



SV670N Series Servo Drive Troubleshooting Guide



Industrial
Automation



Intelligent
Elevator



New Energy
Vehicle



Industrial
Robot



Rail
Transit



Data code 19011863 A01

Preface

Introduction

Thank you for purchasing the SV670N series servo drive developed by Inovance.

The SV670N series servo drive is a high-end servo drive designed based on global-leading standards and high-end application needs. It is featured with high speed, high precision, high performance, and tuning-free Function.

The servo drive covers a power range from 0.05 kW to 7.5 kW and carries EtherCAT communication interfaces to work with the host controller for a networked operation of multiple servo drives. The drive comes with the ITune function which supports adaptive stiffness level setting, inertia auto-tuning, and vibration suppression for easy use. The servo drive, together with an MS1 series high-response servo motor (with ultra-low, low or medium inertia) equipped with a 23-bit single-turn/multi-turn absolute encoder, serve to deliver a quiet and stable operation and accurate process control through the fully closed-loop function and internal process segment function.

The drive also offers dynamic braking, and STO (option) and built-in brake output (no external relay is needed) (option). The drive aims to achieve quick and accurate position control, speed control, and torque control through high-performance solutions for automation equipment in such industries as electronic manufacturing, lithium batteries, manipulators, packaging, and machine tools.

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

More Documents

Name	Data Code	Description
SV670N Series Servo Drive Selection Guide	19011851	Provides instructions on product selection, including the list of supporting components, technical data on the drive and motor, and the selection guide of cables.
SV670N Series Servo Drive installation Guide	19011862	Presents installation of the servo drive, including installation steps, , mechanical installation, and electrical installation.
SV670N Series Servo Drive Hardware Guide	19011853	Presents electrical design guidance of the equipment, description of terminals, required certificates and standards and solutions to common EMC problems.
SV670N Series Servo Drive Commissioning Guide	19011855	Presents servo commissioning, parameter descriptions, including the operating panel, commissioning software, commissioning procedure and a parameter list.

Name	Data Code	Description
SV670N Series Servo Drive Function Guide	19011860	Presents functions and parameters, including function overview, basic servo functions, adjustment and parameter list.
SV670N Series Servo Drive Communication Guide	19011865	Presents functions and parameters of the servo drive, including EtherCAT communication configuration, parameter description, and communication application cases.
SV670N Series Servo Drive Troubleshooting Guide	19011863	Introduces faults and fault levels, the troubleshooting process, warning codes and fault codes.
SV670N Series Servo Drive Maintenance Guide	19011864	Provides instructions on maintenance and repair of the equipment.
SV670N Series Servo Drive Safety Guide	19011861	Presents the safety function and related certifications and standards, wiring, commissioning process, troubleshooting, and functions.
SV670N Series Servo Drive Manual Package	PS00005527	Provides information on selection, installation, commissioning, function, troubleshooting and parameters of the equipment.

Revision History

Date of Revision	Version	Description
2022-06	A01	<ul style="list-style-type: none"> ● Changed E122.6 from Cat-II fault to warning. ● Changed the remedy for EB03.2. ● Added information on faults E108.4, E120.3, E122.9 and EB02.1. ● Updated the schematic diagram of the drive.
2022-03	A00	First release.

Document Acquisition

This manual is not delivered with the product. You can obtain the PDF version by visiting:

- <http://www.inovance.com>.
- Scan the QR code on the equipment to acquire more.

Table of Contents

Preface	1
General Safety Instructions	4
1 Fault Level and Display	11
2 Fault Reset	12
3 Description of Warning Codes	14
4 Description of Fault Codes	31
4.1 Troubleshooting	31
4.2 Internal Faults	94
5 List of Warning Codes.....	95
6 List of Fault Codes.....	97

General Safety Instructions

Safety Precautions

- This section explains the safety precautions that need to be observed to use this product correctly. Before using this product, please read the instruction manual and correctly understand the relevant information of safety precautions. Failure to comply with the safety precautions may result in death, serious injury, or equipment damage.
- "CAUTION", "WARNING", and "DANGER" items in the guide only indicate some of the precautions that need to be followed; they just supplement the safety precautions.
- Use this equipment according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper use.

Safety Levels and Definitions



Indicates that failure to comply with the notice will result in death or severe personal injuries.



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.

General Safety Instructions

- Drawings in the selection 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 instructions. Install the covers or protective guards as specified, and use the equipment in accordance with the instructions described in the user guide.
- The drawings in the guide are shown for illustration only and may be different from the product you purchased.

Unpacking **WARNING**

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

 **CAUTION**

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

Storage and Transportation **WARNING**

- Large-scale or heavy equipment must be transported by qualified professionals using specialized hoisting equipment. Failure to comply may result in personal injuries or equipment damage.
- Before hoisting the equipment, ensure the equipment components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in personal injuries or equipment damage.
- Never stand or stay below the equipment when the equipment is being hoisted by the hoisting equipment.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply may result in personal injuries or equipment damage.

 CAUTION

- 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 the equipment based on the storage and transportation requirements. Failure to comply will result in equipment damage.
- Avoid storing or transporting the equipment in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the equipment 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

 DANGER

- The equipment can be operated by well-trained and qualified professionals only. Non-professionals are not allowed.

 WARNING

- Read through the guide and safety instructions before installation.
- Do not install this equipment in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in an electric shock.
- When installing the equipment in a closed environment (such as a cabinet or casing), 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 the equipment.
- Do not fiddle with the bolts used to fix equipment components or the bolts marked in red.
- When the equipment is installed in a cabinet or final assembly, a fireproof enclosure providing both electrical and mechanical protections 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 an incombustible object such as a metal. Keep the equipment away from combustible objects. Failure to comply will result in a fire.

 CAUTION

- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the cloth or paper on the top of the equipment to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.
- Resonance may occur when the equipment operating at a constant speed executes variable speed operations. In this case, install the vibration-proof rubber under the motor frame or use the vibration suppression function to reduce resonance.

Wiring

 DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Before wiring, cut off power connections with all equipment. Residual voltage exists after power cut-off. Therefore, wait at least the time designated on the equipment warning label before further operations. Measure the DC voltage of the main circuit and make sure it is below the safe voltage, otherwise there will be the danger of electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with 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.

 WARNING

- Do not connect the input power supply to the output end of the equipment. Failure to comply will result in equipment damage or even a fire.
- When connecting a drive to the motor, check that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor 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.
- Fix the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may overheat or damage the connecting part, resulting in a fire.
- After wiring is done, check that all cables are connected properly and no screws, washers or exposed cables are left inside the equipment. Failure to comply may result in an electric shock or equipment damage.

 CAUTION

- During wiring, follow the proper electrostatic discharge (ESD) procedure, and wear an antistatic wrist strap. Failure to comply will damage the equipment or the internal circuits of the equipment.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding purpose. Failure to comply will result in equipment malfunction.

Power-on



- Before power-on, check that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Check that the power supply meets equipment requirements before power-on to prevent equipment damage or a fire.
- After power-on, do not open the cabinet door or protective cover of the equipment, touch any terminal, or disassemble any unit or component of the equipment. Failure to comply will result in an electric shock.



- Perform a trial run after wiring and parameter setting to ensure the equipment operates safely. Failure to comply may result in personal injuries or equipment damage.
- Before power-on, make sure that the rated voltage of the equipment is consistent with that of the power supply. Failure to comply may result in a fire.
- Before power-on, check that no one is near the equipment, motor, or machine. Failure to comply may result in death or personal injuries.

Operation



- The equipment must be operated only by professionals. Failure to comply will result in death or personal injuries.
- Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply will result in an electric shock.







- Do not touch the equipment casing, fan, or resistor with bare hands to feel the temperature. Failure to comply may result in personal injuries.
- Prevent metal or other objects from falling into the equipment during operation. Failure to comply may result in a fire or equipment damage.

Maintenance



- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Do not maintain the equipment with power ON. Failure to comply will result in an electric shock.
- Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
- In case of a permanent magnet motor, do not touch the motor terminals immediately after power-off because the motor terminals will generate induced voltage during rotation even after the equipment power supply is off. Failure to comply will result in an electric shock.

 WARNING <ul style="list-style-type: none"> • Perform routine and periodic inspection and maintenance on the equipment according to maintenance requirements and keep a maintenance record.
Repair
 DANGER <ul style="list-style-type: none"> • Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals. • Do not repair the equipment with power ON. Failure to comply will result in an electric shock. • Before inspection and repair, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
 WARNING <ul style="list-style-type: none"> • Submit the repair request according to the warranty agreement. • When the fuse is blown or the circuit breaker or earth leakage current breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in death, personal injuries or equipment damage. • When the equipment is faulty or damaged, the troubleshooting and repair work must be performed by professionals that follow the repair instructions, with repair records kept properly. • Replace quick-wear parts of the equipment according to the replacement instructions. • Do not use damaged equipment. Failure to comply may result in death, personal injuries, or severe equipment damage. • After the equipment is replaced, check the wiring and set parameters again.
Disposal
 WARNING <ul style="list-style-type: none"> • 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.

Additional Precautions


Cautions for the 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.

- Dynamic braking is common in rotating mechanical structures. For example, when a motor has stopped running, it keeps rotating due to the inertia of its load. In this case, this motor is in the regenerative state and short-circuit current passes through the dynamic brake. If this situation continues, the drive, and even the motor, may be burned.

Safety Label

For safe equipment operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. See the following table for descriptions of the safety labels.

