



GS20-EIP-8L Series High Protection IO-Link Master Module User Guide



Industrial
Automation



Intelligent
Elevator



New Energy
Vehicle



Industrial
Robot



Rail
Transit



Data code PS00018182A01

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This guide is subject to change without notice.

Waste Disposal

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

Personnel Requirements

The product/system described in this guide can only be operated by qualified professionals. Operations must comply with this guide, especially alarm notices and safety instructions. Qualified personnel can identify the risks of the product/system and prevent possible dangers.

Usage Requirements

Proper transportation, storage, assembly, installation, commissioning, operation, and maintenance are prerequisites for the safe and normal operation of the product. It is necessary to use the product in proper environments by following the instructions in this guide.

Preface

Introduction

GS20-EIP-8L is an IP67 master module that transfers EtherNet/IP communication to IO-Link communication. The module is equipped with eight IO-Link ports and can connect up to eight IO-Link devices (Class A type).

This guide introduces the product information, mechanical installation, electrical installation, program commissioning, and troubleshooting of the product.

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	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	-		-
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 Data

Name	Code	Description
GR20-16EMNL Digital Input and Output Module User Guide	PS00007355	Introduces the product information, mechanical installation, and electrical installation of the product.
GR20-16EMPL Digital Input and Output Module User Guide	PS00007356	Introduces the product information, mechanical installation, and electrical installation of the product.
GS20-16EMNL Digital Input and Output Module User Guide	PS00009314	Introduces the product information, mechanical installation, and electrical installation of the product.
GS20-16EMPL Digital Input and Output Module User Guide	PS00009714	Introduces the product information, mechanical installation, and electrical installation of the product.
GS20-16EMNL-S Digital Input and Output Module User Guide	PS00018165	Introduces the product information, mechanical installation, and electrical installation of the product.
GS20-16EMPL-S Digital Input and Output Module User Guide	PS00018166	Introduces the product information, mechanical installation, and electrical installation of the product.
GS20-EIP-8L High Protection IO-Link Master Module User Guide (This guide)	PS00018182	Introduces the product information, mechanical installation, electrical installation, programming commissioning, and troubleshooting of the product.

Revision History

Date	Version	Revision
July 2025	A01	Made minor corrections.
January 2025	A00	Initial release.

Access to the Guide

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

- Do keyword search under Service and Support at www.inovance.com.
- 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 user guides.



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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 unusual voltage

- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance is 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 Product Warranty Card.

Safety Instructions

Safety Disclaimer

1. Read and follow the safety instructions when installing, operating, and maintaining the equipment.
2. To ensure your safety and prevent damage to the equipment, follow the marks on the equipment and all the safety instructions in this guide.
3. "CAUTION", "WARNING", and "DANGER" items in this guide do not indicate all safety precautions that need to be followed; instead, they just supplement the safety precautions.
4. Use this equipment according to the designated environment requirements; otherwise, a fault may occur. Malfunction or 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





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



"WARNING" indicates that failure to comply with the notice may result in death or severe personal injuries.



"CAUTION" indicates that failure to comply with the notice may result in minor or moderate personal injury or equipment damage. Keep this user guide properly for future use and deliver it to the end user.

Control System Design	
	<ul style="list-style-type: none"> • Provide a safety circuit outside the PLC so that the control system can still work safely once external power failure or controller fault occurs. • Add an external fuse or circuit breaker to prevent the module from smoking or catching fire due to long-time overcurrent caused by operation above rated current or load short-circuit.
	<ul style="list-style-type: none"> • An emergency stop circuit, a protection circuit, a forward/reverse operation interlocked circuit, and an upper position limit and lower position limit interlocked circuit must be set in the external circuits of PLC to prevent damage to the equipment. • To ensure safe operation, for the output signals that may cause critical accidents, use external protection circuit and safety mechanism. • Once the CPU of the PLC detects an exception in the system, all outputs may be closed; however, when a fault occurs in the controller circuit, the output may not be under control. Therefore, it is necessary to design an appropriate external control circuit to ensure normal operation. • If the output units such as relays or transistors are damaged, the output may fail to switch between ON and OFF states according to the commands. • The PLC is designed to be used in an indoor electrical environment compliant with overvoltage category II. The power supply must have a system-level surge protector to ensure that overvoltage caused by lightning shock cannot be applied to power supply input terminals, signal input terminals, and control output terminals of the PLC, therefore preventing damage to the product.

Installation



- Installation must be carried out by skilled personal who have undergone specialized electrical training and possess comprehensive electrical expertise.
- Disconnect all external power supplies of the system before installing/removing the module. Failure to do so may result in electric shock, module fault, or malfunction.
- Do not use the PLC in environments with dust, greasy smoke, conductive dust, corrosive or combustible gases, exposed to high temperature, condensation, wind & rain, or subject to vibration and shock. Electric shock, fire, and malfunction may also result in damage or deterioration to the product.
- The PLC is open-type equipment that must be installed in a control cabinet with lock (cabinet housing protection > IP20). Only the skilled personnel who have undergone specialized electrical training and possess comprehensive electrical expertise can open the cabinet.



- Prevent metal filings and wire ends from dropping into ventilation holes of the PLC during installation. Failure to comply may result in fire, fault, and malfunction.
- Ensure there are no unwanted matters on ventilation surface. Failure to comply may result in poor ventilation, which may cause fire, fault, or malfunction.
- Ensure the module is connected to the respective connector securely and hook the module firmly. Improper installation may result in malfunction, fault or fall-off.
- Ensure natural ventilation for the equipment.

Wiring



- Wiring must be carried out by skilled personnel who have undergone specialized electrical training and possess comprehensive electrical expertise.
- Disconnect all external power supplies of the system before wiring. Failure to comply may result in electric shock, module fault, or malfunction.
- After wiring, install the terminal cover attached to the product before power-on or operation. Failure to comply may result in electric shock.
- 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 may result in electric shock or damage to the product.



- To avoid electric shock, cut off the power supply before connecting the equipment to the power supply.
- The input power supply of this product must be 24 VDC. Power supplies outside $\pm 20\%$ of 24 VDC can cause severe damage to the product. Therefore, check whether the DC power supply provided by the switching-mode power supply is stable at a regular interval.

Operation and maintenance

- Operation and maintenance must be carried out by skilled personnel who have undergone specialized electrical training and possess comprehensive electrical expertise.
- Do not touch the terminals while the power is on. Failure to comply may result in electric shock or malfunction.
- Disconnect all external power supplies of the system before cleaning the module or re-tightening screws on the terminal block or the connector. Failure to comply may result in electric shock.
- Disconnect all external power supplies of the system before assembling/disassembling the module or connecting/removing the communication cables. Failure to comply may result in electric shock or malfunction.

Safety Recommendations

- In the position where the operator directly touches the machinery part, for example, where a machinery tool is loaded/unloaded, or where a machine runs automatically, the on-site manual operating devices and any other alternative means must be carefully arranged and designed so that they are independent of the PLC and can start or terminate the automatic running of the system.
- If modification on the program is needed during system operation, use the lock function or other protective measures. Ensure that only authorized personnel can make the necessary modifications.

Disposal

- Treat the scrapped product as industrial waste. Dispose of the battery according to local laws and regulations.
- Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

1 Product Information

1.1 Functions

Basic functions

- IO-Link communication
 - IO-Link master that can communicate with the IO-Link V1.0 and V1.1 devices
 - Equipped with eight IO-Link ports to connect up to eight IO-Link devices (Class A type)
- Ethernet/IP communication

Equipped with two EtherNet/IP network ports (M12-D type) to transfer data between IO-Link devices and EtherNet/IP devices
- Parameter configuration
 - Device parameter modification: The system supports modifying the operation parameters of the slave devices through UCMM communication.
 - Port parameter backup: When this function is enabled, the system automatically backs up the configuration parameters of the slave connected to the port for the first time, and the slave connected to the port will run according to this backup parameter.
- Port mode configuration
 - Standard IO-Link master mode
 - Standard digital input mode
 - Standard digital output mode
- Visualized diagnosis
 - Network connection indicator
 - EtherNet/IP communication state indicator
 - US/UA power supply voltage state indicator
 - I/O-LINK port communication state indicator (indicating faults, short circuit, and overcurrent)

Digital input and output function

- Equipped with 16 configurable DI/DOs
- Pin2 and Pin4 of each port can be configured as DI/DO mode.
- The reference potential of all inputs and outputs is Pin3 voltage.

IO-Link port function

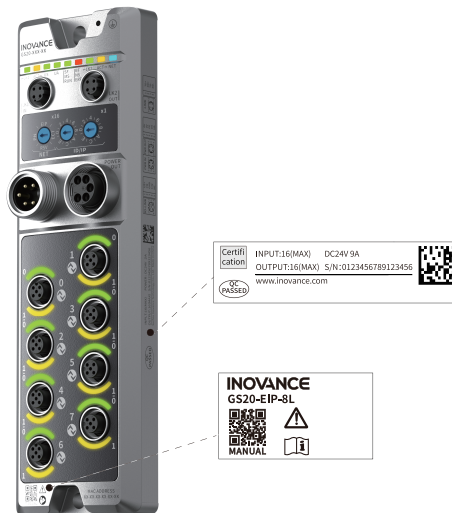
- Equipped with eight IO-Link device power supplies
- Class-A IO-Link ports
- Short circuit detection for the power supply of each port
- Short circuit/overcurrent protection for Pin1, Pin2 (DO mode), and Pin4 (DO mode)

1.2 Naming Rules and Nameplate

GS20-EIP-8L

① ② ③ ④ ⑤ ⑥

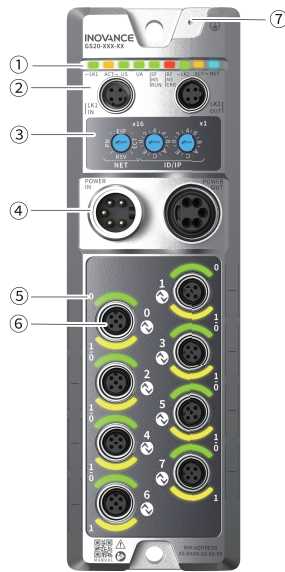
① Product Family G: Inovance controller general-purpose module	④ Communication Protocol ECT: EtherCAT bus communication EIP: EtherNet/IP communication PN: PROFINET communication
② Product Type S: High protection	⑤ Number of Converter Channels 8: Eight channels
③ Series 20: 20 series	⑥ Module Type L: IO-Link




The data for ordering the product is shown in the following table.

Model	Description	Material Code	Applicable Model
GS20-EIP-8L	GS20 series high protection master module that transfers EtherNet/IP communication to eight channels of IO-Link communication	01440656	Class A IO-Link master

1.3 Components



No.	Name	Description		
①	State indicator	Link	Network connection indicator	<ul style="list-style-type: none"> • Solid ON in green: The module is connected to the peer device. • OFF: The module is not connected to the peer device, or the module or the peer device is not powered on.
		ACT	Data transmission indicator	<ul style="list-style-type: none"> • Flashing in yellow: Data transmission in progress • OFF: No data transmission
		US	System power supply indicator	<ul style="list-style-type: none"> • Solid ON in green: The US power supply voltage is normal ($18 \text{ VDC} \leq \text{US power supply voltage} \leq 30.2 \text{ VDC}$). • Solid ON in red: The US power supply voltage is abnormal ($\text{US power supply voltage} > 30.2 \text{ VDC}$). • Flashing in red^[2]: The US power supply voltage is abnormal ($11 \text{ VDC} < \text{US power supply voltage} < 18 \text{ VDC}$). • Flashing in red^[1]: The US power supply voltage is abnormal ($\text{US power supply voltage} < 11 \text{ VDC}$). • OFF: No power supply
		UA	Actuator power supply indicator	<ul style="list-style-type: none"> • Solid ON in green: The UA power supply voltage is normal ($18 \text{ VDC} \leq \text{UA power supply voltage} \leq 30.2 \text{ VDC}$). • Solid ON in red: The UA power supply voltage is abnormal ($\text{UA power supply voltage} > 30.2 \text{ VDC}$). • Flashing in red^[2]: The UA power supply voltage is abnormal ($11 \text{ VDC} \leq \text{UA power supply voltage} \leq 18 \text{ VDC}$). • OFF: The UA power supply voltage is abnormal ($\text{UA power supply voltage} < 11 \text{ VDC}$).
		MS	Module state	<ul style="list-style-type: none"> • Solid ON in green: The module is operating normally. • Flashing in green: The module restores factory settings. • Flashing in red: The module hardware is faulty (abnormal US/UA/temperature).
		NS	Network state	<ul style="list-style-type: none"> • OFF: The communication is not established. • Solid ON in red: IP address conflict occurs. • Solid ON in green: The proprietary owner connection is normal. • Flashing in green: The proprietary owner connection does not exist or is offline. • Flashing in red and green alternatively: The proprietary owner connection and the input-only connection are offline. • Flashing in red: The input-only connection is offline.
		NET	Communication indicator	<p>Solid ON in green: EtherNet/IP communication mode</p> <p>Solid ON in red: Abnormal network startup</p> <p>For details, see the NET indicator state table.</p>
②	EtherNet/IP communication interface	IN	Used for EtherNet/IP communication input and output. For pin assignment, see "3.3 Terminal Definition" on page 20	
		OUT		

