SIEMENS

SINUMERIK

SINUMERIK 828D
Hardware and Software

Service Manual

Preface

Safety notes 1

System description 2

Service cases - software 3

Service cases - hardware 4

Spare parts and accessories 5

ESD guidelines A

Appendix B

Valid for:

CNC software for SINUMERIK 828D V2.6

03/2010
6FC5397-5DP20-0BA0

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠CAUTION
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation for the specific task, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Siemens AG
Industry Sector
Postfach 48 48
90026 NÜRNBERG
GERMANY

order number: 6FC5397-5DP20-0BA0
℗ 04/2010

Preface

SINUMERIK documentation

The SINUMERIK documentation is organized in three parts:

- General documentation
- User documentation
- Manufacturer/service documentation

Information on the following topics is available under the link (http://www.siemens.com/motioncontrol/docu):

- Ordering documentation

  Here you can find an up-to-date overview of publications.
- Downloading documentation

  Links to more information for downloading files from Service & Support.
- Researching documentation online

  Information on DOConCD and direct access to the publications in DOConWEB.
- Customizing documentation based on Siemens content using My Documentation Manager (MDM) (http://www.siemens.com/mdm).
- My Documentation Manager provides you with a range of features for generating your own machine documentation.
- Training and FAQs

  Information on our range of training courses and FAQs (frequently asked questions) is available via the page navigation.

Target group

This document addresses maintenance and service personnel.

Benefits

Based on the Service Manual, the target group can correctly and safely perform service and maintenance work.

Utilization phase: Maintenance and service phase

Standard version

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

Other functions not described in this documentation might be executable in the control. However, no claim can be made regarding the availability of these functions when the equipment is first supplied or in the event of 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.

Questions about this documentation

If you have any queries (suggestions, corrections) in relation to this documentation, please send a fax or e-mail to the following address:

Fax: +49 9131 98 2176 A fax form is available at the end of this document.
E-mail (mailto:docu.motioncontrol@siemens.com)

SINUMERIK Internet address (http://www.siemens.com/sinumerik)

Service & Support

If you have any technical questions, please contact our hotline:

	Europe / Africa
Phone	+49 180 5050 222
Fax	+49 180 5050 223
0.14 €/min from the German fixed-line network; cell phone charges may vary.	
Internet (http://www.siemens.com/automation/support-request)	

	Americas
Phone	+1 423 262 2522
Fax	+1 423 262 2200
E-mail (mailto:techsupport.sea@siemens.com)	

	Asia / Pacific
Phone	+86 1064 75 75 75
Fax	+86 1064 74 74 74
E-mail (mailto:techsupport.asia@siemens.com)	

Note

Country-specific telephone numbers for technical support are provided on the Internet (http://www.siemens.com/automation/partner).

EC Declaration of Conformity

The EC Declaration of Conformity for the EMC Directive can be found on the Internet (http://support.automation.siemens.com) under the Product Order No. 15257461 or at the relevant branch office of the I DT MC Division of Siemens AG.

CompactFlash cards for users:

- The SINUMERIK CNC supports the file systems FAT16 and FAT32 for CompactFlash cards. You may need to format the memory card if you want to use a memory card from another device or if you want to ensure the compatibility of the memory card with the SINUMERIK. However, formatting the memory card will permanently delete all data on it.
- Do not remove the memory card while it is being accessed. This can lead to damage of the memory card and the SINUMERIK as well as the data on the memory card.
- If you cannot use a memory card with the SINUMERIK, it is probably because the memory card is not formatted for the control system (e.g. Ext3 Linux file system), the memory card file system is faulty or it is the wrong type of memory card.
- Insert the memory card carefully with the correct orientation into the memory card slot (take note of arrows, etc.). This way you avoid mechanical damage to the memory card or the device.
- Only use memory cards that have been approved by Siemens for use with SINUMERIK. Even though the SINUMERIK keeps to the general industry standards for memory cards, it is possible that memory cards from some manufacturers will not function perfectly in this device or are not completely compatible with it (you can obtain information on compatibility from the memory card manufacturer or supplier).
- The CompactFlash card from SanDisk "CompactFlash® 5000 Industrial Grade" has been approved for SINUMERIK (Order Number 6FC5313-5AG00-0AA0).

Table of contents

Preface **3**

1 Safety notes **11**

2 System description **13**

2.1 System overview 13

2.2 System versions 14

3 Service cases - software **17**

3.1 Backing up user data 18
3.1.1 This is how you backup user data 18
3.1.2 This is how you load the user data backup 21

3.2 Series commissioning 23
3.2.1 This is how you generate a series commissioning archive on an external data carrier 23
3.2.2 This is how you import a series commissioning archive from an external data carrier 26
3.2.3 This is how you generate a series commissioning archive on the system CompactFlash Card 27
3.2.4 This is how you import a series commissioning archive from the system CompactFlash Card 29

3.3 Software backup 32
3.3.1 This is how you generate a software backup 32
3.3.2 This is how you install a software backup 36

3.4 Software update 40
3.4.1 This is how you update the software 40

3.5 Mini boot system on the CompactFlash Card 44
3.5.1 This is how you generate a mini boot system 44
3.5.2 This is how you install a software backup using the mini boot system 48

3.6 Licensing 51
3.6.1 Licensing after replacing the system CompactFlash Card 51
3.6.2 This is how you license a CNC option 51
3.6.3 How to determine the license requirement 53
3.6.4 This is how you generated a new license key 54
3.6.5 This is how you display the actual license key 57

3.7 Enter the final end user data (EUNA) 60
3.7.1 This is how you generate the machine logbook 60
3.7.2 This is how you make a new entry in the logbook 62
3.7.3 This is how you save the machine identity 64
3.7.4 This is how you send the end user final destination data 66

4 Service cases - hardware **69**

4.1 PPU26x/PPU28x 71
4.1.1 Status displays at the PPU 71
4.1.2 This is how you remove the PPU 73
4.1.3 This is how you install the PPU 74

4.2 Replacing the system CompactFlash Card 76

4.2.1 This is how you remove the system CompactFlash Card ... 76
4.2.2 This is how you insert the system CompactFlash Card ... 78

4.3 SINAUT modem ... 81
4.3.1 LED status displays ... 81
4.3.2 This is how you insert the SIM card ... 82
4.3.3 This is how you load the factory settings ... 88

4.4 Machine control panels ... 89
4.4.1 Status displays MCP 310C PN ... 89
4.4.2 This is how you remove the MCP 310C PN ... 90
4.4.3 This is how you install the MCP 310C PN ... 92
4.4.4 Status displays, MCP 483C PN ... 93
4.4.5 This is how you remove the MCP 483C PN ... 94
4.4.6 This is how you install the MCP 483C PN ... 96

4.5 I/O modules ... 98
4.5.1 Status displays PP 72/48D PN ... 98
4.5.2 This is how you remove the PP 72/48D PN ... 99
4.5.3 This is how you install the PP 72/48D PN ... 101
4.5.4 Status displays PP 72/48D 2/2A PN ... 102
4.5.5 This is how you remove the PP 72/48D 2/2A PN ... 103
4.5.6 This is how you install the PP 72/48D 2/2A PN ... 105

4.6 Expansion module NX10 ... 106
4.6.1 Status displays on the NX10 ... 106
4.6.2 This is how you remove the NX10 ... 106
4.6.3 This is how you install the NX10 ... 108

4.7 Single Motor Modules ... 109
4.7.1 SMM status displays ... 109
4.7.2 SMM connections ... 110
4.7.3 This is how you remove a Motor Module ... 111
4.7.4 This is how you install a Motor Module ... 113

4.8 Double Motor Modules ... 115
4.8.1 DMM status displays ... 115
4.8.2 DMM connections ... 116
4.8.3 This is how you remove a Motor Module ... 117
4.8.4 This is how you install a Motor Module ... 119

4.9 Smart Line Modules ... 121
4.9.1 SLM (< 16 kW) status displays ... 121
4.9.2 SLM (< 16 kW) connections ... 122
4.9.3 SLM (16 kW and higher) status displays ... 123
4.9.4 SLM (16 kW and higher) connections ... 124
4.9.5 This is how you remove an SLM ... 125
4.9.6 This is how you install an SLM ... 127

4.10 Active Line Modules ... 129
4.10.1 ALM status displays ... 129
4.10.2 ALM connections ... 130
4.10.3 This is how you remove an ALM ... 131
4.10.4 This is how you install an ALM ... 133

4.11 SMC20 / SMC30 ... 135
4.11.1 SMC20 status displays ... 135
4.11.2 SMC20 connections ... 136
4.11.3 This is how you remove an SMC20 ... 136
4.11.4 This is how you install an SMC20 ... 138

4.11.5 SMC30 status displays 139
4.11.6 SMC30 connections 140
4.11.7 This is how you remove an SMC30 140
4.11.8 This is how you install an SMC30 142
4.12 SME20 / SME25 144
4.12.1 SME20 connections 144
4.12.2 This is how you remove an SME20 and install it again 144
4.12.3 SME25 connections 145
4.12.4 This is how you remove an SME25 and install it again 146
4.13 DMC20 147
4.13.1 DMC20 status displays 147
4.13.2 DMC20 connections 148
4.13.3 This is how you remove a DMC20 148
4.13.4 This is how you install a DMC20 150
5 Spare parts and accessories 151
A ESD guidelines 153
A.1 RI suppression measures 153
A.2 ESD measures 154
B Appendix 155
B.1 List of abbreviations 155
B.2 Feedback on the documentation 159
B.3 Documentation overview 163
Index 165

Safety notes

1

The following notices are intended firstly for your personal safety and secondly to prevent damage occurring to the product described or any connected devices and machines. Non-observance of the warnings can result in severe personal injury or property damage.

⚠ DANGER

Only appropriately qualified personnel may commission/start-up SINUMERIK equipment.

The personnel must take into account the information provided in the technical customer documentation for the product, and be familiar with and observe the specified danger and warning notices.

When electrical equipment and motors are operated, the electrical circuits automatically conduct a dangerous voltage.

When the system is operating, dangerous axis movements may occur throughout the entire work area.

A potential fire hazard exists due to the energy being transferred in the equipment and the work materials used.

All work on the electrical system must be performed after the system has been switched off and disconnected from the power supply.

⚠ DANGER

Proper transportation, expert storage, installation and mounting, as well as careful operation and maintenance are essential for this SINUMERIK device to operate correctly and reliably.

The details in the catalogs and proposals also apply to the design of special equipment versions.

In addition to the danger and warning information provided in the technical customer documentation, the applicable national, local, and system-specific regulations and requirements must be taken into account.

Only class DVC A protective extra-low voltages (PELVs) may be connected to connections and terminals up to 60 V DC in accordance with EN 61800-5-1.

Should it be necessary to test or take measurements on live equipment, then the specifications and procedural instructions defined in Accident Prevention Regulation BGV A2 must be adhered to, in particular § 8 "Permissible deviations when working on live components". Suitable electric tools should be used.

⚠ WARNING

Operating the equipment in the immediate vicinity (< 1.5 m) of mobile telephones with a transmitting power of > 1 W may lead to incorrect functioning of the devices.

Connecting cables and signal lines should be installed in such a way that inductive and capacitive interference does not in any way impair the automation and safety functions.

⚠ DANGER

Repairs to devices that have been supplied by our company may only be carried out by SIEMENS customer service or by repair centers authorized by SIEMENS.

When replacing parts or components, only use those parts that are included in the spare parts list.

EMERGENCY STOP/EMERGENCY OFF devices according to EN 60204-1 (VDE 0113 Part 1) must remain active in all modes of the automation equipment. Resetting the EMERGENCY STOP/EMERGENCY OFF device must not cause an uncontrolled or undefined restart.

Anywhere in the automation equipment where faults might cause physical injury or major material damage, in other words, where faults could be dangerous, additional external precautions must be taken, or facilities must be provided, that guarantee or enforce a safe operational state, even when there is a fault (e.g. using an independent limit value switch, mechanical locking mechanisms, EMERGENCY STOP/EMERGENCY OFF devices).

⚠ DANGER

External power supply units for supplying components of the drive control must have safety isolation from circuits with dangerous voltages (DVC A according to EN 61800-5-1; SELV/PELV). In addition only power units with control circuits that have safety isolation from circuits with dangerous voltages may be connected.

System description

2

2.1 System overview

System design

The following configuration shows a typical example:

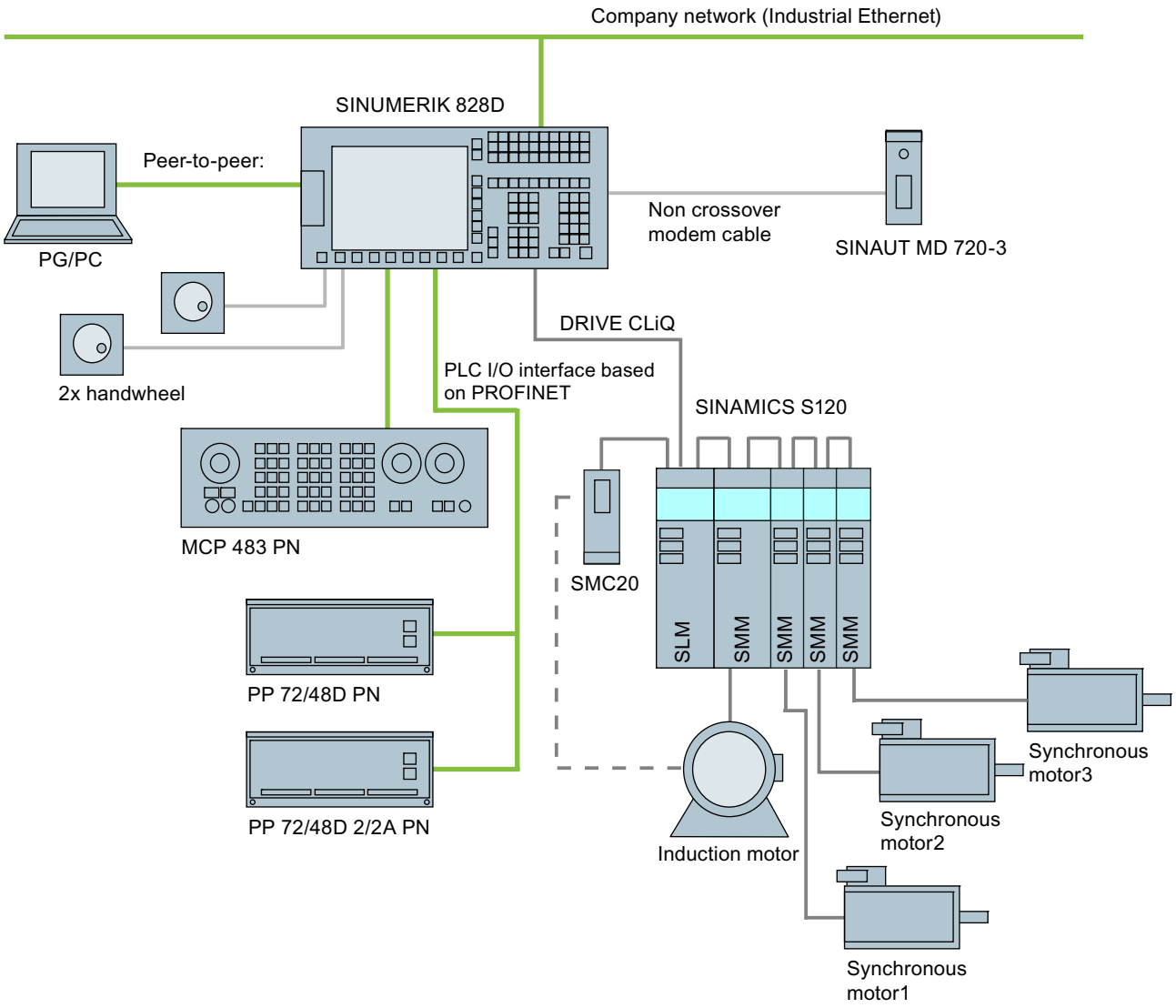
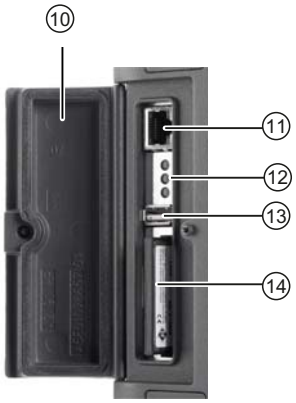
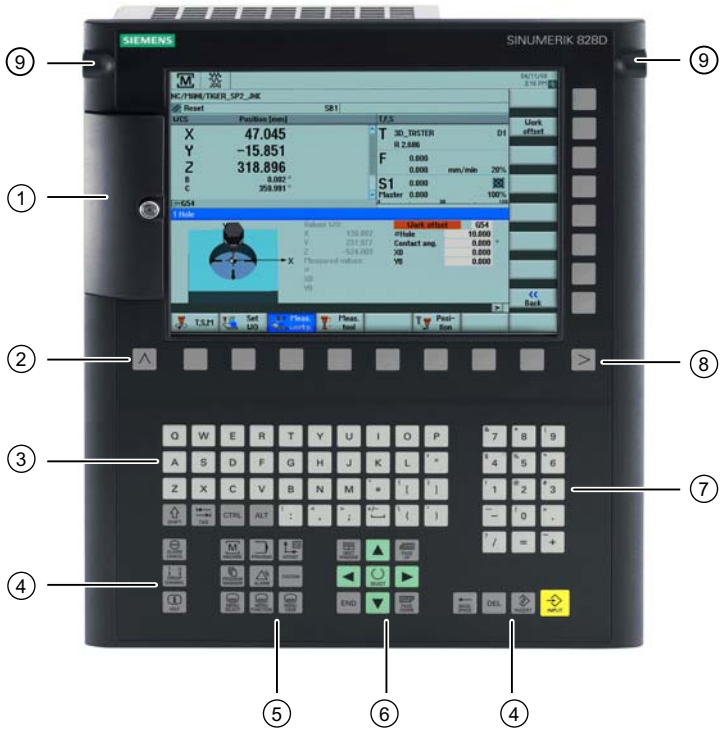


Figure 2-1 Configuration example

2.2 System versions

Front panel of the different versions with interfaces





① Protective cover for user interfaces
② Menu back key
③ Alphabetic key group
④ Control key group
⑤ Hotkey group
⑥ Cursor key group

⑦ Numerical block
⑧ Menu forward key
⑨ 3/8" threads for additional components
⑩ Protective cover for user interfaces
⑪ X127: Ethernet (service socket)
⑫ Status LEDs: RDY, NC, CF
⑬ X125: USB port
⑭ Slot for CompactFlash Card with user data

Figure 2-2 System versions

Rear of the PPU

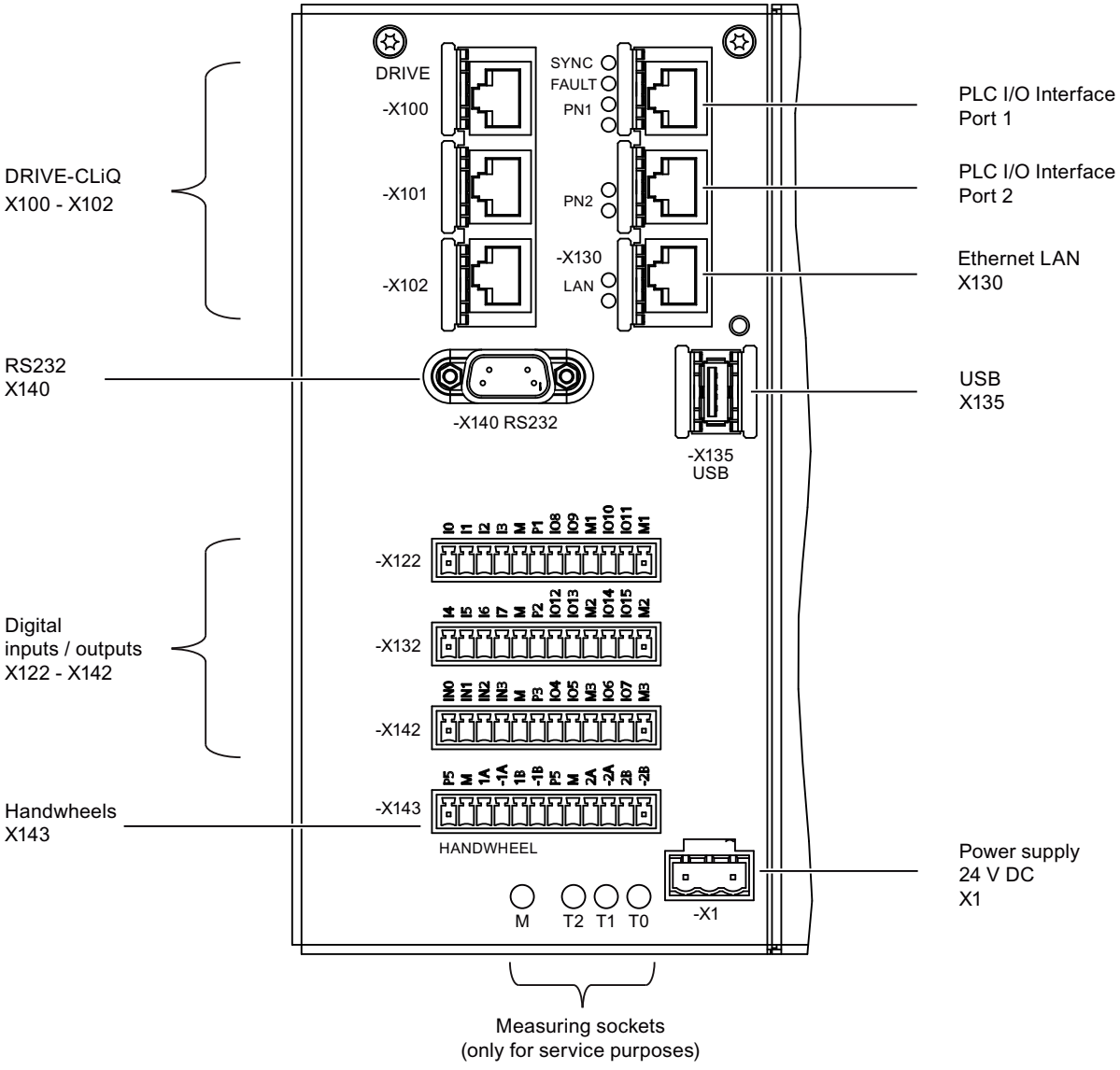


Figure 2-3 Interfaces on the rear side of the PPU

Service cases - software

3

Overview

The following software tools should be used for the subsequently described service activities and to backup system and user data:

- Toolbox CD V2.6 SINUMERIK 828D with the following contents:
  - PLC Programming Tool for Integrated PLC
  - Commissioning software for SINAMICS S120
  - Recovery system
- RCS Commander V2.6 SP1

Backing up log files:

If system problems occur, then it is necessary to backup all of the existing log files in order to provide these to the hotline for diagnostics. There is a special shortcut key for this function:

`CTRL + ALT + D`

This function generates a directory on the User CF card or on the front USB. If both are available, then the directory is created in both storage media.

Example

The directory name has the following structure: LOG_Date_Time

LOG_091102_083615 stands for a directory generated on 02.11.2009 at 8:36:15.

This therefore ensures that a directory is not overwritten by pressing CTRL + ALT + D several times. The directory contains all of the logbook and debug information available in the system.

3.1 Backing up user data

3.1.1 This is how you backup user data

Application

A backup of the data in the complete memory is generated with the "Save data" function.

This data backup must be performed for every control that has been commissioned in order to be able to quickly restore the control system in the case of data loss. If the "Create software backup" function is used, then it is essential to backup the memory data.

With the data backup, a copy of the limited buffered memory is stored in the permanent memory. Backup of selected data (e.g. only machine data and no workpiece programs) is not possible.

Data can be backed up without a password: i.e. always!

Note

Data backup

After making important changes to the data, immediately backup data, e.g. after the 1st commissioning and the 2nd commissioning.

Backing up data

Preconditions:

- The control system has powered up.
- The power supply voltage is guaranteed during the data backup.

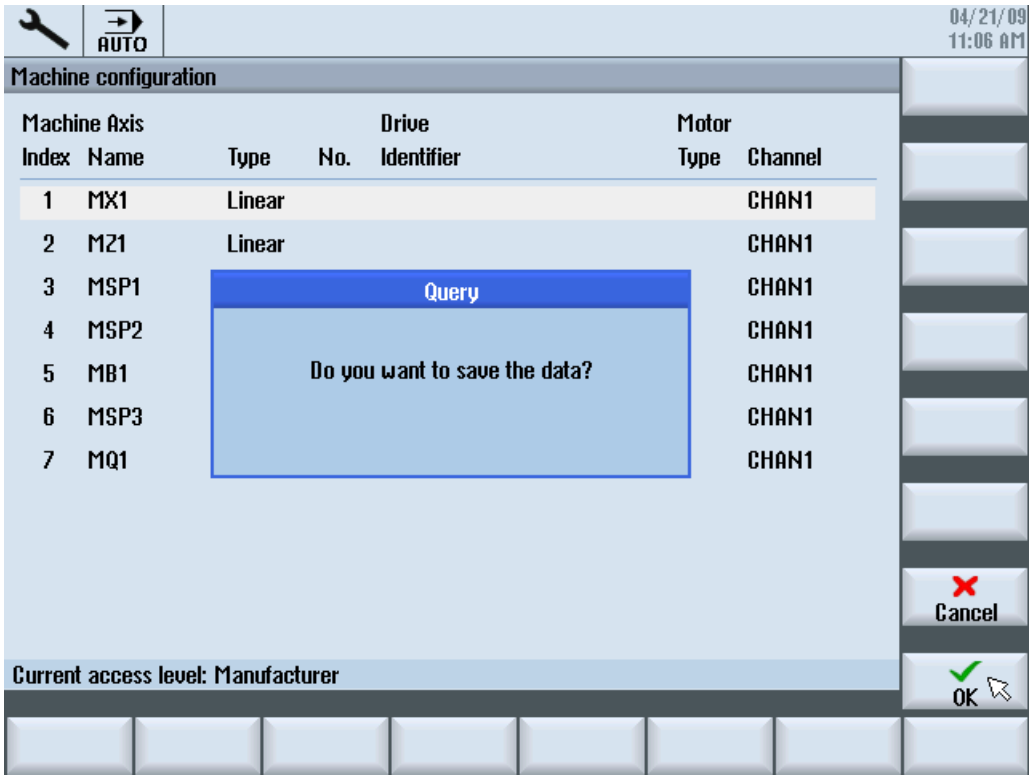
Proceed as follows to generate the internal data backup:

1. Press the <MENU SELECT> key.

2. Select the "Start-up" operating area.

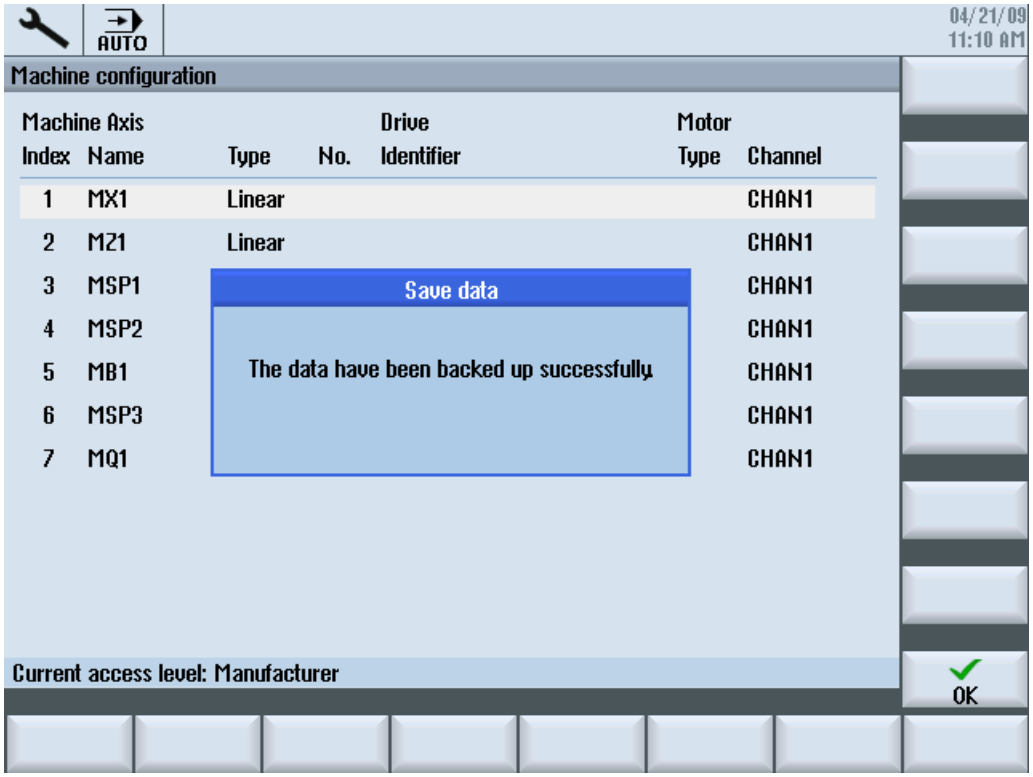
3. Press the "Save data" softkey.

4. This is followed by the "Query" to backup data:



5. Press the "OK" softkey to backup the data.

– A progress indicator indicate the status of the data backup.
– After the data backup has been successfully completed, the following message is output:



6. Confirm this message with "OK".

NOTICE
While the data is being backed up, the control system must neither be operated, nor turned off.

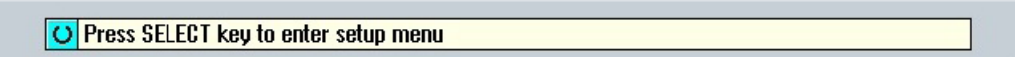
3.1.2 This is how you load the user data backup

NOTICE
If this function is activated, the actual system data is replaced by the data backup.

Procedure

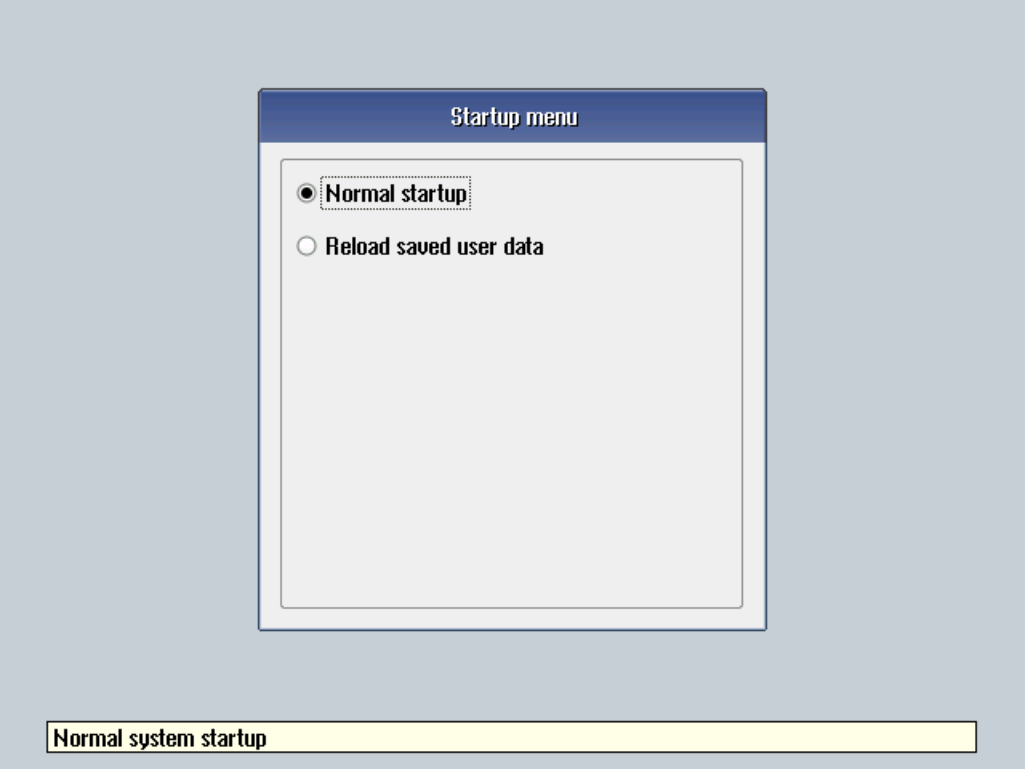
Proceed as follows to load the internal data backup:

1. The following display is shown when booting after power-on:

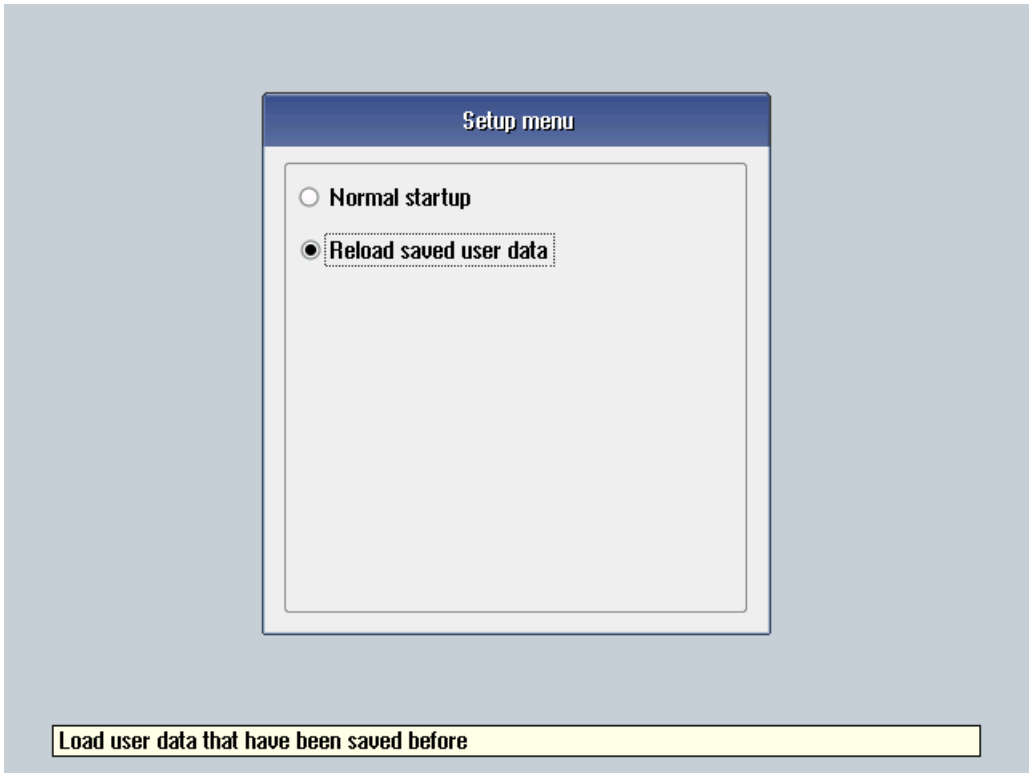


2. To start the Setup menu , press the <SELECT> key.

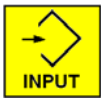
You now go to the Setup menu:



3. Using the arrow key, select the menu item "Reload saved user data".

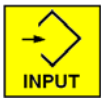


4. Confirm that the backup is loaded by pressing the key <INPUT>.



5. Confirm the confirmation prompt by pressing the <INPUT> key.

   Are you sure you want to reload saved user data?"



