signed (bit 2 = 1).

			HSA SLM VSA		-
P2		0	0	16777215	2/4

1625	PROG_SIGNAL_ON_DELAY			D03	CR: DD1
ms	Pickup delay time, variable message function			UNS. WORD	sofort

Input the pickup delay time to set the message if the threshold (with hysteresis) is exceeded.

Note

Changing MD 1625: PROG_SIGNAL_ON_DELAY and MD 1626: PROG_SIGNAL_OFF_DELAY influences the active time monitoring. The monitoring is initialized with the newly entered times.

			VSA/HSA		ROT/LIN
840D		0	0	10000	2/4

1625	PROG_SIGNAL_ON_DELAY			D03	CR: DD1
ms	Pickup delay time, variable message function			UNS.WORD	Immediately

Input the pickup delay time to set the message if the threshold (with hysteresis) is exceeded.

Note

Changing MD 1625: PROG_SIGNAL_ON_DELAY and MD 1626: PROG_SIGNAL_OFF_DELAY influences the active time monitoring. The monitoring is initialized with the newly entered times.

			HSA SLM VSA		-
P2		0	0	10000	2/4

1626	PROG_SIGNAL_OFF_DELAY			D03	CR: DD1
ms	Dropout delay, variable message function			UNS. WORD	sofort

Input the dropout delay time to reset the message when the threshold (with hysteresis) is fallen below (refer to the graphic representation, MD 1620).

Note

Changing MD 1625: PROG_SIGNAL_ON_DELAY and MD 1626: PROG_SIGNAL_OFF_DELAY influences the active time monitoring. The monitoring is initialized with the newly entered times.

			VSA/HSA		ROT/LIN
840D		0	0	10000	2/4

1626	**PROG_SIGNAL_OFF_DELAY**			D03	**CR:** DD1
ms	Dropout delay, variable message function			UNS.WORD	Immediately

Input the dropout delay time to reset the message when the threshold (with hysteresis) is fallen below (refer to the graphic representation, MD 1620).

Note

Changing MD 1625: PROG_SIGNAL_ON_DELAY and MD 1626: PROG_SIGNAL_OFF_DELAY influences the active time monitoring. The monitoring is initialized with the newly entered times.

			HSA SLM VSA		-
P2		0	0	10000	2/4

1630	**LINK_VOLTAGE_MON_THRESHOLD**			EXP	**CR:** DÜ1
V	Response threshold, only DC link monitoring			UNS. WORD	sofort

Important

This machine data is only relevant for Siemens internal purposes and may not be changed.

Entry of the response threshold of the DC link voltage, dropping below this value results in only the DC link voltage being monitored, the motor temperatures will no longer be monitored. The standard functionality is re-established once the response threshold has been exceeded again.

			VSA/HSA		ROT/LIN
840D		550	0	680	2/4

1630	**LINK_VOLTAGE_MON_THRESHOLD**			EXP	**CR:** DÜ1
V	Response threshold, only DC link monitoring			UNS.WORD	Immediately

Important

This machine data is only relevant for Siemens internal purposes and may not be changed.

Entry of the response threshold of the DC link voltage, dropping below this value results in only the DC link voltage being monitored, the motor temperatures will no longer be monitored. The standard functionality is re-established once the response threshold has been exceeded again.

			HSA SLM VSA		-
P2		550	0	680	2/4

1631	**LINK_VOLTAGE_GEN_ON**			EXP	**CR:** DE1
V	Response voltage of generator axis			UNS. WORD	sofort

Important

This machine data is only relevant for Siemens internal purposes and may not be changed.

Entry of the response threshold of the DC link voltage. When this threshold is fallen below, a drive, defined as generator axis, is changed over into generator operation; this is realized in the NC program.

			VSA/HSA		ROT/LIN
840D		450	280	650	2/4

1631	**LINK_VOLTAGE_GEN_ON**			EXP	**CR:** DE1
V	Response voltage of generator axis			UNS.WORD	Immediately
Important This machine data is only relevant for Siemens internal purposes and may not be changed. Entry of the response threshold of the DC link voltage. When this threshold is fallen below, a drive, defined as generator axis, is changed over into generator operation; this is realized in the NC program.					
			HSA SLM VSA		-
P2		450	280	650	2/4

1632	**LINK_VOLTAGE_GEN_HYST**			EXP	**CR:** DE1
V	Voltage range for generator control			UNS. WORD	sofort
Important This machine data is only relevant for Siemens internal purposes and may not be changed. Enter the voltage range of the DC link voltage for the two-point controller of generator operation. The generator control range lies between: MD 1631: LINK_VOLTAGE_GEN_ON and MD 1631 + MD 1632: LINK_VOLTAGE_GEN_HYST.					
			VSA/HSA		ROT/LIN
840D		30	0	300	2/4

1632	**LINK_VOLTAGE_GEN_HYST**			EXP	**CR:** DE1
V	Voltage range for generator control			UNS.WORD	Immediately
Important This machine data is only relevant for Siemens internal purposes and may not be changed. Enter the voltage range of the DC link voltage for the two-point controller of generator operation. The generator control range lies between: MD 1631: LINK_VOLTAGE_GEN_ON and MD 1631 + MD 1632: LINK_VOLTAGE_GEN_HYST.					
			HSA SLM VSA		-
P2		30	0	300	2/4

1633	**LINK_VOLTAGE_GEN_OFF**			EXP	**CR:** DE1
V	Shutdown threshold of generator operation			UNS. WORD	sofort
Important This machine data is only relevant for Siemens internal purposes and may not be changed. Enter the response threshold of the DC link voltage. When this threshold is exceeded, the drive goes from generator operation back into normal operation.					
			VSA/HSA		ROT/LIN
840D		510	0	660	2/4

1633	**LINK_VOLTAGE_GEN_OFF**			EXP	**CR:** DE1
V	Shutdown threshold of generator operation			UNS.WORD	Immediately
Important This machine data is only relevant for Siemens internal purposes and may not be changed. Enter the response threshold of the DC link voltage. When this threshold is exceeded, the drive goes from generator operation back into normal operation.					
			HSA SLM VSA		-
P2		510	0	660	2/4

1634	**LINK_VOLTAGE_RETRACT**			EXP	**CR:** DE1
V	Response threshold emergency retraction			UNS. WORD	sofort
Important This machine data is only relevant for Siemens internal purposes and may not be changed. Enter the response threshold of the DC link voltage, which, when fallen below, initiates the emergency retraction reactions corresponding to the operating modes selected in the NC program. In addition, a PLC message is output when the DC link voltage falls below this value.					
			VSA/HSA		ROT/LIN
840D		400	0	660	2/4

1634	**LINK_VOLTAGE_RETRACT**			EXP	**CR:** DE1
V	Response threshold emergency retraction			UNS.WORD	Immediately
Important This machine data is only relevant for Siemens internal purposes and may not be changed. Enter the response threshold of the DC link voltage, which, when fallen below, initiates the emergency retraction reactions corresponding to the operating modes selected in the NC program. In addition, a PLC message is output when the DC link voltage falls below this value.					
			HSA SLM VSA		-
P2		400	0	660	2/4

1635	**GEN_AXIS_MIN_SPEED**			EXP	**CR:**
m/min	Minimum speed generator axis			FLOAT	sofort
Important This machine data is only relevant for Siemens internal purposes and may not be changed. Enter the minimum speed of the DC link generator. When this speed is fallen below, a PLC message is output. This message is issued in order to signal the NC that the drive operated as generator (selected in the NC program), has reached a speed, from which the NC should initiate an emergency retraction.					
			VSA		LIN
840D		0.0000	0.0000	100000.0000	2/4

1635	**GEN_AXIS_MIN_SPEED**			EXP	**CR:** DE1
1/min	Minimum speed of the generator axis			FLOAT	sofort

Important

This machine data is only relevant for Siemens internal purposes and may not be changed.

Enter the minimum speed of the DC link generator. When this speed is fallen below, a PLC message is output. This message is issued in order to signal the NC that the drive operated as generator (selected in the NC program), has reached a speed, from which the NC should initiate an emergency retraction.

			VSA/HSA		ROT
840D		0.0000	0.0000	100000.0000	2/4

1635	**GEN_AXIS_MIN_SPEED**			EXP	**CR:** DE1
1/min	Minimum speed of the generator axis			FLOAT	Immediately

Important

This machine data is only relevant for Siemens internal purposes and may not be changed.

Enter the minimum speed of the DC link generator. When this speed is fallen below, a PLC message is output. This message is issued in order to signal the NC that the drive operated as generator (selected in the NC program), has reached a speed, from which the NC should initiate an emergency retraction.

			HSA SLM VSA		-
P2		0.000000	0.000000	100000.000000	2/4

1636	**RETRACT_AND_GENERATOR_MODE**			EXP	**CR:** DE1
-	Operating mode emergency retraction/gen. operation			UNS. WORD	sofort

Important

This machine data is only relevant for Siemens internal purposes and may not be changed.

Various operating modes can be entered in the drive operating mode word. It defines 8 operating modes for fault/error situations:

- Sign-of-life failure
- DC link voltage < MD 1633 or MD 1631
- Activating the autonomous drive emergency retraction by the NC

Values

0	Normal status
1	Monitoring operation
2	Delayed, regenerative braking
3	Delayed regenerative braking only for sign-of-life failure
4	Emergency retraction
5	Emergency retraction only for sign-of-life failure
6	Regenerative operation with the possibility of returning to standard operation
7	Regenerative operation with no possibility of returning to standard operation

			VSA/HSA		ROT/LIN
840D		0	0	7	2/4

1636	**RETRACT_AND_GENERATOR_MODE**			EXP	**CR:** DE1
-	Operating mode emergency retraction/gen. operation			UNS.WORD	Immediately

Important

This machine data is only relevant for Siemens internal purposes and may not be changed.

Various operating modes can be entered in the drive operating mode word. It defines 8 operating modes for fault/error situations:

- Sign-of-life failure
- DC link voltage < MD 1633 or MD 1631
- Activating the autonomous drive emergency retraction by the NC

Values

0	Normal status
1	Monitoring operation
2	Delayed, regenerative braking
3	Delayed regenerative braking only for sign-of-life failure
4	Emergency retraction
5	Emergency retraction only for sign-of-life failure
6	Regenerative operation with the possibility of returning to standard operation
7	Regenerative operation with no possibility of returning to standard operation

			HSA SLM VSA		-
P2 840D		-	-	7	2/4
P2		0	0	0	2/4

1637	**GEN_STOP_DELAY**			EXP	**CR:** DE1
ms	Delay time for regenerative braking			UNS. WORD	sofort

Important

This machine data is only relevant for Siemens internal purposes and may not be changed.

Enter the delay before regenerative braking is initiated when a fault/error situation occurs.

			VSA/HSA		ROT/LIN
840D		0	0	10000	2/4

1637	**GEN_STOP_DELAY**			EXP	**CR:** DE1
ms	Delay time for regenerative braking			UNS.WORD	Immediately

Important

This machine data is only relevant for Siemens internal purposes and may not be changed.

Enter the delay before regenerative braking is initiated when a fault/error situation occurs.

			HSA SLM VSA		-
P2		0	0	10000	2/4

1638	**RETRACT_TIME**			EXP	**CR:** DE1
ms	Emergency retraction time			UNS. WORD	sofort
Important This machine data is only relevant for Siemens internal purposes and may not be changed. Enter the emergency retraction time. During this time the emergency retraction speed (MD1639) is input when a fault/error situation occurs. The axis regeneratively brakes after this time has expired.					
			VSA/HSA		ROT/LIN
840D		0	0	10000	2/4

1638	**RETRACT_TIME**			EXP	**CR:** DE1
ms	Emergency retraction time			UNS.WORD	Immediately
Important This machine data is only relevant for Siemens internal purposes and may not be changed. Enter the emergency retraction time. During this time the emergency retraction speed (MD1639) is input when a fault/error situation occurs. The axis regeneratively brakes after this time has expired.					
			HSA SLM VSA		-
P2		0	0	10000	2/4

1639	**RETRACT_SPEED**			EXP	**CR:** DE1
-	Emergency retraction speed			DWORD	sofort
Important This machine data is only relevant for Siemens internal purposes and may not be changed. Enter the emergency retraction speed. This speed is preset as the setpoint speed during the emergency retraction time (MD1638) when a fault/error situation occurs.					
			VSA/HSA		ROT
840D		0	-4194304	4194304	2/4

1639	**RETRACT_SPEED**			EXP	**CR:**
-	Emergency retraction speed			DWORD	sofort
Important This machine data is only relevant for Siemens internal purposes and may not be changed. Enter the emergency retraction speed. This speed is entered as setpoint speed during the emergency retraction time (MD1638) when a fault/error situation occurs.					
			VSA		LIN
840D		0	-4194304	4194304	2/4

1639	**RETRACT_SPEED**			EXP	**CR:** DE1
-	Emergency retraction speed			DWORD	Immediately
Important This machine data is only relevant for Siemens internal purposes and may not be changed. Enter the emergency retraction speed. This speed is preset as the setpoint speed during the emergency retraction time (MD1638) when a fault/error situation occurs.					
			HSA SLM VSA		-

P2		0	-4194304	4194304	2/4

1650	**DIAGNOSIS_CONTROL_FLAGS**	D04, EXP	**CR:** DD1, DE1
HEX	Diagnostic control	UNS. WORD	sofort

Select the diagnostic functions
- Min/max. memory
- Open-loop voltage controlled, V_f operation in the diagnosis word

Bit No. I Significance

I Min/max. memory 0 = Not active
I 1 = Active
----
1 I Segment, min./max. memory 0 = DSP address space X
I 1 = DSP address space Y
----
2 I Comparison, with sign 0 = without sign
I 1 = with sign

3-7 I Not assigned
----
8 I Open-loop voltage controlled 0 = Standard operation
to SW 3.1 I V_f operation 1 = V_f operation active

9-15 I Reserved/not assigned

Important
These diagnostic functions are only relevant for Siemens internal purposes and must not be changed.

			VSA/HSA		ROT/LIN
840D		0	0	ffff	2/4

1650	**DIAGNOSIS_CONTROL_FLAGS**			D04	**CR:** DD1, DE1
-	Diagnostic control			UNS.WORD	Immediately

Select the diagnostic functions
- Min/max. memory
- Open-loop voltage controlled, V_f operation in the diagnosis word

Bit No. I Significance

I Min/max. memory 0 = Not active
I 1 = Active
---
1 I Segment, min./max. memory 0 = DSP address space X
I 1 = DSP address space Y
---
2 I Comparison, with sign 0 = without sign
I 1 = with sign

3-7 I Not assigned
---
8 I Open-loop voltage controlled 0 = Standard operation
to SW 3.1 I V_f operation 1 = V_f operation active

9-15 I Reserved/not assigned

Important
These diagnostic functions are only relevant for Siemens internal purposes and must not be changed.

			HSA SLM VSA		-
P2		0x0000	0x0000	0xffff	2/4

1651	MINMAX_SIGNAL_NR	D04, EXP	**CR:** DD1
-	Signal number min./max. memory	UNS. WORD	sofort

Entry of the signal number of the memory cell which is to be monitored via the min./max. memory function.
Important
This machine data is only relevant for Siemens internal purposes and must not be changed.

Signal number | Signal designation / Normalization (units)
----
0 | Physical address / -
1 | - / -
2 | Current I_R / MD 1710
3 | Current I_S / MD 1710
4 | Current I_d / MD 1710
5 | Current I_q / MD 1710
6 | Current setpoint I_q (limited after the filter) / MD 1710
7 | Current setpoint I_q (before the filter) / MD 1710
8 | Actual speed value, motor / MD 1711
9 | Speed setpoint / MD 1711
10 | Speed setpoint reference model / MD 1711
11 | Torque setpoint (speed controller output) / MD 1713
12 | Torque setpoint limit / MD 1713
13 | Utilization (m set / m set, limit) / 8000H = 100 %
14 | Active power / 0.01 kW
15 | Rotor flux setpoint / MD 1712
16 | Rotor flux actual value / MD 1712
17 | Quadrature voltage V_q / MD 1709 × V dc link /2
18 | Direct voltage V_d / MD 1709 × V dc link /2
19 | Current setpoint I_d / MD 1710
20 | Motor temperature / 0.1 °C
21 | DC link voltage / 1 V
22 | Zero mark signal, motor measuring system / -
23 | Bero signal / -
24 | Absolute actual speed value / MD 1711
25 | Slip frequency setpoint (2000 x 2 Pi) / (800000H x 1s ex - 1)
26 | Rotor position (electrical) / MD 1714
27 | Torque setpoint, speed controller / MD 1713
28 | precontrol torque / MD 1713
29 | Control voltage Q injection / MD 1709 × V dc link /2
30 | Control voltage D injection / MD 1709 × V dc link /2

			VSA/HSA		ROT/LIN
840D		0	0	100	2/4

1651	MINMAX_SIGNAL_NR	D04	CR: DD1
-	Signal number min./max. memory	UNS.WORD	Immediately

Entry of the signal number of the memory cell which is to be monitored via the min./max. memory function.
Important
This machine data is only relevant for Siemens internal purposes and must not be changed.

Signal number | Signal designation / Normalization (units)
----
0 | Physical address / -
1 | - / -
2 | Current I_R / MD 1710
3 | Current I_S / MD 1710
4 | Current I_d / MD 1710
5 | Current I_q / MD 1710
6 | Current setpoint I_q (limited after the filter) / MD 1710
7 | Current setpoint I_q (before the filter) / MD 1710
8 | Actual speed value, motor / MD 1711
9 | Speed setpoint / MD 1711
10 | Speed setpoint reference model / MD 1711
11 | Torque setpoint (speed controller output) / MD 1713
12 | Torque setpoint limit / MD 1713
13 | Utilization (m set / m set, limit) / 8000H = 100 %
14 | Active power / 0.01 kW
15 | Rotor flux setpoint / MD 1712
16 | Rotor flux actual value / MD 1712
17 | Quadrature voltage V_q / MD 1709 × V dc link /2
18 | Direct voltage V_d / MD 1709 × V dc link /2
19 | Current setpoint I_d / MD 1710
20 | Motor temperature / 0.1 °C
21 | DC link voltage / 1 V
22 | Zero mark signal, motor measuring system / -
23 | Bero signal / -
24 | Absolute actual speed value / MD 1711
25 | Slip frequency setpoint (2000 x 2 Pi) / (800000H x 1s ex - 1)
26 | Rotor position (electrical) / MD 1714
27 | Torque setpoint, speed controller / MD 1713
28 | precontrol torque / MD 1713
29 | Control voltage Q injection / MD 1709 × V dc link /2
30 | Control voltage D injection / MD 1709 × V dc link /2

			HSA SLM VSA		-
P2		0	0	100	2/4

1652	MINMAX_ADDRESS	D04, EXP	CR: DD1
-	Memory cell, min./max. memory	UNS. WORD	sofort

The address of the memory cell which is to be monitored via the min./max. memory function.

Note
This machine data is only effective if the signal number is set to 0 (refer to MD 1651).

		VSA/HSA		ROT/LIN

840D		0	0	65535	2/4

1652	**MINMAX_ADDRESS**			D04	**CR:** DD1
-	Memory cell, min./max. memory			UNS.WORD	Immediately
The address of the memory cell which is to be monitored via the min./max. memory function. Note This machine data is only effective if the signal number is set to 0 (refer to MD 1651).					
			HSA SLM VSA		-

P2		0	0	65535	2/4

1653	**MINMAX_MIN_VALUE**			D04, EXP	**CR:** DD1
-	Minimum value, min./max. memory			UNS. DWORD	sofort
Output of the display value of the minimum value, min./max. memory.					
			VSA/HSA		ROT/LIN

840D		0	0	16777215	2/4

1653	**MINMAX_MIN_VALUE**			D04	**CR:** DD1
-	Minimum value, min./max. memory			UNS.DWORD	Immediately
Output of the display value of the minimum value, min./max. memory.					
			HSA SLM VSA		-

P2		0	0	16777215	2/4

1654	**MINMAX_MAX_VALUE**			D04, EXP	**CR:** DD1
-	Maximum value, min./max. memory			UNS. DWORD	sofort
Outputs the display value of the maximum value, min./max. memory.					
			VSA/HSA		ROT/LIN

840D		0	0	16777215	2/4

1654	**MINMAX_MAX_VALUE**			D04	**CR:** DD1
-	Maximum value, min./max. memory			UNS.DWORD	Immediately
Outputs the display value of the maximum value, min./max. memory.					
			HSA SLM VSA		-

P2		0	0	16777215	2/4

1655	**MONITOR_SEGMENT**			D04, EXP	**CR:** DD1
-	Segment of memory cell for monitor			UNS. WORD	sofort
The segment of the memory cell for the monitor function is addressed using this machine data. 0 DSP address space X 1 DSP address space Y The DSP address is obtained together with the offset address (MD 1656). The contents of the DSP address can be displayed via the machine data MD 1657 MONITOR_DISPLAY.					
			VSA/HSA		ROT/LIN

840D		0	0	1	2/4

1655	**MONITOR_SEGMENT**			D04	**CR:** DD1
-	Segment of memory cell for monitor			UNS.WORD	Immediately
The segment of the memory cell for the monitor function is addressed using this machine data. 0 DSP address space X 1 DSP address space Y The DSP address is obtained together with the offset address (MD 1656). The contents of the DSP address can be displayed via the machine data MD 1657 MONITOR_DISPLAY.					
			HSA SLM VSA		-
P2		0	0	1	2/4

1656	**MONITOR_ADDRESS**			D04, EXP	**CR:** DD1
-	Address of memory cell for monitor			UNS. WORD	sofort
The offset address of the memory cell for the monitor function is addressed using this machine data. The DSP address is obtained together with the memory cell segment (MD 1655). The contents of the DSP address can be displayed via the machine data MD 1657 MONITOR_DISPLAY.					
			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1656	**MONITOR_ADDRESS**			D04	**CR:** DD1
-	Address of memory cell for monitor			UNS.DWORD	Immediately
The offset address of the memory cell for the monitor function is addressed using this machine data. The DSP address is obtained together with the memory cell segment (MD 1655). The contents of the DSP address can be displayed via the machine data MD 1657 MONITOR_DISPLAY.					
			HSA SLM VSA		-
P2		0	0	0x00FFFFFF	2/4

1657	**MONITOR_DISPLAY**			D04, EXP	**CR:** DD1
-	Display monitor value			UNS. DWORD	sofort
Output of the monitor display function value. This machine data displays the contents of the address obtained from the segment (MD 1655) and the offset (MD 1656).					
			VSA/HSA		ROT/LIN
840D		0	0	16777215	2/4

1657	**MONITOR_DISPLAY**			D04	**CR:** DD1
-	Display monitor value			UNS.DWORD	Immediately
Output of the monitor display function value. This machine data displays the contents of the address obtained from the segment (MD 1655) and the offset (MD 1656).					
			HSA SLM VSA		-
P2		0	0	0x00FFFFFF	2/4

1658	**MONITOR_INPUT_VALUE**			D04, EXP	**CR:** DD1
-	Entry of monitor value			UNS. DWORD	sofort
A 24-bit value can be entered in this machine data. The value is written into the monitor function at the address specified by the segment (MD 1655) and the offset (MD 1656). The value is not written until machine data MD 1659 MONITOR_INPUT_STROBE is set to 1.					
			VSA/HSA		ROT/LIN

840D		0	0	16777215	2/4

1658	**MONITOR_INPUT_VALUE**			D04	**CR:** DD1
-	Entry of monitor value			UNS.DWORD	Immediately
A 24-bit value can be entered in this machine data. The value is written into the monitor function at the address specified by the segment (MD 1655) and the offset (MD 1656). The value is not written until machine data MD 1659 MONITOR_INPUT_STROBE is set to 1.					
			HSA SLM VSA		-

P2		0	0	16777215	2/4

1659	**MONITOR_INPUT_STROBE**			D04, EXP	**CR:** DD1
-	Transference of monitor value			UNS. WORD	sofort
The value (MD 1658) is written into the addressed memory cell (MD 1655, MD 1656) using this machine data if the write sequence was initiated with a 1. After the value has been transferred, the machine data is automatically reset to 0.					
			VSA/HSA		ROT/LIN

840D		0	0	1	2/4

1659	**MONITOR_INPUT_STROBE**			D04	**CR:** DD1
-	Transference of monitor value			UNS.WORD	Immediately
The value (MD 1658) is written into the addressed memory cell (MD 1655, MD 1656) using this machine data if the write sequence was initiated with a 1. After the value has been transferred, the machine data is automatically reset to 0.					
			HSA SLM VSA		-

P2		0	0	1	2/4

1660	**UF_MODE_FREQUENCY**			EXP	**CR:** DE1
Hz	Motor frequency V/f mode			FLOAT	sofort
Enter a setpoint frequency (mechanical) for the drive in the open-loop voltage controlled V/f mode. The + or - sign corresponds to the particular direction of rotation of the motor. Note This machine data is only used for diagnostics, and may only be used or set by trained service personnel.					
			VSA/HSA		ROT/LIN

840D		0.0000	-10000.0000	10000.0000	0/0

1660	**UF_MODE_FREQUENCY**			EXP	**CR:** DE1
Hz	Motor frequency V/f mode			FLOAT	Immediately
Enter a setpoint frequency (mechanical) for the drive in the open-loop voltage controlled V/f mode. The + or - sign corresponds to the particular direction of rotation of the motor. Note This machine data is only used for diagnostics, and may only be used or set by trained service personnel.					
			HSA SLM VSA		-

P2		0.000000	-10000.000000	10000.000000	0/0

1661	**UF_MODE_RATIO**			EXP	**CR:** DE1
Vs	V/f ratio in V/f mode			FLOAT	sofort
Enter a voltage/frequency ratio for the drive in the open-loop voltage controlled V/f mode. The following is valid for voltage V_q applied to the drive: V_q = MD 1661 x MD 1660 Note This machine data is only used for diagnostics, and may only be used or set by trained service personnel.					
			VSA/HSA		ROT/LIN
840D		2.4000	0.0000	100.0000	0/0

1661	**UF_MODE_RATIO**			EXP	**CR:** DE1
Vs	V/f ratio in V/f mode			FLOAT	Immediately
Enter a voltage/frequency ratio for the drive in the open-loop voltage controlled V/f mode. The following is valid for voltage V_q applied to the drive: V_q = MD 1661 x MD 1660 Note This machine data is only used for diagnostics, and may only be used or set by trained service personnel.					
			HSA SLM VSA		-
P2		2.400000	0.000000	100.000000	0/0

1662	**UF_MODE_DELTA_FREQUENCY**			EXP	**CR:** DE1
Hz/s	Changing the motor frequency of V/f operation			FLOAT	sofort
Entry of a change of the motor frequency of the V/f operation via a frequency increment for the V/f ramp-up control to the electrical setpoint frequency of the drive. Note This machine data is only used for diagnostics, and may only be used or set by trained service personnel.					
			VSA/HSA		ROT/LIN
840D		5.0000	0.0000	10000.0000	0/0

1662	**UF_MODE_DELTA_FREQUENCY**			EXP	**CR:** DE1
Hz/s	Changing the motor frequency of V/f operation			FLOAT	Immediately
Entry of a change of the motor frequency of the V/f operation via a frequency increment for the V/f ramp-up control to the electrical setpoint frequency of the drive. Note This machine data is only used for diagnostics, and may only be used or set by trained service personnel.					
			HSA SLM VSA		-
P2		5.000000	0.000000	10000.000000	0/0

1665	**IPO_SPEEDCTRL_DELAY_FACTOR**			EXP	**CR:** IAD
-	Run-time factor IPO/SC cycles f. RFG			FLOAT	sofort

Entry of a run time factor between interpolation and speed controller cycles for the ramp-function generator.