No.	Name	Description	
③	DIP switch	ID/IP	<p>Slave address setting switch (value range: 0 to 255)</p> <p>×16/×1: Slave address code plate switch set in hexadecimal format.</p> <p>The value of the x16 DIP switch represents the high 4 bits and the value of the x1 DIP switch represents the low 4 bits. The DIP switch is converted to decimal address as (value corresponding to the x16 DIP switch) * 16 + (value corresponding to the x1 DIP switch) * 1.</p> <p>Example: When the x16 DIP switch is set to A (A = 10 in hexadecimal) and the x1 DIP switch is set to E (E = 14 in hexadecimal), the last byte of the IP address is set to 0×AE, and the corresponding decimal address is 10*16 + 14 = 174.</p>
④	Power supply interface	POWER IN POWER OUT	Used for power supply input/output. For pin assignment, see “3.3 Terminal Definition” on page 20
⑤	IO-Link indicator	0	<p>Indicator 0</p> <ul style="list-style-type: none"> • Solid ON in yellow: The output state of Pin4 is 1. • Solid ON in green: The IO-Link communication is connected or the input state of Pin4 is 1. • Flashing in green^[2]: The IO-Link communication is not connected. • Solid ON in red: Pin4 encounters overcurrent. • Flashing in red and green alternatively: The IO-Link communication is not connected due to invalid verification. • Flashing in red^[2] (together with indicator 1): Pin1 encounters overcurrent. • OFF: The input/output state of Pin4 is 0.
		1	<p>Indicator 1</p> <ul style="list-style-type: none"> • Solid ON in yellow: The output state of Pin2 is 1. • Solid ON in green: The input state of Pin2 is 1. • Solid ON in red: Pin2 encounters overcurrent. • Flashing in red^[2] (together with indicator 0): Pin1 encounters overcurrent. • OFF: The input/output state of Pin2 is 0.
⑥	IO-Link port	0/1/2/3/4/ 5/6/7	Used for I/O-Link data transmission. For pin assignment, see “3.3 Terminal Definition” on page 20
⑦	Grounding terminal		During installation, ensure that the protective grounding terminal of the module is grounded properly, with a recommended grounding impedance of less than 1 Ω.

Note

- Flashing: The indicator is on for 200ms and off for 200ms, repeating this cycle.
- [1]: US/UA indicator is on for 250ms and off for 250ms, repeating this cycle.
- [2]: The IO-Link indicator and US/UA indicator is on for 500ms and off for 500ms, repeating this cycle.



: High temperature caution for the module.

The following table introduces the specific states of the NET indicator.

Input Connection/ Proprietary Owner Connection	The proprietary owner connection does not exist	The proprietary owner connection exists and is online	The proprietary owner connection exists but is offline
Input only connection does not exist	Green indicator OFF Red indicator OFF	Solid ON in green Red indicator OFF	Flashing in green Red indicator OFF
Input only connection exists and is online	Flashing in green Red indicator OFF	Solid ON in green Red indicator OFF	Flashing in green Red indicator OFF
Input only connection exists but is offline	Green indicator OFF Flashing in red	Solid ON in green Flashing in red	Flashing in green Flashing in red

1.4 Technical Specifications

General specifications

Item	Specification
Dimensions (W x H x D)	69.8 mm x 224.8 mm x 20.5 mm
Weight	About 550 g

Power supply specifications

Item	Specification
Rated voltage of US power supply	24 VDC (18 VDC to 30.2 VDC)
Maximum current of US power supply	The maximum input/output current is 9 A (with the external +24 V power supply disabled for IO-Link port).
US reverse polarity protection	Supported
Rated voltage of UA power supply	24 VDC (18 VDC to 30.2 VDC)
Maximum current of UA power supply	The maximum input/output current is 9 A (with the DO disabled).
UA reverse polarity protection	Supported
US undervoltage detection	The module uses software to perform undervoltage detection (< 18 VDC), voltage-loss detection (< 11 VDC), and overvoltage detection (\geq 30.2 VDC).
UA undervoltage detection	The module uses software to perform undervoltage detection (< 18 VDC), voltage-loss detection (< 11 VDC), and overvoltage detection (\geq 30.2 VDC).

Input specifications

Item	Specification
Input type	Digital input
Input mode	PNP
Maximum number of input channels	16
Input voltage	24 VDC (18 VDC to 30.2 VDC)
Input current (typical value)	2.4 mA (typical value @24 V)
ON voltage	> 11 VDC
Signal OFF voltage	< 5 VDC
Hardware response time upon ON/OFF	100 μ s (Max.)/100 μ s (Max.)

Item	Specification
Supported type	Type1/Type3
Isolation	Not supported

Output specifications

Item	Specification
Output type	Digital output/transistor output
Output mode	PNP
Maximum number of output channels	16
Output voltage	24 VDC (18 VDC to 30.2 VDC)
Resistive output load	2 A/channel; 9 A/module
Inductive output load	24 W/point
Lamp output load	18 W/point
Hardware response time upon ON/OFF	100 μ s (Max.)/1.4ms (Max.)
Leakage current upon OFF	10 μ A (with 24 VDC)
Isolation	Not supported
Protective functions	Short circuit protection
Output derating	<ul style="list-style-type: none"> • Outside the cabinet: The module works at full load at 70°C. For example, the output current of the 16-channel resistive output load does not exceed 9 A. • Inside the cabinet: The module works at 75% of full load at 70°C. For example, the output current of the 16-channel resistive output load does not exceed 7 A.

IO-Link specifications

Item	Specification
Number of ports	8
IO-Link version	1.1.3
IO-Link port type	Class A
Communication rate	COM1 (4.8 kbps) COM2 (38.4 kbps) COM3 (230.4 kbps)
Process data volume	Max. 32 bytes of input data of each port. Max. 32 bytes of output data of each port.
Capacity of the memory for device parameters	2 kbyte (applicable to each port)
External +24 V "L+" supply current of IO-Link port (Pin1)	Rated current: 1.6 A Overcurrent protection value: 2 A
Isolation method	Not supported
Unshielded cable length	Max. 20 m
Cable requirements	5-pin unshielded cable
Protective functions	Overcurrent protection

EtherNet specifications

Item	Specification
Number of communication interfaces	2
IP setting method	BOOTP/DHCP
Network topology	Linear, star, tree, and DLR (only supported as managed)
Maximum data length	Input: 392 bytes Output: 262 bytes
Transmission distance	100 m
RPI time	1ms to 50,000ms
Maximum number of CIP connections	16
Network interface	Two M12 D-code interfaces with switching function
Connection rate	100 M
Restore factory settings	Supported

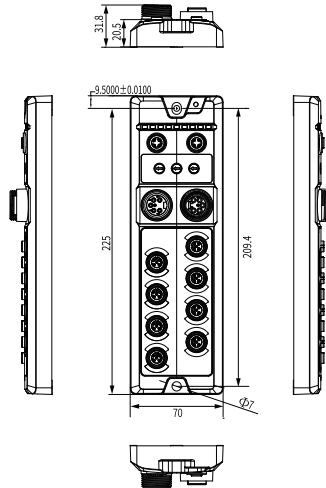
1.5 Environmental Specifications

Item	Operating Specification	Transportation Specification	Storage Specification
IP rating	IP67 (with screws tightened)		
Pollution degree	2		
Immunity	2 kV on power supply line (IEC61000-4-4)		
Overvoltage class	I		
EMC immunity level	Zone B, IEC61131-2		
ESD protection level	Contact discharge +/-6 kV, air discharge +/-8 kV		
Temperature	-30°C to +70°C	-40°C to +85°C	-40°C to +85°C
Humidity	10% RH to 99% RH, without condensation 100% (when all connectors are installed)		
Vi- bra- tion	Frequency	5 Hz to 500 Hz	
	Displacement	1 mm (direct installation) (5 Hz to 61 Hz)	
	Acceleration rate	15 g (direct installation) (61 Hz to 500 Hz)	
	Direction	X/Y/Z directions	
Shock resistance	Application/Transportation scenario: Tested according to IEC60068-2-27; 15 g peak gravitational acceleration, 11 ms pulse width, total 18 times in X/Y/Z directions		
Altitude/Air pressure	0 m to 2000 m (> 79.5 kPa)		0 m to 2000 m (> 79.5 kPa)

2 Mechanical Installation

2.1 Installation Dimensions

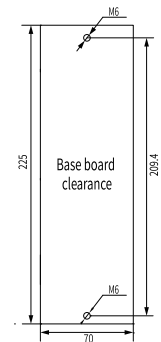
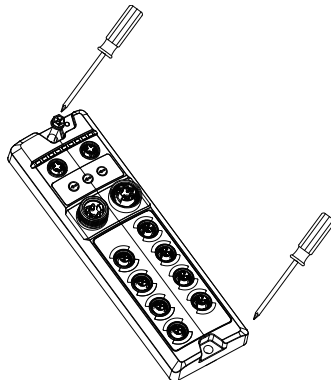
The installation dimensions (in mm) are shown in the figure below.



2.2 Installation Method

Installation

Install the module with two cross recessed hexagon SEMS screws (M6 x 25) with the washer diameter of 11 mm. The clearance between the two screws is 209.4 mm. The following figure describes the installation and clearance (in mm).



Uninstallation

Remove the M6 screws using a Phillips screwdriver, and then detach the module.

Model	Description	Length	Material Code
CAB-M12DMS4-M12DMS4-3	Cable assembly - Ethernet/IP cable - Male (straight) - 22AWG - Green - Male (straight) - 80°C (cables for cascading multiple IO-Link masters (Ethernet/IP cascaded))	3 m	15310153
CAB-M12DMS4-M12DMS4-5		5 m	15310178
CAB-M12DMS4-M12DMS4-8		8 m	15310221
CAB-M12DMS4-M12DMS4-10		10 m	15310177
CAB-M12DMS4-M12DMS4-15		15 m	15310176
CAB-RJ45-M12DMS4-3	Cable assembly - Ethernet/IP cable - Male (straight) - 26 AWG - Black - RJ45 - 80°C (used for connecting PLC network ports and IO-Link masters)	3 m	15310154
CAB-RJ45-M12DMS4-5		5 m	15310187
CAB-RJ45-M12DMS4-8		8 m	15310215
CAB-RJ45-M12DMS4-10		10 m	15310186
CAB-RJ45-M12DMS4-15		15 m	15310185

Power supply input cable

The data for ordering the power supply input cable is as follows.

Model	Description	Length	Material Code
CAB-7/8FL5-3	Cable assembly - 7/8" power supply cable - Female (angled) - 16 AWG - Black - NA - 80°C (used for powering IO-Link masters)	3 m	15310155
CAB-7/8FL5-5		5 m	15310175
CAB-7/8FL5-8		8 m	15310216
CAB-7/8FL5-10		10 m	15310174
CAB-7/8FL5-15		15 m	15310173

The following table introduces the functions of power supply cables in different colors.

No.	Color	Function
1	Black	0V
2	Blue	0V
PE	Green/Yellow	Function grounding
4	Brown	Sensor and power supply system (US)
5	White	Power supply of the actuator (UA)

Power supply input cable

The data for ordering the power supply input cable is as follows.

Model	Description	Length	Material Code
CAB-7/8FL5-3	Cable assembly - 7/8 power supply cable - Female (angled) - 16 AWG - Black - NA - 80°C (used for powering IO-Link masters)	3 m	15310155
CAB-7/8FL5-5		5 m	15310175
CAB-7/8FL5-8		8 m	15310216
CAB-7/8FL5-10		10 m	15310174
CAB-7/8FL5-15		15 m	15310173

The following table introduces the functions of power supply cables in different colors.

No.	Color	Function
1	Black	0V
2	Blue	0V
PE	Green/Yellow	Function grounding

No.	Color	Function
4	Brown	Sensor and power supply system (US)
5	White	Power supply of the actuator (UA)

Power supply output cable

The data for ordering the power supply output cable is as follows.

