INOVANCE

FORWARD, ALWAYS PROGRESSING

SV660N Series Servo Drive

Troubleshooting Guide

Industrial Automation | Intelligent Elevator | New Energy Vehicle | Industrial Robot | Rail Transit

Data code 19011908B00

Preface

About this Guide

Thank you for purchasing the SV660N series servo drive developed by Inovance.

The SV660N series high-performance AC servo drive covers a power range from 50 W to 7.5 kW. It supports EtherCAT communication protocol and carries Ethernet communication interfaces to work with the host controller for a networked operation of multiple servo drives.

The SV660N series servo drive supports stiffness level setting, inertia auto-tuning and vibration suppression to simplify the operation process. It allows a quiet and stable operation together with an MS1 series high-response servo motor with low or medium inertia and a 23-bit single-turn or multi-turn absolute encoder.

The SV660N series servo drive aims to implement fast and accurate control in automation equipment such as semi-conductor manufacturing equipment, chip mounters, PCB punching machines, transport machineries, food processing machineries, machine tools, and transmission machineries.

This guide Introduces faults and fault levels, the troubleshooting process, warning codes and fault codes.

More Data

Data Name	Data Code	Description
SV660N Series Servo Drive Hardware Guide	19011432	Presents installation and wiring of the servo drive, including preparations before installation, unpacking inspection and transportation, mechanical installation, and electrical installation.
SV660N Series Servo Drive Selection Guide	19011431	Presents technical data and dimensions of the servo drive, and specifications and models of optional parts (installation accessories, cables, and periphery electrical parts).
SV660N Series Servo Drive Commissioning Guide	19011433	Presents servo commissioning, parameter descriptions, including the operating panel, commissioning software, commissioning procedure and a parameter list.
SV660N Series Servo Drive Function Guide	19011434	Presents functions and parameters, including function overview, basic servo functions, adjustment and parameter list.
SV660N Series Servo Drive Communication Guide	19011435	Presents functions and parameters of the servo drive, including EtherCAT communication configuration, parameter description, and communication application cases.

Data Name	Data Code	Description
SV660N Series Servo Drive Troubleshooting Guide	19011908	Introduces faults and fault levels, the troubleshooting process, warning codes and fault codes.
SV660N Series Servo Drive Safety Guide	19011883	Presents the safety function and related certifications and standards, wiring, commissioning process, troubleshooting, and functions.
SV660N Series Servo Drive Manual Package	PS00005512	Provides information on selection, installation, commissioning, function, troubleshooting and parameters of the equipment.

Revision History

Date	Revision	Description
2023-04	B00	Added warning E902.3.
February 2023	A02	• Modified the description of H0b.34 (hexadecimal). • Added fault E664.0.
2023-01	A01	• Added warranty information in the preface. • Added error codes and auxiliary codes to tables "List of warning codes" and "List of fault codes". • Modified the description of fault logging. • Updated information on faults.
2022-08	A00	First release

How to obtain

This guide is not in the scope of delivery. If necessary, you can download the PDF file in two ways:

- Log in to Inovance's website (*www.inovance.com*), choose Support > Download, search by keyword, and then download the PDF file.
- Scan the QR code on the equipment to acquire more.

Warranty agreement

Inovance provides warranty services within the warranty period (as specified in your order) for any fault or damage that is not caused by improper operation. You will be charged for any repair work after the warranty period expires.

The warranty does not cover any damage caused by:

- your failure to operate the product in accordance with the user guide
- events beyond our reasonable control, such as fire, flood and abnormal voltage
- function misuse
- out-of-range application

- other events of force majeure, including but not limited to lightning, earthquake and other extreme weather events

The maintenance fee is charged according to the latest Price List of Inovance. If otherwise agreed upon, the agreed terms and conditions shall prevail.

Table of Contents

Safety Precautions

Safety Disclaimer

- Before installing, using, and maintaining this equipment, read the safety information and precautions thoroughly, and comply with them during operations, and comply with them during operations. To ensure the safety of humans and equipment, follow the signs on the equipment and all the safety instructions in this user guide. Failure to comply may result in severe personal injuries or even death or equipment damage.
- "CAUTION", "WARNING", and "DANGER" items in the user guide do not indicate all safety precautions that need to be followed; instead, they just supplement the safety precautions.
- Use this equipment according to the designated environment requirements. Damage caused by improper usage is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper usage.

Safety Levels and Definitions

	Indicates that failure to comply with the notice will result in severe personal injuries or even death.
	Indicates that failure to comply with the notice may result in death or severe personal injuries.
	Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage.

Safety Instructions

- Product illustrations in the user guide are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the user guide.
- Product illustrations in this guide are for reference only. Actual products may vary.

Unpacking

- Do not install the equipment if you find damage, rust, or indications of use on the equipment or accessories.
- Do not install the equipment if you find water seepage, component missing or damage upon unpacking.
- Do not install the equipment if you find the packing list does not conform to the equipment you received.

- Check whether the packing is intact and whether there is any sign of damage, water seepage, dampness, and deformation.
- Unpack the package by following the unpacking sequence. Do not strike the package violently.
- Check whether there is any sign of damage or rust on the surfaces of the equipment and accessories.
- Check whether the package contents are consistent with the packing list.

Storage and Transportation

- Allow only qualified professional personnel to carry large-scale or heavy products by using professional loading and unloading device. Failure to comply will result in injuries or product damage.
- Before you vertically lift the product, confirm that structural components of the product such as the front cover and terminal block have been firmly fixed with screws. Failure to comply will result in component drop-off, causing personnel injuries or product damage.
- Never stand or stay below the product when it is lifted by hoisting device.
- When you hoist the product with a steel rope, hoist it at even speed stably to protect the product against vibration or impact. Do not turn the product or hoist the product for a long period. Failure to comply may result in personal injuries or damage to the device.

- Handle the equipment with care during transportation and mind your steps to prevent personal injuries or equipment damage.
- When carrying the equipment with bare hands, hold the equipment casing firmly with care to prevent parts from falling. Failure to comply may result in personal injuries.
- Store and transport this product in strict accordance with the storage and transportation requirements. Failure to comply may result in damage to the product.
- Do not store or transport the equipment in environments exposed to water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing this product for more than three months. Long-term storage requires stricter protection and necessary inspections.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport the equipment with other equipment or materials that may harm or have negative impacts on this equipment.

Installation

- Installation must be carried out by the specialists who have received the necessary electrical training and understood enough electrical knowledge.

- Thoroughly read the safety instructions and user guide before installation.
- Do not install this equipment in places with strong electric or magnetic fields.
- Before installation, ensure that the installation position has sufficient mechanical strength to support the weight of the device. Failure to comply will result in a mechanical danger.
- To avoid electric shock, do not wear loose clothes or accessories.
- When this equipment is installed in a cabinet or final equipment, use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or a fire.
- Do not retrofit this equipment.
- Do not fiddle with the bolts used to fix equipment components or the bolts marked in red.
- When this product is installed in a cabinet or terminal device, protection measures such as a fireproof enclosure, an electrical enclosure, or a mechanical enclosure must be provided. The IP rating must meet IEC standards and local laws and regulations.
- Before installing devices with strong electromagnetic interference, such as a transformer, install a shielding device for the equipment to prevent malfunction.
- Install the equipment onto flame retardant materials, such as metal. Keep the equipment away from combustible objects. Failure to comply will result in a fire.

- During installation, use a piece of cloth or paper to cover the top of the product to prevent metal chippings, oil, and water from entering into the product when drilling holes. Failure to comply will cause product malfunctions. After installation, remove the cloth or paper for effective ventilation and cooling.
- If the device running at a constant speed begins to run at variable speeds, resonance may occur. In this case, install the vibration-proof rubber under the motor frame or use the vibration suppression function to reduce resonance.

Wiring

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
- Before wiring, cut off all the power supplies of the equipment. Wait as specified on the product warning sign before further operations because residual voltage exists after power-off. Measure the DC voltage of the main circuit and make sure that it is below the safety voltage. Failure to comply will result in an electric shock.
- Never perform wiring, remove the product cover, or contact the PCB at power-on. Failure to comply will result in an electric shock.
- Check that the equipment is grounded properly. Failure to comply will result in an electric shock.

- Do not connect the input power supply to the output end of the equipment. Failure to comply can result in equipment damage or even a fire.
- When connecting a drive to the motor, make sure the phase sequence of the drive and motor are consistent to prevent motor reverse rotation.
- Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- Fasten the terminal screws with the tightening torque specified in the manual. Insufficient or excessive tightening torque may result in overheat and damage of connecting parts, causing fires.
- Ensure that all cables are connected correctly. Cable sheath is not damaged, and no screw or washer is left inside the equipment. Otherwise, electric shock or equipment damage may occur.

- During wiring, follow the proper electrostatic discharge (ESD) procedure and wear an antistatic wrist strap. Failure to comply can result in damage to the equipment or internal circuits.
- In wiring the control circuit, use shielded twisted pair cable and connect the shield to the PE terminal. Otherwise, the equipment may not function properly.

Power-on

DANGER

- Before power-on, check that the equipment is installed properly, the wiring is secure and the motor can be restarted.
- Before power-on, check that the power supply meets equipment requirements to prevent equipment damage or even a fire.
- After power-on, do not open the cabinet door or protective cover of the equipment. Do not touch any wiring terminals, or remove any part of the equipment at power-on. Failure to comply will result in an electric shock.

WARNING

- Perform a trial run after wiring and parameter setting to ensure that the equipment operates safely. Failure to comply may result in personal injuries or equipment damage.
- Before power-on, ensure that the nominal voltage of the equipment is consistent with the power supply voltage. Improper power supply voltage will cause a fire.
- Before power-on, check that no one is near the equipment, motor, or other mechanical parts. Failure to comply may result in personal injuries or even death.

Operation

DANGER

- Only qualified professionals are allowed to run the equipment. Failure to comply can result in injury or death.
- Do not touch any wiring terminals or remove any part of the equipment during operation. Failure to comply will result in an electric shock.

WARNING

- Do not touch the equipment enclosure, fan, or resistor to sense the temperature. Failure to comply may result in burns.
- Prevent metal or other objects from falling into the device during operation. Failure to comply may result in a fire or product damage.

Maintenance

DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
- Do not perform maintenance on the equipment with power ON. Failure to comply can result in the risk of electric shock.
- Before maintenance, cut off all power supplies of the device and wait for a period specified on the warning label of the device.
- When a PM motor rotates, its terminals will produce induced voltage even if the motor is powered off. Failure to comply will result in an electric shock.

- Perform routine and periodic inspection and maintenance on the equipment according to maintenance requirements and keep a maintenance record.

Repair

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed by only professionals.
- Do not repair the equipment after power-on. Failure to comply can result in the risk of electric shock.
- Before device inspection and repair, cut off all power supplies of the device and wait for a period specified on the warning label of the device.

- Submit the repair request according to the warranty agreement.
- When the fuse is blown, the circuit breaker trips, or the earth leakage circuit breaker (ELCB) trips, wait for a period specified on the warning label of the device before you energize or operate the device. Failure to comply may result in personnel injuries or damage to the device.
- When the device is faulty or damaged, require professionals to perform troubleshooting and repair by following repair instructions and keep a repair record.
- Replace quick-wear parts of the equipment according to the replacement instructions.
- Do not operate damaged device. Failure to comply may result in personnel injuries or death or greater damage to the device.
- After replacing the equipment, perform wiring inspection and parameter settings again.

Disposal

- Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, personal injuries, or even death.
- Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

Other cautions

Dynamic brake

- Dynamic braking can only be used for emergency stop in case of failure and sudden power failure. Do not trigger failure or power failure frequently.
- Ensure that the dynamic braking function has an operation interval of more than 5 minutes at high speed, otherwise the internal dynamic braking circuit may be damaged.
- It is common in rotary mechanical structures. Under dynamic braking, after the motor power is cut off, it is still driven by the load on the shaft and is in a

regenerative state. A short circuit current passes through the brake and if the motor is driven continuously, the drive may burn, or even the motor may burn out.

Safety Signs

For safe equipment operation and maintenance, comply with safety signs on the equipment, and do not damage or remove the safety labels. The following table describes the safety signs.

Safety Sign	Description
	• Never fail to connect the protective earth (PE) terminal. Read through the guide and follow the safety instructions before use. • Do not touch terminals within 15 minutes after disconnecting the power supply to prevent the risk of electric shock. • Do not touch the heatsink with power ON to prevent the risk of burn.

1 Fault Level and Display

Faults and warnings of the servo drive are divided into three levels based on severity: No. 1 > No. 2> No. 3, as shown below.

- No. 1 non-resettable fault
- No. 1 resettable fault
- No. 2 resettable fault
- No. 3 resettable warning

Note

"Resettable" means the keypad stops displaying the fault/warning once a "Reset signal" is input.

Fault and warning log

The servo drive can record the latest 10[1] faults and warnings and values of status parameters upon fault/warning. If a repeated fault or warning is present in the latest 5 records, the repeated fault can be logged more than once after being cleared.

A fault/warning will still be saved in the fault log after reset. To remove the fault/ warning from the fault log, set H02.31 to 1. The following figure shows the details.

Read the value of H0b.34 to get the fault/warning code. See examples in the following table.

H0b.34 (hexadecimal)	Description of H0b.34 (hexadecimal)
0101	0: Fault subcode 101: Fault Code

Note

[1]： For -NS models, 20 faults can be recorded.

2 Fault Reset

Faults and warnings of the servo drive are divided into three levels based on severity: No. 1 > No. 2 > No. 3, as shown below.

- No. 1 non-resettable fault
- No. 1 resettable fault
- No. 2 resettable fault
- No. 3 resettable warning

Note

"Resettable" means the keypad stops displaying the fault/warning once a "Reset signal" is input.

Operating procedure:

- To stop the keypad from displaying the fault/warning, set H0d.01 (Fault reset) to 1 or activate the DI terminal assigned with DI function 2 (FunIN.2: ALM- RST, fault and warning reset).
- To reset No. 1 and No. 2 faults, switch off the S-ON signal, and then set H0d.01 to 1 or activate the DI terminal allocated with DI function 2.
- To reset No. 3 warnings, set H0d.01 to 1 or activate the DI terminal allocated with DI function 2.

Note

- Some faults and warnings can be reset only after the fault causes are rectified by modifying the settings. However, a reset operation does not necessarily activate the modifications to settings.
- For modifications activated at next power-on (R, S, T/L1C, L2C powered on again), perform a power cycle.
- For modifications activated after stop, switch off the S-ON signal. The servo drive can operate normally only after modifications are activated.

☆Related function No.

Start Process	Fault Symptom	Cause	Check method
FunIN.2	ALM-RST	Fault/Warning reset signal	The servo drive may, depending on the warning types, continue running after warning reset. When FunIN.2 is assigned to a low-speed DI, the effective level change of this DI must be kept for more than 3 ms. Otherwise, fault reset will be inactive. Do not assign FunIN.2 to a high-speed DI. Otherwise, fault/ warning reset will be inactive. • Inactive: Not resetting the fault/warning • Active: Resetting the fault/ warning

3 Description of Warning Codes

- E108.0: Parameter write error
  Description:

  Parameter values cannot be written to EEPROM.