When ramping-up, the acceleration, which is specified by the servo ramp input, can be greater than the actual permissible drive acceleration, i.e. for relatively fast reversing operations, the drive would still be accelerating while the servo would already be braking.

In order to prevent this, there is the ramp-function generator tracking. This tracking means that if the acceleration reference is excessive, then the servo speed setpoint is linked to the 611 D actual speed value through a tolerance "+ / - DELTA".

Example

DELTA = f(t) * MD 1665

f(t): SIMODRIVE 611D computed function

			VSA/HSA		ROT/LIN
840D		2.0000	0.0000	20.0000	0/0

1665	**IPO_SPEEDCTRL_DELAY_FACTOR**			EXP	**CR:** IAD
-	Run-time factor IPO/SC cycles f. RFG			FLOAT	Immediately

Entry of a run time factor between interpolation and speed controller cycles for the ramp-function generator.

When ramping-up, the acceleration, which is specified by the servo ramp input, can be greater than the actual permissible drive acceleration, i.e. for relatively fast reversing operations, the drive would still be accelerating while the servo would already be braking.

In order to prevent this, there is the ramp-function generator tracking. This tracking means that if the acceleration reference is excessive, then the servo speed setpoint is linked to the 611 D actual speed value through a tolerance "+ / - DELTA".

Example

DELTA = f(t) * MD 1665

f(t): SIMODRIVE 611D computed function

			HSA SLM VSA		-
P2		2.000000	0.000000	20.000000	0/0

1700	**TERMINAL_STATE**		D04	**CR:** DD1
HEX	Status of binary inputs		UNS. WORD	sofort

The machine data is used to display the status of the binary inputs.

```
 Bit       |   Significance (0 = off   1 = on)
-------------------------------------------------------------------------------------------------------
 0         | Gating unit enable (module internal), inclusive the marking
           | according to MD 1003 bit 5
 1         | Image, terminal 663 (module-specific pulse suppression)
 2         | Image, terminal 63/48 of the I/R unit (central drive pulse suppression)
 3         | Common signal, pulse enable:
           | - stored hardware common signal
           | - axial pulse enable by the PLC
 4         | Signal, power module heatsink too hot
 5         | Image, terminal 112 of the I/R unit (setting-up operation signal)
 6         | Image, terminal 64/63 of the I/R unit (central drive enable,
           | setpoint = 0)
 7         | Not assigned
 8         | Image, terminal 5 of the I/R unit
           | (motor and power module temperature early warning alarm)
Bit 9-15   | Not assigned
-------------------------------------------------------------------------------------------------------
```

			VSA/HSA		ROT/LIN
840D		0	0	ffff	2/4

1700	**TERMINAL_STATE**			**CR:** DD1
HEX	Status of binary inputs		UNS. WORD	sofort

The machine data is used to display the status of the binary inputs.

```
 Bit       |   Significance (0 = off   1 = on)
-------------------------------------------------------------------------------------------------------
 0         | Gating unit enable (module internal), inclusive the marking
           | according to MD 1003 bit 5
 1         | Image, terminal 663 (module-specific pulse suppression)
 2         | Image, terminal 63/48 of the I/R unit (central drive pulse suppression)
 3         | Common signal, pulse enable:
           | - stored hardware common signal
           | - axial pulse enable by the PLC
 4         | Signal, power module heatsink too hot
 5         | Image, terminal 112 of the I/R unit (setting-up operation signal)
 6         | Image, terminal 64/63 of the I/R unit (central drive enable,
           | setpoint = 0)
 7         | Not assigned
 8         | Image, terminal 5 of the I/R unit
           | (motor and power module temperature early warning alarm)
Bit 9-15   | Not assigned
-------------------------------------------------------------------------------------------------------
```

			VSA/HSA		-
810D		0	0	7fff	2/4

1700	**TERMINAL_STATE**			D04	**CR:** DD1
-	Status of binary inputs			UNS.WORD	Immediately

The machine data is used to display the status of the binary inputs.

```
 Bit        |    Significance (0 = off   1 = on)
-----------------------------------------------------------------------------------------------------------------------------
 0          |  Gating unit enable (module internal), inclusive the marking
            |  according to MD 1003 bit 5
 1          |  Image, terminal 663 (module-specific pulse suppression)
 2          |  Image, terminal 63/48 of the I/R unit (central drive pulse suppression)
 3          |  Common signal, pulse enable:
            |  - stored hardware common signal
            |  - axial pulse enable by the PLC
 4          |  Signal, power module heatsink too hot
 5          |  Image, terminal 112 of the I/R unit (setting-up operation signal)
 6          |  Image, terminal 64/63 of the I/R unit (central drive enable,
            |  setpoint = 0)
 7          |  Not assigned
 8          |  Image, terminal 5 of the I/R unit
            |  (motor and power module temperature early warning alarm)
Bit 9-15  |  Not assigned
-----------------------------------------------------------------------------------------------------------------------------
```

			HSA SLM VSA		-
P2		0x0000	0x0000	0xffff	2/4

1701	**LINK_VOLTAGE**				**CR:** DD1
V	DC link voltage			UNS. WORD	sofort

This machine data is used to display the DC link voltage level in normal operation and also in the setting-up mode. The DC link voltage V dc link is continually measured.

The display is invalid if a fixed value for the DC link voltage was entered in machine data MD 1161.

			VSA/HSA		-
810D		0	0	32767	2/4

1701	**LINK_VOLTAGE**			D04	**CR:** DD1
V	DC link voltage			UNS. WORD	sofort

This machine data is used to display the DC link voltage level in normal operation and also in the setting-up mode. The DC link voltage V dc link is continually measured.

The display is invalid if a fixed value for the DC link voltage was entered in machine data MD 1161.

			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1701	**LINK_VOLTAGE**			D04	**CR:** DD1
V	DC link voltage			UNS.WORD	Immediately

This machine data is used to display the DC link voltage level in normal operation and also in the setting-up mode. The DC link voltage V dc link is continually measured.

The display is invalid if a fixed value for the DC link voltage was entered in machine data MD 1161.

			HSA SLM VSA		-
P2		0	0	65535	2/4

1702	**MOTOR_TEMPERATURE**			D04	**CR:** DD1
ÝC	Motor temperature			WORD	sofort
This machine data is used to display the motor temperature. The motor temperature is measured using temperature sensors and evaluated in the drive. The display is invalid if a fixed value for the motor temperature was entered in machine data MD 1608.					
			VSA/HSA		ROT/LIN
840D		0	0	32767	2/4

1702	**MOTOR_TEMPERATURE**			D04	**CR:** DD1
degrees C	Motor temperature			WORD	Immediately
This machine data is used to display the motor temperature. The motor temperature is measured using temperature sensors and evaluated in the drive. The display is invalid if a fixed value for the motor temperature was entered in machine data MD 1608.					
			HSA SLM VSA		-
P2		0	0	32767	2/4

1703	**LEAD_TIME_MOTOR_ENC**				**CR:** DD1
us	Leadtime for motor measuring system converter			UNS. WORD	sofort
The machine data is used to display and provide diagnostics for the leadtime of the motor measuring system converter. The leadtime for the converter is required if the converter times exceed the ASIC clock cycle time. This machine data is only valid for indirect measuring systems.					
			VSA/HSA		-
810D		0	0	32767	2/4

1703	**LEAD_TIME_MOTOR_ENC**			EXP	**CR:** DD1
us	Leadtime for motor measuring system converter			UNS. WORD	sofort
The machine data is used to display and provide diagnostics for the leadtime of the motor measuring system converter. The leadtime for the converter is required if the converter times exceed the ASIC clock cycle time. This machine data is only valid for indirect measuring systems.					
			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1703	**LEAD_TIME_MOTOR_ENC**			EXP	**CR:** DD1
us	Leadtime for motor measuring system converter			UNS.WORD	Immediately
The machine data is used to display and provide diagnostics for the leadtime of the motor measuring system converter. The leadtime for the converter is required if the converter times exceed the ASIC clock cycle time. This machine data is only valid for indirect measuring systems.					
			HSA SLM VSA		-
P2		0	0	65535	2/4

1704	**LEAD_TIME_DIRECT_ENC**			EXP	**CR:** DD1
us	Leadtime for direct measuring system converter			UNS. WORD	sofort
This machine data is used to display and for diagnostics of the lead-time for the converter for the direct measuring system. The leadtime for the converter is required if the converter times exceed the ASIC clock cycle time. This machine data is only valid for direct measuring systems.					
			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1704	**LEAD_TIME_DIRECT_ENC**				**CR:** DD1
us	Leadtime for direct measuring system converter			UNS. WORD	sofort
This machine data is used to display and for diagnostics of the lead-time for the converter for the direct measuring system. The leadtime for the converter is required if the converter times exceed the ASIC clock cycle time. This machine data is only valid for direct measuring systems.					
			VSA/HSA		-
810D		0	0	32767	2/4

1704	**LEAD_TIME_DIRECT_ENC**			EXP	**CR:** DD1
us	Leadtime for direct measuring system converter			UNS.WORD	Immediately
This machine data is used to display and for diagnostics of the lead-time for the converter for the direct measuring system. The leadtime for the converter is required if the converter times exceed the ASIC clock cycle time. This machine data is only valid for direct measuring systems.					
			HSA SLM VSA		-
P2		0	0	65535	2/4

1705	**DESIRED_VOLTAGE**			D04	**CR:** DD1
V	Voltage setpoint (rms)			FLOAT	sofort
The absolute voltage setpoint value is sampled in 4ms cycles. This "large" sampling time can result in aliasing or result in incomplete representation or exaggeration of dynamic effects that are present for less than 4ms. MD 1705 = sqr (u²_qset + u²_dset)					
			VSA/HSA		ROT/LIN
840D		0.0000	-100000.0000	100000.0000	2/4

1705	**DESIRED_VOLTAGE**			D04	**CR:** DD1
V	Voltage setpoint (rms)			FLOAT	Immediately
The absolute voltage setpoint value is sampled in 4ms cycles. This "large" sampling time can result in aliasing or result in incomplete representation or exaggeration of dynamic effects that are present for less than 4ms. MD 1705 = sqr (u²_qset + u²_dset)					
			HSA SLM VSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1706	**DESIRED_SPEED**			D04	**CR:** DD1
1/min	Speed setpoint			FLOAT	sofort
This machine data is used to display the speed setpoint. The speed setpoint represents the unfiltered summed set-point. It consists of the component of the position controller output and the speed precontrol branch. Machine data MD 1706, MD 1707 and MD 1708 are not synchronously tapped. The tapping is made by the read request of the non-cyclic communications protocol.					
			VSA/HSA		ROT
840D		0.0000	-100000.0000	100000.0000	2/4

1706	**DESIRED_SPEED**				**CR:** DD1
1/min	Speed setpoint			FLOAT	sofort
This machine data is used to display the speed setpoint. The speed setpoint represents the unfiltered summed setpoint. It consists of the component of the position controller output and the speed precontrol branch. Machine data MD 1706, MD 1707 and MD 1708 are not synchronously tapped. The tapping is made by the read request of the non-cyclic communications protocol.					
			VSA/HSA		-
810D		0.0000	0.0000	32767.0000	2/4

1706	**DESIRED_SPEED**			D04	**CR:**
m/min	Speed setpoint			FLOAT	sofort
This machine data is used to display the speed setpoint. The speed setpoint represents the unfiltered summed setpoint. It consists of the component of the position controller output and the speed pre-control branch. Machine data MD 1706, MD 1707 and MD 1708 are not synchronously stored. The data is saved by the read request of the non-cyclic communications protocol.					
			VSA		LIN
840D		0.0000	-100000.0000	100000.0000	2/4

1706	**DESIRED_SPEED**			D04	**CR:** DD1
1/min	Speed setpoint			FLOAT	Immediately
This machine data is used to display the speed setpoint. The speed setpoint represents the unfiltered summed setpoint. It consists of the component of the position controller output and the speed precontrol branch. Machine data MD 1706, MD 1707 and MD 1708 are not synchronously tapped. The tapping is made by the read request of the non-cyclic communications protocol.					
			HSA SLM VSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1707	**ACTUAL_SPEED**				**CR:** DD1
1/min	Actual speed value			FLOAT	sofort
This machine data is used to display the actual speed value. It represents the non-filtered actual speed value. Machine data MD 1706, MD 1707 and MD 1708 are not synchronously tapped. The tapping of the particular machine data is made by the MMC request "read variables" via the STF-ES communications interface.					
			VSA/HSA		-
810D		0.0000	0.0000	32767.0000	2/4

1707	**ACTUAL_SPEED**			D04	**CR:** DD1
1/min	Actual speed value			FLOAT	sofort
This machine data is used to display the actual speed value. It represents the non-filtered actual speed value. Machine data MD 1706, MD 1707 and MD 1708 are not synchronously tapped. The tapping of the particular machine data is made by the MMC request "read variables" via the STF-ES communications interface.					
			VSA/HSA		ROT
840D		0.0000	-100000.0000	100000.0000	2/4

1707	**ACTUAL_SPEED**			D04	**CR:**
m/min	Speed actual value			FLOAT	sofort
This machine data is used to display the speed actual value. It represents the non-filtered speed actual value. Machine data MD 1706, MD 1707 and MD 1708 are not stored in synchronism. The particular machine data is saved by the read function with the MMC request "read variables" via the STF-ES communications interface.					
			VSA		LIN

840D		0.0000	-100000.0000	100000.0000	2/4

1707	**ACTUAL_SPEED**			D04	**CR:** DD1
1/min	Actual speed value			FLOAT	Immediately
This machine data is used to display the actual speed value. It represents the non-filtered actual speed value. Machine data MD 1706, MD 1707 and MD 1708 are not synchronously tapped. The tapping of the particular machine data is made by the MMC request "read variables" via the STF-ES communications interface.					
			HSA SLM VSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1708	**ACTUAL_CURRENT**				**CR:** DD1
%	Smoothed actual current value			FLOAT	sofort
This machine data is used to display the smoothed quadrature actual current value. The torque-generating actual current value is smoothed by a PT1 element with the coefficient (MD 1250). The smoothed absolute actual current value is displayed as a percentage. 100 % corresponds to the max. power module current (e. g. for the 18/36A power module " 100 % = 36A RMS).					
			VSA/HSA		-
810D		0.0000	0.0000	32767.0000	2/4

1708	**ACTUAL_CURRENT**			D04	**CR:** DD1
%	Smoothed actual current value			FLOAT	sofort
This machine data is used to display the smoothed quadrature actual current value. The torque-generating actual current value is smoothed by a PT1 element with the coefficient (MD 1250). The smoothed absolute actual current value is displayed as a percentage. 100 % corresponds to the max. power module current (e. g. for the 18/36A power module " 100 % = 36A RMS).					
			VSA/HSA		ROT/LIN
840D		0.0000	-100000.0000	100000.0000	2/4

1708	**ACTUAL_CURRENT**			D04	**CR:** DD1
%	Smoothed actual current value			FLOAT	Immediately
This machine data is used to display the smoothed quadrature actual current value. The torque-generating actual current value is smoothed by a PT1 element with the coefficient (MD 1250). The smoothed absolute actual current value is displayed as a percentage. 100 % corresponds to the max. power module current (e. g. for the 18/36A power module " 100 % = 36A RMS).					
			HSA SLM VSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1709	**VOLTAGE_LSB**			EXP	**CR:** DD1
-	Significance of voltage representation			FLOAT	sofort
The machine data is used to display the significance of the voltage representation. The percentage significance of bit 0 is displayed to assign the internal notation of the voltage states for the firing level of the pulse-controlled inverter, . V_LSB = MD 1709 x (V_DCLink/2)					
			VSA/HSA		ROT/LIN
840D		0.0000	-100000.0000	100000.0000	2/4

1709	**VOLTAGE_LSB**				**CR:** DD1
-	Significance of voltage representation			FLOAT	sofort
The machine data is used to display the significance of the voltage representation. The percentage significance of bit 0 is displayed to assign the internal notation of the voltage states for the firing level of the pulse-controlled inverter, . V_LSB = MD 1709 x (V_DCLink/2)					
			VSA/HSA		-
810D		0.0000	0.0000	32767.0000	2/4

1709	**VOLTAGE_LSB**			EXP	**CR:** DD1
-	Significance of voltage representation			FLOAT	Immediately
The machine data is used to display the significance of the voltage representation. The percentage significance of bit 0 is displayed to assign the internal notation of the voltage states for the firing level of the pulse-controlled inverter, . V_LSB = MD 1709 x (V_DCLink/2)					
			HSA SLM VSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1710	**CURRENT_LSB**				**CR:** DD1
uA	Significance of current representation			FLOAT	sofort
The machine data is used to display the significance of the current representation. The significance of bit 0 is displayed to assign the internal notation of the current states to the physical amp values.					
			VSA/HSA		-
810D		0.0000	0.0000	32767.0000	2/4

1710	**CURRENT_LSB**			EXP	**CR:** DD1
uA	Significance of current representation			FLOAT	sofort
The machine data is used to display the significance of the current representation. The significance of bit 0 is displayed to assign the internal notation of the current states to the physical amp values.					
			VSA/HSA		ROT/LIN
840D		0.0000	-100000.0000	100000.0000	2/4

1710	**CURRENT_LSB**			EXP	**CR:** DD1
µA	Significance of current representation			FLOAT	Immediately
The machine data is used to display the significance of the current representation. The significance of bit 0 is displayed to assign the internal notation of the current states to the physical amp values.					
			HSA SLM VSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1711	**SPEED_LSB**			EXP	**CR:**
m/min	Significance of the speed representation			FLOAT	sofort
The machine data is used to display the significance of the speed representation. The significance of bit 0 is displayed to assign the internal significance of the speed statuses to the physical speed values.					
			VSA		LIN
840D		0.0000	-100000.0000	100000.0000	2/4

1711	**SPEED_LSB**			EXP	**CR:** DD1
1/min	Significance of the speed representation			FLOAT	sofort
The machine data is used to display the significance of the speed representation. The significance of bit 0 is displayed to assign the internal significance of the speed statuses to the physical rotation values.					
			VSA/HSA		ROT
840D		0.0000	-100000.0000	100000.0000	2/4

1711	**SPEED_LSB**				**CR:** DD1
1/min	Significance of the speed representation			FLOAT	sofort
The machine data is used to display the significance of the speed representation. The significance of bit 0 is displayed to assign the internal significance of the speed statuses to the physical rotation values.					
			VSA/HSA		-
810D		0.0000	0.0000	32767.0000	2/4

1711	**SPEED_LSB**			EXP	**CR:** DD1
1/min	Significance of the speed representation			FLOAT	Immediately
The machine data is used to display the significance of the speed representation. The significance of bit 0 is displayed to assign the internal significance of the speed statuses to the physical rotation values.					
			HSA SLM VSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1712	**ROTOR_FLUX_LSB**			EXP	**CR:** DD1
uVs	Significance of the rotor flux representation			FLOAT	sofort
The machine data is used to display the significance of the rotor flux representation. The significance of bit 0 is displayed to assign the internal representation of the rotor flux statuses to the physical values in Vs.					
			VSA/HSA		ROT/LIN
840D		0.0000	-100000.0000	100000.0000	2/4

1712	**ROTOR_FLUX_LSB**				**CR:** DD1
uVs	Significance of the rotor flux representation			FLOAT	sofort
The machine data is used to display the significance of the rotor flux representation. The significance of bit 0 is displayed to assign the internal representation of the rotor flux statuses to the physical values in Vs.					
			VSA/HSA		-
810D		0.0000	0.0000	32767.0000	2/4

1712	**ROTOR_FLUX_LSB**			EXP	**CR:** DD1
µVs	Significance of the rotor flux representation			FLOAT	Immediately
The machine data is used to display the significance of the rotor flux representation. The significance of bit 0 is displayed to assign the internal representation of the rotor flux statuses to the physical values in Vs.					
			HSA SLM VSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1713	**FORCE_LSB**			EXP	**CR:**
uN	Significance of the force representation			FLOAT	sofort
The machine data is used to display the significance of the force representation.					
			VSA		LIN

840D		0.0000	-1000000.0000	1000000.0000	2/4

1713	**TORQUE_LSB**			EXP	**CR:** DD1
uNm	Significance of the torque representation			FLOAT	sofort
The machine data is used to display the significance of the torque representation.					
			VSA/HSA		ROT

840D		0.0000	-100000.0000	100000.0000	2/4

1713	**TORQUE_LSB**				**CR:** DD1
uNm	Significance of the torque representation			FLOAT	sofort
The machine data is used to display the significance of the torque representation.					
			VSA/HSA		-

810D		0.0000	0.0000	32767.0000	2/4

1713	**TORQUE_LSB**			EXP	**CR:** DD1
µNm	Significance of the torque representation			FLOAT	Immediately
The machine data is used to display the significance of the torque representation.					
			HSA SLM VSA		-

P2		0.000000	-100000.000000	100000.000000	2/4

1714	**ROTOR_POS_LSB**			EXP	**CR:** DD1
Grad	Significance of rotor position representation			FLOAT	sofort
The machine data is used to assign the internal representation of the rotor position to the physical units system, degrees electrical.					
			VSA/HSA		ROT/LIN

840D		0.0000	-100000.0000	100000.0000	2/4

1714	**ROTOR_POS_LSB**				**CR:** DD1
ø	Significance of rotor position representation			FLOAT	sofort
The machine data is used to assign the internal representation of the rotor position to the physical units system, degrees electrical.					
			VSA/HSA		-

810D		0.0000	0.0000	32767.0000	2/4

1714	**ROTOR_POS_LSB**			EXP	**CR:** DD1
degrees	Significance of rotor position representation			FLOAT	Immediately
The machine data is used to assign the internal representation of the rotor position to the physical units system, degrees electrical.					
			HSA SLM VSA		-

P2		0.000000	-100000.000000	100000.000000	2/4

1719	**ABS_ACTUAL_CURRENT**			D04	**CR:** DD1
A	Absolute current setpoint value (rms)			FLOAT	sofort
The absolute current setpoint value is sampled in 4ms cycles. This "large" sampling time can result in aliasing or result in incomplete representation or exaggeration of dynamic effects that are present for less than 4ms. MD 1719 = sqr (i ²q_set + i ²d_act)					
			VSA/HSA		ROT/LIN
840D		0.0000	-100000.0000	100000.0000	2/4

1719	**ABS_ACTUAL_CURRENT**			D04	**CR:** DD1
A	Absolute current setpoint value (rms)			FLOAT	Immediately
The absolute current setpoint value is sampled in 4ms cycles. This "large" sampling time can result in aliasing or result in incomplete representation or exaggeration of dynamic effects that are present for less than 4ms. MD 1719 = sqr (i ²q_set + i ²d_act)					
			HSA SLM VSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1720	**CRC_DIAGNOSIS**				**CR:** DD1
-	CRC diagnostic parameter			UNS. WORD	sofort
This machine data is used to display the identified CRC errors (cyclic redundancy check). The counter information is updated at each read request and has a 5 bit format (bit 4...bit 0 and counter status 0...31). Note The assignment of the CRC errors to the appropriate drives is not always ensured. If the address is incorrect, the "incorrect" module indicates the fault (if it exists).					
			VSA/HSA		-
810D		0	0	32767	2/4

1720	**CRC_DIAGNOSIS**			D04, EXP	**CR:** DD1
-	CRC diagnostic parameter			UNS. WORD	sofort
This machine data is used to display the identified CRC errors (cyclic redundancy check). The counter information is updated at each read request and has a 5 bit format (bit 4...bit 0 and counter status 0...31). Note The assignment of the CRC errors to the appropriate drives is not always ensured. If the address is incorrect, the "incorrect" module indicates the fault (if it exists).					
			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1720	**CRC_DIAGNOSIS**			D04	**CR:** DD1
-	CRC diagnostic parameter			UNS.WORD	Immediately
This machine data is used to display the identified CRC errors (cyclic redundancy check). The counter information is updated at each read request and has a 5 bit format (bit 4...bit 0 and counter status 0...31). Note The assignment of the CRC errors to the appropriate drives is not always ensured. If the address is incorrect, the "incorrect" module indicates the fault (if it exists).					
			HSA SLM VSA		-

P2		0	0	65535	2/4

1721	**ACCEL_DIAGNOSIS**			**CR:** DD1
-	Diagnostics, actual speed value		UNS. WORD	sofort

Displays the machine data. If an excessive speed difference occurs within the run-time, the machine data value is incremented. A sporadic response involving just a few increments is of no significance as the speed controller is not influenced by it. If the contents of MD1721 are continually increased by several increments, then an increased fault level exists.

The cause could be:

- encoder shield not grounded
- encoder defective
- defective grounding of the electronic ground of the MSD module
- motor ground not connected at the MSD module
- the motor moment of inertia entered too high
- evaluation electronics

			VSA/HSA		-
810D		0	0	32767	2/4

1721	**ACCEL_DIAGNOSIS**		D04, EXP	**CR:** DD1
-	Diagnostics, actual speed value		UNS. WORD	sofort

Displays the machine data. If an excessive speed difference occurs within the run-time, the machine data value is incremented. A sporadic response involving just a few increments is of no significance as the speed controller is not influenced by it. If the contents of MD1721 are continually increased by several increments, then an increased fault level exists.

The cause could be:

- encoder shield not grounded
- encoder defective
- defective grounding of the electronic ground of the MSD module
- motor ground not connected at the MSD module
- the motor moment of inertia entered too high
- evaluation electronics

			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1721	**ACCEL_DIAGNOSIS**		D04	**CR:** DD1
-	Diagnostics, actual speed value		UNS.WORD	Immediately

Displays the machine data. If an excessive speed difference occurs within the run-time, the machine data value is incremented. A sporadic response involving just a few increments is of no significance as the speed controller is not influenced by it. If the contents of MD1721 are continually increased by several increments, then an increased fault level exists.