Model	Description	Length	Material Code
CAB-7/8FL5-7/8ML5-3	Cable assembly - 7/8 power supply cable - Female (angled) - 16 AWG - Black - Female (angled) - 80°C (used for cascading multiple IO-Link master power supplies)	3 m	15310156
CAB-7/8FL5-7/8ML5-5		5 m	15310181
CAB-7/8FL5-7/8ML5-8		8 m	15310219
CAB-7/8FL5-7/8ML5-10		10 m	15310180
CAB-7/8FL5-7/8ML5-15		15 m	15310179

IO-Link communication cable

The data for ordering IO-Link communication cable is as follows:

Model	Description	Length	Material Code
CAB-M12AMS4-M12AFL4-3	Cable assembly - IO-Link cable - Male (straight) - 22AWG - Black - Female (angled) - 85°C (used for connecting the IO-Link master to IO-Link slaves)	3 m	15310142
CAB-M12AMS4-M12AFL4-5		5 m	15310184
CAB-M12AMS4-M12AFL4-8		8 m	15310230
CAB-M12AMS4-M12AFL4-10		10 m	15310183
CAB-M12AMS4-M12AFL4-15		15 m	15310182
CAB-M12AMS4-M12AFL4-3-T-taiyo	Cable assembly - IO-Link cable - Male (straight) - 22AWG - Black - Female (angled) - 85°C - Highly flexible cables fit for drag chains, surviving 3 to 5 million continuous tests (used for connecting the IO-Link master to IO-Link slaves)	3 m	15310232
CAB-M12AMS4-M12AFL4-5-T-taiyo		5 m	15310231
CAB-M12AMS4-M12AFL4-8-T-taiyo		8 m	15310229
CAB-M12AMS4-M12AFL4-10-T-taiyo		10 m	15310228
CAB-M12AMS4-M12AFL4-15-T0-taiyo		15 m	15310227

Plug and connector assembly

The data for ordering the plug and connector assembly is as follows:

Model	Description	Material Code
CON-M12AFS4	4-pin female (straight) field-wirable plug	15051155
CON-M12AFL4	4-pin female (angled) field-wirable plug	15051157
CON-M12AMS5	5-pin male (straight) field-wirable plug	15051156
CON-M12AML5	5-pin male (angled) field-wirable plug	15051158
CON-M12AMS5-YF5	Y splitter that converts one 5-pin male M12 connector to two 5-pin female M12 DIO connectors	15051159
CON-M12AFL4-L	4-pin female (angled) field-wirable plug (applicable to GR20-16EMNL/GR20-16EMPL)	15051269
CON-M12AMS4-YM8F3	Y splitter that converts one M12 5-pin A-code male straight connector to two M8 3-pin female connectors	15051420

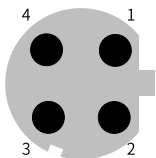
Model	Description	Material Code
CON-M12AMS4-YM8F4	Y splitter that converts one M12 5-pin A-code male straight connector to two M8 4-pin female connectors	15051419
CON-M8AMS3	M8 3-pin assembled connector	15051445
CON-M8AMS4	M8 4-pin assembled connector	15051448
CON-M12AFS5-YM5	Y splitter that converts one 5-pin female connector to two 5-pin male straight connectors. It can be used to connect the class A master to class B valve terminal slave.	15051334
IPT210-A-CAB-M12AMS5-M12AFS5-1.5	Connector that converts 5-pin male straight connector to 5-pin female straight connector. It can be used to connect the IO-Link master to valve terminal.	72235829
IPT210-A-CAB-M12AFS5-1.5	Connector that converts 5-pin female straight connector to discrete cable. It can be used to power the valve terminal.	72235870

Note

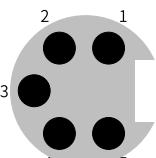
If you have additional requirements for cable selection, contact Inovance for customization.

3.3 Terminal Definition

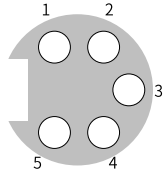
Assignment of EtherNet/IP pins

Diagram	Pin	Description
	1	TD+
	2	RD+
	3	TD-
	4	RD-

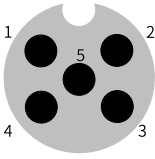
Assignment of power supply input pins

Diagram	Pin	Description
	1	0V
	2	0V
	3	Function grounding (PE)
	4	Sensor and system power supply (US)
	5	Actuator power supply (UA)

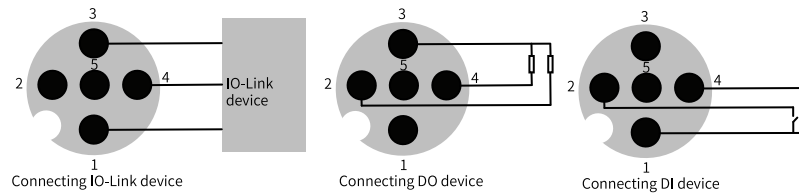
Assignment of power supply output pins

Diagram	Pin	Description
	1	0V
	2	0V
	3	Function grounding (PE)
	4	Sensor and bus power supply (US)
	5	Actuator power supply (UA)

Assignment of IO-Link pins

Diagram	Pin	Function	Description	Color
	1	L+	+24 V power supply (US+)	Brown
	2	I/Q	<ul style="list-style-type: none"> • Not connected (Class A) • DI: Digital input (Class A) • DO: Digital output (Class A) 	White
		2L+	+24 V power supply (UA+)	
	3	L-	+24 V power supply (US-)	Blue
	4	C/Q	<ul style="list-style-type: none"> • SIO: Standard input/output mode • IO-Link communication mode 	Black
	5	NC	Not connected (Class A)	Undefined
2L-		+24 V power supply (UA-)		

3.4 Terminal Wiring



4 Program Commissioning

4.1 IP Address Configuration and Definition

Configure the IP address to establish communication between the PLC and the module. The factory default IP address information is shown below.

- IP address: 192.168.1.66
- Subnet mask: 255.255.255.0
- Gateway address: 192.168.1.1

Configuring the IP address via DIP switch

The GS20-EIP-8L module is equipped with three DIP switches, defined as follows:

- When the ID/IP value of the DIP switch is 0x00, the default IP address (192.168.1.66) is used.
- When the ID/IP value of the DIP switch is within the range of 0x01 to 0xFE, this value represents the last byte of the IP address, which is 192.168.1.(ID/IP value).
- When the ID/IP value of the DIP switch is 0xFF, the device defaults to the DHCP mode.

To reset the DIP switch, power off the module and set the DIP switch to 6FF, as shown below.



Power on the module and set the DIP switch to 400, as shown below. Power off and on the module again, the IP address of the module will be restored to default (192.168.1.66). After modifying the IP address, it is necessary to power off and restart the GS20-EIP-8L module.



4.2 GS20-EIP-8L Module Parameter Configuration

4.2.1 Configuration Data

The following table introduces the parameter configuration of the GS20-EIP-8L module, including the sizes of input, output, and configuration data.

Name	Instance ID	Data Length
Input port	110	392
Output	100	262
Configuration	120	194

The following table introduces the configuration parameter sequence of the GS20-EIP-8L module. Bytes 0 to 9 are for basic module configuration, including port functions and output state upon network disconnection. Bytes 10 to 193 are for IO-Link configuration of the eight ports.

Byte	Configuration Object	Description
0 to 9	Module	Basic configuration of the whole module
10 to 32	IO-Link port 0	Configuration of IO-Link port 0
33 to 55	IO-Link port 1	Configuration of IO-Link port 1
56 to 78	IO-Link port 2	Configuration of IO-Link port 2
79 to 101	IO-Link port 3	Configuration of IO-Link port 3
102 to 124	IO-Link port 4	Configuration of IO-Link port 4
125 to 147	IO-Link port 5	Configuration of IO-Link port 5
148 to 170	IO-Link port 6	Configuration of IO-Link port 6
171 to 193	IO-Link port 7	Configuration of IO-Link port 7

The following table introduces the basic configuration of the entire module. The port function can be configured to use the Pin4 of each port as IO-Link or as standard I/O. If Pin4 is used as standard I/O, the port function can be configured as NO (normally open) input, NC (normally closed) input, or output mode.

● **Configured as standard I/O**

Output state upon network disconnection of Pin2/Pin4: When the network is disconnected, the module can be configured to output 0 V, 24 V, or the last cycle value.

The Pin2 port function can be configured as NO input, NC input, output mode, or output enable mode. When it is configured as output enable, Pin2 output can be achieved without modifying the output process data through I/O mapping.

The Pin4 port function can be configured as NO input, NC input, or output mode.

Byte	Bit								Description
	7	6	5	4	3	2	1	0	
-									-
0	Port 3		Port 2		Port 1		Port 0		Port function (port_ function) ● 0x00: Standard I/O ● 0x01: IO-Link
1	Port 7		Port 6		Port 5		Port 4		
2	Port 3 to Pin2		Port 2 to Pin2		Port 1 to Pin2		Port 0 to Pin2		Pin2 output function upon network disconnection (Pin2_safe_state) ● 0x00: Output 0 V ● 0x01: Output 24 V ● 0x02: Output the last cycle value
3	Port 7 to Pin2		Port 6 to Pin2		Port 5 to Pin2		Port 4 to Pin2		

Byte	Bit				Description
4	Port 3 to Pin4	Port 2 to Pin4	Port 1 to Pin4	Port 0 to Pin4	Pin4 output function upon network disconnection (Pin4_safe_state) <ul style="list-style-type: none"> • 0x00: Output 0 V • 0x01: Output 24 V • 0x02: Output the last cycle value
5	Port 7 to Pin4	Port 6 to Pin4	Port 5 to Pin4	Port 4 to Pin4	
6	Port 3 to Pin2	Port 2 to Pin2	Port 1 to Pin2	Port 0 to Pin2	Pin2 port function (Pin2_fun) <ul style="list-style-type: none"> • 0x00: NO input • 0x01: NC input • 0x02: Output mode • 0x03: Output enable
7	Port 7 to Pin2	Port 6 to Pin2	Port 5 to Pin2	Port 4 to Pin2	
8	Port 3 to Pin4	Port 2 to Pin4	Port 1 to Pin4	Port 0 to Pin4	Pin4 port function (Pin4_fun) <ul style="list-style-type: none"> • 0x00: NO input • 0x01: NC input • 0x02: Output mode
9	Port 7 to Pin4	Port 6 to Pin4	Port 5 to Pin4	Port 4 to Pin4	

Configured as IO-Link port

The following table introduces the IO-Link port configuration details.

Byte	Bit								Description	
-	7	6	5	4	3	2	1	0	-	
10	Time base		Scaling factor							Cycle time configuration
11	Port verification mode								<ul style="list-style-type: none"> • 0: Disable • 1: V1.0 verification for Vendor/Device ID • 2: V1.1 verification for Vendor/Device ID • 3: Enable slave configuration parameter backup and restoration • 4: Enable slave configuration parameter restoration Note: <ul style="list-style-type: none"> • V1.0 and V1.1 indicate the IO-Link slave protocol stack versions. • When using modes 3 and 4, the port must be configured as configuration mode. 	
12	Vendor ID0 (VID)								Vendor ID	
13	Vendor ID1 (VID)									
14	Device ID0 (DID)								Slave device ID	
15	Device ID1 (DID)									
16	Device ID2 (DID)									
17	Serial number 0 (Sernum)								Device serial number	

Byte	Bit	Description
...
32	Serial number 16 (Sernum)	-
...	The data structure of the other serial numbers is the same.	-

The cycle time configuration can affect the IO-Link communication speed. The calculation is based on multipliers and time bases as described in the following table. When the cycle time is set to "automatic", the IO-Link master automatically the update time of the IO-Link device.

Bit								Description	
7	6	5	4	3	2	1	0	-	
Time base		Multiplier						-	<ul style="list-style-type: none"> • Bits 0 to 5 represent the multiplier, which contains a 6-digit multiplier used to calculate MasterCycleTime or MinCycleTime. The multiplier range is 0 to 63. • Bits 6 to 7 represent the time base, which specifies the time base for MasterCycleTime or MinCycleTime calculations.

The optional values of MasterCycleTime and MiniCycleTime are shown in the following table.

Time Base Code	Time Base Value	Calculation Method	Cycle Time
00	0.1ms	Multiplier x Time base	0.4ms to 6.3ms
01	0.4ms	6.4ms + Multiplier x Time base	6.4ms to 31.6ms
10	1.6ms	32.0ms + Multiplier x Time base	32.0ms to 132.8ms
11	Reserved	Reserved	Reserved

4.2.2 Input Process Data

The size of the input data is 392 bytes. The allocation of the process data input is shown in the following table.

Byte	Configuration Object	Note
0 to 7	Standard I/O port	Process data input for standard input
8 to 55	IO-Link port 0	Process data input for IO-Link port 0
56 to 103	IO-Link port 1	Process data input for IO-Link port 1
104 to 151	IO-Link port 2	Process data input for IO-Link port 2
152 to 199	IO-Link port 3	Process data input for IO-Link port 3
200 to 247	IO-Link port 4	Process data input for IO-Link port 4
248 to 295	IO-Link port 5	Process data input for IO-Link port 5
296 to 343	IO-Link port 6	Process data input for IO-Link port 6
344 to 391	IO-Link port 7	Process data input for IO-Link port 7

- **Input process data for standard I/O input**

Bytes 0 to 7 represent the input process data when the port is configured as standard input, as shown in the table below.

Byte	Bit								Note
-	7	6	5	4	3	2	1	0	-
0	I32	I34	I22	I24	I12	I14	I02	I04	Input data • I02: Input data of Pin2 of port 0 • I04: Input data on Pin4 of port 0
1	I72	I74	I62	I64	I52	I54	I42	I44	
2	S3		S2		S1		S0		Short circuit state Short circuit between Pin1 and Pin3
3	S7		S6		S5		S4		
4	O32	O3-4	O22	O24	O12	O14	O02	O04	Overload state • O04: Pin4 of port 0 is overloaded • O02: Pin2 of port 0 is overloaded
5	O72	O7-4	O62	O64	O52	O54	O42	O44	
6	-		T • 00: -30°C < Internal temperature < 85°C • 01: Internal temperature < -30°C • 10: Internal temperature > 85°C • 11: Reserved		US • 00: 18 VDC < US < 30.2 VDC • 01: 11 VDC < US < 18VDC • 10: US > 30.2 VDC • 11: US < 11 VDC		UA • 00: 18 VDC < UA < 30.2 VDC • 01: 11 VDC < UA < 18 VDC • 10: UA > 30.2 VDC • 11: UA < 11 VDC		System state • UA: UA power supply state • US: US power supply state • T: Temperature state
7	0	0	0	0	0	0	0	0	Reserved

• **Input process data for IO-Link port**

Bytes 8 to 391 represent the input process data when the port is configured as IO-Link, as shown in the table below.