Possible Causes	Confirming Method	Solution
An error occurs during parameter-writing.	Modify a certain parameter, power off and on the servo drive again and check whether the modification is saved.	If the modification is not saved and the fault persists after the servo drive is powered off and on repeatedly, replace the servo drive.

- E108.1: Parameter read error
  Description:

  Parameter values cannot be read in EEPROM.

Possible Causes	Confirming Method	Solution
The parameter-read operation is abnormal, and the system indicates an EEPROM read failure.	Modify a certain parameter, power off and on the servo drive again and check whether the modification is saved.	If the modification is not saved and the fault persists after the servo drive is powered off and on repeatedly, replace the servo drive.

- E108.2: Invalid check on data written in EEPROM
  Description:

  The check on the data written in EEPROM fails.

Possible Causes	Confirming Method	Solution
An error occurs during parameter-writing.	Modify a certain parameter, power off and on the servo drive again and check whether the modification is saved.	If the modification is not saved and the fault persists after the servo drive is powered off and on repeatedly, replace the servo drive.

- E108.3: Invalid check on data read in EEPROM
  Description:

  The check on the data read in EEPROM fails.

Possible Causes	Confirming Method	Solution
An error occurs during parameter-reading.	Modify a certain parameter, power off and on the servo drive again and check whether the modification is saved.	If the modification is not saved and the fault persists after the servo drive is powered off and on repeatedly, replace the servo drive.

- E108.4: Single data entry is read frequently
  Description:

  Frequently writing uniform parameters or object dictionaries to EEPROM may cause EEPROM to be corrupted. Set bit6 of H0A.71 to 1 to disable the alarm.

Possible Causes	Confirming Method	Solution
The same parameter is stored too many times	1. Check H0b.90 and H0b.91. H0b.90 shows the parameter in question or object dictionaries (in hexadecimal). If H0b.91= 15, H0b.90 shows internal variables of software. 2. Check “34: Func test 1” in hex with the oscilloscope channel, which shows the address where the EEPROM is storing the data. 3. Check the storage count through the oscilloscope channel "35: Func Test 2".	Modify the host controller program after you are fully sure of the parameters to be stored, to avoid frequent storage of parameters/ object dictionaries. You can also modify the value of H0E.01 to prevent the relevant communication parameters from being stored in the EEPROM. 0-Do not store write parameter or object dictionary 1-Store write parameter 2-Store write object dictionary 3-Store write parameter and object dictionary

- E120.3: The motor and drive do not match in the power
  Description:

  the motor and drive do not match in the rated power.

Possible Causes	Confirming Method	Solution
the motor and drive do not match in the rated power.	-	• Replace the motor or drive. • If the motor and drive can work properly in spite of the mismatch, set bit4 of H0A.71 to 1 to shield the alarm.

- E121.0: Duplicate S-ON instruction
  Description:

  A redundant S-ON signal is sent when some auxiliary functions are used.

Possible Causes	Confirming Method	Solution
The external S-ON signal is active when servo drive is enabled internally.	Check whether auxiliary functions (H0D.02, H0D.03, and H0D.12) are used and DI function 1 (FunIN.1: S-ON signal) is active.	Deactivate the DI assigned with FunIN.1 (both hardware DI and virtual DI).

- E122.0: Multi-turn absolute encoder setting error
  Description:

  The motor does not match the absolute position mode or the motor code is set improperly.

Possible Causes	Confirming Method	Solution
The motor does not match the absolute position mode or the motor code is set incorrectly.	1. Check the motor nameplate to see whether the motor is configured with a multi-turn absolute encoder. 2. Check whether H00.00 (motor code) is set properly.	Reset H00.00 (motor code) according to the motor nameplate or use a suitable motor.

- E600.0: Inertia auto-tuning failure warning
  Description:

  Vibration cannot be suppressed. You can set notch parameters (H09.12...H09.23) manually to suppress vibration.

  The auto-tuned values fluctuate dramatically. Increase the maximum operating speed, reduce the acceleration/deceleration time, and shorten the stroke of the lead screw during ETune operation.

  Mechanical couplings of the load are loose or eccentric. Rectify the mechanical faults.

  A warning occurs during auto-tuning and causes interruption. Rectify the fault causes and perform inertia auto-tuning again.

  The vibration cannot be suppressed if the load carries a large inertia. In this case, increase the acceleration/deceleration time first to ensure the motor current is unsaturated.

Possible Causes	Confirming Method	Solution
1. Continuous vibration occurs during auto-tuning. 2. The auto-tuned values fluctuate dramatically. 3. Mechanical couplings of the load are loose or eccentric. 4. A warning occurs during auto-tuning and causes interruption. 5. The vibration cannot be suppressed if the load carries a large inertia. In this case, increase the acceleration/deceleration time first to ensure the motor current is unsaturated.	1Perform internal inspection to check whether the torque jitters upon stop (not FFT). Check whether Three times more than the last auto-tuned value for variation less than 5 times; 0.5 times more than last auto-tuned value for variation above 5 times.	1. Rectify the fault and perform inertia auto-tuning again. 2. For vibration that cannot be suppressed, enable vibration suppression. 3. Ensure mechanical couplings are connected securely. 4. Increase the maximum operating speed, reduce the acceleration/ deceleration time, and shorten the stroke of the lead screw during ETune operation.

- E601.0: Homing warning
  Description:

  When using the homing function, the home is not found within the time defined by H05.35h.

Possible Causes	Confirming Method	Solution
1The home switch fails.	There is only high-speed searching but no low-speed searching during homing. After high-speed searching, low-speed searching in the reverse direction applies.	If a hardware DI is used, check whether the corresponding DI function is allocated to a certain DI in group 2003h and check the wiring of this DI. Change the DI logic manually and observe the value of H0B.03 (monitored DI status) to monitor whether the servoServo drive receives corresponding DI level changes. If the home signal is Z signal and the home signal cannot be found, check the condition of the Z signal.
2.The time limit for homing is too short.	Check whether the value of H05.35h (time limit for homing) is too small	Increase the value of H05.35.
3.The speed in high-speed searching for the home switch signal is too low.	Check the distance between the start position of homing and the home switch. Then check whether the setpoint of 6099.01h is too low, resulting in a long homing process.	Increase the value of 6099.01h.

- E601.1: Homing switch error
  Description:

  The homing switch is set improperly.

Possible Causes	Confirming Method	Solution
The homing switch is set improperly.	Check whether the limit signals at both sides are activated. Check whether the limit signal and the deceleration point signal/home signal are both activated. Check whether the positive and negative position limits are activated successively.	Set the position of the physical switch properly.

- E601.2: Homing mode setting error
  Description:

  The homing method value is too large.

Possible Causes	Confirming Method	Solution
The homing method value is too large.	Check the homing method value (object dictionary 6098h).	Change the value of 6098h.

- E730.0: Encoder battery warning
  Description:

  The battery voltage of the absolute encoder is lower than 3.0 V.

Possible Causes	Confirming Method	Solution
The battery voltage of the absolute encoder is lower than 3.0 V.	Measure the battery voltage.	Use a new battery with the matching voltage.

Note

E731.0 and E733.0 can trigger E730.0. See E731.0 and E733.0 for other solutions.

- E900.0: DI emergency braking
  Description:

  The logic of the DI terminal (including the hardware DI and virtual DI) allocated with DI function 34 (FunIN.34) is effective.

Possible Causes	Confirming Method	Solution
DI function 34: EmergencyStop is triggered.	Check DI function 34: Check whether the logic of the DI assigned with EmergencyStop is active.	Check the operation mode and clear the active DI braking signal without affecting the safety performance.

- E901.0: Invalid stop mode
  Description:

  The stop mode of an NDB model is set to that for a DB model.

Possible Causes	Confirming Method	Solution
The drive is NDB, but the settings related to its stop mode is for DB.	Check the setting of H02.05 (605C), H02.06 (605E), H02.07, and H02.08.	Correct the setting of H02.05 (605C), H02.06 (605E), H02.07, and H02.08.

- E902.0: DI setting invalid
  Description:

  DI function parameters are set to invalid values.

Possible Causes	Confirming Method	Solution
DI (DI1...DI5) function parameters are set to invalid values.	Check whether H03.02, H03.04, H03.06, H03.08, and H03.10 are set to invalid values.	Set DI function parameters to valid values.

- E902.1: DO setting invalid
  Description:

  DO function parameters are set to invalid values.

Possible Causes	Confirming Method	Solution
DO (DO1...DO3) function parameters are set to invalid values.	Check whether H04.00, H04.02, and H04.04 are set to invalid values.	Set DO function parameters to valid values.

- E902.2: Torque reach setting invalid
  Description:

  The DO parameter set for torque reach in the torque control mode is invalid.

Possible Causes	Confirming Method	Solution
The DO parameter set for torque reach in the torque control mode is invalid.	Check whether the value of H07.22 is lower than or equal to the value of H07.23 (unit: 0.1%).	Set H07.22 to a value higher than that of H07.23.

- E902.3: Invalid position comparison target
  Description:

  The target position value set by group H19 is converted by electronic gear ratio to a value more than 2^{31}-1.

Possible Causes	Confirming Method	Solution
The target position value set by group H19 is converted by electronic gear ratio to a value more than 2^{31}-1.	Check all target position values in the H19 group.	Correct the values.

- E908.0: Model identification failure
  Description:

  The first two check bytes of model identification are incorrect, indicating the attempt to read model identification parameter fails.

Possible Causes	Confirming Method	Solution
1The model identification check word saved in EEPROM is incorrect.	1 Check whether the warning persists after restart.	Set H01-72 to 1 to disable model identification temporarily.
2.The model parameters are not written in the drive before delivery.	Check whether parameters can be saved to EEPROM.	

- E909.0: Motor overload
  Description:

  The accumulative heat of the motor reaches the warning threshold.

Possible Causes	Confirming Method	Solution
1The motor and encoder cables are connected improperly or in poor contact.	Check the wiring among the servo drive, servo motor and the encoder according to the correct wiring diagram.	Connect cables according to the correct wiring diagram. It is recommended to use the cables provided by Inovance. When customized cables are used, prepare and connect the customized cables according to the wiring instructions.
2.The load is so heavy that the effective torque outputted by the motor keeps exceeding the rated torque.	Confirm the overload characteristics of the servo drive or motor. Check whether the average load rate (H0b.12) keeps exceeding 100.0%.	Use a servo drive of higher capacity and a matching servo motor. Reduce the load and increase the acceleration/ deceleration time.
3.Acceleration/Deceleration is too frequent or the load inertia is too large.	Check the mechanical inertia ratio or perform inertia auto-tuning. View the value of H08.15 (load moment of inertia ratio). Confirm the individual operation cycle when the servo motor operates cyclically.	Increase the acceleration/ deceleration time.
4.Gains are improper or the stiffness level is too high.	Check whether the motor vibrates and generates unusual noise during operation.	Adjust the gains again.
5.The model of the servo drive or motor is set improperly.	View the model of the motor equipped with a serial-type encoder in H00.05 and the servo drive model in H01.10.	Read the servo drive nameplate and set the servo drive model (H01.10) and motor model properly according to section "Servo Drive Model and Nameplate" in the Selection Guide.

Possible Causes	Confirming Method	Solution
6.The motor is stalled due to mechanical factors, resulting in overload during operation.	Check the reference and the motor speed (H0b.00) through the software tool or the keypad. • References in the position control mode: H0b.13 (Position reference counter) • References in the speed control mode: H0b.01 (Speed reference) • References in the torque control mode: H0b.02 (Internal torque reference) Check whether the reference value is not 0 or is very large but the motor speed is 0 RPM in the corresponding mode.	Eliminate the mechanical factors.
7.The servo drive is faulty.	Power off and on the servo drive again.	Replace the servo drive if the fault persists after the servo drive is powered off and on again.

- E910.0: Control circuit overvoltage

  Description:

  Overvoltage occurred on the control circuit of the drive.

Possible Causes	Confirming Method	Solution
Overvoltage occurred on the control circuit of the drive.	1. Measure whether the input voltage in the control circuit cable is within the following range: 220 V servo drive: Value range: 220 V to 240 V Allowable deviation: -10% to +10% (198 V to 264 V) 380 V servo drive: Value range: 380 V to 440 V Allowable deviation: -10% to +10% (342 V to 484 V) 2. Check whether control circuit cables are connected properly and whether the voltage of control circuit cables (L1C, L2C) is within the specified range.	Re-connect or replace the cables.

- E920.0: The regenerative resistor is overloaded.
  Description:

  The accumulative heat of the regenerative resistor exceeds the set value.

Possible Causes	Confirming Method	Solution
1The cable connected to the external regenerative resistor is in poor contact, disconnected or broken.	Remove the external regenerative resistor and measure whether its resistance is "∞" (infinite). Measure whether the resistance between terminals P⊕ and C is "∞" (infinite).	Replace the external brake resistor. Measure the resistance of the new resistor and ensure it is the same as the nominal value. Connect it between P⊕ and C.
		Use a suitable cable to connect both ends of the resistor to P ⊕ and C.
2.When you use an internal regenerative resistor, the cable between the power terminal⊕ and D is broken or disconnected	Measure whether the resistance between terminals P⊕ and D is "∞" (infinite).	Ensure terminals P⊕ and D are jumpered.

Possible Causes	Confirming Method	Solution
3. H02.25 (Regenerative resistor type) is set improperly when an external regenerative resistor is used.	• Check the setpoint of H02.25. • Measure the resistance of the used resistor between P⊕ and C. Compare the result with the value of H02.25; • Check whether H02.27 is greater than the resistance of the used resistor between P⊕ and C.	Set H02.25 according to section "Wiring and Setting of Regenerative Resistor" in the Hardware Guide. H02.25 = 1 (external, naturally ventilated) H02.25 = 2 (external, forced-air cooling)
4. The resistance of the external regenerative resistor used is too large.		Select a proper regenerative resistor according to section "Specifications of the Regenerative Resistor" in SV660N Series Servo Drive Commissioning Guide.
5. The setpoint of H02.27 (Resistance of external regenerative resistor) is higher than the resistance of the external regenerative resistor used.		Set H02.27 according to the resistance of the external regenerative resistor used.
6.The input voltage of the main circuit is beyond the specified range.	Check whether the input voltage of the main circuit cable on the drive side is within the following range: • 220 V servo drive:Value range: 220 V to 240 VAllowable deviation: -10% to +10% (198 V to 264 V) • 380 V servo drive: Value range: 380 V to 440 VAllowable deviation: -10% to +10% (342 V to 484 V)	Replace or adjust the power supply according to the specified range.