The cause could be:

- encoder shield not grounded
- encoder defective
- defective grounding of the electronic ground of the MSD module
- motor ground not connected at the MSD module
- the motor moment of inertia entered too high
- evaluation electronics

			HSA SLM VSA		-
P2		0	0	65535	2/4

1722	**LOAD**			D04	**CR:** DD1
%	Utilization			FLOAT	sofort
This is a display machine data to indicate drive utilization. The ratio of the torque setpoint M_d to the actual torque limit M_dmax is displayed. Values less than 100 % indicate that the system is not running at its full capacity.					
			VSA/HSA		ROT/LIN
840D		0.0000	-100000.0000	100000.0000	2/4

1722	**LOAD**				**CR:** DD1
%	Utilization			FLOAT	sofort
This is a display machine data to indicate drive utilization. The ratio of the torque setpoint M_d to the actual torque limit M_dmax is displayed. Values less than 100 % indicate that the system is not running at its full capacity.					
			VSA/HSA		-
810D		0.0000	0.0000	32767.0000	2/4

1722	**LOAD**			D04	**CR:** DD1
%	Utilization			FLOAT	Immediately
This is a display machine data to indicate drive utilization. The ratio of the torque setpoint M_d to the actual torque limit M_dmax is displayed. Values less than 100 % indicate that the system is not running at its full capacity.					
			HSA SLM VSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1723	**ACTUAL_RAMP_TIME**			EXP	**CR:** DD1
ms	Diagnostics, ramp-up time			UNS. WORD	sofort
Load test: The ramp-up time from the drive is displayed in this machine data. The ramp-up time is the time between a 0-1 edge of the control word signal "ramp-function generator active" and when the actual speed enters the defined tolerance range around the setpoint speed, defined in MD 1426: SPEED_DES_EQ_ACT_TOL [n]. Functionality from SW 3.40/04 If the actual speed value does not depart from the tolerance bandwidth around the speed setpoint, the ramp-up time measurement is not evaluated, i.e. MD 1723 = 0. It makes sense to evaluate the ramp-up time when the drive is operated at the torque limit, i.e. there is a large deviation between setpoint and actual value. The acceleration, MD 35200: GEAR_STEP_SPEEDCTRL_ACCEL, must be set to a high enough value. Note If the acceleration is sufficient to follow the setpoint value ramp in the lower but not in the higher range, only the time during which the tolerance bandwidth overstepped or understepped is displayed in the MD 1723 and not the ramp-up time.					
			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1723	**ACTUAL_RAMP_TIME**				**CR:** DD1
ms	Diagnostics, ramp-up time			UNS. WORD	sofort

Load test: The ramp-up time from the drive is displayed in this machine data. The ramp-up time is the time between a 0-1 edge of the control word signal "ramp-function generator active" and when the actual speed enters the defined tolerance range around the setpoint speed, defined in MD 1426: SPEED_DES_EQ_ACT_TOL [n].

Functionality from SW 3.40/04

If the actual speed value does not depart from the tolerance bandwidth around the speed setpoint, the ramp-up time measurement is not evaluated, i.e. MD 1723 = 0. It makes sense to evaluate the ramp-up time when the drive is operated at the torque limit, i.e. there is a large deviation between setpoint and actual value. The acceleration, MD 35200: GEAR_STEP_SPEEDCTRL_ACCEL, must be set to a high enough value.

Note

If the acceleration is sufficient to follow the setpoint value ramp in the lower but not in the higher range, only the time during which the tolerance bandwidth overstepped or understepped is displayed in the MD 1723 and not the ramp-up time.

			VSA/HSA		-
810D		0	0	32767	2/4

1723	**ACTUAL_RAMP_TIME**			EXP	**CR:** DD1
ms	Diagnostics, ramp-up time			UNS.WORD	Immediately

Load test: The ramp-up time from the drive is displayed in this machine data. The ramp-up time is the time between a 0-1 edge of the control word signal "ramp-function generator active" and when the actual speed enters the defined tolerance range around the setpoint speed, defined in MD 1426: SPEED_DES_EQ_ACT_TOL [n].

Functionality from SW 3.40/04

If the actual speed value does not depart from the tolerance bandwidth around the speed setpoint, the ramp-up time measurement is not evaluated, i.e. MD 1723 = 0. It makes sense to evaluate the ramp-up time when the drive is operated at the torque limit, i.e. there is a large deviation between setpoint and actual value. The acceleration, MD 35200: GEAR_STEP_SPEEDCTRL_ACCEL, must be set to a high enough value.

Note

If the acceleration is sufficient to follow the setpoint value ramp in the lower but not in the higher range, only the time during which the tolerance bandwidth overstepped or understepped is displayed in the MD 1723 and not the ramp-up time.

			HSA SLM VSA		-
P2		0	0	65535	2/4

1724	**SMOOTH_RUN_DIAGNOSIS**			EXP	**CR:** DD1
-	Diagnostics, smooth running monitoring			UNS. WORD	sofort

Load test:

In this machine data, with the smooth running monitoring active, the number of times the actual speed leaves the tolerance bandwidth around the setpoint speed specified by MD 1615: SMOOTH_RUN_TOL is counted.

			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1724	**SMOOTH_RUN_DIAGNOSIS**				**CR:** DD1
-	Diagnostics, smooth running monitoring			UNS. WORD	sofort

Load test:

In this machine data, with the smooth running monitoring active, the number of times the actual speed leaves the tolerance bandwidth around the setpoint speed specified by MD 1615: SMOOTH_RUN_TOL is counted.

			VSA/HSA		-
810D		0	0	32767	2/4

1724	**SMOOTH_RUN_DIAGNOSIS**			EXP	**CR:** DD1
-	Diagnostics, smooth running monitoring			UNS.WORD	Immediately
Load test: In this machine data, with the smooth running monitoring active, the number of times the actual speed leaves the tolerance bandwidth around the setpoint speed specified by MD 1615: SMOOTH_RUN_TOL is counted.					
			HSA SLM VSA		-
P2		0	0	65535	2/4

1725	**MAX_FORCE_FROM_NC**			EXP	**CR:**
N	Rating force setpoint interface			FLOAT	sofort
This machine data includes the reference value of the force setpoint limit values and force limit values transferred from the NC to the drive.					
			VSA		LIN
840D		0.0000	-1000000.0000	1000000.0000	2/4

1725	**MAX_TORQUE_FROM_NC**			EXP	**CR:** DD1
Nm	Standardising the torque setpoint average			FLOAT	sofort
This machine data includes the reference value of the torque setpoint limit and torque limit values which are to be transferred from the NC to the drive.					
			VSA/HSA		ROT
840D		0.0000	-100000.0000	100000.0000	2/4

1725	**MAX_TORQUE_FROM_NC**				**CR:** DD1
Nm	Standardising the torque setpoint average			FLOAT	sofort
This machine data includes the reference value of the torque setpoint limit and torque limit values which are to be transferred from the NC to the drive.					
			VSA/HSA		-
810D		0.0000	0.0000	32767.0000	2/4

1725	**MAX_TORQUE_FROM_NC**			EXP	**CR:** DD1
Nm	Standardising the torque setpoint average			FLOAT	Immediately
This machine data includes the reference value of the torque setpoint limit and torque limit values which are to be transferred from the NC to the drive.					
			HSA SLM VSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1728	**DESIRED_TORQUE**			D04	**CR:** F1
%	Torque setpoint			FLOAT	sofort
This MD displays the current torque/force setpoint in the same format as MD 1192 and MD 32460. If only the weight force is effective, you can read off the suitable value and enter it in MD 1192 and MD 32460. If the weight force value exceeds the torque/force limit value of NC, the upper and lower torque/force limit have the same sign.					
			VSA/HSA		ROT/LIN
840D		0.0000	-100000.0000	100000.0000	2/4

1728	**DESIRED_TORQUE**			D04	**CR:** F1
%	Torque setpoint			FLOAT	Immediately
This MD displays the current torque/force setpoint in the same format as MD 1192 and MD 32460. If only the weight force is effective, you can read off the suitable value and enter it in MD 1192 and MD 32460. If the weight force value exceeds the torque/force limit value of NC, the upper and lower torque/force limit have the same sign.					
			HSA SLM VSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1729	**ACTUAL_ELECTRIC_ROTORPOS**			D04	**CR:** FBU, POS3
Grad	Current rotor position (electr.)			FLOAT	sofort
This parameter displays the current electrical rotor position in the range of 0 - 360 degrees.					
			VSA/HSA		ROT/LIN
840D		0.0000	-100000.0000	100000.0000	2/4

1729	**ACTUAL_ELECTRIC_ROTORPOS**			D04	**CR:** FBU, POS3
degrees	Current rotor position (electr.)			FLOAT	Immediately
This parameter displays the current electrical rotor position in the range of 0 - 360 degrees.					
			HSA SLM VSA		-
P2		0.000000	-100000.000000	100000.000000	2/4

1730	**OPERATING_MODE**			D04	**CR:** DD1
-	Operating mode display			UNS. WORD	sofort
This data displays the actual operating mode. Operating mode display Bit No. | Significance 0 = off 1 = on --- 0 | FDD 1-3 | Not assigned 4 | MSD 5-7 | Not assigned 8, only 840D | IM open-loop 9, only 840D | IM, closed-loop 10-11 | Not assigned 12 | V/f mode ---					
			VSA/HSA		ROT/LIN
840D		1	1	65535	2/4

1730	**OPERATING_MODE**				**CR:** DD1
-	Operating mode display			UNS. WORD	sofort

This data displays the actual operating mode.

Operating mode display
Bit No. | Significance 0 = off 1 = on

---

0 | FDD
1-3 | Not assigned
4 | MSD
5-7 | Not assigned
8, only 840D | IM open-loop
9, only 840D | IM, closed-loop
10-11 | Not assigned
12 | V/f mode

			VSA/HSA		-
810D		0	0	32767	2/4

1730	**OPERATING_MODE**			D04	**CR:** DD1
-	Operating mode display			UNS.WORD	Immediately

This data displays the actual operating mode.

Operating mode display
Bit No. | Significance 0 = off 1 = on

---

0 | FDD
1-3 | Not assigned
4 | MSD
5-7 | Not assigned
8, only 840D | IM open-loop
9, only 840D | IM, closed-loop
10-11 | Not assigned
12 | V/f mode

			HSA SLM VSA		-
P2		1	1	65535	2/4

1731	**CL1_PO_IMAGE**			D04, EXP	**CR:** DB1
-	Image ZK1_PO register			UNS. WORD	sofort

This machine data is used to display the internal power-on alarm register. Machine data MD 1600: ALARM_MASK_POWER_ON is not taken into account for this diagnostic data.

Suppressed PO alarms (MD1600) are also displayed

If bit n is set to 1, alarm 300500 + n is displayed.

			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1731	**CL1_PO_IMAGE**				**CR:** DB1
-	Image ZK1_PO register			UNS. WORD	sofort
This machine data is used to display the internal power-on alarm register. Machine data MD 1600: ALARM_MASK_POWER_ON is not taken into account for this diagnostic data. Suppressed PO alarms (MD1600) are also displayed If bit n is set to 1, alarm 300500 + n is displayed.					
			VSA/HSA		-
810D		0	0	32767	2/4

1731	**CL1_PO_IMAGE**			D04	**CR:** DB1
-	Image ZK1_PO register			UNS.WORD	Immediately
This machine data is used to display the internal power-on alarm register. Machine data MD 1600: ALARM_MASK_POWER_ON is not taken into account for this diagnostic data. Suppressed PO alarms (MD1600) are also displayed If bit n is set to 1, alarm 300500 + n is displayed.					
			HSA SLM VSA		-
P2		0	0	65535	2/4

1732	**CL1_RES_IMAGE**			D04, EXP	**CR:** DB1
-	Image ZK1_RES register			UNS. WORD	sofort
This machine data is used to display the internal alarm reset register. MD 1601: ALARM_MASK_RESET is not taken into account for this diagnostic data. Suppressed RESET alarms (MD1601) are also displayed If bit n is set to 1, alarm 300600 + n is displayed. Note This display value is only reset by an NC-side reset (software reset).					
			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1732	**CL1_RES_IMAGE**				**CR:** DB1
-	Image ZK1_RES register			UNS. WORD	sofort
This machine data is used to display the internal alarm reset register. MD 1601: ALARM_MASK_RESET is not taken into account for this diagnostic data. Suppressed RESET alarms (MD1601) are also displayed If bit n is set to 1, alarm 300600 + n is displayed. Note This display value is only reset by an NC-side reset (software reset).					
			VSA/HSA		-
810D		0	0	32767	2/4

1732	**CL1_RES_IMAGE**			D04	**CR:** DB1
-	Image ZK1_RES register			UNS.WORD	Immediately
This machine data is used to display the internal alarm reset register. MD 1601: ALARM_MASK_RESET is not taken into account for this diagnostic data. Suppressed RESET alarms (MD1601) are also displayed If bit n is set to 1, alarm 300600 + n is displayed. Note This display value is only reset by an NC-side reset (software reset).					
			HSA SLM VSA		-
P2		0	0	65535	2/4

1733	**LPFC_DIAGNOSIS**			EXP	**CR:** DD1
-	NPFK diagnosis counter			UNS. WORD	sofort
This diagnostics machine data provides information as to how often the motor temperature and DC link measurement were erroneous through the lower-priority frequency channel. Thus, the machine data is indirectly a hardware indicator (HW diagnostics status indication) for the lower-priority frequency channel. Note This machine data is always reset when the drive is powered-up.					
			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1733	**LPFC_DIAGNOSIS**				**CR:** DD1
-	NPFK diagnosis counter			UNS. WORD	sofort
This diagnostics machine data provides information as to how often the motor temperature and DC link measurement were erroneous through the lower-priority frequency channel. Thus, the machine data is indirectly a hardware indicator (HW diagnostics status indication) for the lower-priority frequency channel. Note This machine data is always reset when the drive is powered-up.					
			VSA/HSA		-
810D		0	0	32767	2/4

1733	**LPFC_DIAGNOSIS**			EXP	**CR:** DD1
-	NPFK diagnosis counter			UNS.WORD	Immediately
This diagnostics machine data provides information as to how often the motor temperature and DC link measurement were erroneous through the lower-priority frequency channel. Thus, the machine data is indirectly a hardware indicator (HW diagnostics status indication) for the lower-priority frequency channel. Note This machine data is always reset when the drive is powered-up.					
			HSA SLM VSA		-
P2		0	0	65535	2/4

1734	**DIAG_ROTORPOS_IDENT**		-		**CR:** DM1
-	Rotor position identification diagnosis		WORD		sofort

0: Function has not been selected or not yet terminated
1: Function successfully terminated (analysis procedure 1)
2: Function successfully terminated (analysis procedure 2)

-1: Measurement has not given a significant result, Remedy: Increase current in MD1019
-2: Current could not be reduced in time during the measurement
Remedy: Check armature inductance (MD1116) and increase, if necessary
-3: During the measurement, the motor has moved to a greater extent than permitted in MD1020
Remedy: Increase permissible turn (MD1020) or reduce current value (MD1019)
-4: Insufficient increase in current; we assume that the motor has not been connected correctly
Remedy: Check motor clamps
-5: The current limits of the motor or power section have been exceeded
Remedy: Check current limits or reduce armature inductance (MD1116).
-6: Longest admissible duration RLI has been exceeded (RLI with movement): no steady rotor position value was reached within the admissible duration
-7: No unique rotor position has been found (RLI with movement): the motor can presumably not move freely (e.g. motor stalled, axis with very high friction)

If rotor position identification was performed successfully, the content of P1075 is copied to P1734 for diagnosis purposes.

			VSA		ROT/LIN
840D		0	-7	3	2/4

1734	**DIAG_ROTORPOS_IDENT**			-	**CR:** DM1
-	Rotor position identification diagnosis			WORD	Immediately

0: Function has not been selected or not yet terminated
1: Function successfully terminated (analysis procedure 1)
2: Function successfully terminated (analysis procedure 2)
3: Function being performed successfully (motion-based method)
6: Function being performed successfully (elasticity-based method)

-1: Measurement has not given a significant result, Remedy: Increase current in MD 1019
-2: Current could not be reduced in time during the measurement
Remedy: Check armature inductance (MD 1116) and increase, if necessary
-3: During the measurement, the motor has moved to a greater extent than permitted in MD 1020
Remedy: Increase permissible turn (MD 1020) or reduce current value (MD 1019)
-4: Insufficient increase in current; we assume that the motor has not been connected correctly
Remedy: Check motor clamps
-5: The current limits of the motor or power section have been exceeded
Remedy: Check current limits or reduce armature inductance (MD 1116).
-6: Longest admissible duration RLI has been exceeded (RLI with movement): no steady rotor position value was reached within the admissible duration
-7: No unique rotor position has been found (RLI with movement): the motor can presumably not move freely (e.g. motor stalled, axis with very high friction)
-11: ATAN calculation error: 0/0
-12: Insufficient no. of measuring points
-13: Outlier in the measuring series
-14: Maximum rotation without current
-15: No positive edge found
-16: The result obtained with Fourier transformation differs by more than 30 degrees from the rough estimate
-17: Result testing failed
-18: No negative measured value found
-1000: Excessive no. of tests: more than 3 (will be added to the last measurement)

If rotor position identification was performed successfully, the content of P1075 is copied to P1734 for diagnosis purposes.

			SLM VSA		-
P2		0	-1018	6	2/4

1735	**PROCESSOR_LOAD**			-	**CR:** DD1
%	Processor load			UNS. WORD	sofort
The processor load display provides on-line information on the available CPU resources.					
			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1735	**PROCESSOR_LOAD**			-	**CR:** DD1
%	Processor load			UNS.WORD	Immediately
The processor load display provides on-line information on the available CPU resources.					
			HSA SLM VSA		-
P2		0	0	65535	2/4

1736	**TEST_ROTORPOS_IDENT**			D04	**CR:** DM1
-	Rotor position identification			UNS. WORD	sofort

Setting MD 1736 = 1 performs a test rotor position identification. The rotor angle used by the controller is not changed.

MD 1737: DIFF_ROTORPOS_IDENT is described; an alarm is issued in the event of an error. MD 1736 is set to 0 after measurement.

The test function is used to optimize the accuracy in conjunction with MD 1019: CURRENT_ROTORPOS_IDENT.

			VSA		ROT/LIN
840D		0	0	1	2/4

1736	**TEST_ROTORPOS_IDENT**			D04	**CR:** DM1
-	Rotor position identification			UNS.WORD	Immediately

Rotor position identification is performed for test purposes by setting MD 1736 = 1. The rotor position angle used by the controller is not changed.

With 6.7.7 or later with prodecure 3 (MD 1075=3) and with braking control released (MD 1060 = 1), bit 1 must be set in addition for starting (MD 1736 = 3).

MD 1737: DIFF_ROTORPOS_IDENT is defined, an alarm is output when a fault occurs. MD 1736 is set to 0 when the measurement has been completed.

The test function serves for optimizing the accuracy in conjunction with

MD 1019: CURRENT_ROTORPOS_IDENT.

			VSA SLM		-
P2		0	0	3	2/4

1737	**DIFF_ROTORPOS_IDENT**			-	**CR:** DM1
Grad	Rotor position identification difference			FLOAT	sofort

After performing rotor position identification, the difference between the rotor angle determined and that currently used by the rotor controller is entered in the machine data and displayed.

			VSA		ROT/LIN
840D		0.0000	-100000.0000	100000.0000	2/4

1737	**DIFF_ROTORPOS_IDENT**			-	**CR:** DM1
degrees	Rotor position identification difference			FLOAT	Immediately

After performing rotor position identification, the difference between the rotor angle determined and that currently used by the rotor controller is entered in the machine data and displayed.

			VSA SLM		-
P2		0.000000	-100000.000000	100000.000000	2/4

1790	**ENC_TYPE_MOTOR**			D04, D06	**CR:** DG1
-	Measuring circuit type, indirect measuring system			WORD	sofort

This machine data indicates the measuring circuit code number of the indirect measuring system (motor).

Measuring circuit code number

0 IPU (V) raw voltage signals

1-15 Reserved

16 EnDat encoder

			VSA/HSA		ROT/LIN
840D		0	-1	32767	2/4

1790	**ENC_TYPE_MOTOR**				**CR:** DG1
-	Measuring circuit type, indirect measuring system			WORD	sofort

This machine data indicates the measuring circuit code number of the indirect measuring system (motor).

Measuring circuit code number
0 IPU (V) raw voltage signals
1-15 Reserved
16 EnDat encoder

			VSA/HSA		-
810D		0	0	32767	2/4

1790	**ENC_TYPE_MOTOR**			D04	**CR:** DG1
-	Measuring circuit type, indirect measuring system			WORD	Immediately

This machine data indicates the measuring circuit code number of the indirect measuring system (motor).

Measuring circuit code number
0 IPU (V) raw voltage signals
1-15 Reserved
16 EnDat encoder

			HSA SLM VSA		-
P2		0	-1	32767	2/4

1791	**ENC_TYPE_DIRECT**				**CR:** DG1
-	Measuring circuit type, direct measuring system			WORD	sofort

This machine data indicates the measuring circuit code number of the direct measuring system, if inserted.

Measuring circuit type, direct measuring system

Value I Significance

- 1 No measuring system available
0 IPU (V) raw voltage signals
1 IPU (C) raw current signals (FDD)
2-15 Reserved
16 EnDat encoder

			VSA/HSA		-
810D		0	0	32767	2/4

1791	**ENC_TYPE_DIRECT**		D04, D06	**CR:** DG1	
-	Measuring circuit type, direct measuring system		WORD	sofort	

This machine data indicates the measuring circuit code number of the direct measuring system, if inserted.

Measuring circuit type, direct measuring system

Value I Significance

- 1 No measuring system available
0 IPU (V) raw voltage signals
1 IPU (C) raw current signals (FDD)
2-15 Reserved
16 EnDat encoder

			VSA/HSA		ROT/LIN
840D		0	-1	32767	2/4

1791	**ENC_TYPE_DIRECT**		D04	**CR:** DG1	
-	Measuring circuit type, direct measuring system		WORD	Immediately	

This machine data indicates the measuring circuit code number of the direct measuring system, if inserted.

Measuring circuit type, direct measuring system

Value I Significance

- 1 No measuring system available
0 IPU (V) raw voltage signals
1 IPU (C) raw current signals (FDD)
2-15 Reserved
16 EnDat encoder

			HSA SLM VSA		-
P2		0	-1	32767	2/4

1796	**HW_VERSION**			EXP	**CR:** FBA
-	Hardware version			UNS. WORD	sofort

The following module types are displayed:
01 = incompatible module (not supported by this drive software)
03 = compatible module (supported by the drive software)

11 = 611D with submodules

21 = Standard1 30Mhz Sida without Safety, no encoder amplitude control
23 = Standard2 30Mhz Sida with Safety

31 = Performance1 32Mhz Sida
33 = Performance1 60Mhz Sida C
35 = Performance2 80Mhz Sida C

75 = CCU3 with 6 measuring circuits
77 = CCU3 with more than 6 measuring circuits

			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1796	**HW_VERSION**			D04	**CR:** FBA
-	HW_VERSION			UNS.WORD	Immediately

The following module types are displayed:
01 = incompatible module (not supported by this drive SW)
03 = compatible module (supported by the drive SW)

11 = 611D with submodules

21 = Standard1 30Mhz Sida no Safety, no encoder amplitude control
23 = Standard2 30Mhz Sida with Safety
25 = Standard2 80Mhz Sida C
31 = Performance1 32Mhz Sida
33 = Performance1 60Mhz Sida C
35 = Performance2 80Mhz Sida C

75 = CCU3 with 6 measuring circuits
77 = CCU3 with more than 6 measuring circuits

			HSA SLM VSA		-
P2		0	0	65535	2/4

1797	**PBL_VERSION**				**CR:** DD1
-	Data version			UNS. WORD	sofort

Output of the actual data version (machine data list).

			VSA/HSA		-
810D		0	0	32767	2/4

1797	**PBL_VERSION**			EXP	**CR:** DD1
-	Data version			UNS. WORD	sofort
Output of the actual data version (machine data list).					
			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1797	**PBL_VERSION**			EXP	**CR:** DD1
-	Data version			UNS.WORD	Immediately
Output of the actual data version (machine data list).					
			HSA SLM VSA		-
P2		0	0	65535	2/4

1798	**FIRMWARE_DATE**			D04, EXP	**CR:** DD1
-	Firmware date			UNS. WORD	sofort
Outputs the coded software date as a decimal number. It is structured as follows: DDMMY, whereby DD = day, MM = month and Y = last number of the year. An example: 01.06.1993 corresponds to 01063_dec					
			VSA/HSA		ROT/LIN
840D		0	0	65535	2/4

1798	**FIRMWARE_DATE**				**CR:** DD1
-	Firmware date			UNS. WORD	sofort
Outputs the coded software date as a decimal number. It is structured as follows: DDMMY, whereby DD = day, MM = month and Y = last number of the year. An example: 01.06.1993 corresponds to 01063_dec					
			VSA/HSA		-
810D		0	0	32767	2/4

1798	**FIRMWARE_DATE**			D04	**CR:** DD1
-	Firmware date			UNS.WORD	Immediately
Outputs the coded software date as a decimal number. It is structured as follows: DDMMY, whereby DD = day, MM = month and Y = last number of the year. An example: 01.06.1993 corresponds to 01063_dec					
			HSA SLM VSA		-
P2		0	0	65535	2/4

1799	**FIRMWARE_VERSION**				**CR:** DD1
-	Firmware release			UNS. DWORD	sofort
Displays the current software release as a decimal number e. g. 21000. This corresponds to release 2.10/00.					
			VSA/HSA		-
810D		0	0	32767	2/4

1799	**FIRMWARE_VERSION**			D04	**CR:** DD1
-	Firmware release			UNS. DWORD	sofort
Displays the current software release as a decimal number e. g. 21000. This corresponds to release 2.10/00.					
			VSA/HSA		ROT/LIN
840D		0	0	2147483647	2/4

1799	**FIRMWARE_VERSION**			D04	**CR:** DD1
-	Firmware release			UNS.DWORD	Immediately
Displays the current software release as a decimal number e. g. 21000. This corresponds to release 2.10/00.					
			HSA SLM VSA		-
P2		0	0	4294967295	2/4

2005	**ENC_RESOL_MOTOR_M2**			D06	**CR:**
-	Motor measuring system encoder increments			UNS. WORD	PowerOn
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the encoder increments per motor revolution of the motor measuring system. The machine data is parameterized via "motor selection". Note: The actual value assignment of the motor measuring system for FDD/MSD must be the same as the drive configuration (axis-specific MD 31020 [0]: ENC_RESOL).					
			HSA		ROT
840D		2048	1	65535	2/4

2098	**INVERTER_MAX_CURR_DERAT_M2**			D05	**CR:** DE1, DM1
A	PS derating limit current			FLOAT	sofort
The maximum current of the power section delimited by derating is shown in the display data MD 2098 [A_eff] (2nd motor).					
			HSA		ROT
840D		200.0000	0.0000	500.0000	2/4

2099	**INVERTER_DERATING_FACT_M2**			D05	**CR:** DE1, DM1
%	PS limit current derating			FLOAT	sofort
During startup, the currently effective derating factor is calculated depending on the pulse rate and the derating factor X1. For the 2nd motor, it can be read out in the display data MD 2099. Also see: MD 1178 MD 1179					
			HSA		ROT
840D		0.0000	0.0000	100.0000	2/4

2100	**PWM_FREQUENCY_M2**			D01, D05, EXP	**CR:**
Hz	Pulse-width modulation frequency			FLOAT	PowerOn

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Using this machine data, the sampling frequency is determined in the PWM inverter. The standard preassignment (default) is dependent on the motor type (FDD = 4000, MSD = 3200) and is configured by the drive configuration at start-up. The frequency value setting is realized on the MMC side (refer to the attached table).

