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PS00016754A06

EVO500 Series Programmable Logic Controller

User Guide

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■ Waste Disposal

The storage, use, and disposal of this product (including optional accessories) must comply with local laws and regulations.

■ Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel can identify the risks of the product/system and prevent possible dangers.

■ Proper Use of the Product

Proper transportation, storage, assembly, installation, commissioning, operation, and maintenance are required to ensure the safe operation of the product without any problems. The required ambient conditions must be met. All operations must follow the guidelines provided in this documentation.

Preface

■ Introduction

This guide describes the product information, mechanical installation, electrical installation, programming, and communication connection.

■ Standards compliance

The following table lists the certifications, directives, and standards that the product may comply with. For details about the acquired certificates, see the certification marks on the product nameplate.

Certification	Directive		Standard
CE certification	EMC directive	2014/30/EU	**24 VDC products:** EN 61131-2 **220 VAC products:** EN 61131-2 EN 61000-3-2 EN 61000-3-3
	LVD directive	2014/35/EU	EN 61010-1 EN 61010-2-201
	RoHS directive	2011/65/EU amended by (EU) 2015/863	EN IEC 63000
UL/cUL certification	-		UL 61010-1 UL 61010-2-201 CAN/CSA-C22.2 No. 61010-1 CSA C22.2 NO. 61010-2-201
KCC certification	-		-
EAC certification	-		-

Certification	Directive		Standard
UKCA certification	Safety regulations	Electrical Equipment (Safety) Regulations 2016	EN 61010-1 EN 61010-2-201
	EMC regulations	Electromagnetic Compatibility Regulations 2016	**24 VDC products:** EN 61131-2 **220 VAC products:** EN 61131-2 EN 61000-3-2 EN 61000-3-3
	RoHS regulations	Directive (RoHS) Regulations 2012	EN IEC 63000

■ More documents

Document	Code	Description
GE20 Series Extension Card User Guide	PS00006443	Describes the product information, mechanical installation, input connection, output connection, I/O connection, communication connection, and programming examples of the GE20 series expansion card
iFA Information System Guide	-	Introduces the basic functions, quick start, network configuration, programming fundamentals, and basic instructions of the medium-sized PLC software.
EVO500 Series Programmable Logic Controller User Guide (This guide)	PS00016754	Introduces the product information, mechanical installation, electrical installation, and communication connections.

■ Revision history

Date	Version	Description
August 2026	A06	Made minor corrections.
June 2026	A05	Made minor corrections.

Date	Version	Description
April 2026	A04	Safety precautions and product technical specifications updated.
November 2025	A03	Made minor corrections.
September 2025	A02	• Added CANopen and PROFINET communication specifications in *"2.4.1 General Specifications" on page 24*. • Added CAN bus to the Communication Networking section in *"5.1 Communication Networking" on page 46*. • Added *"5.4 CAN Communication" on page 49*. • Updated GL20 expansion modules in *"8.1 Appendix 1: Applicable Products" on page 74*. • Added *"8.2 Appendix 2: Fault Codes" on page 80*.
April 2025	A01	• Added EVO52X-0808TP-INT model information in *"2.2 Model and Nameplate" on page 18*. • Added EVO52X-0808TP-INT specifications in *"2.4.1 General Specifications" on page 24*. • Added the diode schematic diagram of EVO52X-0808TP-INT in *"2.4.4 Output Specifications" on page 30*. • Added the wiring of EVO52X-0808TP-INT output terminals in *"4.3 Output Terminal Wiring" on page 44*. • Added EVO52X-0808TP-INT model information in *"8.1 Appendix 1: Applicable Products" on page 74*. • Made minor corrections.
December 2024	A00	First release.

■ Access to the guide

This guide is not delivered with the product. You can download the PDF version in the following ways:

- Visit *https://www.inovance.com/global*, and choose Service&Support > Support > Documentation Download.
- Scan the QR code on the product with your smart phone.
- Scan the QR code below to install My Inovance app, where you can search for and download the guide.



■ Warranty disclaimer

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is not caused by improper operation of the user. Maintenance fees will be charged after the warranty period expires.

Within the warranty period, maintenance fee will be charged for the following damage:

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by using the product for unintended functions
- Damage caused by using the product outside the specified scope
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

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

For details, see the Warranty Card.

1 General Safety Rules

1.1 General Safety Instructions

■ Safety Disclaimer

1. Read and comply with the safety instructions during installation, operation, and maintenance of the product.
2. To ensure personal and equipment safety, observe all safety precautions marked on the product and described in this guide during installation, operation, and maintenance.
3. The "CAUTION", "WARNING", and "DANGER" are only supplements to the safety instructions.
4. Use this product according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
5. Inovance shall take no responsibility for any personal injury or property damage caused by improper use.

■ Safety Levels and Definitions



The "DANGER" sign indicates that failure to comply with the notice will result in death or serious injury.



The "WARNING" sign indicates that failure to comply with the notice could result in death or serious injury.



The "CAUTION" sign indicates that failure to comply with the notice could result in minor or moderate injury, or equipment damage.

Unpacking

WARNING

- Do not install the product in case of any damage, rust, or signs of prior use on the product or its accessories upon unpacking.
- Do not install the product in case of water seepage into the product or missing or damaged components upon unpacking.
- Do not install the product in case of any discrepancy between the product you received and the product name on the packing list.

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 for damage, rust, or dents on the surfaces of the product and accessories upon unpacking.
- After unpacking, check the contents against the packing list to ensure that the equipment and accessories are in the correct quantities, and that all documentation is complete.

Storage and transportation

WARNING

- Large or heavy equipment must be handled by qualified professionals using specialized hoisting equipment. Failure to comply could result in personal injury or equipment damage.
- Before hoisting the equipment, ensure that components such as the front cover and terminal blocks are secured firmly with screws. Loosely connected components may fall off and result in personal injury or equipment damage.
- Do not stand or stay below the product which is being hoisted.
- 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 could result in personal injury or equipment damage.

Storage and transportation

Caution

- Handle the equipment with care and mind your step during transportation to prevent personal injury 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 could result in personal injury.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply could result in equipment damage.
- Do not store or transport the equipment in locations where the equipment may be exposed to splashing water or rain, direct sunlight, strong electric field, strong magnetic field, or strong vibration.
- Store the equipment for up to three months. Take stricter protective measures and carry out the necessary inspections for a longer storage time.
- Pack the equipment securely and properly before transportation. Use a fully enclosed container for long-distance transportation.
- Never transport the equipment with other devices or items that could impact or cause harm to the equipment.

Design

DANGER

- Design a safety circuit and add an error handling program in the software to ensure the product remains in a safe state upon external power failure or product faults.
- If a sustained overcurrent occurs due to overload or load short circuit, the product may smoke or catch fire. An external safety device (such as a fuse or circuit breaker) must be installed.

WARNING

Design

- If an output component (such as a relay or transistor) in this product is damaged, the corresponding output may become uncontrolled and remain permanently ON or OFF.
- The product design must comply with the overvoltage category requirements specified in the environmental specifications. A system-level lightning protection device must be installed on the power supply to ensure that lightning-induced overvoltages do not reach the product’ s power input, signal input, or control output terminals, thereby preventing damage to the product.
- Ensure that appropriate actions have been taken to prevent product malfunction caused by a communication fault between the product and related devices. Failure to comply could cause personal injury or equipment damage.



Switches that could cause personal injury or equipment damage must not be configured on the touch screen. Use independent switches for performing critical operations. Failure to comply could result in accidents caused by wrong outputs or faults.

Installation



This equipment must be operated only by trained and qualified electrical personnel. Non-professionals must not operate this equipment.



Installation

- Read through the guide and safety instructions before installation.
- Do not install this equipment in places with strong electric or magnetic field.
- 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.
- Before installation, ensure that the installation site meets the required environmental conditions. Failure to comply could result in equipment damage.
- Do not wear loose clothes or accessories during installation. Failure to comply could result in electric shock.
- When installing the equipment in an enclosed environment (such as a cabinet or case), use cooling devices (such as fans or air conditioners) to cool the space and meet the installation environment requirements. Failure to do so could result in equipment overheating or fire.
- Do not retrofit the equipment.
- Never loosen or turn the fixing bolts on product components, or any bolts marked in red.
- This equipment must be installed inside an indoor cabinet or terminal equipment. The cabinet or terminal equipment itself must be provided with the necessary protective enclosures, such as a fireproof enclosure, an electrical protective enclosure, and a mechanical protective enclosure. The IP rating of these enclosures must comply with the relevant IEC standards, and applicable 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 a non-combustible object such as metal. Keep the equipment away from combustible objects. Failure to comply could result in fire.
- For products not supporting hot swapping, disconnect all external power supplies of the system before installing/removing the product. Failure to comply could result in electric shock, product failure, or malfunction.

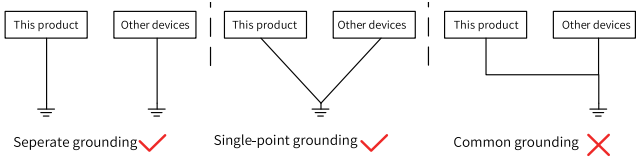


- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the product and causing faults. After installation, remove the cloth or paper on the top of the equipment to prevent the ventilation holes from being blocked, which could cause overheating due to poor heat dissipation.
- During installation, ensure the equipment is connected to the respective connector securely and hook the equipment firmly. Improper installation may result in malfunction, failure, or detachment.

Wiring

DANGER

- This equipment must be operated only by trained and qualified electrical personnel. Non-professionals must not operate this equipment.
- Before wiring, disconnect all the power supplies of the equipment. Wait for at least the time designated on the warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safe voltage range. Failure to comply could result in electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power ON. Failure to comply could result in electric shock.
- Ensure that the equipment is grounded properly. Failure to comply could result in electric shock. Separate grounding or single-point grounding, other than common grounding, is recommended.



- Insulate the cable terminals properly to ensure the insulation distance between cables will not be shortened after cables are connected to the terminal block. Failure to comply could result in electric shock or equipment damage.
- Install the terminal cover attached to the equipment before power-on or operation after wiring is completed. Failure to comply could result in electric shock.

WARNING

Wiring

- Never connect the power cable to output terminals of the equipment. Failure to comply could cause equipment damage or even fire.
- Cables used for wiring must comply with the requirements for the cross-sectional area and shielding. The shielding layer of the shielded cable must be reliably grounded at one end.
- Tighten the terminal screws with the torque specified in the user guide. Insufficient or excessive torque may cause overheating and damage to the joint, which could result in fire.
- After wiring is done, ensure that all cables are connected properly and no screws, washers or exposed cables are left inside the equipment. Failure to comply could result in electric shock or equipment damage.



- Follow the proper electrostatic discharge (ESD) procedure, and wear an anti-static wrist strap to perform wiring. Failure to comply could damage the equipment or its internal circuits.
- Use shielded twisted pair cables for the control circuit. Connect the shield to the grounding terminal of the equipment. Failure to comply may result in equipment malfunction.

Power-on



- This equipment must be operated only by trained and qualified electrical personnel. Non-professionals must not operate this equipment.
- Before power-on, ensure that the equipment is installed and wired properly.
- Ensure that the power supply meets equipment requirements before power-on to prevent equipment damage or fire accident.
- Do not open the cabinet door or protective cover of the product, touch any wiring terminal of the product, or remove any components or parts while the product is powered on. Failure to comply could result in personal injury or even death.



Perform a trial run after wiring to ensure the equipment operates safely. Failure to comply could result in personal injury or equipment damage.

Operation

DANGER

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

WARNING

- Do not touch the enclosure, fan, or resistor with bare hands. Failure to comply could result in burns.
- Prevent metal or other objects from falling into the equipment during operation. Failure to comply could result in fire or equipment damage.
- During operation, do not bring live parts into contact with the metal enclosure of the product. Failure to comply could result in fire or product damage.

Caution

- Operate the equipment within the specified environmental conditions. Failure to comply could result in equipment failure or damage.
- Touch the HMI panel with hands only. Failure to comply could cause panel damage, which is out of the warranty range.

Safety recommendations

- In positions where the operator directly touches the mechanical parts, for example, where a mechanical device is loaded/unloaded, or where a machine runs automatically, manually-operated devices or other alternative means must be carefully designed so that they are independent of the equipment to start or stop the automatic operation of the system.
- If you need to modify the program while the system is running, use the lock function or other protective measures. Ensure that only authorized personnel can make the necessary modifications.

Battery usage

WARNING

- Do not use batteries that do not meet the product requirements. Failure to comply could result in death, personal injury, explosion, or fire.
- Do not throw batteries into fire or hot ovens. Do not crush or cut the battery. Failure to comply could result in death, personal injury, explosion, or fire.
- Do not expose the battery to extremely high temperatures. Failure to comply could result in death, personal injury, explosion, or fire.
- Do not swallow batteries. Failure to comply could result in chemical burns.
- Seek for medical treatment immediately if a button battery is swallowed by accident, because this may cause severe internal burns within two hours and even death.

Caution

- Keep batteries out of reach of children.
- If the battery compartment is not securely closed, stop using the product immediately and keep it out of reach of children.

Maintenance

DANGER

- Maintenance must be performed only by trained and qualified electrical personnel.
- Do not maintain the equipment with power ON. Failure to comply could result in electric shock.
- Before maintenance, disconnect all the power supplies of the equipment and wait for at least the time specified on the warning label.
- Disconnect all external power supplies of the system before cleaning the equipment or re-tightening screws on the terminal block or screws for connector installation. Failure to comply could result in electric shock.
- Disconnect all external power supplies of the system before removing or installing the product, or connecting or disconnecting cables. Failure to comply could result in electric shock or malfunction.

WARNING

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

Repair

DANGER

- Repair must be performed only by trained and qualified electrical personnel.
- Do not repair the equipment with power ON. Failure to comply could result in electric shock.
- Before inspection or repair, disconnect all the power supplies of the equipment and wait for at least the time specified on the warning label.

WARNING

- Submit a request for repair based on the warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage circuit breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply could result in equipment damage, personal injury, or death.
- Troubleshooting and repair of faulty or damaged equipment must be performed by professionals in accordance with the repair instructions, and proper repair records must be kept.
- Replace quick-wear parts of the equipment according to the replacement instructions.
- Do not use damaged equipment. Failure to comply could result in death, personal injury, or severe equipment damage.
- Recheck the wiring and reset the parameters after equipment replacement.

Disposal

WARNING

- Dispose of the retired equipment in accordance with applicable national regulations and standards. Failure to comply could result in property damage, personal injury, or death.
- Recycle retired equipment in accordance with industry waste disposal standards to avoid environmental pollution.
- Treat the scrapped equipment as industrial waste. Dispose of the batteries according to local laws and regulations.

■ Safety Label

To ensure safe operation, comply with safety labels on the equipment and do not damage or remove the labels. The following table describes the meanings of the safety labels.

Safety label	Description
	• Before using the equipment, read the guide and safety precautions carefully. Failure to comply could result in personal injury, death, or equipment damage. • Do not touch the terminals or remove the cover with power-on or within 10 min after power-off. Failure to comply could result in electric shock. • The surface of the product may become very hot during operation. Do not touch these hot areas, as this may cause burns!

1.2 Industrial Information Security

The product provides interfaces for network connection and data transmission. To protect factories, systems, machines, and networks from cyberattacks, it is essential to implement proper protection mechanism for industrial security.

Customers are responsible for providing and maintaining a secure connection between the product and their network or any other network to protect their factories, systems, machines, and networks from unauthorized access. Such systems or machines can be connected to an enterprise network or the Internet only when a secure connection is established and appropriate security measures (such as using antivirus software or installing firewalls) are in place.

Inovance continuously develops and improves its products and solutions to enhance safety. It is strongly recommended that you update the product promptly and always use the latest version.



Malware (such as viruses, Trojans, and worms) can bring the device into an unsafe operating state, resulting in death, serious injury, and property damage. Observe the following precautions:

- Always use the latest software version. If the product version is no longer supported or the latest version is not used, you will be exposed to increased risk of cyber attacks.
- Develop and maintain appropriate protective measures (including but not limited to antivirus software, firewalls, WAF, IPS/IDS, situational awareness system, identity authentication, and data encryption) to prevent the files in mobile storage devices from being damaged by malware, and to protect the products, networks, systems, and interfaces from unauthorized access, tampering, hacking, data leakage, or information theft.
- Check all safety-related interfaces and settings after commissioning.

2 Product Information

2.1 Product Overview

This product is a new-generation medium-sized PLC controller independently developed by Inovance based on the iFA Evolution platform. It offers the following core features:

- Network communication: Equipped with one EtherCAT bus interface and two 100 Mbps Ethernet ports (supports flexible switching between switch mode and independent port mode).
- Expansion capability: Supports local expansion with up to 16 GL20 series I/O modules and supports GE20 series expansion cards.
- Architecture advantage: Modular design supporting distributed I/O configuration.

2.2 Model and Nameplate

■ Model

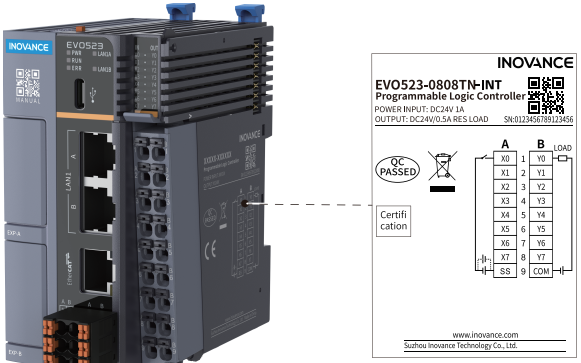
Model descriptions are shown in the figure and table below.

EVO ① 52X ② - 0808 ③ TX ④

① **Product series** EVO: EVO series programmable logic controller	③ **Number of input/output channels** 08: 8 inputs 08: 8 outputs
② **Model code** 5: 500 series platform 2: Two Ethernet ports X: Number of EtherCAT axes, where "1" is for 8 axes, "2" is for 16 axes, and "3" is for 32 axes.	④ **Output type** X: N or P TN: Sinking type transistor TP: Sourcing type transistor

■ Nameplate

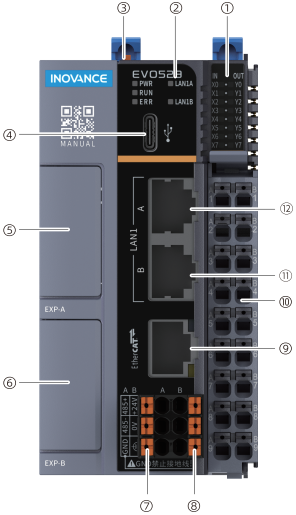
The nameplates of EVO500 series TP and TN models are similar. Take the nameplate of EVO523-0808TN-INT as an example, as shown in the following figure.



Model	Description	Code
EVO521-0808TN-INT	EVO500 series 8-input 8-output 8-axis programmable logic controller (sinking output)	01441941
EVO522-0808TN-INT	EVO500 series 8-input 8-output 16-axis programmable logic controller (sinking output)	01441938
EVO523-0808TN-INT	EVO500 series 8-input 8-output 32-axis programmable logic controller (sinking output)	01441939
EVO521-0808TP-INT	EVO500 series 8-input 8-output 8-axis programmable logic controller (sourcing output)	01441937
EVO522-0808TP-INT	EVO500 series 8-input 8-output 16-axis programmable logic controller (sourcing output)	01441934
EVO523-0808TP-INT	EVO500 series 8-input 8-output 32-axis programmable logic controller (sourcing output)	01441940

2.3 Component Description

The components of the EVO500 series TP and TN models are identical. Take the EVO523-0808TN-INT model as an example, as shown in the following figure.