Note

Booting

If data is lost from the buffer memory, the data saved in the permanent memory will automatically be reloaded to the memory at POWER ON.

If the control boots with the backed-up data, the following message is displayed:

"4062 Data backup copy has been loaded".

3.2 Series commissioning

Overview

A series commissioning archive is used to completely backup all of the data required for the machine function.

A series commissioning archive can be generated on an external data carrier, e.g. USB-FlashDrive or CompactFlash Card at the front panel of the control as well as on the system CompactFlash Card.

Note

Data must always be backed up before a machine is delivered. Only then can it be ensured that in the case of service, the delivery condition of the machine can be restored.

In addition, it may be necessary to generate a series commissioning archive before service activities are started. This means that it can be guaranteed that the actual state of the machine can be restored after the activities have been completed.

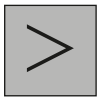
3.2.1 This is how you generate a series commissioning archive on an external data carrier

Generating an archive on an external data carrier

Procedure:

1. Select the "Start-up" operating area.

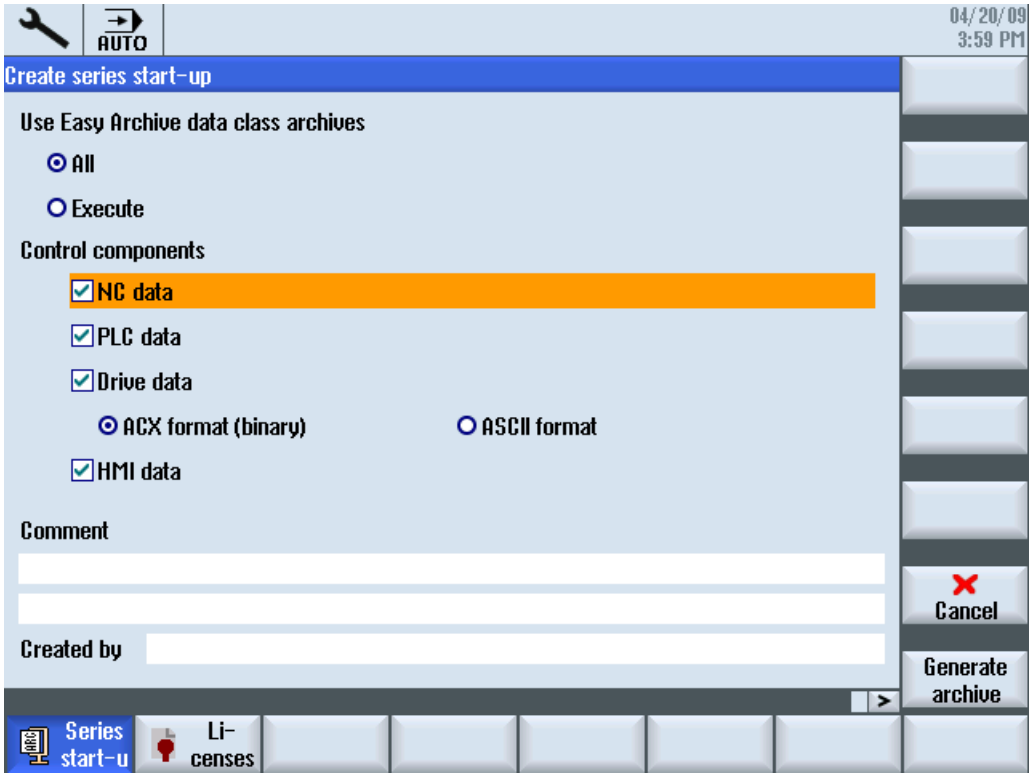
2. Press the menu forward key.



3. Press the "Series startup" softkey.

4. Activate "Series startup".

   The "Create Series Startup" window opens.



5. Select the desired control components.

Note

Easy Archive

- Select all of the components, unless it is known that individual components do not deviate from the Siemens standard.
- Select all data classes, unless only certain data (e.g. INDIVIDUAL) are to be backed up.

6. Press the "Generate archive" softkey.

   The "Generate Archive: Select Archive" window opens.

7. Select the storage location of the archive:
   - USB: USB-FlashDrive at the rear, slot X135
   - USER USB: USB-FlashDrive in slot X125 at the front
   - User CF: CompactFlash Card in the slot at the front

8. Select a directory.

   Example: User CF

   - OR -

9. Press the "New directory" softkey to generate a new directory.

   New directory

   The "New Directory" window opens.

10. Enter the required name and confirm with "OK."

    OK

    The directory is created subordinate to the selected folder.

11. Press the "OK" softkey.

    OK

    The "Generate Archive: Name" window opens.

12. Enter the required name and confirm with "OK."

    OK

A file with format type *.ard is saved in the selected directory:

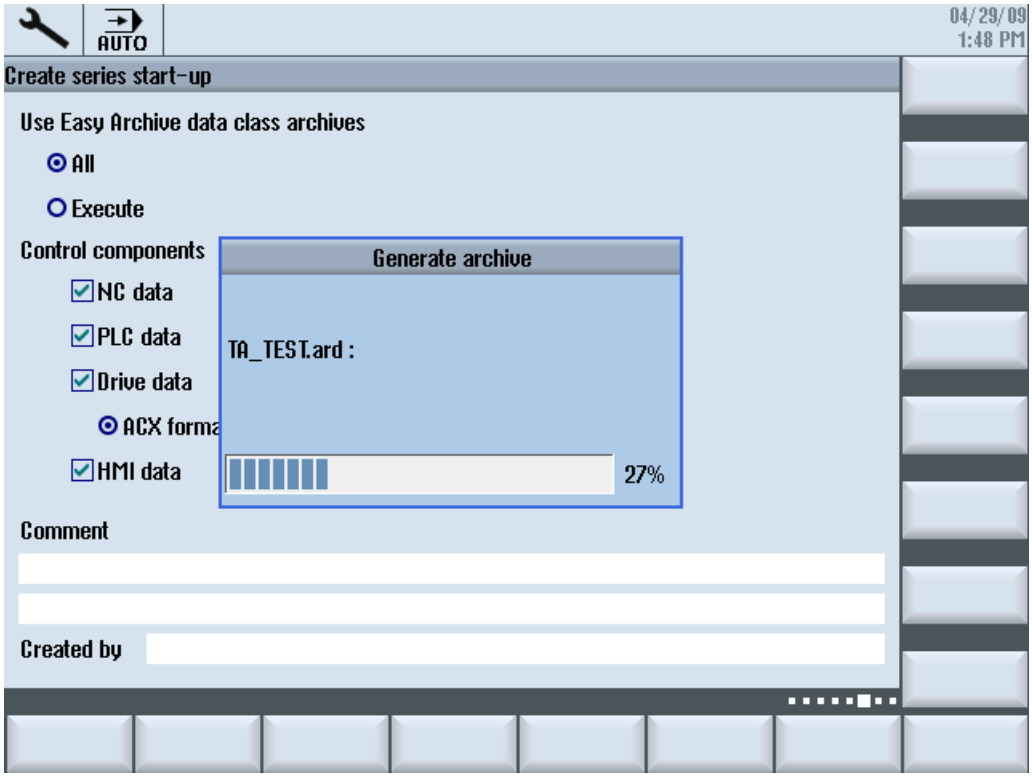


Figure 3-1 Series commissioning: Generating an archive

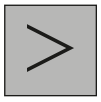
3.2.2 This is how you import a series commissioning archive from an external data carrier

Reading in an archive from an external data carrier

Procedure:

1. Select the "Start-up" operating area.

2. Press the menu forward key.



3. Press the "Series startup" softkey.

4. Press "OK".

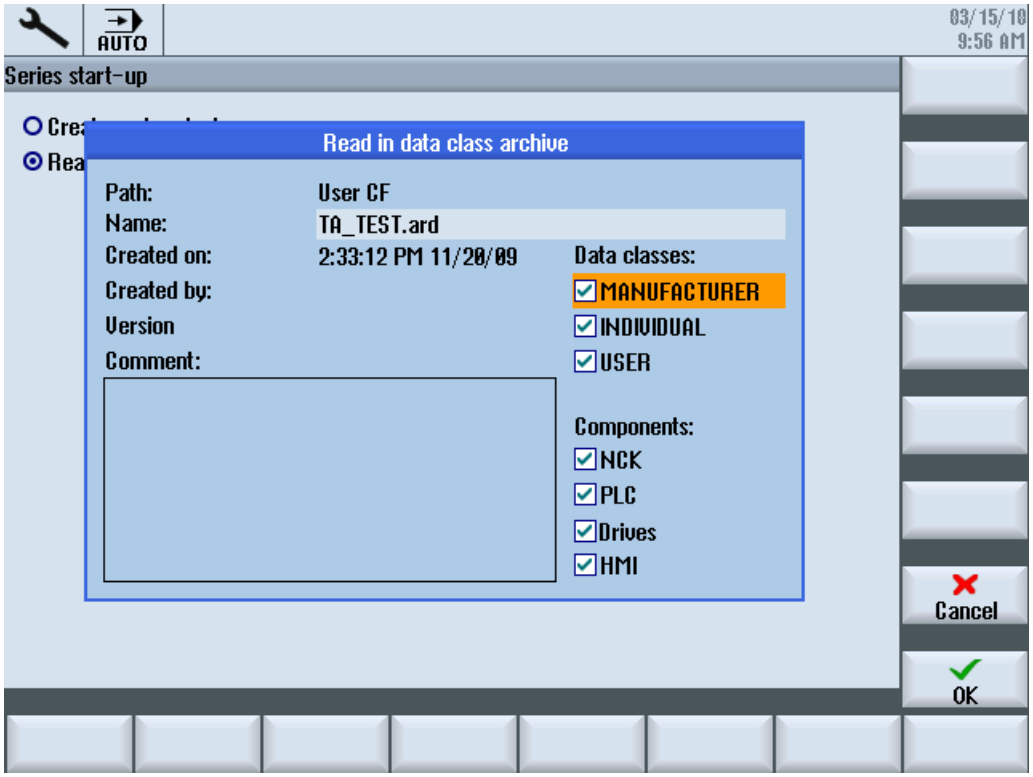
The "Series Start-up" window opens.

5. Activate "Read in series startup".
6. Press "OK".

The "Select Startup Archive" window opens and the data tree is displayed.

7. Select the required commissioning archive (ARD).

   Example: User CF



8. Press "OK".

   A query is displayed, here you can see the most important data of the selected archive to be certain that it is OK.

9. Data is read in when pressing "OK".

10. In the case of errors or problems, import can be terminated by pressing the "Cancel" softkey.

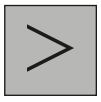
3.2.3 This is how you generate a series commissioning archive on the system CompactFlash Card

Generating an archive on the system CompactFlash Card

Procedure:

1. Select the "Start-up" operating area.

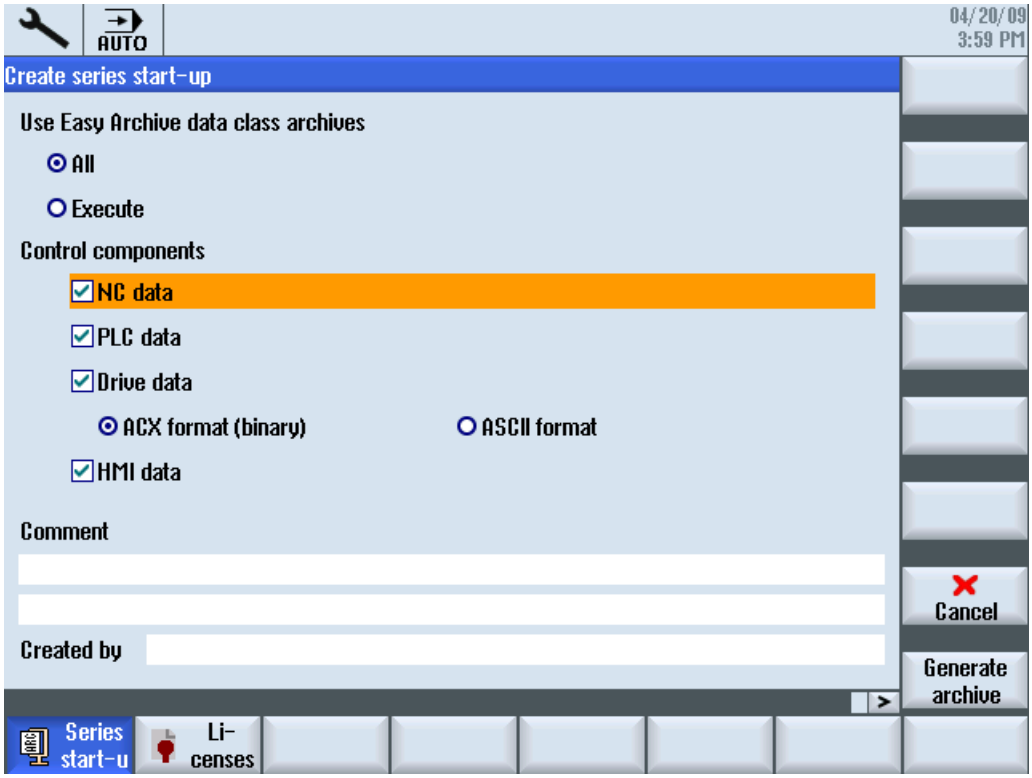
2. Press the menu forward key.



3. Press the "Series startup" softkey.

4. Activate "Series startup".

   The "Create Series Startup" window opens.



5. Select the desired control components.

Note

Easy Archive

- Select all of the components, unless it is known that individual components do not deviate from the Siemens standard.
- Select all data classes, unless only certain data (e.g. INDIVIDUAL) are to be backed up.

6. Press the "Generate archive" softkey.

The "Generate Archive: Select Archive" window opens.

7. Select the storage location of the archive:

   "Archives": Internal memory on the CompactFlash Card system

8. Select a directory.

   Example: "Archives" → "Manufacturer"

   - OR -

9. Press the "New directory" softkey to generate a new directory.

The "New Directory" window opens.

10. Enter the required name and confirm with "OK."

The directory is created subordinate to the selected folder.

11. Press the "OK" softkey.

The "Generate Archive: Name" window opens.

12. Enter the required name and confirm with "OK."

A file with the ARD format type is saved in the selected directory.

3.2.4 This is how you import a series commissioning archive from the system CompactFlash Card

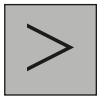
Reading in an archive from the system CompactFlash Card

A description is provided here how you read in a series commissioning archive in order to be able to restore the previous state of the machine.

Procedure:

1. Select the "Start-up" operating area.

2. Press the menu forward key.



3. Press the "Series startup" softkey.

4. Press "OK".

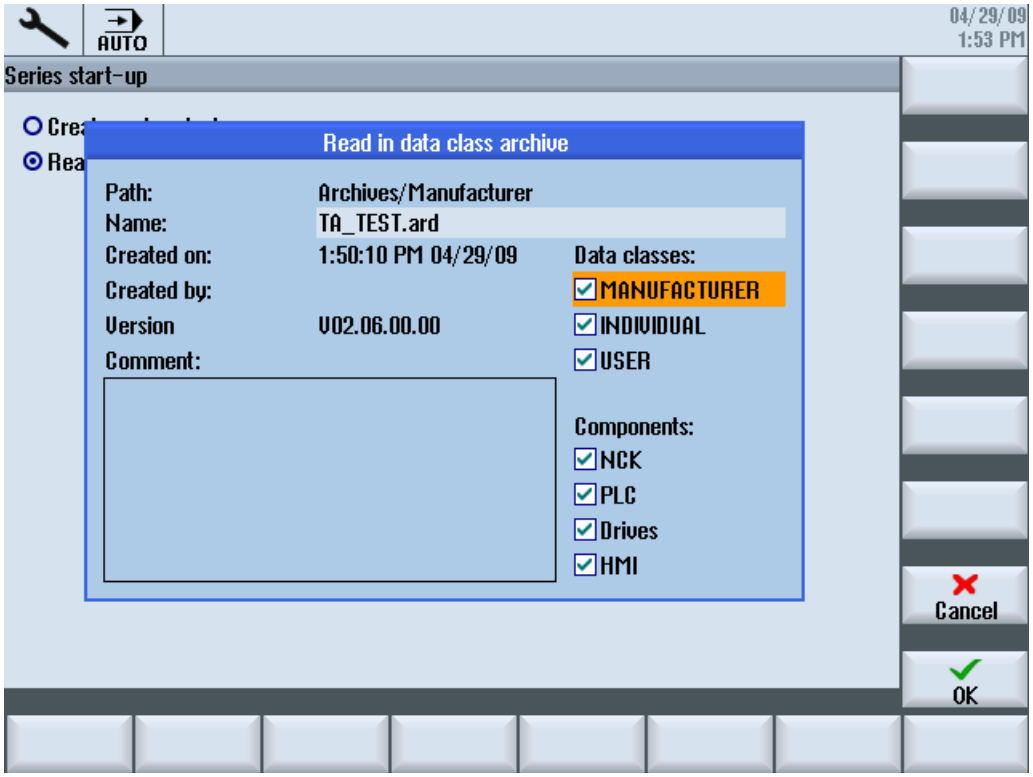
The "Series Start-up" window opens.

5. Activate "Read in series startup".
6. Press "OK".

The "Select Startup Archive" window opens and the data tree is displayed.

7. Select the required commissioning archive (ARD).

   Example: "Archives" → "Manufacturer"



8. Press "OK".

   A window with the data of the selected archive is displayed.

9. Data is read in when pressing "OK".

10. In the case of errors or problems, import can be terminated by pressing the "Cancel" softkey.

3.3 Software backup

3.3.1 This is how you generate a software backup

Overview

With "Create software backup", a function is provided to generate a backup of the system software including all of the user data saved on the system card. This backup represents the "Backup" of the machine.

Note

Memory size: At least 1 GB

The backup does not contain a license key, in order to guarantee use for series production.

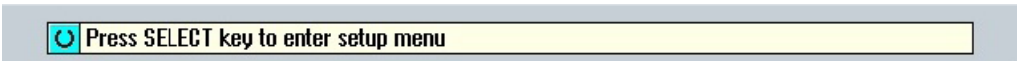
To generate the backup of the system software ("clone"), a storage medium (CompactFlash Card or USB-FlashDrive) with a minimum memory size of 1 GB is required. Other data carriers are not permissible.

Generating the system software backup ("clone")

Procedure:

1. Switch the control on.
2. Perform an internal data backup (see also: This is how you backup user data (Page 18)).

   A correct, complete backup is only generated using the internal data backup.
3. Switch the control off.
4. Switch-on the control again, as the backup can only be generated when the control boots. After the control has been switched-on, the following display appears:

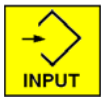
5. Press the <SELECT> key, "Normal startup" is the default setting.
6. Now press the following keys in succession:

   Menu reset key, **HSK2** (horizontal SK2), **VSK2** (vertical SK2)

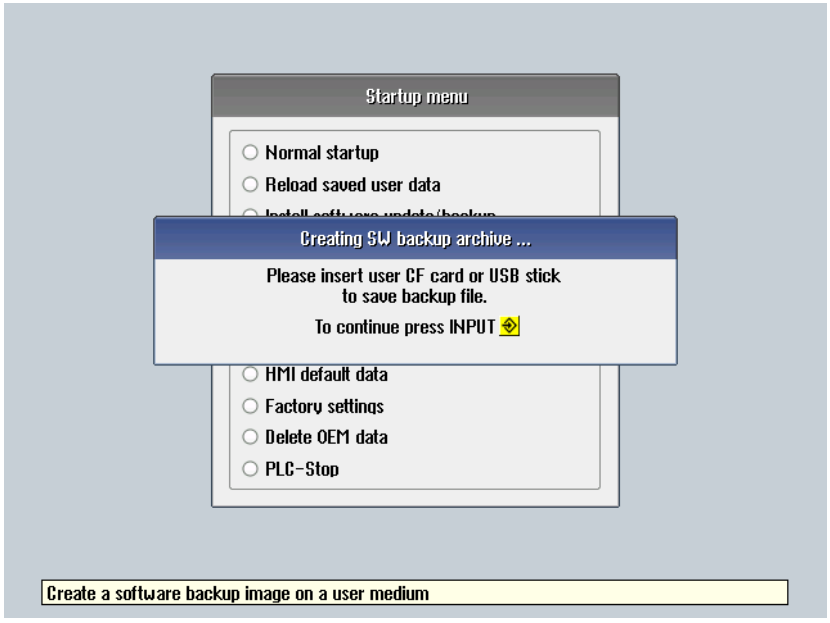
   

7. The Startup menu is displayed:

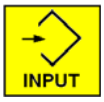
8. Using the cursor keys, select the menu item "Create software backup".
9. Press the <INPUT> key to confirm your selection:



10. Insert a storage medium into the slot on the front panel.

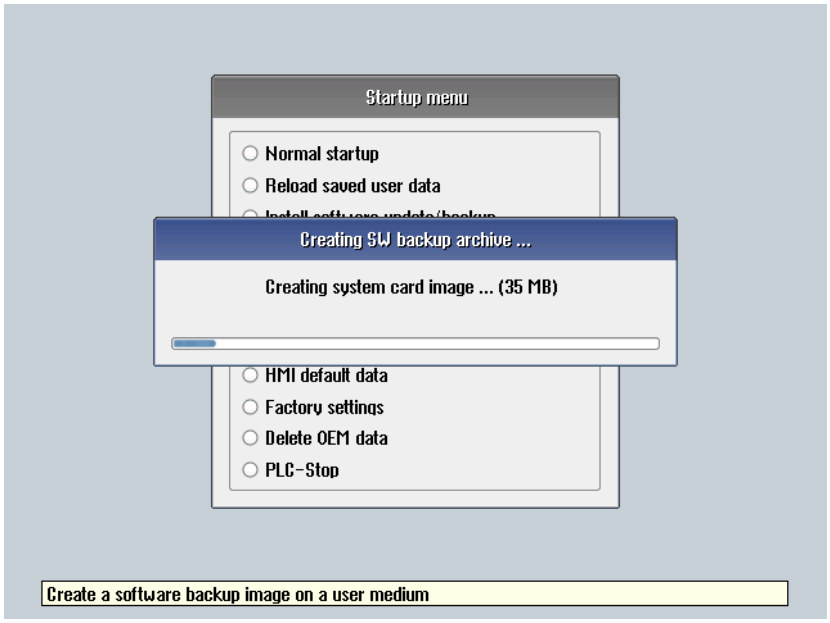


11. Press the <INPUT> key to start the backup.

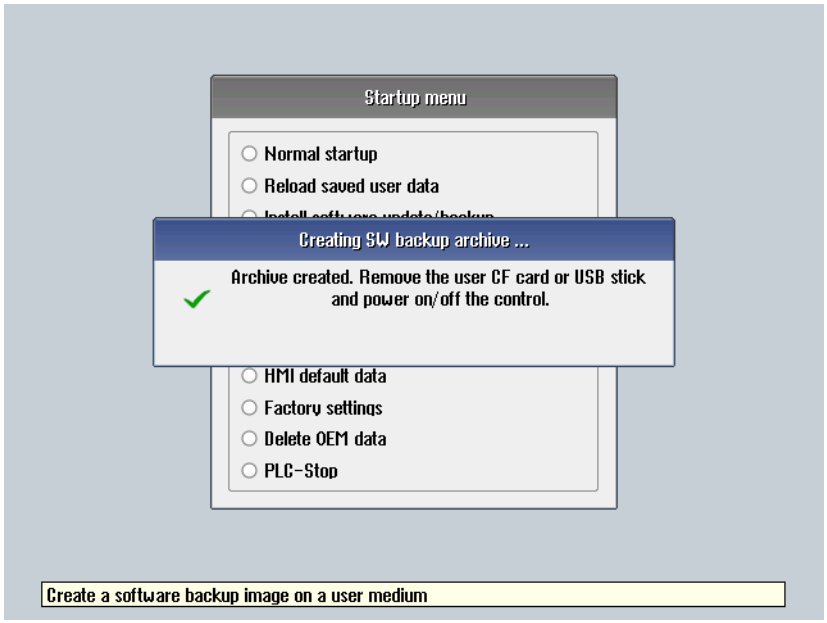


The software first checks whether a backup was already generated on the card and outputs a message. The backup can now be overwritten or the process interrupted by making the appropriate operator action.

12. When starting to generate a backup, the following message is output:



13. Wait until the following message is displayed:



14. Withdraw the storage medium from the slot at the front panel of the control.
15. Switch the control off.
16. Switch the control on.
17. The control boots normally.

Note

Note that when the system software is transferred, no license key for the software of the CNC options is transferred.

3.3.2 This is how you install a software backup

Overview

A backup previously generated is loaded into the control using the function "Install software update/backup". All system and user data are overwritten with the software backup image.

Note

Licenses

The backup does not contain a license key; a valid license key must be available on the control.

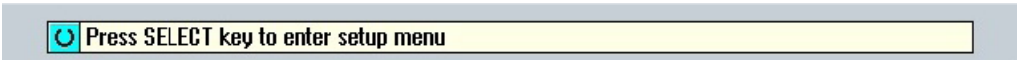
As an alternative, the license key for an already licensed card can be obtained through the Internet: See also This is how you display the actual license key (Page 57)

When replacing a defective system CompactFlash Card, the license key must be requested again: See also Licensing after replacing the system CompactFlash Card (Page 51)

Installing the software backup

Procedure:

1. Switch-on the control again, as the backup can only be generated when the control boots. After the control has been switched-on, the following is displayed:

2. Press the <SELECT> key, "Normal startup" is the default setting.
3. Now press the following keys in succession:

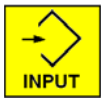
   Menu reset key, **HSK2** (horizontal SK2), **VSK2** (vertical SK2)

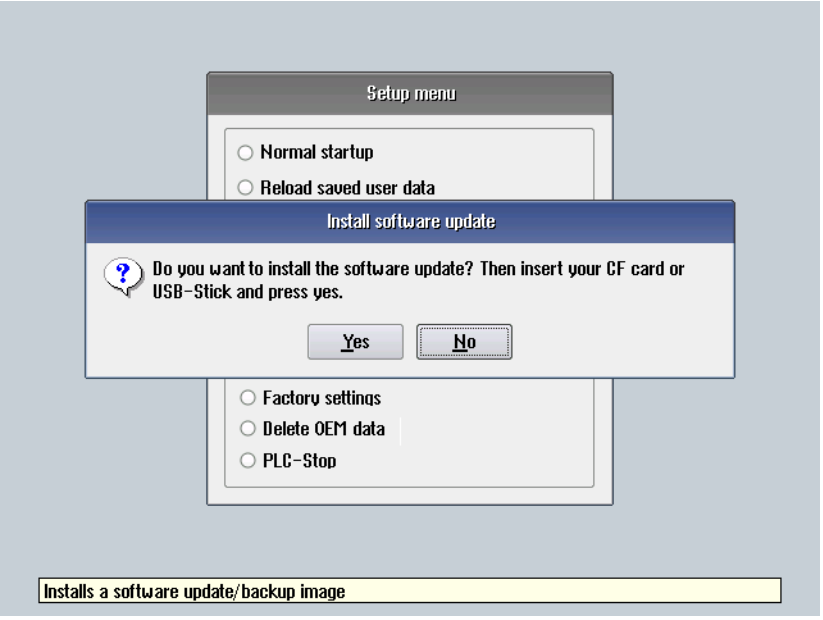
4. The Startup menu is displayed:

5. Using the cursor keys, select the menu item "Install software update/backup".

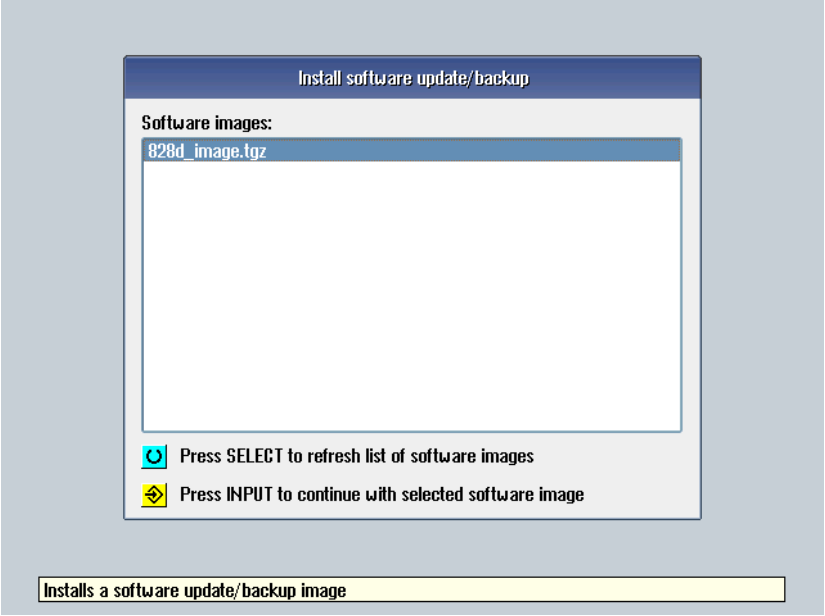
6. Press the <INPUT> key to confirm your selection:



7. Insert the storage medium with the backup in the slot and confirm with "Yes" by using the cursor keys to make the selection:

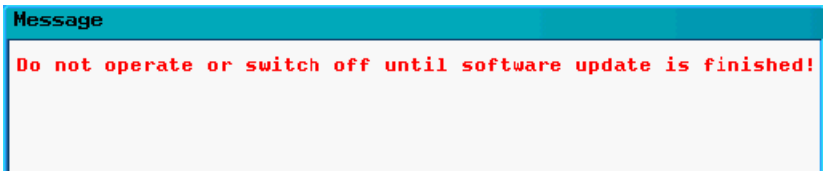


8. Select the valid backup using the cursor keys.



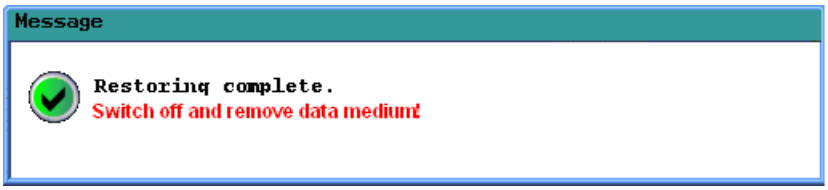
9. Press the <Input> key to confirm your selection.
10. The following message briefly appears: "`Starting software update`"

    Then the screen goes dark for several seconds.
11. If a valid backup has been found, the following message is output:



    If no valid backup was selected, the upgrade is interrupted with the following message: "`Image file is corrupt!`"

    In this case, switch-off the control, withdraw the data carrier and repeat the procedure by selecting a valid backup image.
12. Wait until the following message appears:



13. Switch the control off.
14. Withdraw the storage medium from the slot at the front panel of the control.
15. Switch the control on.
16. The control boots normally.

Note

If the procedure is interrupted, then it must be restarted.

If the system CompactFlash Card is no longer identified as a bootable CompactFlash Card, then a mini boot system must be generated on this card. (See also: This is how you generate a mini boot system (Page 44))

In this case, the license key of the system CompactFlash Card should be transferred to the control.

3.4 Software update

3.4.1 This is how you update the software

Data backup

If a system update is necessary, then the system data must be backed up so that no data is lost in the case of a problem.

In this case, we recommend to perform two types of data backup.

1. Generate an image of the system CompactFlash Card ("clone", see also: This is how you generate a software backup (Page 32)).

   A backup is generated just in case an error occurs during the update. This means that it is then possible to restore the "old system".

2. Generate an archive for series commissioning (see This is how you generate a series commissioning archive on an external data carrier (Page 23)), in order to restore the machine-specific data.

   The control is booted using a *.tgz file on the storage medium (CompactFlash Card or USB-FlashDrive) in the slot at the front panel of the control.

Note

Backup and archive the data of the control system to an external data carrier before booting. Observe the information in the update instructions.

Updating the control

Preconditions:

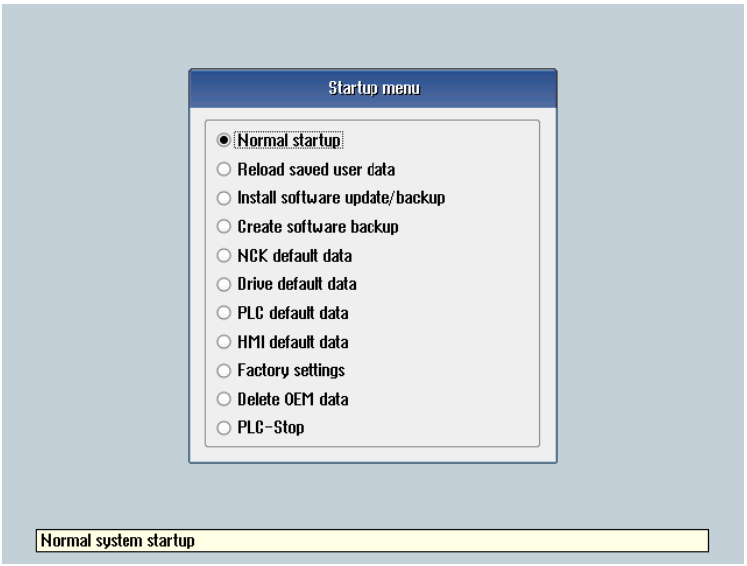
- The control system is switched off.
- The image for the update is saved on the CompactFlash card.
- The CompactFlash card is inserted in the slot on the front panel of the control.