Although various intermediate stages can be set, only the following frequencies are practical: 2000, 2666, 3200, 4000, 5333, 8000 Hz.

If possible, the synchronous switching frequencies should be selected (4000, 8000 Hz). If a frequency greater than the standard frequency is used, then it must be taken into account that the current loading capability of the drive converter is decreased (refer to the Planning Guide for the de-rating characteristic).

It is practical to increase the switching frequency for low-leakage or high-speed third-party drives (motor frequency > 500 Hz), and this must already be taken into account when the power module is dimensioned. Further, it may be practical to modify the standard switching frequency in order to reduce motor noise.

Pulse-width modulation frequency

Standard value	f_PBM in Hz	T_PBM in µs
MSD	3200	312.5
FDD	4000	250.0
-	5333.3....	187.5
-	8000	125

Note:

The pulse frequency can only be entered in the value steps specified above in the table. Other frequencies are rounded-off to the next value in the table (e.g. 3150 Hz becomes 3200 Hz).

			HSA		ROT
840D		3200.0000	2000.0000	8000.0000	2/4

2102	**MOTOR_CODE_M2**			D04, D05	**CR:**
-	Motor code number			UNS. WORD	PowerOn

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the motor code number corresponding to the motor MLFB (machine-readable product designation for Siemens motors). The motor code number is automatically generated from the MFLB when using the start-up tool. The user does not have to make any manual entries (also refer to MD 1106: INVERTER_CODE). For the start-up tool/MMC 102/103, the following motor data are automatically transferred from an internal motor table using the motor code number. If you do not have a start-up tool/MMC102/103 at your disposal, you can enter data manually.

Note

If a valid motor MLFB (code number) is not specified in MD 1102 (e. g. "0" --> third-party motors), then all of the machine data must be entered manually.

			HSA		ROT
840D		0	0	65535	2/4

2103	**MOTOR_NOMINAL_CURRENT_M2**			D05	**CR:**
A	Motor rated current			FLOAT	PowerOn

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the rated current (RMS value), which is drawn by the motor when operated at rated torque and rated motor speed. The input is made using the motor data sheet (third-party motor) or using automatic parameterization with the input and transfer of the motor code number in MD 1102: MOTOR_CODE.

			HSA		ROT
840D		0.0000	0.0000	500.0000	2/4

2117	**MOTOR_INERTIA_M2**			D05	**CR:**
kgm2	Motor moment of inertia			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the motor moment of inertia from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE (for motors without holding brake).

This MD is included in the controller data calculation.

			HSA		ROT
840D		0.0010	0.0000	32.0000	2/4

2119	**SERIES_INDUCTANCE_M2**			D05	**CR:**
mH	Inductance of the series reactor			FLOAT	PowerOn

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

For special high-speed asynchronous motors or low leakage asynchronous motors, a series reactor is generally required to ensure stable current controller operation. The inductance of the reactor is taken into account in the current model.

			HSA		ROT
840D		0.0000	0.0000	65.0000	2/4

2120	**CURRCTRL_GAIN_M2**			D01, EXP	**CR:**
V/A	Current controller P gain			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the current controller proportional gain or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function (from the motor and power module data).					
			HSA		ROT
840D		10.0000	0.0000	10000.0000	2/4

2121	**CURRCTRL_INTEGRATOR_TIME_M2**			D01, EXP	**CR:**
us	Current controller integral action time			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the current controller integral action time or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function. Note The integral component can be disabled by entering TN = 0.					
			HSA		ROT
840D		2000.0000	0.0000	8000.0000	2/4

2125	**UF_MODE_RAMP_TIME_1_M2**			D04, EXP	**CR:**
s	Ramp-up time 1 in V/f operation			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). If V/f operation is selected (MD 1014), this is the time, in which the speed set-point is changed from 0 to the maximum motor speed (MD 1146). Either time 1 or time 2 (MD1126) can be selected via IS "ramp-up time" DB31, ... DBX 20.0.					
			HSA		ROT
840D		5.0000	0.0100	100.0000	2/4

2126	**UF_MODE_RAMP_TIME_2_M2**			D04, EXP	**CR:**
s	Ramp-up time 2 in V/f operation			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). If V/f operation is selected (MD 1014), this is the time, in which the speed set-point is changed from 0 to the maximum motor speed (MD 1146). Either time 1 or time 2 (MD1126) can be selected via IS "ramp-up time" DB31, ... DBX 20.0.					
			HSA		ROT
840D		5.0000	0.0100	100.0000	2/4

2127	**UF_VOLTAGE_AT_F0_M2**			D04, D05, EXP	**CR:**
V	Voltage at f=0 in V/f operation			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). When V/f operation is selected (MD1014), and at frequency 0, the voltage to be output is increased by this value. The MD is set to the default value by the operator initiating the "Calculate controller data" function .					
			HSA		ROT
840D		2.0000	0.0000	20.0000	2/4

2129	**POWER_FACTOR_COS_PHI_M2**			D05	**CR:**
-	Cos phi power factor			FLOAT	PowerOn
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Cos phi is required to calculate the equivalent circuit diagram data from the rating plate data.					
			HSA		ROT
840D		0.8000	0.0000	1.0000	2/4

2130	**MOTOR_NOMINAL_POWER_M2**			D05	**CR:**
kW	Rated motor output			FLOAT	PowerOn
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the rated motor output from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			HSA		ROT
840D		0.0000	0.0000	1500.0000	2/4

2132	**MOTOR_NOMINAL_VOLTAGE_M2**			D05	**CR:**
V	Rated motor voltage			FLOAT	PowerOn
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the rated motor voltage from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			HSA		ROT
840D		380.0000	0.0000	5000.0000	2/4

2134	**MOTOR_NOMINAL_FREQUENCY_M2**			D05	**CR:**
Hz	Rated motor frequency			FLOAT	PowerOn
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the rated motor frequency from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			HSA		ROT
840D		50.0000	0.0000	3000.0000	2/4

2135	**MOTOR_NOLOAD_VOLTAGE_M2**			D05	**CR:**
V	Motor no-load voltage			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the motor no-load voltage from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			HSA		ROT
840D		0.0000	0.0000	500.0000	2/4

2136	**MOTOR_NOLOAD_CURRENT_M2**			D05	**CR:**
A	Motor no-load current			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the motor no-load current (RMS) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. The no-load current is assigned when the motor is selected from the list of motors or set according to the data sheet of the motor manufacturer. If the manufacturer of the motor has not specified the no-load current, the following formula may be used to calculate the value: MD 1136 = MD 1114 x 60 [sec] / (1000 x sq-root (3) x MD 1112 x MD 1116) MD 1112: NUM_POLE_PAIRS MD 1114: EMF_VOLTAGE MD 1116: ARMATURE_INDUCTANCE					
			HSA		ROT
840D		0.0000	0.0000	500.0000	2/4

2137	**STATOR_COLD_RESISTANCE_M2**			D05	**CR:**
Ohm	Cold stator resistance			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the stator resistance (cold condition) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.					
			HSA		ROT
840D		0.0000	0.0000	120.0000	2/4

2138	**ROTOR_COLD_RESISTANCE_M2**			D05	**CR:**
Ohm	Cold rotor resistance			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the rotor resistance (cold condition) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. This MD is included in the controller data calculation.					
			HSA		ROT
840D		0.0000	0.0000	120.0000	2/4

2139	**STATOR_LEAKAGE_REACTANCE_M2**			D05	**CR:**
Ohm	Stator leakage reactance			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the stator leakage reactance from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.

This MD is included in the controller data calculation.

			HSA		ROT
840D		0.0000	0.0000	100.0000	2/4

2140	**ROTOR_LEAKAGE_REACTANCE_M2**			D05	**CR:**
Ohm	Rotor leakage reactance			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the rotor leakage reactance from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.

This MD is included in the controller data calculation.

			HSA		ROT
840D		0.0000	0.0000	100.0000	2/4

2141	**MAGNETIZING_REACTANCE_M2**			D05	**CR:**
Ohm	Magnetizing reactance			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the magnetizing reactance from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.

This MD is included in the controller data calculation.

			HSA		ROT
840D		0.0000	0.0000	1000.0000	2/4

2142	**FIELD_WEAKENING_SPEED_M2**			D05	**CR:**
1/min	Threshold speed for field weakening			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the threshold speed for field weakening from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. In the field-weakening range, the magnetizing inductance L_h linearly increases from the saturated value at the threshold speed for the field weakening up to the non-saturated value at the higher speed of the L_h characteristic.

If the manufacturer of the motor has not specified the threshold speed, it can be calculated using the following formula:

MD 1142 = 380 V x 1000 [rpm] / MD 1114

MD 1114: EMF_VOLTAGE

This MD is included in the controller data calculation.

			HSA		ROT

840D		0.0000	0.0000	100000.0000	2/4

2143	**LH_CURVE_UPPER_SPEED_M2**	-	**CR:**
1/min	Upper speed for the L_h characteristic	FLOAT	PowerOn

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the upper speed for the L_h characteristic (main field inductance L_h) using the motor data sheet (third-party motor) or automatically parameterized when the motor code number is entered and transferred in MD1102: MOTOR_CODE. The magnetizing inductance in the field-weakening range increases linearly from the saturated value at the threshold speed for field weakening up to the unsaturated value at the upper speed of the L_h characteristic (see graphical representation of MD 1144).

			HSA		ROT
840D		0.0000	0.0000	100000.0000	2/4

2144	**LH_CURVE_GAIN_M2**	-	**CR:**
%	Gain factor of the L_h characteristic	FLOAT	PowerOn

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the gain factor (L_h2 /L_h1) of the L_h characteristic (magnetizing inductance) from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE. In the field-weakening range, the magnetizing inductance L_h linearly increases from the saturated value at the threshold speed of field weakening to the non-saturated value at the upper speed of the L_h characteristic.

Note

100 % should be entered if the value is not known, so that the magnetizing inductance is constant over the complete speed range.

			HSA		ROT
840D		100.0000	100.0000	500.0000	2/4

2145	**STALL_TORQUE_REDUCTION_M2**	D05	**CR:**
%	Stall torque reduction factor	FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the stall torque factor from the motor data sheet. The stall torque limit application point is changed using this machine data.

For settings greater than 100 %, the application point is increased, and for less than 100 %, the application point is decreased.

			HSA		ROT
840D		100.0000	5.0000	1000.0000	2/4

2146	**MOTOR_MAX_ALLOWED_SPEED_M2**		D05	**CR:**
1/min	Maximum motor speed		FLOAT	PowerOn

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the maximum motor speed using the motor data sheet (third-party motor) or using automatic parameterization with the input and transfer of the motor code number in MD 1102: MOTOR_CODE.
This MD is included in the controller data calculation.

If the actual speed value exceeds the speed limit (MD 1147) by more than 4 percent, the torque limit (motoring) is internally set to 0, i.e. further acceleration is prevented.
If the motor actual speed falls below the value of MD 1146 + 2%, the torque limit is also reset to its original value.
With an appropriate setting, it is possible that the "speed controller at its limit" monitoring responds (response threshold MD 1606 > MD 1146 and response time > MD1605).

Reference: /IAD/Start-up Guide SINUMERIK 840D

			HSA		ROT
840D		1500.0000	0.0000	100000.0000	2/4

2147	**SPEED_LIMIT_M2**		D02, D05	**CR:**
1/min	Motor speed limit		FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the maximum permissible motor speed or automatic parameterization (initialization) is performed by the operator initiating the "Calculate controller data" function using the machine data.

- FDD: MD 1400: MOTOR_RATED_SPEED x 110 %
- MSD: MD 1146: MOTOR_MAX_ALLOWED_SPEED

If the actual speed value exceeds the speed limit (MD 1147) by more than 4 percent, the torque limit (motoring) is internally set to 0, i.e. further acceleration is prevented.

If the motor actual value falls below the value of MD 1147 + 2%, the torque limit is also reset to its original value.
With an appropriate setting, it is possible that the "speed controller at its limit" monitoring responds (response threshold MD 1606 > MD 1147 and response time > MD1605).

			HSA		ROT
840D		8000.0000	0.0000	100000.0000	2/4

2148	**ACTUAL_STALL_POWER_SPEED_M2**		D04	**CR:**
1/min	Threshold speed of pull-out power		FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Display of speed from which the torque characteristic drops according to the function $1/n^2$.

			HSA		ROT
840D		0.0000	-100000.0000	100000.0000	2/4

2150	**FIELDCTRL_GAIN_M2**			D01, EXP	**CR:**
A/(Vs)	Flux controller P-gain			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the flux controller proportional gain or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function.					
			HSA		ROT
840D		400.0000	0.0000	100000.0000	2/4

2151	**FIELDCTRL_INTEGRATOR_TIME_M2**			D01, EXP	**CR:**
ms	Flux controller integral-action time			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the flux controller integral-action time or it is automatically parameterized (initialized) using calculate contr. MD.					
			HSA		ROT
840D		10.0000	0.0000	500.0000	2/4

2160	**FLUX_ACQUISITION_SPEED_M2**			D01, EXP	**CR:**
1/min	Threshold speed for flux sensing			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the threshold speed for flux sensing or automatic parameterization (initialization) is performed by the operator initiating the "Calculate controller data" function. Important: This machine data is only relevant for Siemens internal purposes and may not be changed.					
			HSA		ROT
840D		1500.0000	200.0000	100000.0000	2/4

2185	**STARTUP_FACT_CURRCTRL_M2**			-	**CR:**
%	Startup factor P-IREG (M2)			FLOAT	sofort
Startup factor P-IREG: The MD is preset after selecting the motor.					
			HSA		ROT
840D		100.0000	0.0000	10000.0000	2/4

2190	**TORQUE_LIMIT_FROM_NC_M2**			D02, EXP	**CR:**
Nm	Evaluation of torque limit			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). This machine data is not relevant for SINUMERIK 840D/810D; it is not permissible to change the standard value.					
			HSA		ROT
840D		100.0000	0.0000	10000.0000	2/4

2192	**TORQUE_LIMIT_WEIGHT_M2**			D02, EXP	**CR:**
%	Weight torque			FLOAT	sofort
Analogously to HLA in MD 1192, the weight force and the torque corresponding to the weight force are set here, the torque/force limit of NC acts symmetrically upwards and downwards around this weight torque/force. For electronic counterweight, MD 1192 uses the same unit as the NC machine data (MD 32460), i.e. percentage for static torque/force (=kT*I0, for synchronous motors) and rated torque (asynchronous motors). MD 1728 facilitates the setting by displaying the current torque/force setpoint in the same format as MD 1192 and MD 32460.					
			HSA		ROT
840D		0.0000	-100.0000	100.0000	2/4

2230	**TORQUE_LIMIT_1_M2**			D02, EXP	**CR:**
%	1st torque limit			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the maximum torque referred to the stall torque (FDD) or rated motor torque (MSD). - FDD: Stall torque = MD 1118 x MD 1113 MD 1118: MOTOR_STANDSTILL_CURRENT MD 1113: TORQUE_CURRENT_RATIO - MSD: Rated motor torque = 9549 x MD 1130 / MD 1400 MD 1130: MOTOR_NOMINAL_POWER MD 1400: MOTOR_RATED_SPEED The minimum torque, power and stall torque limiting is always effective. The standard preassignment for MSD is 100%. For FDD, it is realized by the operator initiating the "Calculate controller data" function, whereby the value is obtained from the following formula: FDD : MD 1230 = (MD 1104 / MD 1118) x 100% As the current limit (MSD - MD 1238, FDD - MD 1104) additionally limits the maximum torque which can be entered, if the torque limit is increased more torque is only available, if a high current can also flow. It may then also be necessary to adapt the current limit. For MSD, the following is especially valid: in order to achieve significantly shorter accelerating times up to the maximum speed, the output and current limits must also be increased. Note If the motor is overloaded for a lengthy period of time, it may lead to impermissible overheating (shutdown with motor overtemperature), and the motor could even be destroyed.					
			HSA		ROT
840D		100.0000	5.0000	900.0000	2/4

2231	**TORQUE_LIMIT_2_M2**			D02, EXP	**CR:**
%	2nd torque limit			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). The 2nd torque limit input is the reduction factor referred the 1st torque limit (MD 1230). It is only effective if the 2nd torque limit is selected via IS "torque limit 2" DB31, ... DBX20.2, and the motor speed exceeds the value set in MD 1232: TORQUE_LIMIT_SWITCH_SPEED with hysteresis (MD 1234).					
			HSA		ROT
840D		100.0000	5.0000	100.0000	2/4

2232	**TORQUE_LIMIT_SWITCH_SPEED_M2**			D02, EXP	**CR:**
1/min	Changeover speed from MD 1230 to MD 1231			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the changeover speed, above which the 2nd torque limit (MD 1231) can be selected. With the changeover, an adjustable hysteresis becomes effective (MD 1234). The 2nd torque limit is only effective if the motor speed exceeds the speed threshold with hysteresis, and the 2nd torque limit was selected via IS "torque limit 2" DB31, ... DBX20.2.					
			HSA		ROT
840D		6000.0000	0.0000	100000.0000	2/4

2233	**TORQUE_LIMIT_GENERATOR_M2**			D02, EXP	**CR:**
%	Regenerative limiting			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). This machine data limits the torque when braking (regenerative torque limiting). The limiting is realized, referred to the maximum motor torque MD 1230: TORQUE_LIMIT_1. If the 2nd torque limit is active, the reference value is obtained from MD 1230: TORQUE_LIMIT_1 and MD 1231: TORQUE_LIMIT_2.					
			HSA		ROT
840D		100.0000	5.0000	100.0000	2/4

2234	**TORQUE_LIMIT_SWITCH_HYST_M2**			D02, EXP	**CR:**
1/min	Hysteresis MD 1232			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the hysteresis for the changeover speed set in MD 1232: TORQUE_LIMIT_SWITCH_SPEED.					
			HSA		ROT
840D		50.0000	0.0000	1000.0000	2/4

2235	**POWER_LIMIT_1_M2**			D02, EXP	**CR:**
%	1st power limit			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the maximum possible power referred to the motor output (FDD) respective to the rated motor output
(MSD - MD 1130: MOTOR_NOMINAL_POWER).
Motor output [kW] (FDD) = 1 / 9549 * (MD 1118 * MD 1113) * MD 1400
MD 1118: MOTOR_STANDSTILL_CURRENT
MD 1113: TORQUE_CURRENT_RATIO
MD 1400: MOTOR_RATED_SPEED

Using the power limiting (constant power) the torque is limited
(P=2 pi x M x n; with P = const. ==> M ~ 1/n) as shown in figure 1-1. The minimum torque, output and stall torque limits are always effective (see fig. 1-1).
The standard assignment for MSD is 100%.
For feed drives, this machine data is automatically set to the default value by the operator initiating the "Calculate controller data" function, whereby the value is obtained from the following formula:

FDD : MD 1235 = (MD 1104 / MD 1118) x 100%

For MSD, the following is especially valid: If the threshold speed for field weakening is greater than the rated speed, then the accelerating times can be shortened and the power yield increased, if only the power limit is increased (the current limit remains the same). As the current limit (MD1238) can additionally limit the maximum torque which can be entered, this results in a further increase in the power limit. However, an increased torque may only be possible if the current limit can also be increased.

Note
If the motor is overloaded for a lengthy period of time, it can lead to inadmissible overheating (shutdown with motor temperature) and can even destroy the motor. Corresponding machine data are MD 1104, MD 1145 and MD 1231 to MD 1239.

			HSA		ROT
840D		100.0000	5.0000	900.0000	2/4

2236	**POWER_LIMIT_2_M2**			D02, EXP	**CR:**
%	2nd power limit			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

The 2nd power limit input is the reduction factor referred to the 1st power limit (MD1236). It is only effective if the 2nd torque limit is selected via IS "torque limit 2" DB31, ... DBX20.2, and the motor speed exceeds the value set in MD1232: TORQUE_LIMIT_SWITCH_SPEED with hysteresis (MD 1234).

			HSA		ROT
840D		100.0000	5.0000	100.0000	2/4

2238	**CURRENT_LIMIT_M2**			D02	**CR:**
%	Motor current limit			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the maximum permissible motor current referred to the rated motor current, MD 1103: MOTOR_NOMINAL_CURRENT. In order to shorten the ramp-up times, it may be practical to set the current limit to values > 100 % and to additionally increase the power and torque limits (MD 1230, MD 1235). If the motor current is at its limit as a result of torque and power limits which are too high, the monitoring intervenes with MD1605 / MD1606. Important If the motor is overloaded for a lengthy period of time, it may lead to inadmissible overheating (shutdown with motor overtemperature), and the motor could even be destroyed.					
			HSA		ROT
840D		150.0000	0.0000	400.0000	2/4

2239	**TORQUE_LIMIT_FOR_SETUP_M2**			D02	**CR:**
%	Torque limit in setting-up operation			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). The torque limit in setting-up operation refers to the rated torque (MSD) or the stall torque (FDD) of the motor (calculation, see MD 1230). MD 1239 is ineffective in standard operation. For setting-up operation, the minimum from the limit values of standard operation and the value set in this machine data is effective as a torque limit (see diagram for MD 1230). Setting-up operation is selected via terminal 112 of the infeed/regenerative feedback unit.					
			HSA		ROT
840D		1.0000	0.5000	100.0000	2/4

2245	**CURRENT_SMOOTH_SPEED_M2**			EXP	**CR:**
1/min	Threshold speed dep. on M setpoint smoothing			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the speed, above which the torque setpoint smoothing, switched-in with the 2nd filter (low-pass filter) in MD 1201: CURRENT_FILTER_CONFIG is activated. The user can reduce the speed ripple at higher speeds using this speed-dependent torque setpoint smoothing (MSD).

The filter remains active as a low-pass filter over the complete speed range if 0 is entered as the threshold value. For other values, two changeover speeds are calculated from MD1245 and MD1246: CURRENT_SMOOTH_HYSTERESIS:

n_top = n_threshold + n_hysteresis = MD 1245 + MD 1246

n_bottom = n_threshold - n_hysteresis = MD 1245 - MD 1246

Functionality

Changeover from bypass to low-pass characteristics if the absolute actual speed value exceeds the value n_top (|n act| >= n_top). Vice versa, bypass is selected instead of low-pass filter if the absolute actual speed is less than n_bottom (In_actI < n_bottom). If 0 is selected for the hysteresis, then both changeover speeds are the same.

Note

The speed threshold is only effective if filter 2 is configured as a low-pass filter. This machine data has no effect on the closed-loop control.

			HSA		ROT
840D		0.0000	0.0000	100000.0000	2/4

2246	**CURRENT_SMOOTH_HYSTERESIS_M2**			EXP	**CR:**
1/min	Hysteresis speed dep. M setpoint smoothing			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the hysteresis for the selected switch-in speed in MD1245: CURRENT_SMOOTH_SPEED.

			HSA		ROT
840D		50.0000	0.0000	1000.0000	2/4

2400	**MOTOR_RATED_SPEED_M2**			D05	**CR:**
1/min	Rated motor speed			FLOAT	PowerOn

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the rated motor speed from the motor data sheet (third-party motor) or it is automatically parameterized when the motor code number is entered and transferred in MD 1102: MOTOR_CODE.

This MD is used in the controller data calculation.

			HSA		ROT
840D		1450.0000	0.0000	100000.0000	2/4

2401	**MOTOR_MAX_SPEED_M2**			D02, D05	**CR:**
1/min	Maximum usable motor speed			FLOAT	PowerOn

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

The machine data defines the maximum motor operating speed. It serves as reference value of the speed setpoint interface as well as for machine data MD 1405: MOTOR_SPEED_LIMIT. The preassignment is calculated by the operator initiating the "Calculate controller data" function for FDD with the rated motor speed according to the motor data sheet, and for MSD with the maximum speed.

			HSA		ROT
840D		0.0000	0.0000	100000.0000	2/4

2403	**PULSE_SUPPRESSION_SPEED_M2**			D02	**CR:**
1/min	Shut down speed pulse suppression			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

The standard assignment is dependent on the motor type (FDD = 0, MSD = 2) and is parameterized at start-up using the drive configuration. The standard value 0 means that the machine data is switched inactive. Pulses are now exclusively suppressed via

MD 1404: PULSE_SUPPRESSION_DELAY.

When the drive controller enable is disabled (this is possible using terminal 64, from the NC or when a fault develops), the drives brake along their torque limit. If the absolute actual speed value falls below the specified speed threshold during shut down, the pulse enable is suppressed and the drives coast down.

The pulses are suppressed before this if the time, set in MD 1404, has expired.

MD1403 has to be functional if an overshoot is to be suppressed when zero speed is reached after the drive controller enable signal has been disabled.

Note

When the PLC disables the controller enable interface signal, the NC- and drives are sequentially shut down with different, adjustable delay times.

Axis-specific MD 36620: SERVO_DISABLE_DELAY_TIME and MD 36060 STANDSTILL_VELO_TOL.

If the drive develops a fault or terminal 64 is disabled, then the drive is shut down with MD 1403 and MD 1404 only.

			HSA		ROT
840D		2.0000	0.0000	7200.0000	2/4

2405	**MOTOR_SPEED_LIMIT_M2**			D02, D05	**CR:**
%	Monitoring motor speed			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

The maximum permissible speed setpoint is entered as a percentage. The reference value used is MD 1401: MOTOR_MAX_SPEED. If the speed setpoint is exceeded, it is limited to the specified value.

The MD is parameterized by the operator initiating the "Calculate controller data" function.