Safety Label	Description
 <p> 危険 DANGER 高压注意 Hazardous Voltage 高温注意 High Temperature </p>	<ul style="list-style-type: none"> • Never fail to connect the protective earth (PE) terminal. Read through the guide and follow the safety instructions before use. • Never fail to connect Protective Earth (PE) terminal. Read the manual 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 terminals with 15 minutes after Disconnect the power. Risk of electrical shock. • Do not touch the heatsink with power ON to prevent the risk of burn. • Do not touch heatsink when power is ON. 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 20 faults and warnings and values of status parameters upon fault/warning. Among the latest 5 faults/warnings, if a fault/warning occurs repetitively, the servo drive records the fault/warning code and the drive status only once.

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.

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

H0b.34 (Hexadecimal)	Description
0101	0: No. 1 non-resettable fault 101: Fault code
2130	2: No. 1 resettable fault 130: Fault code
6121	6: No. 2 resettable fault 121: Fault code
E110	E: No. 3 resettable warning 110: Warning code

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	Confirming Method
FunIN.2	ALM-RST	Fault/Warning reset signal	<p>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.</p> <ul style="list-style-type: none">• Inactive: Not resetting the fault/warning• Active: Resetting the fault/warning

3 Description of Warning Codes

- E108.0: Parameter write error

Cause:

Parameter values cannot be written to e2prom.

Cause	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

Cause:

Parameter values cannot be read from e2prom.

Cause	Confirming Method	Solution
The parameter-read operation is abnormal, and the system indicates an e2prom read error	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: Check on data written in e2prom failed

Cause:

The check on the data written in e2prom fails.

Cause	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: Check on data read in e2prom failed

Cause:

The check on the data read in e2prom fails.

Cause	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 stored too many times

Cause:

Single data is stored too frequently.

Cause	Confirming Method	Solution
That may damage e2prom over time.	<ol style="list-style-type: none"> 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 "Func Test 1" through the oscilloscope channel. Be sure to display it in hexadecimal. This channel displays the address that e2prom is storing. 3. Check the storage count through the oscilloscope channel "Func Test 2". 	<ol style="list-style-type: none"> 1. If the alarm is caused by manually modifying a certain parameter or object dictionary, there will be no frequent storage of a certain data during operation, and you can reset the fault. 2. Check the abnormal parameter through H0b.90 or oscilloscope channel, and find out the cause. For example, if the host controller program frequently writes parameters through SDO, you can modify the program to stop it.

- E110.0: Frequency-division pulse output setting error

Cause	Confirming Method	Solution
The number of frequency divisions (quadrupled) exceeds the motor revolutions	Check the value of H05.17	Adjust the value of H05.17 on the basis of the motor revolutions

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

Cause:

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

Cause	Confirming Method	Solution
the motor and drive do not match in the rated power.	Check rated motor voltage and current (H00.09, H00.11) and rated drive power (H01.10, H01.16).	<ul style="list-style-type: none"> 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: Invalid S-ON command

Cause:

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

Cause	Confirming Method	Solution
The external S-ON signal is active when servo drive is enabled internally.	Check whether the following auxiliary functions are used: Check whether DI functions (H0d.02, H0d.03, and H0d.12) are used and whether 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

Cause:

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

Cause	Confirming Method	Solution
The motor does not match the absolute position mode or the motor code is set incorrectly.	<ol style="list-style-type: none"> Check the motor nameplate to see whether the motor is configured with a multi-turn absolute encoder. Check whether H00.00 (motor code) is set properly. 	Reset H00.00 (motor code) according to the motor nameplate or use a suitable motor.

- E122.6: Absolute function setting fault of the 2nd encoder

Cause:

The motor does not match the absolute mode.

Cause	Confirming Method	Solution
The motor does not match the absolute mode.	Check the motor nameplate to see whether the motor is configured with a multi-turn absolute encoder.	Set H0F.02 to 0.

- E510.0: Frequency division output overspeed

Cause:

The single-channel output pulse frequency exceeds the frequency upper limit allowed by the hardware (4 MHz) when pulse output is used ($H05.38 = 0/1/2$).

Cause	Confirming Method	Solution
The MCU detects excessive pulse increment fed back by FPGA.	When H05.38 is set to 0 (encoder frequency-division output) or 2 (2nd encoder frequency-division output), check whether the output pulse frequency corresponding to the motor speed upon fault exceeds the limit. Output pulse frequency (Hz) = Motor speed (rpm)/60 x H05.17	Decrease the value of H05.17 (encoder frequency-division pulses) to allow the output pulse frequency, within the speed range required by the machine, to drop below the frequency upper limit allowed by the hardware.
	The input pulse frequency exceeds 2 MHz or interference exists in the pulse input pins when H05.38 is set to 1 (Reference pulse synchronous output). <ul style="list-style-type: none"> ● Low-speed pulse input pins: open-collector input terminals: PULLHI, PULSE+, PULSE-, SIGN+, SIGN-; maximum pulse frequency: 200 kpps. ● High-speed pulse input pins: differential input terminals: HPULSE+, HPULSE-, HSIGN+, HSIGN-; maximum pulse frequency: 8 Mpps. 	Decrease the input pulse frequency to a value within the frequency upper limit allowed by hardware. Note: In this case, if you do not modify the electronic gear ratio, the motor speed will be reduced. If the input pulse frequency is high but is still within the frequency upper limit allowed by the hardware, take anti-interference measures (use STP cable for pulse input and set pin filter parameter H0A.24 or H0A.30). This is to prevent false warnings caused by interference pulses superimposed to actual pulse references.

- E600.0: Inertia auto-tuning failure

Cause:

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.

Cause	Confirming Method	Solution
<ol style="list-style-type: none"> 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. 	<p>Perform 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.</p>	<ol style="list-style-type: none"> 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
Cause:

Cause	Confirming Method	Solution
1. The home switch is faulty.	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

Cause:

The homing switch is set improperly.

Cause	Confirming Method	Solution
The home 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 method setting error

Cause:

The homing method value is too large.

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

- E631.4: P-Mos short-circuited

Cause:

The brake circuit is faulty.

Cause	Confirming Method	Solution
When braking is used, the P-MOS short circuit occurred on the brake circuit.	Ensure the brake cable is connected, check if the fault persists after the servo drive is powered off and on again.	1. Replace the servo drive. 2. Turn off the brake switch H02.16.

- E631.5: N-Mos short-circuited

Cause:

The brake circuit is faulty.

Cause	Confirming Method	Solution
When braking is used, the N-MOS short circuit occurred on the brake circuit.	Ensure the brake cable is connected, check if the fault persists after the servo drive is powered off and on again.	1. Replace the servo drive. 2. Turn off the brake switch H02.16.

- E730.0: Encoder battery warning

Cause:

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

Cause	Confirming Method	Solution
The voltage of the absolute encoder battery 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.

- E730.1: Inovance 2nd encoder battery voltage low

Cause:

Inovance 2nd encoder battery voltage is lower than 3.0 V.

Cause	Confirming Method	Solution
Inovance 2nd encoder battery voltage is too low.	Measure the battery voltage.	Use a new battery with the matching voltage.

- E831.0: AI2 zero offset too large

Cause	Confirming Method	Solution
1. The wiring is incorrect or interference exists.	Check the wiring according to the correct wiring diagram.	Use shielded twisted pairs and shorten the circuit length. Increase AI2 input filter time.
2. The servo drive is faulty.	Disconnect AI1 and measure whether the actual terminal voltage exceeds 0.5 V.	If not, replace the servo drive.

- E834.2: AI2 overvoltage

Cause	Confirming Method	Solution
1. The wiring is incorrect or interference exists.	Check the wiring according to the correct wiring diagram.	Use shielded twisted pairs and shorten the circuit length. Increase AI2 input filter time.
2. The input voltage is too high.	Measure whether the actual terminal voltage exceeds 11.5 V.	Adjust the input voltage to a value lower than 11.5 V.

- E834.2: AI2 overcurrent

Cause	Confirming Method	Solution
1. The wiring is incorrect or interference exists.	Check the wiring according to the correct wiring diagram.	Use shielded twisted pairs and shorten the circuit length. Increase AI1 input filter time.
2. The input current is too large.	Check the value of H0b.22.	Adjust the input current to a value lower than 21 mA.

- E900.0: DI emergency braking

Cause:

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

Cause	Confirming Method	Solution
The DI function 34 (EmergencyStop) is triggered.	Check whether the logic of the DI assigned with FunIN.34 (EmergencyStop) is active.	Check the operation mode and clear the active DI braking signal without affecting the safety performance.

- E902.0: DI setting invalid

Cause:

DI function parameters are set to invalid values.

Cause	Confirming Method	Solution
DI (DI1...DI5) function parameters are set to invalid values.	Check whether H04.00, H04.02, H04.04, H04.06, and H04.08 are set to invalid values.	Set DI function parameters to valid values.

- E902.1: DO setting invalid
Cause:

DO function parameters are set to invalid values.

Cause	Confirming Method	Solution
DO (DO1...DO5) function parameters are set to invalid values.	Check whether H04.00 and H04.02 are set to invalid values.	Set DO function parameters to valid values.

- E902.2: Invalid setting for torque reach
Cause:

The DO parameters set for torque reach in the torque control mode are invalid.

Cause	Confirming Method	Solution
The DO parameters set for torque reach in the torque control mode are 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.

- E908.0: Model identification failure

Cause	Confirming Method	Solution
1. The model identification check word store in e2prom 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.	2. Check whether parameters can be saved to e2prom.	

- E909.0: Motor overload warning
Cause:

The accumulative heat of the motor reaches the warning threshold (90% of the maximum allowable heat).

Cause	Confirming Method	Solution
1. The motor cables and encoder cable 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. The gain values 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 servo drive model or motor model 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 servo drive model (H01.10) and motor model properly according to section "Servo Drive Model and Nameplate" in SV670N Series Servo Drive Selection Guide.