Possible Causes	Confirming Method	Solution
7.The load moment of inertia is too large.	Perform moment of inertia auto-tuning according to section "Inertia auto-tuning" in SV660N Series Servo Drive Function Guide or calculate the total mechanical inertia based on mechanical parameters. Check whether the actual load inertia ratio exceeds 30.	• Select an external regenerative resistor with large capacity and set H02.26 to a value consistent with the actual power. • Select a servo drive with large capacity. • Reduce the load if allowed. • Increase the acceleration/ deceleration time if allowed. • Increase the motor operation cycle if allowed.
8.The motor speed is excessively high and deceleration is not done within the set time. The motor is in the continuous deceleration status during cyclic operation.	View the motor speed curve during cyclic operation and check whether the motor is in the deceleration status continuously.	
9.The capacity of the servo drive or the regenerative resistor is insufficient.	View the motor speed curve in an individual cycle and calculate whether the maximum braking energy can be absorbed completely.	
10. The servo drive is faulty.	-	Replace with a new servo drive.

- E922.0: Resistance of the external regenerative resistor too small
  Description:

  The value of H02.27 (resistance of external regenerative resistor) is lower than the value of H02.21 (permissible min. resistance of external regenerative resistor).

Possible Causes	Confirming Method	Solution
When an external regenerative resistor is used (H02.25 = 1 or 2), the resistance of this resistor is lower than the minimum resistance allowed by the servo drive.	Measure whether the resistance of the external regenerative resistor between terminals P⊕ and C is lower than the value of H02.21 (Permissible minimum resistance of regenerative resistor).	• If yes, replace with an external regenerative resistor that matches the servo drive, then set H02.27 according to the resistance of the resistor used. Finally, connect the new resistor between P⊕ and C. • If not, set H02.27 to a value consistent with the resistance of the external regenerative resistor used.

- E924.0: Regenerative transistor over-temperature
  Description:

The estimated temperature of the regenerative transistor is higher than H0A.18 (IGBT overtemperature threshold).

Possible Causes	Confirming Method	Solution
1The junction temperature of the regenerative transistor is too high. 2.The regenerative transistor will be turned off automatically after overload occurs.	The regenerative transistor temperature exceeds the threshold defined by H0A.49.	Control the working conditions and usage of the regenerative transistor.

- E941.0: Modified parameters activated at next power-on
  Description:

  The parameters modified are those whose "Effective time" is "Next power-on".

Possible Causes	Confirming Method	Solution
The parameters modified are those whose "Effective time" is "Next power-on".	Check whether parameters you modified are those whose "Effective Time" is "Next power-on".	Power off and on again.

- E942.0: Parameters saved frequently
  Description:

  The number of parameters modified at a time exceeds 200.

Possible Causes	Confirming Method	Solution
Too many parameters are modified and saved to EEPROM (H0C.13 = 1) at a brief interval.	Check whether parameters are modified through the host controller at a brief interval.	Check the operation mode. For parameters that need not be saved to EEPROM, set H0C.13 to 0.

- E950.0: Forward overtravel warning
  Description:

  The logic of the DI allocated with function 14 (FunIN.14, P-OT, positive overtravel switch) is valid.

Possible Causes	Confirming Method	Solution
1. DI function 14: P-OT (Positive limit switch) is valid.	• Check whether a certain DI in group H03 is assigned with FunIN.14. • Check whether the logic of DI corresponding to the bit of H0b.03 (Monitored DI status) is effective.	Check the operation mode and on the prerequisite of ensuring safety, send a reverse run command or rotate the motor to deactivate the logic of the DI assigned with FunIN.14.
2.The servo position feedback reaches the positive software position limit.	Check whether the position feedback (H0b.17) is close to the value of H0A.41. Check whether the software position limit is set in H0A.40.	Ensure the servo drive references are proper, allowing the load travel range to be within the software position limit.

- E952.0: Reverse overtravel warning
  Description:

  The logic of the DI allocated with function 15 (FunIN.15, N-OT, negative overtravel switch) is valid.

Possible Causes	Confirming Method	Solution
1. DI function 15: Negative limit switch is valid.	• Check whether a certain DI in group H03 is assigned with FunIN.15. • Check whether the logic of DI corresponding to the bit of H0b.03 (Monitored DI status) is effective.	Check the operation mode. On the prerequisite of ensuring safety, send a forward run command or rotate the motor to deactivate the logic of DI assigned with FunIN.15.
2.The servo position feedback reaches the negative software position limit.	Check whether the position feedback (H0b.17) is close to the value of H0A.43. Check whether the software position limit is set in H0A.40.	Ensure the servo drive references are proper, allowing the load travel range to be within the software position limit.

- E980.0: Encoder algorithm error
  Description:

  An encoder algorithm error occurs

Possible Causes	Confirming Method	Solution
The encoder is faulty.	If the servo drive is powered off and on several times but the warning is still reported, it indicates that the encoder is faulty.	Replace the servo motor.

- EA41.0: Torque fluctuation compensation failure
  Description:

The torque compensation fails.

Possible Causes	Confirming Method	Solution
The torque compensation fails.	-	Turn off the torque fluctuation compensation function.

4 Fault Codes

- E101.0: Parameters H02 and above abnormal
  Description:

  The total number of parameters changes, which generally occurs after software update.

  Values of parameters in groups H02 and above exceed the limit, which generally occurs after software update.

Possible Causes	Confirming Method	Solution
1The voltage of the power supply used for the control circuit drops instantaneously.	1Check whether the control circuit (L1C, L2C) is in the process of power-off or instantaneous power failure occurs.	1Restore system parameters to default settings (H02.31 = 1) and write parameters again. 2.Increase the power supply capacity or replace with a power supply of higher capacity. Restore system parameters to default settings (H02.31 = 1), and write parameters again.
	2.Measure whether the input voltage of the control circuit cable on the non-drive side is within the following range: 220 V servo drive: Value range: 220 V to 240 V Allowable deviation: -10% to +10% (198 V to 264 V) 380 V servo drive: Value range: 380 V to 440 V Allowable deviation: -10% to +10% (342 V to 484 V)	Increase the power supply capacity or replace with a power supply of higher capacity. Restore system parameters to default settings (H02.31 = 1), and write parameters again.
2.Instantaneous power failure occurs during saving parameters.	Check whether instantaneous power failure occurs when saving parameters.	Power on the system again, restore system parameters to default settings (H02.31 = 1), and write parameters again.
3.The number of write operations within a certain period of time exceeds the limit.	1Check whether instantaneous power failure occurs when saving parameters. 2.Check whether parameters are updated frequently through the host controller.	1. If the servo drive is faulty, replace the servo drive. 2. Change the write mode and write parameters again.

Possible Causes	Confirming Method	Solution
4.The software is updated.	Check whether parameter values in group H02 and above exceed the upper/ lower limit due to software update.	Reset the servo drive model and servo motor model, and restore system parameters to default settings (H02.31 = 1).
5.The servo drive is faulty.	If the fault persists though parameters are restored to default settings and the servo drive is powered off and on repeatedly, the servo drive is faulty.	Replace the servo drive.

- E101.1: Parameter error in group H00/H01
  Description:

  The total number of parameters changes, which generally occurs after software update.

  Values of parameters in groups H00 or H01 exceed the limit, which generally occurs after software update.

Possible Causes	Confirming Method	Solution
The servo drive detects whether parameter values in groups H00 and H01 exceed the upper/lower limit during initialization upon power-on. If yes, the keypad displays E101.1. Motor parameters in group H00 are read from the encoder. Servo drive parameters in group H01 are mapped based on the servo drive model defined by H01-10.	Check groups H00 and H01 to find the parameter whose value exceeds the limit. Confirm whether this parameter range is abnormal.	Replace the motor or servo drive.

- E101.2: Address error in read/write operation after the number of parameters changes
  Description:

  Address error in read/write operation after the number of parameters changes

Possible Causes	Confirming Method	Solution
The total number of parameters changes after software update, leading to address error in read/write operation.	Read H0b.90 and H0b.91 and obtain the abnormal parameter group number.	Rectify the wrong values. Restore default settings.

- E101.9: Parameter attribute initialization check error.

Description:

Parameter attribute initialization check error.

Possible Causes	Confirming Method	Solution
Parameter attribute initialization check error.	Check that H0A.99 = AA5C.	If the fault persists after repeated restart, replace the drive.

- E102.0: FPGA communication establishment error
  Description:

  The communication between MCU and FPGA cannot be established.

Possible Causes	Confirming Method	Solution
The communication between MCU and FPGA cannot be established.	The fault persists after repeated restart.	Replace the servo drive.

- E102.1: FPGA initialization start error
  Description:

  FPGA failed.

Possible Causes	Confirming Method	Solution
FPGA cannot start.	The fault persists after repeated restart.	Replace the servo drive.

- E102.8: FPGA and MCU version mismatch
  Description:

  The software versions of MCU and FPGA do not match.

Possible Causes	Confirming Method	Solution
The software versions of MCU and FPGA are inconsistent.	1. Check whether the MCU version number of H01.00 is: 9xx.x (the 4th digit on the panel screen is 9); 2. Check whether the FPGA version number of H01.01 is: 9xx.x (the 4th digit on the panel screen is 9).	Contact Inovance for technical support. Update the FPGA or MCU software.

- E104.1: MCU running timeout (MCU break down)
  Description:

  The access to MCU times out.

Possible Causes	Confirming Method	Solution
1. FPGA failure	The fault persists after repeated restart.	Replace the servo drive.
2.FPGA and HOST communication handshaking error		
3.Access timeout occurs between HOST and the coprocessor		

- E104.2: Current loop operation timeout (FPGA break down)
  Description:

  The MCU torque interrupt scheduling time is abnormal. This fault is reported only during commissioning.

Possible Causes	Confirming Method	Solution
1.FPGA failure	The fault persists after repeated restart.	Replace the servo drive.
2. The communication handshake between the FPGA and the MCU is abnormal.		

- E104.4: MCU command update timeout
  Description:

  Take the moment when interrupt starts as the starting time, if the time when commands are written to MCU is larger than the time when position and speed regulators are started by FPGA, a warning will be reported.

Possible Causes	Confirming Method	Solution
The system reports that the encoder communication time is set improperly or the command calculation time is too long.	The fault persists after repeated restart.	1. Hide unnecessary functions. 2. Replace the servo drive.

- E120.0: Unknown encoder model
  Description:

  The servo drive detects the encoder model during initialization upon power-on. If the encoder model does not comply with the requirement, E120.0 occurs.

Possible Causes	Confirming Method	Solution
1The product (motor or servo drive) code does not exist.	Check the nameplates of the drive and motor to ensure that The SV660N series servo drive and motor with a 23-bit encoder are used. Meanwhile, check whether H00.00 (Motor code) is set to 14101.	If the motor code is unknown, set H00.00 to 14101 when the SV660N series servo drive and 23-bit servo motor are used.
	Check the servo drive code (H01.02) to see whether this servo drive code exists.	If the drive code is absent, set the servo drive model correctly according to the nameplate.
2.The power rating of the motor does not match that of the servo drive.	Check whether the servo drive code (H01.02) matches the serial-type motor code (H00.05).	Replace the unmatched products.

- E120.1: Unknown motor model
  Description:

  The servo drive detects the motor model defined by H00.00 during initialization upon power-on. If the motor model does not exist, E120.1 occurs.

Possible Causes	Confirming Method	Solution
The motor model defined by H00.00 is abnormal	Check whether the value of H00.00 matches the used motor.	Rectify the value of H00.00.

- E120.2: Servo drive does not exist
  Description:

  The servo drive detects the servo drive model defined by H01.10 during initialization upon power-on. If the servo drive model does not exist, E120.2 occurs.

Possible Causes	Confirming Method	Solution
H01.10 is incorrect	Check the value of H01.10.	Disable servo drive model auto detection and set H01.10 to a proper value manually..

- E120.5: Motor and drive current mismatch
  Description:

  The rated output of the servo drive is far higher than the rated current of the motor. You must use a servo drive of lower rated output or a motor with higher rated current.

Possible Causes	Confirming Method	Solution
The internal scale value is abnormal.	Check whether the servo drive model is correct. If the set current sampling coefficient is too large, calculation overflow will occur.	Replace the servo drive.

- E120.6: FPGA and motor model mismatch
  Description:
  - The motor model is set improperly, causing mismatch and malfunction of the servo drive.
  - The motor model is set properly, but the motor encoder is not supported by the servo drive.

Possible Causes	Confirming Method	Solution
FPGA software version and H00.00 mismatch	Check whether the FPGA software version (H01.01) supports the motor model set by H00.00.	Update the FPGA software to support the motor model or replace the motor.

- E120.7: Model check error
  Description:

  The servo drive model parameter cannot be identified.

Possible Causes	Confirming Method	Solution
Model parameter CRC check failed	Check whether the model parameter is not programmed or is lost.	Program the model parameter again.

- E120.8: Junction temperature parameter check error
  Description:

  The junction temperature parameter is identified incorrectly.

Possible Causes	Confirming Method	Solution
Junction temperature parameter CRC check failed	Check that the junction temperature parameter is present	Program the junction temperature parameter again.

- E122.1: Different DIs assigned with the same function
  Description:

  The same function is assigned to different DIs.

  The DI function No. exceeds the maximum number allowed for DI functions.

Possible Causes	Confirming Method	Solution
1. Multiple DIs are assigned with the same function.	Check whether H03.02, H03.04...H03.20 and H17.00, H17.02...H17.30 are set with the same non-zero DI function No.	Assign different DI function numbers to these parameters, and then re-energize the control circuit to activate the assignment, or switch off the S-ON signal and send a "RESET" signal to activate the assignment.
2. The DI function No. exceeds the maximum number allowed for DI functions	Check whether the MCU program is updated.	Restore system parameters to default values (H02.31 = 1) and restart the servo drive.

- E122.3: Upper limit in the rotation mode too high
  Description:

  The upper limit (reference range) of the mechanical single-turn position exceeds 2^{31} in the absolute rotation mode.

Possible Causes	Confirming Method	Solution
The upper limit of the mechanical single-turn position exceeds 2^{31} in the absolute position rotation mode.	Check the setting of the mechanical gear ratio, the upper limit of mechanical single-turn position and the electronic gear ratio when the servo drive runs in the absolute rotation mode (H02.01 = 2).	Reset the mechanical gear ratio, the upper limit of mechanical single-turn position, and the electronic gear ratio to ensure the upper limit of the mechanical single-turn position (reference range) does not exceed 2^{31}.

- E136.0: Encoder ROM motor parameter check error
  Description:

  When reading parameters in the encoder ROM, the servo drive detects that no parameters are saved there or parameter values are inconsistent with the setpoints.

Possible Causes	Confirming Method	Solution
1The servo Servo drive model does not match the motor model.	Check if devices used are the SV660N series servo drive and a compatible motor.	Replace the servo drive and motor.
2.A parameter check error occurs or no parameter is saved in the ROM of the serial incremental encoder.	1. Check whether the encoder cable provided by Inovance is used. For cable specifications, see "Matching Cables". The cable must be connected securely without scratching, breaking or poor contact. 2. Measure the following signals at both ends of the encoder cable: PS+, PS-, +5V and GND. Observe whether signals at both ends are consistent. For signal assignment, see Chapter "Wiring" in the user guide.	1. Use the encoder cable provided by Inovance. Ensure motor terminals are connected securely and servo drive screws are tightened properly. Use a new encoder cable if necessary. 2. Route encoder cables and power cables (R/S/T, U/V/W) through different routes.
3.The servo drive is faulty.	The fault persists after the servo drive is restarted.	Replace the servo drive.