Procedure:

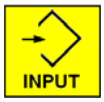
1. Switch-on the control again, as the image can only be generated when booting. After the control has been switched-on, the following display appears:

2. Press the <SELECT> key, "Normal startup" is the default setting.
3. Now press the following keys in succession:
   Menu reset key, **HSK2** (horizontal SK2), **VSK2** (vertical SK2)

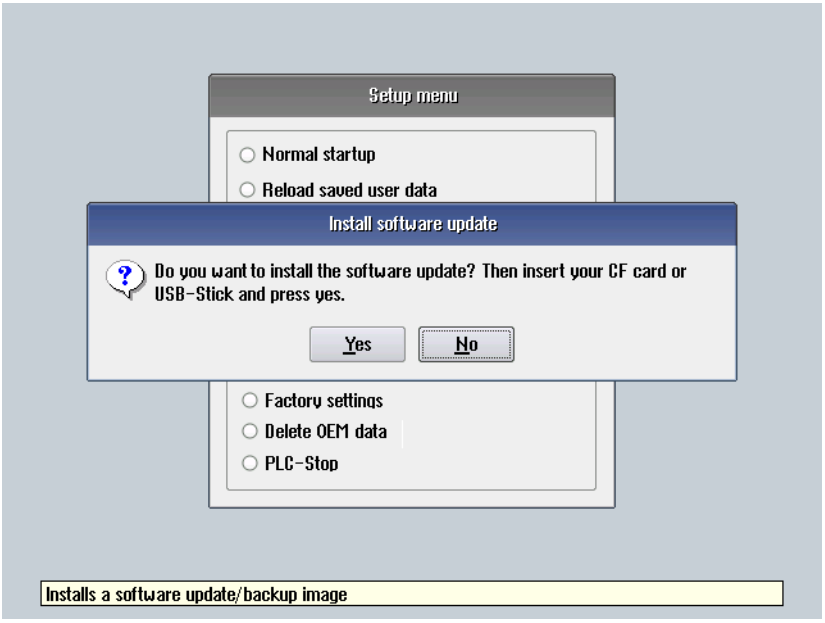
4. The setup menu is displayed:



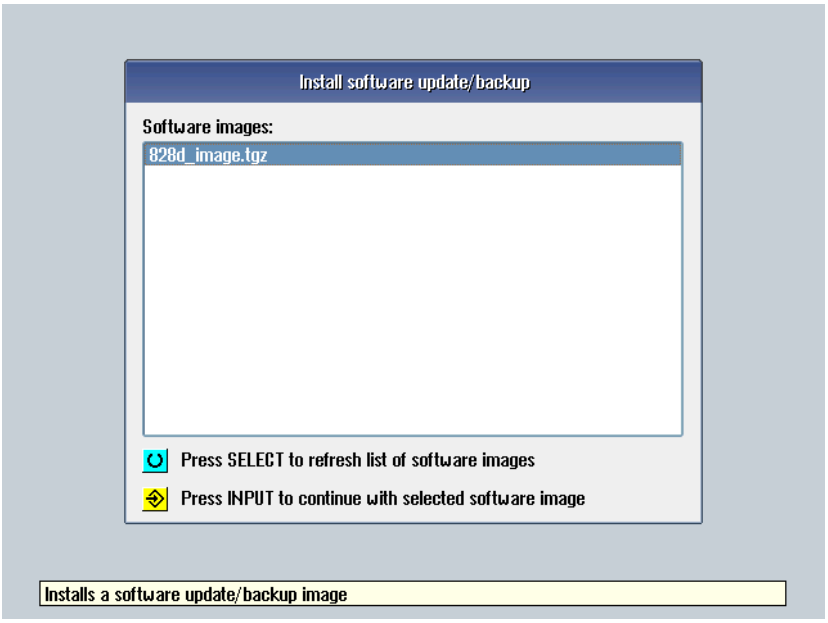
5. Use the cursor keys to select the menu item "Install software update/backup".
6. Press the <INPUT> key to confirm your selection.



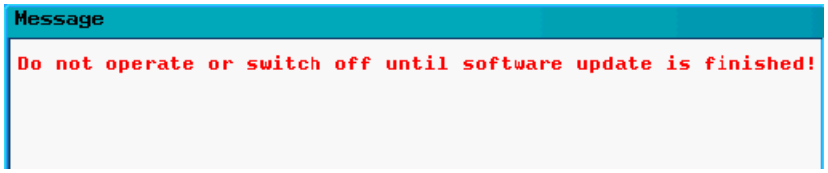
7. Use the cursor keys to select "Yes".



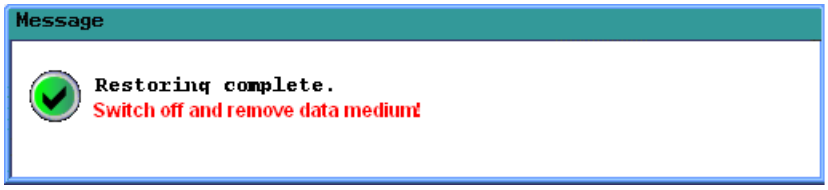
8. Select the update image (*.tgz) on the storage medium and confirm with <INPUT>.



9. The software update is started: The following message appears while the update is running:



10. Wait until the following message is output:



11. Withdraw the storage medium from the slot.
12. Switch the control off.
13. Switch the control on.
14. The control boots normally.

NOTICE
If the update is interrupted, then it must be restarted. If the system CompactFlash Card is no longer identified as bootable system, then a mini boot system must be generated on this card (see also: This is how you generate a mini boot system (Page 44)). In this case, the license key of the system CompactFlash Card should be transferred to the control.

3.5 Mini boot system on the CompactFlash Card

Application

If the system CompactFlash Card hardware is defective, then it must be replaced. The replacement card is an empty CompactFlash Card without any system software and without any user software and cannot be used as system CompactFlash Card as it is without any additional preparation.

Mini boot system image

"Configuration data" are supplied on the toolbox CD of the SINUMERIK 828D, which include in the scope of delivery of mini boot system image:

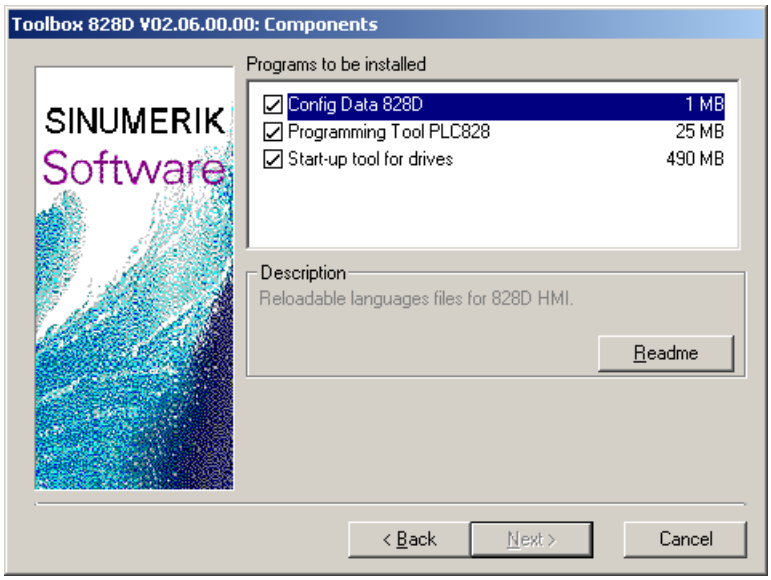


Figure 3-2 Toolbox selection

This program must be installed in order that the image of the mini boot system is installed on the PC/PG.

3.5.1 This is how you generate a mini boot system

Precondition

The default path to install the mini-boot system is:

```
C:\Program Files\Siemens\Toolbox 828D\V02060xx00\RecoverySys
```

The file name of the boot system is: minsys.img

The minsys.img file is copied to an empty replacement card using the RCS commander.

Precondition to write:

- RCS Commander has been installed.
- SW package: Configuration data from the Toolbox has been installed.
- CompactFlash card is a replacement card.

Installing the boot system on an empty card

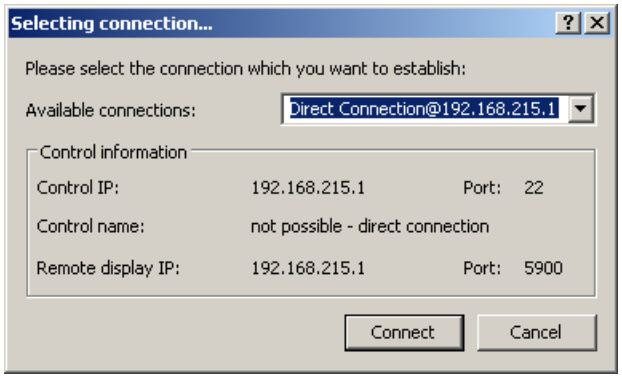
Procedure:

1. Insert the CompactFlash Card into the card reader.
2. Start the RCS Commander via "Start" → "Programs" → "RCS Commander".

   Note

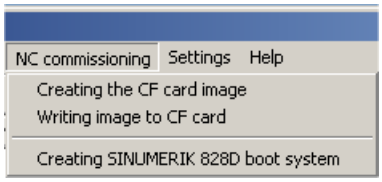
   An online connection to the control is not required to generate the boot system.

3. If you are prompted to establish the connection, press "Cancel".



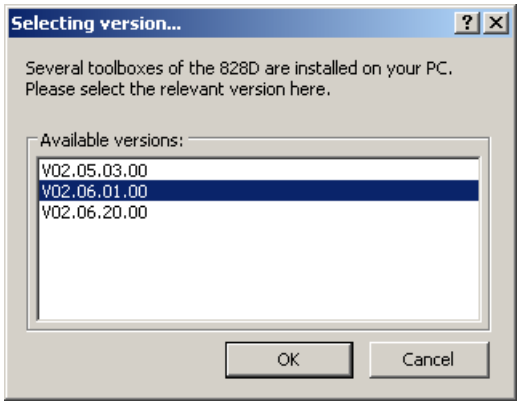
4. In the "View" menu, select the menu item "Expert view".

   The following, additional "NC commissioning" menu is displayed:

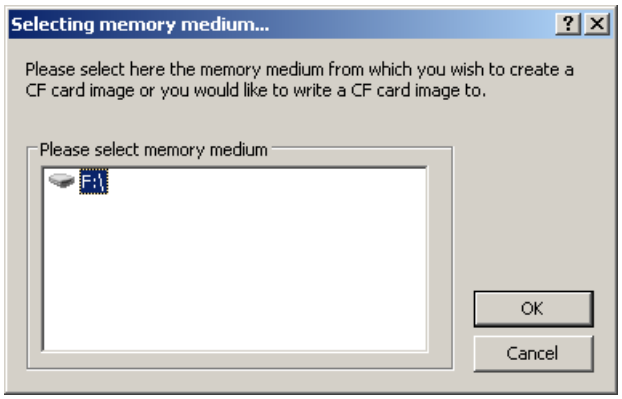


5. Select menu item "Generate 828D boot system".

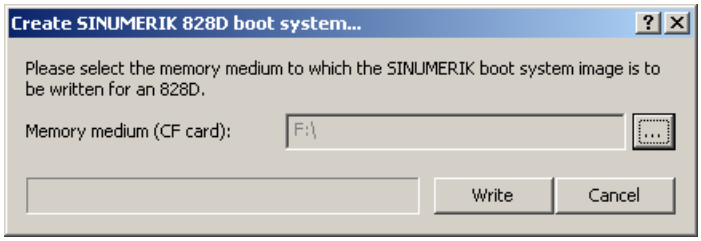
6. If several versions of the toolbox are installed on the PC, you obtain the following selection:



7. All of the identified interchangeable drives are displayed, here in the example, the CompactFlash Card is identified as drive F:\.

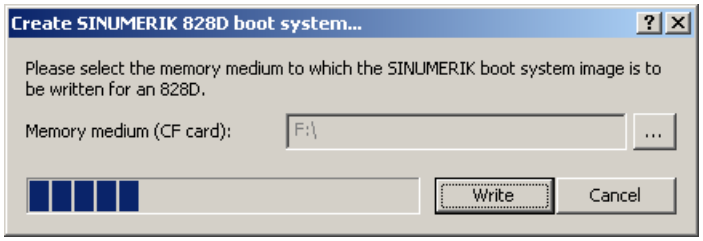


8. Confirm the selection of the target drive with "OK". By pressing the "Write" button, the image is transferred to the target drive.

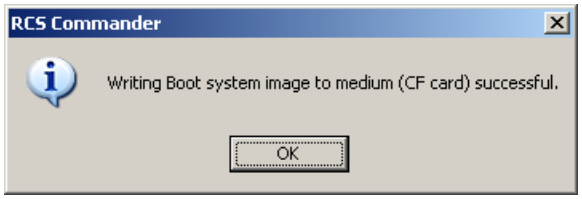


NOTICE
While the data is being transferred, do not switch-off the PC and do not remove the CompactFlash Card.

Data transfer is displayed using a progress bar:



9. The following message is output if data transfer was successfully completed:



10. In order to ensure that there are no read and write access operations to the CompactFlash Card, when you remove the CompactFlash Card from the interchangeable drive, select the Windows function "Safely remove hardware".

3.5.2 This is how you install a software backup using the mini boot system

Overview

If a CompactFlash Card with a mini boot system is used as system CompactFlash Card, the system software or a previously generated software backup must still be transferred.

Note

Licenses

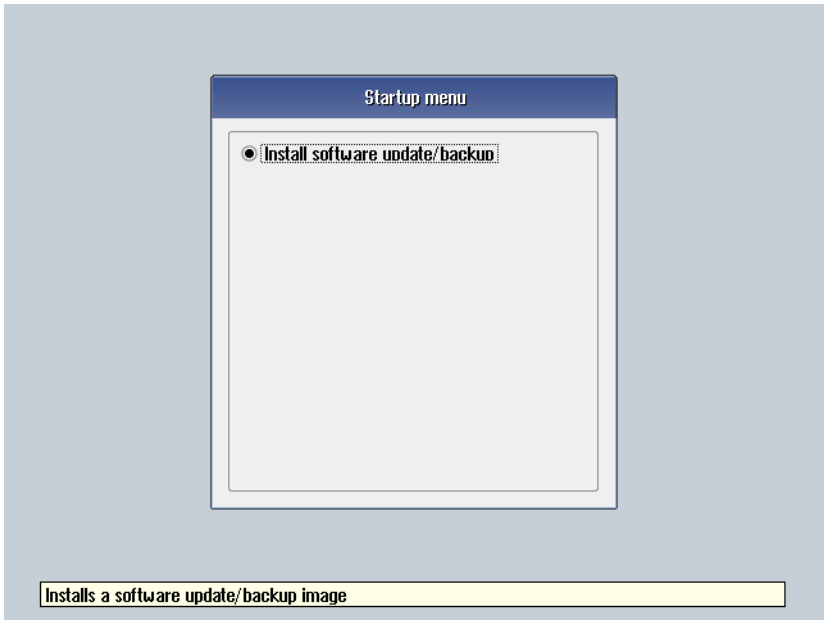
The mini boot system does not contain a license key, a valid license key must be transferred to the control. When replacing a system CompactFlash Card, this must be requested again (see also: This is how you license a CNC option (Page 51)).

All system data and user data are overwritten with the system image.

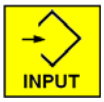
Updating the software

After you have inserted the CompactFlash Card with the mini boot system as new system CompactFlash Card (see Replacing the system CompactFlash Card (Page 76)) proceed as follows:

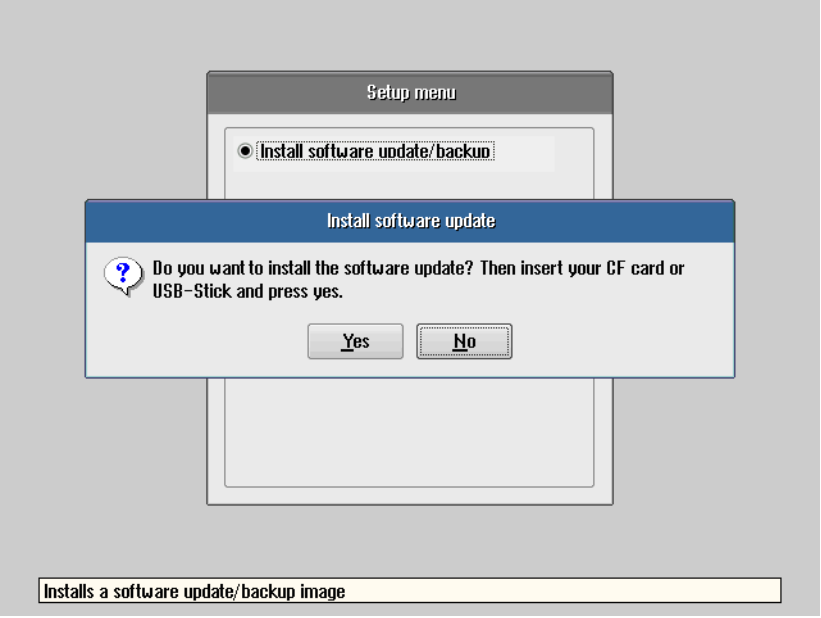
1. Switch the control on. When booting, the following display appears:



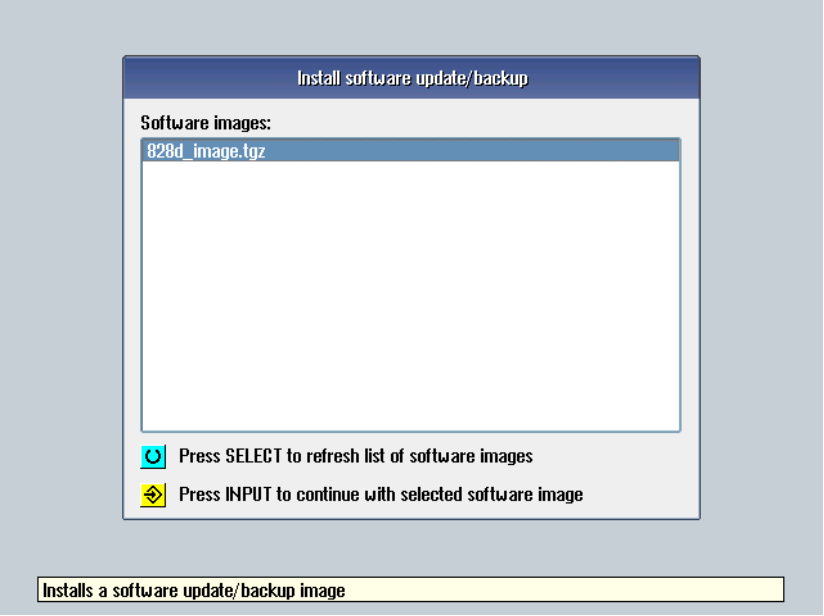
2. Press the <INPUT> key to confirm your selection.



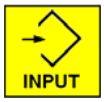
3. Confirm the question with "Yes".



4. Insert the CompactFlash Card or a USB-FlashDrive with the image into the slot on the front panel of the control.



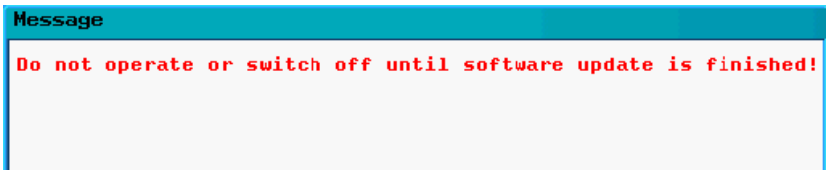
5. Confirm the selection with the <INPUT> key.



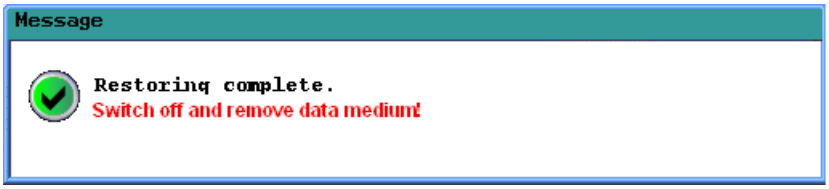
6. The following message briefly appears: "Starting software update"

   Then the screen goes dark for several seconds.

7. If a valid image has been found, the following message is output:



8. Wait until the following message is displayed:



9. Switch the control off.
10. Switch the control system back on again: The control boots normally.

Note

If the system was booted using a mini boot system, there is no valid license key on the system CompactFlash Card. This must be transferred again.

Result

The following cases are possible:

- The control boots and is ready for operation if, when generating the system image, the internal data backup and also a series commissioning file were generated.
- If a valid image is not found, the update is interrupted with the following message:

  ```
  Image file is corrupt!
  ```

  In this case, switch-off the control, withdraw the data carrier and carry out the procedure again by selecting a valid file.

3.6 Licensing

3.6.1 Licensing after replacing the system CompactFlash Card

Application

The license key of the SINUMERIK 828D is linked with the system CompactFlash Card. If the system CompactFlash Card is replaced for a SINUMERIK 828D, the license key loses its validity and the system is only ready with some significant restrictions.

This situation can occur for a defective hardware of the system CompactFlash Card.

Validity of the license key

The following data are required in order to obtain a valid license key after replacing the system CompactFlash Card: **The serial number of the defective and the new CompactFlash Card.**

Note

Only CompactFlash Cards can be used that were released as spare part as only these are known to the license database.

In order to obtain a valid license key for the new CompactFlash Card, contact the SINUMERIK Hotline specifying the serial numbers of the two CompactFlash Cards. The hotline will immediately provide you with a new license key.

3.6.2 This is how you license a CNC option

Precondition

You require at least one authorization to set or reset a CNC option:

Access level 1 (password: Manufacturer).

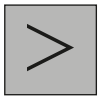
Licensing CNC options

If an additional CNC option is to be activated at a SINUMERIK 828D, then this CNC option must be licensed at the machine and is only valid for this CompactFlash Card.

Proceed as follows to access the "licenses" dialog box:

1. Select the "Start-up" operating area.

2. Press the menu forward key.



3. Press the "Licenses" softkey.

The "Licensing" window opens. Using the vertical softkeys, you can execute the following actions:

- Display a serial number: "Overview"
- "Display all options":
- Display "Missing licenses"
- "Exp. license requirement"
- "Read in the license key"

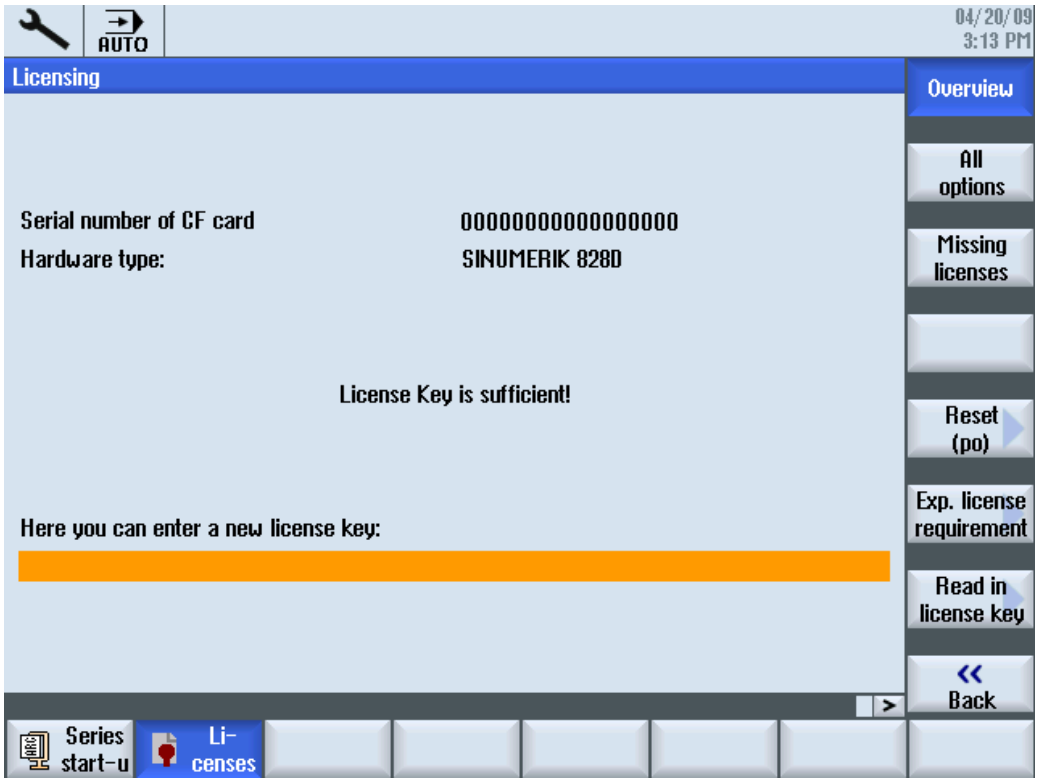


Figure 3-3 Licensing

Web License Manager

Licenses that are purchased are assigned via the Internet.

By using the Web License Manager, you can assign licenses to hardware in a standard Web browser. To conclude the assignment, the license key must be entered at the control via the user interface.

See also

The license database administered by Siemens can only be accessed using the Web License Manager (http://www.siemens.com/automation/license).

NOTICE
The NC start function is suppressed if a CNC option, for which no valid license key has been entered, is additionally activated. This means that the machine can only operate on a severely restricted basis if an attempt is made to use an unlicensed CNC option.

3.6.3 How to determine the license requirement

Determining the license requirement

Procedure:

1. Press the "All options" softkey to list all the options that can be selected for this control.
2. Activate or deactivate the required options in the "Set" column:
   - Mark the checkbox
   - Enter the number of options

     Options displayed in red are activated, however are not licensed or insufficiently licensed.

   - OR -

3. Press the "Missing licenses" softkey to display all options that are activated but not licensed. In the "Set" column, you can deselect the options that you do not require.

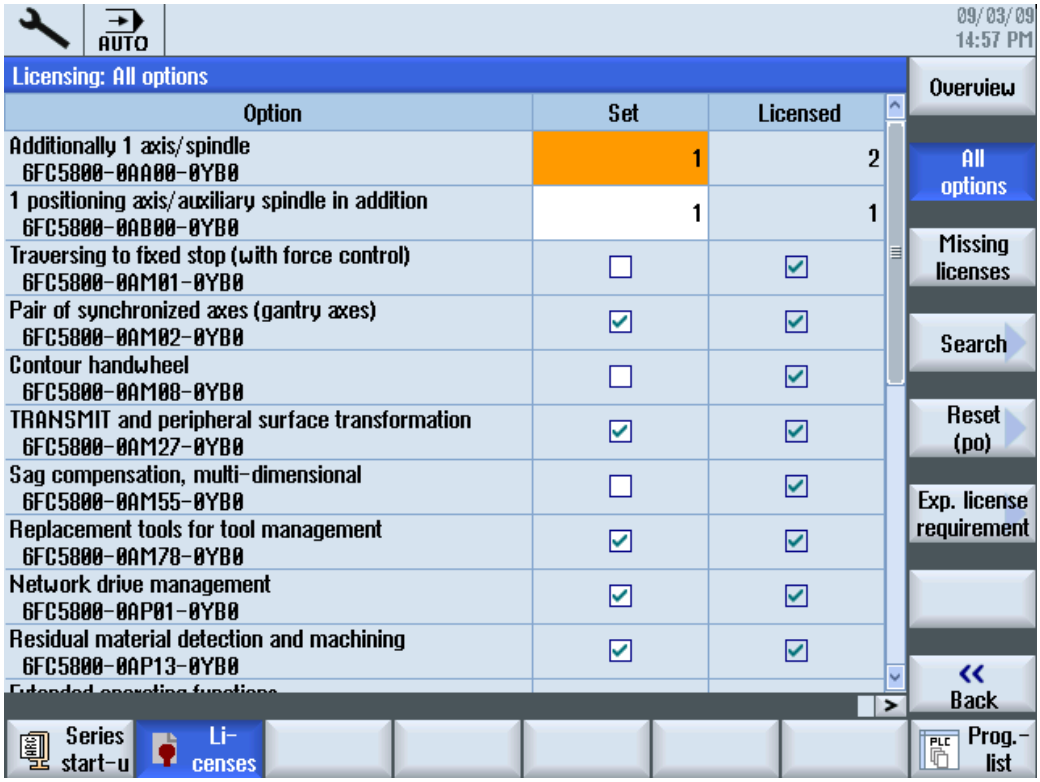


Figure 3-4 Licensing (example)

4. To activate new selected options, press the "Reset (po)" softkey. A safety prompt appears.
5. Press the "OK" softkey to trigger a warm restart.

   - OR -

6. Press the "Cancel" softkey to cancel the process.

3.6.4 This is how you generated a new license key

Assigning the license to hardware

In order to simplify licensing for the technician, licenses are assigned to the hardware in a Standard Web Browser using the Web License Manager .

To conclude the assignment, the license key must be entered manually on the control via the user interface.

As a consequence, a valid license key can be generated at any time worldwide for options that have been additionally purchased.

Preconditions

The following preconditions must be met in order to assign a license to a piece of hardware via direct access and user interface:

- Hardware serial number
- A PC/PG with Internet connection and browser is available.
- The login data for direct access (e.g. per CoL (Certificate of License)) is available:
  - License number
  - Delivery note number

Note

Hardware serial number

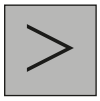
Ensure that the serial number of the hardware displayed is the one you want to make the assignment for. The assignment of a license to a piece of hardware cannot be reversed via the Web License Manager .

Generating a license key

Procedure:

1. Select the "Start-up" operating area.

2. Press the menu forward key.



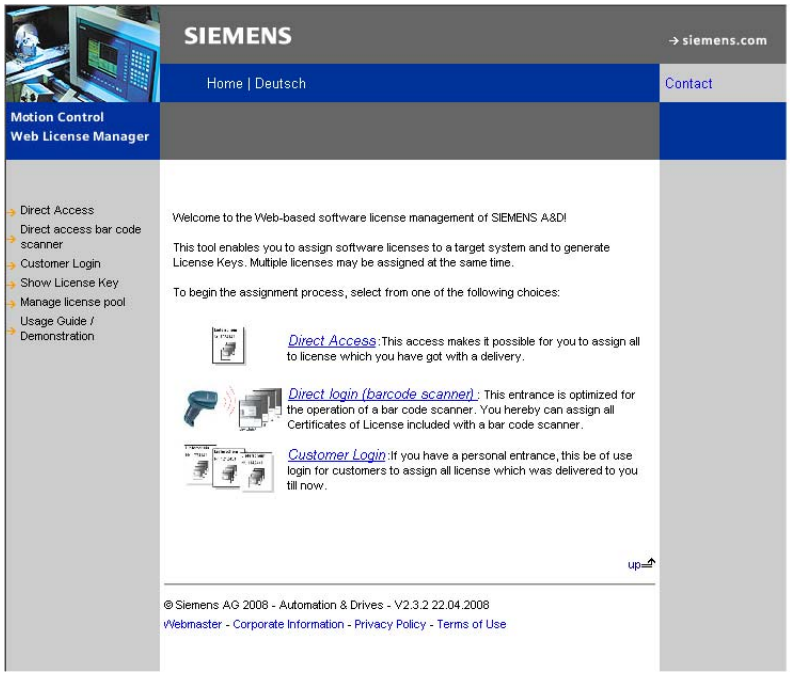
3. Press the "Licenses" softkey.

4. Press the "Overview" softkey and note down the serial number of the system CompactFlash Card.

5. At your PG/PC, establish a connection to the Web License Manager (http://www.siemens.com/automation/license)

6. Log on via "Direct access".

   Follow additional instructions in the Web License Manager:



7. After completing the assignment process, enter the license key displayed in the Web License Manager into the "Licensing" dialog box in SINUMERIK Operate.

Note

License key via e-mail

If you have an e-mail address, you have the option (checkbox) of receiving the license key by e-mail.

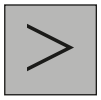
Entering the license key

The newly purchased license key is entered into the control.

Procedure:

1. Select the "Start-up" operating area.

2. Press the menu forward key.

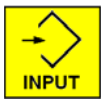


3. Press the "Licenses" softkey.

4. Press the "Overview" softkey.

If you receive the license key via the Web License Manager, enter the license key manually in the field "You can enter a new license key here".

5. Press the <INPUT> key.



If the license key is valid, the message "License key set" is displayed.

3.6.5 This is how you display the actual license key

Overview

The following options are available to display the actual license of the control:

- Directly at the SINUMERIK control
- Without control, in the Internet

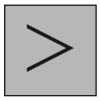
  You require the serial number of the system CompactFlash Card in order to display the actual key in the Internet. This is displayed at the control in the "Licenses" dialog box - or can be read from the system CompactFlash Card.

Displaying the actual license key at the control

Proceed as follows to display the license key at the control:

1. Select the "Start-up" operating area.

2. Press the menu forward key.

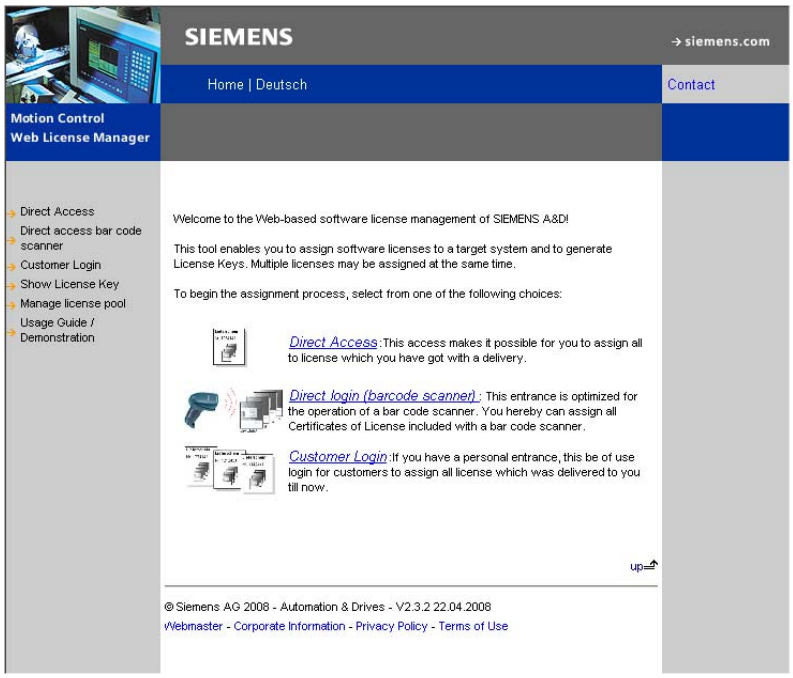


3. Press the "Licenses" softkey to display the control licenses.

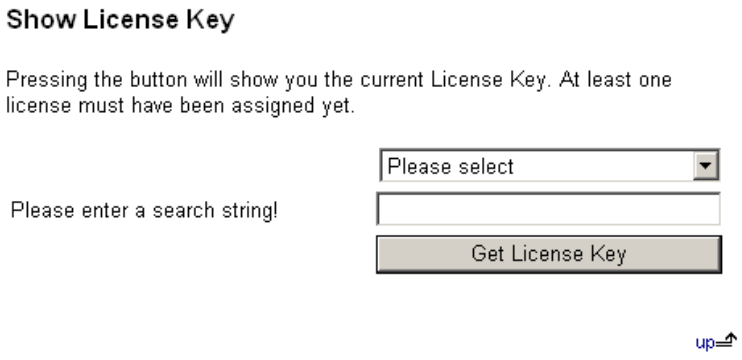
Displaying the actual license key in the Internet

In order to view the actual license key of the control, using the serial number, it is possible display the license key via the Internet. The serial number is on the system CompactFlash Card - or can be displayed at the control as described above.