Cause	Confirming Method	Solution
<p>6. The motor is stalled due to mechanical factors, resulting in overload during operation.</p>	<p>Check the reference and the motor speed (H0b.00) through the software tool or the keypad.</p> <ul style="list-style-type: none"> ● References in the position control mode: H0b.13 (Input position reference counter) ● References in the speed control mode: H0b.01 (Speed reference) ● References in the torque control mode: H0b.02 (Internal torque reference) <p>Check whether the reference value is not 0 or is very large but the motor speed is 0 RPM in the corresponding mode.</p>	<p>Eliminate the mechanical factors.</p>
<p>7. The servo drive is faulty.</p>	<p>Power off and on the servo drive again.</p>	<p>Replace the servo drive if the fault persists after the servo drive is powered off and on again.</p>

- E910.0: Control circuit overvoltage

Cause	Confirming Method	Solution
Overvoltage occurred on the control circuit of the drive.	<ol style="list-style-type: none"> 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: Regenerative resistor overload

Cause:

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

Cause	Confirming Method	Solution
1. The external regenerative resistor is connected improperly or disconnected.	Remove the external regenerative resistor and measure whether its resistance is " ∞ " (infinite). Measure whether the resistance between terminals P \oplus and C is " ∞ " (infinite).	Replace with a new external regenerative resistor. After confirming the resistance measured is the same as the nominal value, connect it between terminals P \oplus and C.
		Connect the external regenerative resistor between terminals P \oplus and C with a proper cable.
2. The jumper between terminals P \oplus and D is shorted or disconnected when the built-in regenerative resistor is used.	Measure whether the resistance between terminals P \oplus and D is " ∞ " (infinite).	Ensure terminals P \oplus and D are jumpered.

Cause	Confirming Method	Solution
3. H02.25 (Regenerative resistor type) is set improperly when an external regenerative resistor is used.	<ul style="list-style-type: none"> ● Check the setpoint of H02.25. ● Measure the resistance of the external regenerative resistor connected between P⊕ and C. Check whether the resistance measured is too large by comparing it with the value listed in Table "Specifications of the regenerative resistor". 	Set H02.25 according to section Wiring and Setting of Regenerative Resistor in SV670N Series Servo Drive Hardware Guide. H02.25 = 1 (external, naturally ventilated) H02.25 = 2 (external, forced-air cooling)
4. The resistance of the external regenerative resistor is too large.	<ul style="list-style-type: none"> ● Check whether the value of H02.27 is larger than the resistance of the external regenerative resistor connected between terminals P⊕ and C. 	Select a proper regenerative resistor according to section "Specifications of the Regenerative Resistor" in SV670N 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.	<p>Check whether the input voltage of the main circuit cable on the drive side is within the following range:</p> <ul style="list-style-type: none"> ● 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.

Cause	Confirming Method	Solution
7. The load moment of inertia ratio is too large.	Perform moment of inertia auto-tuning according to section "Inertia auto-tuning" in SV670N Series Servo Drive Function Guide or calculate the total mechanical inertia based on mechanical parameters. Check whether the actual load inertia ratio exceeds 30.	<ul style="list-style-type: none"> • 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

Cause:

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).

Cause	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).	<ul style="list-style-type: none"> • 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 overtemperature

Cause:

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

Cause	Confirming Method	Solution
1. The 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: Parameter modifications activated at next power-on

Cause:

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

Cause	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 the servo drive again.

- E942.0: Parameter saved frequently

Cause:

The number of parameters modified at a time exceeds 200.

Cause	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 e2prom, set H0C.13 to 0.

- E950.0: Forward overtravel warning

Cause:

The logic of the DI terminal allocated with DI function 14 (FunIN.14: P-OT, positive limit switch) is effective.

Cause	Confirming Method	Solution
1. The logic of the DI assigned with FunIN.14 (P-OT function 14, positive limit switch) is effective.	<ul style="list-style-type: none"> • 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

Cause:

The logic of the DI terminal allocated with DI function 15 (FunIN.15: N-OT, negative limit switch) is effective.

Cause	Confirming Method	Solution
1. The logic of the DI assigned with FunIN.15 is effective.	<ul style="list-style-type: none"> • 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.

- E954.0: Position command overflow

Cause	Confirming Method	Solution
in PR mode, the position command is beyond the limit.	1. Check the position command. 2. Check the limit value.	Change the value of the position command and the limit.

- E971.0: Undervoltage warning for voltage drop protection

Cause	Confirming Method	Solution
The bus voltage is lower than the undervoltage threshold.	Check the bus voltage.	Check the power supply.

- E980.0: Encoder algorithm error

Cause:

An encoder algorithm error occurs.

Cause	Confirming Method	Solution
An encoder fault occurs.	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

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

4 Description of Fault Codes

4.1 Troubleshooting

- E101.0: parameter error in H02 and above

Cause:

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.

Cause	Confirming Method	Solution
1. The voltage of the control circuit power supply drops instantaneously.	1. Check whether the control circuit (L1C, L2C) is in the process of power-off or instantaneous power failure occurs.	1. Restore default settings (H02.31 = 1), and write parameters again. 2. Enlarge the power capacity or replace with a power supply of higher capacity, restore 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 when 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.	1. Check whether instantaneous power failure occurs during parameter storage. 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.

Cause	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

Cause:

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.

Cause	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

Cause	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

Cause:

Parameter attribute initialization check error.

Cause	Confirming Method	Solution
Parameter attribute initialization check error	Check that H0A.99 = AA5C.	If the problems persists after the servo drive is powered off and on several times, replace the servo drive.

- E102.0: FPGA communication establishment error

Cause:

The communication between MCU and FPGA cannot be established.

Cause	Confirming Method	Solution
The communication between MCU and FPGA cannot be established.	The fault persists after the servo drive is powered off and on repeatedly.	Replace the servo drive.

- E102.1: FPGA initialization start error

Cause:

FPGA failed.

Cause	Confirming Method	Solution
FPGA cannot start.	The fault persists after the servo drive is powered off and on repeatedly.	Replace the servo drive.

- E102.8: FPGA and MCU version mismatch

Cause:

FPGA and MCU version mismatch.

Cause	Confirming Method	Solution
The software versions of MCU and FPGA are inconsistent.	<ol style="list-style-type: none"> 1. Check whether the MCU version (H01.00) is 9xx.x (the fourth digit displayed on the keypad is 9); 2. Check whether the FPGA version (H01.01) is 9xx.x (the fourth digit displayed on the keypad is 9). 	Contact Inovance for technical support. Update the FPGA or MCU software.

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

Cause:

The access to MCU times out.

Cause	Confirming Method	Solution
1. FPGA failure	The fault persists after the servo drive is powered off and on repeatedly.	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)

Cause:

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

Cause	Confirming Method	Solution
1.FPGA failure	The fault persists after the servo drive is powered off and on repeatedly.	Replace the servo drive.
2.FPGA and MCU communication handshaking error		

- E104.4: MCU command update timeout

Cause:

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.

Cause	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 the servo drive is powered off and on repeatedly.	1. Hide unnecessary functions. 2. Replace the servo drive.

- E120.0: Unknown encoder model

Cause:

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.

Cause	Confirming Method	Solution
1. The product (motor or servo drive) code does not exist.	Read the nameplates of the servo drive and motor to check whether SV670N series servo drive and 23-bit servo motor 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 SV670N 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

Cause:

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.

Cause	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: Unknown drive model

Cause:

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.

Cause	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

Cause:

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.

Cause	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

Cause:

- 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.

Cause	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

Cause:

The servo drive model parameter cannot be identified.

Cause	Confirming Method	Solution
Model parameter CRC check failed	Check that the model parameter is present.	Write the model parameter again.

- E120.8: Junction temperature parameter check error

Cause:

The junction temperature parameter is identified incorrectly.

Cause	Confirming Method	Solution
Junction temperature parameter CRC check failed	Check that the junction temperature parameter is present	Rewrite the junction temperature parameter.

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

Cause:

The same function is assigned to different DIs.

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

Cause	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.

- E122.2: Different DOs assigned with the same function

Cause	Confirming Method	Solution
The DO function No. exceeds the maximum number allowed for DO functions	Check whether DO function numbers defined by H04.00 and H04.02 are abnormal.	Set the correct DO function No.

- E122.3: Upper limit in the rotation mode invalid
Cause:

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

Cause	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} .

- E122.4: Different VDIs assigned with the same function
Cause:

The same function is assigned to different VDIs. The VDI function No. exceeds the maximum number allowed for VDI functions.

Cause	Confirming Method	Solution
1. The same function is assigned to different VDIs	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 VDI function No. exceeds the maximum number allowed for VDI functions	Check whether the MCU program is updated.	Restore system parameters to default values (H02.31 = 1) and restart the servo drive.

- E122.5: DI and VDI assigned with the same function

Cause:

The same function is assigned to different VDIs. The VDI function No. exceeds the maximum number allowed for VDI functions.

Cause	Confirming Method	Solution
Two or more DIs and VDIs are assigned with the same function No.	Check whether DI function numbers set in groups H03 and H17 are repetitive.	Change any repetitive number.

- E122.7: Fully closed-loop parameter setting error

Cause:

Cause	Confirming Method	Solution
When H0F.00 is not 0, set H02.01 to 2 (absolute position rotation mode)	Check the value of H02.01 if fully closed-loop is used.	Set the value of H02.01 to 2 if fully closed-loop is used.

- E122.9: Fully closed-loop function pin conflict

Cause:

The frequency division output pin conflicts with the fully closed loop second encoder pin.