③
②
①
INOVANCE
EVO521B
PWR
RUN
ERR
LAN1A
LAN1B
IN
OUT
MANUAL
④
⑤
⑥
⑫
⑪
⑩
⑨
LAN1
A
B
EtherCAT
EXP-A
EXP-B
A B
A B
+24V
RS+
RS-
0V
GND
⑦
⑧

No.	Port type	Identification	Definition	Indicator color	Description
①	I/O indicator	IN/OUT	I/O status display	Yellow-green	• Steady on: Input/Output active • Off: Input/Output inactive
②	Running status indicator	PWR	Power supply indicator	Yellow-green	• Steady on: Power supply normal. • Off: No power or power supply abnormal.
		RUN	Running status indicator	Yellow-green	• Steady on: User program in progress • Flashing: Firmware upgrade or SD card program upgrade in progress. • Off: User program stopped
		ERR	Fault indicator	Red	• Off: No critical error occurred • Flashing[1]: Critical error occurred
		LAN1A	LAN1A status indicator	Yellow-green	• Steady on: The link has been successfully established. • Flashing: Communication in progress • Off: Link not established
		LAN1B	LAN1B status indicator	Yellow-green	• Steady on: The link has been successfully established. • Flashing: Communication in progress • Off: Link not established
③	DIP switch	RUN/STOP	Controls start/stop of the PLC.	-	-
④	Type-C port		Connects to a PC (iFA backend) via Type-C.	-	-

No.	Port type	Identification	Definition	Indicator color	Description
⑤⑥	Expansion card slot	EXP-A/ EXP-B	Receives expansion card for extended functions.	-	For details on expansion card options, see *"8.1 Appendix 1: Applicable Products" on page 74*
⑦	RS485	485+	RS485 communication signal (+)	-	-
		485-	RS485 communication signal (-)	-	-
		GND[2]	RS485 communication signal ground	-	-
⑧	Power supply interface	+24 V	24 VDC power supply (+)	-	-
		0 V	24 VDC power supply (-)	-	-
		⏚	Protective earth (PE) of the PLC	-	-
⑨	EtherCAT interface	EtherCAT	For EtherCAT communication	-	-

No.	Port type	Identification	Definition	Indicator color	Description
⑩	I/O terminal	-	8 inputs and 8 outputs	-	For details, see *"4.1 Terminal Arrangement" on page 42*
⑪⑫	Ethernet port	LAN1B/1A	RJ45 interface for Ethernet communication	-	-

Caution

- [1]: To restart the product in case of a fault, turn off the power and disconnect the USB cable. Ensure the power indicator is off for at least 10 seconds before powering it on again.
- [2]: The GND terminal of the RS485 port is for signal common ground only; do not connect it to the cabinet's protective earth (PE).

2.4 Technical Specifications

2.4.1 General Specifications

■ Specifications

Item			Specification
Key items	Program capacity		10 MB
	Data capacity		20 MB, of which 512 KB is retentive at power failure
	Instruction execution time	Bit operation	2.5 ns
		Integer operation	3 ns
		Floating-point operation (double precision)	5 ns
	Number of axes	Servo axis	• EVO521-0808TN-INT/EVO521-0808TP-INT: 8 • EVO522-0808TN-INT/EVO522-0808TP-INT: 16 • EVO523-0808TN-INT/EVO523-0808TP-INT: 32
		Local pulse axis	5
		Local encoder axis	4
		Virtual axis and other axes	23
		Total number of axes	• EVO521-0808TN-INT/EVO521-0808TP-INT: 40 • EVO522-0808TN-INT/EVO522-0808TP-INT: 48 • EVO523-0808TN-INT/EVO523-0808TP-INT: 64
		Number of axis groups	4
	Axis control performance		Supports synchronization of 12 servo axes [1] or 4 pulse axes within a 1 ms cycle (execution time for motion control calculation); supports a total of 32 servo axes.

Item		Specification
Key items	Electronic cam	The cam supports editing of up to 2000 key points and 65535 dense points.
	Axis group	The mechanical model of the axis group supports the following configurations: 2-axis planar, 3-axis Cartesian, 4-axis Cartesian, and 4-axis SCARA.
	Local expansion	Expansion module: Supports up to 16 GL20 series local expansion modules.
		Expansion card: Supports 8 types of expansion cards. Up to 2 expansion cards can be installed simultaneously. For the supported type of expansion card, see *"8.1 Appendix 1: Applicable Products" on page 74*
Program-ming	Programming platform	iFA Evolution
	Programming language	IEC 61131-3 programming language (LD, ST)
High-Speed I/O	Pulse input	8-channel hardware inputs
		• EVO52X-0808TN-INT: Maximum input frequency 200 kHz • EVO52X-0808TP-INT: Maximum input frequency 100 kHz
		Supports up to 4 encoder axes.
		Supports A/B phase, pulse/direction, CW/CCW, single-phase pulse signal
	Pulse output	8-channel hardware outputs
		Maximum output frequency: 200 kHz
		Supports up to 5 pulse axes, with motion control instructions unified with those of bus axes.
		Supports A/B phase, pulse/direction, CW/CCW, single-phase pulse signal
		Supports PWM function (5 Hz to 200 kHz)

Item		Specification
User program upload/ down-load	TF card (SD)	Supports user program download via GE20 series memory expansion card.
	Type-C	• Supports PLC monitoring and user program upload/ download by connecting to a PC via Type-C. • USB cable communication distance: 1.5 m
	EtherNet	Supports PLC monitoring and user program upload/ download by connecting to a PC via Ethernet.
Firmware program-ming	TF card (SD)	Supports firmware programming via the GE20 series storage expansion card.
	Type-C	• Supports firmware programming by connecting to a PC via Type-C. • USB cable communication distance: 1.5 m
	EtherNet	Supports firmware programming by connecting to a PC via Ethernet.
Dimen-sions and weight	Dimensions (W x H x D)	53 mm x 100 mm x 80 mm
	Weight	Approx. 197 g
IP rating		IP20

Note

[1]: The following conditions must be met.

- The communication load must be below 50%.
- All 12 axes operate in single-axis or cam motion mode, with a maximum of 3 axis groups.

■ Communication specifications

Item	Specification	
EtherCAT	Master/Slave	• As master: Supports up to 127 EtherCAT slaves, with a minimum synchronization cycle of 1ms. • As slave: Supports software disable, scan, and program disable functions.
EtherNet	Supported mode	By default, the dual Ethernet ports operate in single NIC switch mode (sharing the same IP address). Starting from firmware V1.3, the dual ports can be switched to independent IP mode. Firmware versions earlier than V1.3 only support the switch mode.
	EtherNet/IP	• When acting as a master, it supports up to 16 slaves; when acting as a slave, it accepts connections from up to 16 masters. • Supports up to 32 connections • Supports producer labels • Supports service message tags
	Modbus TCP	When acting as a master, it supports up to 63 slaves; when acting as a slave, it accepts connections from up to 16 masters.
	OPC UA server	• Security policy: Supported • User authentication: Supported • Maximum number of sessions: 20 • Maximum number of subscriptions per server: 400 (2 x 2) • Maximum number of monitored nodes per server: 2000 • Number of network public variables: 50000
	Free protocol	Supported

Item	Specification	
RS485	Number of channels supported	Up to 3 channels (one channel on the main unit and two channels extended in the expansion card).
	Hardware interface	2 x 3Pin terminal (shared with the power supply)
	Isolation mode	Non-isolation
	Termination resistor	No termination resistor, available as master or slave
	Modbus RTU	When acting as a master, it supports up to 31 slaves; when acting as a slave, it accepts connections from up to 16 masters.
	Communication baud rate	4800 bit/s, 9600 bit/s, 19200 bit/s, 38400 bit/s, 57600 bit/s, 115200 bit/s
	Short-circuit protection	Providing protection against 24 V improper insertion
	Serial port free protocol	Supported
CANopen	Number of slaves	Supports up to 63 slaves.
PROFINET	Master/Slave	Supported as slave
	Interface supported	LAN1
	Maximum number of bytes	1024
	Maximum number of modules	64 I/O modules
	Watchdog parameter setting	• If the CPU load is below 50%, the watchdog setting is 4 x 3 ms. • If the CPU load is between 50% and 80%, the watchdog setting is 4 x 4 ms. • If the CPU load is between 90% and 100%, the watchdog setting is 4 x 10 ms.

2.4.2 Power Supply Specifications

Item	Specification
Rated terminal input voltage	24 VDC±10% (21.6 VDC to 26.4 VDC)
Rated terminal input current	1 A (max@24 VDC)

Item	Specification
Rated local bus output voltage	5 VDC (4.75 VDC to 5.25 VDC)
Rated local bus output current [1]	2A (max@5 V)
24 V input power supply protection	Protection against short circuit and reverse connection
Hot swap	Not supported

Note

[1]: Power supply principle: If the total current demand of the local bus exceeds 2 A, a GL20-PS2 power supply module (rated current: 2 A) is required.

2.4.3 Input Specifications

Item		Specifications
Input type		Digital input
Number of input channels		8
Input mode		Sourcing/Sinking
Input voltage class		24 VDC±10% (21.6 VDC to 26.4 VDC)
High-speed input (X0-X7)	Input current at input ON	• EVO52X-0808TN-INT: > 4 mA • EVO52X-0808TP-INT: > 2.5 mA
	Input current at input OFF	• EVO52X-0808TN-INT: < 2.5 mA • EVO52X-0808TP-INT: < 1.5 mA
	Hardware response time	2 μs (RC time)
	Maximum input frequency	• EVO52X-0808TN-INT: 200 kHz • EVO52X-0808TP-INT: 100 kHz
	Input impedance	• EVO52X-0808TN-INT: 3.4 kΩ • EVO52X-0808TP-INT: 5.7 kΩ
ON-state voltage		⩾ 15 VDC
OFF-state voltage		⩽ 5 VDC
Software filter time		• Low speed: 2 ms to 1000 ms • High speed: 200 ns to 1000 μs

Item	Specifications
Isolation method	Isolated by digital isolator chip
Common terminal	8-point/common terminal (The polarity +/- of input power supply is changeable.)

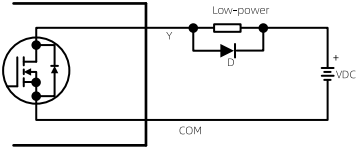
2.4.4 Output Specifications

Item		Specifications
Output type		• EVO52X-0808TN-INT: Transistor NPN output • EVO52X-0808TP-INT: Transistor PNP output
Number of output channels		8
Output voltage class		24 VDC±10% (21.6 VDC to 26.4 VDC)
High-speed output (Y0-Y7)	Output load (resistive load)	0.5 A/point; 2 A/8 points
	Output load (inductive load)	7.2 W/point; 24 W/8 points
	Output load (lamp load)	5 W/point, 18 W/8-point
	Hardware response time (ON/OFF)	< 1 μs (OFF→ON); < 2 μs (ON→OFF)
	Load current requirements	Load current ⩾ 12 mA when used with outputs greater than 10 kHz
	Maximum output frequency	200 kHz for resistive load; 0.5 Hz for inductive load; 10 Hz for lamp load
PWM output		Maximum frequency 200 kHz, minimum pulse width 5 μs, minimum resolution 5 μs, adjustable duty cycle 0.01% to 99.99%
OFF-state leakage current		Less than 30 μA at 24 V
Max. residual voltage during ON		Less than 0.5 VDC
Isolation method		Digital isolator

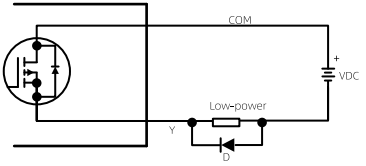
Item	Specifications
Common terminal	8 channels/common terminal • EVO52X-0808TN-INT: Common terminal connected to the negative terminal of the output power supply • EVO52X-0808TP-INT: Common terminal connected to the positive terminal of the output power supply
Short circuit protection	Short circuit protection per channel, recovered after power failure
External inductive load protection	Connect a flywheel diode [1] when connecting the external inductive load.
Output action display	The output indicator turns on (controlled by software) when the output is in drive state.

[1]: Use a 1N4001(50V/1A) or similar diode, as marked by "D" in the following figure.

- EVO52X-0808TN-INT



- EVO52X-0808TP-INT



3 Mechanical Installation

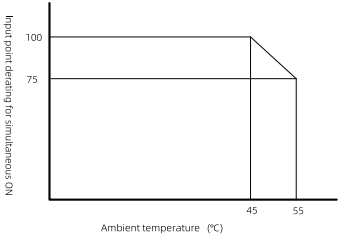
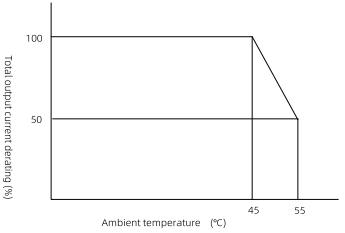
3.1 Installation Environment Requirements

Take the operability, serviceability, and adaptability to environment into account when installing the PLC.

Item	Specification
Ambient environment	No corrosive and flammable gas and no excessive conductive dust
Altitude	≤2000 m (80 kPa)
Pollution degree	2
Interference immunity	2 kV on power supply line (compliant with IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC61131-2
ESD protection level	Contact discharge: +/-6 kV; air discharge: +/-8 kV
Vibration resistance	• Application scenario: Tested according to IEC60068-2-6, 3.5 mm amplitude at 5 Hz to 8.4 Hz; 1 g gravitational acceleration at 8.4 Hz to 200 Hz; 10 cycles per axial direction • Transportation scenario: Tested according to IEC60068-2-64, 0.01 g^2/Hz power spectral density at 5 Hz to 100 Hz; 0.001 g2/Hz power spectral density at 200 Hz; 1.14 g Grms
Shock resistance	Application/Transportation scenario: The module passes the test according to IEC60068-2-27. Test conditions: 15 g peak gravitational acceleration; 11ms pulse width; 18 times in X/Y/Z directions.
Overcurrent protection device	1.5 A fuse

Item	Specification
Operating temperature/ humidity	• Operating temperature: -20°C to +55°C (when installed horizontally), -20°C to +45°C (when installed non-horizontally) • Relative humidity: < 95% RH (30°C), without condensation **Note: Install a fan or an air conditioner in the direction of the ventilation holes when the operating temperature is higher than the maximum allowable temperature.**
Storage temperature/ humidity	• Storage temperature: -20 °C to +60 °C • Relative humidity: < 95% RH (30°C), without condensation

Item	Specification
Transportation temperature/ humidity	• Transportation temperature: -40 °C to +70 °C • Humidity: < 95% RH (40°C), without condensation

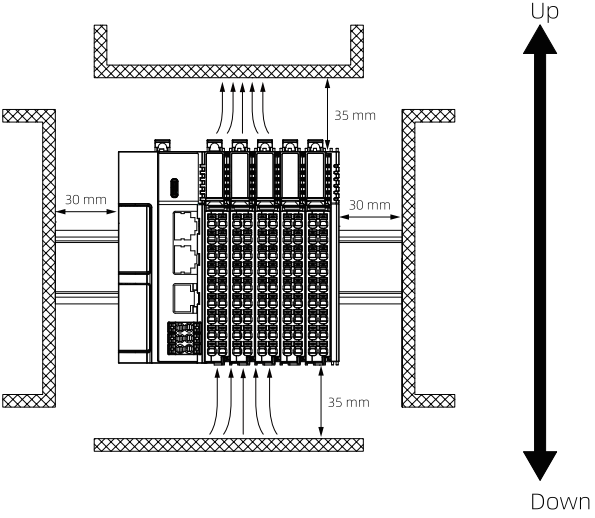
Item	Specification
Installation position and restraints	The PLC can be installed in four directions, as shown in *"3.2 Installation Position Requirements" on page 36* Limit: • When installed horizontally: ■ Input derating: Full load operation is allowed at 45°C. At 55°C, the number of simultaneously ON inputs is derated to 75% (That is, no more than 6 channels). For every 1°C increase, the number of simultaneously ON inputs is derated by 2.5%.  ■ Output derating: Full load operation is allowed at 45° C (total current of all 8 outputs not exceeding 2 A). At 55°C, the total current of simultaneously ON outputs is derated to 50% (That is, no more than 1 A total for all 8 outputs). For every 1°C increase, the total current of simultaneously ON outputs is derated by 5%.  • When installed non-horizontally: The maximum number of inputs should not exceed 6, the maximum output current should not exceed 1 A, and the number of modules should not exceed 6.

3.2 Installation Position Requirements

The PLC can be mounted horizontally or vertically, on top or at the bottom of the electric cabinet. Different mounting options require different operating temperatures, see *"3.1 Installation Environment Requirements" on page 32*.

■ Optimal mounting option

The PLC is most preferably installed horizontally. The heat dissipation is realized by natural convection mode. To ensure normal ventilation and heat dissipation and to allow sufficient wiring space, reserve minimum clearance around the PLC, as shown in the following figure.

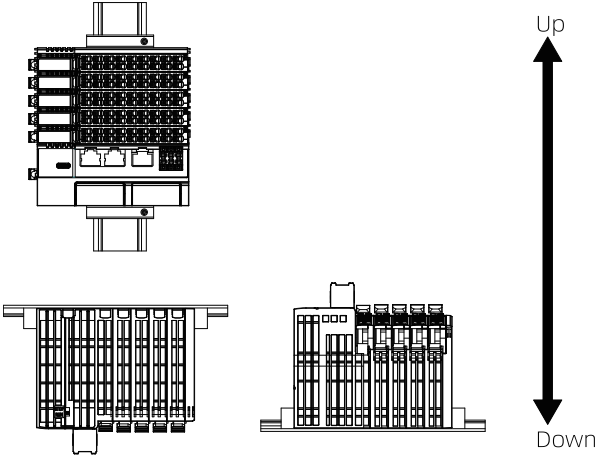


Caution

If there is a high-temperature heat source (heater, transformer, large resistor, etc.) in vicinity of the product, keep the product away from the heat source by at least 100 mm.

■ Other mounting options

Other mounting options require the same clearance as the optimal mounting option and are shown in the following figure.



Caution

In case of vertical installation:

- PLC must be installed below all I/O modules.
- Hold the cables with a cable duct to prevent the weight of cables being applied to the lower end plate, which may result loose of the PLC from the DIN rail.

3.3 Installation Precautions

- Before installing or removing the master and module, ensure that the master and module are powered off.

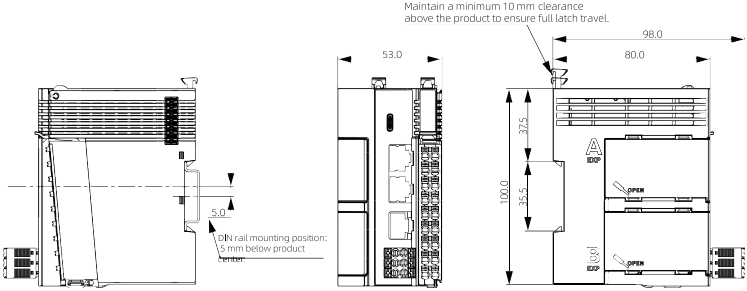
Caution

Do not connect/disconnect the module with power ON. This may lead to master restart or user data loss or damage.

- Prevent the master, module enclosure, or terminals from dropping or suffering from impact or shock.

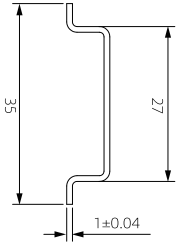
3.4 Installation Dimensions

The installation dimensions (in mm) are shown in the figure below.



3.5 Installation Method

The PLC is mounted onto a DIN rail in conformity with IEC 60715 (width: 35 mm, thickness: 1 mm). The dimensions (unit: mm) are shown below.

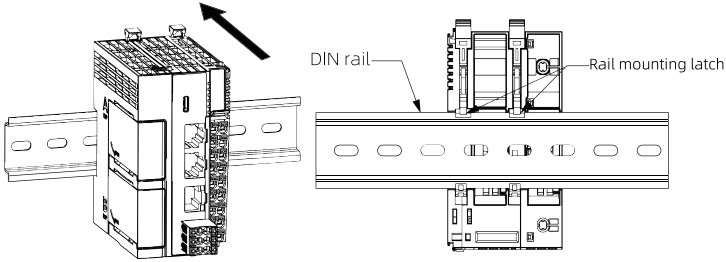


Caution

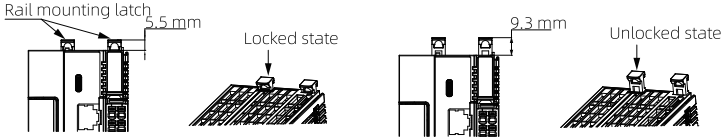
When installed on a DIN rail other than the recommended one (especially the one whose thickness is not 1.0 mm), the product will not fit in place as the mounting hook does not work.