- E136.1: Encoder ROM motor parameter read error
  Description:
  - The encoder cable is disconnected.
  - A communication error occurs on the encoder due to interference.

Possible Causes	Confirming Method	Solution
1The encoder cable is connected improperly.	Check the encoder cable connection. Check whether ambient vibration is too large, which loosens the encoder cable and even damages the encoder.	1. Connect the encoder cables according to the correct wiring diagram. 2. Re-connect encoder cables and ensure encoder terminals are connected securely.
2.The servo drive is faulty.	The fault persists after the servo drive is restarted.	Replace the servo drive.

- E140.0: Encryption chip check fault
  Description:

Encryption chip check failure

Possible Causes	Confirming Method	Solution
Encryption software not flashed	Is the fault still reported after power-off restart.	Contact the manufacturer to re-flash the encryption software.

- E140.1: MCU key calculation failed
  Description:

  Incorrect encryption chip version.

Possible Causes	Confirming Method	Solution
Communication error between MCU and encryption chip	Is the fault still reported after power-off restart.	Contact the manufacturer to re-flash the encryption software.

- E140.2: Encryption chip version error
  Description:

  The MCU does not establish communication with the encryption chip.

Possible Causes	Confirming Method	Solution
Encryption software not flashed	Is the fault still reported after power-off restart.	Contact the manufacturer to re-flash the encryption software.

- E150.0: STO safety state applied
  Description:

  The STO input protection applies (safety state).

Possible Causes	Confirming Method	Solution
Two 24 V inputs are disconnected simultaneously, triggering the STO function.	1Check whether the STO function is activated.	There is no need to take any corrective actions. After the STO terminal is back to normal, clear the fault using the fault reset function.
	2.Check whether the STO power supply is normal.	Check whether the 24 V power supply for the STO is stable. Tighten the cables that are loose or disconnected.
	3.The fault persists after preceding causes are rectified.	Replace the servo drive.

- E150.1: STO input state abnormal
  Description:

  The single-channel input of STO is ineffective.

Possible Causes	Confirming Method	Solution
1. STO input power supply is abnormal.	Check whether the STO power supply is normal.	Check whether the 24 V power supply for the STO is stable. Tighten the cables that are loose or disconnected.
2.STO input resistor is abnormal.	After STO is triggered, only one STO signal is sent to MCU after the 24 V power supply is cut off due to input resistor drift.	Replace the servo drive.
3. STO is ineffective	The fault persists after preceding causes are rectified.	Replace the servo drive.

- E150.2: Abnormal measured buffer 5 V voltage
  Description:

  The MCU monitors the 5 V power supply of the PWM Buffer to detect whether overvoltage or undervoltage occurs. If the voltage is abnormal, E150.2 occurs.

Possible Causes	Confirming Method	Solution
The 5 V voltage supplied to the STO Buffer is abnormal due to undervoltage or overvoltage.	Check whether the fault can be removed by a restart. If not, the 5 V voltage supplied to the Buffer is abnormal.	Replace the servo drive.

- E150.3: STO input circuit hardware diagnosis failure
  Description:

  Short circuit occurs on the optocoupler of the upstream hardware circuit of STO.

Possible Causes	Confirming Method	Solution
Short circuit occurs on the upstream optocoupler of STO1 or STO2.	The fault persists and the keypad displays E150.3 after restart.	Replace the servo drive.

- E150.4: PWM Buffer hardware detection failure
  Description:

  An error occurs on the PWM buffer integrated circuit during initialization detection upon power-on (the PWM signal cannot be blocked).

Possible Causes	Confirming Method	Solution
STO Buffer power-on test error	The fault persists and the keypad displays E150.4 after restart.	Replace the servo drive.

- E201.0: Phase-P overcurrent
  Description:

An excessively high current flows through the positive pole of the DC-AC circuit.

Possible Causes	Confirming Method	Solution
1The gain is set improperly and the motor oscillates.	Check whether vibration or sharp noise occurs during start and operation of the motor, or view "Current feedback" in the software tool.	1. Motor parameters are set improperly, modify motor parameter values. 2. Current loop parameters are set improperly, modify current loop parameter values. 3. Speed loop parameters are set improperly, leading to motor oscillation. 4. Servo drive operates improperly. Replace it.
2.The encoder cable is aged, corroded, or connected incorrectly or loosely.	Check whether the encoder cable provided by Inovance is used. Check whether the cable is aging, corroded, or connected loosely. Switch off the S-ON signal and rotate the motor shaft manually. Check whether the value of H0b.17h (Electrical angle) changes as motor shaft rotates.	Re-solder, tighten or replace the encoder cable.

Possible Causes	Confirming Method	Solution
3.The servo drive is faulty.	1. Switch off the S-ON signal and rotate the motor shaft manually. Check whether the value of H0b.17 (Electrical angle) changes as motor shaft rotates. 2. Disconnect the motor cable and power on the servo drive again, but the fault persists. 3. Check whether resistance of the external regenerative resistor is too small or the regenerative resistor is short-circuited (between terminals P⊕ and C).	1. Replace with a regenerative resistor with matching resistance and perform wiring again. 2. Replace the servo drive.
4.Regenerative resistor overcurrent	Check whether resistance of the external regenerative resistor is too small or the regenerative resistor is short-circuited (between terminals P, C).	Use a regenerative resistor of matching resistance. Perform wiring again.

- E201.1: Phase-U overcurrent
  Description:

  A current higher than threshold is collected in the phase-U current.

Possible Causes	Confirming Method	Solution
1. Motor cables are in poor contact. 2. Motor cables are grounded. 3. U/V/W cables of the motor are short-circuited.	1. Check whether the servo drive power cables and motor cables on the U, V, and W sides of the servo drive are loose. 2. After confirming the servo drive power cables and motor cables are connected properly, measure whether the insulation resistance between the servo drive U/V/W side and the PE cable is at MΩ level.	1. Tighten the cables that are loose or disconnected. 2. Replace the motor in case of poor insulation.
4.The motor is damaged due to overheat.	1. Disconnect motor cables and check whether short circuit occurs among motor U/V/W cables and whether burrs exist in the wiring. 2. Disconnect the motor cables and measure whether the resistance among U, V, and W phases of motor cables is balanced.	1. Connect the motor cables correctly. 2. Replace the motor if the resistance is unbalanced.

- E201.2: Phase-V overcurrent
  Description:

  A current higher than the threshold is collected in the phase-V current.

Possible Causes	Confirming Method	Solution
1. Motor cables are in poor contact. 2. Motor cables are grounded. 3. U/V/W cables of the motor are short-circuited.	1. Check whether the servo drive power cables and motor cables on the U, V, and W sides of the servo drive are loose. 2. After confirming the servo drive power cables and motor cables are connected properly, measure whether the insulation resistance between the servo drive U/V/W side and the PE cable is at MΩ level.	1. Tighten the cables that are loose or disconnected. 2. Replace the motor in case of poor insulation.
4.The motor is damaged due to overheat.	1. Disconnect the motor cables and check whether short circuit occurs among U, V, and W phases and whether burrs exist in the wiring. 2. Disconnect the motor cables and measure whether the resistance among U, V, and W phases of motor cables is balanced.	1. Connect the motor cables correctly. 2. Replace the motor if the resistance is unbalanced.

- E201.4: Phase-N overcurrent
  Description:

  An excessively high current flows through the negative pole of the DC-AC circuit.

Possible Causes	Confirming Method	Solution
1The gain is set improperly and the motor oscillates.	Check whether vibration or sharp noise occurs during start and operation of the motor, or view "Current feedback" in the software tool.	Adjust the gains.
2.The encoder cable is aged, corroded, or connected incorrectly or loosely.	Check whether the encoder cable provided by Inovance is used and whether the cable is aging, corroded, or connected loosely.	Re-solder, tighten or replace the encoder cable.

Possible Causes	Confirming Method	Solution
3.Regenerative resistor overcurrent	Check whether resistance of the external regenerative resistor is too small or the regenerative resistor is short-circuited (between terminals P⊕ and C).	Replace with a regenerative resistor of matching resistance. Perform wiring again.
4.Overcurrent is caused by the superposition of the braking current and phase current.	Check if the drive accelerates abruptly during braking. Check if the voltage feedback exceeds the release threshold through the Inovance drive commissioning platform, and if the torque command increases abruptly.	Increase the acceleration/ deceleration time.
5.The servo drive is faulty.	Switch off the S-ON signal and rotate the motor shaft manually. Check whether the value of H0b.17 (Electrical angle) changes as motor shaft rotates. Disconnect the motor cable but the fault persists after the servo drive is powered off and on again.	Replace the servo drive.

- E208.2: Encoder communication timeout
  Description:

  Failed to receive encoder sent data properly.

Possible Causes	Confirming Method	Solution
The servo drive fails to receive the data fed back by the encoder in three consecutive cycles.	Check bit12 of H0b.30. The encoder cable is connected improperly. The encoder cable is connected loosely. The encoder cable is too long. The encoder communication suffers from interference. The encoder is faulty.	1. Check whether the motor model is correct. 2. Check whether the encoder cable is proper. 3. Check whether the encoder version (H00.04) is set properly. 4. The servo drive operates improperly. Replace it.

- E208.4: FPGA current loop operation timeout
  Description:

  The operating time of the current loop exceeds the interval threshold.

Possible Causes	Confirming Method	Solution
FPGA operation timeout	Internal fault code H0b.45 = 4208: Current loop operation timed out.	Disable some unnecessary functions to reduce the operating load of the current loop.

- E210.0: Output short circuited to ground
  Description:

  An abnormal motor phase current or bus voltage is detected during power-on self-testing.

  - The DC bus voltage exceeds the discharge threshold.
  - The U-phase current of SIZE C/D/E is greater than the setpoint.
  - Overcurrent occurs on phase-P and phase-N of servo drives in SIZE A and B.

Possible Causes	Confirming Method	Solution
1The servo drive power cables (U/V/W) are short-circuited to ground.	Disconnect the motor cables and measure whether the servo drive power cables (U/V/W) are short-circuited to ground (PE).	Connect the cables again or replace the servo drive power cables.
2.The motor is short-circuited to the ground	After confirming the servo drive power cables and motor cables are connected properly, measure whether the insulation resistance between the servo drive U/V/W side and the PE cable is at MΩ level.	Replace the motor.
3.The servo drive is faulty.	Disconnect the power cables from the servo drive, but the fault persists after the servo drive is powered off and on repeatedly.	Replace the servo drive.
4.The motor speed is too high during phase-to-ground detection.	Check whether the motor is in the generating status during power-on.	Reduce the motor speed.
5.Bleed voltage below bus voltage	Check the value of the bleed threshold setpoint (H01.41) and bus voltage value (H0b.26). The bleed function is triggered when the bus voltage exceeds the bleed threshold, which may cause alarm E210.0 during power-up.	1. Measure whether the actual value of the bus voltage is consistent with the value of H0b.26; 2. Check whether the value of H01.41 is correct; 3. Check the input voltage of the power supply.

- E234.0: Runaway

Description:

- The torque reference direction is opposite to the speed feedback direction in the torque control mode.
- The speed feedback direction is opposite to the speed reference direction in the position or speed control mode.

Possible Causes	Confirming Method	Solution
1. The U/V/W cables are connected in the wrong phase sequence.	Check whether the servo drive power cables are connected in the correct sequence at both ends.	Connect the U/V/W cables in the correct phase sequence.
2.An error occurs on the initial phase detection of the motor rotor due to disturbing signals upon power-on.	The UVW phase sequence is correct. But Er.234 occurs when the servo drive is enabled.	Power off and on again.
3.The encoder model is wrong or the encoder is wired improperly.	View the servo drive and servo motor nameplates to check whether the devices used are Inovance SV660N series servo drive and 23-bit servo motor.	Replace with a mutually-matching servo drive and motor. For use of SV660N series servo drive and the motor equipped with a 23-bit encoder, set H00.00 to 14101. Check the motor model, encoder type, and encoder cable connection again.
4.The encoder cable is aged, corroded, or connected incorrectly or loosely.	1. Check whether the encoder cable provided by Inovance is used and whether the cable is aging, corroded, or connected loosely. 2. Switch off the S-ON signal and rotate the motor shaft manually. Check whether the value of H0b.10 (Electrical angle) changes as motor shaft rotates.	Re-solder, tighten or replace the encoder cable.

Possible Causes	Confirming Method	Solution
5.The gravity load is too heavy in vertical axis applications.	Check whether the load of the vertical shaft is too large. Adjust brake parameters H02.09...H02.12 and check whether the fault is cleared.	Reduce the load of the vertical axis, increase the stiffness level, or hide this fault without affecting the safety performance and normal use.
6.Improper parameter settings lead to excessive vibration.	The stiffness level is set to an excessively high value, leading to excessive vibration.	Set a proper stiffness level to avoid excessive vibration.

- E320.0: The regenerative resistor is overloaded.
  Description:

  The regenerative resistor is overloaded.

Possible Causes	Confirming Method	Solution
The accumulative heat of the regenerative resistor exceeds the maximum thermal capacity of the regenerative resistor.	Check whether the value of H0b.67 exceeds 100%.	1. Check if large discharge current is present due to high bus voltage. 2. Ensure that the motor cannot be driven reversely. 3. Replace the servo drive.

In applications where the motor drives a vertical axis or is driven by the load, set H0A.12 to 0 to hide the runaway fault.

- E400.0: Main circuit overvoltage
  Description:

  The DC bus voltage between P⊕ and N⊖ exceeds the overvoltage threshold.

  220 V servo drive: normal value: 310 V, undervoltage level: 420 V

  380 V servo drive: normal value: 540 V, undervoltage level: 760 V

Possible Causes	Confirming Method	Solution
1The voltage input to the main circuit is too high.	Check the power input specifications of the servo drive and measure whether the voltage input to main circuit cables (R/S/T) on the drive side is within the following range: 220 V servo drive: Value range: 220 V to 240 V Allowable deviation: -10% to +10% (198 V to 264 V) 380 V servo drive: Value range: 380 V to 440 V Allowable deviation: -10% to +10% (342 V to 484 V)	Replace or adjust the power supply according to the specified range.
2.The power supply is unstable or affected by lightning.	Check whether the power supply is unstable, affected by lightning, or complies with the preceding range.	Connect a surge protection device and then switch on the main circuit and control circuit power supplies again. If the fault persists, replace the servo drive.