Cause	Confirming Method	Solution
The frequency division output pin conflicts with the fully closed loop second encoder pin.	Check the setpoint of H05.38 and H0F.03.	Disable frequency-division output.

- E136.0: Encoder ROM motor parameter check error

Cause:

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.

Cause	Confirming Method	Solution
1. The servo drive model does not match the motor model.	View the servo drive and servo motor nameplates to check whether the SV670N series servo drive and servo motor are used.	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.	<ol style="list-style-type: none"> 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 signals PS+, PS-, +5V and GND on both ends of the encoder cable and observe whether signals at both ends are consistent. For signal assignment, see Chapter "Wiring" in SV680P Series Servo Drive Hardware Guide. 	<ol style="list-style-type: none"> 1. Use the encoder cable provided by Inovance. Ensure motor terminals and servo drive screws are connected securely. 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

Cause:

- The encoder cable is disconnected.
- A communication error occurs on the encoder due to interference.

Cause	Confirming Method	Solution
1. The encoder cable connections are incorrect or loosened.	Check the encoder cable connection. Check whether ambient vibration is too large, which loosens the encoder cable and even damages the encoder.	<ol style="list-style-type: none"> 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.

- E150.0: STO safety state applied

Cause:

The STO input protection applies (safety state).

Cause	Confirming Method	Solution
Two 24 V inputs are disconnected simultaneously, triggering the STO function.	1. Check 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

Cause:

The single-channel input of STO is ineffective.

Cause	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: Buffer 5 V voltage detection error

Cause:

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.

Cause	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 5V voltage supplied to the Buffer is abnormal.	Replace the servo drive.

- E150.3: STO input circuit hardware diagnosis failure

Cause:

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

Cause	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

Cause:

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

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

- E165.0: SLS1 ramp monitor reference exceeding limit

Cause:

Cause	Confirming Method	Solution
SLS1 deceleration ramp monitor exceeds the upper limit	Check if the slope for SLS1 ramp to decelerate to the limit exceeds the upper limit.	<ol style="list-style-type: none"> 1. Set the upper limit to a proper value. 2. Change the SLS1 deceleration setting so that the slop is smaller than the upper limit.

- E165.1: SLS2 ramp monitor reference exceeding limit

Cause:

Cause	Confirming Method	Solution
SLS2 deceleration ramp monitor exceeds the upper limit	Check if the slope for SLS2 ramp to decelerate to the limit exceeds the upper limit.	<ol style="list-style-type: none"> 1. Set the upper limit to a proper value. 2. Change the SLS2 deceleration setting so that the slop is smaller than the upper limit.

- E165.2: SLS3 ramp monitor reference exceeding limit

Cause:

Cause	Confirming Method	Solution
SLS3 deceleration ramp monitor exceeds the upper limit	Check if the slope for SLS3 ramp to decelerate to the limit exceeds the upper limit.	<ol style="list-style-type: none"> 1. Set the upper limit to a proper value. 2. Change the SLS3 deceleration setting so that the slop is smaller than the upper limit.

- E165.3: SLS4 ramp monitor reference exceeding limit

Cause:

Cause	Confirming Method	Solution
SLS4 deceleration ramp monitor exceeds the upper limit	Check if the slope for SLS4 ramp to decelerate to the limit exceeds the upper limit.	<ol style="list-style-type: none"> 1. Set the upper limit to a proper value. 2. Change the SLS4 deceleration setting so that the slop is smaller than the upper limit.

- E201.0: Phase-P overcurrent

Cause:

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

Cause	Confirming Method	Solution
<p>1. Gains are set improperly, leading to motor oscillation.</p>	<p>Check whether vibration or sharp noise occurs during start and operation of the motor, or view "Current feedback" in the software tool.</p>	<ol style="list-style-type: none"> 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.
<p>2. The encoder is wired improperly, aging, or connected loosely.</p>	<p>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.</p>	<p>Re-solder, tighten or replace the encoder cable.</p>

Cause	Confirming Method	Solution
3. The servo drive is faulty.	<ol style="list-style-type: none"> 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). 	<ol style="list-style-type: none"> 1. Replace with a regenerative resistor with matching resistance and perform wiring again. 2. Replace the servo drive.
4. Overcurrent occurs on the regenerative resistor.	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

Cause:

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

Cause	Confirming Method	Solution
<ol style="list-style-type: none"> 1. Motor cables are in poor contact. 2. Motor cables are grounded. 3. U/V/W cables of the motor are short-circuited. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Tighten the cables that are loose or disconnected. 2. Replace the motor in case of poor insulation.
<ol style="list-style-type: none"> 4. The motor is damaged. 	<ol style="list-style-type: none"> 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 UVW phases of motor cables is balanced. 	<ol style="list-style-type: none"> 1. Connect the motor cables correctly. 2. Replace the motor if the resistance is unbalanced.

- E201.2: Phase-V overcurrent

Cause:

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

Cause	Confirming Method	Solution
<ol style="list-style-type: none"> 1. Motor cables are in poor contact. 2. Motor cables are grounded. 3. U/V/W cables of the motor are short-circuited. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Tighten the cables that are loose or disconnected. 2. Replace the motor in case of poor insulation.
<ol style="list-style-type: none"> 4. The motor is damaged. 	<ol style="list-style-type: none"> 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 UVW phases of motor cables is balanced. 	<ol style="list-style-type: none"> 1. Connect the motor cables correctly. 2. Replace the motor if the resistance is unbalanced.

- E201.4: Phase-N overcurrent

Cause:

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

Cause	Confirming Method	Solution
<ol style="list-style-type: none"> 1. Gains are set improperly, leading to motor oscillation. 	<p>Check whether vibration or sharp noise occurs during start and operation of the motor, or view "Current feedback" in the software tool.</p>	<p>Adjust the gains.</p>
<ol style="list-style-type: none"> 2. The encoder is wired improperly, aging, or connected loosely. 	<p>Check whether the encoder cable provided by Inovance is used and whether the cable is aging, corroded, or connected loosely.</p>	<p>Re-solder, tighten or replace the encoder cable.</p>

Cause	Confirming Method	Solution
3. Overcurrent occurs on the regenerative resistor.	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.

- E201.4: Phase-N overcurrent

Cause:

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

Cause	Confirming Method	Solution
1. Gains are set improperly, leading to motor oscillation.	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 is wired improperly, aging, or connected 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.

Cause	Confirming Method	Solution
3. Overcurrent occurs on the regenerative resistor.	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. 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

Cause:

Cause	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 is wired incorrectly. The encoder cable is loosened. 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 the condition of the encoder cable. 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

Cause:

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

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

- E210.0: Output short-circuited to ground

Cause:

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

- The DC bus voltage exceeds the discharge threshold.
- The phase U current of size C/D/E models is greater than 1/4 of H01.07.
- Overcurrent occurs on phase-P and phase-N of servo drives in SIZE A and B.

Cause	Confirming Method	Solution
1. The 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 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.

- E234.0: Runaway

Cause:

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.

Cause	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 the servo drive again.

Cause	Confirming Method	Solution
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 SV670N series servo drive and 23-bit servo motor.	Replace with a mutually-matching servo drive and servo motor. For use of of SV670N series servo drive and 23-bit servo motor, set H00.00 to 14101. Check the motor model, encoder type, and encoder cable connection again.
4. The encoder is wired improperly, aging, or connected loosely.	<ol style="list-style-type: none"> 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.
5. The gravity load in vertical axis applications is too large.	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: Regenerative resistor overload

Cause:

The regenerative resistor is overloaded.

Cause	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%.	<ol style="list-style-type: none"> 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.



Caution

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

Cause:

The DC bus voltage between P \oplus and N \ominus exceeds the overvoltage threshold.

220 V servo drive: Normal value: 310 V Overvoltage threshold: 420 V

380 V servo drive: Normal value: 540 V Undervoltage threshold: 760 V

Cause	Confirming Method	Solution
<p>1. The voltage input to the main circuit is too high.</p>	<p>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: Effective value: 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)</p>	<p>Replace or adjust the power supply according to the specified range.</p>
<p>2. The power supply is unstable or affected by lightning.</p>	<p>Check whether the power supply is unstable, affected by lightning, or complies with the preceding range.</p>	<p>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.</p>

Cause	Confirming Method	Solution
<p>3. The regenerative resistor fails.</p>	<p>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 table "Specifications of the regenerative resistor" in SV680P Series Servo Drive Commissioning Guide.</p>	<ol style="list-style-type: none"> 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 an external regenerative resistor is used, replace with a new one and connect it 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.

Cause	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 \oplus and C, and compare the measured value with the recommended value.	<ol style="list-style-type: none"> 1. Replace with a new external regenerative resistor that carries the recommended resistance, and connect it between P\oplus 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.	Confirm the acceleration/deceleration time during operation and measure whether the DC bus voltage between P \oplus and N \ominus exceeds the overvoltage threshold during deceleration.	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.	<p>Check whether H0b.26 (Bus voltage) is within the following range:</p> <p>220 V servo drive: H0b.26 > 420 V</p> <p>380 V servo drive: H0b.26 > 760 V</p> <p>Measure whether the DC bus voltage detected between terminals P\oplus and N\ominus is lower than the value of H0b.26.</p>	Contact Invoence 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

Cause:

The DC bus voltage between P \oplus and N \ominus is lower than the undervoltage threshold.

220 V servo drive: Normal value: 310 V Undervoltage threshold: 200 V (180 V for S5R5 models)

380 V servo drive: Normal value: 540 V Undervoltage threshold: 380 V

Cause	Confirming Method	Solution
1. The 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 failure occurs.		
3. The power supply voltage drops during operation.		
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-phase: 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.

- E410.0: Main circuit undervoltage

Cause:

The DC bus voltage between P \oplus and N \ominus is lower than the undervoltage threshold.