■ Installing the PLC

1. Align the PLC with the DIN rail and push it in the direction indicated by the arrow until you hear a click,



2. Confirm that the DIN rail mounting latch on the main unit is locked. The locked and unlocked states of the DIN rail mounting latch are shown in the figure below.



- If the DIN rail mounting latch is in the lower position, it is locked.
- If the DIN rail mounting latch is in the upper position, it is unlocked.

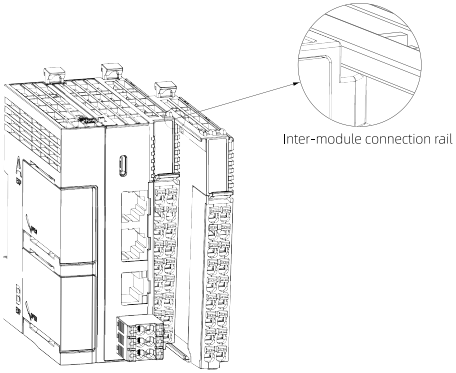
If the DIN rail mounting latch is unlocked, press down the latch to lock it.

Caution

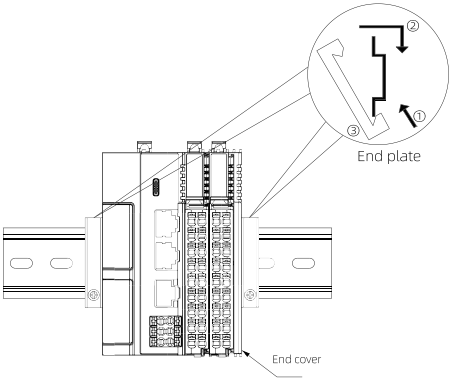
When the PLC is not installed on the rail, keep the mounting hook in the locked state. Keeping the mounting hook unlocked for a prolonged time may cause the hook to fail.

■ Installing expansion module to the PLC

You can install an expansion module to the PLC with the help of top and bottom guides on them, as shown below.

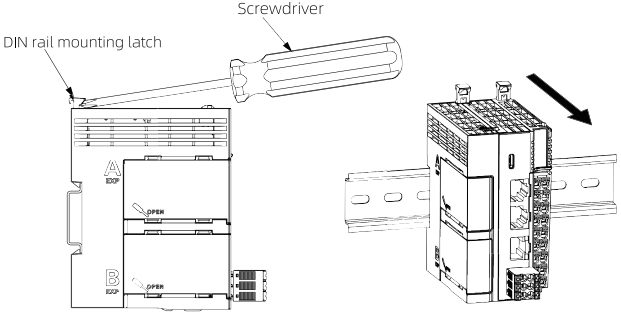


Mount an end plate on a side of the PLC or expansion module. To mount the guide rail end plate, hook its lower lip under the bottom of the guide rail. Then, rotate the end plate so that the top of the end plate hooks onto the top of the rail. Finally, tighten the screws to lock the end plate in place, as shown below.



■ Removing the module

Use a slotted screwdriver or similar tool to pry the rail mounting latch upward. Then, pull the module forward to remove it. After removal, press down the top of the latch.



4 Electrical Installation

4.1 Terminal Arrangement

The terminal assignment is shown in the following figure. The terminal signals are described in the following table.



Signal (Left)	Termi-nal (Left)	Terminal (Right)	Signal (Right)
X0 input	A1	B1	Y0 output
X1 input	A2	B2	Y1 output
X2 input	A3	B3	Y2 output
X3 input	A4	B4	Y3 output
X4 input	A5	B5	Y4 output
X5 input	A6	B6	Y5 output
X6 input	A7	B7	Y6 output

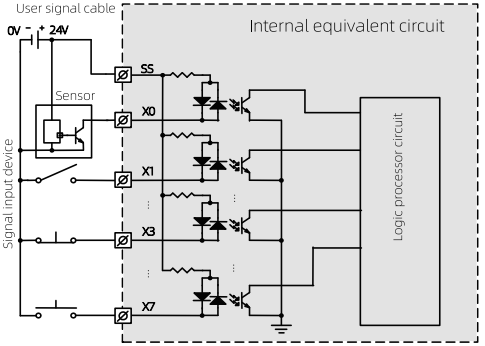
Signal (Left)	Terminal (Left)	Terminal (Right)	Signal (Right)
X7 input	A8	B8	Y7 output
Input common terminal (SS)	A9	B9	Output common terminal (COM)

Caution

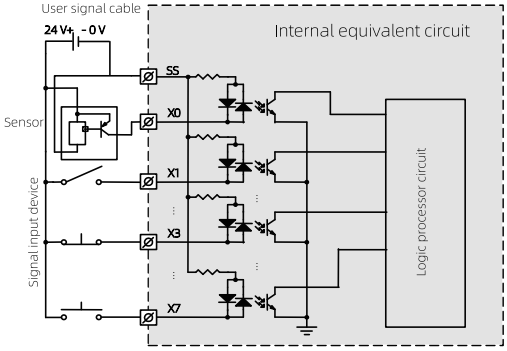
- The total extension length of high-speed I/O extension cables must not exceed 3 m.
- Do not bundle the extension cables with power cables (high voltage, high current) or other cables that carry strong interference. Route the extension cables separately from these cables and avoid running them in parallel.

4.2 Input Terminal Wiring

■ Sinking input wiring



■ Sourcing input wiring

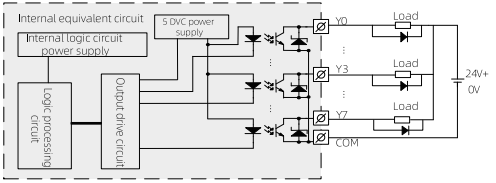


4.3 Output Terminal Wiring

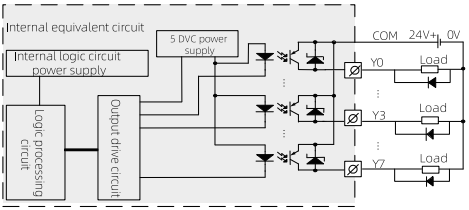
Note

An external flywheel diode is required when an inductive load is connected. In this case, use a 1N4001 or similar diode.

- EVO52X-0808TN-INT



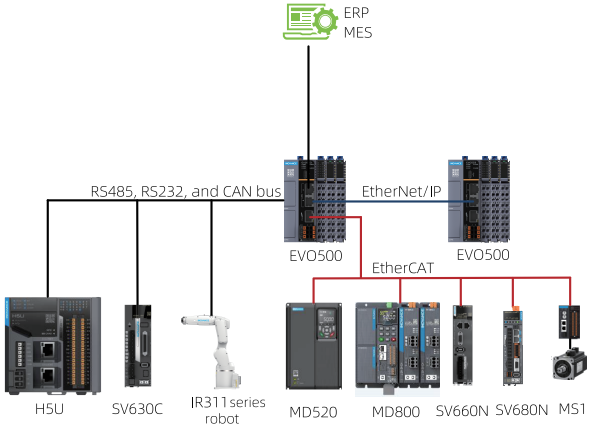
- EVO52X-0808TP-INT


Internal equivalent circuit
5 DVC power supply
Internal logic circuit power supply
Logic processing circuit
Output drive circuit
COM
24V+
0V
Y0
Y3
Y7
Load
Load
Load

5 Communication Connection

5.1 Communication Networking

This product connects to other EtherNet/IP stations, ERP, MES, and similar systems via its Ethernet port. By using the EtherCAT interface, it connects to other slaves, such as MD520 and MD800 AC drives, SV660N and SV680N servo drives, and other EtherCAT-enabled modules. Using GE20 series expansion cards, it connects to devices such as H5U, SV630C, and IR311 series robots via RS485, RS232, or CAN bus communication, as shown in the following figure.



5.2 EtherCAT Communication

■ EtherCAT specifications

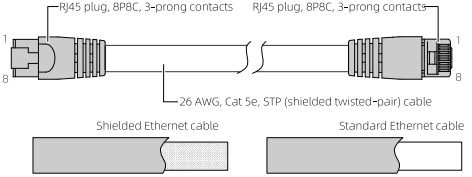
Item	Description
Communication protocol	EtherCAT protocol
Services available	CoE (PDO, SDO), EoE
Synchronization mode	Servo drives use DC (Distributed Clock); I/O modules use input/output synchronization.
Physical layer	100BASE-TX

Item	Description
Baud rate	100 Mbit/s (100Base-TX)
Duplex mode	Full duplex
Topology	Linear
Transmission medium	Network cables, see the Wring section
Transmission distance	Less than 100 m between two nodes
Number of slaves	Up to 127
EtherCAT frame length	44 to 1498 bytes
Process Data	Maximum 1486 bytes per Ethernet frame

■ Wiring

The PLC provides a CN3 port for EtherCAT bus communication. The communication cable must meet the following requirements:

Communication cable requirements



Signal pin assignment

Pin	Signal	Signal Direction	Description
1	TD+	Output	Data transmission +
2	TD-	Output	Data transmission-
3	RD+	Input	Data reception +
4	-	-	Not used
5	-	-	Not used
6	RD-	Input	Data reception-
7	-	-	Not used
8	-	-	Not applicable

Length requirements

The cable between devices cannot exceed 100 m when the EtherCAT bus is used, exceeding of which may attenuate the signal and affect normal communication.

Technical requirements

100% continuity test, without occurrence of short circuit, open circuit, misalignment, or poor contact. Cables meeting the following requirements are recommended.

Item	Specification
Cable type	Flexible crossover cable, S-FTP, Cat5e
Standard	EIA/TIA568A, EN50173, ISO/IEC11801 EIA/TI Abulletin TSB EIA/TIA SB40-A&TSB36
Cross-sectional area	26 AWG
Conductor type	Twisted pair
Number of pairs	4

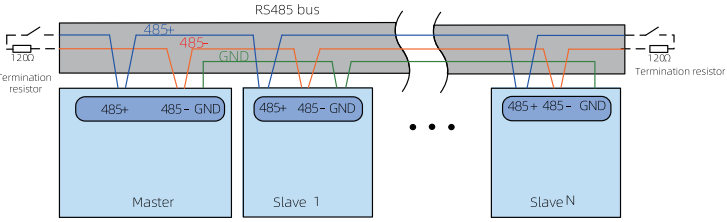
5.3 RS485 Communication

When using RS485 communication, observe the following requirements:

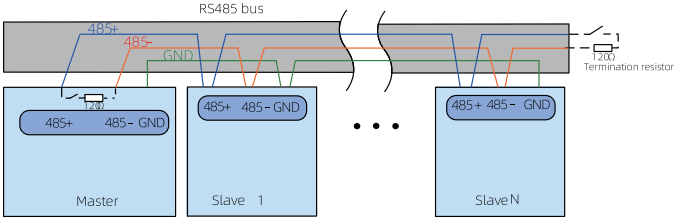
- For the RS485 bus, a shielded twisted-pair cable is recommended. The 485+ and 485- lines must be wired as a twisted pair within this cable.
- Connect 120 Ω termination resistors at both ends of the bus to prevent signal reflection.
- Tie the RS485 signal reference grounds of all nodes together.
- A maximum of 31 nodes are supported. The stub length from each node to the main bus must be less than 3 m.

The RS485 bus topology is shown in the figure below.

Local RS485 communication on the EVO500 series PLC



RS485 communication on GE20 series expansion cards



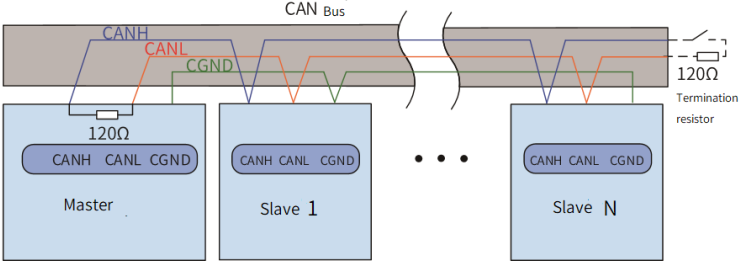
To avoid interference, do not bundle the cable together with an AC power cable or high voltage cable.

5.4 CAN Communication

Install the GE20-CAN-485 expansion card in the slot A to build a CAN bus network. For details on the expansion card, see *"8.1 Appendix 1: Applicable Products" on page 74*

When forming a CAN network, the three corresponding wires of all devices must be connected one by one together. A 120 Ω termination resistor is required at both ends of the CAN bus. The following uses an onboard termination resistor in the PLC as an example.

The CAN bus network topology is illustrated below.



The following table lists the supported CAN baud rates and their corresponding communication distances.

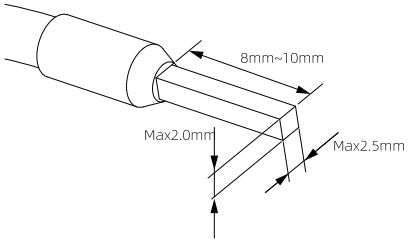
Baud rate (kbit/s)	Communication distance (m)
1000	20
500	80
250	150
125	300
100	500
50	1000

5.5 Cable Selection

The cable lug and sizes in the following table are provided for reference only. Adjustments can be made based on actual usage after proper calculation.

Supporting material	Cable diameter	
	mm^2	AWG
Tubular lug	0.3	22
	0.5	20
	0.75	18
	1.0	18
	1.5	16

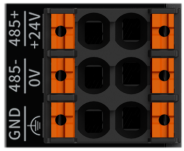
If another type of tubular lug is used, crimp the lug onto the stranded wire. The lug must meet the shape and dimensional requirements shown in the figure below.



5.6 Cable Connection

■ RS485 communication

The RS485 communication port and power supply port share the same terminal block, with RS485 communication port on the left and 24 V power supply port on the right.



- Terminal assignment

Signal description	Terminal (Left)	Terminal (Right)	Signal description
RS485 differential pair signal (+)	485+	+24 V	24 VDC power supply (+)
RS485 differential pair signal (-)	485-	0 V	24 VDC power supply (-)
RS485 communication ground terminal	GND	⏚	Protective earth (PE) of the PLC

- Wiring

  Select cables with tubular lugs as specified in *"5.5 Cable Selection" on page 50*, and insert the cables into the communication ports.

■ Ethernet communication

To improve the reliability of communication, Cat5 shielded twisted pair cables with an iron shell must be used.

- Insert the registered jack on the cable into the Ethernet port (RJ45 interface) until a click is heard.
- To remove the RJ45 network cable, press and hold the tail of the registered jack, and then pull it out along the direction parallel with the module.

6 Troubleshooting

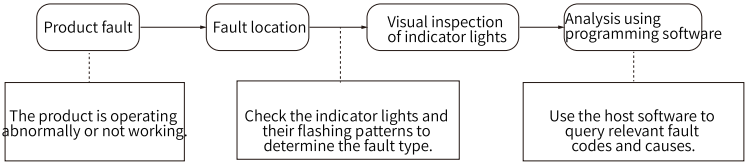
6.1 Overview

Troubleshooting is a method for locating problems. It helps users quickly identify why PLC program execution results deviate from expectations and find appropriate solutions based on the fault messages. The PLC integrates a fault diagnosis function. Detailed diagnostic information is provided through the hardware indicators and the fault diagnosis window of the programming software, allowing users to quickly locate the cause of a problem and resolve system faults efficiently.

This chapter describes the fault diagnosis function of the product from four topics: troubleshooting procedure, troubleshooting method, troubleshooting cases, and fault classification and codes.

6.2 Troubleshooting Procedure

When a fault occurs on this product, first identify the fault type by checking the indicator lights. If the indicators show a fault, enable the fault diagnosis function in the programming software to view the corresponding fault code and handle the fault accordingly.



6.3 Troubleshooting Method

6.3.1 Troubleshooting via Signal Indicators

The front panel of this product is equipped with signal indicators for monitoring the product status and troubleshooting faults.

For details on the signal indicators, see *"2.3 Component Description" on page 19*.

6.3.2 Troubleshooting via iFA Evolution

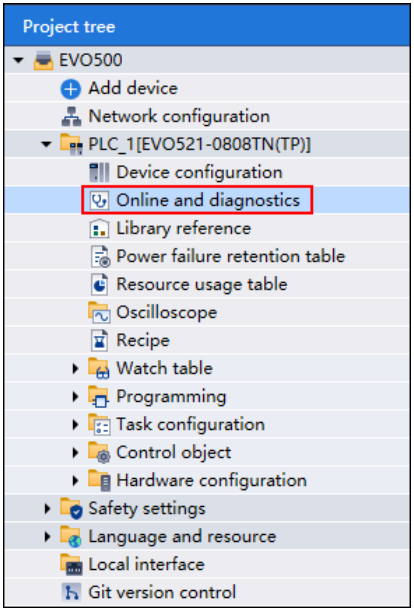
The integrated fault diagnosis function of this product allows you to intuitively view detailed fault information in iFA Evolution, and provides troubleshooting recommendations. This section describes how to use iFA Evolution to troubleshoot faults.

Prerequisites

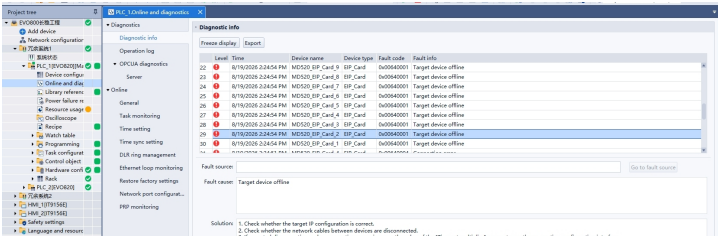
- This product has been connected to the PC running iFA Evolution via an Ethernet cable or USB cable.
- The device is powered on and started.

Procedure

- Click "PLC_1 > Online and diagnostics" in the project tree on the left to open the "Online and diagnostics" interface.



- All faults are displayed in the "Diagnostic info" area, where you can view the fault level, time, device name, fault code, and fault information. Select a fault to display specific fault information. You can locate the fault based on the "Fault cause" and solve the fault according to the "Solution".



For specific diagnostic information, see Section 11 "Diagnostics" in the iFA Evolution Information System.

6.4 Troubleshooting Cases

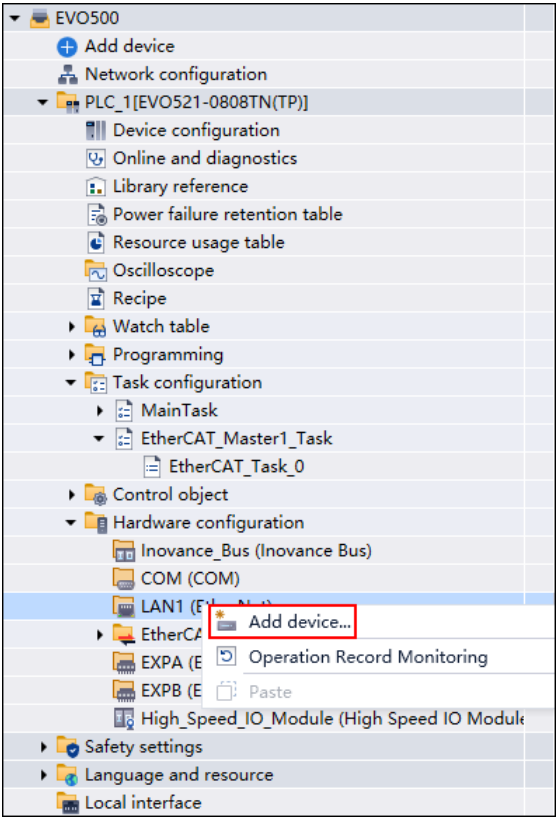
The following uses the "EIP_Card device IP configuration error" fault as an example to illustrate the troubleshooting process.