Possible Causes	Confirming Method	Solution
3.The regenerative resistor fails.	If the built-in regenerative resistor is used (H02.25 = 0), check whether terminals P ⊕ and D are jumpered. If yes, measure the resistance between terminals C and D. If an external regenerative resistor is used (H02.25 = 1 or 2), measure the resistance of the external regenerative resistor connected between terminals P ⊕ and C. For details, See section "Specifications of the regenerative resistor" in SV660P Series Servo Drive Commissioning Guide.	1. If the resistance is "∞" (infinite), the regenerative resistor is disconnected internally. 2. If a built-in regenerative resistor is used, change to use an external regenerative resistor (H02.25 = 1 or 2) and remove the jumper between terminals P ⊕ and D. Select an external regenerative resistor of the same resistance and equal or higher power than the built-in one. 3. If you use an external resistor, connect a new one between P⊕ and C; 4. Set H02.26 (Power of external regenerative resistor) and H02.27 (Resistance of external regenerative resistor) to values consistent with the specifications of the external regenerative resistor used.

Possible Causes	Confirming Method	Solution
4.The resistance of the external regenerative resistor is too large, resulting in insufficient energy absorption during braking.	Measure the resistance of the external regenerative resistor connected between terminals P⊕ and C, and compare the measured value with the recommended value.	1. Replace with a new external regenerative resistor that carries the recommended resistance, and connect it between P⊕ and C. 2. Set H02.26 (Power of external regenerative resistor) and H02.27 (Resistance of external regenerative resistor) to values consistent with the specifications of the external regenerative resistor used.
5.The motor is in abrupt acceleration/deceleration status and the maximum braking energy exceeds the energy absorption value.	Check the acc./dec. time in operation. Measure the DC bus voltage between P⊕ and N⊖ and see if the voltage exceeds the fault value while in the deceleration segment.	After confirming the input voltage of the main circuit is within the specified range, increase the acceleration/ deceleration time if the operating conditions allow.
6.The bus voltage sampling value deviates greatly from the measured value.	Check whether H0b.26 (Bus voltage) is within the following range: 220 V servo drive: H0b.26 > 420 V 380 V servo drive: H0b.26＞ 760 V Measure whether the DC bus voltage detected between terminals P⊕ and N⊖ is lower than the value of H0b.26.	Contact Inovance for technical support.
7.The servo drive is faulty.	The fault persists after the main circuit is powered off and on repeatedly.	Replace the servo drive.

- E410.0: Main circuit undervoltage
  Description:

  The DC bus voltage between P⊕ and N⊖ is lower than the undervoltage threshold.

  220 V servo drive: normal value: 310V， fault value: 200 V (S5R5 model is 180 V).

380 V servo drive: normal value: 540 V, undervoltage level: 380 V

Possible Causes	Confirming Method	Solution
1The power supply of the main circuit is unstable or power failure occurs.	Check the power input specifications of the servo drive and measure whether the input voltage at the power supply side of the main circuit cables and R/S/T on the drive side is within the following range: 220 V servo drive: Value range: 220 V to 240 V Allowable deviation: -10% to +10% (198 V to 264 V) Measure the voltages of all the three phases.	Increase the capacity of the power supply.
2.Instantaneous power-off occurs.		
3.Check whether the power voltage drops during running.	Monitor the power supply voltage and check whether the main circuit power supply is applied to other devices, resulting in insufficient power capacity and voltage drop.	
4.A three-phase servo drive is connected to a single-phase power supply, leading to phase loss.	Check whether the main circuit is wired correctly and whether phase loss detection (H0A.00) is hidden.	Replace the cables and connect the main circuit cables correctly. Three phases: R, S, T
5.The servo drive is faulty.	Check whether H0b.26 (Bus voltage) is within the following range: 220 V servo drive: H0b.26 < 200 V 380 V servo drive: H0b.26 < 380 V The fault persists after the main circuit is powered off and on repeatedly.	Replace the servo drive.

- E410.1: Main circuit de-energized
  Description:

  Phase loss occurs on the three-phase servo drive.

Possible Causes	Confirming Method	Solution
The power supply is disconnected during operation..	Check the power input specifications of the servo drive and measure whether the input voltage at the power supply side of the main circuit cables and R/S/T on the drive side is within the following range: 220 V servo drive: Value range: 220 V to 240 V Allowable deviation: -10% to +10% 380 V servo drive: Value range: 380 V–440 V Allowable deviation: -10% to +10% Measure the voltages of all the three phases.	Increase the capacity of the power supply.
	Monitor the power supply voltage and check whether the main circuit power supply is applied to other devices, resulting in insufficient power capacity and voltage drop.	
	Check whether the value of 200B.1Bh (Bus voltage) is in the following range: 220 V drive: H0b.27h < 200 V; 380 V drive: After H0b.27h < 380 V. After several cycles of power-off and -on of the main circuit, the fault remains.	Replace the servo drive.
	Check the wiring of the main circuit.	Replace the cables and connect the main circuit cables correctly. Three phases: R S T /L1 L2 L3+

- E420.0: Main circuit phase loss
  Description:

  Phase loss occurs on the three-phase servo drive.

Possible Causes	Confirming Method	Solution
1The three-phase input cables are connected improperly.	Check the cable between the non-servo drive side and servo drive main circuit input terminals (R S T) is the cable good and the connection tight.	Replace the cables and connect the main circuit cables correctly.
2.A single-phase power supply is used for a three-phase servo drive.	Check the specifications of the power supply and measure whether the voltage input to the main circuit is within the following range: 220 V servo drive: Value range: 220 V to 240 V Allowable deviation: -10% to +10% (198 V to 264 V) 380 V servo drive: Value range: 380 V to 440 V Allowable deviation: -10% to +10% (342 V to 484 V) Measure the voltages of all the three phases.	Servo drives of 0.75 kW (H01.10 = 5) can be supplied by single-phase power supplies. If the input voltage complies with the specifications, set H0A.00 (Power input phase loss protection) to 2 (Inhibit phase loss faults and warnings). If input voltage is outside the specified range, replace or adjust the power supply.
3.The three-phase power supply is unbalanced or the voltages of the three phases are too low.		

- E430.0: Control power supply undervoltage
  Description:

  The control power voltage of the Size C/D/E servo drive is below the fault value.

Possible Causes	Confirming Method	Solution
1. The control power supply of servo drives in size C/D/E are unstable or fails.	Check the specifications of the power supply and measure whether the voltage input to the main circuit is within the following range: 220 V servo drive: Value range: 220 V to 240 V Allowable deviation: -10% to +10% (198 V to 264 V) 380 V servo drive: Value range: 380 V–440 V Allowable deviation: -10% to +10% (342 V to 484 V) Measure the voltages of all the three phases.	Increase the capacity of the power supply.
2. The control power supply of servo drives in size C/D/E are in poor contact.	Check whether control circuit cables are connected properly and whether the voltage of control circuit cables (L1C, L2C) is within the specified range.	Re-connect or replace the cables.

- E500.0: Motor overspeed
  Description:

  The actual speed of the motor exceeds the overspeed threshold.

Possible Causes	Confirming Method	Solution
1The phase sequence of motor cables is wrong.	Check whether the servo drive power cables are connected in the correct sequence at both ends.	Connect the U/V/W cables in the correct phase sequence.
2. H0A.08 is set improperly.	Check whether the overspeed threshold is lower than the maximum speed needed: Overspeed threshold = 1.2 x Maximum motor speed (H0A.08 = 0). Overspeed threshold = H0A.08 (when H0A.08 ≠ 0, and H0A-08 < 1.2 x maximum motor speed).	Reset the overspeed threshold according to the mechanical requirements.

Possible Causes	Confirming Method	Solution
3.The input reference exceeds the overspeed threshold.	Check whether the motor speed corresponding to the input reference exceeds the overspeed threshold. • Position control mode:In CSP mode, check the gear ratio 6091.01h/6091.02h to determine the position reference increment for an individual synchronization period and convert it to the speed information.In PP mode, check the gear ratio 6091.01h/6091.02h and determine the 6081h (Profile velocity).In HM mode, check the gear ratio 6091.01h/6091.02h, and determine 6099.01h and 6099.02h. • Speed control mode:Check the gear ratio (6091h), target velocity (60FFh), speed limits (H06.06 to H06.09), and the maximum profile velocity (607Fh). • Torque control mode: Check the speed limit defined by H07.17 in the torque control mode and check the corresponding speed limit.	• Position control mode:CSP: Decrease the position reference increment per synchronization cycle. The host controller should cover the position ramp when generating references.PP: Decrease the value of 6081h or increase the acceleration/ deceleration ramp (6083h, 6084h).HM: Decrease the values of 6099.01h and 6099.02h or increase the acceleration/deceleration ramp (609Ah).Decrease the gear ratio according to actual conditions. • Speed control mode: Decrease the target velocity, speed limit, and gear ratio. In PV mode, increase the speed ramp (6083h and 6084h). In CSV mode, the host controller should cover the speed ramp. • Torque control mode:Set the speed limit to a value lower than the overspeed threshold.
4.The motor speed overshoots.	Check in the software tool whether the speed feedback exceeds the overspeed threshold.	Adjust the gains or mechanical operating conditions.
5.The servo drive is faulty.	The fault persists after the servo drive is powered off and on again.	Replace the servo drive.

- E500.1: Speed feedback overflow
  Description:

  The FPGA speed measurement overflows.

Possible Causes	Confirming Method	Solution
1. FPGA internal speed overflows.	Check whether the servo drive power cables are connected in the correct sequence at both ends.	Connect the U/V/W cables in the correct phase sequence.
2.The motor speed overshoots.	Check in the software tool whether the speed feedback exceeds the overspeed threshold.	Adjust the gains or mechanical operating conditions.

- E500.2: Speed feedback error 2
  Description:

  The MCU has detected that the position feedback increment from the FPGA is too large.

Possible Causes	Confirming Method	Solution
Communication error occurred between boards of the drive.	The alarm persists in spite of repeated power off and on.	Replace the servo drive.

- E602.0: Angle auto-tuning failure
  Description:

  Unusual jitter occurs on the encoder feedback during angle auto-tuning.

Possible Causes	Confirming Method	Solution
The data fed back by the encoder is abnormal.	Check if the encoder communication is being disturbed.	Check the wiring of the encoder.

- E602.2: U/V/W phase sequence reversed
  Description:

  A wrong U/V/W phase sequence is detected during angle auto-tuning.

Possible Causes	Confirming Method	Solution
Incorrect UVW wiring is detected during angle auto-tuning.	Check whether U/V/W phases of the motor are wired correctly.	Exchange cables of any two phases among U/V/W and perform auto-tuning again.

- E605.0: Speed too fast upon S-ON
  Description:

  The motor speed exceeds the rated speed when the servo drive in size A/B is switched on.

Possible Causes	Confirming Method	Solution
The motor speed exceeds the rated speed when the servo drive is switched on.	Check if the drive is enabled when the motor has been driven.	Enable the drive when the motor is at standstill.

- E620.0: Motor overload
  Description:

  The accumulative heat of the motor reaches the fault threshold.

Possible Causes	Confirming Method	Solution
1The motor and encoder cables are connected improperly or in poor contact.	Check the wiring between the servo drive, servo motor and the encoder according to the correct “wiring diagram”.	Connect cables according to the correct wiring diagram. It is recommended to use the cables provided by Inovance. When customized cables are used, prepare and connect the customized cables according to the wiring instructions.
2.The load is so heavy that the effective torque outputted by the motor keeps exceeding the rated torque.	Confirm the overload characteristics of the servo drive or motor. Check whether the average load rate (H0b.12) keeps exceeding 100.0%.	Use a servo drive of higher capacity and a matching servo motor, or reduce the load and increase the acceleration/deceleration time.
3.Acceleration/deceleration is too frequent or the load inertia is too large.	Calculate the mechanical inertia ratio or perform inertia auto-tuning. Check the value of H08.00 (Load inertia ratio). Confirm the individual operation cycle when the servo motor operates cyclically.	Increase the acceleration/ deceleration time in an individual operation cycle.
4.The gains are improper or the stiffness level is too high.	Check whether the motor vibrates and generates unusual noise during operation.	Adjust the gains again.
5.The model of the servo drive or motor is set improperly.	Check the motor model (H00.00) and drive model (H01.10) stored in the bus encoder.	Check the servo drive nameplate and the section "Servo Drive Model and Nameplate" in the Hardware Guide to set the servo drive model (H01.10) and motor model properly.

Possible Causes	Confirming Method	Solution
6.The motor is stalled due to mechanical factors, resulting in overload during operation.	Check the reference and motor speed (H0b.00) through the software tool or keypad. • References in the position control mode: H0b.13 (Position reference counter) • References in the speed control mode: H0b.01 (Speed reference) • References in the torque control mode: H0b.02 (Internal torque reference) Check whether the reference value is not 0 but the motor speed is 0 rpm in the corresponding mode.	Eliminate the mechanical factors.
7.The servo drive is faulty.	The fault persists after the servo drive is powered off and on again.	Replace the servo drive.

Note

When E620.0 occurs, stop the servo drive for at least 30s before further operations.

- E630.0: Motor stall overtemperature protection
  Description:

  The actual motor speed is lower than 10rpm but the torque reference reaches the limit, and such status lasts for the time defined by H0A.32.

Possible Causes	Confirming Method	Solution
1U/V/W output phase loss, wire breakage or incorrect phase sequence occurs on the servo drive.	Perform motor trial run without load and check cable connections and the phase sequence.	Connect cables again according to the correct wiring diagram or replace the cables.
2.Incorrect motor parameters: Incorrect motor parameters (especially the number of pole pairs), angle auto-tuning is not performed	View parameters in group H00 to check whether the number of pole pairs are set properly. Perform angle auto-tuning on the motor several times and check whether the value of H00.28 is consistent during angle auto-tuning.	Modify the motor parameter values.

Possible Causes	Confirming Method	Solution
3.Interference with communication instructions	Check whether jitter occurs on the commands sent from the host controller and whether EtherCAT communication is being disturbed.	Check whether the communication line between the host controller and the servo drive is being disturbed.
4.The motor is stalled due to mechanical factors.	Check the reference and motor speed (H0b.00) through the software tool or keypad. • References in the position control mode: H0b.13 (Position reference counter) • References in the speed control mode: H0b.01 (Speed reference) • References in the torque control mode: H0b.02 (Internal torque reference) Check whether the reference value is not 0 but the motor speed is 0 rpm in the corresponding mode. Check the current feedback (torque reference) waveform.	Check whether any mechanical part gets stuck or eccentric.

Note

When E620.0 occurs, stop the servo drive for at least 30s before further operations.

- E640.0: IGBT junction overtemperature
  Description:

  The IGBT temperature reaches the fault threshold defined by H0A.18.

Possible Causes	Confirming Method	Solution
1The ambient temperature is too high. 2.The drive has been restarted several times to reset the overload fault.	Measure the ambient temperature and view the fault records (set H0b.33 and view H0b.34) to check whether an overload fault/ warning is reported (E620.0, E630.0, E650.0, E909.0, E920.0, E922.0).	• Improve the cooling conditions of the servo drive to lower down the ambient temperature. • Change the fault reset method. After overload occurs, wait for 30s before reset. Increase the capacities of the servo drive and servo motor. Increase the acceleration/ deceleration time and reduce the load.
3.The fan is damaged.	Check whether the fan works properly during operation.	Replace the servo drive.
4.The drive is installed in a wrong direction and the clearance between servo drives is improper.	Check whether the servo drive is installed properly.	Install the servo drive according to the requirements.
5.The servo drive is faulty.	The fault persists even though the servo drive is restarted five minutes after power-off.	Replace the servo drive.