Byte	Bit								Note
-	7	6	5	4	3	2	1	0	-
8 to 39	-								IO-Link port 0 data (IOL Ports Inputs)
40	0	0	0	0	0	0	DC	IOL	IO-Link state (IOL Status) • IOL: IO-Link mode port • DC: Device connected • 0: Reserved
41	0	0	0	0	0	PDI	DF	VF	IO-Link fault (IOL Error) • VF: Verification failed • DF: Data storage failed • PDI: Invalid process data
42	Vendor ID2								Vendor ID
43	Vendor ID2								
44	Slave device ID1								Slave device ID
45	Slave device ID2								
46	Slave device ID3								

Byte	Bit						Note
47	Mode	Type	0	-	-	-	Event 1 Mode • 0: Reserved • 1: Event single gap • 2: Event disappeared • 3: Event appeared Type • 0: Reserved • 1: Caution • 2: Alarm • 3: Fault
48	High bytes of event code						
49	Low bytes of event code						
50	Mode	Type	0	-	-	-	Event 2 Mode • 0: Reserved • 1: Event single gap • 2: Event disappeared • 3: Event appeared Type • 0: Reserved • 1: Caution • 2: Alarm • 3: Fault
51	High bytes of event code						
52	Low bytes of event code						
53	Mode	Type	0	-	-	-	Event 3 Mode • 0: Reserved • 1: Event single gap • 2: Event disappeared • 3: Event appeared Type • 0: Reserved • 1: Caution • 2: Alarm • 3: Fault
54	High bytes of event code						
55	Low bytes of event code						
...	The data structure of IO-Link port is the same.						-

4.2.3 Output Process Data

The size of the output data is 262 bytes. The allocation of the output process data is shown in the following table.

Byte	Configuration Object	Note
0 to 5	Standard I/O port	Process data output of standard output
6 to 37	IO-Link port 0	Process data output for IO-Link port 0
38 to 69	IO-Link port 1	Process data output for IO-Link port 1
70 to 101	IO-Link port 2	Process data output for IO-Link port 2

Byte	Configuration Object	Note
102 to 133	IO-Link port 3	Process data output for IO-Link port 3
134 to 165	IO-Link port 4	Process data output for IO-Link port 4
166 to 197	IO-Link port 5	Process data output for IO-Link port 5
198 to 229	IO-Link port 6	Process data output for IO-Link port 6
230 to 261	IO-Link port 7	Process data output for IO-Link port 7

- **Output process data of standard output**

Bytes 0 to 5 represent the output process data when the port is configured as standard output, as shown in the table below.

Byte	Bit								Note
	7	6	5	4	3	2	1	0	
-									-
0	O32	O34	O22	O24	O12	O14	O02	O04	Output data • O04: Output data on Pin4 of port 0 • O02: Output data on Pin2 of port 0
1	O72	O74	O62	O64	O52	O54	O42	O44	
2	0	0	0	0	0	0	0	0	Reserved
3	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	0	0	
5	0	0	0	0	0	0	0	0	

- **Output process data for IO-Link port**

Bytes 6 to 261 represent the output process data when the port is configured as IO-Link, as shown in the table below.

Byte	Bit (0 to 7)	Note
6 to 37	-	Output data for IO-Link port 0
...	The data structure is the same to that of other IO-Link ports.	Output data for IO-Link port n

4.3 IO-Link Slave Parameter Configuration Through UCMM

4.3.1 ODVA EIP-Tools Connection

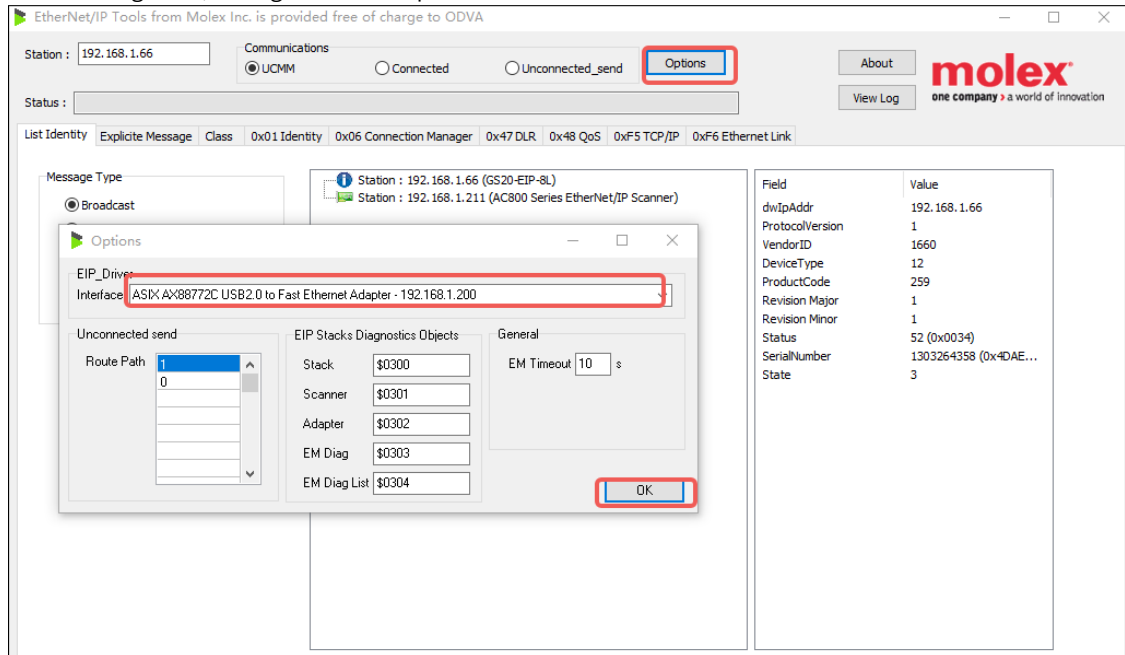
When the GS20-EIP-8L port is configured as IO-Link and connects to an IO-Link slave, the parameters of the slave can be configured through the UCMM communication function.

Prerequisites

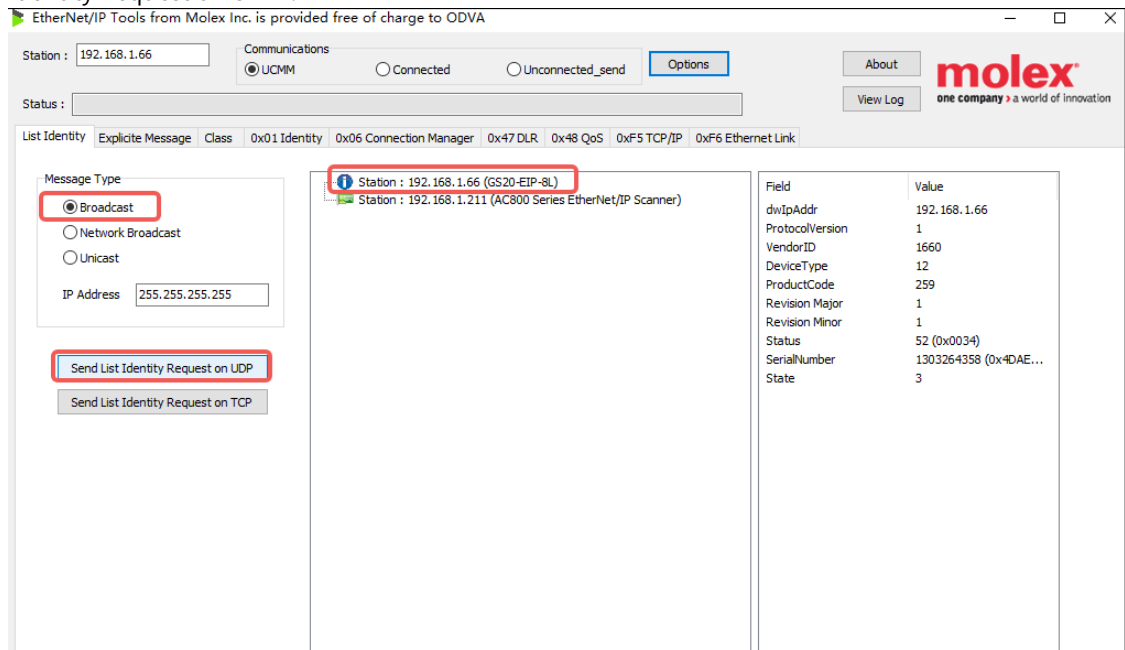
Download and install EIP-Tools from ODVA official.

Procedure

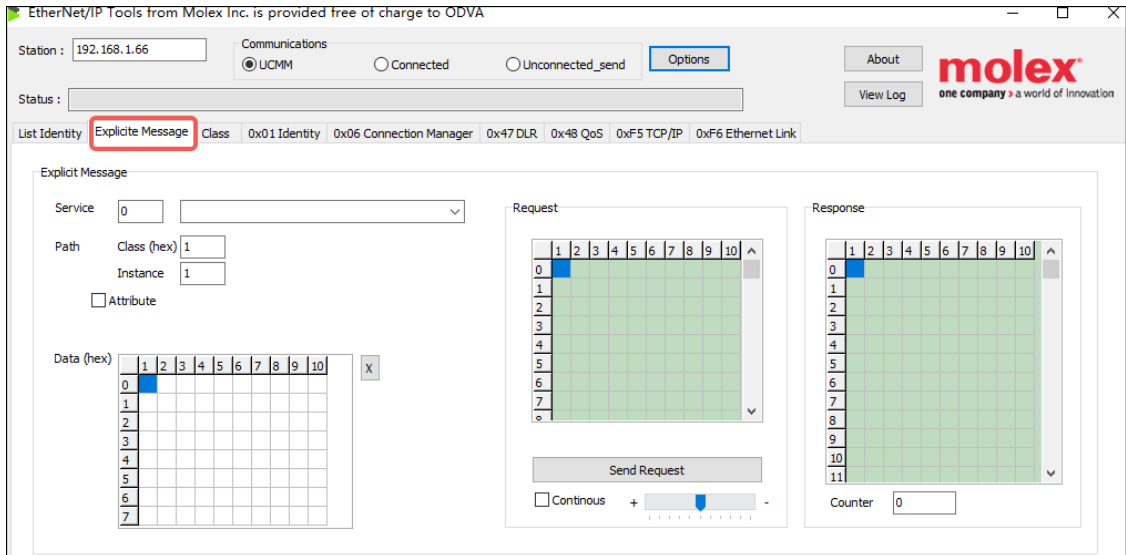
1. Open the ODVA tool and select the same network segment as the module. If they are not in the same network segment, configure the computer's IP address as shown below.



2. Set "Message Type" to "Broadcast" to locate the connected GS20-EIP-8L module. Click "Send List Identity Request on UDP".



3. Click "Explicit Message" and enter related parameters for configuring the UCMM display message issuance.



4.3.2 IO-Link Slave Configuration Parameter Writing

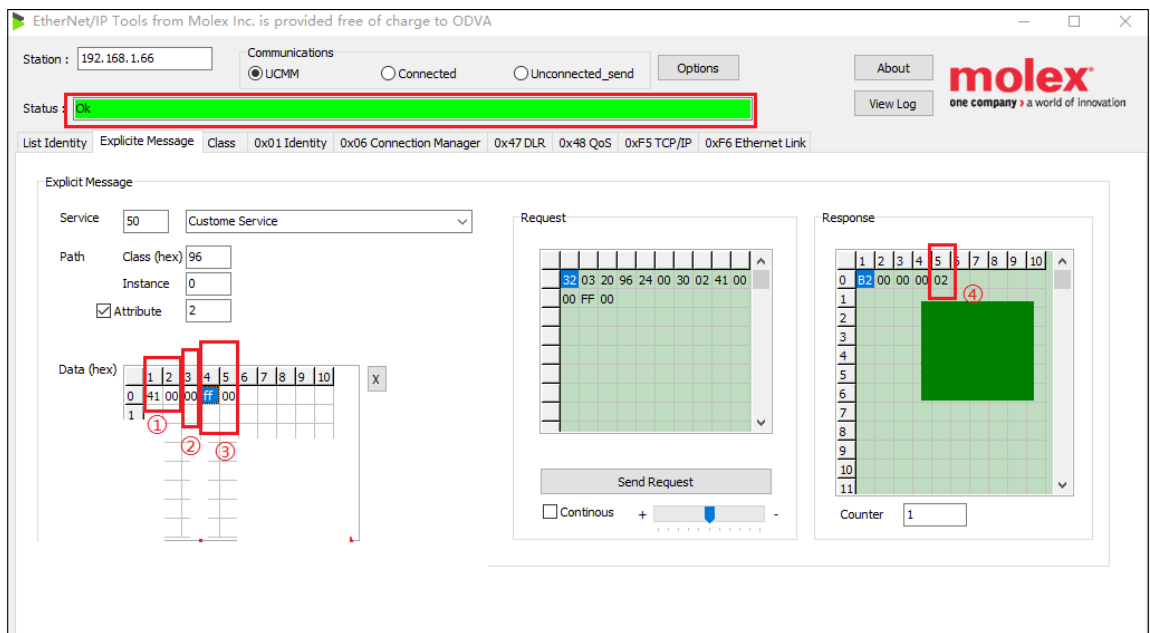
The following parameters need to be configured to write IO-Link slave configuration parameters.

service	class	Instance	Attribute
0x32 (50 in decimal)	0x96	0 to n(7)	0x02 (parameter writing)

Note

"n" refers to port number.