220 V servo drive: Normal value: 310 V Undervoltage threshold: 200 V (180 V for S5R5 models)

380 V servo drive: Normal value: 540 V Undervoltage threshold: 380 V

Cause	Confirming Method	Solution
1. The 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 failure occurs.		
3. The power supply voltage drops during operation.		
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-phase: 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

Cause:

Phase loss occurs on the three-phase servo drive.

Cause	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: Effective value: 380 to 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 200B.1Bh (Bus voltage) is within the following range: 220 V servo drive: $H0b.27h < 200$ V. 380 V servo drive: $H0b.27h < 380$ V. The fault persists after the main circuit is powered off and on repeatedly.	Replace the servo drive.
	Check the wiring of the main circuit.	Replace the cables and connect the main circuit cables correctly. Three-phase: R, S, T/L1, L2, L3

- E410.1: Main circuit de-energized

Cause:

Phase loss occurs on the three-phase servo drive.

Cause	Confirming Method	Solution
<p>The power supply is disconnected during operation.</p>	<p>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: Effective value: 380 to 440 V Allowable deviation: -10% to +10% Measure the voltages of all the three phases.</p>	<p>Increase the capacity of the power supply.</p>
	<p>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.</p>	
	<p>Check whether 200B.1Bh (Bus voltage) is within the following range: 220 V servo drive: $H0b.27h < 200$ V. 380 V servo drive: $H0b.27h < 380$ V. The fault persists after the main circuit is powered off and on repeatedly.</p>	<p>Replace the servo drive.</p>
	<p>Check the wiring of the main circuit.</p>	<p>Replace the cables and connect the main circuit cables correctly. Three-phase: R, S, T/L1, L2, L3</p>

- E420.0: Main circuit phase loss
Cause:

Cause	Confirming Method	Solution
1. The three-phase input cables are connected improperly.	Check whether RST cables on the drive side and non-drive side are in good condition and connected properly.	Replace the cables and connect the main circuit cables properly.
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: Effective value: 380 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.		

- E420.1: Main circuit PL signal detection error

Cause:

Cause	Confirming Method	Solution
1. The three-phase input cables are connected improperly.	Check whether RST cables on the drive side and non-drive side are in good condition and connected properly.	Power off and on the servo drive again. If unexpected power failure occurs, ensure the power supply is stable.
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: Effective value: 380 to 440 V Allowable deviation: -10% to +10% (342 V to 484 V) Measure the voltages of all the three phases.	Replace or adjust the power supply according to the range.
3. The three-phase power supply is unbalanced or the voltages of the three phases are too low.		

- E430.0: Control circuit power supply undervoltage

Cause:

Cause	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: Effective value: 380 to 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

Cause:

The actual speed of the motor exceeds the overspeed threshold.

Cause	Confirming Method	Solution
1. The 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.

Cause	Confirming Method	Solution
3. The input reference exceeds the overspeed threshold.	<p>Check whether the motor speed corresponding to the input reference exceeds the overspeed threshold.</p> <ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • Position control mode: CSP: Decrease the position reference increment per synchronization period. The host controller should cover the position ramp when generating references. PP: Decrease the value 6081h or increase the acceleration/ deceleration ramp (6083h, 6084h). HM: Decrease 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

Cause:

The FPGA speed measurement overflows.

Cause	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: Velocity feedback error 2

Cause	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 error

Cause:

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

Cause	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: Wrong UVW phase sequence detected during angle auto-tuning

Cause:

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

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

- E605.0: Bootstrap overspeed

Cause:

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

Cause	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.	Switch on the drive when the motor is standstill.

- E620.0: Motor overload

Cause:

The accumulative heat of the motor reaches the fault threshold.

Cause	Confirming Method	Solution
1. The 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.	Check the overload characteristics of the servo drive or servo motor. Check whether the average load rate (H0b.12) of the servo drive 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 servo drive model or motor model 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 set the servo drive model (H01.10) and motor model properly according to section "Servo Drive Model and Nameplate" in SV670N Series Servo Drive Hardware Guide.

Cause	Confirming Method	Solution
6. The motor is stalled due to mechanical factors, resulting in overload during operation.	<p>Check the reference and motor speed (H0b.00) through the software tool or keypad.</p> <ul style="list-style-type: none"> References in the position control mode: H0b.13 (Input position reference counter) References in the speed control mode: H0b.01 (Speed reference) References in the torque control mode: H0b.02 (Internal torque reference) <p>Check whether the reference value is not 0 but the motor speed is 0 rpm in the corresponding mode.</p>	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.

- E625.0: Brake abnormality enabled

Cause	Confirming Method	Solution
The brake fails when it is released.	Check if the motor shaft end is held by the brake when the brake release signal is active.	<ol style="list-style-type: none"> 1. Check the brake wiring. 2. Replace the Brake motor.

- E626.0: Brake abnormality enabled

Cause	Confirming Method	Solution
The brake fails when it closes.	Check if the motor shaft end is not held tightly by the brake when the braking signal is active.	<ol style="list-style-type: none"> 1. Check the brake wiring. 2. Replace the Brake motor.

- E630.0: Motor stall
Cause:

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.

Cause	Confirming Method	Solution
1. U/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. The motor parameters (especially the number of pole pairs) are set improperly and motor 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.
3. The communication commands are being disturbed.	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. <ul style="list-style-type: none"> • References in the position control mode: H0b.13 (Input 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.

- E631.1: 24 V or brake not connected
Cause:

The brake circuit is faulty.

Cause	Confirming Method	Solution
The brake or the 24 V power supply is not connected when the brake feature is used.	Check whether 24 V power supply or the brake is not connected when H02.16 is set to 1.	<ol style="list-style-type: none"> 1. Set H02-16 to 0. 2. Replace the motor. 3. Connect the brake cable and 24 V power supply.

- E631.2: P-Mos disconnected

Cause:

The brake circuit is faulty.

Cause	Confirming Method	Solution
When braking is used, P-MOS open circuit occurred on the brake circuit.	Ensure the brake cable is connected, check if the fault persists after the servo drive is powered off and on again.	<ol style="list-style-type: none"> 1. Replace the servo drive. 2. Turn off the brake switch H02.16.

- E631.3: N-Mos disconnected

Cause:

The brake circuit is faulty.

Cause	Confirming Method	Solution
When braking is used, N-MOS open circuit occurred on the brake circuit.	Ensure the brake cable is connected, check if the fault persists after the servo drive is powered off and on again.	<ol style="list-style-type: none"> 1. Replace the servo drive. 2. Turn off the brake switch H02.16.

- E631.4: P-Mos short-circuited

Cause:

The brake circuit is faulty.

Cause	Confirming Method	Solution
The P-Mos is short-circuited.	Ensure the brake cable is connected, check if the fault persists after the servo drive is powered off and on again.	Replace the servo drive.

- E631.5: N-Mos short-circuited

Cause:

The brake circuit is faulty.

Cause	Confirming Method	Solution
The N-Mos is short-circuited.	Ensure the brake cable is connected, check if the fault persists after the servo drive is powered off and on again.	Replace the servo drive.

- E640.0: IGBT junction temperature too high

Cause:

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

Cause	Confirming Method	Solution
1. The ambient temperature is too high. 2. The servo drive is restarted repeatedly 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).	<ul style="list-style-type: none"> ● 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 servo 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 installation 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: Diode overtemperature

Cause:

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

Cause	Confirming Method	Solution
1. The ambient temperature is too high. 2. The servo drive is restarted repeatedly 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).	<ul style="list-style-type: none">• 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 servo 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 installation 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 over-temperature

Cause:

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

Cause	Confirming Method	Solution
1. The 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 servo drive is restarted repeatedly 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 servo 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 installation 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: Motor overtemperature

Cause:

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

Cause	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 error

Cause	Confirming Method	Solution
<p>During ETune operation, the gain drops to the lower limit: Position loop gain < 5. Speed loop gain < 5. Model loop gain < 10.</p>	<p>Check if vibration resonance is properly suppressed in the system. The torque vibration amplitude exceeds the setpoint of H09.11.</p>	<ol style="list-style-type: none"> 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

Cause	Confirming Method	Solution
<p>Check whether resonance that occurred during ETune operation cannot be suppressed.</p>	<p>Check whether there is abnormal noise or torque fluctuation during operation.</p>	<ol style="list-style-type: none"> 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.

- E663.0: ITune error

Cause	Confirming Method	Solution
Check whether resonance that occurred during ITune operation cannot be suppressed.	Check whether there is abnormal noise or torque fluctuation during operation.	<ol style="list-style-type: none"> 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 in the parameter configuration interface. 3. Check whether the machine suffers from periodic fluctuation. 4. Increase the value of H09.11 as appropriate.

- E664.0: Excessive system resonance

Cause	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.	<ol style="list-style-type: none"> 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
Cause:

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

Cause	Confirming Method	Solution
1. The 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: Encoder multi-turn counting error
Cause:

An encoder multi-turn counting error occurs.

Cause	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

Cause:

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

Cause	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

Cause:

Communication timeout occurs on the absolute encoder.

Cause	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.	<ol style="list-style-type: none"> 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

Cause:

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

Cause	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.	<ol style="list-style-type: none"> 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

Cause:

The encoder is faulty.

Cause	Confirming Method	Solution
An encoder fault occurs.	Check whether bit7 of H0b.28 is set to 1.	<ol style="list-style-type: none"> 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 data write error

Cause:

The attempt to write the encoder data fails.

Cause	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 $\pm 30^\circ$ 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 overtemperature

Cause:

The temperature of the absolute encoder is too high.

Cause	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

Cause:

Cause	Confirming Method	Solution
Motor overtemperature	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.