Note

When E620.0 occurs, stop the servo drive for at least 30s before further operations.

- E640.1: Flywheel diode overtemperature
  Description:

  The temperature of the flywheel diode reaches the fault threshold defined by H0A.18.

Possible Causes	Confirming Method	Solution
1The ambient temperature is too high. 2.The drive has been restarted several times to reset the overload fault.	Measure the ambient temperature and view the fault records (set H0b.33 and view H0b.34) to check whether an overload fault/ warning is reported (E620.0, E630.0, E650.0, E909.0, E920.0, E922.0).	• Improve the cooling conditions of the servo drive to lower down the ambient temperature. • Change the fault reset method. After overload occurs, wait for 30s before reset. Increase the capacities of the servo drive and servo motor. Increase the acceleration/ deceleration time and reduce the load.
3.The fan is damaged.	Check whether the fan works properly during operation.	Replace the servo drive.
4.The drive is installed in a wrong direction and the clearance between servo drives is improper.	Check whether the servo drive is installed properly.	Install the servo drive according to the requirements.
5.The servo drive is faulty.	The fault persists even though the servo drive is restarted five minutes after power-off.	Replace the servo drive.

Note

When E620.0 occurs, stop the servo drive for at least 30s before further operations.

- E650.0: Heatsink overtemperature
  Description:

  The temperature of the servo drive power module is higher than the overtemperature threshold.

Possible Causes	Confirming Method	Solution
1The ambient temperature is too high.	Measure the ambient temperature.	Improve the cooling conditions of the servo drive to lower down the ambient temperature.
2.The drive has been restarted several times to reset the overload fault.	View the fault log (set H0b.33 and view H0b.34). Check whether an overload fault or warning (E620.0, E630.0, E650.5, E909.0, E920.0, E922.0) occurs.	Change the fault reset method. After overload occurs, wait for 30s before reset. Increase the capacities of the servo drive and servo motor. Increase the acceleration/ deceleration time and reduce the load.
3.The fan is damaged.	Check whether the fan works properly during operation.	Replace the servo drive.
4.The drive is installed in a wrong direction and the clearance between servo drives is improper.	Check whether the servo drive is installed properly.	Install the servo drive according to the requirements.
5.The servo drive is faulty.	The fault persists even though the servo drive is restarted five minutes after power-off.	Replace the servo drive.

Note

When E620.0 occurs, stop the servo drive for at least 30s before further operations.

- E660.0: The motor temperature is too high
  Description:

  The temperature of the air-cooled motor is too high.

Possible Causes	Confirming Method	Solution
The temperature of the air-cooled motor is too high.	Measure whether the temperature of the air-cooled motor is too high.	Cool the motor down.

- E661.0: STune failure
  Description:

  The gain drops to the low limit during adjustment.

Possible Causes	Confirming Method	Solution
During ETune operation, the gain drops to the lower limit: Position loop gain < 5; Velocity loop gain < 5; Model loop gain < 10.	Check if vibration resonance is properly suppressed in the system. The torque vibration amplitude exceeds the setpoint of H09.11.	1. Set the notch manually. 2. Modify the electronic gear ratio to improve the command resolution, increase the command filter time constant in the parameter configuration interface. 3. Check whether the machine suffers from periodic fluctuation. 4. Set H09.58 to 1 to clear resonance suppression parameters, and perform STune again.

- E662.0: ETune failure
  Description:

  Check whether resonance that occurred during ETune operation cannot be suppressed.

Possible Causes	Confirming Method	Solution
Check whether resonance that occurred during ETune operation cannot be suppressed.	Check whether there is abnormal noise or torque fluctuation during operation.	1. Set the notch manually when vibration cannot be suppressed automatically. 2. Modify the electronic gear ratio to improve the command resolution, increase the command filter time constant or in the parameter configuration interface. 3. Increase the value of H09.11 as appropriate. 4. Check whether the machine suffers from periodic fluctuation. 5. Check whether the positioning threshold is too low. Increase the reference acceleration/ deceleration time.

- E664.0: Resonance too strong
  Description:

  Resonance is present in the servo system and torque fluctuation is greater than the threshold.

Possible Causes	Confirming Method	Solution
Resonance occurs on the servo system and the torque fluctuation amplitude is higher than the value of H09.54.	Check whether there is abnormal noise or torque fluctuation during operation.	1. Check whether the inertia ratio or loop gain parameters are set properly. 2. Check whether resonance parameters are set properly. 3. Increase the value of H09.54 or set H09.54 to 0 to disable this function.

- E731.0： Encoder battery failure
  Description:

The voltage of the absolute encoder battery is lower than 2.9 V.

Possible Causes	Confirming Method	Solution
1The battery is not connected during power-off.	Check whether the battery is connected during power-off.	Set H0d.20 to 1 to clear the fault.
2.The encoder battery voltage is too low.	Measure the battery voltage.	Use a new battery with the matching voltage.

- E733.0: An encoder multi-turn counting error occurs.
  Description:

  An encoder multi-turn counting error occurs.

Possible Causes	Confirming Method	Solution
The encoder is faulty.	Set H0d.20 to 2 to clear the fault, but E733.0 persists after restart.	Replace the motor.

- E735.0: Encoder multi-turn counting overflow
  Description:

  A multi-turn counting overflow occurs on the absolute encoder.

Possible Causes	Confirming Method	Solution
The number of forward revolutions exceeds 32767 or the number of reverse revolutions exceeds 32768.	Check whether the value of H0b.70 (Number of absolute encoder revolutions) is 32767 or 32768 when the servo drive works in the absolute linear mode (H02.01 = 1).	Set H0d.20 to 2 to power on again. Perform homing if necessary.

- E740.0: Absolute encoder communication timeout
  Description:

  Absolute encoder communication timeout

Possible Causes	Confirming Method	Solution
The communication between the servo drive and the encoder times out.	Check the wiring of the encoder and power on the servo drive again.	1. Check whether the encoder version (H00.04) is set properly. 2. Check whether the servo drive software version (H01.00). 3. Check the encoder cable connections. 4. Replace the servo motor.

- E740.2: Absolute encoder error
  Description:

A communication error occurs on the RX side of the encoder.

Possible Causes	Confirming Method	Solution
An error occurs on the communication between the servo drive and the encoder.	Check whether the value of H0b.28 is not 0.	1. Check whether H00.00 (Motor code) is set properly. 2. Check whether the encoder cable is connected properly. 3. Check whether the servo drive and motor are grounded properly. You can wind a magnetic ring on the encoder cable to reduce interference.

- E740.3: Absolute encoder single-turn calculation error
  Description:

  The encoder is faulty.

Possible Causes	Confirming Method	Solution
The encoder is faulty.	Check whether bit7 of H0b.28 is set to 1.	1. Check whether the encoder version (H00.04) is proper. 2. Check whether the encoder cable is proper. 3. Replace the motor.

- E740.6: Encoder write error
  Description:

  The attempt to write the encoder data fails.

Possible Causes	Confirming Method	Solution
An error occurs when writing the position offset after angle auto-tuning.	Replace with a new encoder cable. If the fault no longer occurs after cable replacement, it indicates the original encoder cable is damaged. Keep the motor in a certain position, power on the system several times and observe the change of H0b.17 (Electrical angle). The electrical angle deviation should be within ±30° when the motor position does not change.	Replace with a new encoder cable. If the fault persists after the encoder cable is replaced, the encoder may be faulty. In this case, replace the servo motor.

- E760.0: Encoder over-temperature
  Description:

  The temperature of the absolute encoder is too high.

Possible Causes	Confirming Method	Solution
The temperature of the absolute encoder is too high.	Measure the encoder or motor temperature.	Switch off the S-ON signal to wait for the encoder to cool down.

- E765.0: Nikon encoder over-temperature or overspeed
  Description:

  Nikon encoder temperature too high.

Possible Causes	Confirming Method	Solution
The motor temperature is too high	Check if the ambient temperature or the average load rate is too high.	Switch off the S-ON signal to wait for the encoder to cool down.

- E939.0: Motor power cables disconnected
  Description:

  Motor three phase cable breakage

Possible Causes	Confirming Method	Solution
Motor three phase cable breakage	Check the wiring of U/V/W power cables.	1. Check whether the power cables are disconnected or in poor contact. Re-connect the power cables. 2. Replace the servo motor.

- EA33.0: Encoder read/write check error
  Description:

Encoder parameters are abnormal.

Possible Causes	Confirming Method	Solution
1The serial incremental encoder cable is disconnected or loose.	Check the wiring.	Check for wrong connection, disconnection and poor contact of the encoder cable. Route the motor cable and encoder cable through different routes.
2.An error occurs when reading/writing the serial incremental encoder parameters.	If the fault persists after the servo drive is powered off and on repeatedly, the encoder is faulty.	Replace the servo motor.

- EB00.0: Position deviation too large
  Description:

  The position deviation is larger than the value of 6065h in position control mode.

Possible Causes	Confirming Method	Solution
1U/V/W output phase loss or incorrect phase sequence occurs on the servo drive.	Perform a no-load trial run on the motor and check the wiring.	Connect cables again according to the correct wiring diagram or replace the cables.
2.The servo drive U/V/W cables or the encoder cable is disconnected.	Check the wiring.	Connect the cables again. The servo drive power cables must be connected in the correct order at both ends. Replace with new cables if necessary and ensure cables are connected properly.
3.The motor is stalled due to mechanical factors.	Check the reference and motor speed (H0b.00) through the software tool or keypad. • References in the position control mode: H0b.13 (Position reference counter) • References in the speed control mode: H0b.01 (Speed reference) • References in the torque control mode: H0b.02 (Internal torque reference) Check whether the reference value is not 0 but the motor speed is 0 rpm in the corresponding mode.	Eliminate the mechanical factors.

Possible Causes	Confirming Method	Solution
4.The gain values are too low.	Check the position loop gain and speed loop gain of the servo drive. 1st gain set: H08.00–H08.02; 2nd gain set: H08.03–H08.05.	Adjust the gain values manually or perform gain auto-tuning.
5.The position reference increment is too large.	Position control mode: • In CSP mode, check the gear ratio 6091.01h/ 6091.02h to determine the position reference increment for an individual synchronization period and convert it to the speed information. • In PP mode, check the gear ratio 6091.01h/6091.02h and determine the 6081h (Profile velocity). • In HM mode, check the gear ratio 6091.01h/ 6091.02h, and determine 6099.01h and 6099.02h.	• CSP: Decrease the position reference increment per synchronization cycle. The host controller should cover the position ramp when generating references. • PP: Decrease the value of 6081h or increase the acceleration/deceleration ramp (6083h, 6084h). • HM: Decrease the values of 6099.01h and 6099.02h or increase the acceleration/ deceleration ramp (609Ah). • Decrease the gear ratio according to actual conditions.
6.The value of 6065h is insufficient for the operating conditions.	Check whether the setpoint of 6065h is too low.	Increase the setpoint of 6065h.
7.The drive/motor is faulty.	Monitor the operating waveforms using the oscilloscope function in the software tool: position reference, position feedback, speed reference, torque reference	If the position reference is not 0, but the position feedback is always 0, replace the servo drive or motor.

- EB00.1: Position deviation overflow
  Description:

  The position deviation is too large.

Possible Causes	Confirming Method	Solution
1U/V/W output phase loss or incorrect phase sequence occurs on the servo drive.	Perform a no-load trial run on the motor and check the wiring.	Connect cables again according to the correct wiring diagram or replace the cables.
2.The servo drive U/V/W cables or the encoder cable is disconnected.	Check the wiring.	Connect the cables again. The servo drive power cables must be connected in the correct order at both ends. Replace with new cables if necessary and ensure cables are connected properly.
3.The motor is stalled due to mechanical factors.	Check the reference and motor speed (H0b.00) through the software tool or keypad. • References in the position control mode: H0b.13 (Position reference counter). • References in the speed control mode: H0b.01 (Speed reference). • References in the torque control mode: H0b.02 (Internal torque reference). Check whether the reference value is not 0 but the motor speed is 0 rpm in the corresponding mode.	Eliminate the mechanical factors.
4.The gain values are too low.	Check the position loop gain and speed loop gain of the servo drive. • 1st gain set: H08.00–H08.02; • 2nd gain set: H08.03–H08.05.	Adjust the gain values manually or perform gain auto-tuning.

Possible Causes	Confirming Method	Solution
5.The position reference increment is too large.	Position control mode: • In CSP mode, check the gear ratio 6091.01h/ 6091.02h to determine the position reference increment for an individual synchronization period and convert it to the speed information. • In PP mode, check the gear ratio 6091.01h/6091.02h and determine the 6081h (Profile velocity). • In HM mode, check the gear ratio 6091.01h/ 6091.02h, and determine 6099.01h and 6099.02h.	• CSP: Decrease the position reference increment per synchronization cycle. The host controller should cover the position ramp when generating references. • PP: Decrease the value of 6081h or increase the acceleration/deceleration ramp (6083h, 6084h). • HM: Decrease the values of 6099.01h and 6099.02h or increase the acceleration/ deceleration ramp (609Ah). Decrease the gear ratio according to actual conditions.
6.The drive/motor is faulty.	Monitor the operating waveforms using the oscilloscope function in the software tool: position reference, position feedback, speed reference, torque reference	If the position reference is not 0, but the position feedback is always 0, replace the servo drive or motor.

- EB01.1: Individual position reference increment too large
  Description:

  The target position increment is too large.

Possible Causes	Confirming Method	Solution
The target position increment is too large.	Check the variation between two adjacent target positions using the software tool.	1. Check whether the maximum speed of the motor fulfills the application requirement. If yes, reduce the target position reference increment, which is to lower the profile reference speed. If not, replace the servo motor. 2. Before switching the mode or enabling the servo drive, check whether the target position is aligned with current position feedback. 3. The communication sequence of the host controller is abnormal, leading to slave data error. Check the communication sequence of the host controller.

- EB01.2: Position reference increment too large continuously
  Description:

  The target position increment is too large.

Possible Causes	Confirming Method	Solution
The target position increment is too large.	Check the variation between two adjacent target positions using the software tool.	1. Check whether the maximum speed of the motor fulfills the application requirement. If yes, reduce the target position reference increment, which is to lower the profile reference speed. If not, replace the servo motor. 2. Before switching the mode or enabling the servo drive, check whether the target position is aligned with current position feedback. 3. The communication sequence of the host controller is abnormal, leading to slave data error. Check the communication sequence of the host controller.

- EB01.3: Reference overflow
  Description:

  The target position is still in the process of transmission when the servo limit or software position limit signal is activated and the 32-bit upper/lower limit is reached.