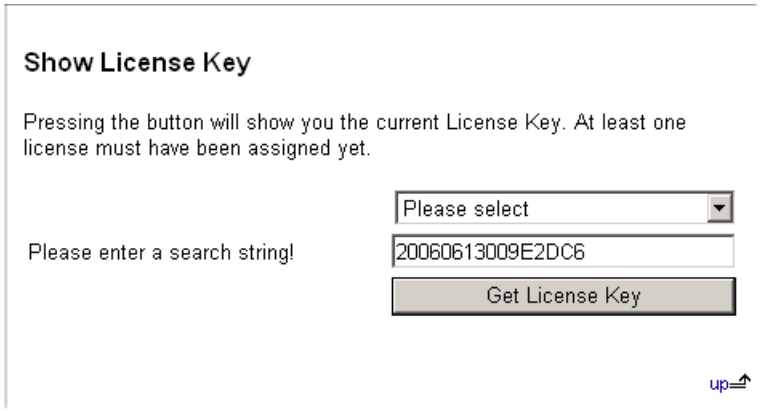
1. Go to the Internet page of the Web License Manager:



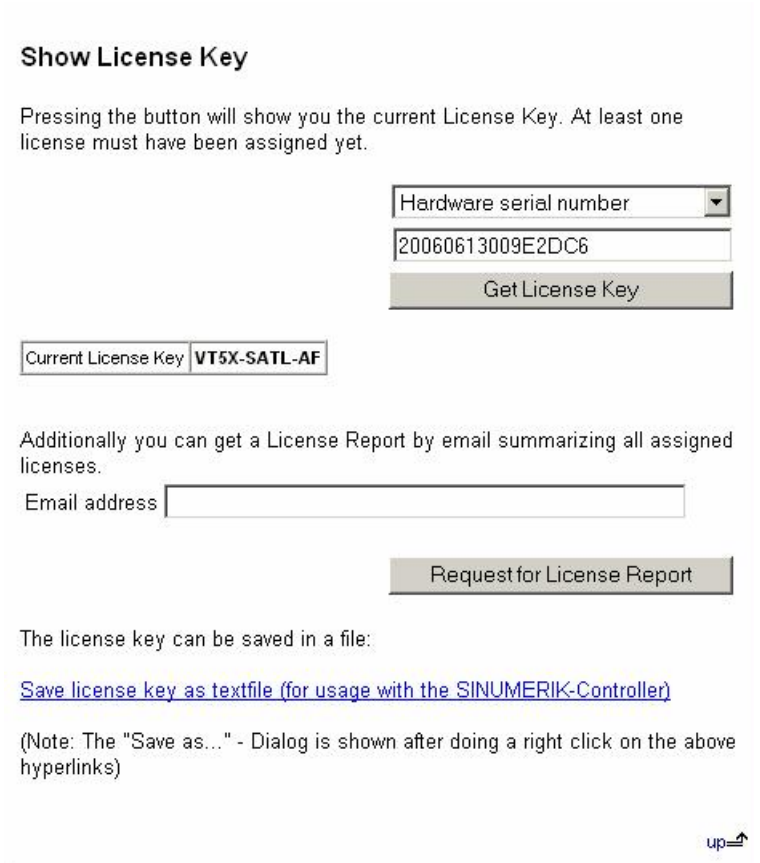
2. Press the menu item "Display license key".
3. A window with the license key opens:



4. In the menu, select "Hardware serial number" and enter the serial number of the system CompactFlash Card.



5. Press the "Display license key" softkey.
6. The actual license key is displayed as follows:



3.7 Enter the final end user data (EUNA)

Precondition

At least access level 3 must be set to change the end user final destination data (EUNA).

Repair and Service Contract (RSC)

SINUMERIK offers an electronic logbook in which all of the activities relating to the Repair and Service Contract (RSC) are saved.

After the service call has been completed, the control data are checked and are transferred to the EUNA database for update.

3.7.1 This is how you generate the machine logbook

Machine data

The following data are saved in the control in the "Machine logbook":

- Contact data of the manufacturer (OEM)
- Contact data of the dealer
- Contact data of the end customer
- Log of the service and diagnostic procedures that have already been carried out.

During a service call, the data should be checked as to whether it is correct.

Open the "Machine identity" dialog box

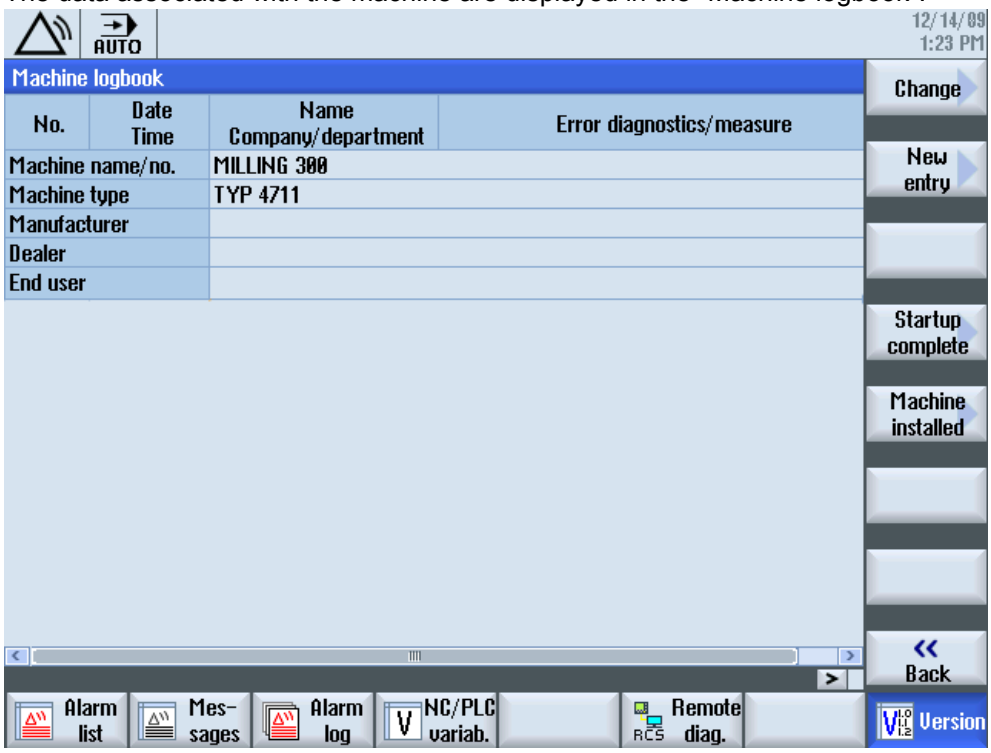
Procedure:

1. Select the "Diagnostics" operating area.

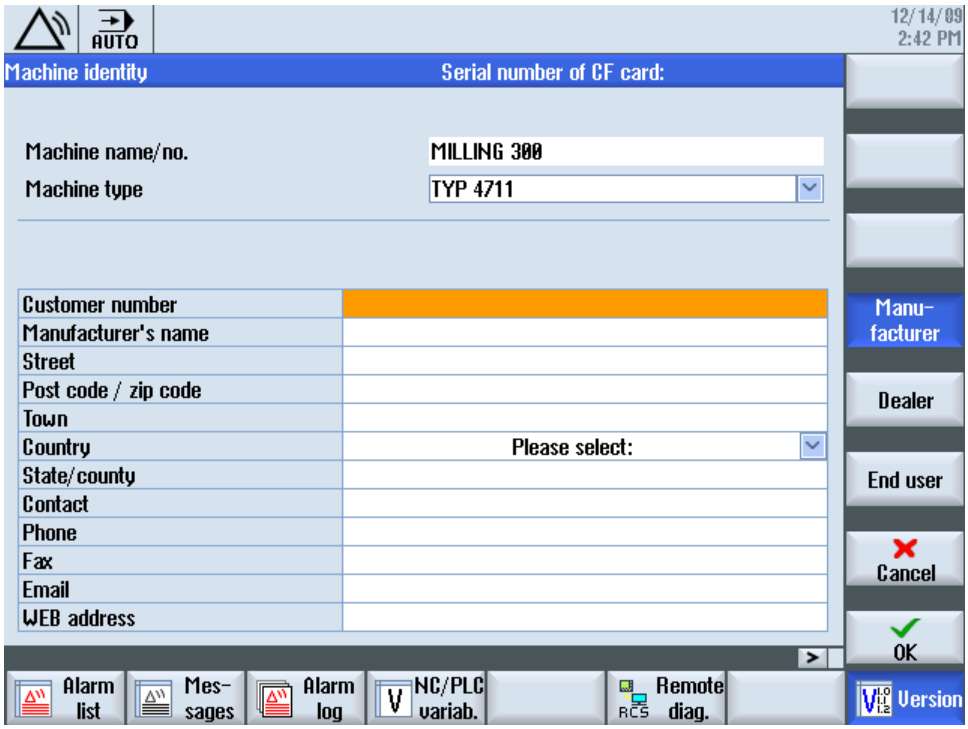
2. Press the "Version" softkey to open the "Version data" dialog box.

3. Press the "Details" softkey.

The data associated with the machine are displayed in the "Machine logbook".



4. Press the "Change" softkey to open the "Machine identity" dialog box.
5. Select the vertical softkey and enter the contact data of: Manufacturer, dealer and end customer.



6. Confirm your entries by clicking on "OK".

3.7.2 This is how you make a new entry in the logbook

Generating a new logbook entry

In order to log service and diagnostic procedures at the machine, make an entry in the machine logbook. The activities performed are logged here after each service call.

To make a logbook entry, proceed as follows:

1. Select the "Diagnostics" operating area.

2. Press the "Version" softkey.

3. Press the "Logbook" softkey.

4. Press the "New entry" softkey in order to make an entry in the logbook.

Complete the fields for the new logbook entry:

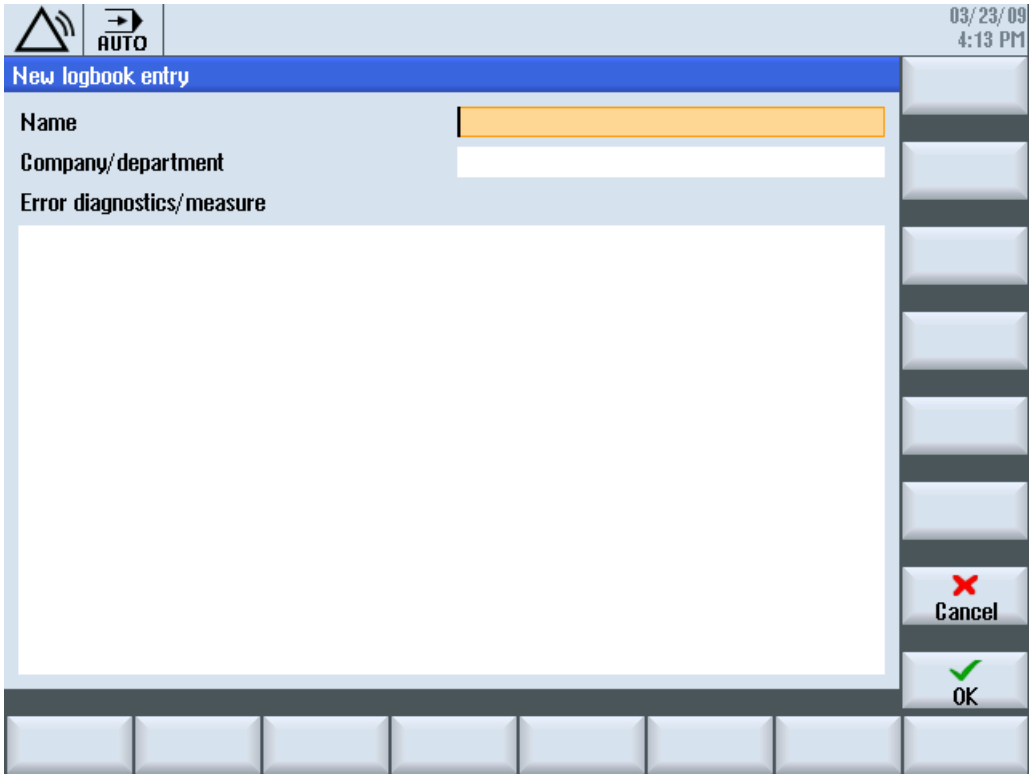


Figure 3-5 Editing the logbook

5. Press the "OK" softkey to save an entry in the logbook.

For the following activities, two additional softkeys are available, which generate pre-configured logbook entries:

1. Commissioning completed

2. Commissioning completed

NOTICE
Once saved, data can no longer be changed.

3.7.3 This is how you save the machine identity

Saving the machine identity

Note

Ensure that the machine identity that has been entered is correct before saving in order that no incorrect information is saved.

In order to save the machine identity (address data, version data and logbook) externally on a data carrier, proceed as follows:

1. Select the "Diagnostics" operating area.

2. Press the "Version" softkey.

3. Press the "Save" softkey.

   The "Save version information: Select Archive" window opens. Select a directory.

4. Press the "OK" softkey.

The data are pre-assigned so that a change is not necessary.

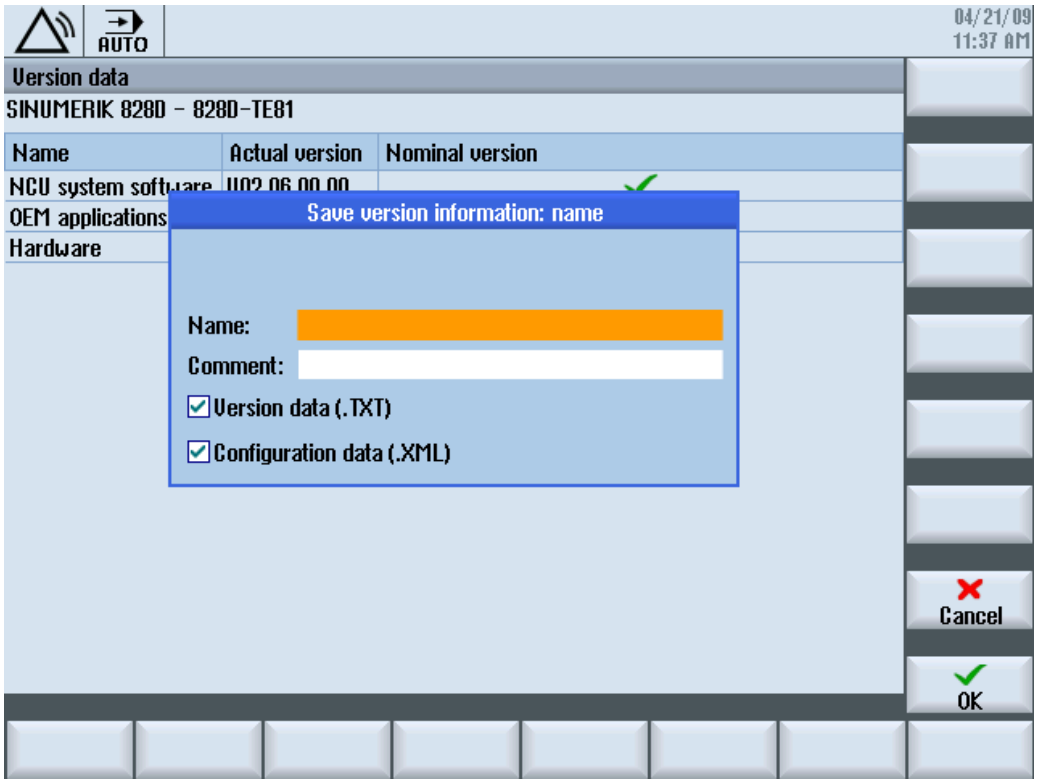


Figure 3-6

The "Name" text field is pre-assigned as follows:

<Machine name/Number>+<Number of the CompactFlash Card>

You now have the opportunity of changing this name.

You can enter a comment in the "Comments" text field.

Select the following options:

– "Version data (.TXT)": Output of the version data in the text format
– "Configuration data (.XML)": All information about the machine identity

5. Press the "OK" softkey to start saving the data.

3.7.4 This is how you send the end user final destination data

Overview

The configuration file (address data, logbook data, version data) of the control can be sent to the EUNA database (End User Notification Administration) via an Internet connection.

This means that the service organization has the possibility of obtaining a profile about the history of the control without having to go to the machine. Therefore, service can be more effectively carried-out as all of the relevant information is available.

Sending the end user final destination data

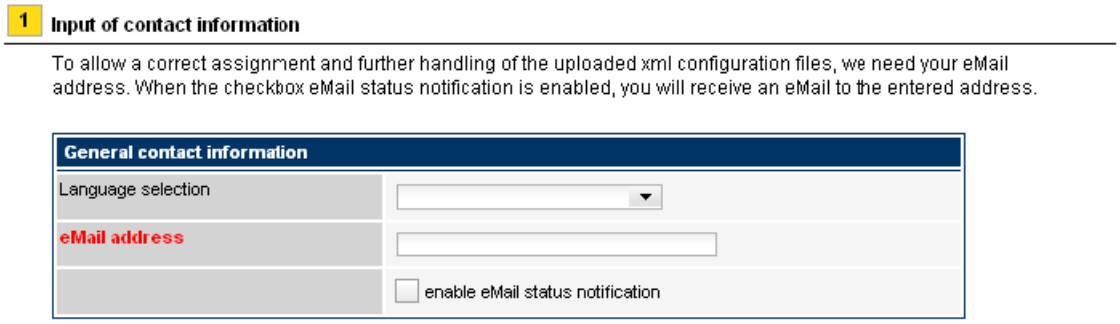
Preconditions:

- The commissioning status is saved in the logbook.
- The machine identity has been entered/updated in the machine.
- The machine identity was saved and is available on the PC/PG.
- The PC/PG is connected with the Internet.

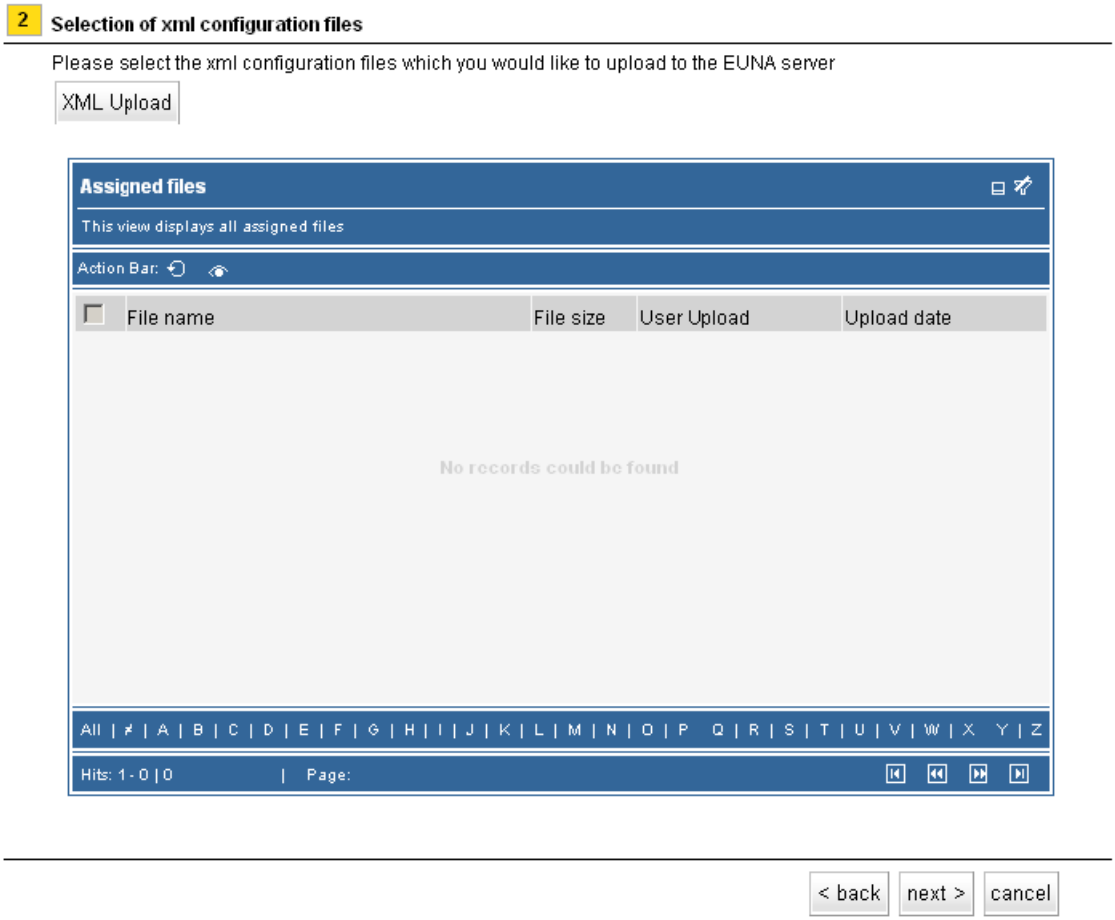
Please proceed as follows:

1. Open the Internet Browser on your PC/PG.
2. Connection with EUNA (http://www.siemens.com/sinumerik/register).

3. Select a language and enter an e-mail address:



4. In the following dialog box, select the configuration files:



5. To open a navigation window, press the "XML Upload" softkey.
6. Select the files of the machine identity that you wish to transfer to EUNA.
7. Now confirm using the softkey "Upload file ...".
8. After the upload, other files can also be uploaded.

   During the upload, the files are checked and a log is displayed for each file that has been transferred.
9. If no other files are to be uploaded, press the softkey "continue >".
10. Complete the upload by pressing the "Save" softkey.

Note

Contact persons worldwide

If it was not possible to transfer the file, then please contact your local Siemens officeContact (http://www.automation.siemens.com/partner) in sales.

Service cases - hardware

4

Overview

The sequence in the chapter of the hardware components corresponds to the following criteria:

- Components at the machine
- Components in the control cabinet

Component overview

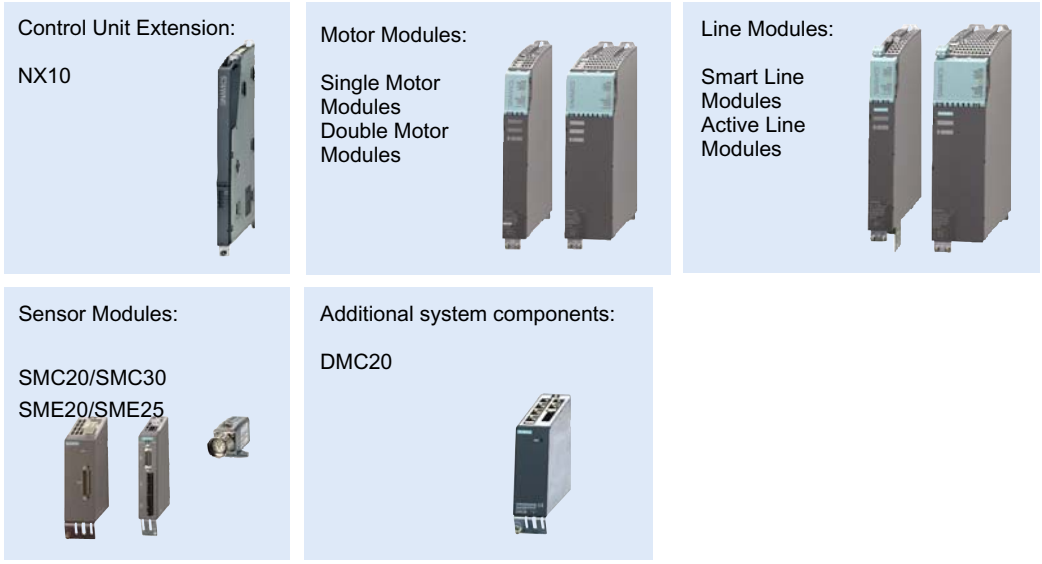


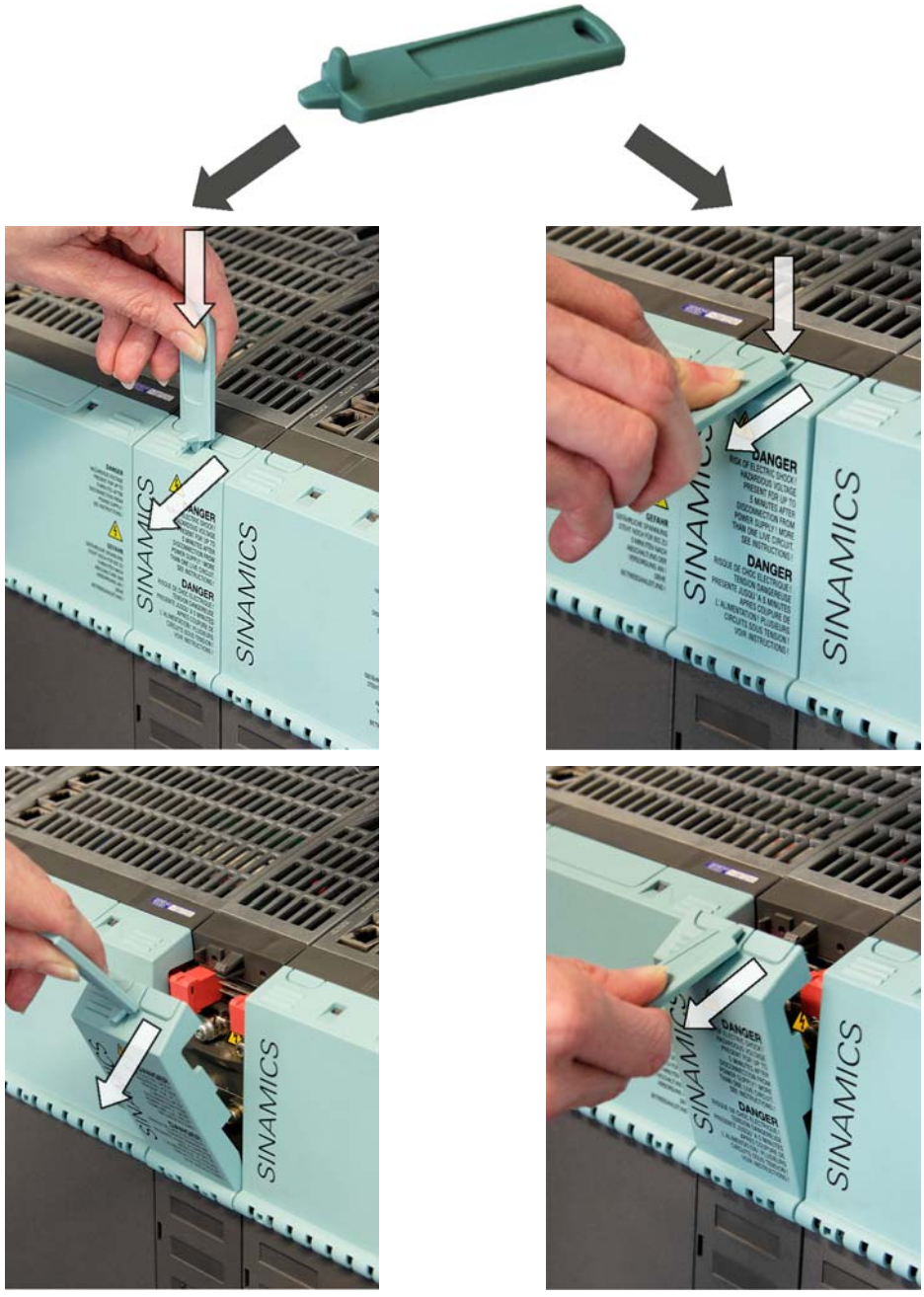
Figure 4-1 Components in the control cabinet

Note

A special tool is supplied to unlock the DC link covers of SINAMICS components.

Using the unlocking tool

An unlocking tool is supplied with every power unit for the purpose of opening the DC link covers. The diagrams below illustrate how the tool should be used.



4.1 PPU26x/PPU28x

4.1.1 Status displays at the PPU

LED status at the front

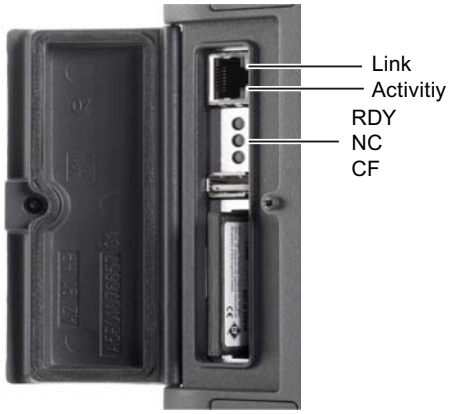


Figure 4-2 Vertical flap (detail)

The 3 LEDs located behind the protective flap on the front side of the PPU mean the following:

Name	Color	State	Meaning
RDY	Green	Is lit	NC Ready and PLC in run mode.
	Yellow	Is lit	PLC in stop mode
		Flashing	Booting
	Red	Is lit	NC in stop mode: • When booting, if NC Ready is not yet available • Critical fault (power off/on necessary)
NC	Yellow	Cyclic flashing	NC operation
CF	Yellow	Is lit	User CompactFlash Card being accessed

CAUTION
If the LED is lit, the CompactFlash Card must not be removed! Non-compliance can result in damage to the CompactFlash Card.

The RJ45 socket is equipped with one green and one yellow LED. As a consequence, the following information of the PLC I/O interface is displayed based on PROFINET:

Name	Color	State	Meaning
Link	Green	ON	100 MBit link available
		OFF	Missing or faulty link
Activity	Yellow	ON	Sending or receiving
		OFF	No activity

LED status, rear

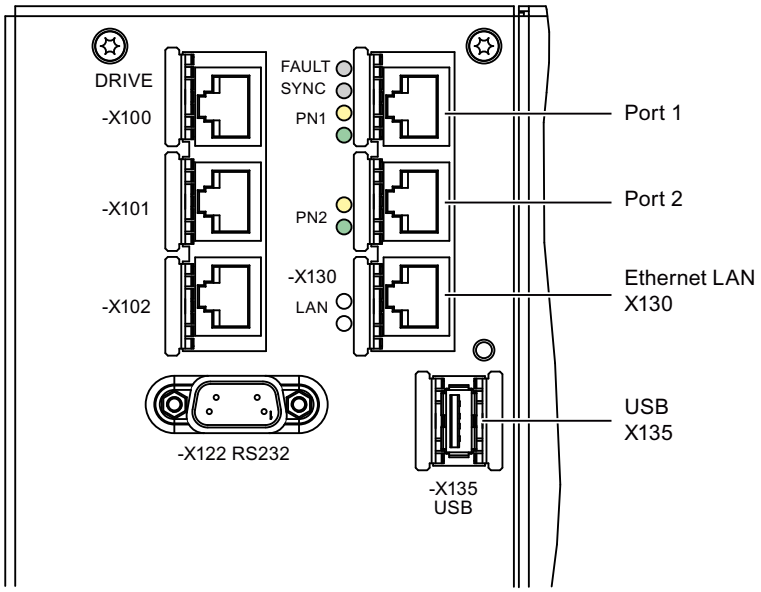


Figure 4-3 Rear of the PPU

For diagnostic purposes, the RJ45 sockets, port 1 and port 2 are each equipped with a green and a yellow LED. As a consequence, the following connection information of the PLC I/O interface is displayed based on PROFINET:

Name	Color	State	Meaning
Link	Green	ON	100 MBit link available
		OFF	Missing or faulty link
Activity	Yellow	ON	Sending or receiving
		OFF	No activity

There are 2 additional LEDs "FAULT" and "SYNC" next to port 1, which apply to both ports:

Name	Color	State	Meaning
FAULT	Red	OFF	The data exchange to all configured IO devices runs without errors.
		Is lit	Bus fault: • No physical connection to a subnet/switch • Incorrect transmission rate • Full duplex transmission is not activated.
		Flashing (2 Hz)	• Failure of a connected I/O device • At least one of the assigned IO devices cannot be addressed. • Incorrect or no configuration.
SYNC *)	Green	OFF	Task system of the SINUMERIK 828D is not synchronized to the send clock of the PLC I/O interface based on PROFINET IO. An internal substitute clock of the same size as the send clock will be generated.
		Is lit	Task system of the SINUMERIK 828D has synchronized to the clock of the PLC I/O interface based on PROFINET IO, data is being exchanged.
		Flashing (0.5 Hz)	Task system of the SINUMERIK 828D has synchronized to the clock of the PLC I/O interface based on PROFINET IO, data is being cyclically exchanged.

4.1.2 This is how you remove the PPU

Removing

The following description refers to both versions (vertical/horizontal).

Precondition:

For this description, it is assumed that the PPU has been completely connected.

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control panel/control cabinet where the PPU is installed.
3. Use a multimeter to check that the system really is in a no-voltage condition (isolated from the supply).
4. If it has not already been done, label all connectors that lead to the module now.
5. Only then, can it be ensured that the cables are not interchanged.
6. Withdraw the power supply X1.
7. Withdraw the digital input/output terminals X122, X132, X142.

8. Withdraw the handwheel terminal X142.
9. Withdraw the RS232 cable, X140.
10. Withdraw the USB cable, X135.
11. Withdraw the connected DRIVE-CLiQ cable X100 – X102
12. Withdraw the connected Ethernet cable X130
13. Withdraw the connected PN interfaces PN1, PN2
14. Remove the ground connection by releasing the grounding screw.
15. If required, release the strain relief.
16. Release the PPU from the operator panel by releasing the clips.
17. Remove the system CompactFlash Card from the control.
    (refer to Chapter This is how you remove the system CompactFlash Card (Page 76))

4.1.3 This is how you install the PPU

Installing

Procedure:

1. Now, install the system CompactFlash Card into the new PPU.
   (refer to Chapter This is how you insert the system CompactFlash Card (Page 78))
2. Installing a new PPU.
3. Attach and tighten the clips to fix the PPU.
4. Connect the ground connections and tighten.
5. Insert the PN1, PN2 interfaces that were withdrawn.
6. Insert the Ethernet cable that was withdrawn at X130.
7. Insert the DRIVE-CLiQ cable that was withdrawn at X100 – X102
8. Insert the USB cable that was withdrawn at X135.
9. Insert the handwheel terminal that was withdrawn at X142.
10. Insert the digital input/output terminals that were withdrawn at X122, X132, X142.
11. Reconnect power supply X1.
12. Retighten the strain relief assemblies.
13. Close the cabinet and switch-on the system again.
14. Read-in the available data backup.