Enter the corresponding values in turn, as shown below.





Caution

When configuring the entire index (with the sub-index value set to 0), the data in Data (hex) must be at least 5 bytes; when configuring the subindex, the data in Data (hex) must be at least 4 bytes.

No.	Description
①	Configure parameter index, with the lower byte preceding the higher bit
②	Configure parameter subindex.
③	Configure parameter data to be issued.
④	Returning “0x02” indicates successful configuration.

4.3.3 IO-Link Slave Configuration Parameter Reading

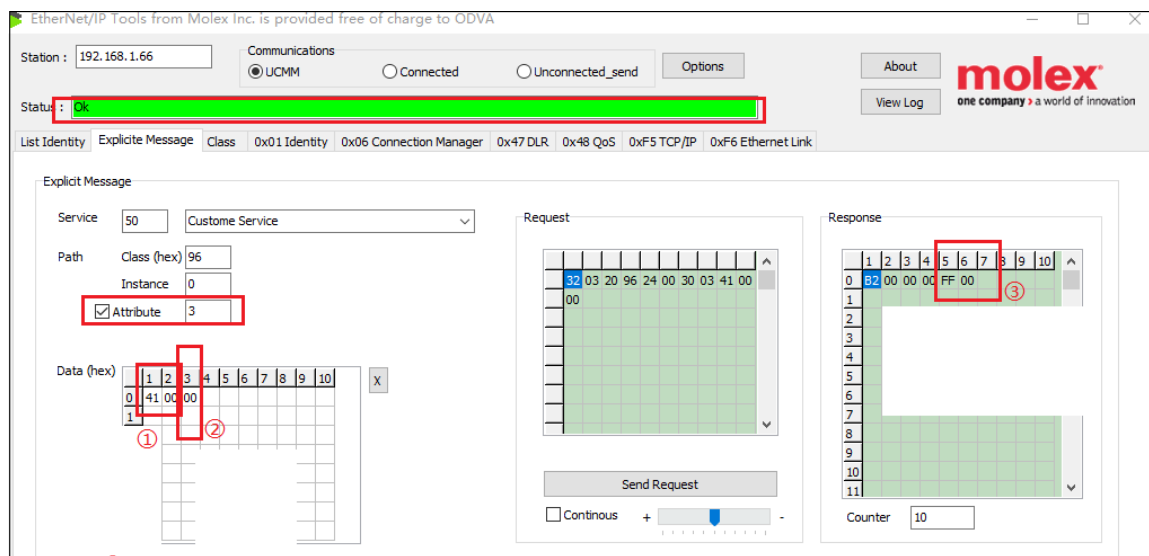
The following parameters need to be configured to read IO-Link slave configuration parameters.

Service	Class	Instance	Attribute
0x32 (50 in decimal)	0x96	0 to n(7)	0x03 (read parameters)

Note

"n" refers to the port number.

Enter the corresponding values in turn, including the parameter index and subindex of the slave to be read, as shown below.



No.	Description
①	Configure parameter index, with the lower byte preceding the higher bit
②	Configure parameter subindex.
③	FF: No fault, read the corresponding configuration parameter 00: A fault occurred, read the parameter fault code
④	Returning “0x02” indicates successful configuration.



Caution

Data within Data (hex) must be greater than or equal to 2 bytes.

If there is an issue with the path being read, the "Status" will not return OK; instead, it will return the corresponding fault code, as shown below.

Fault Code	Description	Solution
0x08	Service not supported	Check whether the Service is correct.
0x05	Incorrect Class	Check whether the Class is correct.
0x09	Incorrect Attribute	Check whether the Attribute is correct.
0x20	Incorrect parameter	Check whether the length of "Data" meets the requirements.
0x02	Unavailable data source	Check whether the Instance is correct and whether the IO-Link slave is connected.

4.4 Program Commissioning

4.4.1 Programming with Inovance InoProShop

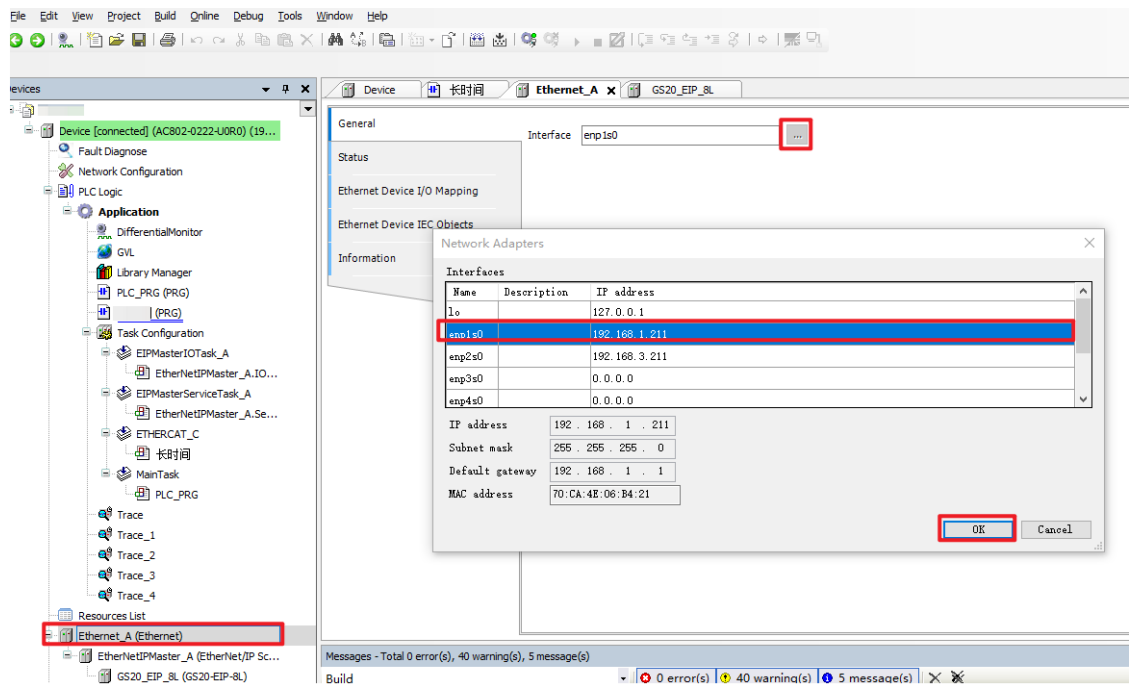
Prerequisites

- The cables are connected correctly.
- InoProShop V1.7.3 and above is installed.
- The EDS file of the GS20-EIP-8L module is imported into InoProShop. The EDS file can be obtained under Software and Commissioning Tools on the GS20 series product page at www.inovance.com.
- EIP-Tools is downloaded and installed from ODVA official for IO-Link slave parameter configuration.

Procedure

1. Configure the EtherNet/IP network adapter.

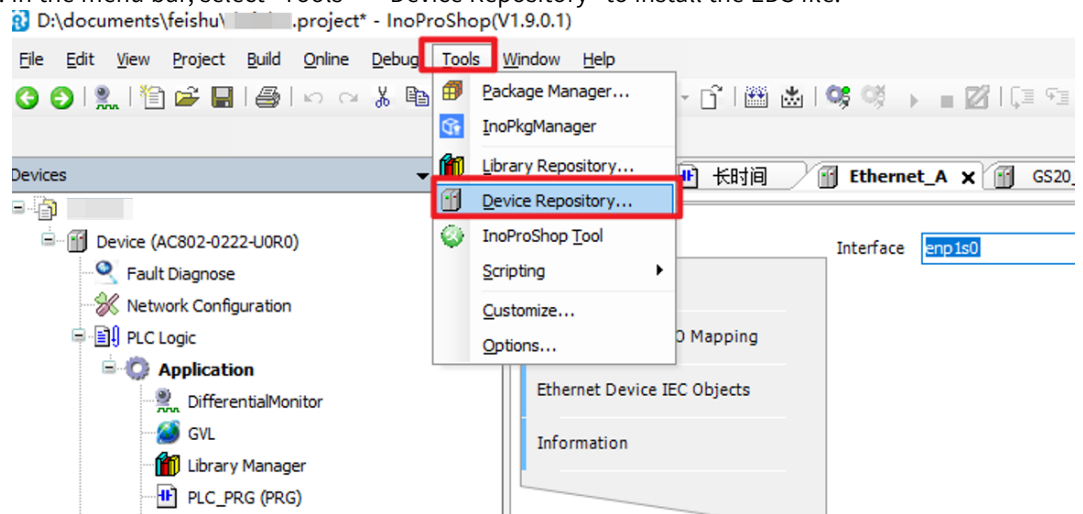
In the "Devices" pane, double-click "EtherNet_A (EtherNet)". In the "General" tab of the pop-up window, set "Interface" to the network adapter with the same IP as the GS20-EIP-8L module.



2. Add the GS20-EIP-8L module.

a. Add the EDS file.

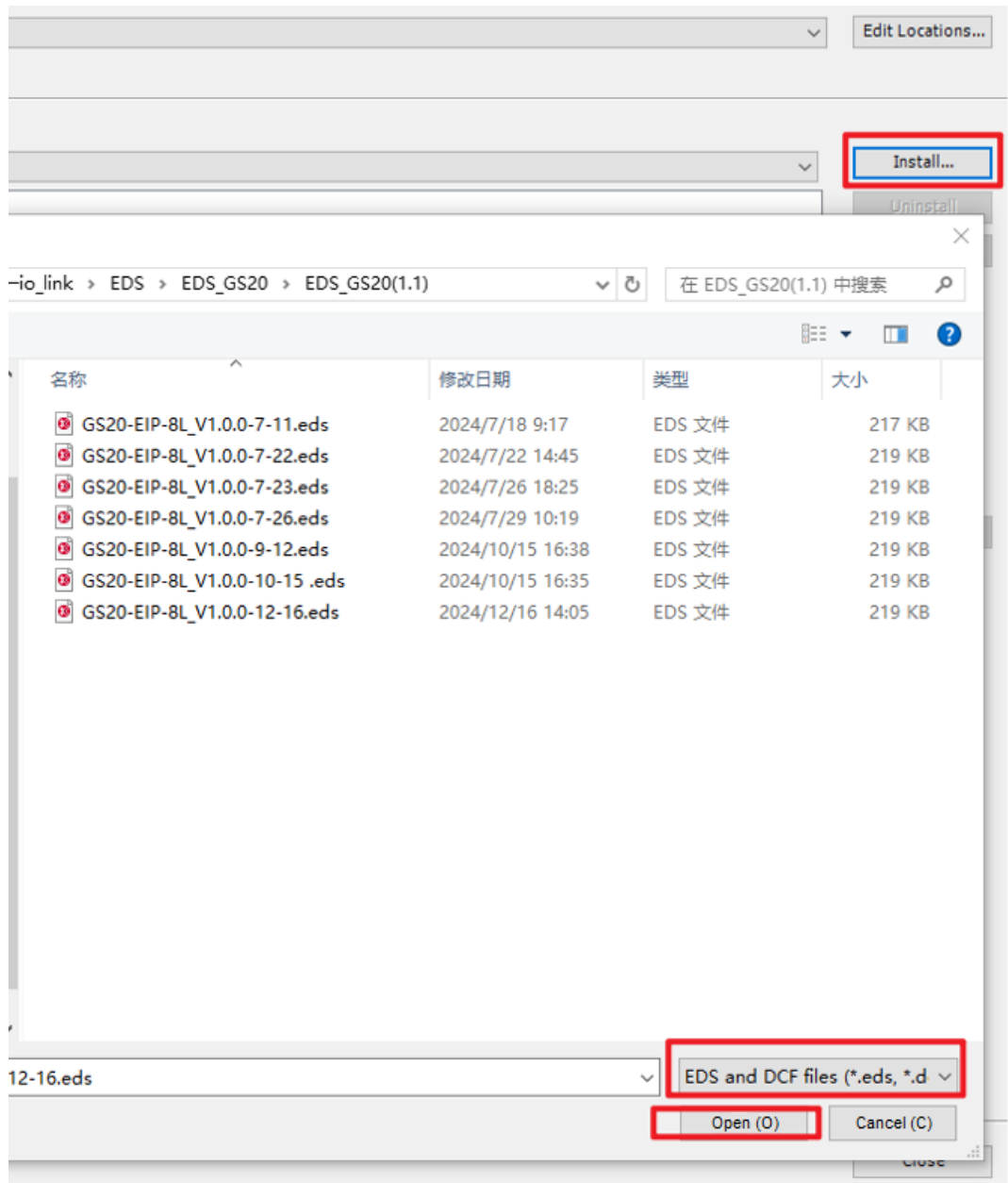
1). In the menu bar, select "Tools" > "Device Repository" to install the EDS file.



Note

Note: If the EDS file is not installed, the GS20-EIP-8L device cannot be scanned.