Prerequisites

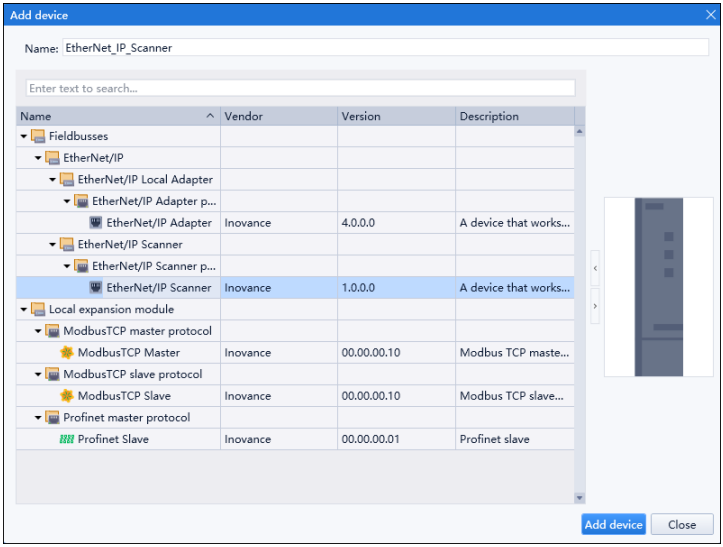
An EIP_Card device IP configuration fault has occurred.

(Optional) You can reproduce the EIP_Card device IP configuration fault by following these steps:

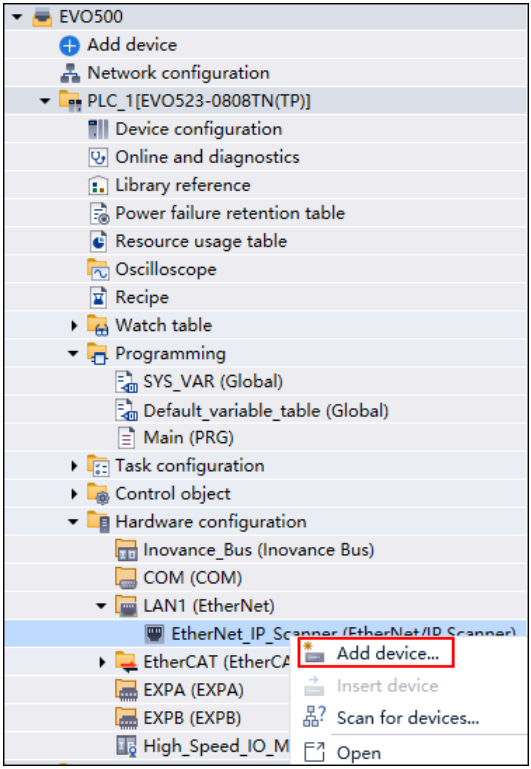
1. In the project tree on the left, right-click "PLC_1 > Hardware configuration > LAN1" and select "Add device".



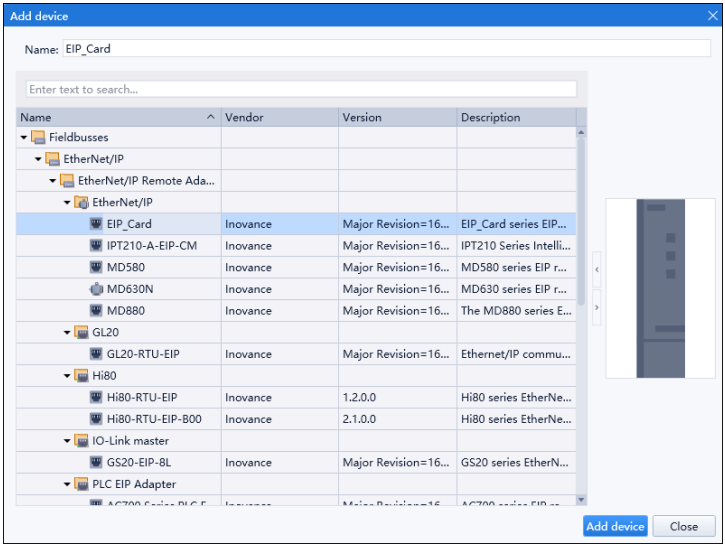
2. In the pop-up "Add device" dialog box, select "EtherNet/IP Scanner", and click "Add device" to add the EtherNet/IP Scanner.



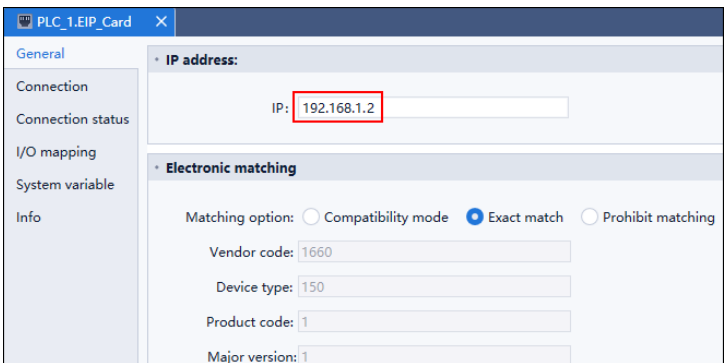
3. In the "Project tree" on the left, right-click "PLC_1 > Hardware configuration > LAN1 > EtherNet_IP_Scanner", and select "Add device".



4. In the pop-up "Add device" dialog box, select "EIP_Card", and click "Add device" to add the EIP_Card.

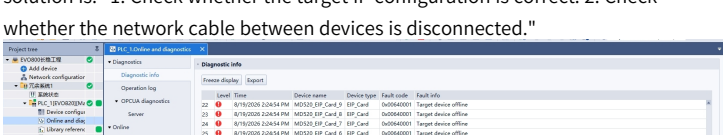


5. Double-click "PLC_1 > Hardware Configuration > LAN1 > EtherNet/IP Scanner > EIP_Card" to open the EIP_Card configuration window. In the General area, set "IP" to "192.168.1.2".



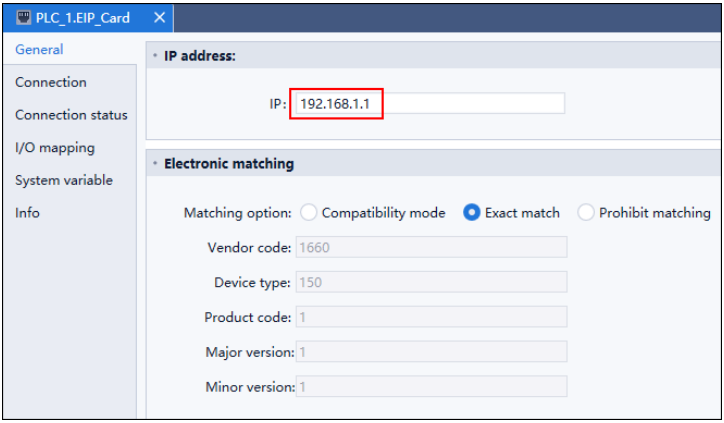
Procedure

1. Perform the diagnosis via the signal indicator. The red ERR indicator on the PLC is on, indicating an abnormal user program.
2. Perform online diagnostics via iFA Evolution. Double-click "Online and diagnostics" in the "Project tree" on the left to open the "Diagnostic info" interface, which displays all fault messages that have occurred on the device.
3. Click fault entry 1. The displayed fault message is "Target device is offline", and the solution is: "1. Check whether the target IP configuration is correct. 2. Check whether the network cable between devices is disconnected."

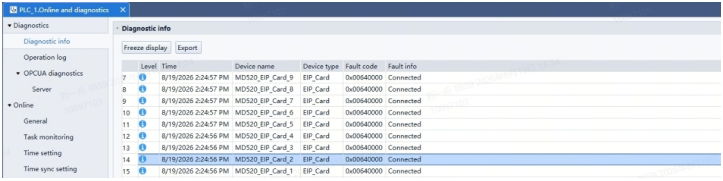


4. The solution prompts you to check the device IP of the EIP_Card. In the project tree on the left, double-click "Hardware configuration > LAN1 > EtherNet_IP_

Scanner > EIP_Card", verify the "IP" setting, and correct it to the correct value. In this case, the correct IP is "192.168.1.1".



5. After correction, go back to "Online and diagnostics" interface. Now the interface shows "Connected", indicating that the fault has been resolved. The handling method for fault 2 is the same as mentioned.



6.5 Fault Classification and Fault Codes

For fault codes related to the local controller in iFA Evolution, see *"8.2 Appendix 2: Fault Codes" on page 80*. For other fault codes, see iFA Evolution Information System.

7 Operation and Maintenance

7.1 Run and Stop Operation

After the PLC is programmed, start and stop it as follows.

After writing the program while the PLC is in STOP state, do the following to run the system:

1. Set the system to RUN state.
2. Confirm that the RUN indicator is steady on and yellow-green.
3. To stop operation, set the system to STOP state, or stop it via the host software.

7.2 User Program Upgrade

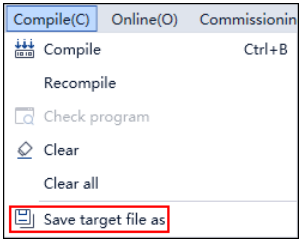
7.2.1 Upgrading User Programs via SD Card

■ Prerequisites

A SD card with a capacity of 32 G or less and using FAT32 file system is ready.

■ Procedure

1. Generate the Application.fauserprg file through the iFA Evolution software.
   a. In the menu bar, select "Compile -> Save target file as".

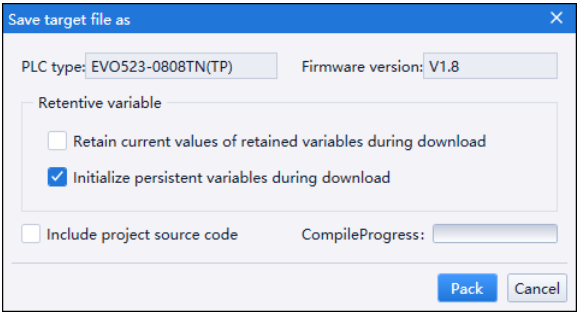


   b. In the "Save target file as" dialog box, click "Package" to generate the Application.fauserprg file. You can select the save path. The file is saved in .fauserprg format.

Note

Packaging is not supported in simulation mode or online mode.

Parameter	Description
PLC type	Displays the current PLC type.
Firmware version	Displays the current firmware version of the device.
Retentive variable	You can choose whether to clear retentive variables during download. The default setting is "reinitialize retentive variables upon download".
Include project source code	This option is not checked by default. When checked, the project source code will be included in the package.
Compilation progress	The interface displays the compilation progress by default. The packaging progress is displayed after the compilation is complete and the save path is selected.



2. Create a "PLCProgram" directory in the root directory of the SD card, copy the Application.fauserprg file into the "PLCProgram" directory.
3. After the device is powered off, insert the SD card into the GE20-TF storage expansion card, and then install the expansion card into the device.
4. Set the DIP switch of the PLC to Stop state.

Note

If the device is not in Stop state, the user program cannot be upgraded after a power cycle; however, this does not affect the program operation on the device.

5. Power on the device to automatically upgrade the user program. For the indicator states during the upgrade, see the "Device indicator states" table.

Note

The device model, firmware version, and device permissions are verified during the upgrade. Any inconsistency in these items will cause the upgrade to fail.

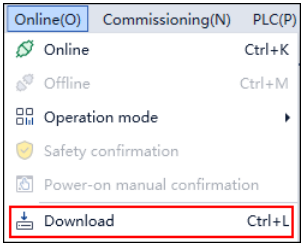
6. Set the DIP switch of the PLC to Run state and load the user program.

■ **Device indicator states**

Item	State
Upgrade process	RUN indicator: Fast flashing (4 Hz)
Upgrade success	RUN indicator: Off
Upgrade failure	ERR indicator: Slow flashing (1 Hz)
Program running	RUN indicator: Steady on

7.2.2 Upgrading User Programs via Type-C-Ethernet

1. Open a compiled project using the iFA Evolution.
2. Choose "Online -> Download" from the menu bar.

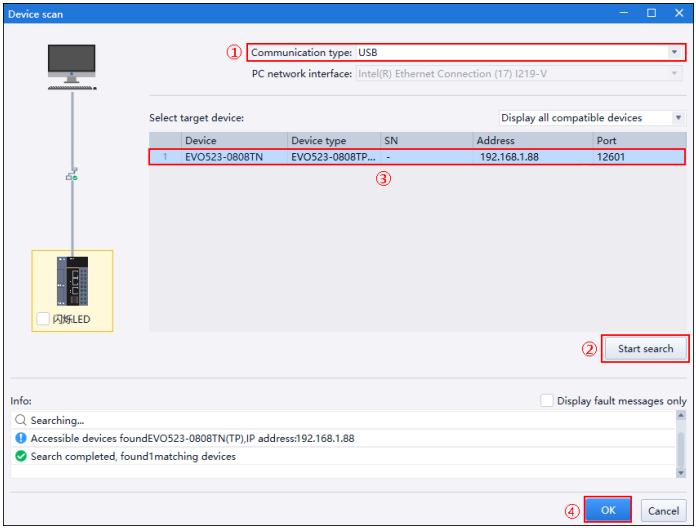


3. Scan for devices.

- Scan for devices via Type-C.

  a. In the "Device scanning" dialog box, select "USB" for the "Communication type", and then click "Start search".

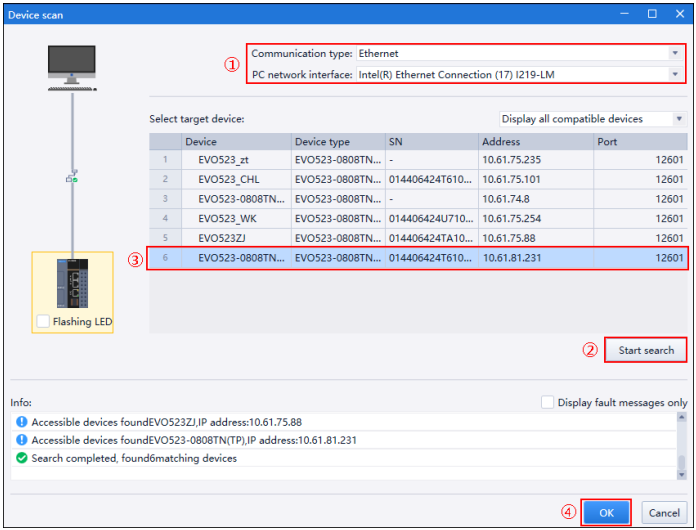
  b. Select the device to upgrade, and then click "OK".



- Scan for devices via Ethernet.

a. In the "Device scanning" dialog box, select "Ethernet" for the "Communication type" and the network interface connected to the device for the "PC network interface", and then click "Start search".

b. Select the device to upgrade, and then click "OK".

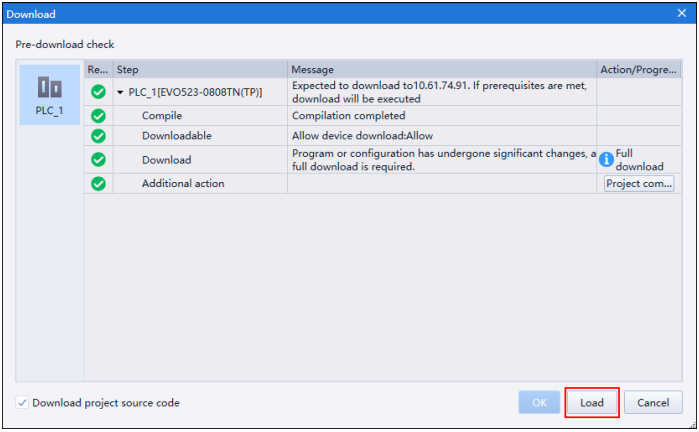


4. Download the project.

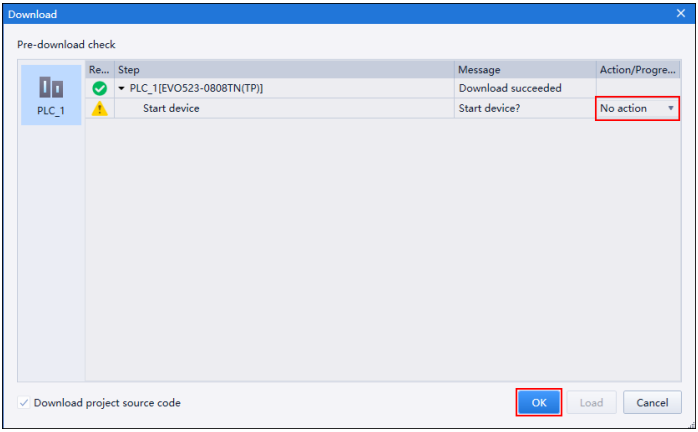
a. In the "Download" dialog box, click "Load" to download the project.

Note

The option "Download project source code" is checked by default, which means that the project source code will be downloaded to the device; if this option is not checked, the project source code will not be downloaded.



b. After successful download, select whether to start the device, and then click "Completed".



7.3 Firmware Upgrade

7.3.1 Upgrading Firmware via SD Card

■ Prerequisites

- A SD card with a capacity of 32 G or less and using FAT32 file system is ready.
- Obtain the firmware file either by downloading it from the Inovance official website or by contacting Inovance technical engineers, save it into the SD card.

■ Procedure

1. After the device is powered off, insert the SD card into the GE20-TF storage expansion card, and then install the expansion card into the device.
2. After the device is powered on again, the system starts the firmware upgrade. For the indicator states during the upgrade, see the "Device indicator states" table.

Note

The upgrade lasts about two minutes. Do not power off the device during the upgrade; otherwise, unrecoverable system faults may occur.

---

3. After the upgrade, power off the device and remove the SD card.
4. Power on the device to resume normal operation.

■ Device indicator states

Item	State
Firmware upgrade start	RUN steady on + ERR fast flashing (4 Hz)
Upgrade process	RUN steady on + ERR steady on
Upgrade success	RUN steady on + ERR slow flashing (1 Hz)
Upgrade failure	ERR slow flashing (1 Hz)

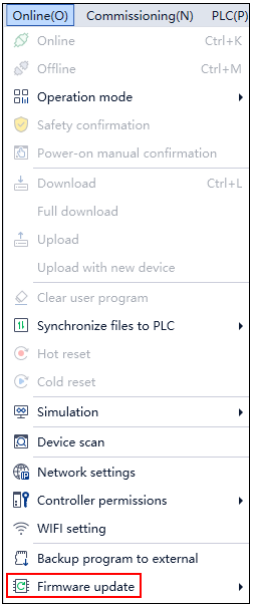
7.3.2 Upgrading Firmware via Type-C-Ethernet

■ Prerequisites

Obtain the firmware file either by downloading it from the Inovance official website or by contacting Inovance technical engineers.

■ Procedure

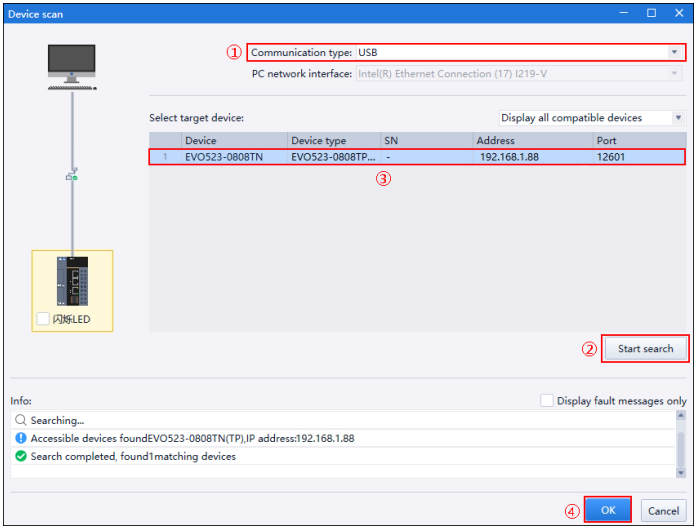
1. Open a compiled project using the iFA Evolution.
2. Click "Online -> Firmware update" in the menu bar.



3. Scan for devices.
   - Scan for devices via Type-C.

     a. In the "Device scanning" dialog box, select "USB" for the "Communication type", and then click "Start search".