Note

Changing the MAC address

When replacing the PPU, then the MAC address of Ethernet interface X130 changes: Notify the customer or the system administrator of the new MAC address.

⚠ CAUTION

Ensure that all of the connectors and screws are correctly tightened or latched and inserted.

4.2 Replacing the system CompactFlash Card

4.2.1 This is how you remove the system CompactFlash Card

Overview

If service is required, it may be necessary to replace the system CompactFlash Card of the control. This is the case if, e.g. the system CompactFlash Card or the PPU is defective.

CAUTION
Electro-static discharge (ESD) **The system CompactFlash card must only be inserted or removed in a no-current condition.** Before you touch the CompactFlash Card, discharge yourself at the cabinet or at the ground terminal.

Removing the system CompactFlash Card

Procedure:

1. Switch-off the power supply of the control and the control cabinet.
2. Release the screw (M3).

3. Move the metal cover to the side and remove it.

4. Remove the system CompactFlash Card from the side.

5. Fix the metal cover by first locating at the rear and then tilting it into the end position.

6. Fix the metal cover to the housing using the screw.

Note

When removing the system CompactFlash Card, carefully ensure that neither the screw nor the system CompactFlash Card falls into the PPU or the machine.

PPU as replacement part

Note

For a PPU as replacement part (spare part), a system CompactFlash Card is not supplied.

4.2.2 This is how you insert the system CompactFlash Card

Precondition

The control cabinet and the PPU are in a no-voltage condition or the PPU has already been removed.

CAUTION
Electro-static discharge (ESD) **The system CompactFlash card must only be inserted or removed in a no-current condition.** Before you touch the CompactFlash Card, discharge yourself at the cabinet or at the ground terminal.

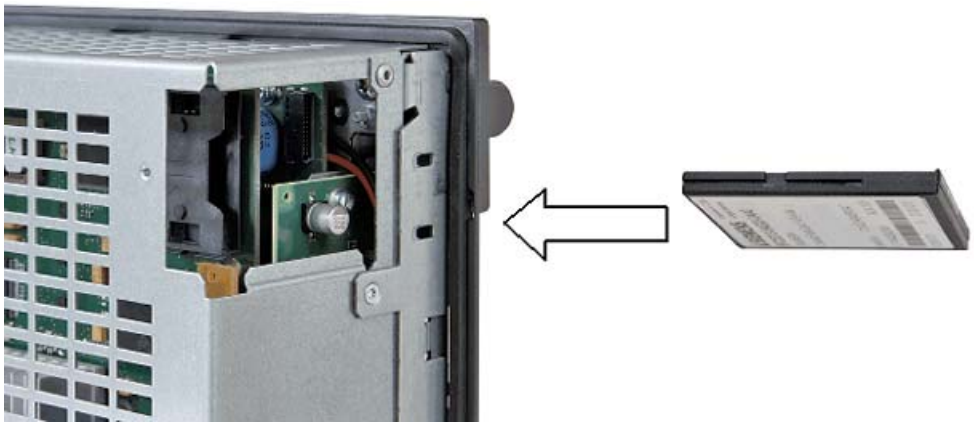
Inserting the system CompactFlash Card

Procedure:

1. Release the screw (M3).

2. Move the metal cover to the side and withdraw it.

3. Gently insert the system CompactFlash Card into the slot until it clicks into place.



4. Reattach the metal cover by first locating it at the rear and then tilting it into the end position.

5. Fix the metal cover to the housing using the screw.

Note

When inserting the system CompactFlash Card, carefully ensure that neither the screw nor the system CompactFlash Card falls into the PPU or the machine.

4.3 SINAUT modem

4.3.1 LED status displays

Validity

This description is valid for the GPRS/GSM modem MD720-3, hardware version 3.x. You can find additional information in the System Manual SINAUT MD720-3 in the Chapter "Service functions".

LED status

The device has 3 LEDs, which provide information about the operating state:

S (Status)
Q (Quality)
C (Connect)

LED	State	Meaning
S, Q, C Common	Flash on and off in a fast sequence	Booting
	Slow flashing in synchronism	Service mode
	Flash on and off in a slow sequence	Update
	Fast flashing in synchronism	Error
S (Status)	Slow flashing	Waiting for PIN input
	Fast flashing	PIN error/ SIM error
Q (Quality)	Slow flashing	Logging into GSM network
	Flashes 1 time with interval	Field strength inadequate
	Flashes 2 times with interval	Field strength adequate
	Flashes 3 times with interval	Field strength good
	Always ON	Field strength very good
	OFF	Waiting for PIN
C (Connect)	Flashing	Terminal mode activated

4.3.2 This is how you insert the SIM card

CAUTION
Risk of damage to sensitive components due to static electricity
This activity must always be carried out by trained personnel.

Open the module

Proceed as follows to open the module:

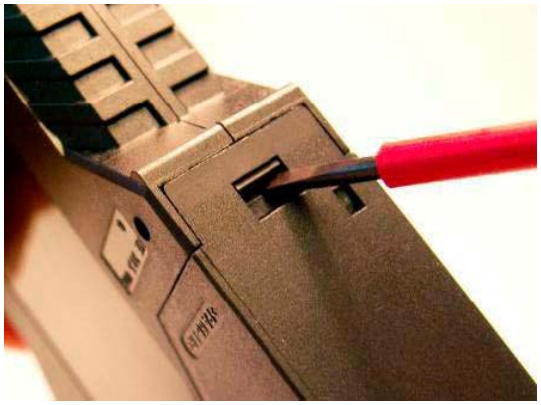
1. Ensure that the module has been disconnected from the power supply.
2. You must open the housing of the SINAUT MD720-3 in order to insert the SIM card.

   A fastener with opening lug is located at the upper and lower side of the housing.

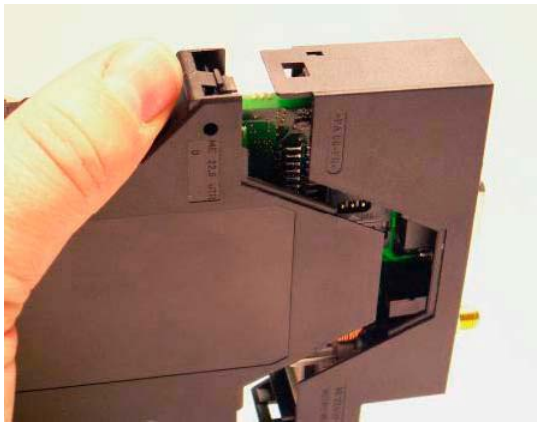
① Opening lug
② Opening lug

Figure 4-4 SINAUT modem

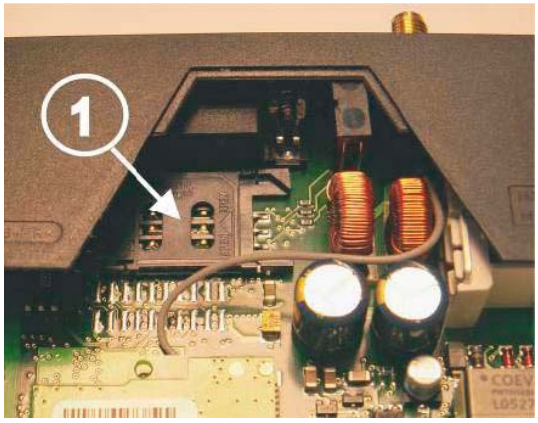
1. Using a suitable object, press one of the two opening lugs carefully so that the fastener opens.



2. Remove the rear section of the housing.



3. The SIM card holder can be seen on the printed circuit board:



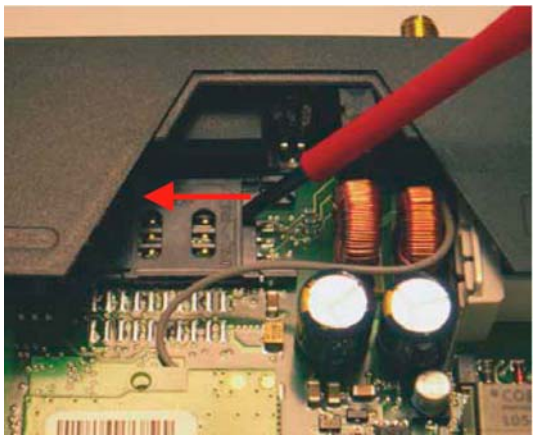
① SIM card holder

Inserting the SIM card

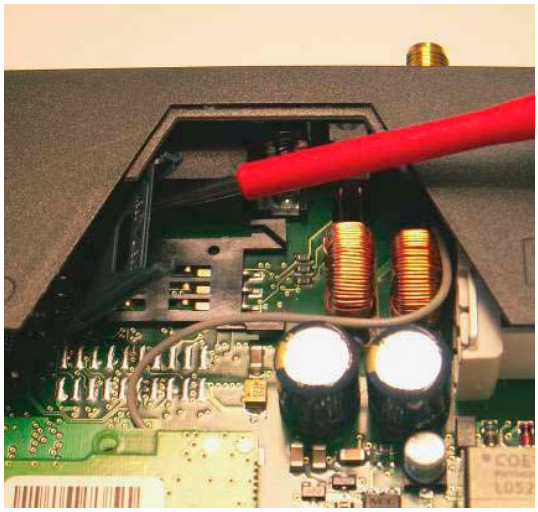
NOTICE
When handling SIM cards, carefully observe its safety instructions. When changing the SIM card, do not forget to change the PIN in your control. If you are using a lot of SIM cards, it may make sense to set all SIM cards, e.g. with one cellular phone to the same PIN.

Proceed as follows to insert the SIM card:

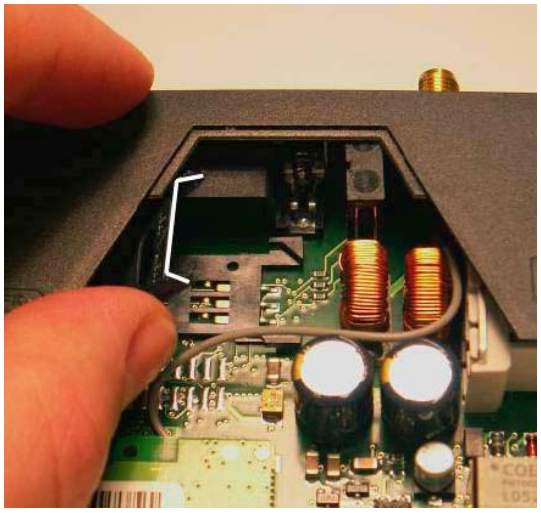
1. Using your fingernail or a suitable object, slide the upper section of the SIM card holder approximately 2 mm in the direction of the arrow to the left so that the upper section can be flipped up.



2. Flip up the upper section of the SIM card holder so that you can insert the SIM card into this section.



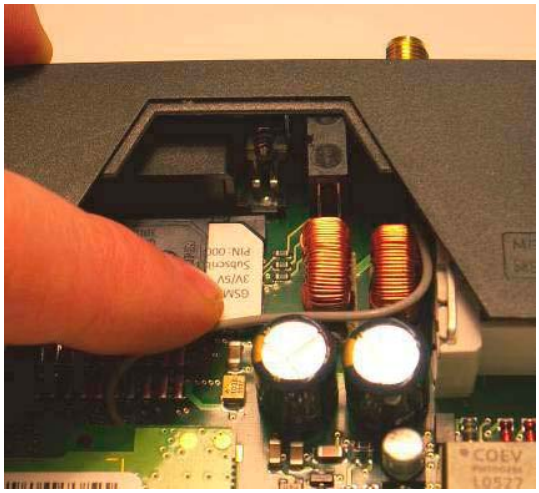
The slot for the SIM card in the upper section is shown in **white** in the following diagram:



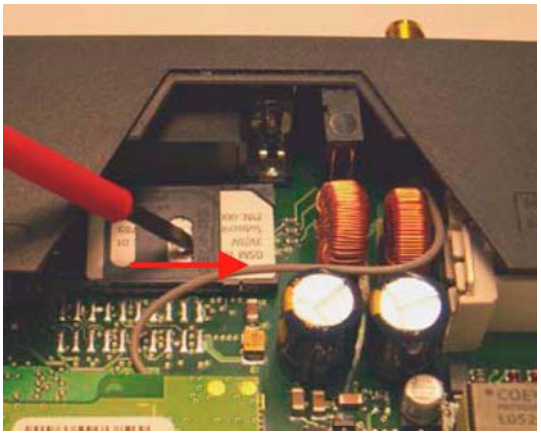
3. Insert the SIM card into the upper section of the SIM card holder so that the contact surface is at the bottom and the sloped corner of the SIM card points towards the front of the device.

4. Insert the SIM card far enough so that the upper section of the SIM card holder can again be flipped downwards.

5. Press the upper section of the SIM card holder downwards. Ensure that the sloped corner of the SIM card clicks into place.

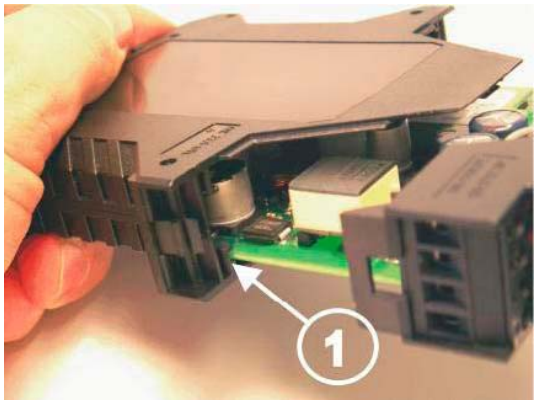


6. Using your fingernail or a suitable object, slide the upper section of the SIM card holder approximately 2 mm in the direction of the arrow to the right in order to lock the SIM card holder.



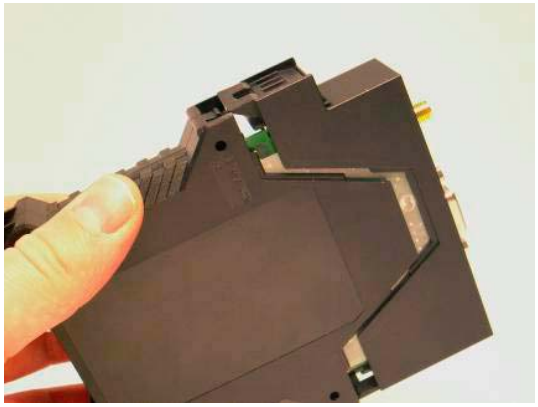
7. The SIM card is then firmly locked in the SIM card holder:

8. Then assemble the two housing sections again. To do this, locate the printed circuit board in the upper and lower rails inside the rear section of the housing.



① Rail for the printed circuit board

9. Press the two housing sections together so that the lugs of the fasteners click into place at the top and bottom.



Result

SIM card is ready; screw the SINAUT modem together again.

4.3.3 This is how you load the factory settings

Loading the factory settings

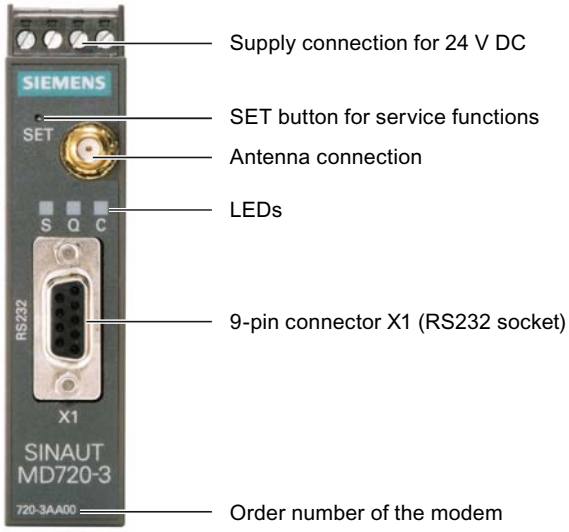


Figure 4-5 MD720-3: Front view

If you press the SET key for longer than 4 seconds until the LED "C" starts to light up, then the SINAUT MD720-3 configuration is reset to the default values set in the factory.

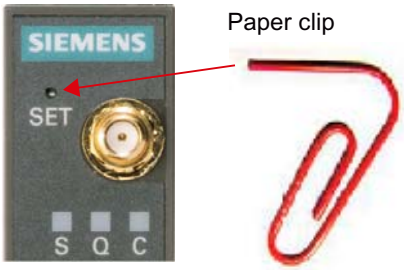


Figure 4-6 MD720-3: SET key

4.4 Machine control panels

4.4.1 Status displays MCP 310C PN

LEDs for status display

For the MCP 310C PN there are 3 LEDs in a row (H1-H3), which provide information about the module state:

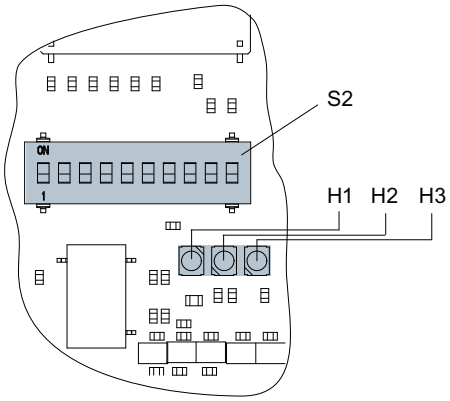


Figure 4-7 Status displays

LED	H1 (green) PowerOK	H2 (green) PN Sync	H3 (red) PN Fault
Power Off	off	off	off
Power On (voltage is stable)	on	off	off
Boot software runs and loads the system software	on	on	on
System software runs	on	off	off
System software runs, no communication to the controller	on	off	off
System software runs, communication to the controller, STOP state	on	on	off
System software runs, communication to the controller, RUN state	on	Flashes at 0.5 Hz	off

4.4.2 This is how you remove the MCP 310C PN

Overview

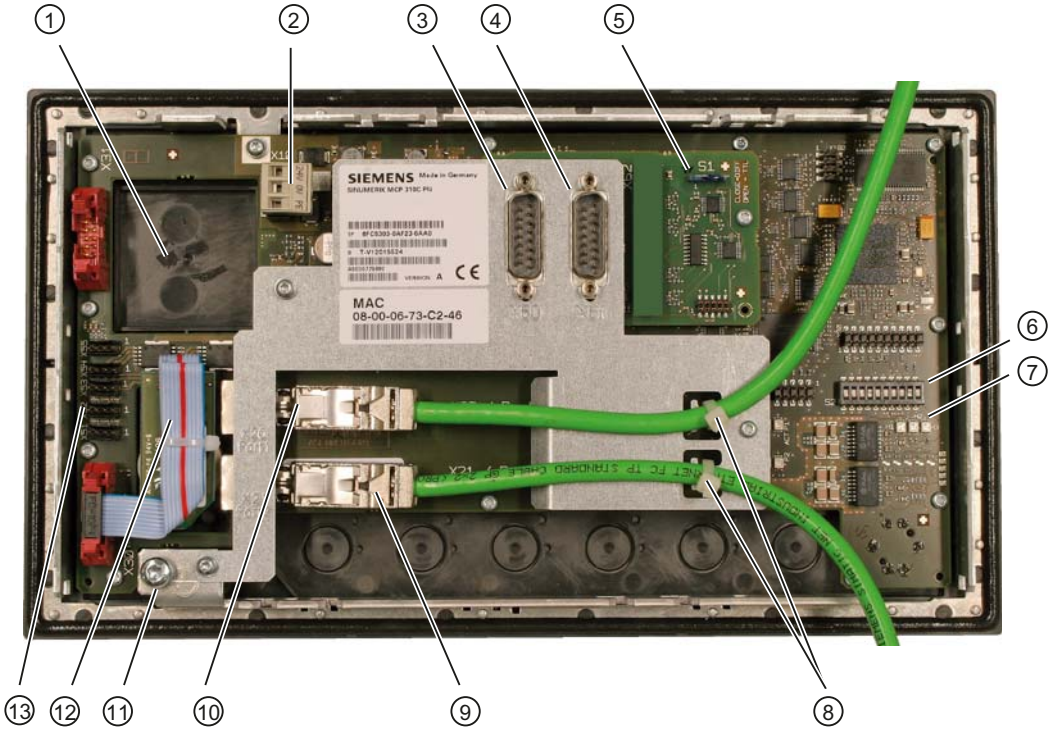
The activities that must be taken into account when replacing a machine control panel are subsequently described.

If the machine control panel has a hardware defect, then it must be replaced by an identical replacement part.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing



①		Slot for Emergency Stop button or spindle override
②	X10	Power supply interface
③	X60	Handwheel connection *)
④	X61	Handwheel connection *)
⑤	S1	Switch: for SINUMERIK 828D, no function
⑥	S2	Switch
⑦		LEDs
⑧		Ethernet cable strain relief
⑨	X21	Port 2: PLC I/O interfaces based on PROFINET
⑩	X20	Port 1: PLC I/O interfaces based on PROFINET
⑪		Equipotential bonding
⑫		Feedrate override
⑬		Customer-specific inputs and outputs

*) Handwheels are directly connected to the PPU: Do not wire X60/X61.

Figure 4-8 MCP 310C PN rear side

NOTICE
Electro-static discharge (ESD) Before you touch the machine control panel, discharge yourself at the cabinet or at the ground terminal.

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the operator panel or control cabinet in which the machine control panel is located.
3. Using a multimeter, check the X10 power supply to ensure that the system really is in a no-voltage condition.
4. If it has not already been done, label all connectors that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
5. Withdraw the power supply X10 (②).
6. Release the strain relief of the Ethernet cable (⑧)
7. Remove the Ethernet cables from the X20/X21 interface (port 1/port 2) (⑨, ⑩).
8. Release other cables (e.g. the Emergency Stop cable or the button from the mini handheld unit or from other command devices), if available.
9. Remove the ground connection by releasing the grounding screw (⑪).
10. Release the machine control panel from the control panel by releasing the clips.
11. Note down the set address S2 (⑥) at the DIL switch of the defective module.

4.4.3 This is how you install the MCP 310C PN

Installing

Procedure:

1. Set DIL switch S2 of the new module to what you previously noted down.
2. Install the new machine control panel.
3. Secure the clips to retain the machine control panel and tighten them.
4. Connect the ground connection (⑪).
5. Reconnect the other cables (e.g. the Emergency Stop cable or the button from the mini handheld unit or from other command devices), if available.
6. Reinsert the Ethernet cables at the X20/X21 interface (port 1/port 2) (⑨, ⑩).
7. Re-establish the strain relief for the Ethernet cables (⑧).
8. Reconnect the power supply X10 (②).
9. Close the cabinet and switch-on the system again.

DIP switch S2

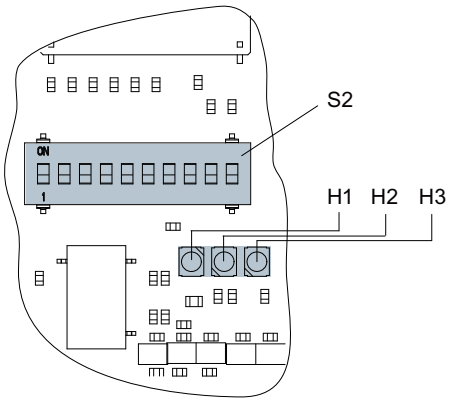


Figure 4-9 Switch S2

Switch S2 defines the IP address of the machine control panel:

1	2	3	4	5	6	7	8	9	10	Device name
								on	on	
on	off	on	off	off	off	off	off			mcp-pn64

For SINUMERIK 828D, the IP address = 192.168.214.64 must always be assigned to the MCP.

4.4.4 Status displays, MCP 483C PN

LED status displays

For the MCP 483C PN there are 3 LEDs in a row (H1 - H3), which provide information about the module state:

Figure 4-10 Status displays

LED	H1 (green) PowerOK	H2 (green) PN Sync	H3 (red) PN Fault
Power Off	off	off	off
Power On (voltage is stable)	on	off	off
Boot software runs and loads the system software.	on	on	on
System software runs.	on	off	off
System software runs, no communication to the controller.	on	off	off
System software runs, communication to the controller, STOP state	on	on	off
System software runs, communication to the controller, RUN state	on	Flashes at 0.5 Hz	off

4.4.5 This is how you remove the MCP 483C PN

Overview

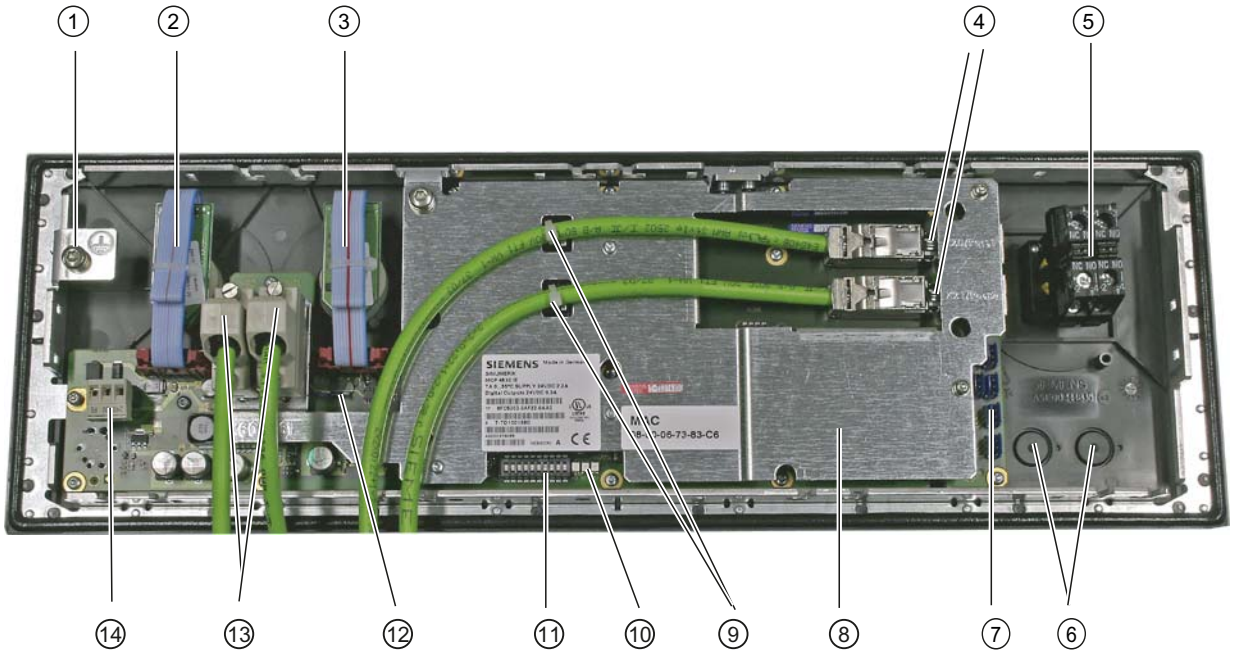
The activities that must be taken into account when replacing a machine control panel are subsequently described.

If the machine control panel has a hardware defect, then it must be replaced by an identical replacement part.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing



①		Ground terminal
②	X30	Feedrate override
③	X31	Spindle override
④	X20	Port 1: Connection: PLC I/O interface based on PROFINET
	X21	Port 2: Connection: PLC I/O interface based on PROFINET
⑤		Slot for Emergency Stop
⑥		Mounting slots for additional command devices
⑦		Customer-specific inputs and outputs
⑧		Cover plate
⑨		Ethernet cable strain relief
⑩		LEDs
⑪	S2	Switch
⑫	S1	Switch: for SINUMERIK 828D, has no function
⑬	X60	Handwheel connection *)
	X61	Handwheel connection *)
⑭	X10	Power supply interface

*) Handwheels are directly connected to the PPU: Do not wire X60/X61

Figure 4-11 MCP 483C PN rear side

NOTICE
Electro-static discharge (ESD)
Before you touch the machine control panel, discharge yourself at the cabinet or at the ground terminal.

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the operator panel/control cabinet in which the machine control panel is located.
3. Using a multimeter, check the X10 power supply to ensure that the system really is in a no-voltage condition.
4. If it has not already been done, label all connectors that lead to the module now.

   Only then, can it be ensured that the cables are not interchanged.
5. Withdraw the power supply X10 (⑭).
6. Release the strain relief of the Ethernet cable (⑨)
7. Remove the Ethernet cables from the X20 / X21 interface (port 1 / port 2) (④)
8. Release other cables (e.g. the Emergency Stop cable or the button from the mini handheld unit or from other command devices), if available.
9. Remove the ground connection by releasing the grounding screw (①).
10. Release the machine control panel from the control panel by releasing the clips.
11. Note down the set address S2 (⑪) at the DIL switch of the defective module.

4.4.6 This is how you install the MCP 483C PN

Installing

Procedure:

1. Set DIL switch S2 (⑪) of the new module to what you previously noted down.
2. Installing a new machine control panel.
3. Secure the clips to retain the machine control panel and tighten them.
4. Connect the ground connection (①).
5. Reconnect the other cables (e.g. the Emergency Stop cable or the button from the mini handheld unit or from other command devices), if available.
6. Reinsert the Ethernet cables at the X20/X21 interface (port 1/port 2) (④).
7. Re-establish the Ethernet cable strain relief (⑨).
8. Reconnect the power supply X10 (⑭).
9. Close the cabinet and switch-on the system again.

Switch S2

Figure 4-12 Switch S2

Switch S2 defines the IP address of the machine control panel:

1	2	3	4	5	6	7	8	9	10	Device name
								on	on	
on	off	on	off	off	off	off	off			mcp-pn64

For SINUMERIK 828D, the IP address = 192.168.214.64 must always be assigned to the MCP.

4.5 I/O modules

4.5.1 Status displays PP 72/48D PN

LEDs for status display

The following LEDs on the I/O module provide information about the module state:

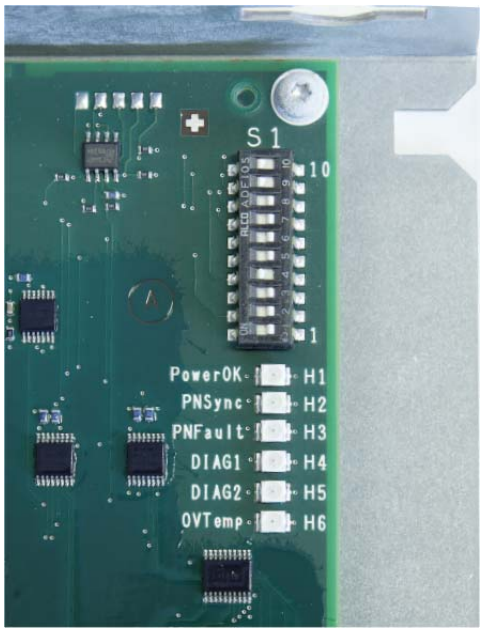


Figure 4-13 Switch S1 and LEDs H1 to H6

	H1 (green) PowerOK	H2 (green) PN Sync	H3 (red) PN Fault	H4 (green) Diag1	H5 (green) Diag2	H6 OVTemp
Power Off	off	off	off	off	off	off
Power On (voltage is stable)	on	off	off	off	off	off
Boot software runs and loads the system software.	on	on	on	on	on	off
System software runs	on	off	off	off	off	off
System software runs, no communication to the controller.	on	off	off	off	off	off
System software runs, communication to the controller, STOP state	on	on	off	off	off	off
System software runs, communication to the controller, RUN state	on	Flashes at 0.5 Hz	off	off	off	off
Overtemperature alarm	--	--	--	--	--	on

LEDs at port 1 and port 2

There are 2 LEDs at port 1 and port 2 for diagnostics of the PLC I/O interfaces based on PROFINET.

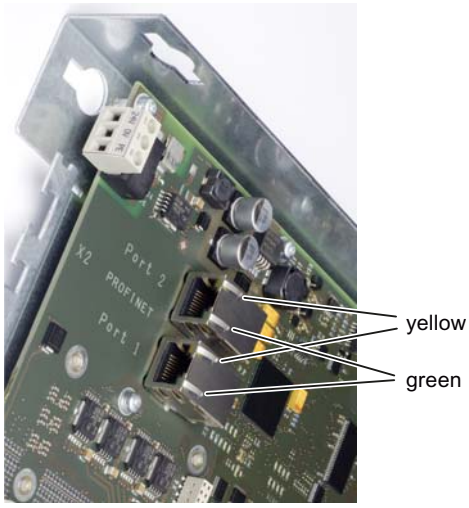


Figure 4-14 Port 1 and port 2

LED for communication at the RJ45 connector.

Name	Color	State	Meaning
Link	Green	ON	100 MBit link available
		OFF	Missing or faulty link
Activity	Yellow	ON	Sending or receiving
		OFF	No activity

4.5.2 This is how you remove the PP 72/48D PN

Overview

The activities necessary to replace the PP72/48D PN I/O module are described in the following.

If the PP 72/48D PN has a hardware defect, then this must be replaced by an identical module.

Preconditions:

- The I/O module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

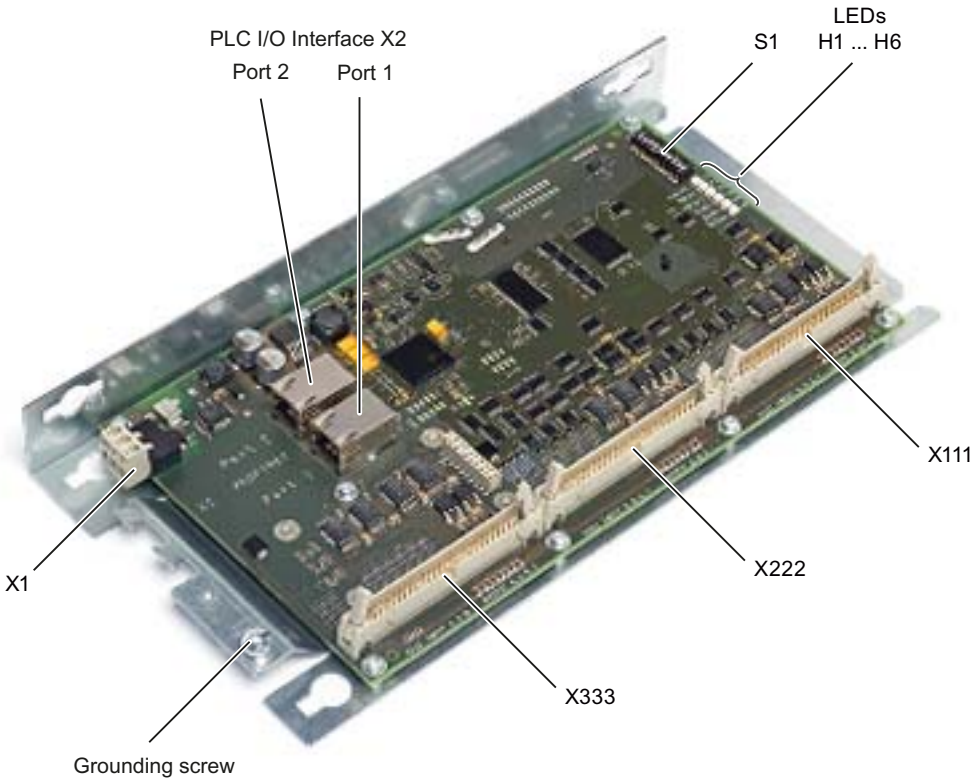


Figure 4-15 Rear of the PP 72/48D PN

NOTICE
Electro-static discharge (ESD) Before you touch the module, discharge yourself at the cabinet or at the ground terminal.