FDD: 110%

MSD: 100%

Note

From SW 4.2:

For limiting the speed setpoint for MSD/IM, in addition to MD 1405, the SPEED_LIMIT parameterized speed limit in MD 1147: SPEED_LIMIT is also taken into account .

The speed setpoint limit can then be defined as follows:

N max1 = 1.02 x (minimum of MD 1146, MD 1147)

M max2 = MD 1401 x MD 1405

N setmax = Minimum of N max1 , N max2

			HSA		ROT
840D		110.0000	100.0000	110.0000	2/4

2407	**SPEEDCTRL_GAIN_1_M2**			D01, D08	**CR:**
Nms/rad	P gain of speed controller			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the speed control loop P gain over the complete speed control range (exception: with adaptation enabled, refer to MD1413) and automatic parameterization (initialization) by the operator initiating the "Calculate controller data" function.

Note

When entering a P gain of 0, the associated integral component (MD 1409) is automatically de-activated.

			HSA		ROT
840D		0.3000	0.0000	1000000.0000	2/4

2408	**SPEEDCTRL_GAIN_2_M2**			D01, EXP	**CR:**
Nms/rad	P gain of upper adaptation speed			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

The speed control loop P gain is entered in the upper speed range (n > MD 1412: SPEEDCTRL_ADAPT_SPEED_2) or is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. The gains in the lower speed range (MD 1407) and in the upper speed range (MD 1408) are not mutually restricted.

Note

When entering a P gain of 0, the associated integral component (MD 1409) is automatically de-activated.

MD 1408 is not active when the speed controller adaptation is disabled (MD 1413 = 0).

			HSA		ROT
840D		0.3000	0.0000	1000000.0000	2/4

2409	**SPEEDCTRL_INTEGRATOR_TIME_1_M2**			D01, D08	**CR:**
ms	Integral action time of speed controller			FLOAT	sofort

The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2).

Enter the speed control loop integral action time over the complete speed range (exception: with adaptation enabled, refer to MD1413) and automatic parameterization (initialization) by the operator initiating the "Calculate controller data" function.

Note

Entering an integral action time of 0 disables the I component for the appropriate speed range (deleting the integral gain and the integrator contents = > torque jumps cannot be excluded).

Important

If the adaptation is active, the integral component should not be deactivated for just one speed (MD 1409 = 0 and MD 1410 = 0 or vice versa) (problem due to torque jumps when resetting the integral value at the transition from the adaptation range to the constant range).

			HSA		ROT
840D		10.0000	0.0000	500.0000	2/4

2410	**SPEEDCTRL_INTEGRATOR_TIME_2_M2**			D01, EXP	**CR:**
ms	Integral action time of upper adaptation speed			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). The speed control loop integral action time is entered in the upper speed range (n > MD 1412: SPEEDCTRL_ADAPT_SPEED_2) or is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. The integral action times in the lower speed range (MD 1409) and in the upper speed range (MD 1410) are not subject to any mutual restriction. Important If the adaptation is active, the integral component should not be deactivated for just one speed (MD 1409 = 0 and MD 1410 = 0 or vice versa) (problem due to torque jumps when resetting the integral value at the transition from the adaptation range to the constant range). Note When an integral action time of 0 is entered, the integral component for the range, which is greater than MD1412: SPEEDCTRL_ADAPT_SPEED_2, is de-activated (refer to the information in MD 1409). MD 1410 is not active when speed adaptation is cancelled (MD 1413 = 0).					
			HSA		ROT
840D		10.0000	0.0000	500.0000	2/4

2411	**SPEEDCTRL_ADAPT_SPEED_1_M2**			D01, EXP	**CR:**
1/min	Lower adaptation speed			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the lower speed threshold to adapt the speed controller machine data, or it is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. If adaptation is active, for speeds n < MD 1411, the control machine data MD 1407 and MD 1409 are active. The characteristic between the two control machine data sets is linearly interpolated in the adaptation range MD 1411 < n < MD 1412.					
			HSA		ROT
840D		0.0000	0.0000	100000.0000	2/4

2412	**SPEEDCTRL_ADAPT_SPEED_2_M2**			D01, EXP	**CR:**
1/min	Upper adaptation speed			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the upper speed threshold to adapt the speed controller machine data, or it is automatically parameterized (initialization) by the operator initiating the "Calculate controller data" function. If adaptation is active, for speeds n > MD 1412, the control machine data MD 1408 and MD 1410 are active. The characteristic between the two control machine data sets is linearly interpolated in the center range MD 1411 < n < MD 1412.					
			HSA		ROT
840D		0.0000	0.0000	100000.0000	2/4

2413	**SPEEDCTRL_ADAPT_ENABLE_M2**			D01, EXP	**CR:**
-	Select adaptation speed controller			UNS. WORD	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Using this machine data, the adaptation of the speed controller machine data can be controlled as a function of the speed. Input 0 The adaptation is not active. The speed controller settings (MD 1407 and MD 1409) are valid over the complete speed range. Machine data MD 1408 and MD 1410 are not taken into account. Input 1 Adaptation is active. For a description, refer to machine data MD 1408, MD 1410, MD 1411 and MD 1412. Note For MSD, the adaptation is automatically activated by the operator initiating the "Calculate controller data" function.					
			HSA		ROT
840D		0	0	1	2/4

2417	**SPEED_THRESHOLD_X_M2**			D03	**CR:**
1/min	Signal n_x for 'n_act < n_x'			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). The speed threshold is entered for monitoring purposes. If the actual speed falls below the selected speed threshold (absolute value), then the signal is sent to the PLC (IS "n_act <n_x" DB 31-48 DBX 94.5), see fig. 1-2.					
			HSA		ROT
840D		6000.0000	0.0000	100000.0000	2/4

2418	**SPEED_THRESHOLD_MIN_M2**			D03	**CR:**
1/min	Signal n_min for 'n_act < n_min'			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). The speed threshold is entered for monitoring purposes. If the actual speed falls below the set speed threshold (absolute value), then the signal is sent to PLC, IS "|n_act| < n_min" DB 31, ... DBX 94.4, see fig. 1-2.					
			HSA		ROT
840D		5.0000	0.0000	100000.0000	2/4

2426	**SPEED_DES_EQ_ACT_TOL_M2**			D03	**CR:**
1/min	Tolerance bandwidth for 'n_act = n_set' signal			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). The response value for the tolerance bandwidth of the PLC status signals is entered: IS "n_act = n_set" DB 31, ... DBX 94.6 and IS "ramp-up function completed" DB 31-48 DBX 94.2. The "n_act = n_set" signal becomes active, if the speed actual value enters the selected tolerance bandwidth associated with the speed setpoint, and remains within this bandwidth for a minimum of the delay time (MD 1427). The signal becomes immediately inactive when the tolerance bandwidth is exited. The "ramp-up function completed" signal becomes simultaneously active with the "n_act = n_set" signal, however, it is latched in the active state up to the next setpoint change, even if the actual speed value exits the tolerance bandwidth. The "ramp-up function completed" signal becomes immediately inactive if the setpoint changes. Functionality from SW 3.40/04 As soon as the controller signals adjustment of the speed setpoint, the tolerance bandwidth is "frozen" at the last setpoint value. The message is deleted when the setpoint moves outside the tolerance bandwidth. Thus, no messages are produced for setpoint value changes within the tolerance bandwidth. See also "ramp-up timing", MD 1723: ACTUAL_RAMP_TIME.					
			HSA		ROT
840D		20.0000	0.0000	10000.0000	2/4

2451	**SPEEDCTRL_GAIN_1_AM_M2**			D01	**CR:**
Nms/rad	P gain of speed control loop IM			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the P gain of the speed control loop in the induction motor mode or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function.					
			HSA		ROT
840D		0.3000	0.0000	100000.0000	2/4

2453	**SPDCTRL_INTEGR_TIME_1_AM_M2**			D01	**CR:**
ms	Integral action time of speed control loop IM			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the integral action time of the speed control loop in the IM mode or it is automatically parameterized (initialized) by the operator initiating the "Calculate controller data" function.					
			HSA		ROT
840D		140.0000	0.0000	6000.0000	2/4

2458	**DES_CURRENT_OPEN_LOOP_AM_M2**			D01	**CR:**
%	Current setpoint controlled range IM			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). In the pure IM mode (MD 1465 = 0), the drive operates in the current-frequency open-loop controlled mode below the changeover speed (MD 1466). In order to accept a high load torque, the motor current in this range can be increased using MD 1458. The input is a percentage referred to the rated motor current (MD1103). The current is limited to 90% of the current limit value (MD 1238).					
			HSA		ROT
840D		90.0000	0.0000	150.0000	2/4

2459	**TORQUE_SMOOTH_TIME_AM_M2**			D01	**CR:**
ms	Torque smoothing time constant IM			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). In IM operation, a precontrol for the speed torque frequency is implemented on account of the low dynamics. The precontrol value for the torque is smoothed using MD 1459.					
			HSA		ROT
840D		4.0000	0.0000	100.0000	2/4

2465	**SWITCH_SPEED_MSD_AM_M2**			D01, D06	**CR:**
1/min	Changeover speed MSD/IM			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Above the speed set here, the drive operates in IM mode . n = 0 pure IM operation 0 < n < n max mixed MSD/IM operation n > n max only MSD operation If IM operation is selected, only pulse frequencies (MD 1100) of 4 kHz and 8 kHz are permissible. MD 1465 is set to default 0 by the operator initiating the "Calculate controller data" function if a "no" is entered in MD 1011.5 motor measuring system available.					
			HSA		ROT
840D		100000.0000	0.0000	100000.0000	2/4

2466	**SWITCH_SPD_OPEN_LOOP_AM_M2**			D01	**CR:**
1/min	Changeover speed closed/open loop IM			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). For pure IM operation (MD 1465=0) below the speed set here, current-frequency, open-loop controlled mode is used. MD1466 is set to the default value by the operator initiating the "Calculate controller data" function.					
			HSA		ROT
840D		300.0000	150.0000	100000.0000	2/4

2602	**MOTOR_TEMP_WARN_LIMIT_M2**			D02, D05	**CR:**
ÝC	Motor temperature alarm threshold			UNS. WORD	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). Enter the thermal steady-state permissible motor temperature or automatic parameterization with the input and transfer of the motor code no. in MD 1102: MOTOR_CODE. The motor temperature is sensed using a temperature sensor (KTY84) and is evaluated on the drive side. When the alarm limit is reached, a signal is issued to the PLC (IS "temperature pre-alarm, motor", DB31, ... DBX94.0) (also refer to MD 1603 and MD 1607). Terminal 5.x on the I/R module is energized, independent of MD 1601, bit 14: ALARM_MASK_RESET and signals the motor overtemperature condition.					
			HSA		ROT
840D		120	0	200	2/4

2607	**MOTOR_TEMP_SHUTDOWN_LIMIT_M2**			D02, D05	**CR:**
ÝC	Motor temperature shutdown limit			UNS. WORD	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). The motor temperature is sensed by the temperature sensor and evaluated on the drive side. When the shutdown limit is reached, the drive generates a configurable reset alarm (refer to MD 1601, bit 13). If the fault is not suppressed, the "300613 axis %1, drive %2 max. permissible motor temperature exceeded" alarm is output. Depending upon the configured response (MD 1613, bit 13) to the alarm, the unit is shut down - The pulse enable is immediately suppressed and the drive coasts down. or - The controller enable is suppressed. In this case, the drive brakes along the torque limit until MD 1404: PULSE_SUPPRESSION_DELAY or MD 1403: PULSE_SUPPRESSION_SPEED becomes active and the pulse enable is suppressed. Note The temperature monitoring function (alarm MD 1602 + time MD 1603 or MD 1607) are not subject to any mutual restrictions. This means that MD 1607 can be < MD 1602. In this case, there is no alarm before shutdown. The motor temperature sensing accuracy lies in the range 3-5 %. Terminal 5.x at the power supply module is only influenced by MD 1602.					
			HSA		ROT
840D		155	0	200	2/4

2608	**MOTOR_FIXED_TEMPERATURE_M2**			D02, D05	**CR:**
ÝC	Fixed temperature			UNS. WORD	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). If a value > 0 is entered, the temperature-dependent adaptation of the rotor resistor is executed with this fixed temperature. Note The motor temperature monitoring set using MD 1602: MOTOR_TEMP_WARN_LIMIT and MD 1607: MOTOR_TEMP_SHUTDOWN_LIMIT are then no longer effective.					
			HSA		ROT
840D		0	0	200	2/4

2711	**SPEED_LSB_M2**			EXP	**CR:**
1/min	Significance of the speed representation			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). The machine data is used to display the significance of the speed representation. The significance of bit 0 is displayed to assign the internal significance of the speed statuses to the physical rotation values.					
			HSA		ROT
840D		0.0000	-100000.0000	100000.0000	2/4

2712	**ROTOR_FLUX_LSB_M2**			EXP	**CR:**
uVs	Significance of the rotor flux representation			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). The machine data is used to display the significance of the rotor flux representation. The significance of bit 0 is displayed to assign the internal representation of the rotor flux statuses to the physical values in Vs.					
			HSA		ROT
840D		0.0000	-100000.0000	100000.0000	2/4

2713	**TORQUE_LSB_M2**			EXP	**CR:**
uNm	Significance of the torque representation			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). The machine data is used to display the significance of the torque representation.					
			HSA		ROT
840D		0.0000	-100000.0000	100000.0000	2/4

2714	**ROTOR_POS_LSB_M2**			EXP	**CR:**
Grad	Significance of rotor position representation			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). The machine data is used to assign the internal representation of the rotor position to the physical units system, degrees electrical.					
			HSA		ROT
840D		0.0000	-100000.0000	100000.0000	2/4

2725	**MAX_TORQUE_FROM_NC_M2**			EXP	**CR:**
Nm	Standardising the torque setpoint average			FLOAT	sofort
The MD of the 2nd motor has the same function as the corresponding MD for the first motor (without the additional identifier_M2). This machine data includes the reference value of the torque setpoint limit and torque limit values which are to be transferred from the NC to the drive.					
			HSA		ROT
840D		0.0000	-100000.0000	100000.0000	2/4

2.2 Drive machine data of the hydraulic module

Number	**Identifier**			Display filter	Reference
Unit	Name			Data type	Active
Description					
			Type		Rot/Lin
System		Default value	Minimal value	Maximum value	Protection

5001	**SPEEDCTRL_CYCLE_TIME**			D01, EXP	**QV:** FBHLA
31,25 us	Velocity controller clockrate			UNS. WORD	PowerOn
Sampling time used to calculate the velocity control loop. Short cycle: good dynamic response, but the noise of the actual velocity value becomes greater. Long cycle: bad dynamic response, actual velocity values include little noise.					
		4	2	16	3/3

5002	**MONITOR_CYCLE_TIME**			EXP	**QV:** FBHLA
31,25 us	Monitoring cycle			UNS. WORD	PowerOn
MD 5002 will be removed later, it does not exist with hydraulics.					
		3200	128	3200	3/3

5003	**STS_CONFIG**			EXP	**QV:** FBHLA
HEX	STS configuration			UNS. WORD	PowerOn
MD 5003 will be removed later, it does not exist with hydraulics.					
		330	0	7F0	3/3

5004	**CTRL_CONFIG**			D01	**QV:** FBHLA
HEX	Configuration structure			UNS. WORD	PowerOn
The velocity setpoints are defined in the position controller cycle. In order to avoid violent positioning movements of the drive at the beginning of each position controller cycle, the drive performs linear interpolation between the last and current velocity setpoints. Bit Meaning Bit 12=0 No interpolation, the velocity setpoint only changes in the position controller cycle Bit 12=1 Linear interpolation of the velocity setpoint over a position controller cycle					
		1000	0	1000	3/3

5005	**ENC_RESOL_MOTOR**			EXP	**QV:** FBHLA
-	Increments of rotary measuring system			UNS. WORD	PowerOn
Increments of motor measuring system					
		2048	128	65535	3/3

5008	**ENC_PHASE_ERROR_CORRECTION**			EXP, D06	**QV:** FBHLA
degrees	Encoder phase error compensation			FLOAT	immediately
Phase error compensation of the measuring system is performed with this machine data. In the case of raw signal generators, phase errors can occur between tracks A and B. These are characterized by a rougher actual value. MD 5008 is activated with bit 1 of MD 5011: ACTUAL_VALUE_CONFIG.					
		0.0	-20.0	20.0	3/3

5011	**ACTUAL_VALUE_CONFIG**			D06	**QV:** FBHLA
HEX	Configuration of actual value acquisition			UNS. WORD	PowerOn
Input of the configuration for the measuring system. Bit Meaning Bit 0=1: Inversion of actual value Bit 1=1: Phase error compensation activated Bit 3=1: Absolute value encoder (EnDat) Bit 4=1: Linear measuring system Bit 7=1: Distance-coded measuring system Bit 8=1: Selection of zero mark by NC BIT:14-15:Transmission rate EnDat					
		0	0	65535	3/3

5012	**FUNC_SWITCH**			D01, D02, D03	**QV:** FBHLA
HEX	Function switch			UNS. WORD	immediately
Input of the configuration for switch-on functionality. Only bits 2 and 8 are relevant for the user. Bit Meaning Bit 2=1: Drive ready depending on clamp Bit 4=1: DC link 2 parameterization error Bit 14=1: Offset between machine zero and actual value zero is valid Bit 15=1: Offset between piston zero and machine zero is valid					
		4	0	65535	3/3

5021	**ENC_ABS_TURN_MOTOR**			D06	**QV:** FBHLA
-	Multiturn resol. motor absolute encoder			UNS. WORD	PowerOn
No. of the absolute encoder revolutions that can be displayed. This value can only be read.					
		0	0	FFFF	3/3

5022	**ENC_ABS_RESOL_MOTOR**			D06	**QV:** FBHLA
-	Measuring steps of motor absolute track			UNS. DWORD	PowerOn
Resolution of the absolute encoder in measuring pulses per revolution. This value can only be read.					
		8192	0	7FFFFF	3/3

5023	**ENC_ABS_DIAGNOSIS_MOTOR**			D06	**QV:** FBHLA
HEX	Diagnosis of measuring circuit motor absolute track			UNS. WORD	immediately
Diagnosis bits of absolute encoder, measuring system. Bit Meaning Bit: 0=1: "Lighting failure" Bit: 1=1: "Signal amplitude too low" Bit: 2=1: "Faulty code connection" Bit: 3=1: "Overvoltage" Bit: 4=1: "Undervoltage" Bit: 5=1: "Overcurrent" Bit: 6=1: "Battery replacement required" Bit: 7=1: "Control check error" Bit: 8=1: "EnDat encoder cannot be used" Bit: 9=1: "CD track of encoder ERN1387 defective" Bit:10=1: "Protocol cannot be aborted" Bit:11=1: "SSI level detected on data cable" Bit:12=1: "TIMEOUT when reading measured value" Bit:13=1: "CRC error" Bit:14=1 unassigned Bit:15=1: "Encoder defective" Bits 12 and 15 : "Zero level monitoring SSI" Bits 14 and 15 : "Idle level monitoring SSI"					
		0	0	BFFF	3/3

5024	**DIVISION_LIN_SCALE**			D06	**QV:** FBHLA
nm	Linear scale graduations			UNS. DWORD	PowerOn
Graduations of linear scale. Parameterization supports only incremental linear measuring systems. ROD encoders must be converted by the user, that means he must enter the distance the drive traverses between two (coarse) graduation marks.					
		20000	1000	5000000	3/3

5025	**SERIAL_NO_ENCODER**			D06, EXP	**QV:** FBHLA
-	Serial no. of motor measuring system			UNS. DWORD	PowerOn
-					
		0	0	ffffffff	3/3

5027	**ENC_CONFIG**			D06	**QV:** FBHLA
HEX	Configuration of encoder IM			UNS. WORD	PowerOn
Bit Meaning Bit: 0=1: "" Bit: 1=1: "" Bit: 2=1 "" Bit: 3=1: "" Bit: 4=1: "" Bit: 5=1: "" Bit: 6=1: "" Bit: 7=1: "00:100 kHz,01:500kHz,10:1MHz,11:2MHz " Bit: 8=1: " " Bit: 9=1: "SSI encoder without incremental track" Bit:10=1: "0:Gray code, 1:Dual code" Bit:11=1: "Christmas tree format" Bit:12=1: "Parity bit existing" Bit:13=1: "Parity even" Bit:14=1 "Alarm bit existing" Bit:15=1: "SSI encoder"					
		0	0	ffff	3/3

5028	**NO_TRANSMISSION_BITS**			D06	**QV:** FBHLA
-	IM message frame length SSI			UNS. WORD	PowerOn
Overall message frame length including alarm and parity bits					
		25	0	25	3/3

5040	**PISTON_ZERO**			EXP, D04	**QV:** FBHLA
mm	Piston zero in relation to machine zero			FLOAT	immediately
Offset between piston zero (piston stop at the drive end) and machine zero. If, after reference point approach, the actual position value in the drive counts in machine coordinates, you can use this to determine the piston position (e.g. for adaptation).					
		0.0	-1000000.0	1000000.0	3/3

5041	**MACHINE_ZERO_HIGH**			EXP	**QV:** FBHLA
-	Machine zero in relation to actual position zero			DWORD	immediately
After switching on, the actual position value is equal to zero. HIGH describes the "coarse information" from the encoder. The NC determines the offset between the machine zero and the actual position zero and describes this data. The actual position value in the drive can thus count in machine coordinates. Remark : ATTR SAVE is not necessary since it is always overwritten by NC					
		0	-2147483647	7FFFFFFF	3/3

5042	**MACHINE_ZERO_LOW**			EXP	**QV:** FBHLA
-	Machine zero in relation to actual position zero			UNS. DWORD	immediately
After switching on, the actual position value is equal to zero. LOW describes the "fine information" from the encoder. The NC determines the offset between the machine zero and the actual position zero and describes this data. The actual position value in the drive can thus count in machine coordinates. Remark : ATTR SAVE is not necessary since it is always overwritten by NC					
		0	0	FFFFFFFF	3/3

5046	**NO_MAX_TESTS**			D06	**QV:** FBHLA
-	Maximum number of SSI tests			UNS. DWORD	immediately
Number of tests during encoder initialization					
		33	0	10000	3/3

5047	**VARIANZ_BORDER**			D06	**QV:** FBHLA
-	Variance limit			UNS. DWORD	immediately
Variance test limit during encoder initialization					
		40	0	10000	3/3

5100	**FLUID_ELASTIC_MODULUS**			D01	**QV:** FBHLA
bar	Modulus of elasticity for hydraulic oil			FLOAT	immediately
This machine data describes the compressibility of the hydraulic fluid. Standard fluid 11,000 bar.					
		11000	1000	21000	3/3

5101	**WORKING_PRESSURE**			D01	**QV:** FBHLA
bar	System pressure			FLOAT	PowerOn
This machine data describes the pressure supplied by the hydraulic power unit.					
		0.0	0.0	700.0	3/3

5102	**PILOT_OPERATION_PRESSURE**			D01	**QV:** FBHLA
bar	Pilot pressure			FLOAT	immediately
This machine data describes the pressure of pilot valves. Enter zero for valves which are not pilot controlled.					
		0.0	0.0	350.0	3/3

5106	**VALVE_CODE**			D05, D04	**QV:** FBHLA
-	Valve code number			UNS. WORD	immediately
This machine data represents the valve code number for a servo solenoid valve made by Bosch, selected from a list and allocated to the respective Bosch order no. The valve code number 1000 has been defined for third-party valves.					
		0	0	2000	3/3

5107	**VALVE_NOMINAL_FLOW**			D05	**QV:** FBHLA
l/min	Valve rated flow			FLOAT	immediately
This machine data describes the valve rated flow for the selected servo solenoid valve.					
		0.0	0.0	1000	3/3

5108	**VALVE_NOMINAL_PRESSURE**			D05	**QV:** FBHLA
bar	Valve rated pressure drop			FLOAT	immediately
This machine data describes the rated pressure drop per control edge of the selected servo solenoid valve.					
		35.0	1.0	200.0	3/3

5109	**VALVE_NOMINAL_VOLTAGE**			D05	**QV:** FBHLA
V	Valve rated voltage			FLOAT	immediately
This machine data describes the control voltage (generally 10 V) which must be applied in order to reach the nominal working point of the valve. (Rated flow at rated pressure drop).					
		10.0	0.5	15.0	3/3

5110	**VALVE_DUAL_GAIN_FLOW**			D05	**QV:** FBHLA
%	Valve flow knee point			FLOAT	immediately
It is possible to select valves with linear or bent characteristic. Bent characteristics fulfil the requirement for higher resolution in the lower signal range (machining) and sufficient flow in the upper signal range (rapid traverse). The knee-point position is determined with MD 5110 for the knee point "flow" and with MD 5111 for the knee point "voltage". Example: MD 5110=10%; MD 5111=40% The definition of the knee-point position means that only 10 % of the aperture cross-section (flow) is opened at 40 % of the actuating signal (i.e. when U=4V).					
		10.0	0.2	95.0	3/3

5111	**VALVE_DUAL_GAIN_VOLTAGE**			D05	**QV:** FBHLA
%	Valve voltage knee point			FLOAT	immediately
It is possible to select valves with linear or bent characteristic. Bent characteristics fulfil the requirement for higher resolution in the lower signal range (machining) and sufficient flow in the upper signal range (rapid traverse). The knee-point position is determined with MD 5110 for the knee point "flow" and with MD 5111 for the knee point "voltage". Example: MD 5110=10%; MD 5111=40% The definition of the knee-point position means that only 10 % of the aperture cross-section (flow) is opened at 40 % of the actuating signal (i.e. when U=4V).					
		10.0	0.2	95.0	3/3

5112	**VALVE_FLOW_FACTOR_A_B**			D05	**QV:** FBHLA
-	Valve flow ratio A/B			FLOAT	immediately
This machine data specifies the flow ratio between the rated flow in the A direction and the rated flow in the B direction.					
		1.0	0.5	2.0	3/3

5113	**VALVE_CONFIGURATION**			D05	**QV:** FBHLA
HEX	Valve configuration			UNS. WORD	immediately
This machine data characterizes special features of the servo solenoid valve with control bits. Bit Meaning Bit 0=0: Directly controlled valve Bit 0=1: Pilot-controlled valve Bit 1/Bit 2=00: No fail safe Bit 1/Bit 2=01: Fail safe open Bit 1/Bit 2=10: Fail safe closed Bit 1/Bit 2=11: - Bit 3=0: No differential circuit Bit 3=1: Differential circuit Bit 4=0: 7-pin connector Bit 4=1: 12-pin connector					
		0	0	13	3/3