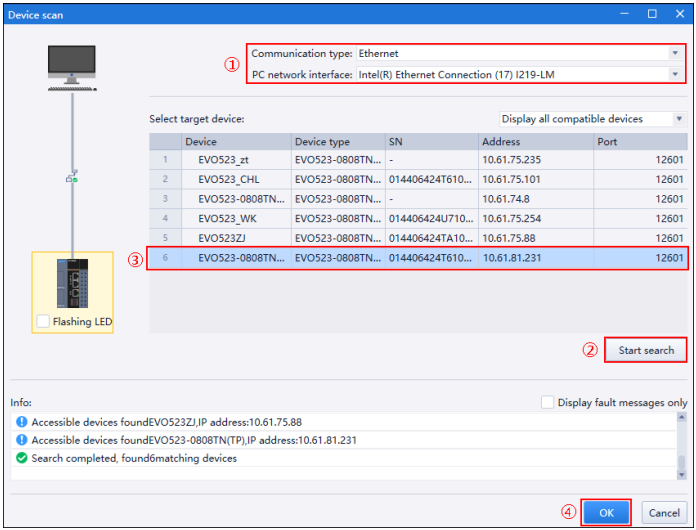
     b. Select the device to be updated, and then click "OK".



- Scan for devices via Ethernet.

  a. In the "Device scanning" dialog box, select "Ethernet" for the "Communication type" and the network interface connected to the device for the "PC network interface", and then click "Start search".

  b. Select the device to be updated, and then click "OK".

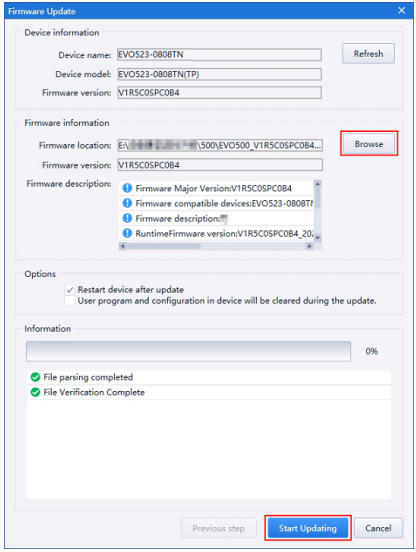


4. Upgrade the firmware.

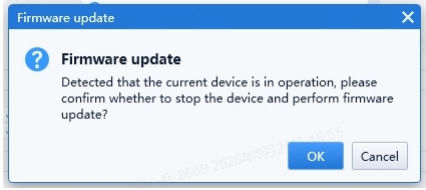
   a. In the "Firmware update" dialog box, check whether the device information is correct. Click "Browse" to select the firmware file to be updated. Confirm the firmware version and information, and then click "Start updating".

Parameter		Description
Device information	Device name	Current device name, such as EVO523-0808TN-INT.
	Device model	Current device model, such as EVO523-0808TN-INT.
	Firmware version	Current firmware version of the device, such as V1R1C0SPC0B10Beta.
Firmware information	Firmware location	The location where the firmware is stored.
	Firmware version	The firmware version to be upgraded.
	Firmware description	Detailed information about the firmware upgrade package.

Parameter		Description
Options	Automatically re-start device after update	This option enables automatic restart of the device after the firmware upgrade.
	Clear user program and configuration during the update	This option clears the user projects, data, IP configuration, and other properties in the device during the upgrade.



b. Click "OK" in the "Firmware update" dialog box.



Note

- Do not power off the device during the upgrade; otherwise, unrecoverable system faults may occur.
- The upgrade takes about two minutes, and the device will restart automatically upon completion.
- After the device restart (or the upgrade), the device's display shows "00" or changing numbers.

5. After the upgrade, check the device information and version information for consistency with the firmware version and details.

8 Appendix

8.1 Appendix 1: Applicable Products

■ EVO500 series programmable logic controller

Model	Description	Code
EVO521-0808TN-INT	EVO500 series 8-input 8-output 8-axis programmable logic controller (sinking output)	01441941
EVO522-0808TN-INT	EVO500 series 8-input 8-output 16-axis programmable logic controller (sinking output)	01441938
EVO523-0808TN-INT	EVO500 series 8-input 8-output 32-axis programmable logic controller (sinking output)	01441939
EVO521-0808TP-INT	EVO500 series 8-input 8-output 8-axis programmable logic controller (sourcing output)	01441937
EVO522-0808TP-INT	EVO500 series 8-input 8-output 16-axis programmable logic controller (sourcing output)	01441934
EVO523-0808TP-INT	EVO500 series 8-input 8-output 32-axis programmable logic controller (sourcing output)	01441940

■ GE20 expansion card

Type	Model	Description	Code	Slot supported	ID
Digital	GE20-4DI-INT	GE20 series 4-channel digital input card	01480130	A/B	13
	GE20-4DO-TN-INT	GE20 series 4-channel digital sinking transistor output card	01480115	A/B	5
Analog	GE20-2AD1DA-I-INT	GE20 series expansion card with 2-channel analog inputs and 1-channel analog output (current type)	01480138	A/B	11
	GE20-2AD1DA-V-INT	GE20 series expansion card with 2-channel analog inputs and 1-channel analog output (voltage type)	01480107	A/B	3
Communication	GE20-232/485-INT	GE20 series RS232 or RS485 communication card	01480119	A/B	7
	GE20-232/485-RTC-INT	GE20 series RS232 or RS485 communication card (integrated RTC)	01480122	B	14
	GE20-CAN-485-INT	GE20 series CAN and RS485 communication card	01480114	A	15
Storage	GE20-TF-INT	GE20 series TF card	01480109	B	1
Clock	GE20-RTC-INT	GE20 series RTC card	01480099	B	9
Storage	GE20-TF-RTC-INT	GE20 series TF card (intergrated RTC)	01480132	B	6

Note

If no expansion card is installed, the corresponding ID is "0". To check the expansion card ID, see the User Guide of the relevant expansion card.

■ GL20 expansion module

Model	Description	Support for local operation	Support for ECT communication interface module	Support for EIP communication interface module	Code
GL20-0016ETP-INT	16-channel digital transistor PNP output module	Supported	Supported	Supported	01441069
GL20-1600END-INT	16-channel digital input module	Supported	Supported	Supported	01441085
GL20-0016ETN-INT	16-channel digital transistor NPN output module	Supported	Supported	Supported	01441063
GL20-0800END-INT	8-channel digital input module	Supported	Supported	Supported	01441054
GL20-0008ETP-INT	8-channel digital transistor PNP output module	Supported	Supported	Supported	01441062
GL20-0008ETN-INT	8-channel digital transistor NPN output module	Supported	Supported	Supported	01441058
GL20-0808ETN-INT	8-channel digital input and 8-channel transistor NPN output module	Supported	Supported	Supported	01441072
GL20-0008ER-INT	8-channel general-purpose relay output module	Supported	Supported	Supported	01441064
GL20-3200END-INT	32-channel digital input module (PUSH IN terminal)	Supported	Supported	Supported	01441067

Model	Description	Support for local operation	Support for ECT communication interface module	Support for EIP communication interface module	Code
GL20-3200END-M-INT	32-channel digital input module (ejector header)	Supported	Supported	Supported	01441091
GL20-0032ETN-INT	32-channel transistor NPN output module (PUSH IN terminal)	Supported	Supported	Supported	01441079
GL20-0032ETN-M-INT	32-channel transistor NPN output module (ejector header)	Supported	Supported	Supported	01441076
GL20-3232ETN-M-INT	32-channel digital input and 32-channel NPN transistor output module (ejector header)	Supported	Supported	Supported	01441080
GL20-0032ETP-INT	32-channel digital transistor PNP output module	Supported	Supported	Supported	01441533
GL20-0004ER-INT	4-channel relay output general-purpose module	Supported	Supported	Supported	01441088
GL20-0404ETP-5V-INT	4-channel digital input and 4-channel digital output module (5 V)	Supported	Supported	Supported	01441070

Model	Description	Support for local operation	Support for ECT communication interface module	Support for EIP communication interface module	Code
GL20-0004ETP-2A-INT	4-channel high-current digital PNP transistor output module	Supported	Supported	Supported	01441059
GL20-4AD-INT	4-channel analog input module	Supported	Supported	Supported	01441075
GL20-4DA-INT	4-channel analog output module	Supported	Supported	Supported	01441089
GL20-8ADV-INT	8-channel analog input module - voltage type	Supported	Supported	Supported	01441086
GL20-8ADI-INT	8-channel analog input module - current type	Supported	Supported	Supported	01441092
GL20-8DAI-INT	8-channel analog output module - current type	Supported	Supported	Supported	01441087
GL20-8DAV-INT	8-channel analog output module - voltage type	Supported	Supported	Supported	01441083
GL20-4PT-INT	4-channel input thermal resistor temperature detection module	Supported	Supported	Supported	01441074
GL20-4TC-INT	4-channel input thermocouple temperature detection module	Supported	Supported	Supported	01441066

Model	Description	Support for local operation	Support for ECT communication interface module	Support for EIP communication interface module	Code
GL20-RTU-ECT32-INT	EtherCAT (auto-scan) communication module – global version	Supported	Supported	Supported	01441093
GL20-RTU-EIP-INT	EtherNet/IP communication module	Supported	Supported	Supported	01441077
GL20-2SSI-INT	2-channel SSI communication module	Supported	Supported	Supported	01441056
GL20-2HC-INT	2-channel high-speed count module	Supported	Supported	-	01441073
GL20-2SCOM-MDB-INT	2-channel serial communication module (Modbus)	Supported	Supported	-	01441065
GL20-2S485-MDB-INT	2-channel RS485 module (Modbus)	Supported	Supported	-	01441055
GL20-4PT-ISO-INT	4-channel thermal resistor temperature detection input module, channel-separated	Supported	Supported	Supported	01441528
GL20-4TC-ISO-INT	4-channel thermocouple temperature input module, channel-separated	Supported	Supported	Supported	01441532

Model	Description	Support for local operation	Support for ECT communication interface module	Support for EIP communication interface module	Code
GL20-8TC-PID-INT	8-channel PID integrated thermocouple temperature input module	Supported	Supported	Supported	01441534
GL20-4LC-PID-INT	4-channel PID integrated RTD/ thermocouple temperature control module	Supported	Supported	Supported	01441530
GL20-PS2-INT	Power supply module	Supported	Supported	Supported	01441060

8.2 Appendix 2: Fault Codes

The fault codes in iFA Evolution are shown in the table below.

■ Local controller fault codes

Fault code	Level	Description	Cause	Solutions/Recommendations
0x10060010	Fatal	IEC task runtime exceeding watchdog threshold or task exit timeout	The watchdog malfunctions.	The task runtime or exit time is too long. Check the program execution time.
0x10060013	Fatal	Program verification error	An error occurs during program verification.	Attempt to re-download the program. If the fault persists, contact the manufacturer.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x10060015	Fatal	I/O data update error	An error occurs during I/O data update.	Restart the module and check whether the fault is cleared. If not, contact the manufacturer.
0x10060018	Fatal	External library interface not implemented in RTS	The external library interface is improper.	Check the user-defined library type.
0x1006001B	Fatal	Loading startup project failed	An error occurs while loading the startup project.	Check whether the startup project is not configured properly.
0x10060023	Fatal	Project file verification error	An error occurs during project file verification.	-
0x10060025	Fatal	IEC task not configured properly	The IEC task is not configured properly.	Contact the manufacturer for correct IDE version.
0x10060027	Critical	Power-off file verification error	An error occurs during power-off file verification.	Contact the manufacturer to resolve the power-off retention error.
0x10060029	Critical	Downloading user project failed	The user project size exceeds the available system disk space.	Clear the PLC space and try re-downloading, or reduce the user project size.
0x10060050	Fatal	Illegal instruction	The instruction is illegal.	Restart the module and check whether the fault is cleared. If not, contact the manufacturer.
0x10060051	Fatal	Access violation	An access violation occurs.	Restart the module and check whether the fault is cleared. If not, contact the manufacturer.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x10060059	Fatal	Invalid OP instruction operation	The OP instruction operation is invalid.	Restart the module and check whether the fault is cleared. If not, contact the manufacturer.
0x1006005A	Fatal	Unaligned memory access	The memory access is unaligned.	Restart the module and check whether the fault is cleared. If not, contact the manufacturer.
0x1006005B	Critical	Download failed: Global variable initialization error. Check the controller log, then recompile and perform a full download.	Check whether the global variables are configured correctly and whether there are any configuration errors such as null pointer references.	Check whether the user program is configured incorrectly.
0x100600FF	Fatal	TCP thread fault	The TCP thread enters a deadlock state.	A deadlock has occurred in the TCP thread. Check and resolve the deadlock issue in the program, then restart the system and verify whether normal operation is restored. If the issue persists, contact the manufacturer.
0x10060101	Warning	An array index out-of-bounds error occurs in the project.	An array element in the project exceeds the defined upper or lower bound for the array.	Check arrays in the project where the elements are under a user-defined variable, and verify whether the computed values of the user-defined variable are out of the array range.
0x10060102	Warning	Division by zero in the project	The project contains a case where the divisor is zero.	Check division operations in the project for cases where the divisor is zero.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x10060105	Fatal	CPU monitoring thread watchdog error	A CPU monitoring thread watchdog error occurs.	Restart the module and check whether the fault is cleared. If not, contact the manufacturer.
0x10061010	Fatal	IEC task runtime exceeding two task cycles	The IEC task runtime exceeds two task cycles.	Check the user program execution time.
0x10061049	Critical	IP address conflict detected on LAN1_A	Multiple devices in the network share the same IP address.	Check the IP addresses of devices in the network, and reconfigure a new IP address for the current device or other devices that share the same IP address as the current device.
0x1006104A	Critical	IP address conflict detected on LAN1_B	Multiple devices in the network share the same IP address.	Check the IP addresses of devices in the network, and reconfigure a new IP address for the current device or other devices that share the same IP address as the current device.
0x10062000	Warning	CPU average load too high	The average load of the CPU is too high.	Check the project configuration to inspect excessive load in the user logic or device configuration.
0x10062001	Warning	CPU2 high load alarm	The load of the CPU2 is too high.	Check the project configuration to inspect excessive load in the user logic or device configuration.
0x10062002	Warning	CPU3 load too high	The load of the CPU3 is too high.	Check the project configuration to inspect excessive load in the user logic or device configuration.
0x10062003	Warning	CPU0 load too high	The load of the CPU0 is too high.	Check the project configuration to inspect excessive load in the user logic or device configuration.
0x10062004	Warning	CPU1 load too high	The load of the CPU1 is too high.	Check the project configuration to inspect excessive load in the user logic or device configuration.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x10062005	Information	CPU average load too high fault cleared	The fault "CPU average load too high" has been cleared.	-
0x10062006	Information	CPU2 load too high fault cleared	The fault "CPU2 load too high" has been cleared.	-
0x10062007	Information	CPU3 load too high fault cleared	The fault "CPU3 load too high" has been cleared.	-
0x10062008	Information	CPU0 load too high fault cleared	The fault "CPU0 load too high" has been cleared.	-
0x10062009	Information	CPU1 load too high fault cleared	The fault "CPU1 load too high" has been cleared.	The fault "CPU1 load too high" has been cleared.
0x10062018	Warning	CPU temperature exceeds 115°C	The PLC operating ambient temperature exceeds the product specification requirements.	1. Check whether the ambient temperature for PLC operation exceeds the product's ambient temperature requirements. 2. Check whether the PLC heat dissipation is adequate and the cabinet cooling system is working properly.
0x10062019	Critical	Failed to switch the mode.	The PLC does not support mode switching.	In the network settings, select switch mode or use a device that supports mode switching.
0x10062025	Warning	SD card inserted	The SD card is recovered.	Check the SD card.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x10062026	Warning	SD card removed	The SD card is not detected.	Check the SD card.
0x10062027	Warning	SD card full	SD card warning	Manage the SD card contents to free up space.
0x1006304C	Information	LAN1_A IP address conflict resolved	The IP address conflict is resolved.	-
0x1006304D	Information	LAN1_B IP address conflict resolved	The IP address conflict is resolved.	-
0x10064032	Fatal	Network loop detected on port LAN1_A.	The device connections in the network form a closed loop.	Check the device connection in the network to avoid forming a closed loop.
0x10064033	Fatal	Network loop detected on port LAN1_B.	The device connections in the network form a closed loop.	Check the device connection in the network to avoid forming a closed loop.
0x10064042	Information	Network loop on port LAN1_A cleared	The network loop has been cleared.	-
0x10064043	Information	Network loop on port LAN1_B cleared	The network loop has been cleared.	-

■ EtherNet/IP fault codes

- Device fault codes

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00640000	Information	Connected successfully	/	-
0x00640001	Critical	Target device offline	The target device is offline.	1. Check if the target IP is configured properly. 2. Check if the network cable between devices is disconnected. 3. In case of repeated disconnection and reconnection, try increasing the "timeout multiplier" parameter on the connection configuration interface.
0x00640002	Critical	Target device online but not responding	The target device is online but not responding.	1. Check if the target IP is configured properly. 2. Check if the target device is operating properly.
0x00640003	Warning	Target device dropping frames	The target device drops frames.	Check the network connection stability.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00640004	Critical	Connection fault	Connection fault	1. On the "Connection status" interface, check the specific fault cause for each connection and resolve it according to the instructions. 2. In case of repeated disconnection and reconnection, try increasing the "timeout multiplier" parameter on the connection configuration interface. 3. If a coupler is connected, confirm whether the configuration of the device of the I/O module under the coupler matches that of the actually connected one.
0x00640005	Critical	Declaring IP address failed	The IP address is not declared successfully.	Check if the IP address of the device in the iFA Evolution and the one configured in the network match that of the physical device, and check whether the EIP port number is occupied.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00640009	Warning	Connection established but target device variables not yet ready	1. The primary PLC or target device is currently loading and starting up. 2. The connection with the primary PLC or target device is not configured properly. 3. Variables are temporarily not accessible due to online modification on the target device.	1. Check whether the target device is currently loading and starting up. 2. Check the connection issue details in the "Connection status" section.
0x0064000A	Warning	Closing connection	/	-
0x0064000B	Critical	EIP thread task exception	An exception occurs in the EIP thread task.	Re-compile and download the project. If the fault persists, contact the manufacturer.
0x00780005	Critical	Declaring IP address failed	The IP address is not declared successfully.	Check if the IP address of the device in the iFA Evolution and the one configured in the network match that of the physical device, and check whether the EIP port number is occupied.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x0078000B	Critical	EIP thread task exception	An exception occurs in the EIP thread task.	Re-compile and download the project. If the fault persists, contact the manufacturer.
0x00830000	Information	Connected successfully	/	-
0x00830001	Critical	Target device offline	The target device is offline.	1. Check if the target IP is configured properly. 2. Check if the network cable between devices is disconnected. 3. In case of repeated disconnection and reconnection, try increasing the "timeout multiplier" parameter on the connection configuration interface.
0x00830002	Critical	Target device online but not responding	The target device is online but not responding.	1. Check if the target IP is configured properly. 2. Check if the target device is operating properly.
0x00830003	Warning	Target device dropping frames	The target device drops frames.	Check the network connection stability.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00830004	Critical	Connection fault	Connection fault	1. On the "Connection status" interface, check the specific fault cause for each connection and resolve it according to the instructions. 2. In case of repeated disconnection and reconnection, try increasing the "timeout multiplier" parameter on the connection configuration interface.
0x00830005	Critical	Declaring IP address failed	The IP address is not declared successfully.	Check whether the IP address of the device in iFA and the one configured in the network match that of the physical device, or use "netstat -ano | find 44818" to check the pid and verify whether the EIP port number is occupied.
0x0083000A	Warning	Closing connection	/	-
0x0083000B	Critical	EIP thread task exception	An exception occurs in the EIP thread task.	Re-compile and download the project. If the fault persists, contact the manufacturer.