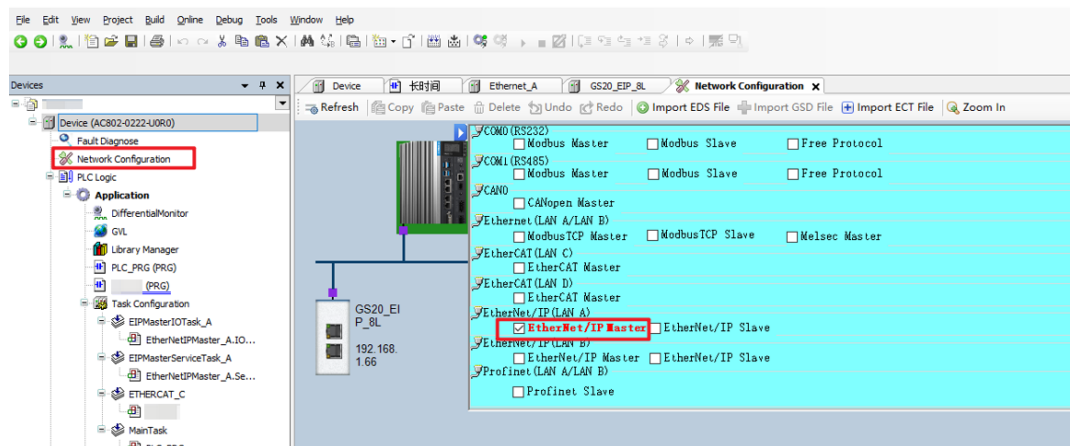
2). Click "Install" and select the EDS file of the GS20-EIP-8L module to be installed.



b. Add the GS20-EIP-8L module.

1). Add the EtherNet/IP master.

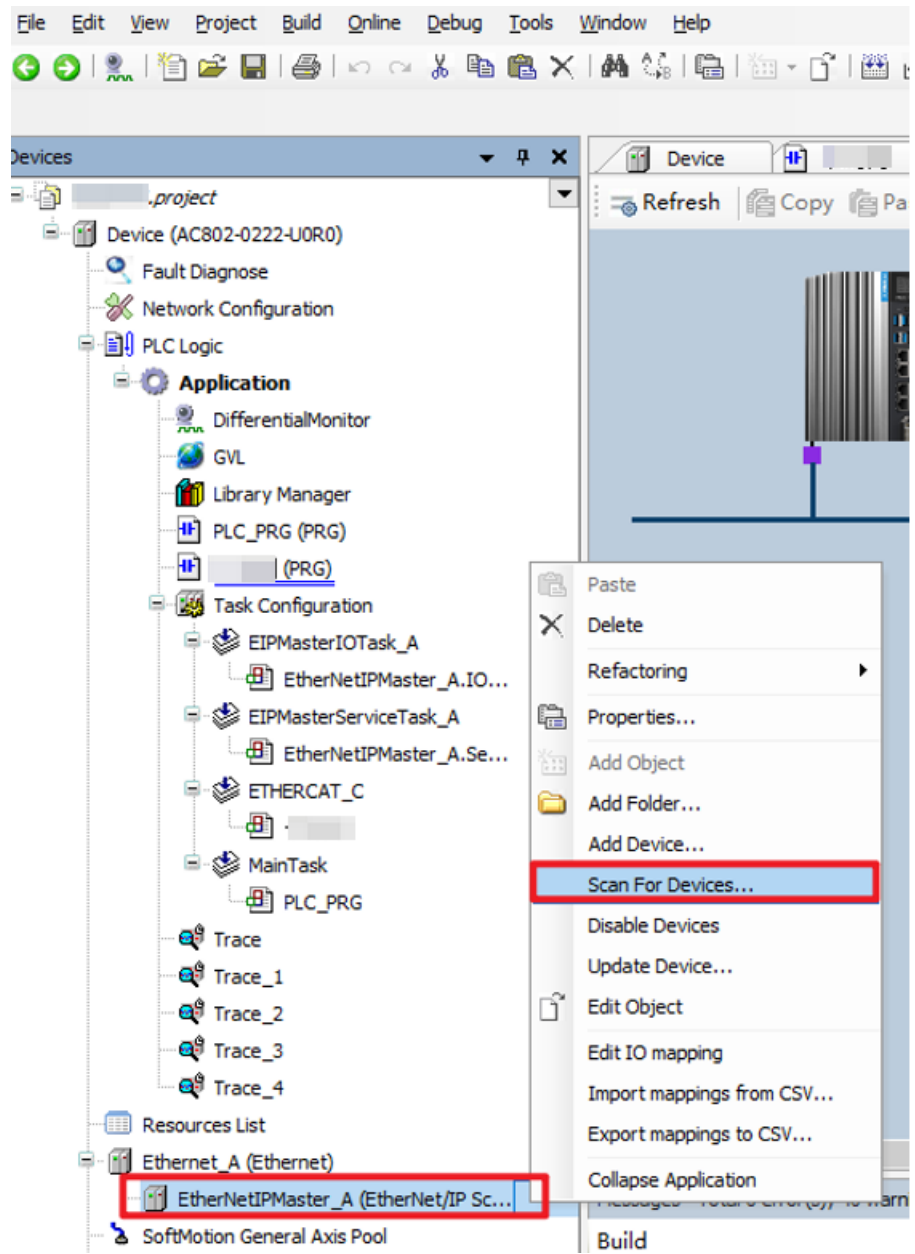
Double-click "Network Configuration" and select "EtherNet/IP Master".



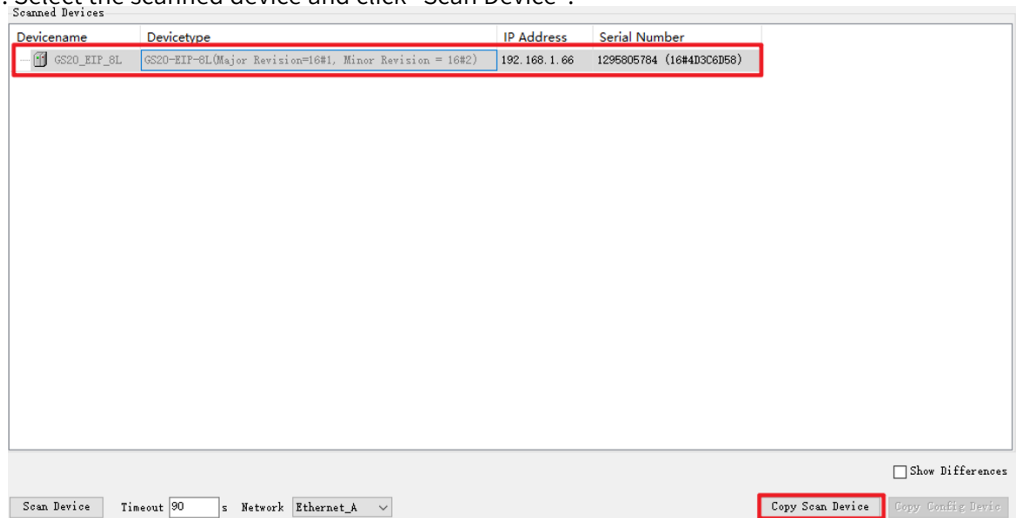
2). Add the GS20-EIP-8L module.

The module can be added through automatic scanning or manual addition.

- Automatic scanning
 - i. Right-click "EtherNetIPMaster_A (EtherNet/IP Scanner)" and select "Scan For Devices".

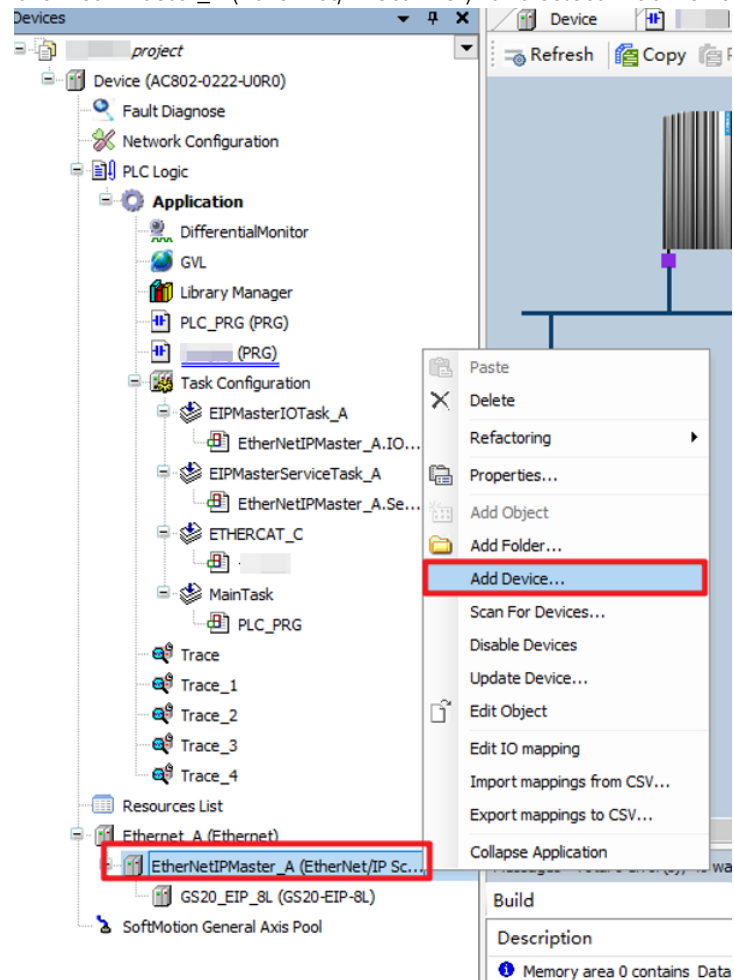


ii. Select the scanned device and click "Scan Device".

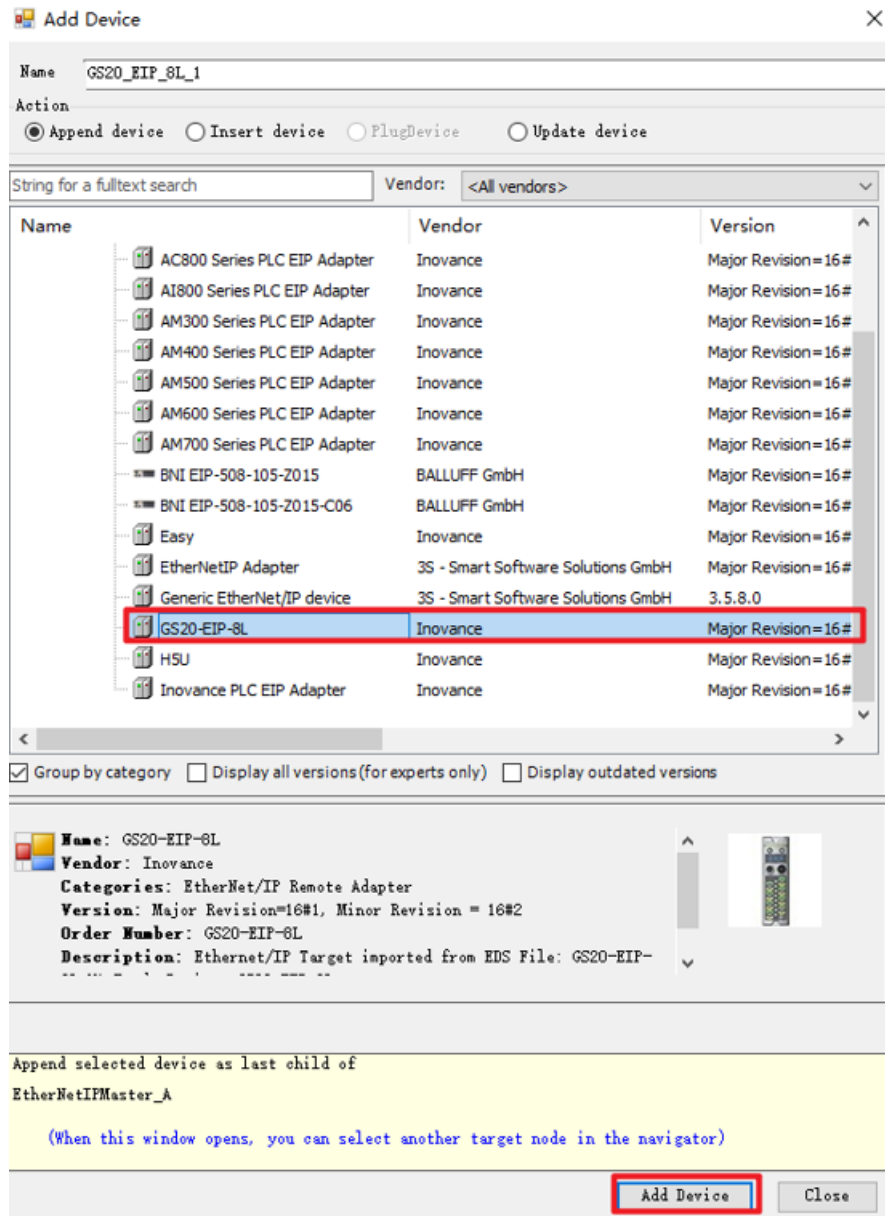


- Manual addition

i. Right-click "EtherNetIPMaster_A (EtherNet/IP Scanner)" and select "Add Device".