5114	**VALVE_NATURAL_FREQUENCY**			D01, D05	**QV:** FBHLA
Hz	Valve natural frequency			FLOAT	immediately
To design the velocity controller, the transmission behavior of the servo solenoid valve is approached as PT2 low pass when converting the voltage setpoint into the spool position. The valve natural frequency can be read off at a phase shift of -90°. MD 5114 specifies the valve natural frequency for a valve modulation of +-20% with respect to a pilot pressure of 100 bar.					
		150.0	1.0	1000.0	3/3

5115	**VALVE_DAMPING**			D01, D05	**QV:** FBHLA
-	Valve damping			FLOAT	immediately
To design the velocity controller, the transmission behavior of the servo solenoid valve is approached as PT2 low pass when converting the voltage setpoint into the spool position. For values lower than 0.7, the valve damping can be determined from the amplitude rise at resonant frequency. MD 5115 specifies the valve damping for a valve modulation of +-20% with respect to a pilot pressure of 100 bar.					
		0.8	0.4	1.0	3/3

5131	**CYLINDER_PISTON_DIAMETER**			D05	**QV:** FBHLA
mm	Cylinder piston diameter			FLOAT	PowerOn
The cylinder piston diameter must be entered in this machine data.					
		0.0	0.0	2500.0	3/3

5132	**PISTON_ROD_A_DIAMETER**			D05	**QV:** FBHLA
mm	Cylinder piston rod diameter A			FLOAT	PowerOn
The diameter of the cylinder piston rod at the drive end must be entered in this machine data. In the case of a differential cylinder, both rod diameters (drive end, non-drive end) are different, and one of them can be zero.					
		0.0	0.0	2400.0	3/3

5133	**PISTON_ROD_B_DIAMETER**			D05	**QV:** FBHLA
mm	Cylinder piston rod diameter B			FLOAT	PowerOn
The diameter of the cylinder piston rod at the non-drive end must be entered in this machine data. In the case of a differential cylinder, both rod diameters (drive end, non-drive end) are different, and one of them can be zero.					
		0.0	0.0	2400.0	3/3

5134	**PISTON_STROKE**			D05	**QV:** FBHLA
mm	Piston stroke			FLOAT	immediately
The maximum piston stroke of the cylinder must be entered in this machine data.					
		0.0	0.0	3000.0	3/3

5135	**CYLINDER_DEAD_VOLUME_A**			D05	**QV:** FBHLA
ccm	Cylinder dead volume at the drive end			FLOAT	immediately
The dead volume A in relation to the cylinder volume A must be entered in this machine data. The cylinder dead volume is the fluid volume between the cylinder and the servo solenoid valve that cannot be displaced by the piston. The dead volume resulting from the pipes is parameterized separately in MD 5141 to MD 5143. The dead volume influences the natural frequency of the drive.					
		0.0	0.0	200000.0	3/3

5136	**CYLINDER_DEAD_VOLUME_B**			D05	**QV:** FBHLA
ccm	Cylinder dead volume at the non-drive end			FLOAT	immediately
The dead volume B in relation to the cylinder volume B must be entered in this machine data. The cylinder dead volume is the fluid volume between the cylinder and the servo solenoid valve that cannot be displaced by the piston. The dead volume resulting from the pipes is parameterized separately in MD 5141 to MD 5143. The dead volume influences the natural frequency of the drive.					
		0.0	0.0	200000.0	3/3

5140	**VALVE_CYLINDER_CONNECTION**			D05	**QV:** FBHLA
HEX	Connection configuration of valve cylinder			UNS. WORD	immediately
The connection configuration, i.e. the connection between the valve and the cylinder, must be entered in this machine data. Bit Meaning Bit 0=0: Valve A on cylinder A Bit 0=1: Valve A on cylinder B					
		0	0	1	3/3

5141	**PIPE_LENGTH_A**			D05	**QV:** FBHLA
mm	Pipe length at the drive end			FLOAT	immediately
If there is a pipe between the valve and the cylinder, the pipe length at the drive end must be entered in MD 5141. The dead volume of the pipe is determined from the pipe length in MD 5141 and the cable diameter in MD 5143. If the valve is mounted directly on the cylinder, zero must be entered in each case as pipe length.					
		0.0	0.0	10000.0	3/3

5142	**PIPE_LENGTH_B**			D05	**QV:** FBHLA
mm	Pipe length at the non-drive end			FLOAT	immediately
If there is a pipe between the valve and the cylinder, the pipe length at the non-drive end must be entered in MD 5142. The dead volume of the pipe is determined from the pipe length in MD 5142 and the pipe diameter in MD 5143. If the valve is mounted directly on the cylinder, zero must be entered in each case as pipe length.					
		0.0	0.0	10000.0	3/3

5143	**PIPE_INNER_DIAMETER_A_B**			D05	**QV:** FBHLA
mm	Pipe inside diameters A and B			FLOAT	immediately
If there is a pipe between the valve and the cylinder, the inside pipe diameters A and B must be entered in MD 5143. The dead volume of the pipe (at the drive end and at the non-drive end) is thus determined with the pipe lengths (MD 5141, MD 5142).					
		5.0	0.0	100.0	3/3

5150	**DRIVE_MASS**			D05	**QV:** FBHLA
kg	Mass moved by drive			FLOAT	immediately
The movement of the cylinder piston rod is transferred to other mechanical parts (e.g. table, tools...). The total mass moved must be entered in MD 5150.					
		0.0	0.0	50000.0	3/3

5151	**CYLINDER_A_ORIENTATION**			D05	**QV:** FBHLA
degrees	Mounting position at the drive end of the cylinder			FLOAT	immediately
The mounting position of the drive in relation to the drive end must be entered in degrees in this machine data. The mounting position specifies the extent to which the weight of the mass moved (MD 5150) is taken into account to calculate the servo gain and the maximum travel-in/travel-out speed. It is assumed that the moved mass is guided in the direction of the cylinder axis. If the weight of the mass is not effective in the direction of the cylinder axis, MD 5151 has to be converted accordingly.					
		0.0	-90.0	90.0	3/3

5152	**CYLINDER_FASTENING**			D05	**QV:** FBHLA
-	Fastening the cylinder			UNS. WORD	immediately
The stationary part of the HLA must be stated in this machine data: 1. The cylinder is stationary, the moving mass is fastened to the piston rod (Bit 0=0). 2. The piston is stationary, the moving mass is fastened to the cylinder (Bit0=1). Bit Meaning Bit 0=0: cylinder Bit 0=1: piston rod					
		0	0	1	3/3

5160	**PISTON_POS_MIN_NAT_FREQ**			D05	**QV:** FBHLA
mm	Piston position min. natural frequency			FLOAT	immediately
The piston position at minimum natural frequency of the drive must be entered in this machine data. MD 5160 is parameterized if an adaptation (MD 5413) of the velocity controller has been set. The natural frequency of the drive changes over the path. An adaptation which can be connected (MD 5413) is thus possible over the path and can be set via "Calculate controller data". If these calculated values are to be modified, it is possible to enter new values in MD 5162 to MD 5164.					
		0.0	0.0	3000.0	3/3

5161	**DRIVE_DAMPING**			D01, D05	**QV:** FBHLA
-	Damping the drive			FLOAT	immediately
The data for damping the drive are preset in MD 5161 on the basis of the data for valve, cylinder and mounting/ supply data. It is possible to modify these data later manually. We recommend that you confirm the calculated model data through test functions on the drive or correct them with the measured results in MD 5161.					
		0.1	0.01	1.0	3/3

5162	**DRIVE_NATURAL_FREQUENCY_A**			D01, D05	**QV:** FBHLA
Hz	Natural frequency of drive A			FLOAT	immediately
The data for the natural frequency of the drive at the drive end of the cylinder are preset in MD 5162 on the basis of the data for valve, cylinder and mounting/supply data. It is possible to modify these data later manually. We recommend that you confirm the calculated model data through test functions on the drive or correct them with the measured results in MD 5162. The natural frequency of the drive changes over the path. An adaptation which can be connected (MD 5413) is thus possible over the path and can be set via "Calculate controller data". If these calculated values are to be modified, it is possible to enter new values in MD 5162 to MD 5164.					
		1.0	1.0	2000.0	3/3

5163	**DRIVE_NATURAL_FREQUENCY**			D01, D05	**QV:** FBHLA
Hz	Natural frequency of the drive			FLOAT	immediately
The data for the natural frequency of the drive are preset in MD 5163 on the basis of the data for valve, cylinder and mounting/supply data. We recommend that you confirm the calculated model data through test functions on the drive or correct them with the measured results in MD 5163. The natural frequency of the drive changes over the path. An adaptation which can be connected (MD 5413) is thus possible over the path and can be set via "Calculate controller data". If these calculated values are to be modified, it is possible to enter new values in MD 5162 to MD 5164.					
		1.0	1.0	2000.0	3/3

5164	**DRIVE_NATURAL_FREQUENCY_B**			D01, D05	**QV:** FBHLA
Hz	Natural frequency of drive B			FLOAT	immediately
The data for the natural frequency of the drive at the non-drive end of the cylinder are preset in MD 5164 on the basis of the data for valve, cylinder and mounting/supply data. We recommend that you confirm the calculated model data through test functions on the drive or correct them with the measured results in MD 5164. The natural frequency of the drive changes over the path. An adaptation which can be connected (MD 5413) is thus possible over the path and can be set via "Calculate controller data". If these calculated values are to be modified, it is possible to enter new values in MD 5162 to MD 5164.					
		1.0	1.0	2000.0	3/3

5180	**CLOSED_LOOP_SYSTEM_DAMPING**			D01	**QV:** FBHLA
-	Desired damping closed-loop system			FLOAT	immediately
You can specify in this machine data with which damping the closed-loop system is to be calculated with "Calculate controller data". Example: Damping 0.9: Slow control loop with little overshoot Damping 0.5: Fast control loop with higher overshoot					
		0.7	0.2	1.0	3/3

5200	**NUM_OUTPUT_VCTRL_FILTERS**			D01	**QV:** FBHLA
-	Number of manipulated variable filters			UNS. WORD	immediately
The number of manipulated variable filters must be entered in this machine data. Activation of the filters: 0 No manipulated variable filter active 1 Filter 1 active 2 Filters 1 and 2 active					
		0	0	2	3/3

5201	**OUTPUT_VCTRL_FILTER_CONFIG**			D01	**QV:** FBHLA
HEX	Type of manipulated variable filter			UNS. WORD	immediately
The type of the manipulated variable filter must be entered in this machine data. The filter parameters to be set in each case are entered in the appropriate machine data (MD 5202 to MD 5215). Bit Meaning Bit 0=0: 1st filter, low pass Bit 0=1: 1st filter, band-stop filter Bit 1=0: 2nd filter, low pass Bit 1=1: 2nd filter, band-stop filter					
		0	0	3	3/3

5202	**OUTPUT_VCTRL_FIL_1_FREQ**			D01	**QV:** FBHLA
Hz	PT2 natural frequency of manipulated variable filter 1			FLOAT	immediately
Input of the natural frequency for manipulated variable filter 1 (PT 2 low pass). An input with a value <10 Hz for the natural frequency of the low pass deactivates the filter. The filter is activated with MD 5200: NUM_OUTPUT_FILTERS and MD 5201: OUTPUT_FILTER_CONFIG.					
		1000.0	10.0	8000.0	3/3

5203	**OUTPUT_VCTRL_FIL_1_DAMP**			D01	**QV:** FBHLA
-	PT2 damping of manipulated variable filter 1			FLOAT	immediately
Input of the damping for manipulated variable filter 1 (PT 2 low pass). The filter is activated with MD 5200: NUM_OUTPUT_FILTERS and MD 5201: OUTPUT_FILTER_CONFIG.					
		1.0	0.05	1.0	3/3

5204	**OUTPUT_VCTRL_FIL_2_FREQ**			D01	**QV:** FBHLA
Hz	PT2 natural frequency of manipulated variable filter 2			FLOAT	immediately
Input of the natural frequency for manipulated variable filter 2 (PT 2 low pass). An input with a value <10 Hz for the natural frequency of the low pass deactivates the filter. The filter is activated with MD 5200: NUM_OUTPUT_FILTERS and MD 5201: OUTPUT_FILTER_CONFIG.					
		1000.0	10.0	8000.0	3/3

5205	**OUTPUT_VCTRL_FIL_2_DAMP**			D01	**QV:** FBHLA
-	PT2 damping of manipulated variable filter 2			FLOAT	immediately
Input of the damping for manipulated variable filter 2 (PT 2 low pass). The filter is activated with MD 5200: NUM_OUTPUT_FILTERS and MD 5201: OUTPUT_FILTER_CONFIG.					
		1.0	0.05	1.0	3/3

5210	**OUTPUT_VCTRL_FIL_1_SUP_FREQ**			D01	**QV:** FBHLA
Hz	Blocking frequency for manipulated variable filter 1			FLOAT	immediately
Input of the blocking frequency for manipulated variable filter 1 (band-stop filter). The filter is activated with MD 5200: NUM_OUTPUT_FILTERS and MD 5201: OUTPUT_FILTER_CONFIG.					
		3500.0	1.0	7999.0	3/3

5211	**OUTPUT_VCTRL_FIL_1_BW**			D01	**QV:** FBHLA
Hz	Bandwidth of manipulated variable filter 1			FLOAT	immediately
Input of the -3dB bandwidth for manipulated variable filter 1 (band-stop filter). The filter is activated with MD 5200: NUM_OUTPUT_FILTERS and MD 5201: OUTPUT_FILTER_CONFIG.					
		500.0	5.0	7999.0	3/3

5212	**OUTPUT_VCTRL_FIL_1_BW_NUM**			D01	**QV:** FBHLA
Hz	Numerator bandwidth of manipulated variable filter 1			FLOAT	immediately
Input of the numerator bandwidth for the damped band-stop filter for manipulated variable filter 1. Input of the value 0 initializes the filter as undamped band-stop filter. The filter is activated with MD 5200: NUM_OUTPUT_FILTERS and MD 5201: OUTPUT_FILTER_CONFIG.					
		0.0	0.0	7999.0	3/3

5213	**OUTPUT_VCTRL_FIL_2_SUP_FREQ**			D01	**QV:** FBHLA
Hz	Blocking frequency of manipulated variable filter 2			FLOAT	immediately
Input of the blocking frequency for manipulated variable filter 2 (band-stop filter). The filter is activated with MD 5200: NUM_OUTPUT_FILTERS and MD 5201: OUTPUT_FILTER_CONFIG.					
		3500.0	1.0	7999.0	3/3

5214	**OUTPUT_VCTRL_FIL_2_BW**			D01	**QV:** FBHLA
Hz	Bandwidth of manipulated variable filter 2			FLOAT	immediately
Input of the -3dB bandwidth for manipulated variable filter 2 (band-stop filter). The filter is activated with MD 5200: NUM_OUTPUT_FILTERS and MD 5201: OUTPUT_FILTER_CONFIG.					
		500.0	5.0	7999.0	3/3

5215	OUTPUT_VCTRL_FIL_2_BW_NUM		D01	QV: FBHLA	
Hz	Numerator bandwidth of manipulated variable filter 2		FLOAT	immediately	
Input of the numerator bandwidth for the damped band-stop filter for manipulated variable filter 2. Input of the value 0 initializes the filter as undamped band-stop filter. The filter is activated with MD 5200: NUM_OUTPUT_FILTERS and MD 5201: OUTPUT_FILTER_CONFIG.					
		0.0	0.0	7999.0	3/3

5230	FORCE_LIMIT_THRESHOLD		D02	QV: FBHLA	
N	Power limitation threshold for weight		FLOAT	immediately	
Force limitation threshold (plus/minus) by weight force. If acquisition of pressures A and B is present and connected, force limitation MD 5241 can be activated. The force controller then ensures that if the value set in MD 5230 plus the weight force (MD 5231) is about to be exceeded or if the weight force (MD 5231) minus the value set in 5230 is about to be exceeded, the force controller is active. Because only the cylinder force is measured and controlled, the weight force must be taken into account in MD 5231 and the frictional force in MD 5230 if necessary. A further force limitation value that acts like MD 5230 can be defined by the NC, e.g. when traveling to a fixed stop. The smaller of the two force limitation thresholds then takes effect.					
		10000.0	0.0	100000000.0	3/3

5231	FORCE_LIMIT_WEIGHT		D02	QV: FBHLA	
N	Power limitation weight		FLOAT	immediately	
Force limitation weight force. If acquisition of pressures A and B is present and connected, force limitation MD 5241 can be activated. The force controller then ensures that if the value set in MD 5230 plus the weight force (MD 5231) is about to be exceeded or if the weight force (MD 5231) minus the value set in 5230 is about to be exceeded, the force controller is active. Because only the cylinder force is measured and controlled, the weight force must be taken into account in MD 5231 and the frictional force in MD 5230 if necessary. A further force limitation value that acts like MD 5230 can be defined by the NC, e.g. when traveling to a fixed stop. The smaller of the two force limitation thresholds then takes effect.					
		0.0	-100000000.0	100000000.0	3/3

5232	STICTION_SPEED_THRESHOLD		D02	QV: FBHLA	
mm/min	Velocity threshold static friction		FLOAT	immediately	
Velocity below which static friction and thus standstill are detected. If a pressure sensing device has been connected to measure the pressures of A and B, the static friction injection can be activated in MD 5240. If the velocity in MD 5232 is not achieved, the force controller ensures adjustment of the force value set in MD 5234 or MD 5235 as long as the drive is stationary. The sign of the velocity setpoint decides which of the two force setpoints (MD 5234 or MD 5235) is used. The force controller is deactivated via the interrupting lead (MD 5233) some time before reaching the force setpoint so that the valve actuating time does not cause overshooting.					
		10.0	0.0	500.0	3/3

5233	**STICTION_COMP_THRESHOLD**		D01	**QV:** FBHLA
%	Interrupting lead static friction		FLOAT	immediately
If a pressure sensing device has been connected to measure the pressures of A and B, the static friction injection can be activated in MD 5240. If the velocity in MD 5232 is not achieved, the force controller ensures adjustment of the force value set in MD 5234 or MD 5235 as long as the drive is stationary. The sign of the velocity setpoint decides which of the two force setpoints (MD 5234 or MD 5235) is used. The force controller is deactivated via the interrupting lead (MD 5233) some time before reaching the force setpoint so that the valve actuating time does not cause overshooting. If 100 % has been entered in MD 5233, the force controller is deactivated only when the force setpoint (MD 5234 or MD 5235) has been reached or if the drive moves before. This causes overshooting of the actual velocity value.				
	40.0	3.0	100.0	3/3

5234	**STICTION_FORCE_POS**		D02	**QV:** FBHLA
N	Friction force velocity >0		FLOAT	immediately
Cylinder force with friction force with positive velocity. If a pressure sensing device has been connected to measure the pressures of A and B, the static friction injection can be activated in MD 5240. If the velocity in MD 5232 is not achieved, the force controller ensures adjustment of the force value set in MD 5234 or MD 5235 as long as the drive is stationary. The sign of the velocity setpoint decides which of the two force setpoints (MD 5234 or MD 5235) is used. Since only the cylinder force is measured and controlled, the weight must possibly be taken into account in MD 5231. This data can therefore also be set to negative values. If the cylinder load is changed and the cylinder weight must be maintained, the static friction injection cannot be used since the values in MD 5234 change depending on the load.				
	100.0	-100000000.0	100000000.0	3/3

5235	**STICTION_FORCE_NEG**		D02	**QV:** FBHLA
N	Friction force velocity <0		FLOAT	immediately
Cylinder force with friction force with positive velocity. If a pressure sensing device has been connected to measure the pressures of A and B, the static friction injection can be activated in MD 5240. If the velocity in MD 5232 is not achieved, the force controller ensures adjustment of the force value set in MD 5234 or MD 5235 as long as the drive is stationary. The sign of the velocity setpoint decides which of the two force setpoints (MD 5234 or MD 5235) is used. Since only the cylinder force is measured and controlled, the weight must possibly be taken into account in MD 5231. This data can therefore also be set to positive values. If the cylinder load is changed and the cylinder weight must be maintained, the static friction injection cannot be used since the values in MD 5235 change depending on the load.				
	-100.0	-100000000.0	100000000.0	3/3

5240	**FORCECONTROLLED_SYSTEM_GAIN**			D01	**QV:** FBHLA
N/V	Controlled system gain power controller			FLOAT	immediately
This machine data contains the proportional controlled system gain of the force control circuit. Since the force control circuit has an integrating behavior, a standard integrator (integration time 1 s) has been subtracted from the controlled system to calculate the controlled system gain. MD 5240 is preset with "Calculate drive model data". The controlled system gain depends on the oil volumes of the cylinder and the rated flow of the valve. In general, this value should not be changed. The value specified in MD 5240 is the reference value for the P gain of the force controller. MD 5240 considers the influence of the geometrical dimensions. The influence of the valve dynamic response is taken into account in MD 5242 so that it is possible to set always the same gain value for the same valve dynamic response of different cylinders.					
		0.0	0.0	1000000000.0	3/3

5241	**FORCECTRL_CONFIG**			D02	**QV:** FBHLA
HEX	Configuration of force controller			UNS. WORD	immediately
Input of the configuration for force controller: force limitation on/off, static friction injection on/off. Only bit 0 and bit 1 are relevant for the user. Bit 0 =1: Force limitation on Bit 1=1: Static friction injection on If a pressure sensing device has been connected to measure the pressures of A and B, the force limitation and/or static friction injection can be activated in MD 5241. Before the force limitation or static friction injection is activated, the relevant machine data for the force limitation (MD 5230, MD 5231) or the friction force (MD 5234, MD 5235) should be set. These data possibly contain the weight and can possibly not be preset correctly with the standard values. If the cylinder load is changed and the cylinder weight must be maintained, the static friction injection cannot be used since the values in MD 5234 and MD 5235 change depending on the load.					
		0	0	6	3/3

5242	**FORCECTRL_GAIN**			D01	**QV:** FBHLA
-	P gain of force controller			FLOAT	immediately
If the force limitation and/or static friction injection is activated in MD 5241, the P gain of the force controller is entered in this machine data. MD 5240 is the reference value in which the influence of the geometrical dimensions is combined. The influence of the valve dynamic response is considered in MD 5242 so that it is possible to set always the same gain value for the same valve dynamic response of different cylinders.					
		0.0	0.0	10000.0	3/3

5243	**FORCECTRL_GAIN_RED**			D01	**QV:** FBHLA
%	Attenuation of power controller P component			FLOAT	immediately
If the force limitation and/or static friction injection is activated in MD 5241, the attenuation of the P gain of the force controller is entered in MD 5243 for larger setpoint-actual value differences (large signal behavior). The small signal behavior is set in MD 5242. Limitations which are effective in the large signal behavior reduce the possible dynamic response of the control loop. It is therefore suitable to reduce the P gain in the large signal behavior. The factor in MD 5243 specifies the percentage by which a P component of 10 V is attenuated.					
		40.0	0.1	100.0	3/3

5244	**FORCECTRL_INTEGRATOR_TIME**			D01	**QV:** FBHLA
ms	Power controller reset time			FLOAT	immediately
If the force limitation and/or static friction injection is activated in MD 5241, the reset time of the force controller is entered in this machine data. If a value of 0 is entered for the reset time, the I component is deactivated.					
		40.0	0.0	2000.0	3/3

5245	**FORCECTRL_PT1_TIME**			D01	**QV:** FBHLA
ms	Power controller smoothing time constant			FLOAT	immediately
If the force limitation and/or static friction injection is activated in MD 5241, a smoothing time constant is set in this machine data for the force controller for differentiation. If the D component of the velocity controller is deactivated (MD 5246), smoothing becomes inactive, too.					
		0.5	0.25	100.0	3/3

5246	**FORCECTRL_DIFF_TIME**			D01	**QV:** FBHLA
ms	Power controller lead time			FLOAT	immediately
If the force limitation and/or static friction injection is activated in MD 5241, a differentiating component (jerk feed-back) for the controller is entered in MD 5246 in addition to the P component of the force controller (MD 5242). The preset lead time can be negative or positive. If zero is entered, no D component is active.					
		0.0	-10000.0	10000.0	3/3

5247	**FORCE_FFW_WEIGHT**			D01	**QV:** FBHLA
%	Power controller precontrol factor			FLOAT	immediately
Factor for setting the precontrol gain in the force controller. This is only active if force limitation or static friction injection is activated in MD 5241. The more precise the precontrol, the better the force limitation with higher velocities. An excessively high value may lead to continuous switchover between force controller and velocity controller. The area adaptation (MD 5462 and MD 5463) and the controlled system gain (MD 5435) are taken into account for precontrol.					
		100.0	0.0	120.0	3/3

5260	**NUM_FFW_FCTRL_FILTERS**			D01	**QV:** FBHLA
-	Number of pilot filters in force controller			UNS. WORD	immediately
The number of pilot filters in the force controller is entered in this machine data. 0: no pilot filter active (standard) 1: filter active enabled					
		0	0	1	3/3

5261	FFW_FCTRL_FILTER_TYPE		D01	QV: FBHLA	
HEX	Type of pilot filter in the force controller		UNS. WORD	immediately	
The type of pilot filter in the force controller is entered in this machine data. The corresponding settable filter parameters are entered in the associated machine data (MD 5264 to MD 5270). Before configuring the filter type, the corresponding filter machine data are to be assigned. Bit Meaning Bit 0=0: Low pass (see MD 5264, MD 5265) Bit 0=1: Band stop filter (see MD 5268, MD 5269, MD 5270)					
		0	0	1	3/3

5264	FFW_FCTRL_FIL_1_FREQ		D01	QV: FBHLA	
Hz	PT2 natural freq. pilot filter 1		FLOAT	immediately	
Enter the natural frequency for pilot filter 1 (PT2 low pass) in the force controller. An entry with a value < 10 Hz on the natural frequency of the low pass initializes the filter independently of the associated damping as a proportional element with the gain 1.					
		2000.0	10.0	8000.0	3/3

5265	FFW_FCTRL_FIL_1_DAMP		D01	QV: FBHLA	
-	PT2 damping pilot filter 1		FLOAT	immediately	
Entry of the damping for pilot filter 1 (PT2 low pass) in the force controller.					
		0.7	0.2	1.0	3/3

5268	FFW_FCTRL_FIL_1_SUP_FREQ		D01	QV: FBHLA	
Hz	Blocking frequency pilot filter 1		FLOAT	immediately	
Entry of the blocking frequency for pilot filter 1 (band-stop filter) in the force controller.					
		3500.0	10.0	7999.0	3/3

5269	FFW_FCTRL_FIL_1_BW		D01	QV: FBHLA	
Hz	Bandwidth pilot filter 1		FLOAT	immediately	
Entry of the -3dB bandwidth for pilot filter 1 (band-stop filter) in the force controller.					
		500.0	5.0	7999.0	3/3