Possible Causes	Confirming Method	Solution
The target position is still in the process of transmission when the servo limit or software position limit signal is activated and the 32-bit upper/lower limit is reached.	Check whether the host controller continues sending commands after overtravel warning is reported by the servo drive.	1. Detect the servo limit signal (bit0 and bit1 of 60FD is recommended) through the host controller. 2. Stop sending limit direction commands when an active servo limit signal is detected by the host controller.

- EB01.4: Target position in single turn absolute mode exceeds max. mechanical single turn position
  Description:

  The target position exceeds the upper/lower limit of the single-turn position in the single-turn absolute mode.

Possible Causes	Confirming Method	Solution
The target position exceeds the upper/lower limit of the single-turn position in the single-turn absolute mode.	Check whether the set target position is within the single-turn upper/lower limit.	Set the target position to a value within the upper/ lower limit.

- EB03.0: Electronic gear ratio beyond the limit - H05.02
  Description:

  H05.02 electronic gear ratio exceeds limit: (0.001–4000 × Encoder resolution/ 10000).

Possible Causes	Confirming Method	Solution
The electronic gear ratio converted by converted exceeds the maximum gear ratio or is less than the minimum gear ratio.	Check if the electronic gear ratio is within the range of 0.001–4000 × Encoder resolution/10000.	Adjust the value of H05.02.

- EB03.1: Electronic gear ratio beyond the limit - Electronic gear ratio 1
  Description:

  1st electronic gear ratio exceeds limit: (0.001–4000 × Encoder resolution/10000).

Possible Causes	Confirming Method	Solution
The group 1 electronic gear ratio exceeds the maximum gear ratio or is less than the minimum gear ratio.	Check whether electronic gear ratio 1 is within the range of 0.001 to 4000 x Encoder resolution/10000.	The electronic gear ratio 1 is used (H05.07/H05.09).

- EE08.0: Synchronization signal loss
  Description:

  The SYNC signal is turned off when the EtherCAT network is in the OP state.

Possible Causes	Confirming Method	Solution
1The SYNC signal is not generated due to hardware errors.	Check whether the SYNC signal period is 0 using the oscilloscope in the software tool.	Replace the servo drive. Contact Inovance for maintenance.
2.The data received by the slave is abnormal during synchronous communication.	• Check whether the shielded twisted pair cable is used as the communication cable. • Check whether the servo drive is well grounded. • Check the Ethernet port of the servo drive is damaged.	• Use the shielded twisted pair cable. • Connect the cable according to the wiring instructions. • Check the network connection status through the first LED on the left.
3.The data transmitted by the master is abnormal during synchronous communication.	• The synchronous clock of the host controller is not activated. • Excessive error occurs on the synchronization clock of the host controller.	Measure the synchronization cycle through an actual oscilloscope or the oscilloscope tool in the software tool. • If the synchronization cycle is 0, the host controller synchronous clock is not activated. In this case, check whether the network cables connected to each slave come in from the IN port and out from the OUT port. If yes, restart the network. If the network cables are connected in the correct sequence, without the need for prior check, restart the network directly. • If the sync cycle is not 0 and within the permissible fluctuation range (2 us) of the drive, increase the synchronization loss threshold of the slave (H0E.32h).
4.When the servo is enabled, the network switches from OP to non-OP.	Check whether the network status switches from OP to non-OP.	Check the network status switchover program of the host controller.

- EE08.1: Status switchover error
  Description:

  When the servo drive is enabled, the EtherCAT network status switches from OP to other status.

Possible Causes	Confirming Method	Solution
1This fault is caused by mal-operation of the master or the operator.	Check whether the master switches the network status when the servo drive is enabled.	Check the network status switchover program of the host controller.
2.The data received by the slave is abnormal during synchronous communication.	• Check whether the shielded twisted pair cable is used as the communication cable. • Check whether the servo drive is well grounded. • Check the Ethernet port of the servo drive is damaged.	• Use the shielded twisted pair cable. • Connect the cable according to the wiring instructions. • Check the network connection status through the first LED on the left.
3.The data transmitted by the master is abnormal during synchronous communication.	• The synchronous clock of the host controller is not activated. • Excessive error occurs on the synchronization clock of the host controller.	Measure the synchronization cycle through an actual oscilloscope or the oscilloscope tool in the software tool. • If the synchronization cycle is 0, the host controller synchronous clock is not activated. In this case, check whether the network cables connected to each slave come in from the IN port and out from the OUT port. If yes, restart the network. If the network cables are connected in the correct sequence, without the need for prior check, restart the network directly. • If the sync cycle is not 0 and within the permissible fluctuation range (2 us) of the drive, increase the synchronization loss threshold of the slave (H0E.32h).
4.When the servo is enabled, the network switches from OP to non-OP.	Check whether the network status switches from OP to non-OP.	Check the network status switchover program of the host controller.

- EE08.3: Network cable connected improperly
  Description:

  The network cable of the servo drive is connected improperly. (The low 16 bits of H0E.29 represents the number of IN port loss events. The high 16 bits of H0E.29 represents the number of OUT port loss events.)

Possible Causes	Confirming Method	Solution
The physical connection of the data link is unstable or the process data is lost due to plug-in/plug-out of the network cable.	Check: 1) whether the network cable of the servo drive is connected securely. 2) whether strong vibration occurs on site. 3) whether the network cable is plugged in or out. 4) whether the network cable provided by Inovance is used.	Check the connection of the network port through the change of the H0E.29 value. Use a new network cable that can connect reliably.

- EE08.4: Data frame loss protection error
  Description:

  PDO data is corrupted due to EMC interference or an inferior network cable.

Possible Causes	Confirming Method	Solution
The data is lost due to EMC interference, poor quality of the network cable or improper connection.	Check whether the high 16 bits of H0E-25 have values that are increased.	• Check whether the servo drive is grounded properly and rectify the EMC problem. • Check whether the network cable used is the one designated by Inovance. • Check whether the network cable is connected properly.

- EE08.5: Data frame transfer error
  Description:

  The upstream slave detects that the data frame has been corrupted and marked, which is then transferred to the downstream slave, leading to a warning event.

Possible Causes	Confirming Method	Solution
The upstream station detects that the data frame has been corrupted and marked, which is then transfered to the slave, leading to a warning report.	Check whether a processing unit error occurs due to transfer error (H0E.27) or invalid frames (H0E.28) upon occurrence of the fault, and check whether no counting is performed in RX-ERR of Port0.	Check the upstream station to locate the fault cause.

- EE08.6: Data update timeout
  Description:

  The slave is in the OP status and does not receive the data frame in a long time.

Possible Causes	Confirming Method	Solution
The data frame is lost or aborted in the upstream slave or the master performance is not up to standard.	Check through the software tool whether the phase difference between SYNC and IRQ exceeds the value of H0E.22 multiplied by the communication period.	• Check whether the operating load of the master CPU is excessive. Increase the communication time or set H0E-22 to a larger value. • Check whether link loss occurs on the upstream slave.

- EE09.0: Software position limit setting error
  Description:

  The lower limit of the software position limit is equal to or larger than the upper limit.

Possible Causes	Confirming Method	Solution
The lower limit of the software position limit is equal to or larger than the upper limit.	Check the values of 607D.01h and 607D.02h.	Reset 607D.01h and 607D.02h and ensure the former is lower than the latter.

- EE09.1: Home setting error
  Description:

  The home offset exceeds the upper/lower limit.

Possible Causes	Confirming Method	Solution
1The home offset is outside the soft limit.	The home offset is outside the software position limit when the encoder works in the incremental mode, absolute linear mode, and single-turn absolute mode.	Set the home offset to a value within the software position limit.
2.The home offset is beyond the upper/lower limit in the rotation mode.	The home offset is outside the mechanical single-turn upper/lower limit when the encoder works in the rotation mode.	Set the home offset to a value within the mechanical single-turn upper/lower limit.

- EE09.2: Gear ratio beyond the limit
  Description:

  Electronic gear ratio exceeds the limit: (0.001, 4000 × Encoder resolution/10000).

Possible Causes	Confirming Method	Solution
The set electronic gear ratio exceeds the preceding range.	The gear ratio 6091.01h/ 6091.02h exceeds the preceding range.	Set the gear ratio according to the preceding range.

- EE09.3: Homing method setting error

Description:

The MCU does not receive the synchronization signal when the servo communication is switched to OP status.

Possible Causes	Confirming Method	Solution
1The communication synchronization clock is configured improperly.	Use another master (such as Beckhoff or Omron PLC) and perform tests to compare between different masters.	Rectify the communication configuration of the master.
2. The communication IN and OUT ports are connected inversely.	Check the connection of the IN and OUT ports.	Connect the IN and OUT ports in the correct sequence.
3.The slave controller chip is damaged.	If the fault persists after the master is replaced, measure the synchronization signal generated by the slave controller integrated circuit with an oscilloscope. If there is no signal, the slave controller integrated circuit is damaged.	Contact Inovance for replacing the slave controller integrated circuit.
4.The MCU pins are damaged.	Test the sync signal generated by the slave controller integrated circuit with an oscilloscope. If there is a signal, the pins of the MCU integrated circuit are damaged.	Contact Inovance to replace the MCU integrated circuit.

- EE09.5: PDO mapping beyond the limit
  Description:

  The mapping objects in TPDO or RPDO exceeds 40 bytes.

Possible Causes	Confirming Method	Solution
The mapping objects in TPDO or RPDO exceeds 40 bytes.	In the host controller servo process parameters, check the number of self-index configured by 1600h or 1A00h.	The mapping objects in TPDO or RPDO must not exceed 40 bytes.

- EE10.0: Protection against MailBox setting error
  Description:
  - Check whether the SM channel is enabled.
  - Check whether the read/write direction is configured correctly.
  - Check whether the mailbox mode applies (single buffer mode).
  - Check whether the length of the data received is within the set range.
  - Check whether the address of the data received is within the set range.

- Check whether the memory of the read/write mailbox overlaps.

Possible Causes	Confirming Method	Solution
11. The master station is configured incorrectly. 2.The slave XML file is incorrect.	The keypad displays the fault code.	Check whether the configuration of SM0 and SM1 channels is wrong.

- EE10.1: SM2 setting error
  Description:
  - PDO mapping object dictionary index exceeds the set maximum (0x1600–0x170A).
  - When SM2 is not enabled, the length of SM and the length of RxPDO are not equal to 0.
  - The length of the RxPDO does not match.
  - Not writing.
  - In the preop state, the address of RxPDO is not in the set address field (maximum and minimum addresses), or in a non-preop state, the address of SM2 is equal to the starting address of RxPDO.
  - The memory of SM2 overlaps with adjacent SM1 or SM3.

Possible Causes	Confirming Method	Solution
1. 1. The master station is configured incorrectly. 2. The slave XML file is incorrect.	Check the configuration of SM2 for errors. Check whether the index of the RxPDO mapping object dictionary is out of bounds (the maximum index is 0x0A).	Ensure that the SM2 channel is configured correctly. The index of the RxPDO mapping object dictionary is correct.

- EE10.2: SM3 configuration error
  Description:
  - The index of the object dictionary mapped by PDO exceeds the maximum value (0x1A00–0x1B0A).
  - When SM3 is not enabled, the length of SM and the length of TxPDO are not equal to 0.
  - The length of the TxPDO does not match.
  - Not reading.
  - In the preop state, the address of TxPDO is not in the set address field (maximum and minimum addresses), or in a non-preop state, the address of SM3 is equal to the starting address of TxPDO.
  - Buffer overruns. The memory of SM2 overlaps SM3 and SM0 or SM1).

Possible Causes	Confirming Method	Solution
1. 1. The master station is configured incorrectly. 2. The slave XML file is incorrect.	Check whether SM3 channel is configured improperly. Check whether the index of the TxPDO mapping object dictionary is out of bounds (the maximum index is 0x1A).	Ensure SM3 channel is configured correctly. The index of the TxPDO mapping object dictionary is correct.

- EE10.3: PDO watchdog setting error
  Description:
  - The watchdog is enabled but the count is 0.
  - The watchdog is not enabled but the count is non-zero.

Possible Causes	Confirming Method	Solution
1. The watchdog is enabled but the count is 0. 2. The watchdog is not enabled but the count is non-zero.	The settings of the master station is incorrect.	Make sure the watchdog time is configured correctly.

- EE10.4: PLL error protection not completed (no sync signal)
  Description:

  During SAFEOP to OP, DC is enabled, but not running.

Possible Causes	Confirming Method	Solution
During SAFEOP_2_OP, DC is enabled, but not running.	The settings of the master station is incorrect.	Make sure a sync0 signal is generated.

Note

When more than 25 SV660N drives are networked with Omron NX701, you need to modify the cable length defined in the Omron master station. The cable length is calculated based on the fact that one drive needs a length of 36 m.

- EE11.0: ESI check error
  Description:

  The attempt to load the XML file fails during EtherCAT communication.

Possible Causes	Confirming Method	Solution
1The XML configuration file is not programmed.	Check whether the XML version displayed in H0E.96 is normal.	Program the XML file.
2.The drive is faulty and the XML file is modified illegally.	The XML version number is not empty.	Set H0E. 37 to 1 and power on again.

- EE11.1: EEPROM read error
  Description:

  The EEPROM communication of external EtherCAT devices fails.

Possible Causes	Confirming Method	Solution
The EtherCAT data in the EEPROM cannot be read	This fault persists after repeated restart.	Replace the servo drive.

- EE11.2: EEPROM update failure
  Description:

  The communication is normal but the message in the EEPROM is wrong or lost.

Possible Causes	Confirming Method	Solution
The EtherCAT data in the EEPROM cannot be updated.	This fault persists after repeated restart.	Replace the servo drive.

- EE11.3: ESI and drive mismatch
  Description:

  ESI and drive mismatch

Possible Causes	Confirming Method	Solution
1The programmed XML file is not compatible with the drive. 2.The drive is faulty and the XML file is modified illegally.	Check whether the XML version displayed in H0E.96 is normal.	Program the XML file.

- EE12.0: EtherCAT initialization failure
  Description:

  EtherCAT peripheral initialization failed after power-on.

Possible Causes	Confirming Method	Solution
1 The device configuration file is not programmed.	The slave ID is null when the host controller scans the slave.	Program the device configuration file.
2. The servo drive is faulty.	The servo drive is faulty.	Replace the servo drive.

- EE13.0: EtherCat sync period setting error
  Description:

  After the system switches over to the running mode, the synchronization cycle is not an integral multiple of 125 us or 250 us.

Possible Causes	Confirming Method	Solution
Set the synchronization period to an integer multiple of 125 us or 250 us.	Check the setting of the synchronization period in the controller.	Modify the synchronization cycle to an integral multiple of 125 us or 250 us.

- EE15.0: Excessive EtherCAT sync period error
  Description:

  The synchronization cycle error exceeds the threshold.

Possible Causes	Confirming Method	Solution
The synchronization cycle error of the controller is too large.	• Measure the synchronization cycle of the controller. • Through a digital oscilloscope. • Measure the synchronization cycle of the controller by using the oscilloscope function in the software tool.	Increase the value of H0E.32.

Note

You can clear the fault or restart the power supply 30s after overload occurs.