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control cabinet where the module is located.
3. Using a multimeter, check the X1 power supply to ensure that the system really is in a no-voltage condition.
4. If it has not already been done, label all connectors that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
5. Withdraw the power supply X1.
6. Release the connectors of the ribbon cables (X111, X222, X333) on the module that are used to connect the digital inputs and outputs.
7. Remove the strain relief of the communication cables to interfaces X2.

8. Remove the communication cables from interface X2 (port 1 and port 2).
9. Remove the ground connection by releasing the grounding screw.
10. To remove the I/O module, release the fixing screws.
11. Note down the address set with DIP switch S1 on the defective module.

4.5.3 This is how you install the PP 72/48D PN

Installing

Procedure:

1. Set DIP switch S1 of the new module as you previously noted down.
2. Install the new I/O module.
3. Connect the ground connection.
4. Connect the communication cables at interface X2 (port 1 and port 2).
5. Re-establish the strain relief for the communication cables.
6. Re-insert the connectors of the ribbon cables (X111, X222, X333) on the module that are used to connect the digital inputs and outputs.
7. Reconnect power supply X1.
8. Close the cabinet and switch-on the system again.

DIP switch S1

Setting of switch S1:

1	2	3	4	5	6	7	8	9	10	Device name
								on	on	
on	off	off	on	off	off	off	off			pp72x48pn9
off	off	off	on	off	off	off	off			pp72x48pn8
on	on	on	off	off	off	off	off			pp72x48pn7
off	on	on	off	off	off	off	off			pp72x48pn6
on	off	on	off	off	off	off	off			pp72x48pn5

The switch positions 9 and 10 guarantee the PROFINET functionality of the module and must always be switched "on".

NOTICE
A new address only becomes effective after voltage OFF → ON.

4.5.4 Status displays PP 72/48D 2/2A PN

LEDs for status display

The following LEDs on the I/O module provide information about the module state:

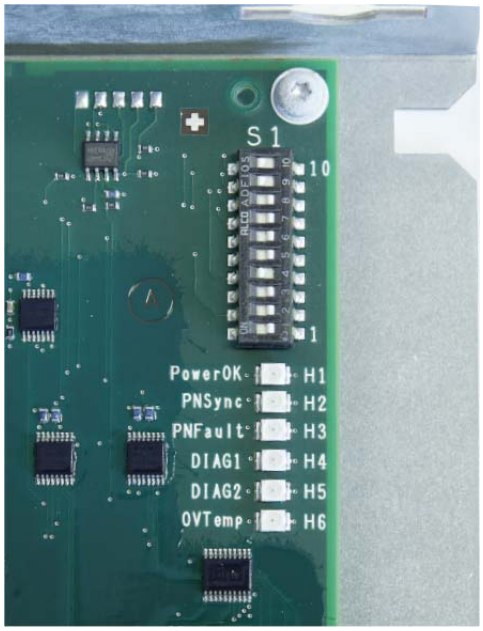


Figure 4-16 Switch S1 and LEDs H1 to H6

	H1 (green) PowerOK	H2 (green) PN Sync	H3 (red) PN Fault	H4 (green) Diag1	H5 (green) Diag2	H6 OVTemp
Power Off	off	off	off	off	off	off
Power On (voltage is stable)	on	off	off	off	off	off
Boot software runs and loads the system software.	on	on	on	on	on	off
System software runs	on	off	off	off	off	off
System software runs, no communication to the controller.	on	off	off	off	off	off
System software runs, communication to the controller, STOP state	on	on	off	off	off	off
System software runs, communication to the controller, RUN state	on	Flashes at 0.5 Hz	off	off	off	off
Overtemperature alarm	--	--	--	--	--	on

LEDs at port 1 and port 2

There are 2 LEDs at port 1 and port 2 for diagnostics of the PLC I/O interfaces based on PROFINET.

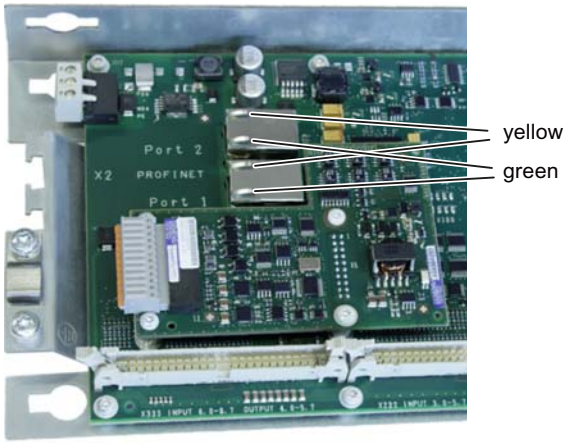


Figure 4-17 Port 1 and port 2

LED for communication at the RJ45 connector.

Name	Color	State	Meaning
Link	Green	ON	100 MBit link available
		OFF	Missing or faulty link
Activity	Yellow	ON	Sending or receiving
		OFF	No activity

4.5.5 This is how you remove the PP 72/48D 2/2A PN

Overview

The activities necessary when replacing the PP 72/48D 2/2A PN I/O module are described in the following.

If the PP 72/48D 2/2A PN has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The I/O module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

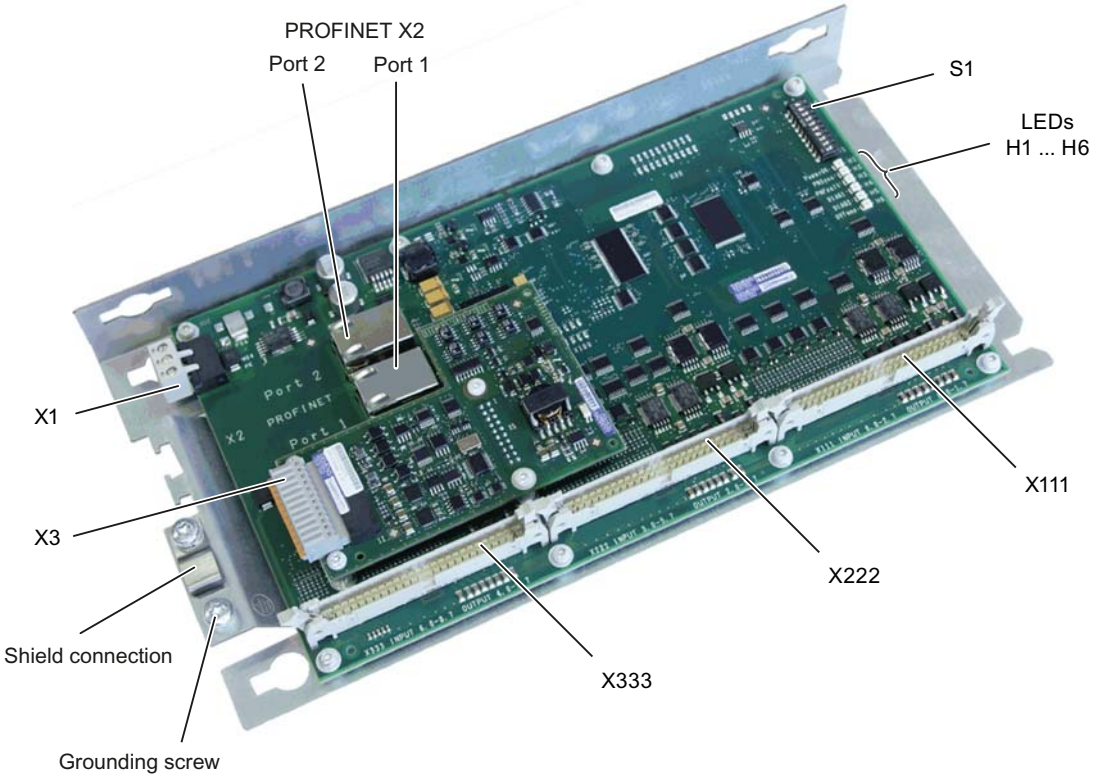


Figure 4-18 Rear of PP 72/48D 2/2A PN

NOTICE
Electro-static discharge (ESD)
Before you touch the module, discharge yourself at the cabinet or at the ground terminal.

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control cabinet where the module is located.
3. Using a multimeter, check the X1 power supply to ensure that the system really is in a no-voltage condition.
4. If it has not already been done, label all connectors that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
5. Withdraw the power supply X1.
6. Release the connectors of the ribbon cables (X111, X222, X333) on the module that are used to connect the digital inputs and outputs.
7. Remove the strain relief of the communication cables to interfaces X2.

8. Remove the communication cables from interface X2 (port 1 and port 2).
9. Remove the ground connection by releasing the grounding screw.
10. To remove the I/O module, release the fixing screws.
11. Note down the address set with DIP switch S1 on the defective module.

4.5.6 This is how you install the PP 72/48D 2/2A PN

Installing

Procedure:

1. Set DIP switch S1 of the new module as you previously noted down.
2. Install the new I/O module.
3. Connect the ground connection.
4. Connect the communication cables at interface X2 (port 1 and port 2).
5. Re-establish the strain relief for the communication cables.
6. Re-insert the connectors of the ribbon cables (X111, X222, X333) on the module that are used to connect the digital inputs and outputs.
7. Reconnect power supply X1.
8. Close the cabinet and switch-on the system again.

DIP switch S1

Setting of switch S1:

1	2	3	4	5	6	7	8	9	10	Device name
								on	on	
on	off	off	on	off	off	off	off			pp72x48pn9
off	off	off	on	off	off	off	off			pp72x48pn8
on	on	on	off	off	off	off	off			pp72x48pn7
off	on	on	off	off	off	off	off			pp72x48pn6
on	off	on	off	off	off	off	off			pp72x48pn5

The switch positions 9 and 10 guarantee the PROFINET functionality of the module and must always be switched "on".

NOTICE
A new address only becomes effective after voltage OFF → ON.

4.6 Expansion module NX10

4.6.1 Status displays on the NX10

LEDs for status display

The following LEDs on the NX10 provide information about the module state:

LED	Color	State	Description
RDY, H1	-	OFF	Electronics power supply outside the permissible tolerance range.
	Green	Continuous light	Component is ready.
		Flashing light 2 Hz	Writing to CompactFlash Card.
	Red	Continuous light	There is at least one fault (e.g., RESET, watchdog monitoring, basic system fault). NX10 is booting.
		Flashing light 0.5 Hz	Error when booting: e.g. the firmware cannot be loaded into the RAM.
	Yellow	Continuous light	Firmware is being loaded into the RAM
		Flashing light 0.5 Hz	Firmware cannot be loaded into the RAM.
		Flashing light 2 Hz	Firmware CRC error.
DP1, CU_LINK, H2	-	OFF	Electronics power supply outside the permissible tolerance range. NX10 is not ready.
	Green	Continuous light	CU_LINK is ready for communication and cyclic communication is running.
		Flashing light 0.5 Hz	CU_LINK is ready for communication and no cyclic communication is running.
	Red	Continuous light	At least one CU_LINK fault is present. CU_LINK is not ready for operation (e.g., after switching on).

4.6.2 This is how you remove the NX10

The activities necessary when replacing an NX10 are subsequently described.

If the NX10 has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

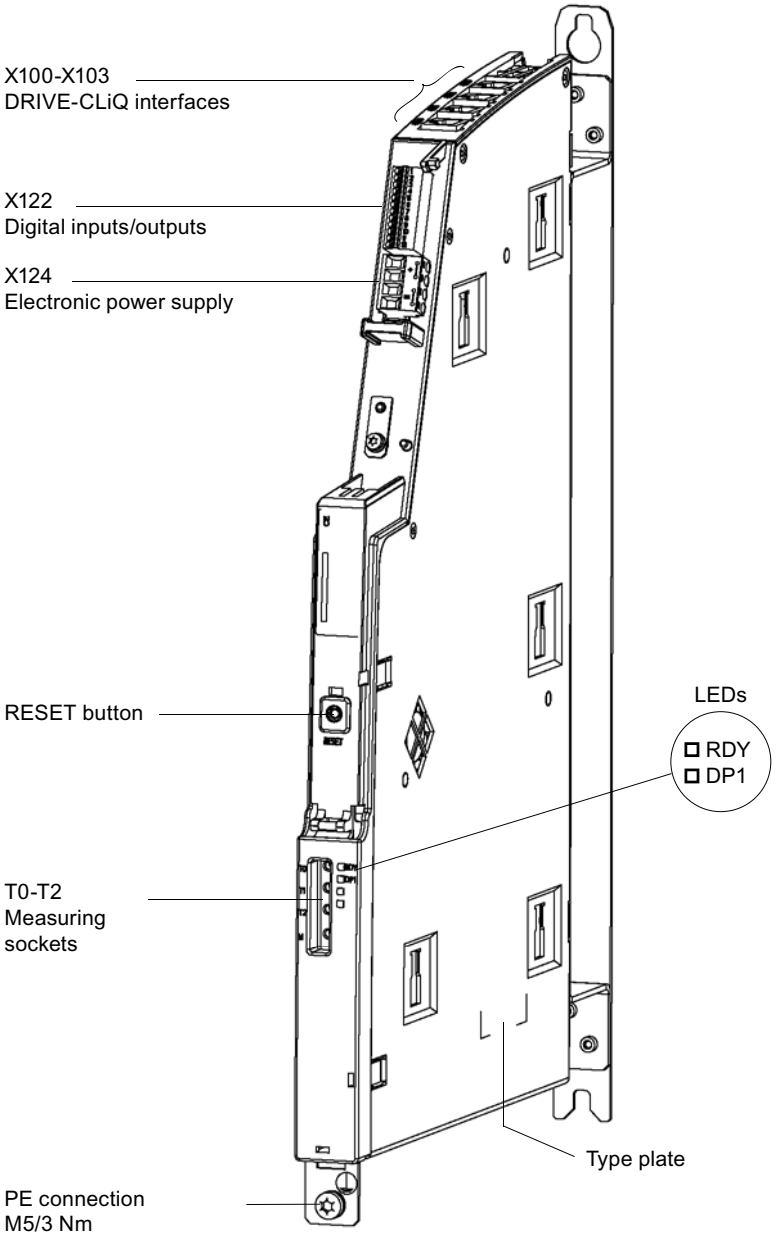


Figure 4-19 NX10 illustration

NOTICE
Electro-static discharge (ESD) Before you touch the component, discharge yourself at the cabinet or at the ground terminal.

Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control cabinet where the NX10 is located.
3. Use a multimeter to check that the system really is in a no-voltage condition (isolated from the supply).
4. Open the cover cap of the NX10 module.
5. If it has not already been done, label all connectors and cables that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
6. Withdraw the electronics power supply X124.
7. Withdraw the digital input/output terminal X122.
8. Withdraw any connected DRIVE-CLiQ cables X100 - X103.
9. Remove the protective conductor connection of the NX10.
10. Release the screws retaining the NX10 to the mounting plate.

    – OR –

11. If the module is located to the left of the infeed, remove the module by first pulling it upwards and then removing it towards the left.

4.6.3 This is how you install the NX10

Installing

Procedure:

1. Screw the new NX10 to the mounting plate.

    – OR –

2. If the module was located to the left of the infeed, re-attach it here by first introducing the NX10 into the holder to the right and then press it down slightly to retain it.
3. Reconnect the protective conductor connection of the NX10.
4. Insert the DRIVE-CLiQ cables that were previously withdrawn into sockets X100-X103.
5. Insert the digital input/output terminal X122 into the NX10.
6. Reconnect the electronics power supply X124.
7. Now check that all of the cables have been re-connected.
8. Now close the cover cap of the NX10.
9. Close the cabinet and switch-on the system again.

CAUTION
Ensure that all of the connectors and screws are correctly tightened or latched and inserted.

4.7 Single Motor Modules

4.7.1 SMM status displays

Status displays

The Motor Module has the following status displays, which provide information about the module state:

LED state		Description, cause	Remedy
Ready (H200)	**DC Link (H201)**		
OFF	OFF	The electronics power supply is missing or outside the permissible tolerance range.	–
Green	OFF	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is present.	–
	Red	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is too high.	Check the line supply voltage.
Orange	Orange	DRIVE-CLiQ communication is being established.	–
Red	–	This component has at least one fault. **Note:** The LED is controlled irrespective of the corresponding messages being reconfigured.	Remove the fault and acknowledge.
Green/red (0.5 Hz)	–	Firmware is being downloaded.	–
Green/red (2 Hz)	-	Firmware download has been completed. Wait for POWER ON.	Carry out a POWER ON.
Green/orange or red/orange	–	Component recognition via LED is activated (p0124). **Note:** Both options depend on the LED status when module recognition is activated via p0124 = 1.	–

⚠ DANGER

Irrespective of the state of LED "DC Link", a hazardous DC link voltage can always be present. The warning information on the components must be carefully observed!

4.7.2 SMM connections

Connections

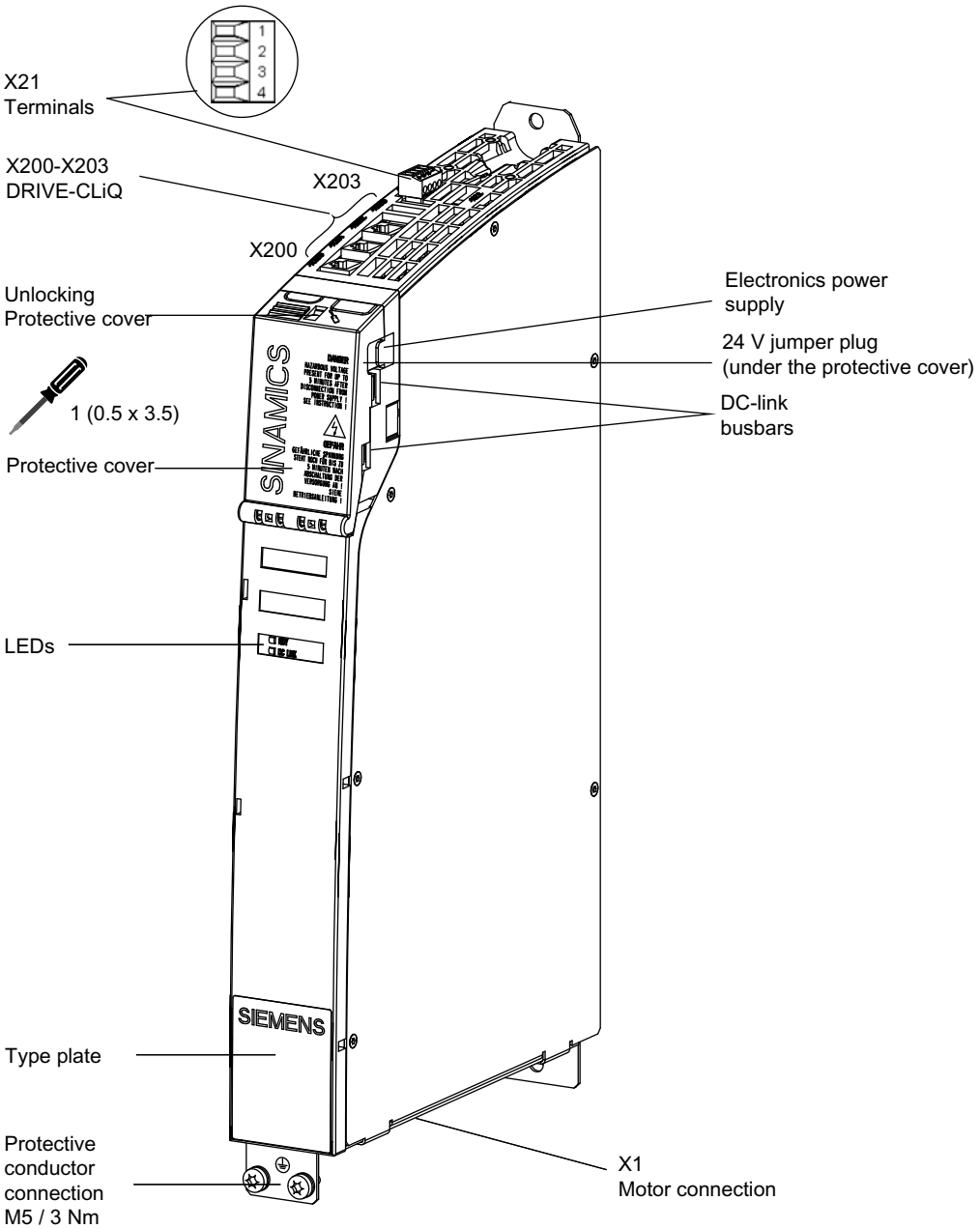


Figure 4-20 Single Motor Module (SMM)

4.7.3 This is how you remove a Motor Module

Overview

The activities required when replacing a Motor Module are subsequently described.

If a Motor Module has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

NOTICE
Electro-static discharge (ESD) Before you touch the module, discharge yourself at the cabinet or at the ground terminal.

Procedure:

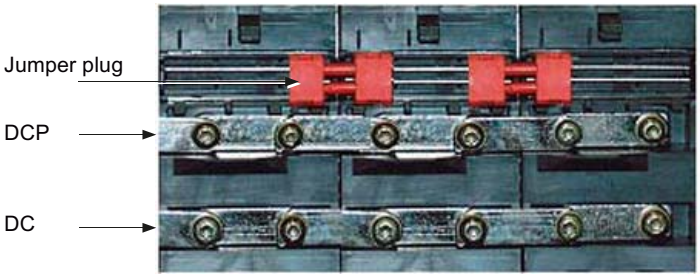
1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control cabinet where the infeed module is located.
3. If it has not already been done, label all connectors and cables that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
4. Withdraw the enable terminals X21 (and X22 if available).
5. Withdraw the connected DRIVE-CLiQ cables X200 - X202.
6. Release the fixing screw (Torx) and remove the motor connection X1 (and X2 - if available).

⚠ DANGER
Risk of electric shock A hazardous voltage is present for up to **5 minutes** after the power supply has been switched off. The protective cover must not be opened until this time has elapsed. The warning information on the components must be carefully observed!

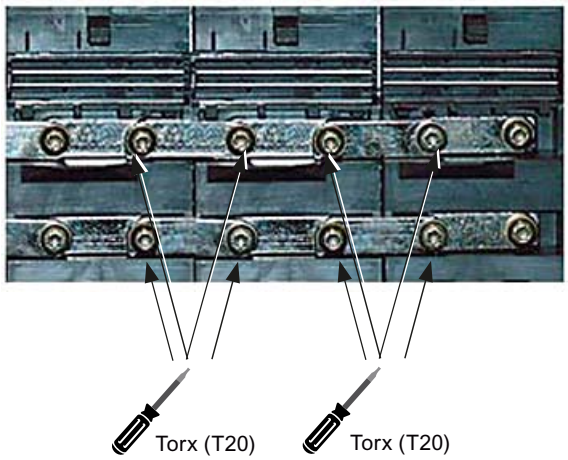
7. Open the protective cover of the DC link voltage of the defective module as well as the adjacent module - if available - using a suitable tool (e.g. a screwdriver).
8. Withdraw the 24 V terminal adapter.

9. Using a multimeter (set the measuring range to 1000 V DC) at the points DCP/DCN, check that the DC link voltage is in a no-voltage condition.

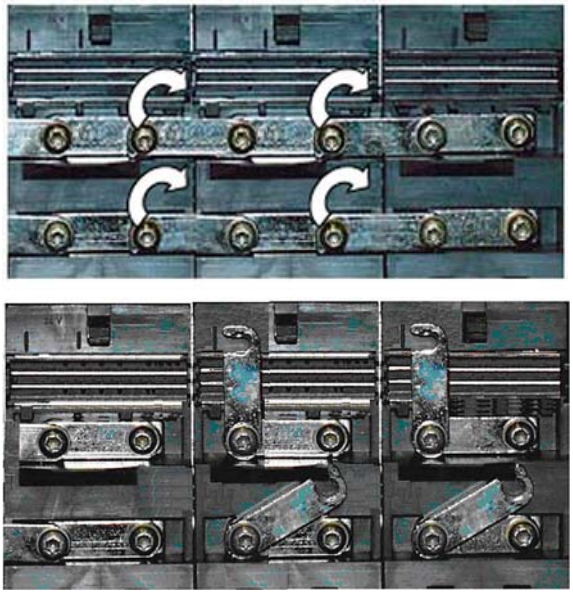
   Only continue with the work when it has been absolutely ensured that no voltage is present (a no-voltage condition has been established).



10. Withdraw the red 24 V jumper plug.
11. Release the Torx screws of the DC link.



12. Open the DC link busbars of the two modules.



13. Release the screws that are used to retain the motor module to the mounting plate.
14. Remove the protective conductor connection of the Motor Module.
15. Remove the Motor Module from the control cabinet.

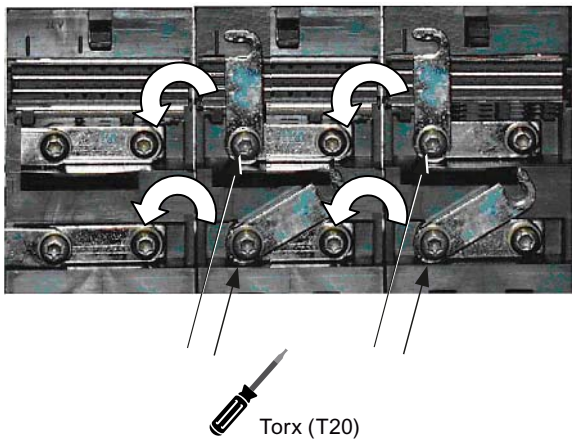
4.7.4 This is how you install a Motor Module

Installing

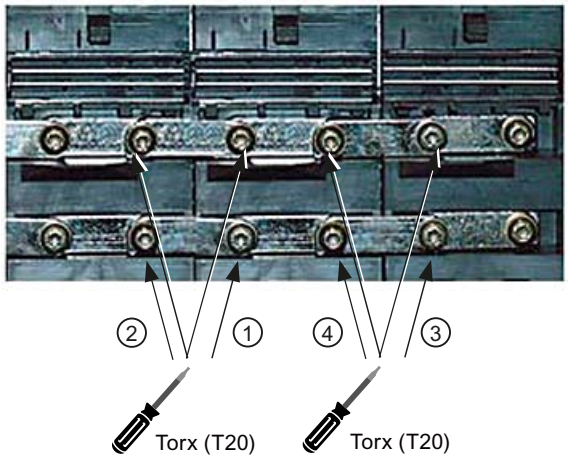
⚠ DANGER
Risk of electric shock A hazardous voltage is present for up to **5 minutes** after the power supply has been switched off. The protective cover must not be opened until this time has elapsed. The warning information on the components must be carefully observed!

Procedure:

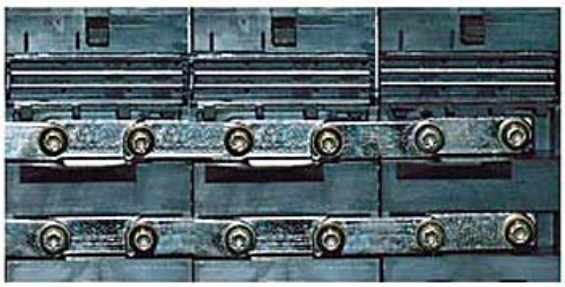
1. Screw the new Motor Module to the mounting plate.
2. Reconnect the protective conductor connection of the Motor Module.
3. Open the protective cover of the DC link voltage using a suitable tool (e.g. a screwdriver).
4. Release the Torx screws and connect the DC link busbar.



5. Tighten the Torx screws of the DC link busbars, observe the correct sequence.



6. Place the red jumper plug on the electronics busbar until it clicks into place.



7. Place the 24 V terminal adapter on the electronics power supply busbar until it clicks into place.
8. Close the protective cover of the DC link voltage.
9. Reconnect motor connections X1 and X2 - if available - to the module.
10. Insert the DRIVE-CLiQ cables that were previously withdrawn into sockets X200 - X202.
11. Reinsert the enable terminals X21 and X22 - if available - into the module.
12. Check whether all of the cables have been re-connected.
13. Close the cabinet and switch-on the system again.

CAUTION
Ensure that all of the connectors and screws are correctly tightened and latched or inserted.

⚠ WARNING
The components must only be operated when the protective cover of the DC link is closed. Damaged components must not be used.

4.8 Double Motor Modules

4.8.1 DMM status displays

Status displays

The Motor Module has the following status displays, which provide information about the module state:

LED state		Description, cause	Remedy
Ready (H200)	**DC Link (H201)**		
OFF	OFF	The electronics power supply is missing or outside the permissible tolerance range.	–
Green	OFF	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is present.	–
	Red	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place. The DC link voltage is too high.	Check the line supply voltage.
Orange	Orange	DRIVE-CLiQ communication is being established.	–
Red	–	This component has at least one fault. **Note:** The LED is controlled irrespective of the corresponding messages being reconfigured.	Remove the fault and acknowledge
Green/red (0.5 Hz)	–	Firmware is being downloaded.	–
Green/red (2 Hz)	-	Firmware download has been completed. Wait for POWER ON.	Carry out a POWER ON.
Green/orange or red/orange	–	Component recognition via LED is activated (p0124). **Note:** Both options depend on the LED status when module recognition is activated via p0124 = 1.	–

⚠ DANGER

Irrespective of the state of LED "DC Link", a hazardous DC link voltage can always be present. The warning information on the components must be carefully observed!

4.8.2 DMM connections

Connections

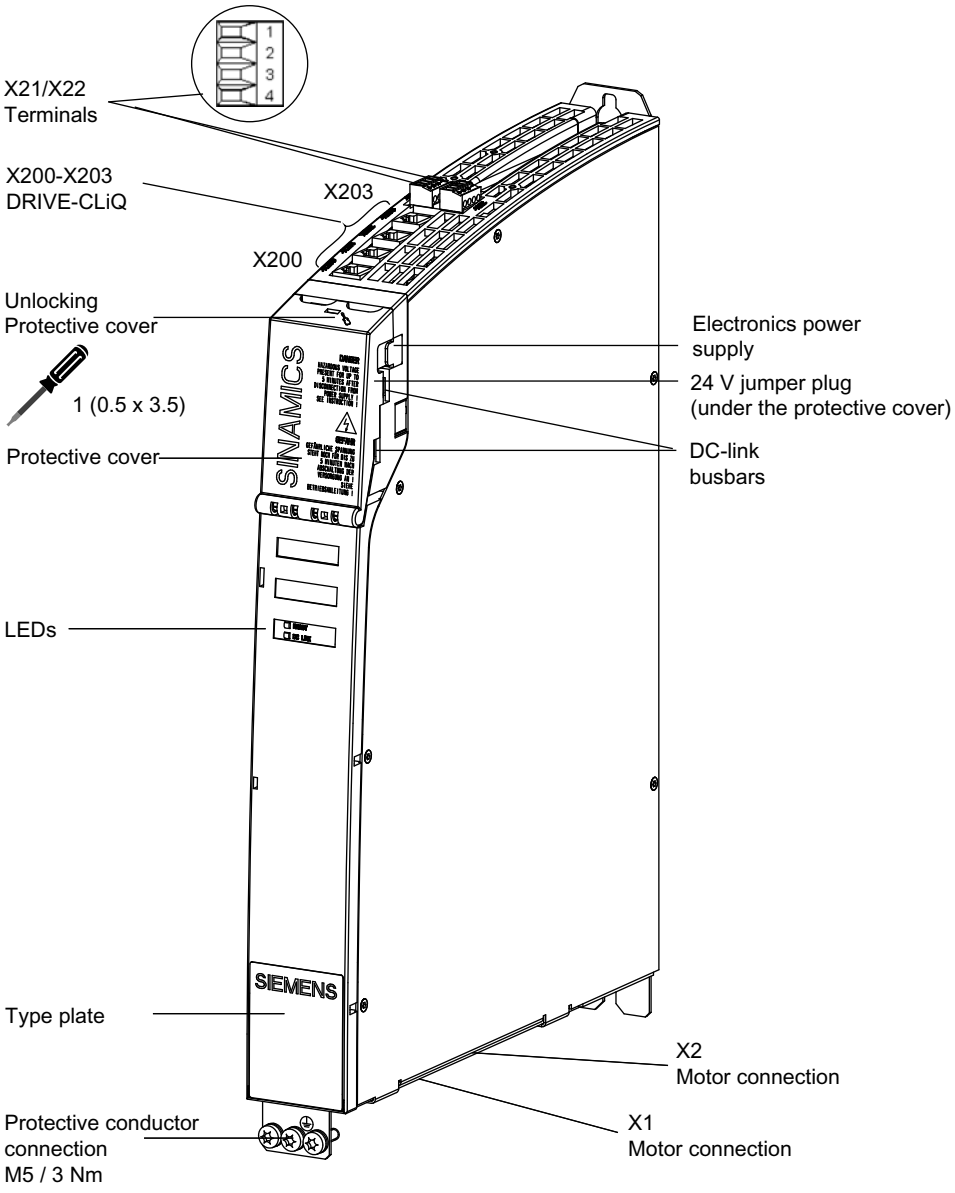


Figure 4-21 Double Motor Module (DMM)

4.8.3 This is how you remove a Motor Module

Overview

The activities required when replacing a Motor Module are subsequently described.

If a Motor Module has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

NOTICE
Electro-static discharge (ESD) Before you touch the module, discharge yourself at the cabinet or at the ground terminal.

Procedure:

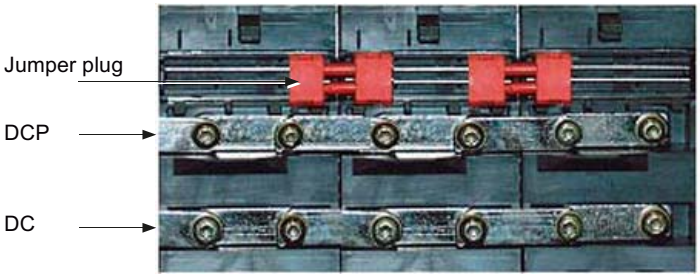
1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control cabinet where the infeed module is located.
3. If it has not already been done, label all connectors and cables that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
4. Withdraw the enable terminals X21 (and X22 if available).
5. Withdraw the connected DRIVE-CLiQ cables X200 - X202.
6. Release the fixing screw (Torx) and remove the motor connection X1 (and X2 - if available).