- E770.0: Fully-closed input phase A wire breakage

Cause	Confirming Method	Solution
Fully-closed phase A input differential voltage wire breakage	Measure the phase AB differential voltage to check if it is below 2.5 V.	Adjust the fully-closed loop phase A input voltage.

- E770.1: Fully-closed input phase B wire breakage

Cause	Confirming Method	Solution
Fully-closed phase B input differential voltage wire breakage	Measure the phase B differential voltage to check if it is below 2.5 V.	Adjust the fully-closed loop phase B input voltage.

- E770.2: Fully-closed input phase Z wire breakage

Cause	Confirming Method	Solution
Fully-closed phase Z input differential voltage wire breakage	Measure the phase Z differential voltage to check if it is below 2.5 V.	Adjust the fully-closed loop phase Z input voltage.

- E770.3: BISS communication protocol timeout

Cause	Confirming Method	Solution
BISS fully closed-loop external loop encoder communication timeout	<ul style="list-style-type: none"> ● Check the wiring. ● Check whether H0F.28, H0F.29, and H0F.30 are set properly. 	<ul style="list-style-type: none"> ● Check the wiring. ● Set H0F.28, H0F.29 and H0F.30 according to the specifications of the BISS encoder.

- E770.4: BISS communication CRC error

Cause	Confirming Method	Solution
BISS fully closed-loop external loop encoder communication CRC error	Check the communication cable for interference.	Replace the cable with a shielded twisted pairs.

- E770.5: BISS response data error

Cause	Confirming Method	Solution
BISS fully closed-loop external loop encoder response data error	Check the communication cable for interference.	Replace the cable with a shielded twisted pairs.

- E770.6: Fully closed-loop 2nd encoder initialization communication error

Cause	Confirming Method	Solution
1. The encoder cable connections are incorrect or loosened.	1. Check the encoder cable connections. 2. Check whether vibration on site is too strong, 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.

- E770.7: Fully closed-loop Inovance 2nd encoder communication error

Cause	Confirming Method	Solution
<p>1. The encoder is wired incorrectly.</p> <p>2. The encoder cable is loosened.</p>	<p>1. Check the wiring of the encoder.</p> <p>2. Check whether vibration on site is too strong, which loosens the encoder cable and even damages the encoder.</p> <p>3. Replace with a new encoder cable. If the fault no longer occurs after cable replacement, it indicates the original encoder cable is damaged.</p>	<p>1. Connect the cables again according to the correct wiring diagram. Connect the cables again and ensure encoder terminals are connected securely. Preferably use cables provided by Inovance. If a customized encoder cable is used, check whether this cable is a shielded twisted pair cable complying with the specifications. Route the motor cables and encoder cables through different routes. Ensure the servo motor and servo drive are grounded properly.</p>
<p>3. The encoder Z signal is interfered with.</p>	<p>1. Check whether ambient devices are generating interference and whether multiple interference sources are present in the cabinet.</p> <p>2. Make servo drive stay in "Rdy" status and rotate motor shaft counterclockwise (CCW) manually and observe whether H0b.17 (Electrical angle) increases/ decreases smoothly. Turning one circle corresponds to five 0–360° (for Z series motors). For X series motors, turning one circle corresponds to four 0–360°. If H0b.17 changes abnormally during motor rotating, the encoder is faulty. If no warning is reported during rotation but the servo drive reports a warning during operation, disturbance may be present.</p>	<p>2. Check whether the connectors at both ends of the encoder are in good contact and whether any pin retracts.</p> <p>3. 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.</p>
<p>4. The encoder is faulty.</p>	<p>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 $\pm 30^\circ$ when the motor position does not change.</p>	

- E939.0: Motor power cable disconnected

Cause	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.

- E939.1: Phase-U power cable disconnected

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

- E939.2: Phase-V power cable disconnected

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

- E939.3: Phase-W power cable disconnected

Cause	Confirming Method	Solution
Motor W phase power cable breakage	Check the wiring of the phase-W power cable.	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

Cause:

Encoder parameters are abnormal.

Cause	Confirming Method	Solution
1. The 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

Cause:

The position deviation in the position control mode is larger than the setpoint of 6065h (Threshold of excessive position deviation).

Cause	Confirming Method	Solution
1. U/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.	<p>Check the reference and motor speed (H0b.00) through the software tool or keypad.</p> <ul style="list-style-type: none"> ● References in the position control mode: H0b.13 (Input position reference counter) ● References in the speed control mode: H0b.01 (Speed reference) ● References in the torque control mode: H0b.02 (Internal torque reference) <p>Check whether the reference value is not 0 but the motor speed is 0 rpm in the corresponding mode.</p>	Eliminate the mechanical factors.

Cause	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: <ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> CSP: Decrease the position reference increment per synchronization period. The host controller should cover the position ramp when generating references. PP: Decrease the value 6081h or increase the acceleration/deceleration ramp (6083h, 6084h). HM: Decrease 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 the value of 6065h.	Increase the setpoint of 6065h.
7. The servo 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

Cause:

The position deviation is too large.

Cause	Confirming Method	Solution
1. U/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.	<p>Check the reference and motor speed (H0b.00) through the software tool or keypad.</p> <ul style="list-style-type: none"> ● References in the position control mode: H0b.13 (Input position reference counter) ● References in the speed control mode: H0b.01 (Speed reference) ● References in the torque control mode: H0b.02 (Internal torque reference) <p>Check whether the reference value is not 0 but the motor speed is 0 rpm in the corresponding mode.</p>	Eliminate the mechanical factors.
4. The gain values are too low.	<p>Check the position loop gain and speed loop gain of the servo drive.</p> <ul style="list-style-type: none"> ● 1st gain set: H08.00... H08.02 ● 2nd gain set: H08.03... H08.05 	Adjust the gain values manually or perform gain auto-tuning.

Cause	Confirming Method	Solution
5. The position reference increment is too large.	Position control mode: <ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • CSP: Decrease the position reference increment per synchronization period. The host controller should cover the position ramp when generating references. • PP: Decrease the value 6081h or increase the acceleration/deceleration ramp (6083h, 6084h). • HM: Decrease 6099.01h and 6099.02h or increase the acceleration/deceleration ramp (609Ah). Decrease the gear ratio according to actual conditions.
6. The servo drive/motor is faulty.	Monitor the operation waveform through the oscilloscope function in the software tool: position references, position feedback, speed references, and torque references.	If the position reference is not 0 but the position feedback is always 0, replace the servo drive or motor.

- EB01.0: Position reference increment too large
Cause:

Cause	Confirming Method	Solution
The pulse reference increment exceeds the excessive reference threshold three times consecutively.	Check whether the baud rate of pulse reference input exceeds H0A.09.	1. Increase the value of H0A.09. 2. Reduce the baud rate of pulse input.

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

The target position increment is too large.

Cause	Confirming Method	Solution
<p>The target position increment is too large.</p>	<p>Check the variation between two adjacent target positions using the software tool.</p>	<ol style="list-style-type: none"> 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

Cause:

The target position increment is too large.

Cause	Confirming Method	Solution
The target position increment is too large.	Check the variation between two adjacent target positions using the software tool.	<ol style="list-style-type: none"> 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: Command overflow

Cause:

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.

Cause	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.	<ol style="list-style-type: none"> 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: Max. value of single-turn position exceeded in rotation mode

Cause:

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

Cause	Confirming Method	Solution
The target position exceeds the upper/lower limit of the unit 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.

- EB02.0: Excessive position deviation in fully closed-loop mode

Cause:

The absolute value of position deviation in fully closed-loop mode exceeds the value of H0F.08 (Excessive position deviation threshold in fully closed-loop mode).

Cause	Confirming Method	Solution
1. U/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 (Input 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.

Cause	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 use gain auto-tuning.
5. The input pulse frequency is high.	When the position reference source is pulse reference, check whether the input pulse frequency is too high or whether the acceleration/deceleration time is set to 0 or an excessively low value.	Reduce the position reference frequency or the electronic gear ratio. If position pulses are outputted through the host controller, you can set the acceleration/deceleration time through the host controller directly. If not, increase the values of H05.04 and H05.06.
6. The value of H0F.08 (Threshold of excessive position deviation) is too low under current operating conditions.	Check whether the value of H0F.08 is too low.	Increase the setpoint of H0F.08.
7. The servo drive/motor is faulty.	Monitor the operation waveform through the oscilloscope function in the software tool: position references, position feedback, speed references, and torque references.	If the position reference is not 0 but the position feedback is always 0, replace the servo drive or motor.

- EB02.1: Fully closed-loop position deviation overflow
Cause:

The absolute value of the fully closed-loop position deviation is greater than 2³¹.

Cause	Confirming Method	Solution
1. U/V/W output phase loss or incorrect phase sequence occurs on the 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 drive U/V/W cables or the encoder cable is disconnected.	Check the wiring.	Connect the cables again. The 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.

Cause	Confirming Method	Solution
3. The motor is stalled due to mechanical factors.	Check the reference and motor speed (H0b.00) through the software tool or keypad. <ul style="list-style-type: none"> ● References in the position control mode: H0b.13 (Input 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. <ul style="list-style-type: none"> ● 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: <ul style="list-style-type: none"> ● In IP/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. 	<ul style="list-style-type: none"> ● IP/CSP: Decreases the position reference increment per synchronization period. The host controller should cover the position ramp when generating references. ● PP: Decreases the value of 6081h or decreases the acceleration/deceleration ramp (6083h, 6084h). ● HM: Decreases 6099.01h and 6099.02h or decreases the acceleration/deceleration ramp (609Ah). Reduce the gear ratio as needed.