5270	FFW_FCTRL_FIL_1_BW_NUM		D01	QV: FBHLA	
Hz	Counter bandwidth pilot filter 1		FLOAT	immediately	
Entry of the counter bandwidth for pilot filter 1 (damped band-stop filter) in the force controller. Entering the value 0 initializes the filter as an undamped band-stop filter. The value of MD 5270 may be a maximum of twice that of MD 5269.					
		0.0	0.0	7999.0	3/3

5280	**NUM_OUTPUT_FILTERS**			D01	**QV:** FBHLA
-	Number of manipulated value filters			UNS. WORD	immediately
The number of manipulated value filters is to be entered in this machine data. 0: no filter active (standard) 1: filter active enabled					
		0	0	1	3/3

5281	**OUTPUT_FILTER_TYPE**			D01	**QV:** FBHLA
HEX	Type of manipulated value filter			UNS. WORD	immediately
The type of manipulated value filter is entered in this machine data. The corresponding settable filter parameters are entered in the associated machine data (MD 5284 to MD 5290). Before configuring the filter type, the corresponding filter machine data are to be assigned. Bit Meaning Bit 0=0: Low pass (see MD 5284, MD 5285) Bit 0=1: Band-stop filter (see MD 5288, MD 5289, MD 5290)					
		0	0	1	3/3

5284	**OUTPUT_FIL_1_FREQ**			D01	**QV:** FBHLA
Hz	Natural frequency of manipulated value filter 1			FLOAT	immediately
Enter the natural frequency for manipulated value filter 1 (PT2- low pass). An entry with a value < 10 Hz on the natural frequency of the low pass initializes the filter independently of the associated damping as a proportional element with the gain 1.					
		1000.0	10.0	8000.0	3/3

5285	**OUTPUT_FIL_1_DAMP**			D01	**QV:** FBHLA
-	Damping manipulated value filter 1			FLOAT	immediately
Entry of the damping for manipulated value filter 1 (PT2 low pass).					
		1.0	0.05	1.0	3/3

5288	**OUTPUT_FIL_1_SUP_FREQ**			D01	**QV:** FBHLA
Hz	Blocking frequency manipulated value filter 1			FLOAT	immediately
Entry of the blocking frequency for manipulated value filter 1 (band-stop filter).					
		3500.0	1.0	7999.0	3/3

5289	**OUTPUT_FIL_1_BW**			D01	**QV:** FBHLA
Hz	Bandwidth manipulated value filter 1			FLOAT	immediately
Entry of the -3dB bandwidth for manipulated value filter 1 (band-stop filter).					
		500.0	5.0	7999.0	3/3

5290	**OUTPUT_FIL_1_BW_NUM**			D01	**QV:** FBHLA
Hz	Numerator bandwidth manipulated value filter 1			FLOAT	immediately
Entry of the numerator bandwidth for manipulated value filter 1 (damped band-stop filter). An entry of the value 0 initializes the filter as an undamped band-stop filter. The value of MD 5290 may be a maximum of twice that of MD 5289.					
		0.0	0.0	7999.0	3/3

5401	**DRIVE_MAX_SPEED**			D02, D05	**QV:** FBHLA
mm/min	Maximum useful velocity			FLOAT	PowerOn
Maximum velocity. The transfer interface NC -> drive normalizes to this velocity. The velocity limit is set with MD 5440 and MD 5441, not with MD 5401.					
		0.0	0.0	120000.0	3/3

5402	**SPEED_CRTL_DISABLE_STOPTIME**			D02	**QV:** FBHLA
ms	Deceleration time with servo disable			FLOAT	immediately
The deceleration ramp with velocity servo disable is set here. The time entered here corresponds to that required by the deceleration ramp to decelerate from the velocity set in MD 5401 to zero. The acceleration and deceleration times in normal mode are set with NC machine data.					
		0.0	0.0	120000.0	3/3

5404	**POWER_DISABLE_DELAY**			D02	**QV:** FBHLA
ms	Power disable timer			FLOAT	immediately
If velocity servo disable is required with power disable (MD 5530 Bit3=0), this corresponds to the time the system is waiting after velocity servo disable until the power is disabled. This data has no significance with MD5530 Bit3=1.					
		100	0	100000	3/3

5406	**SPEEDCTRL_GAIN_A**			D01, D08	**QV:** FBHLA
%	P gain of velocity controller A			FLOAT	immediately
The P gain of the velocity controller at the cylinder edge at the drive end with connected adaptation (MD 5413) must be entered in this machine data.					
		0.0	-100.0	1000.0	3/3

5407	**SPEEDCTRL_GAIN**			D01, D08	**QV:** FBHLA
%	P gain of velocity controller			FLOAT	immediately
The P gain of the velocity controller at a piston position at the lowest natural frequency (MD 5160) with connected adaptation (MD 5413) must be entered in this machine data. If the adaptation is deactivated, the P gain is active in the whole area.					
		0.0	-100.0	1000.0	3/3

5408	**SPEEDCTRL_GAIN_B**			D01, D08	**QV:** FBHLA
%	P gain of velocity controller B			FLOAT	immediately
The P gain of the velocity controller at the cylinder edge at the non-drive end with connected adaptation (MD 5413) must be entered in this machine data.					
		0.0	-100.0	1000.0	3/3

5409	**SPEEDCTRL_INTEGRATOR_TIME**			D01, D08	**QV:** FBHLA
ms	Velocity controller reset time			FLOAT	immediately
Input of the reset time of the velocity controller. If a value of 0 is entered for the reset time, the I component is deactivated for the corresponding velocity range. In the case of negative P gain, the reset time is interpreted negative, so that the compensation is always active as negative feedback.					
		50.0	0.0	2000.0	3/3

5413	**SPEEDCTRL_ADAPT_ENABLE**			D01	**QV:** FBHLA
-	Selection of velocity controller adaptation			UNS. WORD	immediately
The adaptation of the velocity controller as a function of the piston position can be activated/deactivated with this machine data. Bit Meaning Bit 0=0 The adaptation is not active. The settings for the velocity controller (MD 5407, MD 5409) are valid over the whole piston stroke. Bit 0=1 The adaptation is active. The machine data MD 5406 to MD 5408, MD 5162 to MD 5164 are active.					
		0	0	1	3/3

5414	**SPEEDCTRL_REF_MODEL_FREQ**			D01, EXP	**QV:** FBHLA
Hz	Natural frequency of the reference model			FLOAT	immediately
The dynamic behavior of the velocity control loop without I component in the velocity controller with control excitation is simulated in the reference model. In the ideal case of exact simulation, there is no deviation on the integrator without load after comparison of the setpoints/actual values. Velocity overshoot in the control behavior is thus reduced in practice. The natural frequency of the reference model is parameterized with MD 5414.					
		150.0	0.0	1000.0	3/3

5415	**SPEEDCTRL_REF_MODEL_DAMPING**			D01, EXP	**QV:** FBHLA
-	Damping of the reference model			FLOAT	immediately
The dynamic behavior of the velocity control loop without I component in the velocity controller with control excitation is simulated in the reference model. In the ideal case of exact simulation, there is no deviation on the integrator without load after comparison of the setpoints/actual values. Velocity overshoot in the control behavior is thus reduced in practice. The damping of the reference model is parameterized with MD 5415.					
		0.9	0.4	1.0	3/3

5420	**DRIVE_MAX_SPEED_SETUP**			D02	**QV:** FBHLA
mm/min	Maximum setup mode velocity			FLOAT	immediately
In setup mode (terminal 112), the velocity setpoint is limited to the value preset in MD 5420.					
		10.0	0.0	120000.0	3/3

5421	**SPEEDCTRL_INTEGRATOR_FEEDBK**			D01	**QV:** FBHLA
ms	Time constant for integrator feedback			FLOAT	immediately
The time constant for integrator feedback is entered in this machine data. The integrator feedback changes the integrator structure into a PT1 behavior. Minor integrated deviations lead to drive movements eliminated by the integrator feedback. Small deviations will then no longer lead to reactions of the I component. The integrator feedback is deactivated for values lower than 1 ms in MD 5421.					
		0.0	0.0	1000.0	3/3

5422	**FEEDBK_SPEED_THRESHOLD**			D01	**QV:** FBHLA
mm/min	Speed treshold integrator feed back			FLOAT	immediately
Speed below which the integrator feedback takes effect. The integrator feedback is above all used for adhesion problems to prevent unwanted movements during position-controlled operation and zero speed because of the adhesion (slip-stick effect). With this machine data you can cause the integrator feedback only to become active for small speed setpoints and to stabilize zero speed. For high speeds, the effect of the I component is not restricted.					
		10.0	0.0	120000.0	3/3

5430	**SPEEDCTRL_PT1_TIME**			D01	**QV:** FBHLA
ms	Smoothing time constant for velocity controller			FLOAT	immediately
A smoothing time constant for the velocity controller is set in this machine data for exact differentiation. If the D component of the velocity controller is deactivated (MD 5431 to MD 5433), smoothing becomes inactive, too.					
		0.25	0.25	100.0	3/3

5431	**SPEEDCTRL_DIFF_TIME_A**			D01	**QV:** FBHLA
ms	Lead time for velocity controller A			FLOAT	immediately
In addition to the P component of the velocity controller (MD 5406 to MD 5408), a differentiating component (acceleration feedback) is entered for the controller at the cylinder edge at the drive end in MD 5431. The preset lead time can be negative or positive. If zero is entered, no D component is active. MD 5431 is only active with activated adaptation (MD 5413).					
		0.0	-100.0	100.0	3/3

5432	SPEEDCTRL_DIFF_TIME			D01	QV: FBHLA
ms	Lead time for velocity controller			FLOAT	immediately
In addition to the P component of the velocity controller (MD 5406 to MD 5408), a differentiating component (acceleration feedback) is entered in MD 5432 for the controller. The preset lead time can be negative or positive. If zero is entered, no D component is active. MD 5432 is active when adaptation (MD 5413) is activated with a piston position at the lowest natural frequency (MD 5160). If adaptation is deactivated, the D component is active over the whole area.					
		0.0	-100.0	100.0	3/3

5433	SPEEDCTRL_DIFF_TIME_B			D01	QV: FBHLA
ms	Lead time for velocity controller B			FLOAT	immediately
In addition to the P component of the velocity controller (MD 5406 to MD 5408), a differentiating component (acceleration feedback) is entered for the controller at the cylinder edge at the non-drive end in MD 5433. The preset lead time can be negative or positive. If zero is entered, no D component is active. MD 5433 is only active with activated adaptation (MD 5413).					
		0.0	-100.0	100.0	3/3

5435	CONTROLLED_SYSTEM_GAIN			D01	QV: FBHLA
mm/Vmin	Controlled system gain			FLOAT	immediately
The controlled system gain after "Calculate drive model data" is entered in this machine data. This value should only be changed if it is incorrect. The value entered in MD 5435 is the reference value for the P gain of the velocity controller.					
		0.0	0.0	20000.0	3/3

5440	POS_DRIVE_SPEED_LIMIT			D02	QV: FBHLA
mm/min	Positive velocity setpoint limit			FLOAT	immediately
The velocity setpoint is delimited in the positive and negative direction. On the differential cylinder, the physically possible velocities for travel-in and travel-out are unsymmetrical. It is thus suitable to enter unsymmetrical limitations. The positive velocity setpoint limit is set in this machine data.					
		0.0	0.0	120000.0	3/3

5441	NEG_DRIVE_SPEED_LIMIT			D02	QV: FBHLA
mm/min	Negative velocity setpoint limit			FLOAT	immediately
The velocity setpoint is delimited in the positive and negative direction. On the differential cylinder, the physically possible velocities for travel-in and travel-out are unsymmetrical. It is thus suitable to enter unsymmetrical limitations. The negative velocity setpoint limit is set in this machine data.					
		0.0	0.0	120000.0	3/3

5460	FRICTION_COMP_GRADIENT			D01	QV: FBHLA
%	Increase in friction compensation			FLOAT	immediately
In order to reduce friction effects, the characteristic around zero is risen in the volume precontrol branch. This causes build-up of an accordingly higher difference pressure with the sign of the velocity setpoint. The increase in friction compensation is entered in this machine data.					
		0.0	0.0	400.0	3/3

5461	FRICTION_COMP_OUTPUT_RANGE			D01	QV: FBHLA
%	Range of action of friction compensation			FLOAT	immediately
In order to reduce friction effects, the characteristic around zero is risen in the volume precontrol branch. This causes build-up of an accordingly higher difference pressure with the sign of the velocity setpoint. The range of action of friction compensation at the output is entered in this machine data.					
		0.1	0.1	10.0	3/3

5462	AREA_FACTOR_POS_OUTPUT			D01	QV: FBHLA
%	Positive area adaptation factor			FLOAT	immediately
The asymmetrical cylinder areas with unilateral piston rod (differential cylinder) can lead to asymmetrical following errors. In order to compensate for the direction-dependent controlled system gain, a characteristic has been introduced the rise of which can be changed depending on the direction. The positive area adaptation factor is entered in this machine data.					
		100.0	10.0	200.0	3/3

5463	AREA_FACTOR_NEG_OUTPUT			D01	QV: FBHLA
%	Negative area adaptation factor			FLOAT	immediately
The asymmetrical cylinder areas with unilateral piston rod (differential cylinder) can lead to asymmetrical following errors. In order to compensate for the direction-dependent controlled system gain, a characteristic has been introduced the rise of which can be changed depending on the direction. The negative area adaptation factor is entered in this machine data.					
		100.0	10.0	200.0	3/3

5464	POS_DUAL_GAIN_COMP_FLOW			D01	QV: FBHLA
%	Knee-point compensation of flow			FLOAT	immediately
The knee points for a servo solenoid valve are determined with MD 5110 and MD 5111. The characteristic of this servo solenoid valve is compensated by an inverse characteristic. In order to calculate the inverse characteristic, the knee point is determined in the positive quadrant of the valve characteristic using MD 5464 and MD 5465. The valve flowrate in the knee point in percent referring to the rated flowrate (MD 5107) is entered in MD 5464. If the values are identical (standard value) in MD 5464 and MD 5465, the characteristic is linear (without knee point in the zero range (standard value) and without saturation (standard value)). The knee point is rounded for real servo solenoid valves. The rounding range is parameterized in MD 5466.					
		10.0	0.2	95.0	3/3

5465	**POS_DUAL_GAIN_COMP_VOLTAGE**			D01	**QV:** FBHLA
%	Knee-point compensation of voltage			FLOAT	immediately
The knee points for a servo solenoid valve are determined with MD 5110 and MD 5111. The characteristic of this servo solenoid valve is compensated by an inverse characteristic. In order to calculate the inverse characteristic, the knee point is determined in the positive quadrant of the valve characteristic using MD 5464 and MD 5465. The valve voltage in the knee point in percent referring to the rated valve voltage (MD 5109) is entered in MD 5465. If the values are identical (standard value) in MD 5464 and MD 5465, the characteristic is linear (without knee point in the zero range (standard value) and without saturation (standard value)). The knee point is rounded for real servo solenoid valves. The rounding range is parameterized in MD 5466.					
		10.0	0.2	95.0	3/3

5466	**DUAL_GAIN_COMP_SMOOTH_RANGE**			D01	**QV:** FBHLA
%	Knee-point compensation of rounding area			FLOAT	immediately
The knee points for a servo solenoid valve are determined with MD 5110 and MD 5111. The non-linear characteristic of these servo solenoid valves is compensated by an inverse characteristic. The knee point is rounded for real servo solenoid valves. Rounding is performed according to a basic characteristic so that the connecting points are tangential and the rounding area can be parameterized in this machine data.					
		2.5	0.0	20.0	3/3

5467	**NEG_DUAL_GAIN_COMP_FLOW**			D01	**QV:** FBHLA
%	Knee-point compensation neg. flow			FLOAT	immediately
MD 5110 and MD 5111 define the knee-points for the servo solenoid valve. The characteristic of the servo solenoid valve is compensated by an inverse characteristic. The knee point in the negative quadrant of the valve characteristic is defined in MD 5467 and MD 5468 for calculating the inverse characteristic. The valve flow in the knee point in per cent based on the rated flow (MD 5107) is entered in MD 5467. If MD 5467 and MD 5468 have the same values (standard value), the characteristic is linear (no bend in the zero range (standard value) and without saturation (standard value)). The bend is rounded in real servo solenoid valves. The rounding range is parameterized in MD 5466.					
		10.0	0.2	95.0	3/3

5468	**NEG_DUAL_GAIN_COMP_VOLTAGE**			D01	**QV:** FBHLA
%	Knee-point compensation neg. voltage			FLOAT	immediately
MD 5110 and MD 5111 define the knee-points for the servo solenoid valve. The characteristic of the servo solenoid valve is compensated by an inverse characteristic. The knee point in the negative quadrant of the valve characteristic is defined in MD 5467 and MD 5468 for calculating the inverse characteristic. The valve voltage in the knee point in per cent based on the rated valve voltage (MD 5109) is entered in MD 5468. If MD 5467 and MD 5468 have the same values (standard value), the characteristic is linear (no bend in the zero range (standard value) and without saturation (standard value)). The bend is rounded in real servo solenoid valves. The rounding range is parameterized in MD 5466.					
		10.0	0.2	95.0	3/3

5470	**OFFSET_COMPENSATION**			D01	**QV:** FBHLA
-	Offset compensation			WORD	immediately
Since the servo solenoid valves are actuated analogously, an offset voltage of the D/A converter or valve booster can lead to a zero point error and thus to position deviation (if no I component has been activated). The offset error can be eliminated to a large extent by adding a compensation value set in this machine data.					
		0	-4000	4000	3/3

5474	**OUTPUT_VOLTAGE_POS_LIMIT**			D02	**QV:** FBHLA
V	Actuating voltage limitation			FLOAT	immediately
In this machine data, you enter the value of the actuating voltage limitation delimiting the manipulated variable value before D/A conversion in the positive direction. The absolute values of the limits are equal.					
		10.0	0.0	10.0	3/3

5475	**OUTPUT_VOLTAGE_NEG_LIMIT**			D02	**QV:** FBHLA
V	Actuating voltage limitation			FLOAT	immediately
In this machine data, you enter the value of the actuating voltage limitation delimiting the manipulated variable value before D/A conversion in the negative direction. The absolute values of the limits are equal.					
		10.0	0.0	10.0	3/3

5476	**OUTPUT_VOLTAGE_INVERSION**			D01	**QV:** FBHLA
HEX	Manipulated variable inversion			UNS. WORD	immediately
The voltage output (manipulated variable) can be inverted in this machine data. Different signs in tubing or wiring can thus be compensated. Bit Meaning Bit 0=0: No inversion Bit 0=1: Inversion					
		0	0	1	3/3

5480	**POS_DUAL_GAIN_COMP_Z_FLOW**			D01	**QV:** FBHLA
%	Knee-point compensation pos. flow zero range			FLOAT	immediately
The characteristic of the servo solenoid valve is compensated by an inverse characteristic. A knee point in the positive zero range of the valve characteristic is defined in MD 5480 and MD 5481 for calculating the inverse characteristic. The valve flow in the knee point in per cent based on the rated flow (MD 5107) is entered in MD 5480. With the standard value zero in MD 5481, there is no bend in the pos. zero range. The bend in the zero range is rounded in real servo solenoid valves. The rounding range is parameterized in MD 5482.					
		0.01	0.01	95.0	3/3

5481	**POS_DUAL_GAIN_COMP_Z_VOLT**			D01	**QV:** FBHLA
%	Knee-point compensation pos. voltage zero range			FLOAT	immediately
The characteristic of the servo solenoid valve is compensated by an inverse characteristic. The knee point in the positive zero range of the valve characteristic is defined in MD 5480 and MD 5481 for calculating the inverse characteristic. The valve voltage in the knee point in per cent based on the rated voltage (MD 5109) is entered in MD 5481. With the standard value zero in MD 5481, there is no bend in the pos. zero range. The bend in the zero range is rounded in real servo solenoid valves. The rounding range is parameterized in MD 5482..					
		0.0	0.0	95.0	3/3

5482	**DUAL_GAIN_COMP_SMOOTH_Z_R**			D01	**QV:** FBHLA
%	Knee-point compensation rounding zero range			FLOAT	immediately
The characteristic of the servo solenoid valve is compensated by an inverse characteristic. The bend in the zero range is rounded in real servo solenoid valves. The rounding is compensated by a root characteristic so that the connection points are always tangential. The rounding range is parameterized in MD 5482..					
		0.0	0.0	10.0	3/3

5483	**NEG_DUAL_GAIN_COMP_Z_FLOW**			D01	**QV:** FBHLA
%	Knee-point compensation neg. flow zero range			FLOAT	immediately
The characteristic of the servo solenoid valve is compensated by an inverse characteristic. A knee point in the negative zero range of the valve characteristic is defined in MD 5483 and MD 5484 for calculating the inverse characteristic. The valve flow in the knee point in per cent based on the rated flow (MD 5107) is entered in MD 5483. With the standard value zero in MD 5484 there is no bend in the neg. zero range. The bend in the zero range is rounded in real servo solenoid valves. The rounding range is parameterized in MD 5482.					
		0.01	0.01	95.0	3/3

5484	**NEG_DUAL_GAIN_COMP_Z_VOLT**			D01	**QV:** FBHLA
%	Knee-point compensation neg. voltage zero range			FLOAT	immediately
The characteristic of the servo solenoid valve is compensated by an inverse characteristic. A knee point in the negative zero range of the valve characteristic is defined in MD 5483 and MD 5484 for calculating the inverse characteristic. The valve voltage in the knee point in per cent based on the rated valve voltage (MD 5109) is entered in MD 5484. With the standard value zero in MD 5481 there is no bend in the neg. zero range. The bend in the zero range is rounded in real servo solenoid valves. The rounding range is parameterized in MD 5482..					
		0.0	0.0	95.0	3/3

5485	**POS_DUAL_GAIN_COMP_S_FLOW**			D01	**QV:** FBHLA
%	Knee-point compensation pos. flow saturation			FLOAT	immediately
The characteristic of the servo solenoid valve is compensated by an inverse characteristic. The beginning of a parabolic, rounded saturation region in the positive quadrant of the valve characteristic is defined with MD 5485 and MD 5486 for calculating the inverse characteristic. The valve flow at the beginning of the saturation region in per cent based on the rated flow (MD 5107) is entered in MD 5485. The saturation region is compensated by a root characteristic so that the connection point is always tangential and the characteristic ends in the point (100%,100%). With the standard value 100% in MD 5485 and MD 5486, there is no saturation region in the positive quadrant.					
		100.0	0.2	100.0	3/3

5486	**POS_DUAL_GAIN_COMP_S_VOLT**			D01	**QV:** FBHLA
%	Knee-point compensation pos. voltage saturation			FLOAT	immediately
The characteristic of the servo solenoid valve is compensated by an inverse characteristic. The beginning of a parabolic, rounded saturation region in the positive quadrant of the valve characteristic is defined with MD 5485 and MD 5486 for calculating the inverse characteristic. The valve voltage at the beginning of the saturation region in per cent based on the rated valve voltage (MD 5109) is entered in MD 5486. The saturation region is compensated by a root characteristic so that the connection point is always tangential and the characteristic ends in the point (100%,100%). With the standard value 100% in MD 5485 and MD 5486, there is no saturation region in the positive quadrant.					
		100.0	0.2	100.0	3/3

5487	**NEG_DUAL_GAIN_COMP_S_FLOW**			D01	**QV:** FBHLA
%	Knee-point compensation neg. flow saturation			FLOAT	immediately
The characteristic of the servo solenoid valve is compensated by an inverse characteristic. The beginning of a parabolic, rounded saturation region in the negative quadrant of the valve characteristic is defined with MD 5487 and MD 5488 for calculating the inverse characteristic. The valve flow at the beginning of the saturation region in per cent based on the rated valve flow (MD 5107) is entered in MD 5487. The saturation region is compensated by a root characteristic so that the connection point is always tangential and the characteristic ends in the point (100%,100%). With the standard value 100% in MD 5487 and MD 5488, there is no saturation region in the negative quadrant.					

		100.0	0.2	100.0	3/3

5488	**NEG_DUAL_GAIN_COMP_S_VOLT**	D01	**QV:** FBHLA
%	Knee-point compensation neg. voltage saturation	FLOAT	immediately

The characteristic of the servo solenoid valve is compensated by an inverse characteristic.

The beginning of a parabolic, rounded saturation region in the negative quadrant of the valve characteristic is defined with MD 5487 and MD 5488 for calculating the inverse characteristic.

The valve voltage at the beginning of the saturation region in per cent based on the rated valve voltage (MD 5109) is entered in MD 5488.

The saturation region is compensated by a root characteristic so that the

connection point is always tangential and the characteristic ends in the point (100%,100%).

With the standard value 100% in MD 5487 and MD 5488, there is no saturation region in the negative quadrant.

		100.0	0.2	100.0	3/3

5500	**NUM_SPEED_FILTERS**	D01	**QV:** FBHLA
-	Number of velocity filters	UNS. WORD	immediately

The number of velocity filters must be entered in this machine data.

0: No velocity filter active (by default)

1: Filter activated

		0	0	1	3/3

5501	**SPEED_FILTER_TYPE**	D01	**QV:** FBHLA
HEX	Type of velocity filter	UNS. WORD	immediately

The type of velocity filter must be entered in this machine data.

The filter parameters which can be set in each case are entered in the relevant machine data (MD 5502 to MD 5520).

The corresponding filter machine data must be assigned before configuring the filter type.

Bit Meaning

Bit 0=0: Low pass (see MD 5502, MD 5506, MD 5507)

Bit 0=1: Band-stop filter (see MD 5514, MD 5515, MD 5516)

Bit 8=0: PT2 low pass (see MD 5506, MD 5507)

Bit 8=1: PT1 low pass (see MD 5502)

		0	0	257	3/3

5502	**SPEED_FILTER_1_TIME**	D01	**QV:** FBHLA
ms	PT1 time constant of velocity filter 1	FLOAT	immediately

Input of the time constant for velocity filter 1 (PT 1 low pass).

If 0 is entered, the filter is deactivated.

		0.0	0.0	500.0	3/3

5506	**SPEED_FILTER_1_FREQUENCY**	D01	**QV:** FBHLA
Hz	PT 2 natural frequency of velocity filter 1	FLOAT	immediately

Input of the natural frequency for velocity filter 1 (PT2 low pass).

An input with a value < 10 Hz on the natural frequency of the low pass initializes the filter independently of the relevant damping as proportional element with gain 1.