- Connection fault codes

Fault code	Level	Description	Cause	Solutions/ Recommendations
0x00641000	Informa-tion	Connection closed	The connection is closed.	-
0x00641001	Critical	The device is attempting to reconnect to the target device which has already established a connection.	The device is attempting to reconnect to the target device which has already established a connection.	Check whether the configuration is correct.
0x00641002	Critical	Transmission type and trigger mode not supported	The transmission type and trigger mode are not supported.	Check if the transmission type and trigger mode are set properly.
0x00641011	Critical	Connection ownership conflict. Multiple connection attempts to the same target device.	Connection ownership conflict. Multiple connection attempts to the same target device.	Check if multiple masters are connecting to the device simultaneously or if there is a configuration error.
0x00641012	Critical	Invalid connection size	Invalid connection size	Check if the connection parameters are set correctly.
0x00641013	Critical	The device is not configured. The configuration data is not set for the device requiring configuration.	The device is not configured. The configuration data is not set for the device requiring configuration.	Check if the configuration data length is correctly set and if the configuration path is correct.
0x00641014	Critical	RPI is not supported, or there is an issue with the timeout multiplier or inhibit time.	RPI is not supported, or there is an issue with the timeout multiplier or inhibit time.	Check if the RPI and the timeout multiplier meet the target device requirements.

Fault code	Level	Description	Cause	Solutions/ Recommendations
0x00641015	Critical	RPI is not accepted.	RPI is not accepted.	Check if the RPI meets the target device requirements.
0x00641016	Critical	The local connection is at full capacity. The connection manager cannot support additional connections.	The local connection is at full capacity. The connection manager cannot support additional connections.	Check the project configuration, and if the number of connections to this device has reached the limit
0x00641017	Critical	Vendor Id or Product Code does not match the device.	Vendor Id or Product Code does not match the device.	Check if the configured device matches the target device.
0x00641018	Critical	The product type does not match the device.	The product type does not match the device.	Check if the configured device matches the target device.
0x00641019	Critical	The primary or secondary version number does not match the device.	The primary or secondary version number does not match the device.	Check whether the device version in the EDS file matches the target device.
0x0064101A	Critical	The connection request failed because there are currently no open connections.	The connection request failed because there are currently no open connections.	Check if other connections have been established before using ListenOnly.
0x0064101B	Critical	The target application cannot support more connections.	The target application cannot support more connections.	The target device connection is full, and check the connection status of the target device.
0x0064101C	Critical	RPI is less than the inhibit time.	RPI is less than the inhibit time.	Adjust RPI to a value greater than or equal to the inhibit time.

Fault code	Level	Description	Cause	Solutions/ Recommendations
0x0064101D	Critical	Connection timeout	Connection timeout	In case of connection timeout, check the target device status or link status.
0x0064101E	Critical	An invalid segment path or segment value exists in the path.	An invalid segment path or segment value exists in the path.	-
0x0064101F	Critical	Vendor-specific error	Vendor-specific error	Contact the manufacturer according to the specific error.
0x00641020	Critical	The specified transmission type in the Transmission type/Trigger mode parameter is not supported.	The specified transmission type in the Transmission type/Trigger mode parameter is not supported.	-
0x00641021	Critical	The specified trigger mode in the Transmission type/ Trigger mode parameter is not supported.	The specified trigger mode in the Transmission type/ Trigger mode parameter is not supported.	Check if the trigger type is correct.
0x00641022	Critical	The direction requested in the Transmission type/ Trigger mode parameter is not supported.	The direction requested in the Transmission type/ Trigger mode parameter is not supported.	-
0x00641023	Critical	O->T fixed/variable flag is not supported.	O->T fixed/variable flag is not supported.	Check if the O->T fixed/variable flag is set correctly.

Fault code	Level	Description	Cause	Solutions/ Recommendations
0x00641024	Critical	T->O fixed/variable flag is not supported.	T->O fixed/variable flag is not supported.	Check if the T-> O fixed/variable flag is set correctly.
0x00641025	Critical	O->T priority is not supported.	O->T priority is not supported.	Check if the O-> T priority is set correctly and if the target device supports this priority.
0x00641026	Critical	T->O priority is not supported.	T->O priority is not supported.	Check if the T-> O priority is set correctly and if the target device supports this priority.
0x00641027	Critical	O->T connection type is not supported.	O->T connection type is not supported.	Check if the O-> T connection type is set correctly.
0x00641028	Critical	T->O connection type is not supported.	T->O connection type is not supported.	Check if the T->O connection type is set correctly.
0x00641029	Critical	O->T redundancy owner flag is not supported.	O->T redundancy owner flag is not supported.	-
0x0064102A	Critical	The data segment provided in the connection path parameters does not contain the acceptable 16-bit word count for the requested configuration application path. The data area length is invalid.	The data segment provided in the connection path parameters does not contain the acceptable 16-bit word count for the requested configuration application path. The data area length is invalid.	The configuration data length is set incorrectly.

Fault code	Level	Description	Cause	Solutions/ Recommendations
0x0064102B	Critical	The requested size in the O->T network connection parameters is not supported.	The requested size in the O->T network connection parameters is not supported.	Check if the O-> T length is set correctly.
0x0064102C	Critical	The requested size in the T->O network connection parameters is not supported.	The requested size in the T->O network connection parameters is not supported.	Check if the T-> O length is set correctly.
0x0064102D	Critical	The specified configuration application path does not match the valid configuration application path.	The specified configuration application path does not match the valid configuration application path.	Check if the configuration instance ID in the connection path is correct.
0x00641030	Critical	The specified consumption application path does not match the valid consumption application path.	The specified consumption application path does not match the valid consumption application path.	Check if the consumption connection point ID in the connection path is correct.
0x00641031	Critical	The specified production application path does not match the valid production application path.	The specified production application path does not match the valid production application path.	Check if the production connection point ID in the connection path is correct.
0x00641032	Critical	Configuration symbol does not exist.	Configuration symbol does not exist.	-
0x00641033	Critical	Consumption symbol does not exist.	Consumption symbol does not exist.	-
0x00641034	Critical	Production symbol does not exist.	Production symbol does not exist.	-

Fault code	Level	Description	Cause	Solutions/ Recommendations
0x00641035	Critical	The specified application paths for configuration, consumption, and/ or production are inconsistent with each other.	The specified application paths for configuration, consumption, and/ or production are inconsistent with each other.	Check whether the path is correctly set.
0x00641036	Critical	The information in the data segment is inconsistent with the consumer data format.	The information in the data segment is inconsistent with the consumer data format.	Check whether the configuration data format content is correct.
0x00641037	Critical	The information in the data segment is inconsistent with the production data format.	The information in the data segment is inconsistent with the production data format.	Check whether the configuration data format content is correct.
0x00641041	Critical	The target does not support the function that empty Forward Open requests.	The target does not support the function that empty Forward Open requests.	Check if the connection type is set correctly.
0x00641042	Critical	The connection timeout multiplier is retained, or the resulting timeout value is too large for the device to support.	The connection timeout multiplier is retained, or the resulting timeout value is too large for the device to support.	Check if the timeout multiplier is set correctly.
0x00641043	Critical	The connection size does not match the existing multicast connection.	The connection size does not match the existing multicast connection.	Check if the current ListenOnly length matches the previous connection.

Fault code	Level	Description	Cause	Solutions/ Recommendations
0x00641044	Critical	The fixed/variable connection type does not match the existing multicast connection.	The fixed/variable connection type does not match the existing multicast connection.	Check if the current ListenOnly connection type matches the previous connection.
0x00641045	Critical	The fixed/variable connection priority does not match the existing multicast connection.	The fixed/variable connection priority does not match the existing multicast connection.	Check if the current ListenOnly priority matches the previous connection.
0x0064104F	Critical	The fixed/variable transmission type does not match the existing multicast connection.	The fixed/variable transmission type does not match the existing multicast connection.	Check if the current ListenOnly transfer type matches the previous connection.
0x00641050	Critical	The fixed/variable production trigger does not match the existing multicast connection.	The fixed/variable production trigger does not match the existing multicast connection.	Check if the current ListenOnly trigger type matches the previous connection.
0x00641051	Critical	The fixed/variable production inhibit time does not match the existing multicast connection.	The fixed/variable production inhibit time does not match the existing multicast connection.	Check if the current ListenOnly inhibition time matches the previous connection.
0x00641052	Critical	Other errors	Other errors	Check the specific fault code in the iFA project for the device.

- EtherNet/IP communication I/O online diagnostic fault codes

Fault code	Level	Description	Cause	Solutions/Recommendations
0x0064F001	Information	A too long array in EIP Class3/ UCMM causes some elements to be transmitted at different times.	EIP Class3/ UCMM contains the arrays with too large length.	It is recommended to set the UCMM array to 200 bytes or less, and the Class3 array to 1400 bytes or less.
0x0064FFFF	Critical	EIP stack startup failed	The EIP stack startup fails.	Try restarting the device and then use the iFA software to start the EIP task.
0x00831000	Information	Connection closed	The connection is closed.	-
0x0083FFFF	Critical	EIP stack startup failed	The EIP stack startup fails.	Try restarting the device and then use the iFA software to start the EIP task.
0x64200100	Information	Coupler fault cleared	The coupler fault is cleared.	-
0x64200101	Critical	Coupler software version outdated	The coupler software version is outdated.	Contact the manufacturer for updated coupler software.
0x64200102	Critical	Coupler diagnostic bytes mismatch	The number of coupler diagnostic bytes is mismatched.	Reconfigure the number of coupler diagnostic bytes.
0x64200103	Information	I/O module fault cleared	The I/O module fault has been cleared.	-

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64200104	Critical	Getting coupler version information failed	The coupler version information is not obtained.	1. Check the network connection stability. 2. Check whether the coupler is operating properly. 3. Power cycle the coupler. If the problem persists, contact the manufacturer.
0x64200105	Critical	Getting coupler diagnostic bytes failed	The number of coupler diagnostic bytes is not obtained.	1. Check the network connection stability. 2. Check whether the coupler is operating properly. 3. Power cycle the coupler. If the problem persists, contact the manufacturer.
0x64200106	Warn-ing	Device configuration or module parameter configuration failure	The devices or module parameters are not configured successfully.	1. Check the network connection stability. 2. Check whether the coupler is operating properly. 3. Power cycle the coupler. If the problem persists, contact the manufacturer.
0x64201003	Critical	I/O module type mismatch	The type of the configured I/O module is mismatched with that of the actually scanned one.	1. Check the number and installation sequence of expansion modules. 2. Check the contact of the communication interface of the expansion module or restart the rack.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64201004	Critical	I/O module configuration failure	The I/O module is not configured successfully.	Check the contact of the communication interface of the expansion module or restart the rack.
0x64201005	Critical	Switching I/O module status failed	The I/O module status is not switched successfully.	Check the contact of the communication interface of the expansion module or restart the rack.
0x64201006	Critical	I/O module offline	The I/O module is offline.	1. Check whether the module is powered off or removed from the slot. 2. Check the contact of the communication interface of the expansion module or restart the rack.
0x64201007	Critical	Module type mismatch	The hardware component has been inserted, but the type of this component does not match that of the configured module.	Check the inserted module, and correct the configuration if necessary.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64201008	Critical	New module inserted	A new hardware component has been inserted, and the type of this component matches that of the configured module.	-
0x64201009	Critical	Communication fault: CRC error	Data message frame has transmission error: data inconsistency (CRC (cyclic redundancy check) error).	Check the contact of the communication interface of the expansion module or restart the rack.
0x6420100A	Critical	Communication fault: timeout	Possible causes: 1. The monitoring time is set incorrectly. 2. There is a bus fault.	1. Correct the fault. 2. Check the contact of the communication interface of the expansion module or restart the rack.
0x6420100B	Critical	Configuration conflict	The same I/O module is configured under multiple controllers.	Detect the configuration, resolve the conflict, and then re-download.
0x6420100C	Critical	The stopper plate is faulty or missing.	The stopper plate is faulty or missing.	Reinstall or replace the stopper plate.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64202100	Critical	CH0 preset value out of range	The CH0 preset value is out of range.	Modify the preset value to keep it not greater than the maximum value and not smaller than the minimum value.
0x64202101	Critical	CH0 counter configuration error	The CH0 counter is not configured properly.	1. The instruction enabled the single-ended counting function, but the DI is not configured for counting. 2. The single-ended interface enabled by the instruction does not match the counting interface configured on the DI. 3. Ensure that DI0 and DI1 are not set to counter mode simultaneously. 4. The counter is configured as a differential interface, but DI0 or DI1 is configured with the counting mode.
0x64202102	Critical	CH0 signal type not supported	The CH0 signal type is not supported.	The signal type is not set to an allowed value, which includes phase A/B 1x frequency, phase A/B 2x frequency, phase A/B 4x frequency, pulse + direction, CW/CCW, single-phase counting (A), and single-phase counting (B).
0x64202103	Critical	CH0 counter limit not configured properly	The CH0 counter limit is not configured properly.	Maximum value <= Minimum value

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64202104	Critical	CH0 unit pulse increment not configured properly	The CH0 unit pulse increment is not configured properly.	The unit pulse increment is less than 1.
0x64202105	Critical	CH0 speed measurement time base not configured properly	The time base for CH0 speed measure-ment is not configured properly.	Check that the time base is an allowed value.
0x64202106	Critical	CH0 input filter parameter not configured properly	The CH0 input filter parameter is not configured properly.	Check that the input filter parameter is an allowed value.
0x64202107	Critical	CH0 frequency sampling time not configured properly	The CH0 frequency sampling time is not configured properly.	Check that the frequency sampling time is an allowed value.
0x64202108	Critical	CH0 reset function not configured properly	The CH0 reset function is not configured properly.	The clearing function is enabled through commands, but the DI is not configured with the clearing function.
0x64202109	Critical	CH0 preset function not configured properly	The CH0 preset function is not configured properly.	The preset function is enabled through commands, but the DI is not configured with the preset function.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x6420210A	Critical	CH0 comparison 0 function not configured properly	The CH0 comparison 0 function is not configured properly.	The comparison function is enabled through commands, but the DO is not configured with the comparison function.
0x6420210B	Critical	CH0 comparison 1 function not configured properly	The CH0 comparison 1 function is not configured properly.	The comparison function is enabled through commands, but the DO is not configured with the comparison function.
0x6420210C	Critical	CH0 comparison 2 function not configured properly	The CH0 comparison 2 function is not configured properly.	The comparison function is enabled through commands, but the DO is not configured with the comparison function.
0x6420210D	Critical	CH0 comparison 3 function not configured properly	The CH0 comparison 3 function is not configured properly.	The comparison function is enabled through commands, but the DO is not configured with the comparison function.
0x6420210E	Critical	CH0 probe 0 function not configured properly	The CH0 probe 0 function is not configured properly.	The probe function is enabled through commands, but the DI is not configured with the probe function.
0x6420210F	Critical	CH0 probe 1 function not configured properly	The CH0 probe 1 function is not configured properly.	The probe function is enabled through commands, but the DI is not configured with the probe function.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64202110	Critical	CH0 probe 2 function not configured properly	The CH0 probe 2 function is not configured properly.	The probe function is enabled through commands, but the DI is not configured with the probe function.
0x64202111	Critical	CH0 probe 3 function not configured properly	The CH0 probe 3 function is not configured properly.	The probe function is enabled through commands, but the DI is not configured with the probe function.
0x64202112	Critical	CH0 DO0 parameter not configured properly	The CH0 DO0 parameter is not configured properly.	The parameter is not set to the allowed value, which includes normal output and comparison output.
0x64202113	Critical	CH0 DO1 parameter not configured properly	The CH0 DO1 parameter is not configured properly.	The parameter is not set to the allowed value, which includes normal output and comparison output.
0x64202114	Critical	CH0 DO2 parameter not configured properly	The CH0 DO2 parameter is not configured properly.	The parameter is not set to the allowed value, which includes normal output and comparison output.
0x64202115	Critical	CH0 DO3 parameter not configured properly	The CH0 DO3 parameter is not configured properly.	The parameter is not set to the allowed value, which includes normal output and comparison output.
0x64202116	Critical	CH0 DI0 parameter not configured properly	The CH0 DI0 parameter is not configured properly.	The parameter is not set to the allowed value, which includes normal input, probe function, counting, clear, preset, and gating.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64202117	Critical	CH0 DI1 parameter not configured properly	The CH0 DI1 parameter is not configured properly.	The parameter is not set to the allowed value, which includes normal input, probe function, counting, clear, preset, and gating.
0x64202118	Critical	CH0 DI2 parameter not configured properly	The CH0 DI2 parameter is not configured properly.	The parameter is not set to the allowed value, which includes normal input, probe function, counting, clear, preset, and gating.
0x64202119	Critical	CH0 DI3 parameter not configured properly	The CH0 DI3 parameter is not configured properly.	The parameter is not set to the allowed value, which includes normal input, probe function, counting, clear, preset, and gating.
0x64205001	Critical	Power supply overvoltage	The power supply voltage is too high.	Check the power supply of the module.
0x64205002	Critical	Power supply undervoltage	The power supply voltage is too low.	Check the power supply of the module.
0x64205003	Critical	External 24 V power supply failure	The external 24 V power supply fails.	Check the power supply of the module.
0x64205004	Critical	Module ADC parameters not configured properly	The ADC parameters of the module are not configured properly.	1. Check the stability of the external 24 V power voltage for the module. 2. Restart the module.
0x64205005	Critical	External 5 V power supply failure	The external 5 V power supply fails.	Check the power supply of the module.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64205011	Critical	Chip overheating	The chip is overheating.	1. Check whether the module hardware is faulty. 2. Replace the module.
0x64205021	Critical	Module ADC malfunction	The ADC of the module malfunctions.	1. Check whether the module hardware is faulty. 2. Replace the module.
0x64205022	Critical	Module DAC malfunction	The DAC of the module malfunctions.	1. Check whether the module hardware is faulty. 2. Replace the module.
0x64205023	Critical	ADC reference voltage error	The ADC reference voltage is abnormal.	1. Check whether the module hardware is faulty. 2. Replace the module.
0x64205031	Critical	Reference channel fault	The reference channel is faulty.	1. Check whether the module hardware is faulty. 2. Replace the module.
0x64206001	Critical	Channel open circuit	The channel is open-circuit.	1. Check the external wiring of the module channel. 2. In case of no external wiring error, check the internal hardware of the module or replace the module.
0x64206002	Critical	Channel short circuit	The channel is short-circuited.	1. Check the external wiring of the module channel. 2. In case of no external wiring error, check the internal hardware of the module or replace the module.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64206003	Critical	The channel data exceeds the upper limit.	The channel data exceeds the upper limit.	Check whether the external input signal of the input module is abnormal.
0x64206004	Critical	The channel data is below the lower limit.	The channel data is below the lower limit.	Check whether the external input signal of the input module is abnormal.
0x64206005	Critical	Channel data overflow	The channel data overflows.	Check whether the external input signal of the input module is abnormal.
0x64206006	Critical	Channel data underflow	The channel data underflows.	Check whether the external input signal of the input module is abnormal.
0x64206007	Critical	Channel overcurrent	The channel current exceeds the limit.	1. Check the external wiring for short circuit. 2. Check the load for overcurrent. 3. Check the module for damage.
0x64206008	Critical	Channel ADC malfunction	The channel ADC malfunc-tions.	1. Check the module for hardware faults. 2. Replace the module.
0x64206009	Critical	Channel data not configured properly	The channel data is not configured properly.	Check whether the issued parameters are configured properly.
0x64206030	Critical	SSI module channel 24 V output error	An error occurs in 24 V output of the SSI module channel.	Check the output voltage.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64206031	Critical	SSI module channel communication error	An error occurs during channel communication of the SSI module.	Check the connection between D+ and D- terminals.
0x64206032	Critical	SSI module channel data error	The SSI module channel data is abnormal.	Check whether the baud rate is configured properly.
0x64206050	Critical	Short circuit to VDD	A short circuit to VDD occurs.	Check the hardware wiring.
0x64206051	Critical	Switch-on open circuit	An open circuit occurs when the switch is ON.	Check the hardware wiring.
0x64206052	Critical	Switch-off open circuit	An open circuit occurs when the switch is OFF.	Check the hardware wiring.
0x64206053	Critical	Overcurrent	The current exceeds the limit.	Check the hardware wiring.
0x64206054	Critical	Overload	Overload	Check the hardware wiring.
0x64206800	Critical	Phase A open circuit	An open circuit occurs in phase A.	Check the hardware wiring.
0x64206801	Critical	Phase B open circuit	An open circuit occurs in phase B.	Check the hardware wiring.
0x64206802	Critical	Frequency out of limit	The frequency is out of limit.	Check the hardware wiring.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64206803	Critical	Count value overflow	The count value overflows.	Check the hardware wiring.
0x64206804	Critical	Count value underflow	The count value underflows.	Check the hardware wiring.
0x64206805	Critical	Comparison function 0 quantity/step out of range	The quantity/step is out of range for the comparison function 0.	Check the hardware wiring.
0x64206806	Critical	Comparison function 1 quantity/step out of range	The quantity/step is out of range for the comparison function 1.	Check the hardware wiring.
0x64206807	Critical	Comparison function 2 quantity/step out of range	The quantity/step is out of range for the comparison function 2.	Check the hardware wiring.
0x64206808	Critical	Comparison function 3 quantity/step out of range	The quantity/step is out of range for the comparison function 3.	Check the hardware wiring.
0x64206809	Critical	Comparison function 0 output hold time/pulse number not configured properly	The output hold time/pulse number is not configured properly for the comparison function 0.	Check the hardware wiring.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x6420680A	Critical	Comparison function 1 output hold time/pulse number not configured properly	The output hold time/ pulse number is not configured properly for the comparison function 1.	Check the hardware wiring.
0x6420680B	Critical	Comparison function 2 output hold time/pulse number not configured properly	The output hold time/ pulse number is not configured properly for the comparison function 2.	Check the hardware wiring.
0x6420680C	Critical	Comparison function 3 output hold time/pulse number not configured properly	The output hold time/ pulse number is not configured properly for the comparison function 3.	Check the hardware wiring.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x6420680D	Critical	Comparison function 0 output start/stop position and step direction not configured properly	The output start/stop position and step direction is not configured properly for the comparison function 0.	Check the hardware wiring.
0x6420680E	Critical	Comparison function 1 output start/stop position and step direction not configured properly	The output start/stop position and step direction is not configured properly for the comparison function 1.	Check the hardware wiring.
0x6420680F	Critical	The output start/stop position and step direction is not configured properly for the comparison function 2.	The output start/stop position and step direction is not configured properly for the comparison function 2.	Check the hardware wiring.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64206810	Critical	Comparison 3 function output start/stop position and step direction not configured properly	The output start/stop position and step direction is not configured properly for the comparison 3 function.	Check the hardware wiring.
0x64206811	Critical	Comparison function 0 comparison value out of range	The comparison value is out of range for the comparison function 0.	Check the hardware wiring.
0x64206812	Critical	Comparison function 1 comparison value out of range	The comparison value is out of range for the comparison function 1.	Check the hardware wiring.
0x64206813	Critical	Comparison function 2 comparison value out of range	The comparison value is out of range for the comparison function 2.	Check the hardware wiring.
0x64206814	Critical	Comparison 3 function comparison value out of range	The comparison value is out of range for the comparison 3 function.	Check the hardware wiring.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64206815	Critical	Comparison function 0 type not configured properly	The type is not configured properly for the comparison function 0.	Check the hardware wiring.
0x64206816	Critical	Comparison function 1 type not configured properly	The type is not configured properly for the comparison function 1.	Check the hardware wiring.
0x64206817	Critical	Comparison function 2 type not configured properly	The type is not configured properly for the comparison function 2.	Check the hardware wiring.
0x64206818	Critical	Comparison 3 function type not configured properly	The type is not configured properly for the comparison 3 function.	Check the hardware wiring.
0x64206819	Critical	Comparison function 0 output control mode not configured properly	The output control mode is not configured properly for the comparison function 0.	Check the hardware wiring.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x6420681A	Critical	Comparison function 1 output control mode not configured properly	The output control mode is not configured properly for the comparison function 1.	Check the hardware wiring.
0x6420681B	Critical	Comparison function 2 output control mode not configured properly	The output control mode is not configured properly for the comparison function 2.	Check the hardware wiring.
0x6420681C	Critical	Comparison 3 function output control mode not configured properly	The output control mode is not configured properly for the comparison 3 function.	Check the hardware wiring.
0x6420681D	Critical	DO0 short circuit	A short circuit occurs in DO0.	Check the hardware wiring.
0x6420681E	Critical	DO1 short circuit	A short circuit occurs in DO1.	Check the hardware wiring.
0x6420681F	Critical	DO2 short circuit	A short circuit occurs in DO2.	Check the hardware wiring.
0x64206820	Critical	DO3 short circuit	A short circuit occurs in DO3.	Check the hardware wiring.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64210103	Infor-mation	Slave fault cleared	The slave fault has been cleared.	-
0x64211800	Critical	Device not detected by the port	Device not detected by the port	-
0x64211802	Critical	Invalid vendor ID	Invalid vendor ID	-
0x64211803	Critical	Invalid DEVICE ID	Invalid DEVICE ID	-
0x64211805	Critical	PHY chip overtemperature	PHY chip overtempera-ture	-
0x64211806	Critical	Pin1 short circuit	Pin1 short circuit	-
0x64211807	Critical	Pin1 overcurrent	Pin1 overcurrent	-
0x64211810	Critical	Pin2 short circuit	Pin2 is short-circuited.	-
0x64211811	Critical	Pin4 short-circuited	Pin4 short-circuited	-
0x64211F00	Critical	MCU temperature exceeding 80°C	MCU temperature exceeding 80°C	-
0x64211F10	Critical	The MCU temperature is below -26°C.	The MCU temperature is below -26° C.	-
0x64211F01	Critical	US voltage exceeds 30 V.	US voltage exceeds 30 V.	-
0x64211F11	Critical	US voltage is below 18 V.	US voltage is below 18 V.	-
0x64211F02	Critical	UA voltage exceeds 30 V.	UA voltage exceeds 30 V.	-