Cause	Confirming Method	Solution
6. The value of H0F.08 is insufficient for the operating conditions.	Check the value of 6065h.	Increase the setpoint of 6065h.
7. The servo 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.

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

Cause:

The electronic gear ratio exceeds the limit: $(0.001-4000 \times \text{Encoder resolution}/10000)$.

Cause	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 $0.001-4000 \times \text{Encoder resolution}/10000$.	Change the value of H05.02.

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

Cause:

The electronic gear ratio exceeds the limit: $(0.001-4000 \times \text{Encoder resolution}/10000)$.

Cause	Confirming Method	Solution
The group 1 electronic gear ratio exceeds the maximum gear ratio or is less than the minimum gear ratio.	Check if the electronic gear ratio is within the range of $0.001-4000 \times \text{Encoder resolution}/10000$.	Change the values of H05.07/H05.09.

- EB03.2: Electronic gear ratio beyond the limit - Electronic gear ratio 2

Cause:

The group 2 electronic gear ratio exceeds the limit: $(0.001-4000 \times \text{Encoder resolution}/10000)$.

Cause	Confirming Method	Solution
The group 2 electronic gear ratio exceeds the maximum gear ratio or is less than the minimum gear ratio.	Check if the group 2 electronic gear ratio is within the range of $0.001-4000 \times \text{Encoder resolution}/10000$.	Change the values of H05.11/H05.13.

- EE08.0: Synchronization (SYNC) signal loss

Cause:

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

Cause	Confirming Method	Solution
The 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.

- EE08.1: Network status switchover error

Cause:

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

Cause	Confirming Method	Solution
This 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.

- EE08.3: Network cable connected improperly

Cause:

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.)

Cause	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

Cause:

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

Cause	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.	<ul style="list-style-type: none"> • 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

Cause:

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.

Cause	Confirming Method	Solution
The upstream station detects that the data frame has been corrupted and marked, which is then transferred 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 slave to locate the fault cause.

- EE08.6: Data update timeout

Cause:

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

Cause	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.	<ul style="list-style-type: none"> • 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

Cause:

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

Cause	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 the values and ensure the former is smaller than the latter.

- EE09.1: Home setting error

Cause:

The home offset exceeds the upper/lower limit.

Cause	Confirming Method	Solution
1. The home offset is outside the software position 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

Cause:

The electronic gear ratio exceeds the limit: $(0.001, 4000 \times \text{Encoder resolution} / 10000)$.

Cause	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: No synchronization signal

Cause:

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

Cause	Confirming Method	Solution
1. The communication synchronization clock is configured improperly.	Replace with another master (such as Beckhoff or Omron PLC) and perform tests to compare between different masters.	Rectify improper configurations.
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.

Cause	Confirming Method	Solution
3. The slave controller integrated circuit 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 synchronization 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 for replacing the MCU chip.

- EE09.5: PDO mapping beyond the limit

Cause:

The mapping objects in TPDO or RPDO exceeds 40 bytes.

Cause	Confirming Method	Solution
The mapping objects in TPDO or RPDO exceeds 40 bytes.	Check the number of self-indexes configured in 1600h or 1A00h.	The mapping objects in TPDO or RPDO must not exceed 40 bytes.

- EE10.0: Protection against MailBox setting error

Cause	Confirming Method	Solution
1 The master station is configured incorrectly. 2. The slave XML file is incorrect.	Fault code is displayed on the panel.	Check the configuration of SM0 and SM1 channels for errors.

- EE10.1: SM2 setting error

Cause:

- 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.

Cause	Confirming Method	Solution
<ol style="list-style-type: none"> 1. The master station is configured incorrectly. 2. The slave XML file is incorrect. 	<p>Check the configuration of SM2 for errors.</p> <p>Check whether the index of the RxPDO mapping object dictionary is out of bounds (the maximum index is 0x0A).</p>	<p>Ensure that the SM2 channel is configured correctly.</p> <p>The index of the RxPDO mapping object dictionary is correct.</p>

- EE10.2: SM3 setting error

Cause:

- PDO mapping object dictionary index exceeds the set maximum (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).

Cause	Confirming Method	Solution
<ol style="list-style-type: none"> 1. 1. The master station is configured incorrectly. 2. The slave XML file is incorrect. 	<p>Check the configuration of SM3 for errors.</p> <p>Check whether the index of the TxPDO mapping object dictionary is out of bounds (the maximum index is 0x1A).</p>	<p>Ensure that the SM3 channel is configured correctly.</p> <p>The index of the TxPDO mapping object dictionary is correct.</p>

- EE10.3: PDO watchdog setting error

Cause:

Cause	Confirming Method	Solution
<ol style="list-style-type: none"> 1. The watchdog is enabled but the count is 0. 2. The watchdog is not enabled but the count is non-zero. 	<p>The settings of the master station is incorrect.</p>	<p>Make sure the watchdog time is configured correctly.</p>

- EE10.4: Protection against incomplete PLL (no sync signal)

Cause:

Cause	Confirming Method	Solution
<p>During SAFEOP_2_OP, DC is enabled, but not running.</p>	<p>The settings of the master station is incorrect.</p>	<p>Make sure a sync0 signal is generated.</p>

- EE11.0: ESI check error

Cause:

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

Cause	Confirming Method	Solution
1. The XML configuration file is not downloaded.	Check whether the XML version displayed in H0E.96 is normal.	Download the XML file.
2. The servo drive is faulty. The XML file is modified unexpectedly.	The XML version number is not empty.	H0E. 37 is set to 1 and power on and off again.

- EE11.1: Failed to read e2prom by bus

Cause:

The e2prom communication fails.

Cause	Confirming Method	Solution
The EtherCAT data in the e2prom cannot be read.	This fault persists after the servo drive is powered off and on several times.	Replace the servo drive.

- EE11.2: Failed to update e2prom by bus

Cause:

The communication is normal but the information in the e2prom is wrong or lost.

Cause	Confirming Method	Solution
The EtherCAT data in the e2prom cannot be updated.	This fault persists after the servo drive is powered off and on several times.	Replace the servo drive.

- EE11.3: ESI and drive mismatch

Cause	Confirming Method	Solution
1. The downloaded XML file is not compatible with the drive. 2. The servo drive is faulty. The XML file is modified unexpectedly.	Check whether the XML version displayed in H0E.96 is normal.	Download the XML file.

- EE12.0: EtherCAT initialization failure

Cause:

Cause	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

Cause:

The synchronization period is not an integer multiple of 125 μ s or 250 μ s after the network switches to the OP mode.

Cause	Confirming Method	Solution
Set the synchronization period to an integer multiple of 125 μ s or 250 μ s.	Check the setting of the synchronization period in the controller.	Set the synchronization period to an integer multiple of 125 μ s or 250 μ s.

- EE15.0: Excessive EtherCAT sync period error

Cause:

The synchronization cycle error exceeds the threshold.

Cause	Confirming Method	Solution
The synchronization cycle error of the controller is too large.	<ul style="list-style-type: none"> ● 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

Cause	Confirming Method	Solution
MCU and ESC communication timeout	The fault persists after the servo drive is powered off and on repeatedly.	Replace the servo drive.

4.2 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	Display	Name	Fault Type	Resettable
E108	E108.0	Parameter write error	No. 3	Yes
	E108.1	Parameter read error	No. 3	Yes
	E108.2	Check on data written in e2prom failed	No. 3	Yes
	E108.3	Check on data read in e2prom failed	No. 3	Yes
	E108.4	Single data is stored too many times	No. 3	Yes
E110	E110.0	Frequency-division pulse output setting error	No. 3	Yes
E120	E120.3	The motor and drive do not match in the power	No. 3	Yes
E121	E121.0	Invalid S-ON command	No. 3	Yes
E122	E122.0	Multi-turn absolute encoder setting error	No. 3	Yes
	E122.6	Absolute function setting fault of 2nd encoder	No. 3	Yes
E510	E510.0	Frequency division pulse output overspeed	No. 3	Yes
E600	E600.0	Inertia auto-tuning failure	No. 3	Yes
E601	E601.0	Homing warning	No. 3	Yes
	E601.1	Homing switch error	No. 3	Yes
	E601.2	Homing mode setting error	No. 3	Yes
E631	E631.4	P-MOS short-circuited	No. 1	Yes
	E631.5	N-MOS short-circuited	No. 1	Yes
E730	E730.0	Encoder battery warning	No. 3	Yes
	E730.1	Inovance 2nd encoder battery voltage low	No. 3	Yes
E831	E831.0	AI1 zero offset too large	No. 3	Yes
E834	E834.1	AI1 overvoltage	No. 3	Yes
	E834.2	AI2 overcurrent	No. 3	Yes
E900	E900.0	DI emergency braking	No. 3	Yes
E902	E902.0	DI setting invalid	No. 3	Yes
	E902.1	DO setting invalid	No. 3	Yes
	E902.2	Torque reach setting invalid	No. 3	Yes
E908	E908.0	Model identification failure	No. 3	Yes
E909	E909.0	Motor overload	No. 3	Yes
E910	E910.0	Control circuit overvoltage	No. 3	Yes
E920	E920.0	Regenerative resistor overload	No. 3	Yes
E922	E922.0	Resistance of the external regenerative resistor too small	No. 3	Yes

List of Warning Codes

Fault Code	Display	Name	Fault Type	Resettable
E924	E924.0	Regenerative transistor over-temperature	No. 3	Yes
E941	E941.0	Modified parameters activated at next power-on	No. 3	Yes
E942	E942.0	Parameters saved frequently	No. 3	Yes
E950	E950.0	Forward overtravel warning	No. 3	Yes
E952	E952.0	Reverse overtravel warning	No. 3	Yes
E954	E954.0	Position reference overflow	No. 3	Yes
E971	E971.0	Undervoltage warning for voltage drop protection	No. 3	Yes
E980	E980.0	Encoder algorithm error	No. 3	Yes
EA41	EA41.0	Torque fluctuation compensation failure	No. 3	Yes