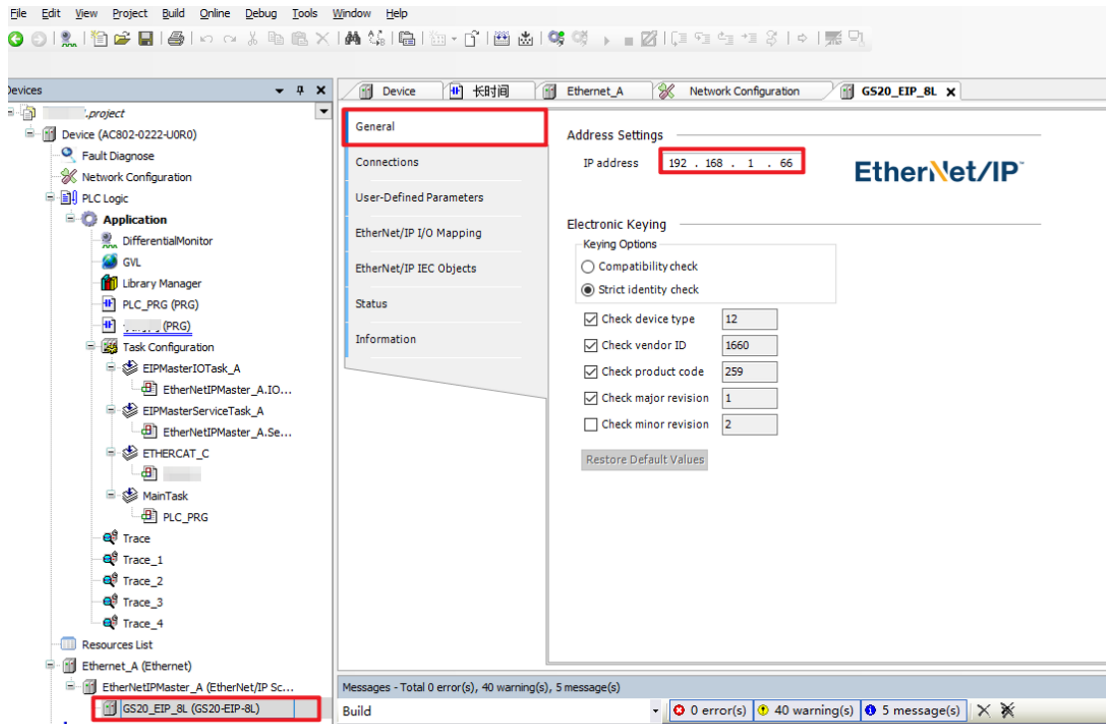
ii. Select "GS20-EIP-8L" and click "Add Device".



3. Configure the GS20-EIP-8L module.

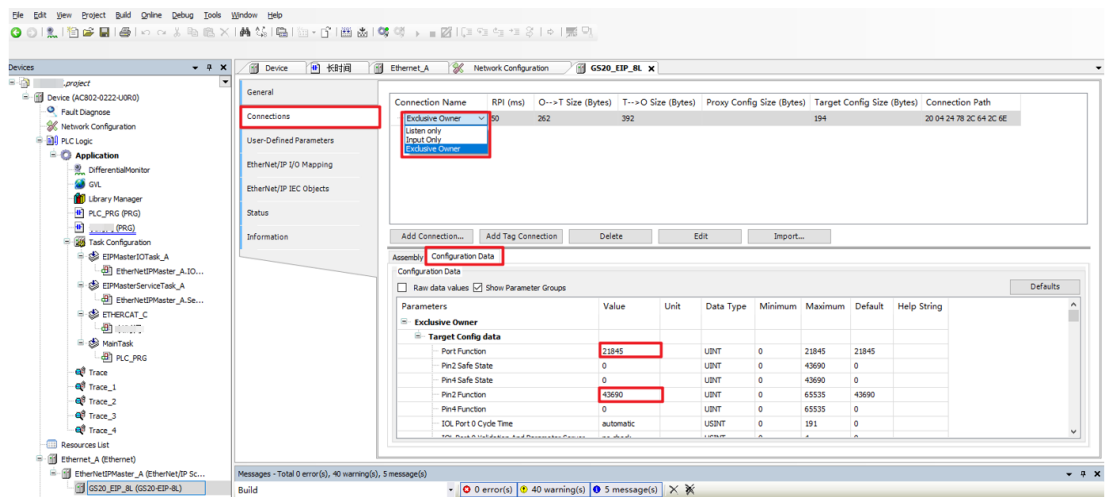
a. Configure the general data.

In the "Devices" pane, double-click "GS20-EIP-8L" and click "Generic". Check whether the "IP Address" matches that of the GS20-EIP-8L module. If not, modify the "IP Address".





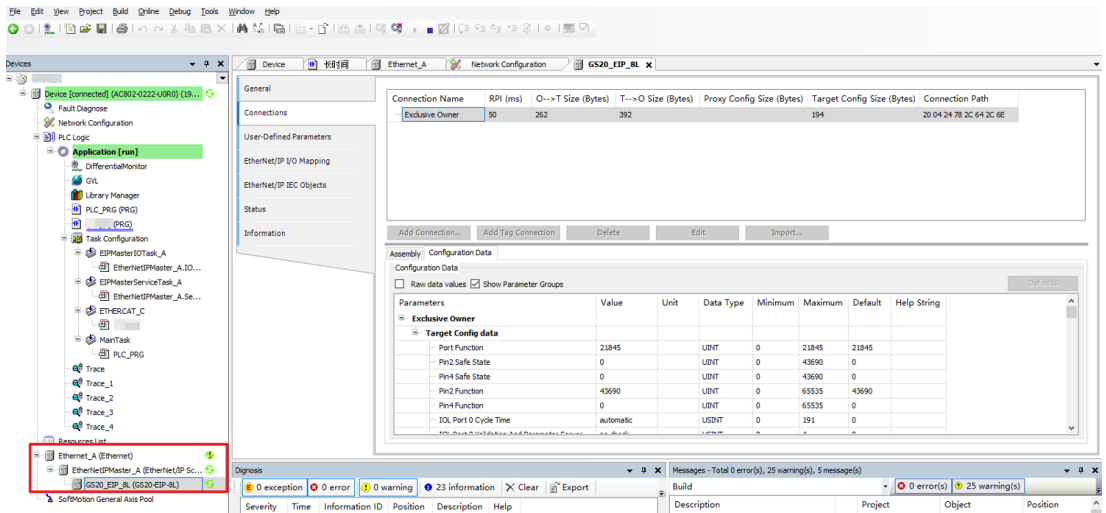
b. Configuration the module data.

Click "Connection" and select the "Connection Name". Click "Configuration Data" to obtain the configuration parameters based on the content represented by the configuration data bits. Enter the configuration module in the corresponding configuration data. In the figure below, all port functions are configured as IO-Link, and all Pin2 functions are configured as output mode.



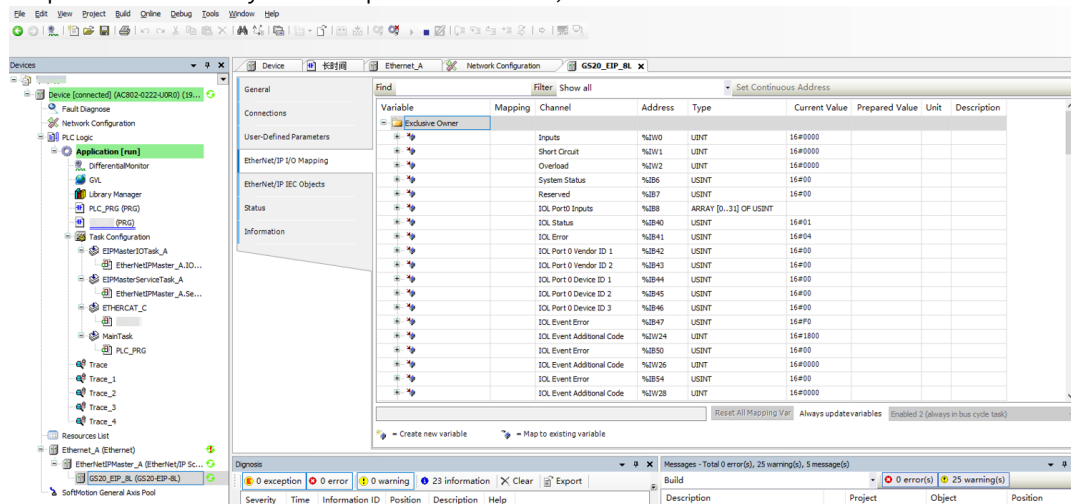
c. Log in to and operate the GS20-EIP-8L module.


Click  to log in and then click  to operate the module. The result shown below indicates that the operation is successful.

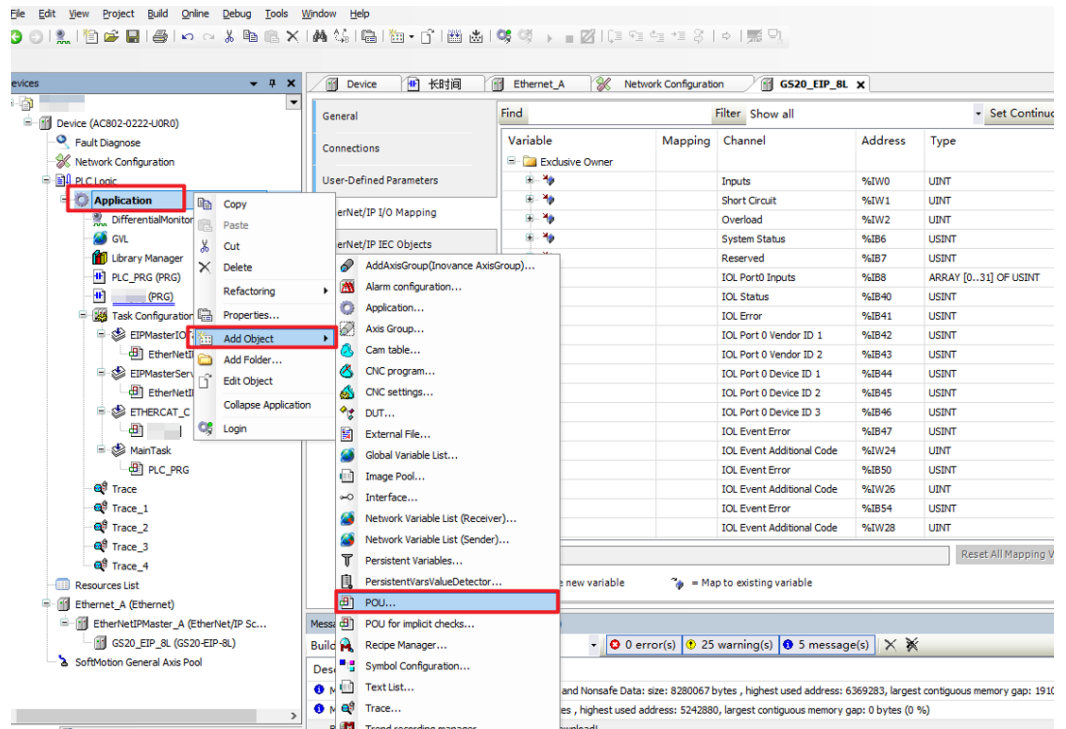


- d. Map the process data of GS20-EIP-8L.
Example: Configure Pin2 of all ports as outputs.

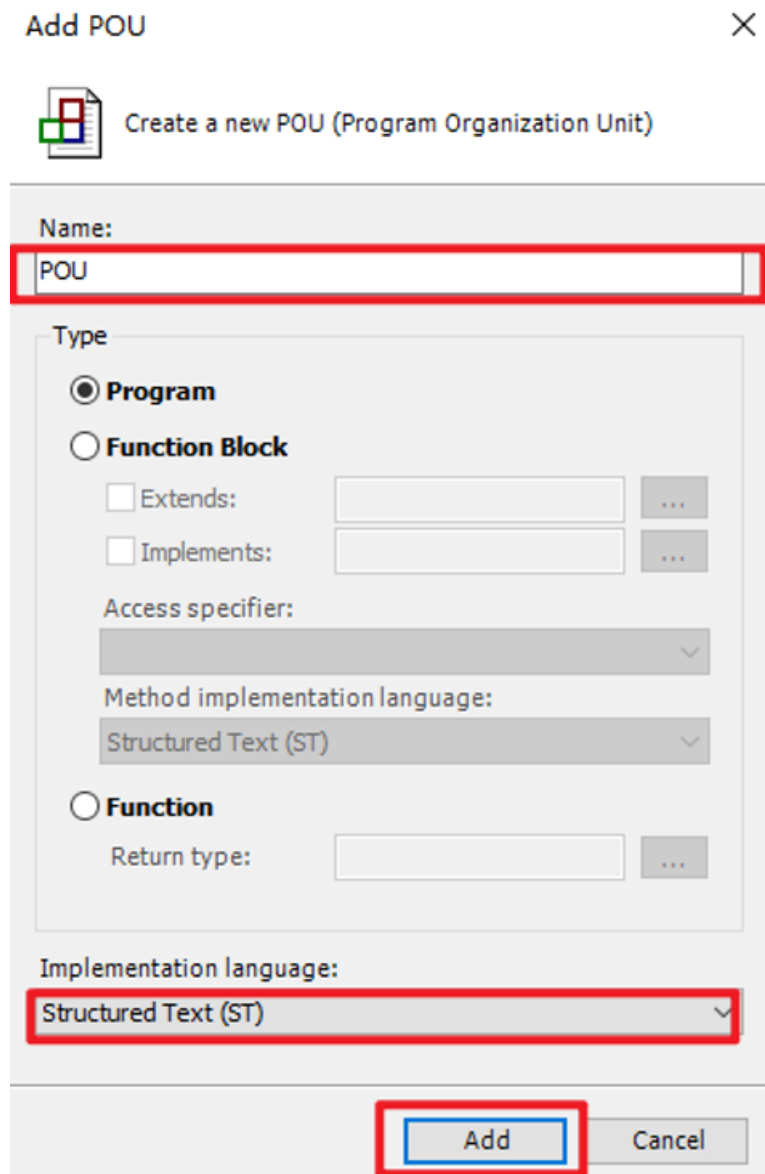
- 1). After logging in to InoProShop, select "GS20-EIP-8L" > "Ethernet/IP I/O Mapping". Obtain the corresponding input parameter values in the input vendor process data, and map the variables in the output data or directly write output values online, as shown below.