		2000.0	10.0	8000.0	3/3

5507	**SPEED_FILTER_1_DAMPING**			D01	**QV:** FBHLA
-	PT2 damping of velocity filter 1			FLOAT	immediately
Input of the damping for velocity filter 1 (PT2 low pass).					
		0.7	0.2	1.0	3/3

5514	**SPEED_FILTER_1_SUPPR_FREQ**			D01	**QV:** FBHLA
Hz	BSF blocking frequency of velocity filter 1			FLOAT	immediately
Input of the blocking frequency for velocity filter 1 (band-stop filter).					
		3500.0	10.0	7999.0	3/3

5515	**SPEED_FILTER_1_BANDWIDTH**			D01	**QV:** FBHLA
Hz	BSF bandwidth of velocity filter 1			FLOAT	immediately
Input of the -3dB bandwidth for velocity filter 1 (band-stop filter).					
		500.0	5.0	7999.0	3/3

5516	**SPEED_FILTER_1_BW_NUMERATOR**			D01	**QV:** FBHLA
Hz	Numerator bandwidth of velocity filter 1			FLOAT	immediately
Input of the numerator bandwidth for the damped band-stop filter. If 0 is entered, the filter is initialized as undamped band-stop filter. The value of MD 5516 may be maximum the double of that specified in MD 5515.					
		0.0	0.0	7999.0	3/3

5520	**SPEED_FILTER_1_BS_FREQ**			D01	**QV:** FBHLA
%	BSF natural frequency of velocity filter 1			FLOAT	immediately
Percentage input of the natural frequency for the band-stop filter of velocity filter 1. For MD 5520=100%, the filter is initialized as damped band-stop filter. The natural filter frequency in Hz must be lower than the reciprocal value of two velocity controller cycles; MD 5520*0.01*MD 5514<1/(2*MD 5001*31.25 microsec).					
		100.0	1.0	141.0	3/3

5522	**ACT_SPEED_FILTER_TIME**			D01	**QV:** FBHLA
HEX	Time constant velocity actual value filter			UNS. WORD	PowerOn
For reasons of compatibility, activation of the linear interpolation of the speed setpoint has been relocated from MD 5522 to MD 5004 Bit 12. MD 5522 is now a wildcard for the time constant of the speed actual value filter.					
		0	0	0	3/3

5530	CYLINDER_SAFETY_CONFIG		D05, D02	QV: FBHLA	
HEX	Safety circuit		UNS. WORD	immediately	
The safety circuit for the hydraulic drive must be parameterized in this machine data. Bit Meaning Bit 0=0: No shutoff valve Bit 0=1: With shutoff valve Bit 1=0: Central shutoff valve Bit 1=1: Axis-specific shutoff valve Bit 2=0: No feedback of valve spool Bit 2=1: Valve spool feedback existing Bit 3=0: Velocity controller disable with power disable Bit 3=1: Velocity controller disable without power disable Bit 4=0: Valve supply open for power disable with shutoff valve (without significance without shutoff valve) Bit 4=1: Valve supply maintained for power disable with shutoff valve (without significance without shutoff valve)					
		4	0	3F	3/3

5531	OUTPUT_ENABLE_DELAY		D02	QV: FBHLA	
ms	Manipulated variable blocking time		UNS. WORD	immediately	
Time during which the velocity controller enable is blocked after power enable. This is necessary since the shutoff valve must open before; without shutoff valve, the drive must first move from the fail safe position to the zero position. The velocity controller enable must be blocked during this time. With shutoff valve and valve supply OFF with power disable (MD 5530 Bit 4=0), this corresponds to the time the system is waiting until the valve supply is terminated after power disable (shutoff valve closed).					
		300	0	500	3/3

5532	POWER_ENABLE_DELAY		D02	QV: FBHLA	
ms	Power enable blocking time		UNS. WORD	immediately	
Time during which the power enable is delayed after 24 V ON. The servo solenoid valve shall thus have enough time to move from the fail safe to the zero position. This is only suitable with shutoff valve. Without shutoff valve, you must enter zero.					
		100	0	300	3/3

5550	PRESSURE_SENS_A_REF		D06	QV: FBHLA	
bar	Reference value of pressure sensor A at 10 V		FLOAT	immediately	
Here, you enter the pressure in bar at which the pressure sensor outputs 10 V for P_a (cylinder at drive end). The pressure sensor should be in a range between 0 and 10 V with the pressure 0 imaged to 0 V and the reference value to 10 V.					
		200.0	50.0	6000.0	3/3

5551	**PRESSURE_SENS_A_OFFS**			D06	**QV:** FBHLA
-	Offset compensation for pressure sensor A			WORD	immediately
Here, the pressure sensor offset is compensated for P_a (cylinder at drive end). If the pressure is zero, the pressure display should also show 0 bar. If the speed controller cycle is modified, the offset should be readjusted.					
		0	-32760	32760	3/3

5552	**PRESSURE_SENS_B_REF**			D06	**QV:** FBHLA
bar	Reference value of pressure sensor B at 10V			FLOAT	immediately
Here, you enter the pressure in bar at which the pressure sensor outputs 10 V for P_a (cylinder at non-drive end). The pressure sensor should be in a range between 0 and 10 V with the pressure 0 imaged to 0 V and the reference value to 10 V.					
		200.0	50.0	6000.0	3/3

5553	**PRESSURE_SENS_B_OFFS**			D06	**QV:** FBHLA
-	Offset compensation for pressure sensor B			WORD	immediately
Here, the pressure sensor offset is compensated for P_b (cylinder at non-drive end). If the pressure is zero, the pressure display should also show 0 bar.					
		0	-32767	32767	3/3

5600	**ALARM_MASK_POWER_ON**			D02, EXP	**QV:** FBHLA
HEX	Concealable alarms (Power On)			UNS. WORD	immediately
Power On alarms can be concealed with this machine data. If the corresponding Bit=0, the corresponding monitor is active. If the corresponding Bit=1, error monitoring is deactivated. All monitors are active by default. Bit Meaning (0: Error active; 1: Error concealed) Bit 4: "Measuring circuit measuring system" Bit 5: "Measuring circuit absolute track" Bit 8: "Zero marker error"					
		0	0	FFFF	3/3

5601	**ALARM_MASK_RESET**			D02, EXP	**QV:** FBHLA
HEX	Concealable alarms (Reset)			UNS. WORD	immediately
Reset alarms can be concealed and deactivated with this machine data. If the corresponding Bit=0, the alarm is active. If the corresponding Bit=1, the error monitor is deactivated. All monitors are active by default. Bit Meaning Bit 7: "Valve controller does not react" Bit 8: "Velocity controller delimited" Bit 10: "Piston position negative" Bit 11: "Pressure measurement failed" Bit 12: "Force limitation off"					

		0	0	FFFF	3/3

5605	**SPEEDCTRL_LIMIT_TIME**	D02	**QV:** FBHLA
ms	Time limit of velocity controller	FLOAT	immediately

The output of the velocity controller is monitored.

If the output remains longer at the power limit (MD 5605) than the timer and the actual velocity is lower than the value set in MD 5606, an alarm is output.

		200.0	20.0	1000.0	3/3

5606	**SPEEDCTRL_LIMIT_THRESHOLD**	D02	**QV:** FBHLA
mm/min	Threshold limit of velocity controller	FLOAT	immediately

The output of the velocity controller is monitored.

If the output remains longer at the power limit (MD 5605) than the timer and the actual velocity is lower than the value set in MD 5606, an alarm is output.

		120000.0	0.0	120000.0	3/3

5609	**ENC_SPEED_LIMIT**	D06, d02	**QV:** FBHLA
mm/min	Maximum measuring velocity of linear scale	FLOAT	immediately

The maximum measuring velocity of the linear scale is entered in this machine data.

The limit frequency of the measured value preprocessing hardware is monitored with respect to the A/B signals.

The limit frequency is calculated from MD 5005 and MD 5609.

It is approx. 100 kHz and usually specified by the measuring system manufacturer.

Encoder limit frequency = maximum measuring velocity (MD 5609)/graduations (MD 5005).

		240000.0	1.0	240000.0	3/3

5610	**DIAGNOSIS_ACTIVATION_FLAGS**	EXP	**QV:** FBHLA
HEX	Diagnostic functions	UNS. WORD	PowerOn

Description of the bit assignment: Bit 0: dn/dt monitoring

Bit 1: Circular movement monitoring

		0	0	3	3/3

5612	**ALARM_REACTION_POWER_ON**	D02	**QV:** FBHLA
HEX	Configurable shutdown reaction with PO alarms	UNS. WORD	immediately

Changeover of the respective Power On alarm is configured in this machine data.

It is possible to deactivate or conceal the alarms with MD 5600 so that they are no longer active.

Bit Meaning

Bit 0=0: No enable blocking with internal errors

Bit 0=1: Enable blocking with internal errors

		0	0	FFFF	3/3

5613	**ALARM_REACTION_RESET**			D02	**QV:** FBHLA
HEX	Configurable shutdown reaction with RESET alarms			UNS. WORD	immediately
Changeover of the respective Reset alarm is configured in this machine data. It is possible to deactivate or conceal the alarms with MD 5601 so that they are no longer active. Bit Meaning Bit 0=0: No enable blocking with configuration errors Bit 0=1: Enable blocking with configuration errors					
		0	0	FFFF	3/3

5614	**VALVE_ERROR_TIME**			D02	**QV:** FBHLA
ms	Valve spool monitoring timer			UNS. WORD	immediately
The valve spool position is reported for all valves. If, with power enable, the valve spool position leaves the tolerance hose of 10% of the maximum stroke by the setpoint during a longer time than that set in MD 5614, the message "Valve spool does not react" is output. If there is no feedback for the valve spool position (MD 5530 Bit 2=0), this error cannot be output.					
		50	1	1000	3/3

5620	**PROG_SIGNAL_FLAGS**			D03	**QV:** FBHLA
HEX	Bits of variable signaling functions			UNS. WORD	immediately
Input field for the control of the variable signaling functions. Bit 1 is only active if signal number 0 is selected in MD 5621. Bit Meaning Bit 0=0: Variable signaling function; not active Bit 0=1: Variable signaling function; active Bit 1=0: Segment of variable signaling function; address space X Bit 1=1: Segment of variable signaling function; address space Y Bit 2=0: Comparison of variable signaling function; comparison without sign Bit 2=1: Comparison with sign					
		0	0	7	3/3

5621	**PROG_SIGNAL_NR**			D03	**QV:** FBHLA
-	Signal number of variable signaling function			UNS. WORD	immediately
Input of the signal number of the storage location which is to be monitored by means of the variable signaling function.					
		0	0	100	3/3

5622	**PROG_SIGNAL_ADDRESS**			D03	**QV:** FBHLA
HEX	Address of variable signaling functions			UNS. DWORD	immediately
Input of the address of the storage location which is to be monitored by means of the variable signaling function. This machine data is only active if the signal number is set to the value of zero (MD 5621).					
		0	0	FFFFFF	3/3

5623	**PROG_SIGNAL_THRESHOLD**			D03	**QV:** FBHLA
HEX	Threshold of variable signaling functions			UNS. DWORD	immediately
Input of the threshold for the storage location address entered in MD 5622 which is to be monitored by means of the variable signaling function. Together with MD 5624, this yields the value which must in fact be checked for monitoring.					
		0	0	FFFFFF	3/3

5624	**PROG_SIGNAL_HYSTERESIS**			D03	**QV:** FBHLA
HEX	Hysteresis of variable signaling functions			UNS. DWORD	immediately
Input of the hysteresis (tolerance band) for the storage location address entered in MD 5622 which is to be monitored by means of the variable signaling function. Together with MD 5623, this yields the value which must in fact be checked for monitoring. Note: The numerical value entered in MD 5624 is interpreted without sign (Bit 2=0) or with sign (Bit 2=1) depending on MD 5620.					
		0	0	FFFFFF	3/3

5625	**PROG_SIGNAL_ON_DELAY**			D03	**QV:** FBHLA
-	Pickup delay of variable signaling function			UNS. WORD	immediately
Input of the pickup delay for output of the message if the threshold (with hysteresis) is exceeded. Note: Any change in MD 5625 and 5626 influences the time monitoring currently in process. The monitoring is initialized with the newly entered timers.					
		0	0	10000	3/3

5626	**PROG_SIGNAL_OFF_DELAY**			D03	**QV:** FBHLA
-	Dropout delay of variable signaling function			UNS. WORD	immediately
Input of the dropout delay for reset of the message if the threshold (with hysteresis) is not reached. Note: Any change in MD 5625 and 5626 influences the time monitoring currently in process. The monitoring is initialized with the newly entered timers.					
		0	0	10000	3/3

5648	**VALVE_ID_PARAMS1**			D04, EXP	**QV:** FBHLA
-	Valve-Idi-Parameter2			UNS. WORD	immediately
The parameters for valve characteristic identification are entered here. The explanation is given in MD_5649					
		0	0	7999	3/3

5649	VALVE_ID_PARAMS2		D04, EXP	QV: FBHLA
-	Valve-Idi-Parameter2		UNS. WORD	immediately

The parameters for valve characteristic identification are entered here.
Machine data 5648 5649
1st par. x_min [%] x_max [%]
2nd par. u_search_neg [%] u_search_pos [%]
3rd par. t_ss [ms] t_transient [ms]
4th par. t_meas [ms] t_ramp [ms]
5th par. u_start [%] u_end [%]
6th par. n_measurements [1] x_ss [grid mark]
7th par. t_interm_meas [ms]

		0	0	7999	3/3

5650	DIAGNOSIS_CONTROL_FLAGS		D04, EXP	QV: FBHLA
HEX	Diagnostic control		UNS. WORD	immediately

Input selection of the diagnostic functions.
Bit Meaning
Bit 0=1: Min./max. storage
Bit 1=1: Segment of min./max. storage
Bit 2=1: Comparison with sign
Bit 8=1: Deflection of velocities to measuring function forces, function generator
Bit 9=1: Deflection of function generator to valve characteristic identification
Bit 12=1 Offset adjustment p_a, p_b
Bit 13=1:Offset adjustment of slide valve setpoint

This machine data is relevant to diagnostic as well as installation and startup purposes.

To adjust the offset of the pressure sensors, pressure is relieved and Bit 12 is set in MD 5650. After approx. 2 s, the adjustment has been performed in which the corresponding offsets are preset in MD 5551 and MD 5553. The display should then show approx. 0.0 bar for both pressures (MD 5704, MD 5705).

To adjust the valve setpoint offset, the drive is operated with position control. In this case, you must initiate all enables. In addition, the I component of the velocity controller must be active (that means, MD 5407 and MD 5409 must be unequal to zero, in the case of adaptation, MD 5406 and MD 5408 must be unequal to zero). Bit 13 is then set in MD 5650.

The offset adjustment takes about 30 s. The actuating signal averaged ist stored as offset in MD 5470.

To start up the force controller, you can deflect the measuring functions and the function generator of the velocity controller to the force controller by setting Bit 8.

The velocity setpoints are interpreted as force setpoints in [kN].

		0	0	FFFF	3/3

5651	MINMAX_SIGNAL_NR		D04, EXP	QV: FBHLA
-	Signal number of min./max. storage		UNS. WORD	immediately

Input of the signal number of the storage location which is to be monitored by means of the min./max. storage function.

This machine data is only important for Siemens-internal purposes and must not be changed.

		0	0	FFFF	3/3

5652	**MINMAX_ADDRESS**			D04, EXP	**QV:** FBHLA
HEX	Storage location of min./max. storage			UNS. DWORD	immediately
Input of the address of the storage location which is to be monitored by means of the min./max. storage function. This machine data is only important for Siemens-internal purposes and must not be changed.					
		0	0	FFFFFF	3/3

5653	**MINMAX_MIN_VALUE**			D04, EXP	**QV:** FBHLA
HEX	Minimum value of min./max. storage			UNS. DWORD	immediately
Output of the display value of the minimum value of the min./max. storage. This machine data is only important for Siemens-internal purposes and must not be changed.					
		0	0	FFFFFF	3/3

5654	**MINMAX_MAX_VALUE**			D04, EXP	**QV:** FBHLA
HEX	Maximum value of min./max. storage			UNS. DWORD	immediately
Output of the display value of the maximum value of the min./max. storage. This machine data is only important for Siemens-internal purposes and must not be changed.					
		0	0	FFFFFF	3/3

5655	**MONITOR_SEGMENT**			D04, EXP	**QV:** FBHLA
HEX	Monitor storage location segment			UNS. WORD	immediately
The segment of the storage location for the monitor function is addressed with this machine data. Together with MD 5656, this yields the DSP address the contents of which can be displayed with MD 5657. This machine data is only important for Siemens-internal purposes and must not be changed.					
		0	0	FFFF	3/3

5656	**MONITOR_ADDRESS**			D04, EXP	**QV:** FBHLA
HEX	Monitor storage location address			UNS. DWORD	immediately
The offset address of the storage location for the monitor function is addressed with this machine data. Together with MD 5655, this yields the DSP address the contents of which can be displayed with MD 5657. This machine data is only important for Siemens-internal purposes and must not be changed.					
		0	0	FFFFFF	3/3

5657	**MONITOR_DISPLAY**			D04, EXP	**QV:** FBHLA
HEX	Monitor value display			UNS. DWORD	immediately
Output of the display value of the monitor function. This machine data displays the contents of the address resulting from the segment (MD 5655) and the offset (MD 5656). This machine data is only important for Siemens-internal purposes and must not be changed.					
		0	0	FFFFFF	3/3

5658	MONITOR_INPUT_VALUE			D04, EXP	**QV:** FBHLA
HEX	Monitor value input			UNS. DWORD	immediately
It is possible to enter a 24-bit value in this machine data. In the monitor function, this value is written to the address preset by the segment (MD 5655) and the offset (MD 5656). The value is only written if MD 5659 is set to 1. This machine data is only important for Siemens-internal purposes and must not be changed.					
		0	0	FFFFFF	3/3

5659	MONITOR_INPUT_STROBE			D04, EXP	**QV:** FBHLA
HEX	Monitor value accept			UNS. WORD	immediately
With this machine data, the value (MD 5658) is written into the addressed storage location (MD 5655, MD 5656) if the write operation has been initiatied with the value of 1. After the value has been accepted, the machine data is reset automatically to zero. This machine data is only important for Siemens-internal purposes and must not be changed.					
		0	0	FFFF	3/3

5700	TERMINAL_STATE			D04	**QV:** FBHLA
HEX	Status of binary inputs			UNS. WORD	immediately
This machine data is used to display the status of the binary inputs. Bit Meaning Bit 0=1: 24 V supply existing Bit 1=1: Terminal 663 existing Bit 2=1: Terminal 63 existing Bit 3=1: Group signal for hardware release existing Bit 5=1: Setup mode selected Bit 6=1: Terminal 64 existing Bit 12=1: 24 V servo solenoid valve on Bit 13=1: 24 V shutoff valve on					
		0	0	FFFF	3/3

5704	ACTUAL_PRESSURE_A			D04	**QV:** FBHLA
bar	Actual pressure value A			FLOAT	immediately
This machine data serves for display of the actual pressure value at the cylinder drive end if the pressure sensors are connected to X111/X112. The sensors are adapted in MD 5550 and 5551. If no pressure sensor is connected, this value is not meaningful.					
		0.0	-10000.0	10000.0	3/3

5705	ACTUAL_PRESSURE_B			D04	**QV:** FBHLA
bar	Actual pressure value B			FLOAT	immediately
This machine data serves for display of the actual pressure value at the cylinder non-drive end if the pressure sensors are connected to X111/X112. The sensors are adapted in MD 5552 and 5553. If no pressure sensor is connected, this value is not meaningful.					
		0.0	-10000.0	10000.0	3/3

5706	**DESIRED_SPEED**			D04	**QV:** FBHLA
mm/min	Velocity setpoint			FLOAT	immediately
This machine data serves for display of the velocity setpoint.					
		0.0	-240000.0	240000.0	3/3

5707	**ACTUAL_SPEED**			D04	**QV:** FBHLA
mm/min	Actual velocity value			FLOAT	immediately
This machine data serves for display of the actual velocity value.					
		0.0	-240000.0	240000.0	3/3

5708	**ACTUAL_CYL_FORCE**			D04	**QV:** FBHLA
N	Actual cylinder force value			FLOAT	immediately
The cylinder force is determined from the actual pressure values at the cylinder drive end and non-drive end and displayed here if pressure sensors are connected to X111/X112. If no pressure sensor is connected, this value is not meaningful.					
		0.0	-1000000000.0	1000000000.0	3/3

5709	**VOLTAGE_LSB**			EXP	**QV:** FBHLA
V	Significance of voltage display			FLOAT	immediately
This machine data serves for display of the significance of the voltage display. It specifies the [V] corresponding to 1 increment of the internal voltage format (valve spool setpoint/actual value).					
		0.0	-100000.0	100000.0	3/3

5710	**PRESSURE_LSB**			EXP	**QV:** FBHLA
bar	Significance of pressure display			FLOAT	immediately
This machine data serves for display of the significance of the pressure display. It specifies the [bar] corresponding to 1 increment of the internal pressure format.					
		0.0	-240000.0	240000.0	3/3

5711	**SPEED_LSB**			EXP	**QV:** FBHLA
mm/min	Significance of velocity display			FLOAT	immediately
This machine data serves for display of the significance of the velocity display. It specifies the [mm/min] corresponding to 1 increment of the internal velocity format.					
		0.0	-240000.0	240000.0	3/3

5713	**FORCE_LSB**			EXP	**QV:** FBHLA
uN	Significance of power display			FLOAT	immediately
This machine data serves for display of the significance of the force display. It specifies the [microN] corresponding to 1 increment of the internal force format.					
		0.0	-10000000.0	10000000.0	3/3

5714	**POSITION_LSB**			EXP	**QV:** FBHLA
nm	Significance of position display			FLOAT	immediately
This machine data serves for display of the significance of the position display. It specifies the [nm] corresponding to 1 increment of the internal position format.					
		0.0	-1000000.0	1000000.0	3/3

5715	**DESIRED_VALVE_SPOOL_POS**			D04	**QV:** FBHLA
V	Valve spool position setpoint voltage			FLOAT	immediately
This machine data serves for display of the voltage for the valve spool position setpoint.					
		0.0	-10.0	10.0	3/3

5716	**ACTUAL_VALVE_SPOOL_POS**			D04	**QV:** FBHLA
V	Voltage for actual valve spool position value			FLOAT	immediately
This machine data serves for display of the voltage for the actual valve spool position value. Only if the valve has received feedback.					
		0.0	-10.0	10.0	3/3

5717	**DESIRED_CYL_FORCE**			D04	**QV:** FBHLA
N	Desired cylinder power			FLOAT	immediately
If the force controller (force limitation or adhesion feedforward control) is activated in MD 5241, the effective force setpoint is displayed. It can originate from the force limitation (MD 5230 or MD 5231) or from the adhesion feedforward control (MD 5234 or 5235). Make sure that the force controller only intervenes on friction feedforward control and zero speed or on force limitation and violation of the force limitation value. Otherwise, the voltage setpoint of the speed controller is active. In that case, the force setpoint has no meaning.					
		0.0	-1000000000.0	1000000000.0	3/3

5720	**CRC_DIAGNOSIS**			D04, EXP	**QV:** FBHLA
-	CRC diagnostic parameters			UNS. WORD	immediately
This machine data serves for display of the detected CRC errors (cyclic redundancy check). The counter information is determined with each read request and is 5 bits wide (Bit 4...Bit 0 resp. count 0...31).					
		0	0	FFFF	3/3

5725	**MAX_FORCE_FROM_NC**			D04, EXP	**QV:** FBHLA
N	Standardization of the power setpoint interface			FLOAT	immediately
This machine data standardizes the interface for the fast PLC data channel. 4000hex correspond to the value stated in MD 5725.					
		0.0	0.0	1000000000.0	3/3

5730	**OPERATING_MODE**		D04	**QV:** FBHLA	
HEX	Display of the operating mode		UNS. WORD	immediately	
The current operating mode is displayed in this machine data. Bit Meaning Bit 0=1: Velocity controller active Bit 1=1: Force limitation active Bit 2=1: Friction compensation active Bit 3=1: Velocity controller adaptation active Bit 4=1: Piston position known Bit 8=1: Force limitation on Bit 9=1: Friction compensation on Bit10=1: Single force limitation on					
		1	1	FFFF	3/3

5731	**CL1_PO_IMAGE**		D04, EXP	**QV:** FBHLA	
HEX	Map of the ZK1_PO register		UNS. WORD	immediately	
Ths machine data serves for display of the internal Power On alarm register. Concealed PO alarms (MD 5600) are also displayed.					
		0	0	FFFF	3/3

5732	**CL1_RES_IMAGE**		D04, EXP	**QV:** FBHLA	
HEX	Map of the ZK1_RES register		UNS. WORD	immediately	
Ths machine data serves for display of the internal Reset alarm register. Concealed RESET alarms (MD 5601) are also displayed.					
		0	0	FFFF	3/3

5735	**PROCESSOR_UTILIZATION**		D04, EXP	**QV:** FBHLA	
%	Processor load		UNS. WORD	immediately	
This machine data informs about the available calculating time reserves (processor load display).					
		0	0	FFFF	3/3

5740	**ACTUAL_POSITION**		EXP, D04	**QV:** FBHLA	
mm	Actual position value in relation to machine zero		FLOAT	immediately	
This machine data serves for display of the actual position value in relation to the machine zero.					
		0.0	-10000000.0	10000000.0	3/3

5741	**ACTUAL_PISTON_POSITION**		EXP, D04	**QV:** FBHLA	
mm	Piston position in relation to piston zero		FLOAT	immediately	
This machine data serves for display of the piston position in relation to the piston zero.					
		0.0	-10000000.0	10000000.0	3/3

5790	**ENC_TYPE**			D04, D06	**QV:** FBHLA
-	Measuring circuit type of measuring system			WORD	immediately
This machine data displays the measuring circuit code number of the indirect measuring system. 0: IPU (V) voltage signals 1...15: reserved 16: EnDat encoder					
		0	-1	32767	3/3

5797	**PBL_VERSION**			D04	**QV:** FBHLA
-	Data version			UNS. WORD	immediately
This machine data displays the current data version (machine data list).					
		0	0	FFFF	3/3

5798	**FIRMWARE_DATE**			D04	**QV:** FBHLA
-	Firmware date			UNS. WORD	immediately
This machine data displays the software version code (firmware date). The display is decimal, e.g. 01.01.1993 corresponds to 1063dec.					
		0	0	FFFF	3/3

5799	**FIRMWARE_VERSION**			D04	**QV:** FBHLA
-	Firmware version			UNS. DWORD	immediately
This machine data displays the current software version (firmware version). The display is decimal, e.g. 21000 corresponds to the version 2.10/00.					
		0	0	FFFFFF	3/3

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Suggestions and/or Corrections

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