6 List of Fault Codes

No. 1 non-resettable faults:

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

Fault Code	Display	Fault Name	Fault Type	Resettable
E101	E101.0	Abnormal parameters in groups H02 and above	No. 1	No
	E101.1	Parameter error in group H00/H01	No. 1	No
	E101.2	Address error in read/write operation after the number of parameters changes	No. 1	No
	E101.9	Parameter attribute initialization check error	No. 1	No
E102	E102.0	FPGA communication establishment error	No. 1	No
	E102.1	FPGA initialization start error	No. 1	No
	E102.8	FPGA and MCU version mismatch	No. 1	No
E104	E104.1	MCU running timeout (MCU break down)	No. 1	No
	E104.2	FPGA running timeout (FPGA break down)	No. 1	No
	E104.4	MCU command update timeout	No. 1	No
E120	E120.0	Unknown encoder model	No. 1	No
	E120.1	Unknown motor model	No. 1	No
	E120.2	Unknown drive model	No. 1	No
	E120.5	Motor and drive current mismatch	No. 1	No
	E120.6	FPGA and motor model mismatch	No. 1	No
	E120.7	Model check error	No. 1	No
E136	E120.8	Junction temperature parameter check error	No. 1	No
	E136.0	Encoder ROM motor parameter check error	No. 1	No
E201	E136.1	Encoder ROM motor parameter read error	No. 1	No
	E201.0	Phase-P overcurrent	No. 1	No
	E201.1	Phase-U overcurrent	No. 1	No
	E201.2	Phase-V overcurrent	No. 1	No
E210	E201.4	Phase-N overcurrent	No. 1	No
	E210.0	Output short-circuited to ground	No. 1	No
E234	E234.0	Runaway	No. 1	No

Fault Code	Display	Fault Name	Fault Type	Resettable
E740	E740.0	Absolute encoder communication timeout	No. 1	No
	E740.2	Absolute encoder error	No. 1	No
	E740.3	Absolute encoder single-turn calculation error	No. 1	No
	E740.6	Encoder write error	No. 1	No
E765	E765.0	Nikon encoder over-temperature or overspeed	No. 1	No
EA33	EA33.0	Encoder read/write check error	No. 1	No
EE12	EE12.0	EtherCAT initialization failure	No. 1	No
EE16	EE16.0	MCU and ESC communication error	No. 1	No

No. 1 resettable faults

Table 6-2 List of No. 1 resettable faults

Fault Code	Fault subcode	Fault Name	Fault Type	Resettable
E150	E150.0	STO safety state applied	No. 1	Yes
	E150.1	STO input state abnormal	No. 1	Yes
	E150.2	Buffer 5 V supply error	No. 1	Yes
	E150.3	STO input circuit hardware diagnosis failure	No. 1	Yes
	E150.4	PWM Buffer hardware diagnosis failure	No. 1	Yes
E208	E208.2	Encoder communication timeout	No. 1	Yes
	E208.4	FPGA current loop operation timeout	No. 1	Yes
E320	E320.0	Regenerative resistor overload	No. 1	Yes
E400	E400.0	Main circuit overvoltage	No. 1	Yes
E410	E410.0	Main circuit undervoltage	No. 1	Yes
	E410.1	Main circuit de-energized	No. 1	Yes
E500	E500.0	Motor overspeed	No. 1	Yes
	E500.1	Speed feedback overflow	No. 1	Yes
	E500.2	FPGA position feedback pulse overspeed	No. 1	Yes
E602	E602.0	Angle auto-tuning failure	No. 1	Yes
	E602.2	U/V/W phase sequence reversed	No. 1	Yes
E605	E605.0	Speed too fast upon S-ON	No. 1	Yes
E620	E620.0	Motor overload	No. 1	Yes
E625	E625.0	Brake abnormality enabled	No. 1	Yes
E626	E626.0	Brake abnormality disabled	No. 1	Yes
E630	E630.0	Motor stall overtemperature protection	No. 1	Yes

Fault Code	Fault subcode	Fault Name	Fault Type	Resettable
E631	E631.1	24 V power supply or brake not connected	No. 1	Yes
	E631.2	P-MOS open circuit	No. 1	Yes
	E631.3	N-MOS open circuit	No. 1	Yes
	E631.4	P-MOS short-circuited	No. 1	Yes
	E631.5	N-MOS short-circuited	No. 1	Yes
E640	E640.0	IGBT junction overtemperature	No. 1	Yes
	E640.1	Flywheel diode overtemperature	No. 1	Yes
E650	E650.0	Heatsink overtemperature	No. 1	Yes
E660	E660.0	Motor overtemperature	No. 1	Yes
E770	E770.0	Fully-closed input phase A wire breakage	No. 1	Yes
	E770.1	Fully-closed input phase B wire breakage	No. 1	Yes
	E770.2	Fully-closed input phase Z wire breakage	No. 1	Yes
	E770.3	BISS communication protocol timeout	No. 1	Yes
	E770.4	BISS communication CRC error	No. 1	Yes
	E770.5	BISS response data error	No. 1	Yes
	E770.6	Fully closed-loop 2nd encoder initialization communication error	No. 1	Yes
E939	E770.7	Fully closed-loop Inovance 2nd encoder communication error	No. 1	Yes
	E939.0	Motor power cables disconnected	No. 1	Yes
	E939.1	Phase-U power cable disconnected	No. 1	Yes
	E939.2	Phase-V power cable disconnected	No. 1	Yes
	E939.3	Phase-W power cable disconnected	No. 1	Yes

No. 2 resettable faults

Table 6-3 List of No. 2 resettable faults

Fault Code	Display	Fault Name	Fault Type	Resettable
E122	E122.1	Different DIs assigned with the same function	No. 2	Yes
	E122.2	Different DOs assigned with the same function	No. 2	Yes
	E122.3	Upper limit in the rotation mode too high	No. 2	Yes
	E122.4	Different VDIs assigned with the same function	No. 2	Yes
	E122.5	DI and VDI assigned with the same function	No. 2	Yes
	E122.7	Fully closed-loop parameter setting error	No. 2	Yes
	E122.9	Fully closed-loop function pin conflict	No. 2	Yes
E420	E420.0	Main circuit phase loss	No. 2	Yes
	E420.1	Main circuit PL signal detection error	No. 2	Yes
E430	E430.0	Control power supply undervoltage	No. 2	Yes
E661	E661.0	STune failure	No. 2	Yes
E662	E662.0	ETune failure	No. 2	Yes
E663	E663.0	ITune failure	No. 2	Yes
E664	E664.0	Resonance too strong	No. 2	Yes
E731	E731.0	Encoder battery failure	No. 2	Yes
E733	E733.0	Encoder multi-turn counting error	No. 2	Yes
E735	E735.0	Encoder multi-turn counting overflow	No. 2	Yes
E760	E760.0	Encoder over-temperature	No. 2	Yes
EB00	EB00.0	Position deviation too large	No. 2	Yes
	EB00.1	Position deviation overflow	No. 2	Yes
EB01	EB01.0	The position reference increment is too large.	No. 2	Yes
	EB01.1	Individual position reference increment too large	No. 2	Yes
	EB01.3	Reference overflow	No. 2	Yes
EB02	EB02.0	Position deviation too large in fully closed-loop mode	No. 2	Yes
	EB02.1	Fully closed-loop position deviation overflow	No. 2	Yes
EB03	EB03.0	Electronic gear ratio beyond the limit - H05.02	No. 2	Yes
	EB03.1	Electronic gear ratio beyond the limit - Electronic gear ratio 1	No. 2	Yes
	EB03.2	Electronic gear ratio beyond the limit -Electronic gear ratio 2	No. 2	Yes

Fault Code	Display	Fault Name	Fault Type	Resettable
EE08	EE08.0	Synchronization signal loss	No. 2	Yes
	EE08.1	Status switchover error	No. 2	Yes
	EE08.3	Network cable connected improperly	No. 2	Yes
	EE08.4	Data frame loss protection error	No. 2	Yes
	EE08.5	Data frame transfer error	No. 2	Yes
	EE08.6	Data update timeout	No. 2	Yes
EE09	EE09.0	Software position limit setting error	No. 2	Yes
	EE09.1	Home setting error	No. 2	Yes
	EE09.2	Gear ratio beyond the limit	No. 2	Yes
	EE09.3	Homing method setting error	No. 2	Yes
	EE09.5	PDO mapping beyond the limit	No. 2	Yes
EE10	EE10.0	Protection against MailBox setting error	No. 2	Yes
	EE10.1	SM2 setting error	No. 2	Yes
	EE10.2	SM3 setting error	No. 2	Yes
	EE10.3	PDO watchdog setting error	No. 2	Yes
	EE10.4	Protection against incomplete PLL	No. 2	Yes
EE11	EE11.0	ESI check error	No. 2	Yes
	EE11.1	Failed to read e2prom by bus	No. 2	Yes
	EE11.2	Failed to update e2prom by bus	No. 2	Yes
	EE11.3	ESI and drive mismatch	No. 2	Yes
EE12	EE12.0	EtherCat initialization failure	No. 2	Yes
EE13	EE13.0	EtherCat sync period setting error	No. 2	Yes
EE15	EE15.0	Excessive EtherCAT sync period error	No. 2	Yes
EE16	EE16.0	MCU and ESC communication error	No. 2	Yes



19011863A01

Copyright © Shenzhen Inovance Technology Co., Ltd.

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