⚠ DANGER
Risk of electric shock A hazardous voltage is present for up to **5 minutes** after the power supply has been switched off. The protective cover must not be opened until this time has elapsed. The warning information on the components must be carefully observed!

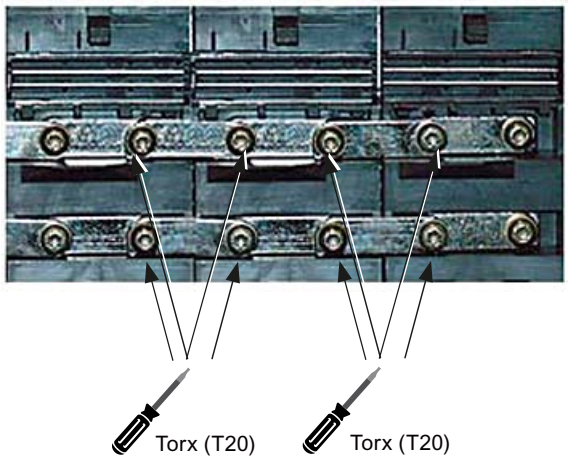
7. Open the protective cover of the DC link voltage of the defective module as well as the adjacent module - if available - using a suitable tool (e.g. a screwdriver).
8. Withdraw the 24 V terminal adapter.

9. Using a multimeter (set the measuring range to 1000 V DC) at the points DCP/DCN, check that the DC link voltage is in a no-voltage condition.

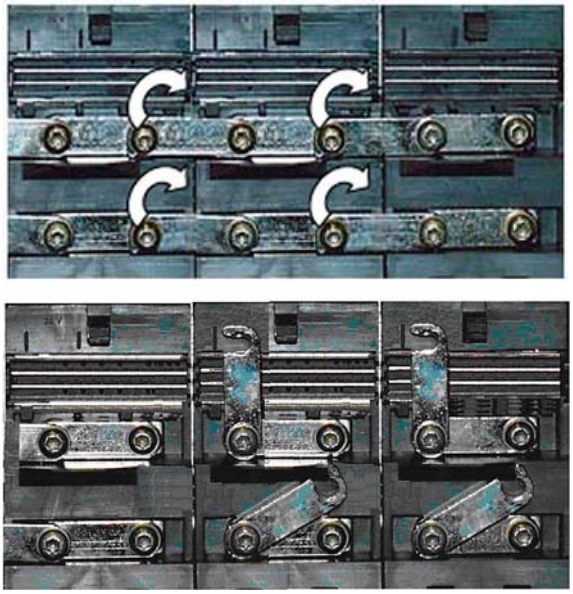
   Only continue with the work when it has been absolutely ensured that no voltage is present (a no-voltage condition has been established).



10. Withdraw the red 24 V jumper plug.
11. Release the Torx screws of the DC link.



12. Open the DC link busbars of the two modules.



13. Release the screws that are used to retain the motor module to the mounting plate.
14. Remove the protective conductor connection of the Motor Module.
15. Remove the Motor Module from the control cabinet.

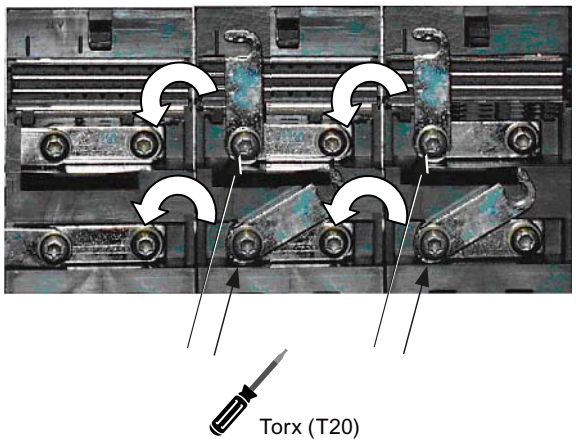
4.8.4 This is how you install a Motor Module

Installing

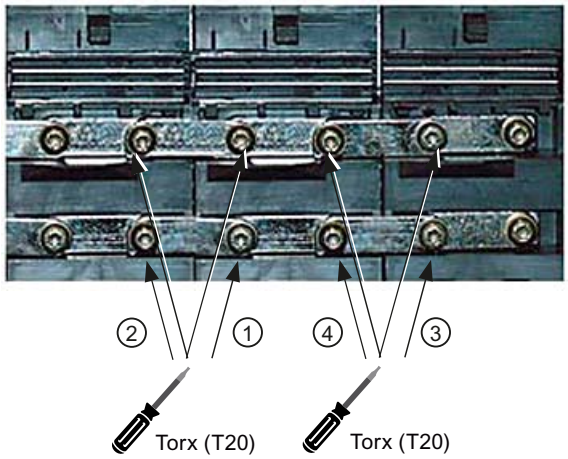
⚠ DANGER
Risk of electric shock A hazardous voltage is present for up to **5 minutes** after the power supply has been switched off. The protective cover must not be opened until this time has elapsed. The warning information on the components must be carefully observed!

Procedure:

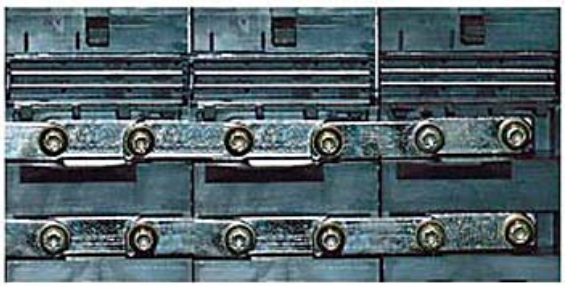
1. Screw the new Motor Module to the mounting plate.
2. Reconnect the protective conductor connection of the Motor Module.
3. Open the protective cover of the DC link voltage using a suitable tool (e.g. a screwdriver).
4. Release the Torx screws and connect the DC link busbar.



5. Tighten the Torx screws of the DC link busbars, observe the correct sequence.



6. Place the red jumper plug on the electronics busbar until it clicks into place.



7. Place the 24 V terminal adapter on the electronics power supply busbar until it clicks into place.
8. Close the protective cover of the DC link voltage.
9. Reconnect motor connections X1 and X2 - if available - to the module.
10. Insert the DRIVE-CLiQ cables that were previously withdrawn into sockets X200 - X202.
11. Reinsert the enable terminals X21 and X22 - if available - into the module.
12. Check whether all of the cables have been re-connected.
13. Close the cabinet and switch-on the system again.

CAUTION
Ensure that all of the connectors and screws are correctly tightened and latched or inserted.

⚠ WARNING
The components must only be operated when the protective cover of the DC link is closed. Damaged components must not be used.

4.9 Smart Line Modules

4.9.1 SLM (< 16 kW) status displays

Status displays

The 5 kW and 10 kW Smart Line Modules have the following status displays, which provide information about the module state:

LED	Color	State	Description, cause	Remedy
READY	–	OFF	Electronics power supply is missing or outside permissible tolerance range.	–
	Green	Continuous light	Component is ready.	–
	Yellow	Continuous light	Precharging not yet complete.	–
			Bypass relay has dropped-out.	
			EP terminals are not supplied with 24 V DC.	
	Red	Continuous light	Overtemperature	Diagnose the fault (using the output terminals) and acknowledge (using the input terminal)
			Overcurrent trip	
DC LINK	–	OFF	Electronics power supply is missing or outside permissible tolerance range.	–
	Yellow	Continuous light	DC link voltage in the permissible tolerance range.	–
	Red	Continuous light	DC link voltage outside the permissible tolerance range. Line supply fault	Check the line supply voltage.

⚠ DANGER

DC link voltage

Irrespective of the state of LED "DC Link", a hazardous DC link voltage can always be present. It must be checked that it really is in a no-voltage condition.

The warning information on the components must be carefully observed!

4.9.2 SLM (< 16 kW) connections

Connections

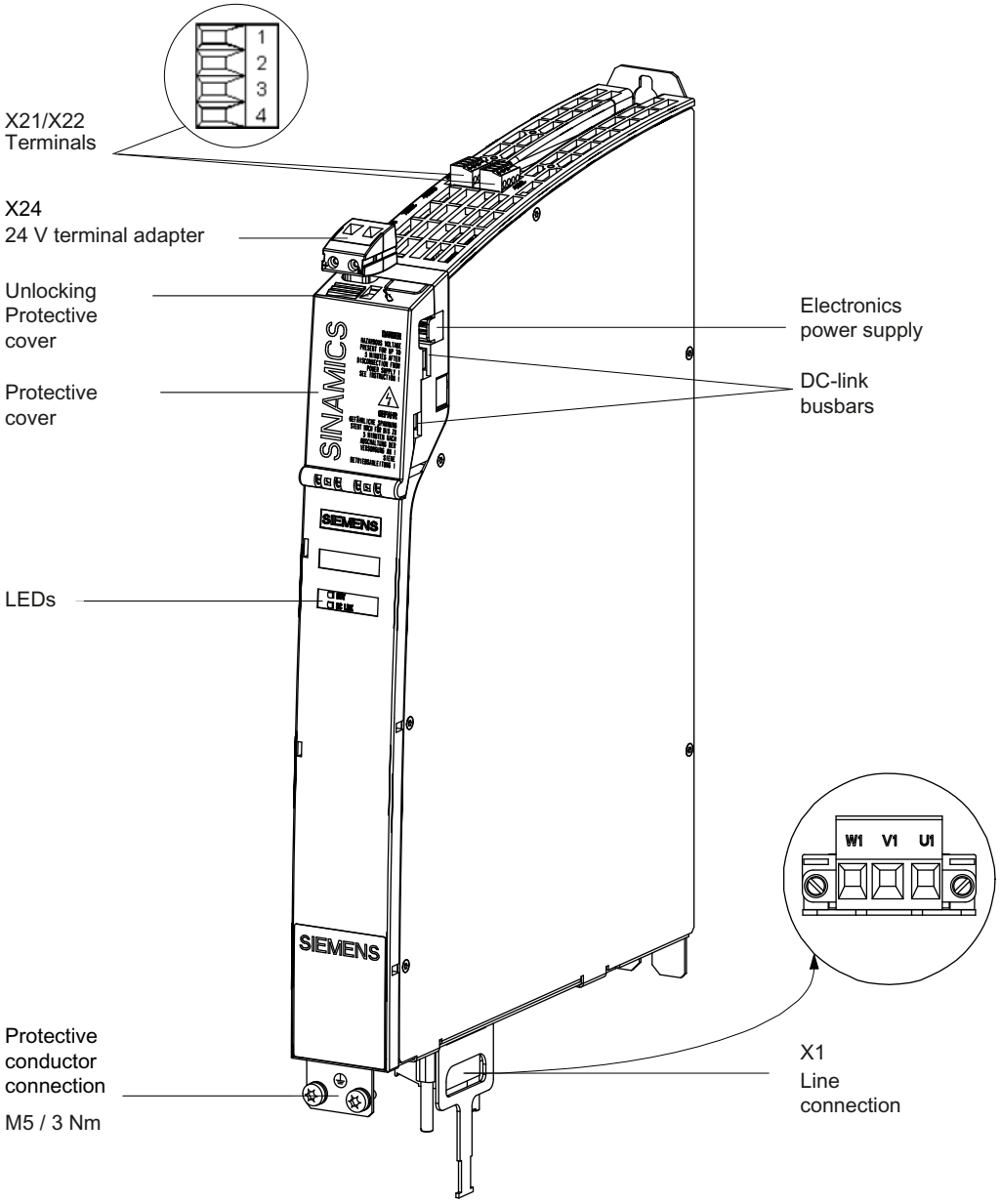


Figure 4-22 SLM connections

4.9.3 SLM (16 kW and higher) status displays

Status displays

The Smart Line Modules ≥ 16 kW have the following status displays, which provide information about the module state:

LED state		Description, cause	Remedy
Ready (H200)	DC Link (H201)		
OFF	OFF	Electronics power supply is missing or outside permissible tolerance range.	–
Green	OFF	The component is ready and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	The component is ready and cyclic DRIVE-CLiQ communication is taking place.	–
		The DC link voltage is present.	
	Red	The component is ready and cyclic DRIVE-CLiQ communication is taking place.	Check the line supply voltage.
		The DC link voltage is too high.	
Orange	Orange	DRIVE-CLiQ communication is being established.	–
Red	–	This component has at least one fault.	Remove the fault and acknowledge
		Note:	
		The LED is controlled irrespective of the corresponding messages being reconfigured.	
Green/red (0.5 Hz)	–	Firmware is being downloaded.	–
Green/red (2 Hz)	-	Firmware download has been completed. Wait for POWER ON.	Carry out a POWER ON
Green/orange	–	Component recognition via LED is activated (p0124).	–
or		Note:	
Red/orange		Both options depend on the LED status when module recognition is activated via p0124 = 1.	

⚠ DANGER

DC link voltage

Irrespective of the state of LED "DC Link", a hazardous DC link voltage can always be present. The warning information on the components must be carefully observed!

4.9.4 SLM (16 kW and higher) connections

Connections

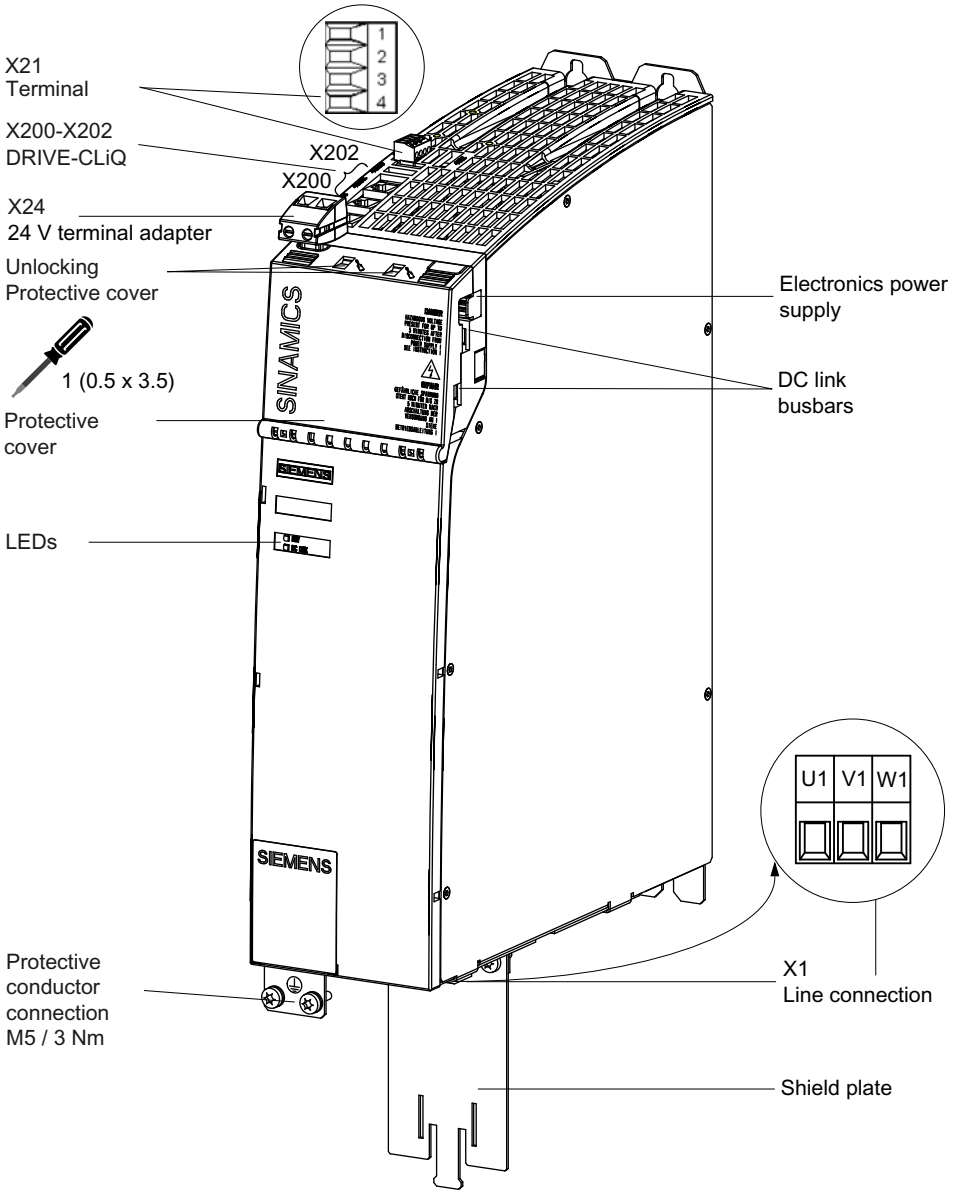


Figure 4-23 Connections,SLM ≥ 16 kW

4.9.5 This is how you remove an SLM

Overview

The activities that must be taken into account when replacing a Smart Line Module (SLM) are subsequently described.

If a module has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

NOTICE
Electro-static discharge (ESD) Before you touch the module, discharge yourself at the cabinet or at the ground terminal.

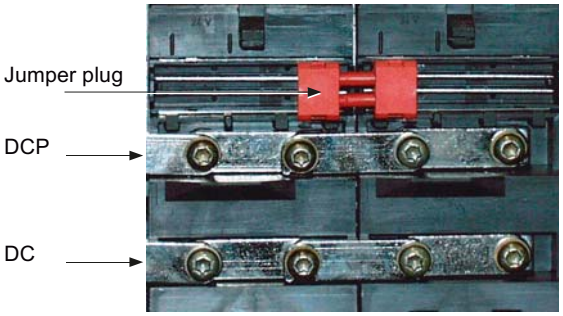
Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control cabinet where the infeed module is located.
3. If it has not already been done, label all connectors/cables that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
4. Withdraw the enable terminals X21.
5. Withdraw the connected DRIVE-CLiQ cables X200 - X202.
6. Withdraw the line supply connection X1.

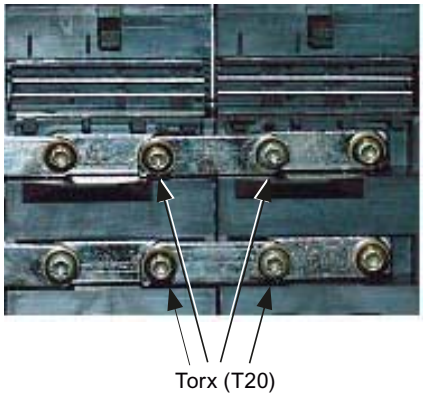
⚠ DANGER
Risk of electric shock A hazardous voltage is present for up to **5 minutes** after the power supply has been switched off. The protective cover must not be opened until this time has elapsed. The warning information on the components must be carefully observed!

7. Open the protective cover of the DC link voltage using a suitable tool (e.g. a screwdriver).
8. Withdraw the 24 V terminal adapter.

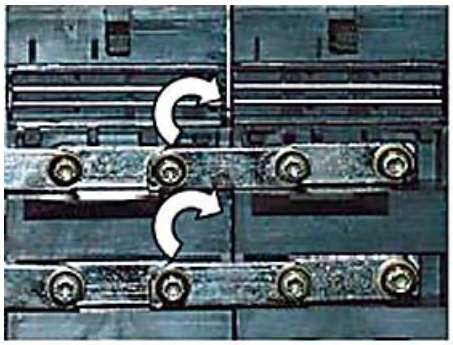
9. Using a multimeter (set the measuring range to 1000 V DC) at the points DCP/DCN, check that the DC link voltage is in a no-voltage condition. Only continue with the work when it has been absolutely ensured that no voltage is present (no-voltage condition has been established).



10. Withdraw the red 24 V jumper plug.
11. Release the Torx screws of the DC link.



12. Open the DC link busbars of the two modules.



13. Release the screws that are used to retain the module to the mounting plate.
14. Remove the protective conductor connection of the module.
15. Remove the module from the control cabinet.

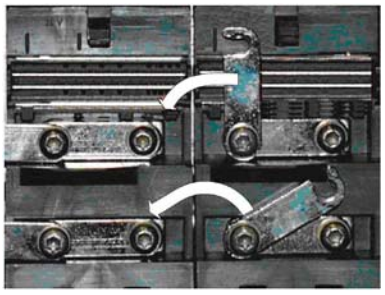
4.9.6 This is how you install an SLM

Installing

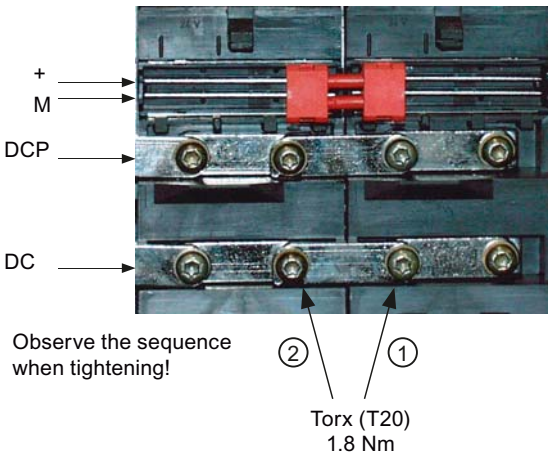
> **⚠ DANGER**
>
> **Risk of electric shock**
>
> A hazardous voltage is present for up to **5 minutes** after the power supply has been switched off. The protective cover must not be opened until this time has elapsed.
>
> The warning information on the components must be carefully observed!

Procedure:

1. Screw the new module to the mounting plate.
2. Reconnect the protective conductor connection of the module.
3. Open the protective cover of the DC link voltage using a suitable tool (e.g. a screwdriver).
4. Release the Torx screws and connect the DC link busbar.



5. Tighten the Torx screws of the DC link busbars, observe the correct sequence.
6. Place the red jumper plug on the electronics busbar until it clicks into place.



7. Place the 24 V terminal adapter on the electronics power supply busbar until it clicks into place.
8. Close the protective cover of the DC link voltage.

9. Reconnect the line supply connection X1 at the module.
10. Insert the DRIVE-CLiQ cables that were previously withdrawn into sockets X200 - X202.
11. Reinsert the enable terminals X21 at the module.
12. Check whether all of the cables have been re-connected.
13. Close the cabinet and switch-on the system again.

CAUTION
Ensure that all of the connectors and screws are correctly tightened and latched or inserted.

⚠WARNING
The components must only be operated when the protective cover of the DC link is closed. Damaged components must not be used.

4.10 Active Line Modules

4.10.1 ALM status displays

Status displays

The Active Line Module (ALM) has the following status displays, which provide information about the module status:

LED state		Description, cause	Remedy
Ready (H200)	DC Link (H201)		
OFF	OFF	Electronics power supply is missing or outside permissible tolerance range.	–
Green	OFF	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
		The DC link voltage is present.	
	Red	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	Check the line supply voltage.
		The DC link voltage is too high.	
Orange	Orange	DRIVE-CLiQ communication is being established.	–
Red	–	This component has at least one fault.	Remove the fault and acknowledge.
		Note:	
		The LED is controlled irrespective of the corresponding messages being reconfigured.	
Green/	-	Firmware is being downloaded.	–
Red (0.5 Hz)			
Green/red (2 Hz)	-	Firmware download has been completed. Wait for POWER ON.	Carry out a POWER ON.
Green/orange or red/orange	–	Component recognition via LED is activated (p0124).	–
		Note:	
		Both options depend on the LED status when module recognition is activated via p0124 = 1.	

⚠DANGER

DC link voltage

Irrespective of the state of LED "DC Link", a hazardous DC link voltage can always be present. The warning information on the components must be carefully observed!

4.10.2 ALM connections

Connections

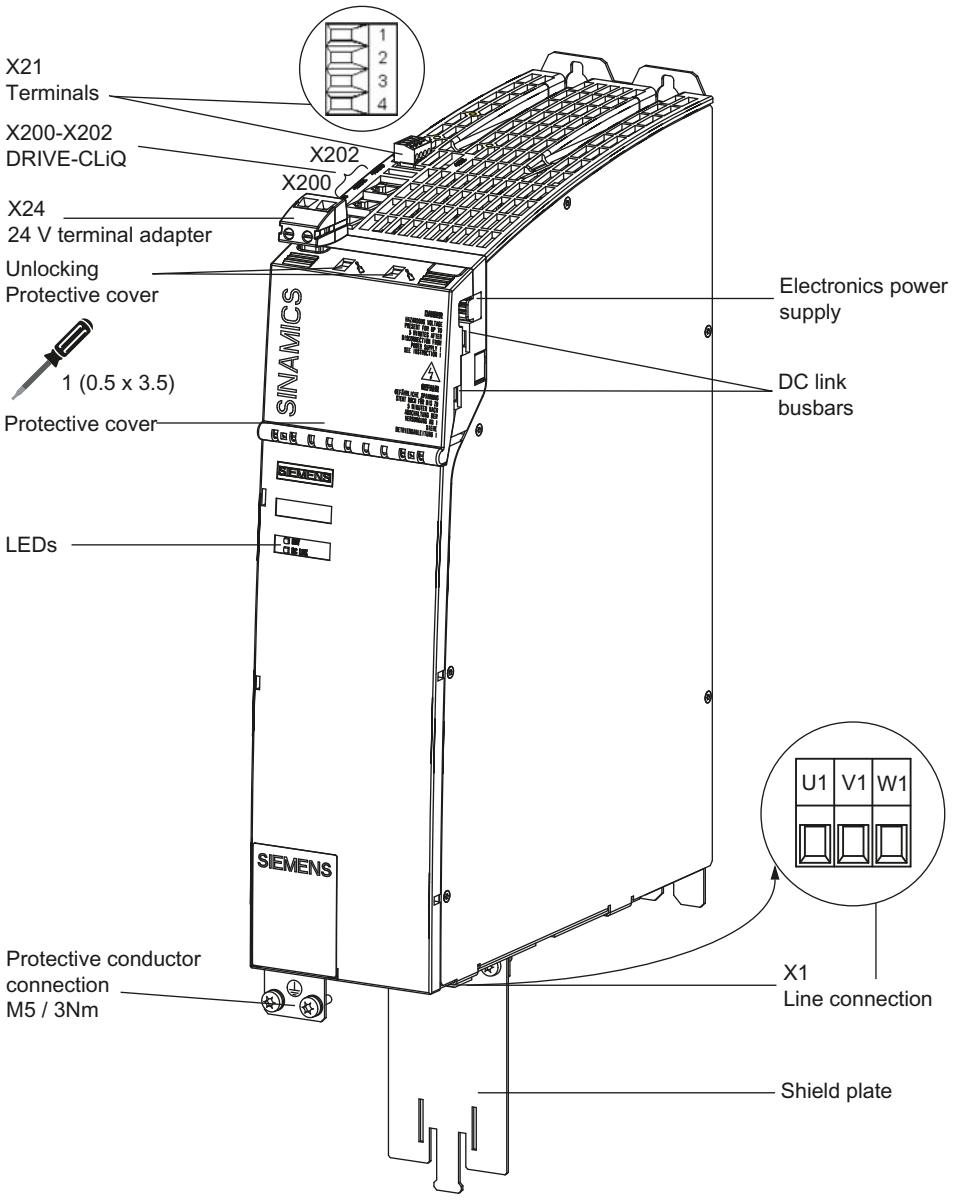


Figure 4-24 ALM connections

4.10.3 This is how you remove an ALM

Overview

The activities that must be taken into account when replacing an Active Line Module (ALM) are subsequently described.

If a module has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

NOTICE
Electro-static discharge (ESD) Before you touch the module, discharge yourself at the cabinet or at the ground terminal.

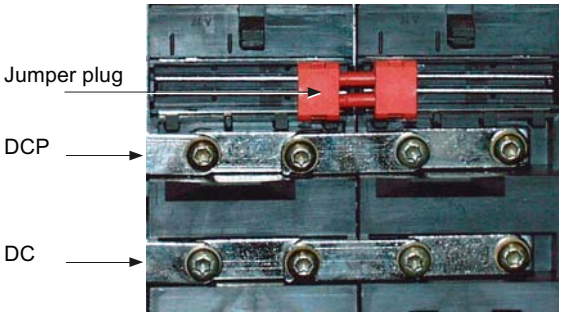
Procedure:

1. Switch-off the control: Completely switch off the system. Check that the system is in a no-voltage condition and is locked-out so that it cannot be switched on again without the appropriate authorization.
2. Access the control cabinet where the infeed module is located.
3. If it has not already been done, label all connectors/cables that lead to the module now. Only then, can it be ensured that the cables are not interchanged.
4. Withdraw the enable terminals X21.
5. Withdraw the connected DRIVE-CLiQ cables X200 - X202.
6. Withdraw the line supply connection X1.

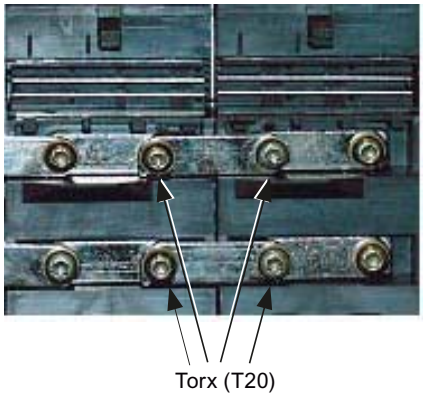
⚠ DANGER
Risk of electric shock A hazardous voltage is present for up to 5 minutes after the power supply has been switched off. The protective cover must not be opened until this time has elapsed. The warning information on the components must be carefully observed!

7. Open the protective cover of the DC link voltage using a suitable tool (e.g. a screwdriver).
8. Withdraw the 24 V terminal adapter.

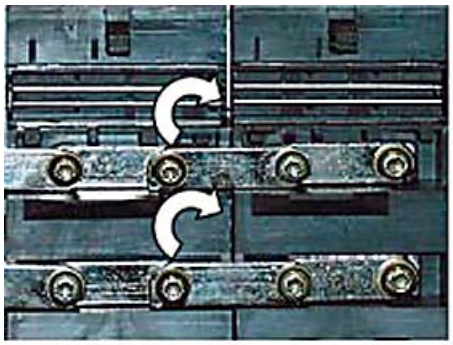
9. Using a multimeter (set the measuring range to 1000 V DC) at the points DCP/DCN, check that the DC link voltage is in a no-voltage condition. Only continue with the work when it has been absolutely ensured that no voltage is present (no-voltage condition has been established).



10. Withdraw the red 24 V jumper plug.
11. Release the Torx screws of the DC link.



12. Open the DC link busbars of the two modules.



13. Release the screws that are used to retain the module to the mounting plate.
14. Remove the protective conductor connection of the module.
15. Remove the module from the control cabinet.

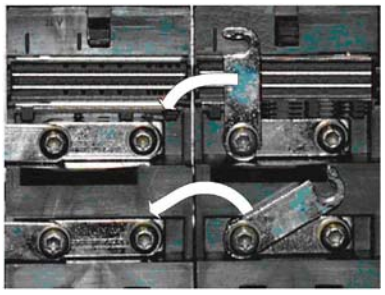
4.10.4 This is how you install an ALM

Installing

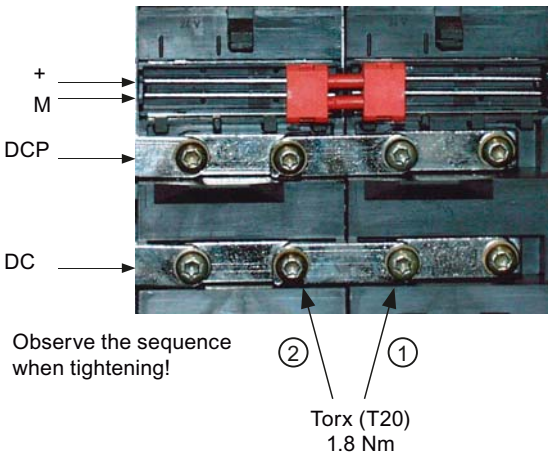
⚠ DANGER
Risk of electric shock A hazardous voltage is present for up to **5 minutes** after the power supply has been switched off. The protective cover must not be opened until this time has elapsed. The warning information on the components must be carefully observed!

Procedure:

1. Screw the new module to the mounting plate.
2. Reconnect the protective conductor connection of the module.
3. Open the protective cover of the DC link voltage using a suitable tool (e.g. a screwdriver).
4. Release the Torx screws and connect the DC link busbar.



5. Tighten the Torx screws of the DC link busbars, observe the correct sequence.
6. Place the red jumper plug on the electronics busbar until it clicks into place.



7. Place the 24 V terminal adapter on the electronics power supply busbar until it clicks into place.
8. Close the protective cover of the DC link voltage.

9. Reconnect the line supply connection X1 at the module.
10. Insert the DRIVE-CLiQ cables that were previously withdrawn into sockets X200 - X202.
11. Reinsert the enable terminals X21 at the module.
12. Check whether all of the cables have been re-connected.
13. Close the cabinet and switch-on the system again.

CAUTION
Ensure that all of the connectors and screws are correctly tightened and latched or inserted.

⚠WARNING
The components must only be operated when the protective cover of the DC link is closed. Damaged components must not be used.

4.11 SMC20 / SMC30

4.11.1 SMC20 status displays

Status displays

The Sensor Module Cabinet-Mounted SMC20 has the following status displays, which provide information about the module state:

LED	Color	State	Description, cause	Remedy
RDY	-	OFF	Electronics power supply is missing or outside permissible tolerance range.	–
	Green	Continuous light	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	Continuous light	DRIVE-CLiQ communication is being established.	–
	Red	Continuous light	This component has at least one fault.	Remove and acknowledge fault.
			Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	
	Green/red	Flashes at 0.5 Hz	Firmware is being downloaded.	–
		Flashes at 2 Hz	Firmware download has been completed. Wait for POWER ON	Carry out a POWER ON.
	Green/orange or red/orange	Flashing	Component recognition via LED is activated (p0144)	–
			Note: Both options depend on the LED status when module recognition is activated via p0144 = 1.	