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64211F12	Critical	UA voltage is below 18 V.	UA voltage is below 18 V.	-
0x64211F20	Critical	Invalid input process data length	Invalid input process data length	-
0x64211F21	Critical	Invalid output process data length	Invalid output process data length	-
0x64216000	Critical	Invalid cycle time	Invalid cycle time	-
0x64216001	Critical	Slave version error	Slave version error	-
0x64214210	Warning	Overtemperature	Overtemperature	The ambient temperature is high. Lower down the temperature before using the module.
0x64214220	Warning	Low temperature	Low temperature	The ambient environment is low. Increase the temperature before using the module.
0x64215000	Critical	Device function fault	Device function fault	Check the module for component faults.
0x64215011	Critical	Loss of data for which retention upon power-off is configured	Loss of data for which retention upon power-off is configured	Configuration of retention upon power-off fails. Re-configure the parameter for retention upon power-off.
0x64215100	Critical	Device power supply error	Device power supply error	The UA power supply for the module is not provided. Enable the master PIN2 power supply or connect an external UA power source.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64215110	Warn-ing	System power supply overvoltage	System power supply overvoltage	The US power supply voltage of the module is higher than the normal operating voltage. Reduce the US power supply voltage.
0x64215111	Warn-ing	System power supply undervoltage	System power supply undervoltage	The US power supply voltage of the module is lower than the normal operating voltage. Increase the US power supply voltage.
0x64216320	Critical	Incorrect parameter	Incorrect parameter	The module parameters have been configured incorrectly. Configure the parameters correctly according to the product data.
0x64216321	Critical	Parameter loss	Parameter loss	In expert mode, an input signal is detected for a channel configured as output. Modify the input/output configuration parameter 0x41 according to actual usage.
0x64217710	Critical	DO short circuit	DO short circuit	A short circuit has occurred on the module output. Check the external wiring.
0x64218CA0	Critical	PIN1 short circuit	PIN1 short circuit	A short circuit occurs on the module PIN1. Check the external wiring.
0x64218CA1	Critical	No cascaded devices connected	No cascaded device is connected.	Check if any cascaded devices are connected.
0x64218CA2	Critical	Cascaded device verification failed	Cascaded device verification failed	Check if a compatible cascaded device is connected.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64218DA0	Warn-ing	Cascaded device temperature out of range	The cascaded device temperature is out of range.	The ambient temperature of the cascaded device is too high. Decrease the temperature before using the device.
0x64218DA1	Warn-ing	Cascaded device temperature too low	The cascaded device temperature is too low.	The ambient temperature of the cascaded device is too low. Increase the temperature before using the device.
0x64218DA4	Critical	Retentive data loss due to cascaded device power failure	The retentive data upon cascaded device power failure is lost.	Failed to save configuration parameters for the cascaded device. Re-configure the parameters.
0x64218DA6	Critical	Cascaded device power supply error	Power supply error on the cascaded device.	The UA power supply for the cascaded device module is not provided. Enable the master PIN2 power supply or connect an external UA power source.
0x64218DA8	Warn-ing	Cascaded device system power supply voltage out of range	The system power supply voltage for the cascaded device exceeds the limit.	The US power supply voltage of the cascaded device module is higher than the normal operating voltage. Reduce the US power supply voltage.
0x64218DA9	Warn-ing	Cascaded device system power supply undervoltage	The system power supply voltage for the cascaded device is below the limit.	The US power supply voltage of the cascaded device module is lower than the normal operating voltage. Increase the US power supply voltage.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64218DAC	Critical	Cascaded device parameter error	The parameter in the cascaded device is faulty.	The parameters for the cascaded device module have been configured incorrectly. Configure the parameters correctly according to the product data.
0x64218DAD	Critical	Missing parameters in the cascaded device	The parameters in the cascaded device are missing.	In expert mode of the cascaded device, if an input signal is detected on a channel that is configured as an output, modify the I/O configuration parameter 0x41 to match the actual usage.
0x64218DAF	Critical	Cascaded device DO short circuit	The DO on the cascaded device is short-circuit-ed.	There is a short circuit on the output of the cascaded device module. Check the external wiring.
0x64218DB0	Critical	Cascaded device PIN1 short circuit	PIN1 on the cascaded device is short-circuit-ed.	There is a short circuit on PIN1 of the cascaded device module. Check the external wiring.
0x64218CB0	Critical	Device output overload	Device output overload	Check the device load.
0x64218CB1	Critical	Device port 1 PIN1 overcurrent	Overcurrent detected on device port 1, PIN1.	A short circuit has been detected on the module channel 1 PIN1. Check the external wiring.
0x64218CB2	Critical	Device port 2 PIN1 overcurrent	Overcurrent detected on device port 2, PIN1.	A short circuit has been detected on the module channel 2 PIN1. Check the external wiring.
0x64218CB3	Critical	Device port 3 PIN1 overcurrent	Overcurrent detected on device port 3, PIN1.	A short circuit has been detected on the module channel 3 PIN1. Check the external wiring.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64218CB4	Critical	Device port 4 PIN1 overcurrent	Overcurrent detected on device port 4, PIN1.	A short circuit has been detected on the module channel 4 PIN1. Check the external wiring.
0x64218CB5	Critical	Device port 5 PIN1 overcurrent	Overcurrent detected on device port 5, PIN1.	A short circuit has been detected on the module channel 5 PIN1. Check the external wiring.
0x64218CB6	Critical	Device port 6 PIN1 overcurrent	Overcurrent detected on device port 6, PIN1.	A short circuit has been detected on the module channel 6 PIN1. Check the external wiring.
0x64218CB7	Critical	Device port 7 PIN1 overcurrent	Overcurrent detected on device port 7, PIN1.	A short circuit has been detected on the module channel 7 PIN1. Check the external wiring.
0x64218CB8	Critical	Device port 8 PIN1 overcurrent	Overcurrent detected on device port 8, PIN1.	A short circuit has been detected on the module channel 8 PIN1. Check the external wiring.
0x64217701	Critical	Port 1 disconnection	A disconnection has occurred at port 1.	Check if the input connection is correct.
0x64217702	Critical	Port 2 disconnection	A disconnection has occurred at port 2.	Check if the input connection is correct.
0x64217703	Critical	Port 3 disconnection	A disconnection has occurred at port 3.	Check if the input connection is correct.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64217704	Critical	Port 4 disconnection	A disconnection has occurred at port 4.	Check if the input connection is correct.
0x64217705	Critical	Port 5 disconnection	A disconnection has occurred at port 5.	Check if the input connection is correct.
0x64217706	Critical	Port 6 disconnection	A disconnection has occurred at port 6.	Check if the input connection is correct.
0x64217707	Critical	Port 7 disconnection	A disconnection has occurred at port 7.	Check if the input connection is correct.
0x64217708	Critical	Port 8 disconnection	A disconnection has occurred at port 8.	Check if the input connection is correct.
0x64218C11	Warning	Port 1 input above the upper limit	The port 1 input exceeds the upper limit.	The input exceeds the upper measurement limit. Reduce the input.
0x64218C12	Warning	Port 2 input above the upper limit	The port 2 input exceeds the upper limit.	The input exceeds the upper measurement limit. Reduce the input.
0x64218C13	Warning	Port 3 input above the upper limit	The port 3 input exceeds the upper limit.	The input exceeds the upper measurement limit. Reduce the input.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64218C14	Warn-ing	Port 4 input above the upper limit	The port 4 input exceeds the upper limit.	The input exceeds the upper measurement limit. Reduce the input.
0x64218C15	Warn-ing	Port 5 input above the upper limit	The port 5 input exceeds the upper limit.	The input exceeds the upper measurement limit. Reduce the input.
0x64218C16	Warn-ing	Port 6 input above the upper limit	The port 6 input exceeds the upper limit.	The input exceeds the upper measurement limit. Reduce the input.
0x64218C17	Warn-ing	Port 7 input above the upper limit	The port 7 input exceeds the upper limit.	The input exceeds the upper measurement limit. Reduce the input.
0x64218C18	Warn-ing	Port 8 input above the upper limit	The port 8 input exceeds the upper limit.	The input exceeds the upper measurement limit. Reduce the input.
0x64218C21	Critical	Port 1 input overflow	An overflow has occurred at port 1.	The input exceeds the normal measurement range. Check the input.
0x64218C22	Critical	Port 2 input overflow	An overflow has occurred at port 2.	The input exceeds the normal measurement range. Check the input.
0x64218C23	Critical	Port 3 input overflow	An overflow has occurred at port 3.	The input exceeds the normal measurement range. Check the input.
0x64218C24	Critical	Port 4 input overflow	An overflow has occurred at port 4.	The input exceeds the normal measurement range. Check the input.
0x64218C25	Critical	Port 5 input overflow	An overflow has occurred at port 5.	The input exceeds the normal measurement range. Check the input.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64218C26	Critical	Port 6 input overflow	An overflow has occurred at port 6.	The input exceeds the normal measurement range. Check the input.
0x64218C27	Critical	Port 7 input overflow	An overflow has occurred at port 7.	The input exceeds the normal measurement range. Check the input.
0x64218C28	Critical	Port 8 input overflow	An overflow has occurred at port 8.	The input exceeds the normal measurement range. Check the input.
0x64218C31	Warn-ing	Port 1 input below lower limit	The port 1 input is below the lower limit.	The input is below the lower measurement limit. Increase the input.
0x64218C32	Warn-ing	Port 2 input below lower limit	The port 2 input is below the lower limit.	The input is below the lower measurement limit. Increase the input.
0x64218C33	Warn-ing	Port 3 input below lower limit	The port 3 input is below the lower limit.	The input is below the lower measurement limit. Increase the input.
0x64218C34	Warn-ing	Port 4 input below lower limit	The port 4 input is below the lower limit.	The input is below the lower measurement limit. Increase the input.
0x64218C35	Warn-ing	Port 5 input below lower limit	The port 5 input is below the lower limit.	The input is below the lower measurement limit. Increase the input.
0x64218C36	Warn-ing	Port 6 input below lower limit	The port 6 input is below the lower limit.	The input is below the lower measurement limit. Increase the input.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x64218C37	Warn-ing	Port 7 input below lower limit	The port 7 input is below the lower limit.	The input is below the lower measurement limit. Increase the input.
0x64218C38	Warn-ing	Port 8 input below lower limit	The port 8 input is below the lower limit.	The input is below the lower measurement limit. Increase the input.

■ EtherCAT fault codes

- EtherCAT master device fault codes

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00400000	Infor-mation	No fault	No fault	No fault
0x00400001	Critical	The network card has no connection.	No LINK signal from the network card	Check whether the network cable between the master and slave stations is disconnected.
0x00400002	Warn-ing	Slave station number mismatch	The number of online slaves is greater than that of configured slaves.	Scan devices on the master station or compare device configurations, and check whether the configured number of slave stations matches the number of online slave stations.
0x00400003	Critical	Alias conflict	There is a slave alias conflict when the alias is enabled.	1. Scan devices on the master station or compare device configurations, and check if there is a slave alias conflict when the alias is enabled. 2. Check the PLC log and locate the specific error based on diagnostic information.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00400004	Critical	The master device continuously loses frames.	EtherCAT frames are not received.	Check the master online interface and PLC logs, and locate the specific error based on diagnostic information.
0x00400005	Warning	The master device occasionally loses frames.	The link quality is affected by interference.	1. Replace the network cable. 2. Replace the current or the previous slave. 3. Add a magnetic ring or replace with a higher-grade network cable. 4. Check the master online interface and PLC logs, and locate the specific error based on diagnostic information.
0x00400006	Warning	Main network card has no connection.	In redundant ring network, the main network card has no connection.	Check whether the network cable of the main network card is disconnected.
0x00400007	Warning	Redundant network card has no connection.	In redundant ring network, the redundant network card has no connection.	Check whether the network cable of the redundant network card is disconnected.
0x00400008	Warning	An alias is 0.	A slave alias name is 0 when the alias is enabled.	1. Scan devices on the master station or compare device configurations, and check if a slave alias name is 0 when the alias is enabled. 2. Check the PLC log and locate the specific error based on diagnostic information.

- EtherCAT slave device fault codes

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00410000	Information	No fault	No fault	No fault
0x00410001	Critical	Slave offline	Slave network cable disconnected	1. Check if the network cables between the slaves is disconnected. 2. Check if the slave is powered off.
0x00410002	Critical	Type mismatch	Vendor ID, product code, or version number mismatch	1. Use EtherCAT scanning function to compare configuration with scanning results. 2. Power off and restart the slave which the master failed to access.
0x00410003	Critical	IN/OUT reversal	The IN and OUT ports on the slave are connected in reverse.	1. Troubleshoot the network cable connection on the current device. 2. The device may be incorrectly wired. Scan the network or compare the device configuration to locate the swapped slave and fix the wiring.
0x00410004	Critical	State error	Initialization, pre-operational, safe-operational, operational, or boot error	Check the master online interface and PLC logs, and locate the specific error based on diagnostic information.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00410005	Warning	SDO configuration error	SDO configuration error	Check the master online interface and PLC logs, and locate the specific error based on diagnostic information.
0x00410006	Critical	Status switchover timeout	Timeout during transition between initialization, pre-operational, safe-operational, operational, or boot states.	Check the master online interface and PLC logs, and locate the specific error based on diagnostic information.
0x00410007	Warning	SDO transmission timeout	SDO transmission timeout	Check the master online interface and PLC logs, and locate the specific error based on diagnostic information.
0x00410008	Warning	IN port disconnected	In redundant ring network, the slave IN port is disconnected.	Check if the Ethernet cable at the slave IN port is disconnected.
0x00410009	Warning	OUT port disconnected	In redundant ring network, the slave OUT port is disconnected.	Check if the Ethernet cable at the slave OUT port is disconnected.
0x0041000A	Critical	Continuous frame drop error	EtherCAT frames are not received.	Check the master online interface and PLC logs, and locate the specific error based on diagnostic information.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x0041000B	Warning	Occasional frame drop warning	The link quality is affected by interference.	1. Replace the network cable. 2. Replace the current or the previous slave. 3. Add a magnetic ring or replace with a higher-grade network cable. 4. Check the master online interface and PLC logs, and locate the specific error based on diagnostic information.
0x00411001	Critical	Undefined error	Any state, 0x134 = 0x0001	-
0x00411002	Critical	No memory	Any state, 0x134 = 0x0002	Insufficient heap memory
0x00411011	Critical	Invalid requested state change	I->S, I->O, P->O, O->B, S->B, P->B, 0x134=0x0011	Check whether the state requested by the master is valid.
0x00411012	Critical	Unknown requested state change	Any state, 0x134 = 0x0012	Check whether the state requested by the master is valid.
0x00411013	Critical	Bootstrap not supported	I->B, 0x134=0x0013. During transition from initialization to bootstrap state, the slave does not support bootstrap state.	Check if the slave XML and slave firmware versions match.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00411014	Critical	No valid firmware	I->P, 0x134 = 0x0014. During transition from initialization to pre-operational state, the DPRAM address exceeds the limit.	1. Check if the ESC version of the slave device matches. 2. Check if the MCU software version matches.
0x00411015	Critical	Invalid mailbox configuration	I->B, 0x134=0x0015. Mailbox configuration error during transition from initialization to bootstrap.	1. Check if the slave XML and slave firmware versions match. 2. Check if the slave mailbox SM configuration has been modified.
0x00411016	Critical	Invalid mailbox configuration	I->P, 0x134=0x0016. Mailbox configuration error during transition from initialization to pre-operational state.	1. Check if the slave XML and slave firmware versions match. 2. Check if the slave mailbox SM (0/1) configuration has been modified.
0x00411017	Critical	Invalid sync manager configuration	P->S, S->O, 0x134= 0x0017. A fault occurs in the synchronization manager configuration during transition from pre-operational to safe-operational state or from safe-operational to operational state.	1. Check if the slave XML and slave firmware versions match. 2. Check if the slave SM (2/3) configuration has been modified.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00411018	Critical	No valid inputs available	O, S->O, 0x134= 0x0018. The input data is invalid in operational state or during transition from safe-operational to operational state.	1. Power off and on again 2. Contact the agent or Inovance.
0x00411019	Critical	No valid outputs available	O, S->O, 0x134= 0x0019. The output data is invalid in operational state or during transition from safe-operational to operational state.	1. Power off and on again 2. Contact the agent or Inovance.
0x0041101A	Critical	Sync error	O, S->O, 0x134= 0x001A. The process data frame is lost, or the jitter is excessive in operational state or during transition from safe-operational to operational state.	1. Check if the network cable is connected properly. 2. Check the master-slave cycle. 3. Check if there is a value in the slave 0x300 register (The data link error counter is enabled on the master online interface). 4. Check the parameter value of the slave synchronization loss window (Inovance).