- EE16.0: MCU and ESC communication error
  Description:

  MCU and ESC communication timeout

Possible Causes	Confirming Method	Solution
MCU and ESC communication timeout	The fault persists after repeated restart.	Replace the servo drive.

4.1 Internal Faults

When any one of the following fault occurs, contact Inovance for technical support.

- E602.0: Angle auto-tuning failure
- E220.0: Phase sequence incorrect
- EA40.0: Parameter auto-tuning failure
- E111.0: Internal parameter error

5 List of Warning Codes

Table 5–1 No. 3 resettable warning list

Fault code	Fault subcode	Alarm Name	Fault Level	Resettable	Error Code (603Fh)	Aux. Code (203Fh)
E108	E108.0	Parameter write error	No. 3	Yes	0x5530	0x01500150
	E108.1	Parameter read error	No. 3	Yes	0x5530	0x11500150
	E108.2	Invalid check on data written in EEPROM	No. 3	Yes	0x5530	0x21500150
	E108.3	Invalid check on data read in EEPROM	No. 3	Yes	0x5530	0x31500150
	E108.4	Single data entry is read frequently	No. 3	Yes	0x0108	0x41500150
E120	E120.3	The motor and drive do not match in the power	No. 1	No	0x7122	0x31200120
E121	E121.0	Duplicate S-ON instruction	No. 3	Yes	0x0121	0x01210121
E122	E122.0	Multi-turn absolute encoder setting error	No. 3	Yes	0x6320	0x01220122
E600	E600.0	Inertia auto-tuning failure	No. 3	Yes	0x0600	0x06000600
E601	E601.0	Homing warning	No. 3	Yes	0x0601	0x06010601
	E601.1	Homing switch error	No. 3	Yes	0x0601	0x16010601
	E601.2	Homing mode setting error	No. 3	Yes	0x6320	0x26010601
E730	E730.0	Encoder battery warning	No. 3	Yes	0x7305	0x07300730
E900	E900.0	DI emergency braking	No. 3	Yes	0x0900	0x09000900
E901	E901.0	Invalid stop mode	No. 3	Yes	0x0901	0x09010901
E902	E902.0	DI setting invalid	No. 3	Yes	0x6320	0x09020902
	E902.1	DO setting invalid	No. 3	Yes	0x0902	0x19020902
	E902.2	Torque reach setting invalid	No. 3	Yes	0x0902	0x29020902
	E902.3	Invalid position comparison target	No. 3	Yes	0x0902	0x39020902
E908	E908.0	Model identification failure	No. 3	Yes	0x0908	0x09080908
E909	E909.0	Motor overload	No. 3	Yes	0x3230	0x09090909
E910	E910.0	Control circuit overvoltage	No. 3	Yes	0x3210	0x09100910
E920	E920.0	The regenerative resistor is overloaded.	No. 3	Yes	0x3210	0x09200920
E922	E922.0	Resistance of the external regenerative resistor too small	No. 3	Yes	0x6320	0x09220922
E924	E924.0	Regenerative transistor over-temperature	No. 3	Yes	0x3230	0x09240924

Fault code	Fault subcode	Alarm Name	Fault Level	Resettable	Error Code (603Fh)	Aux. Code (203Fh)
E941	E941.0	Modified parameters activated at next power-on	No. 3	Yes	0x6320	0x09410941
E942	E942.0	Parameters saved frequently	No. 3	Yes	0x7600	0x09420942
E950	E950.0	Forward overtravel warning	No. 3	Yes	0x5443	0x09500950
E952	E952.0	Reverse overtravel warning	No. 3	Yes	0x5444	0x09520952
E980	E980.0	Encoder algorithm error	No. 3	Yes	0x0980	0x09800980
EA41	EA41.0	Torque fluctuation compensation failure	No. 3	Yes	0x0A41	0x0A410A41

6 Fault Code Table

No. 1 non-resettable faults:

Table 6–1 List of No. 1 non-resettable faults

Fault code	Fault subcode	Name	Fault Level	Resettable	Error Code (603Fh)	Aux. Code (203Fh)
E101	E101.0	Abnormal parameters in groups H02 and above	No. 1	No	0x6320	0x01010101
	E101.1	Parameter error in group H00/H01	No. 1	No	0x6320	0x11010101
	E101.2	Address error in read/ write operation after the number of parameters changes	No. 1	No	0x6320	0x21010101
	E101.9	Parameter attribute initialization check error.	No. 1	No	0x0101	0x91010101
E102	E102.0	FPGA communication establishment error	No. 1	No	0x7500	0x01020102
	E102.1	FPGA initialization start error	No. 1	No	0x7500	0x11020102
	E102.8	FPGA and MCU version mismatch	No. 1	No	0x7500	0x81020102
E104	E104.1	MCU running timeout (MCU break down)	No. 1	No	0x7500	0x11040104
	E104.2	FPGA running timeout (FPGA break down)	No. 1	No	0x7500	0x21040104
	E104.4	MCU command update timeout	No. 1	No	0x7500	0x41040104
E120	E120.0	Unknown encoder model	No. 1	No	0x7122	0x01200120
	E120.1	Unknown motor model	No. 1	No	0x7122	0x11200120
	E120.2	Unknown drive model	No. 1	No	0x7122	0x21200120
	E120.5	Motor and drive current mismatch	No. 1	No	0x7122	0x51200120
	E120.6	FPGA and motor model mismatch	No. 1	No	0x7122	0x61200120
	E120.7	Model check error	No. 1	No	0x0120	0x71200120
	E120.8	Junction temperature parameter check error	No. 1	No	0x0120	0x81200120
E136	E136.0	Encoder ROM motor parameter check error	No. 1	No	0x7305	0x01360136
	E136.1	Encoder ROM motor parameter read error	No. 1	No	0x7305	0x11360136

Fault code	Fault subcode	Name	Fault Level	Resettable	Error Code (603Fh)	Aux. Code (203Fh)
E140	E140.0	Encryption chip check fault	No. 1	No	0x0140	0x01400140
	E140.1	MCU key calculation failed	No. 1	No	0x0140	0x21400140
	E140.2	Encryption chip version error	No. 1	No	0x0140	0x31400140
E201	E201.0	Phase-P overcurrent	No. 1	No	0x2312	0x02010201
	E201.1	Phase-U overcurrent	No. 1	No	0x2312	0x12010201
	E201.2	Phase-V overcurrent	No. 1	No	0x2312	0x22010201
	E201.4	Phase-N overcurrent	No. 1	No	0x2312	0x42010201
E210	E210.0	Output short circuited to ground	No. 1	No	0x2330	0x02100210
E234	E234.0	Runaway	No. 1	No	0x0234	0x02340234
E740	E740.0	Absolute encoder communication timeout	No. 1	No	0x0740	0x07400740
	E740.2	Absolute encoder error	No. 1	No	0x7305	0x27400740
	E740.3	Absolute encoder single-turn calculation error	No. 1	No	0x7305	0x37400740
	E740.6	Encoder write error	No. 1	No	0x7305	0x67400740
E765	E765.0	Nikon encoder over-temperature or overspeed	No. 1	No	0x0765	0x07650765
EA33	EA33.0	Encoder read/write check error	No. 1	No	0x7305	0x0A330A33
EE12	EE12.0	EtherCAT initialization failure	No. 1	No	0x0E12	0x0E120E12
EE16	EE16.0	MCU and ESC communication error	No. 1	No	0x0E16	0x0E160E16

No. 1 resettable faults

Table 6–2 List of No. 1 resettable faults

Fault code	Fault subcode	Name	Fault Level	Resettable	Error Code (603Fh)	Aux. Code (203Fh)
E150	E150.0	STO safety state applied	No. 1	Yes	0x0150	0x01500150
	E150.1	STO input state abnormal	No. 1	Yes	0x0150	0x11500150
	E150.2	Buffer 5 V supply error	No. 1	Yes	0x0150	0x21500150
	E150.3	STO input circuit hardware diagnosis failure	No. 1	Yes	0x0150	0x31500150
	E150.4	PWM Buffer hardware diagnosis failure	No. 1	Yes	0x0150	0x41500150
E208	E208.2	Encoder communication timeout	No. 1	Yes	0x0208	0x22080208
	E208.4	FPGA current loop operation timeout	No. 1	Yes	0x0208	0x42080208

Fault code	Fault subcode	Name	Fault Level	Resettable	Error Code (603Fh)	Aux. Code (203Fh)
E320	E320.0	The regenerative resistor is overloaded.	No. 1	Yes	0x0320	0x03200320
E400	E400.0	Main circuit overvoltage	No. 1	Yes	0x3210	0x04000400
E410	E410.0	Main circuit undervoltage	No. 1	Yes	0x3220	0x04100410
	E410.1	Main circuit de-energized	No. 1	Yes	0x0410	0x14100410
E500	E500.0	Motor overspeed	No. 1	Yes	0x8400	0x05000500
	E500.1	Speed feedback overflow	No. 1	Yes	0x8400	0x15000500
	E500.2	FPGA position feedback pulse overspeed	No. 1	Yes	0x0500	0x25000500
E602	E602.0	Angle auto-tuning failure	No. 1	Yes	0x0602	0x06020602
	E602.2	U/V/W phase sequence reversed	No. 1	Yes	0x0602	0x26020602
E605	E605.0	Speed too fast upon S-ON	No. 1	Yes	0x8400	0x06050605
E620	E620.0	Motor overload	No. 1	Yes	0x3230	0x06200620
E630	E630.0	Motor stall overtemperature protection	No. 1	Yes	0x7121	0x06300630
E640	E640.0	IGBT junction overtemperature	No. 1	Yes	0x4210	0x06400640
	E640.1	Flywheel diode overtemperature	No. 1	Yes	0x0640	0x16400640
E650	E650.0	Heatsink overtemperature	No. 1	Yes	0x4210	0x06500650
E660	E660.0	The motor temperature is too high	No. 1	Yes	0x4210	0x06600660
E939	E939.0	Motor power cables disconnected	No. 1	Yes	0x0939	0x09390939

No. 2 resettable faults

Table 6–3 List of No. 2 resettable faults

Fault code	Fault subcode	Name	Fault Level	Resettable	Error Code (603Fh)	Aux. Code (203Fh)
E122	E122.1	Different DIs assigned with the same function	No. 2	Yes	0x6320	0x11220122
	E122.3	Upper limit in the rotation mode too high	No. 2	Yes	0x6320	0x31220122
E420	E420.0	Main circuit phase loss	No. 2	Yes	0x3130	0x04200420
E430	E430.0	Control power supply undervoltage	No. 2	Yes	0x3120	0x04300430
E661	E661.0	STune failure	No. 2	Yes	0x0661	0x06610661
E662	E662.0	ETune failure	No. 2	Yes	0x0662	0x06620662
E664	E664.0	Resonance too strong	No. 2	Yes	0x0664	0x06640664
E731	E731.0	Encoder battery failure	No. 2	Yes	0x7305	0x07310731

Fault code	Fault subcode	Name	Fault Level	Resettable	Error Code (603Fh)	Aux. Code (203Fh)
E733	E733.0	An encoder multi-turn counting error occurs.	No. 2	Yes	0x7305	0x07330733
E735	E735.0	Encoder multi-turn counting overflow	No. 2	Yes	0x7305	0x07350735
E760	E760.0	Encoder over-temperature	No. 2	Yes	0x4210	0x07600760
EB00	EB00.0	Position deviation too large	No. 2	Yes	0x8611	0x0B000B00
	EB00.1	Position deviation overflow	No. 2	Yes	0x8611	0x1B000B00
EB01	EB01.1	Individual position reference increment too large	No. 2	Yes	0x6320	0x1B010B01
	EB01.2	Position reference increment too large continuously	No. 2	Yes	0x6320	0x2B010B01
	EB01.3	Reference overflow	No. 2	Yes	0x6320	0x3B010B01
	EB01.4	Target position in single turn absolute mode exceeds max. mechanical single turn position	No. 2	Yes	0x6320	0x4B016B01
EB03	EB03.0	Electronic gear ratio beyond the limit - H05.02	No. 2	Yes	0x0B03	0x0B030B03
	EB03.1	Electronic gear ratio beyond the limit - Electronic gear ratio 1	No. 2	Yes	0x0B03	0x1B030B03
EE08	EE08.0	Synchronization signal loss	No. 2	Yes	0x0E08	0x0E080E08
	EE08.1	Status switchover error	No. 2	Yes	0x0E08	0x1E080E08
	EE08.3	Network cable connected improperly	No. 2	Yes	0x0E08	0x3E080E08
	EE08.4	Data frame loss protection error	No. 2	Yes	0x0E08	0x4E080E08
	EE08.5	Data frame transfer error	No. 2	Yes	0x0E08	0x5E080E08
	EE08.6	Data update timeout	No. 2	Yes	0x0E08	0x6E080E08
EE09	EE09.0	Software position limit setting error	No. 2	Yes	0x6320	0x0E090E09
	EE09.1	Home setting error	No. 2	Yes	0x6320	0x1E090E09
	EE09.2	Gear ratio beyond the limit	No. 2	Yes	0x6320	0x2E090E09
	EE09.3	Homing method setting error	No. 2	Yes	0x6320	0x3E090E09
	EE09.5	PDO mapping beyond the limit	No. 2	Yes	0x6320	0x5E090E09

Fault code	Fault subcode	Name	Fault Level	Resettable	Error Code (603Fh)	Aux. Code (203Fh)
EE10	EE10.0	Protection against MailBox setting error	No. 2	Yes	0x0E10	0x0E100E10
	EE10.1	SM2 setting error	No. 2	Yes	0x0E10	0x1E100E10
	EE10.2	SM3 configuration error	No. 2	Yes	0x0E10	0x2E100E10
	EE10.3	PDO watchdog setting error	No. 2	Yes	0x0E10	0x3E100E10
	EE10.4	PLL error protection not completed (no sync signal)	No. 2	Yes	0x0E10	0x4E100E10
EE11	EE11.0	ESI check error	No. 2	Yes	0x5530	0x0E110E11
	EE11.1	EEPROM read error	No. 2	Yes	0x5530	0x1E110E11
	EE11.2	EEPROM update failure	No. 2	Yes	0x5530	0x2E110E11
	EE11.3	ESI and drive mismatch	No. 2	Yes	0x0E11	0x3E110E11
EE13	EE13.0	EtherCat sync period setting error	No. 2	Yes	0x6320	0x0E130E13
EE15	EE15.0	Excessive EtherCAT sync period error	No. 2	Yes	0x0E15	0x0E150E15

19011908B00

Shenzhen Inovance Technology Co., Ltd.

www.inovance.com

Add.: Inovance Headquarters Tower, High-tech Industrial Park, Guanlan Street, Longhua New District, Shenzhen
Tel: (0755) 2979 9595 Fax: (0755) 2961 9897

Suzhou Inovance Technology Co., Ltd.

www.inovance.com

Add.: No. 16 Youxiang Road, Yuexi Town, Wuzhong District, Suzhou 215104, P.R. China
Tel: (0512) 6637 6666 Fax: (0512) 6285 6720