4.11.2 SMC20 connections

Connections

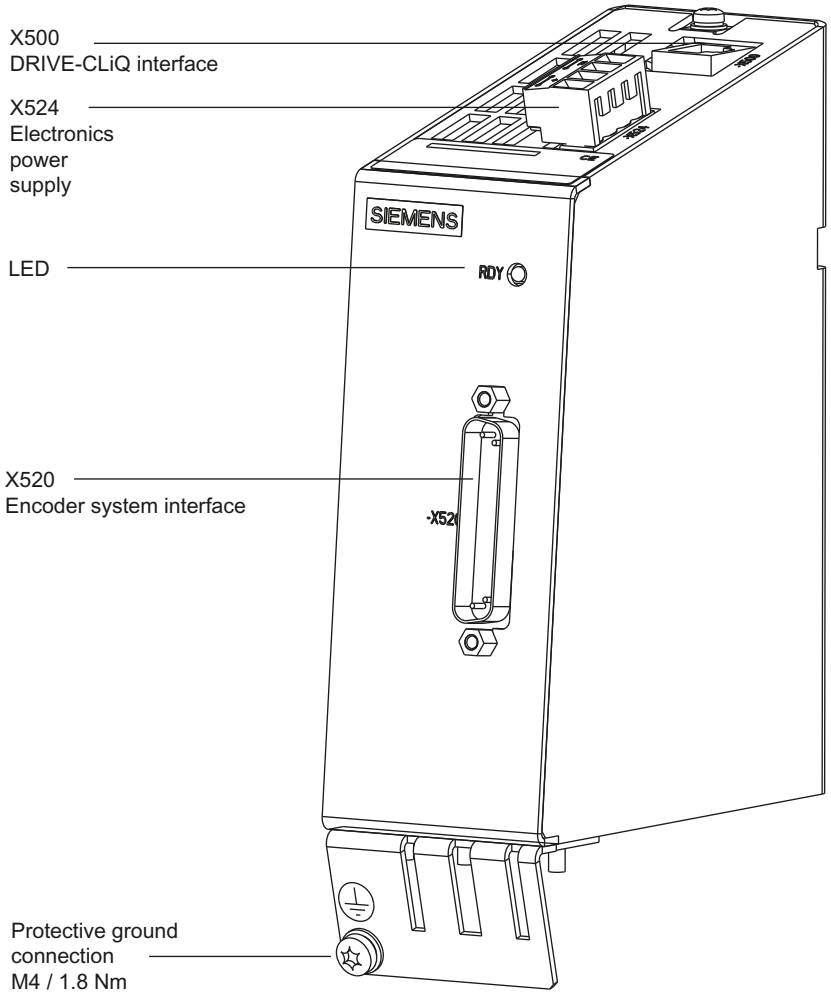


Figure 4-25 Connections SMC20

4.11.3 This is how you remove an SMC20

Overview

The activities that must be taken into account when replacing an SMC20 are subsequently described.

If a SMC20 has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

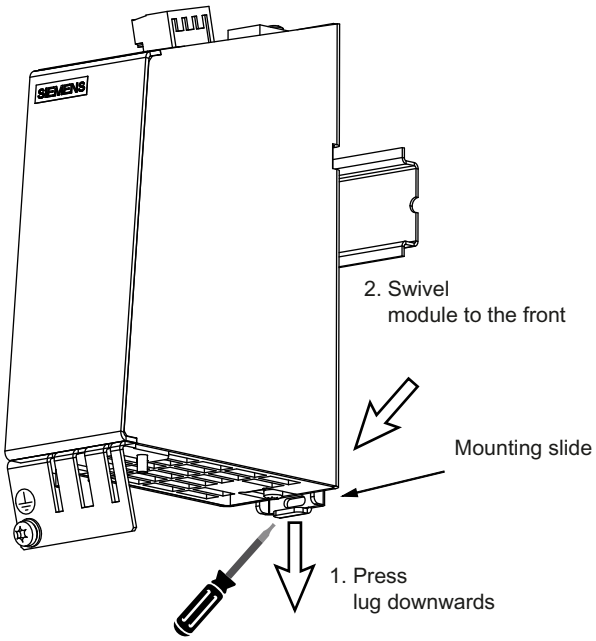


Figure 4-26 SMC20 removal

NOTICE
Electro-static discharge (ESD)
Before you touch the module, discharge yourself at the cabinet or at the ground terminal.

Procedure:

1. Withdraw the electronics power supply connector X524 and label.
2. Unscrew the encoder connecting cable at X520 or X521 / X531, if required, also the shield connection.
3. Withdraw the DRIVE-CLiQ cable X500 and write the slot designation on the cable.
4. Release the protective conductor connection and write the position designation on the cable.
5. Push the lug downwards.
6. Swivel the module to the front.

CAUTION
The 50 mm clearances above and below the components must be observed.

4.11.4 This is how you install an SMC20

Installing

Procedure:

1. Place the components on the mounting rail.
2. Then, swivel the components on the mounting rail so that the mounting catches click into place at the rear.
3. Slide the components along the mounting rail to either the left or right up to their final position.
4. Screw on the protective conductor connection.
5. Screw on the encoder connecting cable to X520 and X521 / X531, if required, also the shield connection.
6. Insert the DRIVE-CLiQ cable at X500.
7. Insert connector X524 for the electronics power supply.

CAUTION
The 50 mm clearances above and below the components must be observed.

4.11.5 SMC30 status displays

Status displays

The Sensor Module Cabinet-Mounted SMC30 has the following status displays, which provide information about the module state:

LED	Color	State	Description, cause	Remedy
RDY	-	OFF	Electronics power supply is missing or outside permissible tolerance range.	–
	Green	Continuous light	The component is ready and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	Continuous light	DRIVE-CLiQ communication is being established.	–
	Red	Continuous light	This component has at least one fault.	Remove and acknowledge fault.
			Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	
	Green/red	Flashes at 0.5 Hz	Firmware is being downloaded.	–
		Flashes at 2 Hz	Firmware download has been completed. Wait for POWER ON	Carry out a POWER ON.
	Green/orange or red/orange	Flashing	Component recognition via LED is activated (p0144)	–
			Note: Both options depend on the LED status when module recognition is activated via p0144 = 1.	
OUT > 5 V	-	OFF	Electronics power supply is missing or outside permissible tolerance range. Power supply ≤ 5 V	-
	Orange	Continuous light	Electronics power supply for measuring system available. Power supply >5 V.	-
			Notice:	
			It must be ensured that it is permissible to operate the connected encoder with a 24 V power supply. If an encoder that is designed for a 5 V supply is operated with a 24 V supply, this can destroy the encoder electronics.	

4.11.6 SMC30 connections

Connections

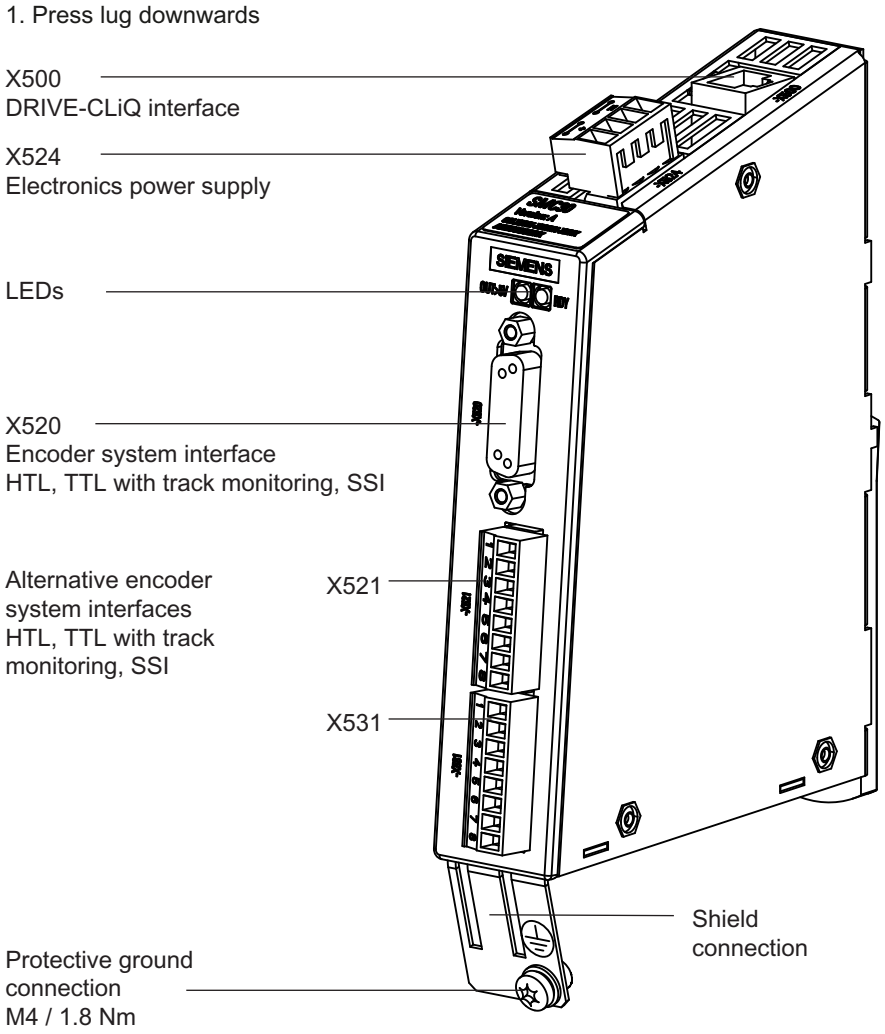


Figure 4-27 Connections SMC30

4.11.7 This is how you remove an SMC30

Overview

The activities that must be taken into account when replacing an SMC30 are subsequently described.

If an SMC30 has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

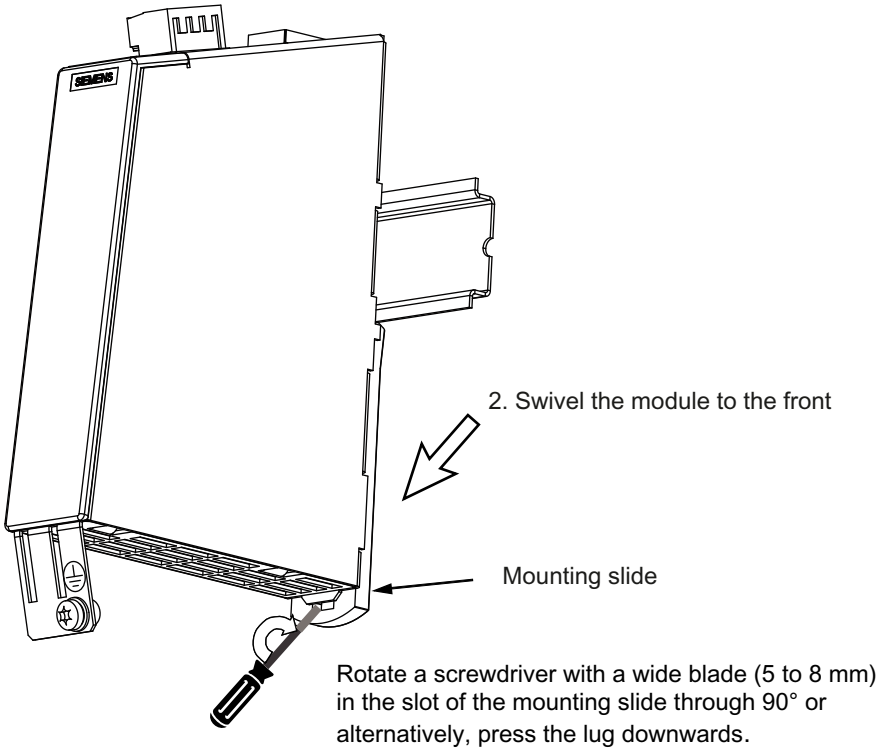


Figure 4-28 SMC30 removal

NOTICE
Electro-static discharge (ESD)
Before you touch the module, discharge yourself at the cabinet or at the ground terminal.

Procedure:

1. Before withdrawing it, label the connector X524 for the electronics power supply.
2. Screw on the encoder connecting cable to X520 or X521 / X531, if required, also the shield connection.
3. Release the protective conductor connection and write the position designation on the cable.

4. Slide the lug downwards.
5. Swivel the module to the front to remove it.

CAUTION
The 50 mm clearances above and below the components must be observed.

4.11.8 This is how you install an SMC30

Installing

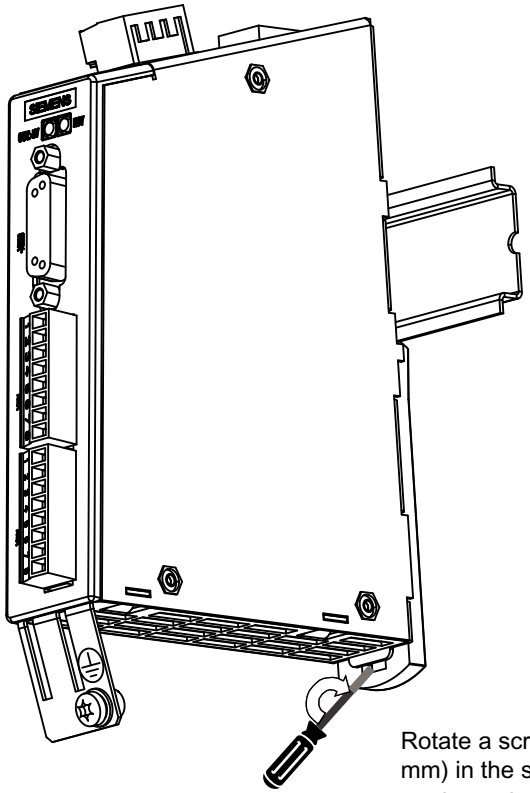


Figure 4-29 Installing SMC30

Procedure:

1. Place the components on the mounting rail.
2. Then, swivel the components on the mounting rail so that the mounting catches click into place at the rear.

3. Slide the components along the mounting rail to either the left or right up to their final position.
4. Screw on the protective conductor connection.
5. Screw on the encoder connecting cable to X520 or X521 / X531, if required, also the shield connection.
6. Insert the DRIVE-CLiQ cable at X500.
7. Insert connector X524 for the electronics power supply.

CAUTION
The 50 mm clearances above and below the components must be observed.

4.12 SME20 / SME25

4.12.1 SME20 connections

Connections

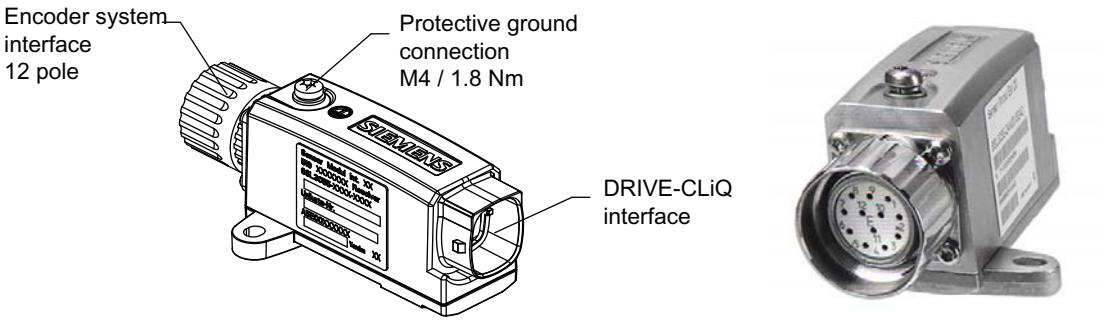


Figure 4-30 Connections SME20

4.12.2 This is how you remove an SME20 and install it again

Overview

The activities that must be taken into account when replacing an SME20 are subsequently described.

If an SME20 has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

NOTICE
Electro-static discharge (ESD) Before you touch the module, discharge yourself at the cabinet or at the ground terminal.

Procedure:

1. Release the encoder connecting cable of the SME20.
2. Withdraw the DRIVE-CLiQ cable from the SME20.
3. Release the protective conductor connection of the SME20.
4. Remove the defective SME20.

Installing

Procedure:

1. Now install the new SME20.
2. Screw on the protective conductor connection.
3. Reconnect the encoder connecting cable.
4. Connect the DRIVE-CLiQ cable.

CAUTION
Connections/cables Only measuring systems where the measuring system power supply is not grounded may be connected. The maximum DRIVE-CLiQ cable length is 100 m. The maximum encoder cable length is 3 m. In order to guarantee the degree of protection, all of the plug connectors must be correctly screwed into place or snapped into place.

4.12.3 SME25 connections

Connections

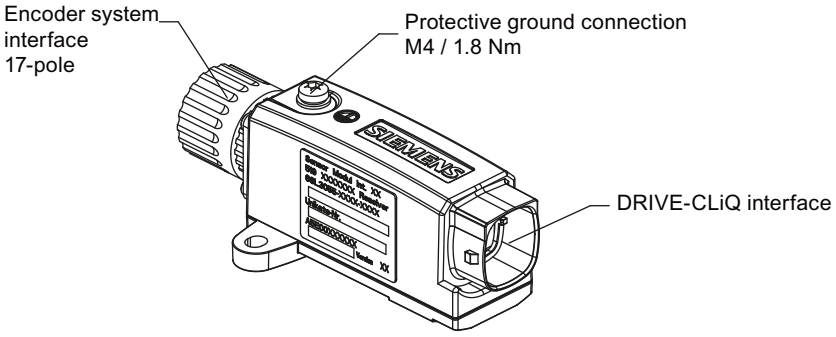


Figure 4-31 Connections SME25

4.12.4 This is how you remove an SME25 and install it again

Overview

The activities that must be taken into account when replacing an SME25 are subsequently described.

If an SME25 has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

NOTICE
Electro-static discharge (ESD) Before you touch the module, discharge yourself at the cabinet or at the ground terminal.

Procedure:

1. Release the encoder connecting cable of the SME25.
2. Withdraw the DRIVE-CLiQ cable from the SME25.
3. Release the protective conductor connection of the SME25.
4. Remove the defective SME25.

Installing

Procedure:

1. Now install the new SME25.
2. Screw on the protective conductor connection.
3. Reconnect the encoder connecting cable.
4. Connect the DRIVE-CLiQ cable.

CAUTION
Cables The maximum DRIVE-CLiQ cable length is 100 m. The maximum encoder cable length is 3 m. In order to guarantee the degree of protection, all of the plug connectors must be correctly screwed into place or snapped into place.

4.13 DMC20

4.13.1 DMC20 status displays

Status displays

The DRIVE-CLiQ Hub Module DMC20 has the following status displays, which provide information about the module state:

LED	Color	State	Description, cause	Remedy
RDY	-	Off	Electronics power supply is missing or outside permissible tolerance range.	–
	Green	Continuous light	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.	–
	Orange	Continuous light	DRIVE-CLiQ communication is being established.	–
	Red	Continuous light	This component has at least one fault.	Remove and acknowledge fault.
			Note: The LED is controlled irrespective of the corresponding messages being reconfigured.	
	Green/red	Flashes at 0.5 Hz	Firmware is being downloaded.	–
		Flashes at 2 Hz	Firmware download has been completed. Wait for POWER ON	Carry out a POWER ON.
	Green/orange or red/orange	Flashing	Component recognition via LED is activated (p0154).	–
			Note: Both options depend on the LED status when activated via p0154 = 1.	

4.13.2 DMC20 connections

Connections

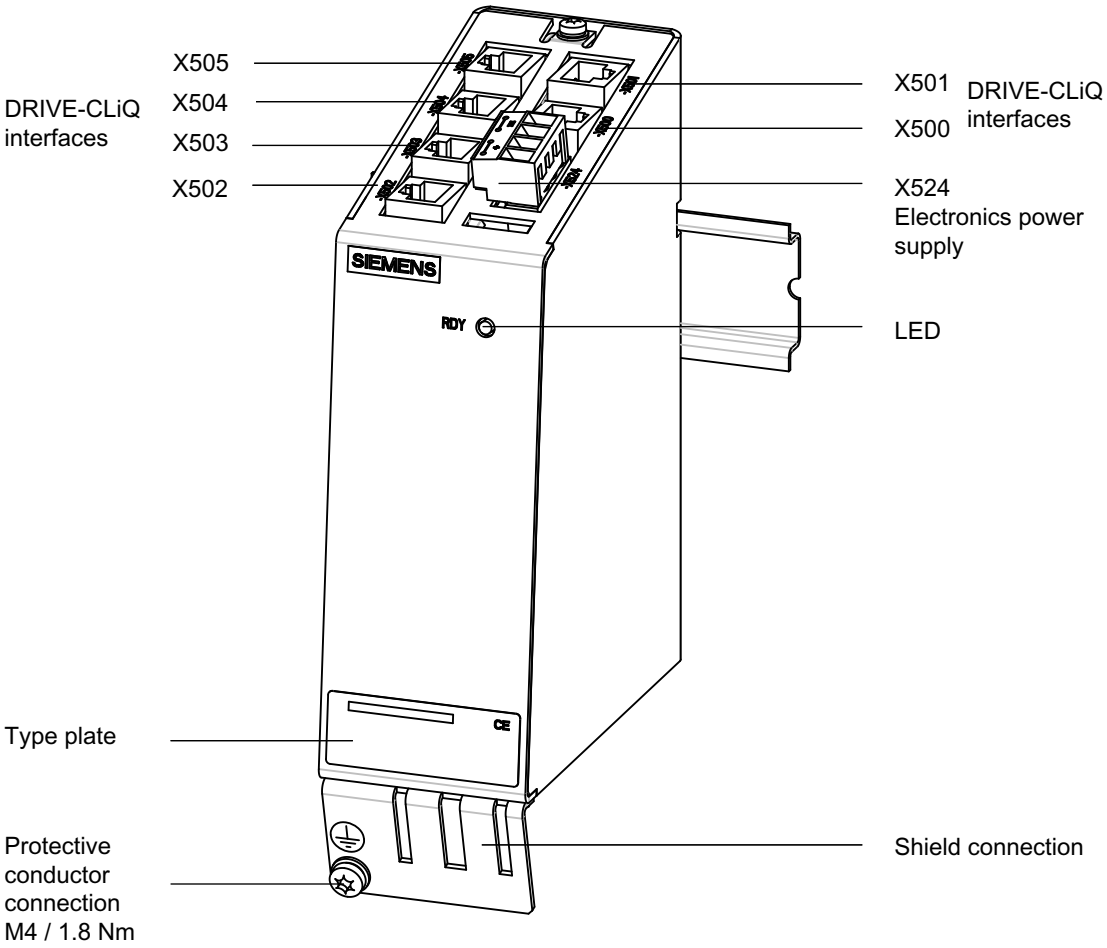


Figure 4-32 Connections DMC20

4.13.3 This is how you remove a DMC20

Overview

The activities that must be taken into account when replacing a DMC20 are subsequently described.

If a DMC20 has a hardware defect, then it must be replaced by an identical module.

Preconditions:

- The module is defective and must be replaced.
- The control cabinet is in a no-voltage condition, all of the connectors and cables are labeled.

Removing

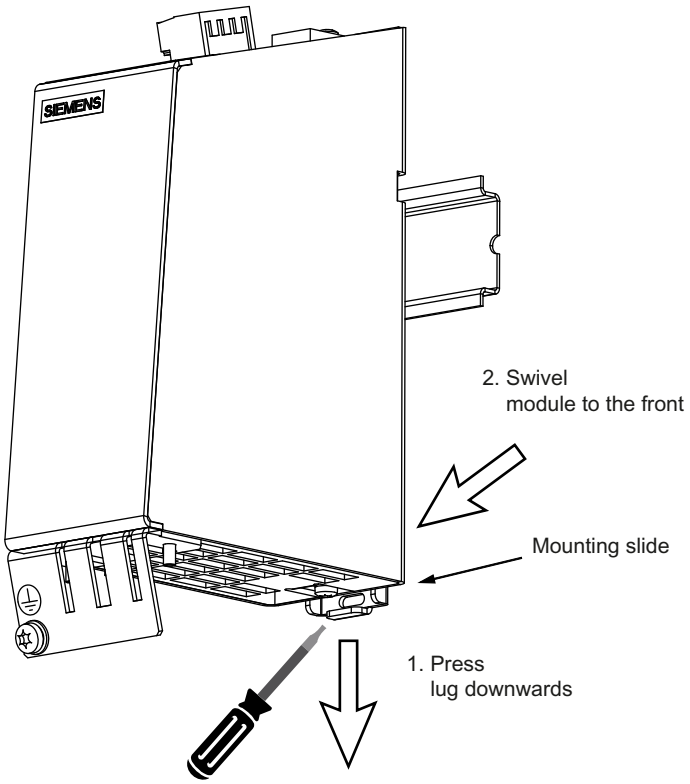


Figure 4-33 DMC20 removal

NOTICE
Electro-static discharge (ESD)
Before you touch the module, discharge yourself at the cabinet or at the ground terminal.

Procedure:

1. Before withdrawing it, label the connector X524 for the electronics power supply.
2. Withdraw the connected DRIVE-CLiQ cables X500 – X505 and write the slot designation on the cable.
3. Release the protective conductor connection and write the position designation on the cable.
4. Slide the lug downwards.
5. Swivel the module to the front to remove it.

CAUTION
The 50 mm clearances above and below the components must be observed.

4.13.4 This is how you install a DMC20

Installing

Procedure:

1. Place the components on the mounting rail.
2. Then, swivel the components on the mounting rail so that the mounting catches click into place at the rear.
3. Slide the components along the mounting rail to either the left or right up to their final position.
4. Screw on the protective conductor connection.
5. Screw on the encoder connecting cable to X520.
6. Insert the DRIVE-CLiQ cable at X500 – X505.
7. Insert connector X524 for the electronics power supply.

CAUTION
The 50 mm clearances above and below the components must be observed.

Spare parts and accessories

5

Order data for accessories

The following accessories are available:

Component		Order No.:	Description
CompactFlash Card (empty)	1 GB	6FC5313-5AG00-0AA0	for SIMOTION / SINUMERIK
USB FlashDrive	2 GB	6ES7648-0DC40-0AA0	USB2.0, bootable

See also

Spares-on-web (https://b2b-extern.automation.siemens.com/spares_on_web)

ESD guidelines

A

A.1 RI suppression measures

Shielded signal cables

To ensure safe, interference-free system operation, it is essential to use the cables specified in the individual diagrams. Both ends of the shield must always be conductively connected to the equipment housing.

Exception:

If third-part devices are connected (printers, programming devices, etc.), you can also use standard shielded cables, which are connected at one end.

These external devices may not be connected to the control during normal operation. However, if the system cannot be operated without them, then the cable shields must be connected at both ends. Furthermore, the external device must be connected to the control via an equipotential bonding cable.

Rules for routing cables

In order to achieve the best-possible noise immunity for the complete system (control, power section, machine) the following EMC measures must be observed:

- Signal cables and load cables must be routed at the greatest possible distance from one another.
- Only use Siemens signal cables for connecting to and from the NC or PLC.
- Signal cables may not be routed close to strong external magnetic fields (e.g. motors and transformers).
- Pulse-carrying HC/HV cables must always be laid completely separate from all other cables.
- If signal cables cannot be laid at a sufficient distance from other cables, then they must be installed in shielded cable ducts (metal).
- The clearance (interference injection area) between the following lines must be kept to a minimum:
  - Signal cable and signal cable
  - Signal lead and associated equipotential bonding lead
  - Equipotential bonding lead and protective conductor routed together

See also

For further information about radio interference suppression measures and the connecting shielded leads:

Configuration Manual, EMC Guidelines

A.2 ESD measures

CAUTION
The modules contain electrostatically sensitive devices. Discharge yourself of electrostatic energy before touching the electronic modules. The easiest way to do this is to touch a conductive, grounded object immediately beforehand (for example, bare metal parts of control cabinet or the protective ground contact of a socket outlet).

NOTICE
Handling ESDS modules: • When handling electrostatically sensitive devices, make sure that operator, workplace and packing material are properly grounded. • Generally, electronic modules may not be touched unless work has to be carried out on them. When handling PC boards make absolutely sure that you do not touch component pins or printed conductors. • Components may only be touched under the following conditions: – You are permanently grounded by means of an ESD armband. – you are wearing ESD boots or ESD boots with grounding strips in conjunction with ESD flooring. • Boards/modules must only be placed on conductive surfaces (table with ESDS surface, conductive ESDS foam, ESDS packaging, ESDS transport container). **Exceptions:** Modules with their own power supply units (e.g. batteries) are an exception. These may not be placed on conductive surfaces, as this might result in short circuits and thus destroy the component on the module. • Never place modules in the vicinity of display units, monitors, or television sets (minimum distance to the screen > 10 cm). • Do not bring ESD-sensitive modules into contact with chargeable and highly-insulating materials, such as plastic, insulating table tops or clothing made of synthetic materials. • Measurements may only be carried out on modules under the following conditions: – The measuring device is grounded (via a protective conductor). – When floating measuring equipment is used, the probe is briefly discharged before making measurements (e.g. a bare-metal control housing is touched).

Appendix B

B.1 List of abbreviations

Abbreviation	Meaning	Explanation
ALM	Active Line Module	
ASCII	American Standard Code for Information Interchange	American coding standard for the exchange of information
AUTO	"Automatic" operating mode	
BAG	Mode group	
BERO	Proximity limit switch with feedback oscillator	
BICO	Binector Connector	Interconnection technology for the drive
CEC	Cross Error Compensation	
CNC	Computerized Numerical Control	Computerized numerical control
DB	Data Block in the PLC	
DBB	Data Block Byte in the PLC	
DBW	Data Block Word in the PLC	
DBX	Data Block Bit in the PLC	
DDE	Dynamic Data Exchange	Dynamic Data Exchange
DIN	Deutsche Industrie Norm	
DO	Drive object	Drive Object
DRAM	Dynamic Random Access Memory	Dynamic memory block
DRF	Differential Resolver Function	Differential resolver function (handwheel)
DRY	DRY run	DRY run feedrate
ESR	Extended Stop and Retract	
FIFO	First In - First Out	Method of storing and retrieving data in a memory
GUD	Global User Data	Global user data
Hardware	Hardware	
HD	Hard Disk	Hard disk
HMI	Human Machine Interface	Controller user interface
HSC	High-Speed Cutting	
IGBT	Insulated Gate Bipolar Transistor	
IME	Input Method Editor	Entering Asian characters
INC	Increment	Increment
INI	Initializing Data	Initializing data
IPO	Interpolator	
IRT	Isochronous Real Time	Isochronous communication
ISO	International Standardization Organisation	International Standards Organization
JOG	"Jogging" operating mode	Jogging via the direction keys

Abbreviation	Meaning	Explanation
LEC	Leadscrew Error Compensation	Leadscrew error compensation
LED	Light Emitting Diode	Light-emitting diode
LUD	Local User Data	Local user data
MAIN	Main program	Main program (OB1, PLC)
MB	Megabyte	
MCP	Machine Control Panel	Machine control panel
MCS	Machine Coordinate System	
MD	Machine data	
MDA	"Manual Data Automatic" operating mode	Manual input
MLFB	Machine-readable product designation	
MPF	Main Program File	Main program (NC part program)
MPI	Multi Point Interface	Multi-Point Interface
NCK	Numerical Control Kernel	Numerical control kernel
NCU	Numerical Control Unit	NCK hardware unit
OEM	Original Equipment Manufacturer	
OPI	Operator Panel Interface	
PCU	Programmable Control Unit	
PG	Programming device	
PI	Program Instance	
PLC	Programmable Logic Control	Programmable logic controller
POU	Program organization unit	in the PLC user program
PPU	Panel Processing Unit	Panel-based control
QEC	Quadrant Error Compensation	Quadrant error compensation
REF POINT	"Reference point approach" in JOG mode	
REPOS	"Repositioning" in JOG mode	
RPA	R parameter Active	Memory area on the NCK for R parameter numbers
RTC	Real Time Clock	Real-time clock
SBL	Single Block	Single block
SBR	Subroutine	Subroutine (PLC)
SD	Setting Data	
SDB	System Data Block	
SEA	Setting Data Active	Identifier (file type) for setting data
SK	Softkey	
SLM	Smart Line Module	
SPF	Subprogram file	Subprogram (NC)
SRAM	Static Random Access Memory	Static memory block
SW	Software	
TEA	Testing Data Active	Identifier for machine data
TO	Tool Offset	Tool offset
TOA	Tool Offset Active	Identifier (file type) for tool offsets
TM	Tool Management	
TMMG	Tool Magazine Management	

Abbreviation	Meaning	Explanation
WCS	Workpiece Coordinate System	
WO	Work Offset	
ZOA	Zero Offset Active	Identifier (file type) for work offset data

B.2 Feedback on the documentation

This document will be continuously improved with regard to its quality and ease of use. Please help us with this task by sending your comments and suggestions for improvement via e-mail or fax to:

E-mail:	mailto:docu.motioncontrol@siemens.com
Fax:	+49 9131 - 98 2176 Please use the fax form on the back of this page.

To	From
SIEMENS AG I DT MC MS1 P.O. Box 3180 D-91050 Erlangen / Germany	Name:
	Address of your company/department
	Street:
	Zip code: City:
	Phone: /
Fax: +49 9131 - 98 2176 (Documentation)	Fax: /

Suggestions and/or corrections

B.3 Documentation overview

Documentation overview SINUMERIK 828D

General documentation

Advertising Brochure

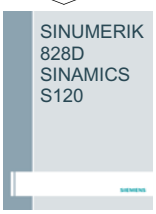
EMC Directives

User documentation

Operating Manual
- Turning
- Milling

Programming manual
- Basic principles
- Job planning
- Easy Screen

Programming Manual
- ISO Turning
- ISO Milling

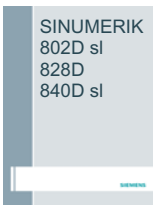


Diagnostics Manual

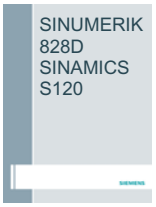
Manufacturer/service documentation

Manual
Commissioning Manual
Service Manual

Function Manual
- Basic Functions
- Extended Functions



Function Manual
ISO Dialects



List Manual

Electronic documentation

DOConCD
DOConWEB

Industry Mall

Index

B

Backing up log files, 17

C

CompactFlash Card, 151
Connections
  ALM, 130
  DMC20, 148
  DMM, 116
  SLM ≥ 16kW, 124
  SLM 5kW, 10kW, 122
  SMC30, 140
  SME20, 144
  SME25, 145
  SMM, 110

D

Data backup, 40
DC-link cover flap, 70

E

EMC measures, 153
End User Notification Administration (EUNA), 60
ESD measures, 154
EUNA
  Configuration file, 66
  Machine identity, 60
  Machine logbook, 60

L

LED status
  Front of the PPU, 71
  MCP 310C PN, 89
  MCP 483C PN, 93
  NX10, 106
  Rear of the PPU, 72
  SINAUT MD720-3, 81
License key, 51
  Control, 57
  Web License Manager, 58
Licenses
  Save as backup, 57
Licensing a CNC option, 51
Logbook entry, 62

M

Mini boot system, 45

R

Repair and Service Contract (RSC), 60
RI suppression measures, 153
Rules for routing cables, 153

S

Shielded cables, 153
SIM card, 82
SINAUT modem, 82
Switch
  S1 on the I/O module, 101, 105
  S2 on the MCP 310C PN, 93
  S2 on the MCP 483C PN, 97

U

Unlocking tool, 70
USB FlashDrive, 40, 151

W

Web License Manager, 58