Fault code	Level	Description	Cause	Solutions/Recommendations
0x0041101B	Critical	Sync manager watchdog	O, S, 0x134=0x001B. Process data watchdog timeout in operational state or safe-operational state.	1. Check the watchdog configuration. 2. Check the master cycle. 3. Check if there is a value in the slave 0x300 register (The data link error counter is enabled on the master online interface). 4. Check if the network port connection is normal.
0x0041101C	Critical	Invalid sync manager type	O, S, P->S, 0x134=0x001C. A fault occurs in the synchronization manager type configuration in operational state, safe-operational state, or during transition from pre-operational to safe-operational state.	1. Power off and on again 2. Contact the agent or Inovance.
0x0041101D	Critical	Invalid output configuration	O, S, P->S, 0x134=0x001D. A fault occurs in the output synchronization manager configuration in operational state, safe-operational state, or during transition from pre-operational to safe-operational state.	1. Check if the slave XML and slave firmware versions match. 2. Check if the slave output SM (2) configuration has been modified. 3. Check that the PDO configuration is correct. 4. Check if PDO mapping configuration via SDO succeeded.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x0041101E	Critical	Invalid input configuration	O, S, P->S, 0x134=0x001E. A fault occurs in the input synchronization manager configuration in operational state, safe-operational state, or during transition from pre-operational to safe-operational state.	1. Check if the slave XML and slave firmware versions match. 2. Check if the slave input SM (3) configuration has been modified. 3. Check that the PDO configuration is correct. 4. Check if PDO mapping configuration via SDO succeeded.
0x0041101F	Critical	Invalid watchdog configuration	O, S, P->S, 0x134=0x001F. A fault occurs in the watchdog configuration in operational state, safe-operational state, or during transition from pre-operational to safe-operational state.	1. Check the SM watchdog configuration. 2. Check the watchdog prescaler setting (reg0x400).
0x00411020	Critical	Slave needs cold restart.	Any state, 0x134=0x0020	-
0x00411021	Critical	Slave needs INIT	B, P, S, O, 0x134=0x0021	1. Power off and on again 2. Contact the agent or Inovance.
0x00411022	Critical	Slave needs PREOP	S, O, 0x134=0x0022	1. Power off and on again 2. Contact the agent or Inovance.
0x00411023	Critical	Slave needs SAFEOP	O, 0x134=0x0023	1. Power off and on again 2. Contact the agent or Inovance.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00411024	Critical	Invalid input mapping	P->S, 0x134= 0x0024. A fault occurs in the input PDO mapping configuration during transition from pre-operational to safe-operational state.	1. Check the input PDO mapping configuration (0x1600 to 0x17FF). 2. Check if the PDO mapping length exceeds the limit.
0x00411025	Critical	Invalid output mapping	P->S, 0x134= 0x0025. A fault occurs in the output PDO mapping configuration during transition from pre-operational to safe-operational state.	1. Check the output PDO mapping configuration (0x1A00 to 0x1BFF). 2. Check if the PDO mapping length exceeds the limit.
0x00411026	Critical	Inconsistent settings	P->S, 0x134=0x0026	1. Power off and on again 2. Contact the agent or Inovance.
0x00411027	Critical	FreeRun not supported	P->S, 0x134=0x0027	1. Power off and on again 2. Contact the agent or Inovance.
0x00411028	Critical	SyncMode not supported	P->S, 0x134=0x0028	1. Power off and on again 2. Contact the agent or Inovance.
0x00411029	Critical	Mode requiring three buffer zones	P->S, 0x134= 0x0029. Buffer configuration error during transition from pre-operational to safe-operational state.	1. Check the SM configurations. 2. Check the synchronization mode configuration.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x0041102A	Critical	Background watchdog	S, O, 0x134=0x002A	1. Power off and on again 2. Contact the agent or Inovance.
0x0041102B	Critical	No valid inputs and outputs	O, S->O, 0x134=0x002B. The input and output data are invalid in operational state or during transition from safe-operational to operational state.	1. Power off and on again 2. Contact the agent or Inovance.
0x0041102C	Critical	Fatal sync error	O, 0x134=0x002C. The synchronization signal is lost in operational state.	1. Check the slave synchronization signal. 2. Check the synchronization cycle setting.
0x0041102D	Critical	No sync error	S->O, 0x134=0x002D. There is no synchronization signal during transition from safe-operational to operational state.	1. Check the slave startup time configuration. 2. Check the time interval between the slave DC enable time and the configured startup time.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00411030	Critical	Invalid DC SYNC configuration	O, S->O, P->S, 0x134=0x0030. The synchronization (SYNC) signal is configured incorrectly in operational state, during transition from safe-operational state to operational state, or from pre-operational to safe-operational state.	1. Check the synchronization mode configuration of the slave. 2. Check the ESC status of the slave. 3. Check the DC activation status.
0x00411031	Critical	Invalid DC latch configuration	O, S->O, P->S, 0x134=0x0031. The latch (LATCH) signal is configured incorrectly in operational state, during transition from safe-operational state to operational state, or from pre-operational to safe-operational state.	1. Power off and on again 2. Contact the agent or Inovance.
0x00411032	Critical	PLL error	O, S->O, 0x134= 0x0032. A PLL fault occurs in operational state or during transition from safe-operational to operational state.	1. Power off and on again 2. Contact the agent or Inovance.
0x00411033	Critical	DC sync I/O error	O, S->O, 0x134= 0x0033	1. Power off and on again 2. Contact the agent or Inovance.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00411034	Critical	DC sync timeout fault	O, S->O, 0x134=0x0034	1. Power off and on again 2. Contact the agent or Inovance.
0x00411035	Critical	DC invalid sync period	P->S, 0x134=0x0035	1. Power off and on again 2. Contact the agent or Inovance.
0x00411036	Critical	DC Sync0 period	P->S, 0x134=0x0036. The synchronization (SYNC0) signal period is configured incorrectly during transition from pre-operational to safe-operational state.	Check the slave synchronization signal (SYNC0) period configuration.
0x00411037	Critical	DC Sync1 period	P->S, 0x134=0x0037. The synchronization (SYNC1) signal period is configured incorrectly during transition from pre-operational to safe-operational state.	Check the slave synchronization signal (SYNC1) period configuration.
0x00411041	Critical	AOE mailbox communication error	B, P, S, O, 0x134=0x0041	1. Power off and on again 2. Contact the agent or Inovance.
0x00411042	Critical	EOE mailbox communication error	B, P, S, O, 0x134=0x0042	1. Power off and on again 2. Contact the agent or Inovance.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00411043	Critical	COE mailbox communication error	B, P, S, O, 0x134=0x0043	1. Power off and on again 2. Contact the agent or Inovance.
0x00411044	Critical	FOE mailbox communication error	B, P, S, O, 0x134=0x0044	1. Power off and on again 2. Contact the agent or Inovance.
0x00411045	Critical	SOE mailbox communication error	B, P, S, O, 0x134=0x0045	1. Power off and on again 2. Contact the agent or Inovance.
0x0041104F	Critical	VOE email communication error	B, P, S, O, 0x134=0x004F	1. Power off and on again 2. Contact the agent or Inovance.
0x00411050	Critical	EEPROM no access	Any, 0x134=0x0050	1. Power off and on again 2. Contact the agent or Inovance.
0x00411051	Critical	EEPROM error	Any, 0x134=0x0051	Check if the XML file is programmed.
0x00411052	Critical	External hardware is not ready.	The EtherCAT slave cannot switch states due to loss of connection with an external device or signal.	1. Power off and on again 2. Contact the agent or Inovance.
0x00411060	Critical	Local restart of the slave	Any, 0x134=0x0060	1. Power off and on again 2. Contact the agent or Inovance.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00411061	Critical	The device's identification value has been changed.	P, P+E	1. Power off and on again 2. Contact the agent or Inovance.
0x00411070	Critical	Configuration mismatch	The actual device does not match the configuration.	Check if the configuration matches the actual device.
0x00411080	Critical	Power supply voltage too low		1. Power off and on again 2. Contact the agent or Inovance.
0x00411081	Critical	Power supply voltage too high		1. Power off and on again 2. Contact the agent or Inovance.
0x00411082	Critical	The temperature is too low.		1. Power off and on again 2. Contact the agent or Inovance.
0x00411083	Critical	The temperature is too high.		1. Power off and on again 2. Contact the agent or Inovance.
0x004110F0	Critical	The application controller is available.		1. Power off and on again 2. Contact the agent or Inovance.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00412101	Critical	Wireless connection establishment timeout	The TS terminal device cannot connect to the wireless network.	1. Troubleshoot based on the MS device indicators, and eliminate issues such as power supply, overheating, and version upgrades. 2. Troubleshoot the MS wireless network configuration, such as frequency point, number of TS connections, and whitelist configuration. 3. Check if the antennas of the MS and TS devices are properly installed and tightened. 4. Check the surrounding environment for other devices that may cause radio interference to this device. You can use a near-end tool to scan the frequency points and obtain a clean frequency band. 5. Check if there is significant obstruction or excessive distance between the MS device and the TS device.
0x00412102	Critical	MS is not the first slave.	The MS is not directly connected to the PLC; other devices exist between them.	Check if there are any other devices between the PLC and the MS. If there are, remove them and reconnect them to the MS's three-port wired side.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00412103	Critical	Wireless side real-time channel resource allocation failed.	Under the current channel conditions, the wireless side is unable to allocate sufficient real-time channel resources for transmitting PDO data.	1. Check if the antennas of the MS and TS devices are properly tightened. 2. Check the surrounding environment for other devices that may cause radio interference to this device. You can use a near-end tool to scan the frequency points and obtain a clean frequency band. 3. Check if there is significant obstruction or excessive distance between the MS device and the TS device. 4. It is recommended to select the LRW mode. 5. Reduce the number of wireless slave devices or reduce the PDO mapping data for the slaves.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00412104	Critical	PLC transmission phase is not aligned with the wireless side.	In MS mode, there are scenarios where no ECAT PDO frames or multiple ECAT PDO frames are received within a single communication cycle.	1. Check and increase the synchronization offset parameter in the background configuration, then restart the PLC. 2. Increase the PLC control cycle and configure the corresponding synchronization offset parameter. 3. Replace the PLC with a high-performance model that exhibits lower transmission jitter.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00412105	Warning	Non-process data continuous loss	Under current channel conditions, the non-process data packet error rate is high, or the transmission delay is large on the wireless side.	1. Reduce the number of wireless-side slaves or reduce the number of TS devices. 2. It is recommended to enable slave auto-restart. 3. Check if the antennas of the MS and TS devices are properly tightened. 4. Check the surrounding environment for other devices that may cause radio interference to this device. You can use a near-end tool to scan the frequency points and obtain a clean frequency band. 5. Check if there is significant obstruction or excessive distance between the MS device and the TS device.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00412106	Warning	Process data continuous loss	Under current channel conditions, the process data packet error rate is high on the wireless side.	1. Check if the antennas of the MS and TS devices are properly tightened. 2. Check the surrounding environment for other devices that may cause radio interference to this device. You can use a near-end tool to scan the frequency points and obtain a clean frequency band. 3. Check if there is significant obstruction or excessive distance between the MS device and the TS device.
0x00412107	Warning	MS processing PLC data continuous abnormality	Some PLC data frames are not sent to slaves.	1. It is recommended to enable slave auto-restart. 2. Reduce the number of wireless-side slaves or reduce the number of TS devices, and restart the system.
0x00412108	Critical	Invalid iFA configuration parameters	iFA configuration parameter validation fails on the MS side.	Check the MAC address, frequency points, wireless frequency band identifier, and other parameters configured on the MS.
0x00412109	Critical	Failed to read system time	MS fails to read the system time as the first slave.	1. Restart the wireless MS device and check if the fault is resolved. 2. If the fault persists, replace the wireless MS device.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00412301	Critical	IN/OUT reverse connection detected on TS side	The IN/OUT connection for the slave on the TS side is reversed.	Check each connected slave by its TS-id to determine if there is any IN/OUT reverse connection.
0x00412302	Critical	Abnormal communication between TS and slave	The communication between the TS and its connected slaves is abnormal.	1. Check if the TS is connected to ECAT slave devices. 2. Check if any slave device connected after the TS reports an alarm. If so, clear the alarm and restart the PLC. 3. Check if there is a non-ECAT switch among the devices connected after the TS.
0x00412303	Critical	Synchronization anomaly detected on TS side	The synchronization function on the TS side is abnormal.	1. Restart the PLC. 2. Power off and then power on the slave, restart the wireless system, and re-run the PLC. 3. Replace with a DC synchronous high-performance slave. 4. Use non-DC mode on the PLC to control slave operation.
0x00412304	Warning	Changing number of devices connected to TS	Devices connected to the TS side are removed or added.	1. Check if the network cables between the TS and the slaves are disconnected. 2. When the number of devices connected to the TS side changes, the PLC needs to be restarted.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x00412305	Critical	TS offline	Some TS devices are offline in the wireless system, resulting in communication interruption.	1. Troubleshoot based on the MS device indicators, and eliminate issues such as power supply, and overheating. 2. Check if the antennas of the MS and TS devices are properly installed and tightened. 3. Check the surrounding for any other devices that may cause radio interference to this device. 4. Check if there is significant obstruction or excessive distance between the MS device and the TS device.
0x00412306	Warning	Topological anomaly	TS detects a branch-type slave.	Check if a branch-type device is connected to the TS side and if there are three or more ports connected.

■ CANopen fault codes

Fault code	Level	Description	Cause	Solutions/Recommendations
0x9CA50000	Information	No fault	No fault	No fault
0x9CA50001	Critical	CANOpen master configuration error	CANOpen configuration error	1. Check if the CANopen configuration is correct. 2. Check for conflicts in the PDO COB-ID.
0x9CA50010	Warning	CANopen slave offline	The CANopen slave is offline.	1. Check whether the baud rate of the CAN bus device matches the configured value. 2. Check if the CAN bus wiring is abnormal, and if the termination resistors are consistent. 3. Check if the CANopen slave number matches the configured number.

■ Modbus fault codes

- Modbus RTU fault codes

Fault code	Level	Description	Cause	Solutions/Recommendations
0x9DD20000	Information	Fault cleared	-	Channel fault cleared
0x9DD20070	Critical	Slave address setting error	The set slave station address does not match the actual slave station address.	1. Check whether the response data from the slave is correct. 2. Check whether the master and slave device addresses are consistent.
0x9DD20072	Critical	Illegal data address	The accessed peer data address does not exist or is out of bounds.	Check if the data access address or data length exceeds the limit.

Fault code	Level	Description	Cause	Solutions/Recommendations
0x9DD20073	Critical	CRC check error	Data message CRC check error	1. Check that the termination resistor is connected correctly. 2. Optimize wiring, such as eliminating potential interference sources
0x9DD20074	Critical	Unsupported command code	Attempted to access a command code not supported by the peer.	Check if the slave supports the parameter requested by the master.
0x9DD20075	Critical	Receiving timeout	1. The communication link is faulty. 2. The peer device is not operational.	1. Check if the master serial port configuration is correct. 2. Check if the serial port of the peer device is working properly. 3. Check if the peer device Modbus-RTU is started normally. 4. Optimize wiring, such as eliminating potential interference sources
0x9DD20076	Critical	Illegal data value	The data value is illegal.	Check if the response data from the peer slave is faulty.
0x9DD20077	Critical	Buffer overflow	Buffer overflow	Check if the number of requested coils or registers exceeds the maximum supported by Modbus.
0x9DD20078	Critical	Frame fault	The data frame is faulty.	Check if the response data frame length or the data frame of the peer slave is invalid.

- Modbus TCP fault codes

Fault code	Level	Description	Cause	Solutions/ Recommendations
0x9E360000	Informa-tion	Fault cleared	-	Channel fault has been recovered.
0x9E360072	Critical	Illegal data address	The accessed peer data address does not exist or is out of bounds.	Check if the data access address or data length exceeds the limit.
0x9E360074	Critical	Unsupport-ed command code	Attempted to access a command code not supported by the peer.	Check if the slave supports the parameter requested by the master.
0x9E360075	Critical	Receiving timeout	1. The communication link is faulty. 2. The peer device is not operational.	1. Check if the master IP address or port is configured correctly. 2. Check if the TCP network of the peer device is working properly. 3. Check if the peer device Modbus-TCP is started normally. 4. Optimize the wiring by eliminating potential interference sources.
0x9E360076	Critical	Illegal data value	The data value is illegal.	Check if the response data from the peer slave is faulty.
0x9E360077	Critical	Buffer overflow	Buffer overflow	Check if the number of requested coils or registers exceeds the maximum supported by Modbus.
0x9E360078	Critical	Frame fault	The data frame is faulty.	Check if the response data frame length or the data frame of the peer slave is invalid.

Fault code	Level	Description	Cause	Solutions/ Recommendations
0x9E36009A	Critical	TCP cannot be connected to the device.	TCP link error	1. Check if the master IP address or port is configured correctly. 2. Check if the network of the peer device can work normally. 3. Check if the wiring is disconnected. 4. Optimize the wiring by eliminating potential interference sources.
0x9E35009B	Critical	TCP master IP address declaration failed.	EtherNet port IP address does not match the device network port IP address.	Check if the EtherNet port IP address is set correctly.
0x9E3E009B	Critical	TCP slave IP address declaration failed.	EtherNet port IP address does not match the device network port IP address.	Check if the EtherNet port IP address is set correctly.
0x9E36009C	Critical	TCP slave port is occupied.	The slave station was started on the PC, consuming the Modbus port configured in iFA.	Close the slave started on the PC to release the occupied port.

Service and Support

Should you encounter a safety accident during the use or operation of the product, or face challenges in operating and maintaining the equipment, which remain unresolved after the relevant documentation is consulted, we provide multiple channels to ensure prompt resolution:

- Channel #1: Contact service@inovance.com.
- Channel #2: Visit https://www.inovance.com/global to access document downloads, after-sales support, spare parts ordering, repair applications, and authenticity verification services.
- Channel #3: Download My Inovance app (https://zshc-eu.inovance.com/download-pc/) where you can access products info and documentation, and query product parameters.

We are committed to providing you with quick and professional technical support, and we look forward to your satisfaction and trust.