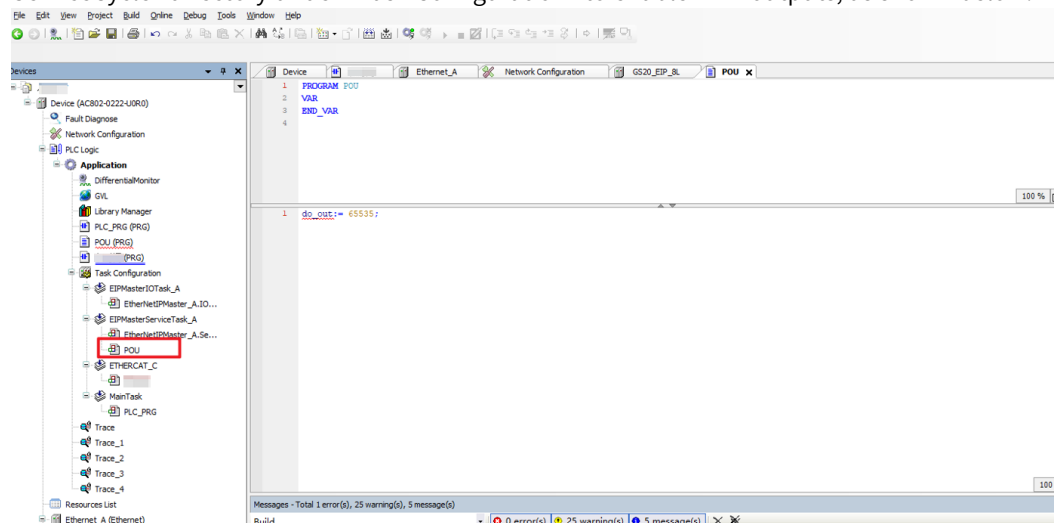
- 2). Map the variables.
 - i. Click  to log out. Right-click "Application" and select "Add Object" > "POU".



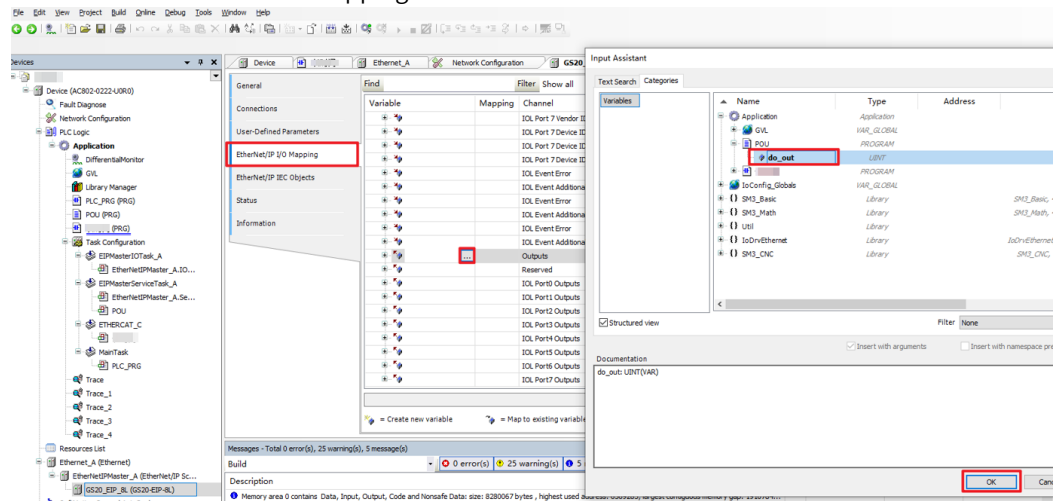
ii. Select the appropriate implementation language and click "Add".






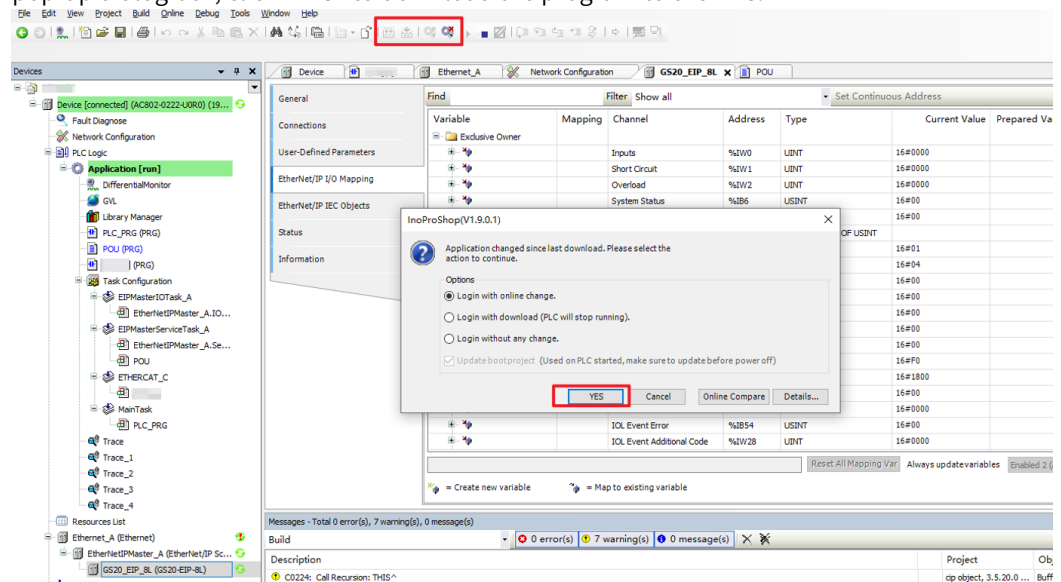
iii. Compile the program. Drag the compiled program file to the "EIPMasterServiceTask_A. ServiceCycle" directory under "Task Configuration" to enable Pin2 outputs, as shown below.




- iv. Map the corresponding variables. In the "Ethernet/IP I/O Mapping" interface, click the "..."
button of a variable to open the pop-up "Input Assistant" window. Select the corresponding
variable and click "OK" for mapping.



- v. Click  to compile the program,  to log in, and  to download the program. In the
pop-up dialog box, click "YES" to download the program to the PLC.



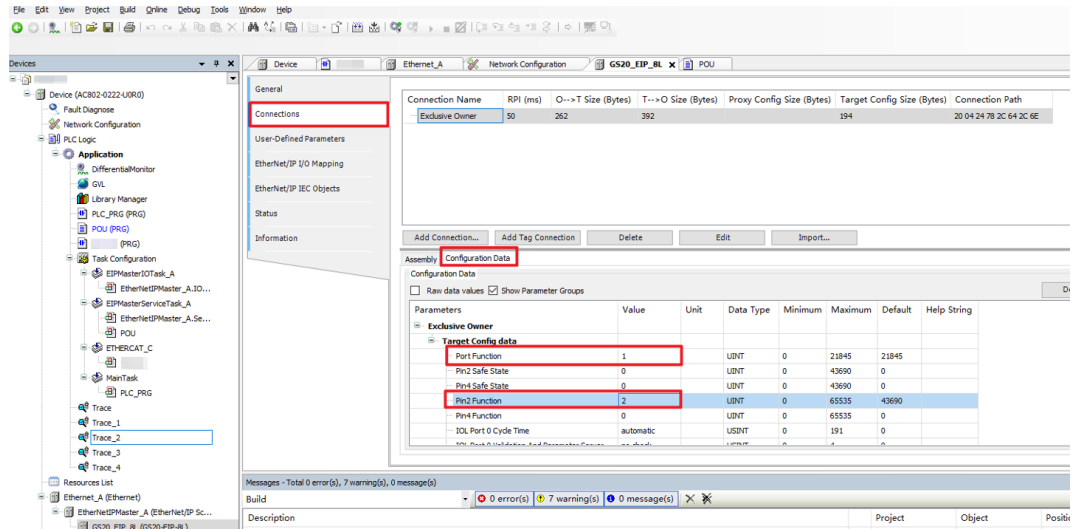
- vi. Click  to run the program.

- e. Use the GS20-EIP-8L module with an Inovance IO-Link slave.

In the following example, the GS20-EIP-8L module is used as IO-Link and an IO-Link slave is connected.

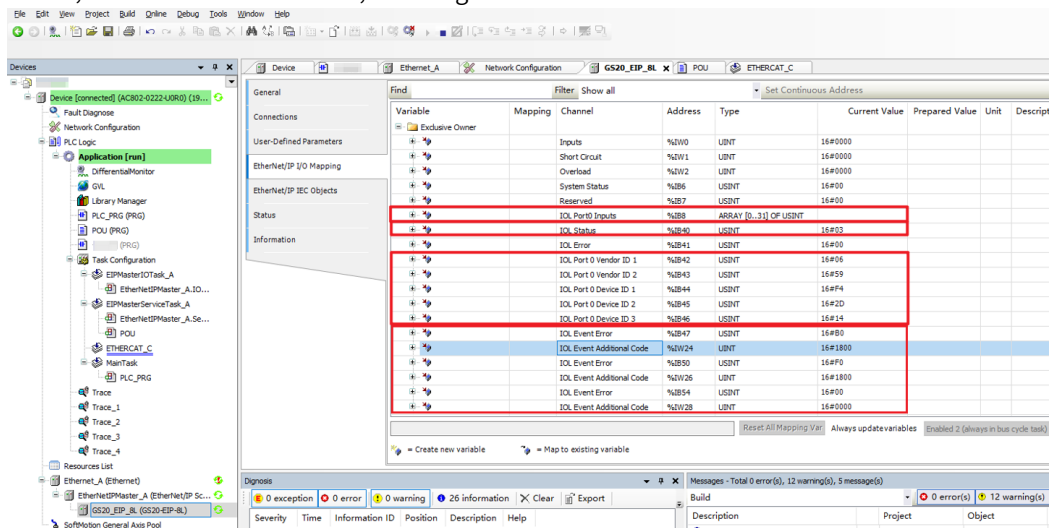
- 1). Configure the software.

Based on ["4.2.1 Configuration Data" on page 22](#), configure port 0 as IO-Link mode and configure Pin2 of port 0 as output mode to provide UA power supply for the IO-Link slave. Log out the PLC, modify the configuration data, and log back in to the PLC.




2). Based on [“4.2.2 Input Process Data” on page 25](#) and [“4.2.3 Output Process Data” on page 27](#), obtain the input data from the connected IO-Link slave and issue the output data.

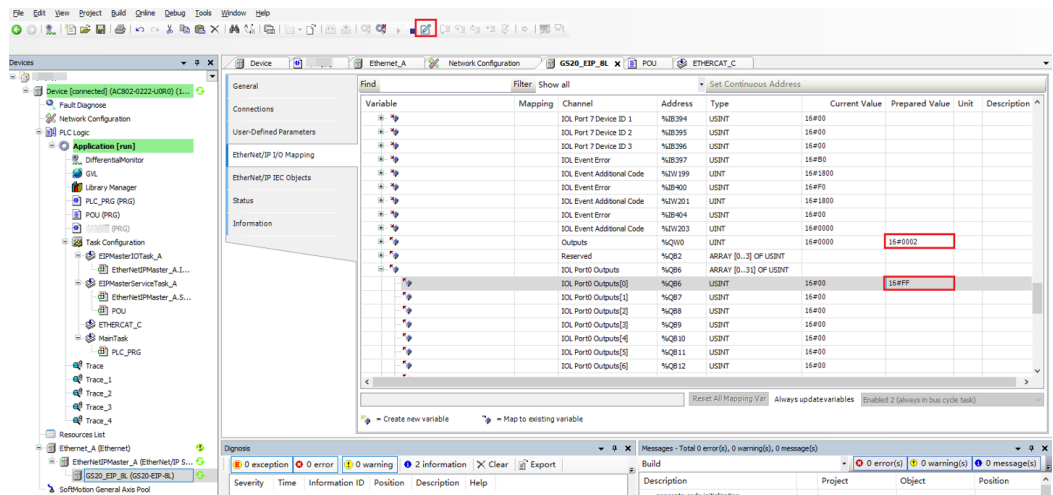
i. Obtain the process data input (PDI) from the connected slave, including IO-Link connection status, slave device information, and diagnostic information.



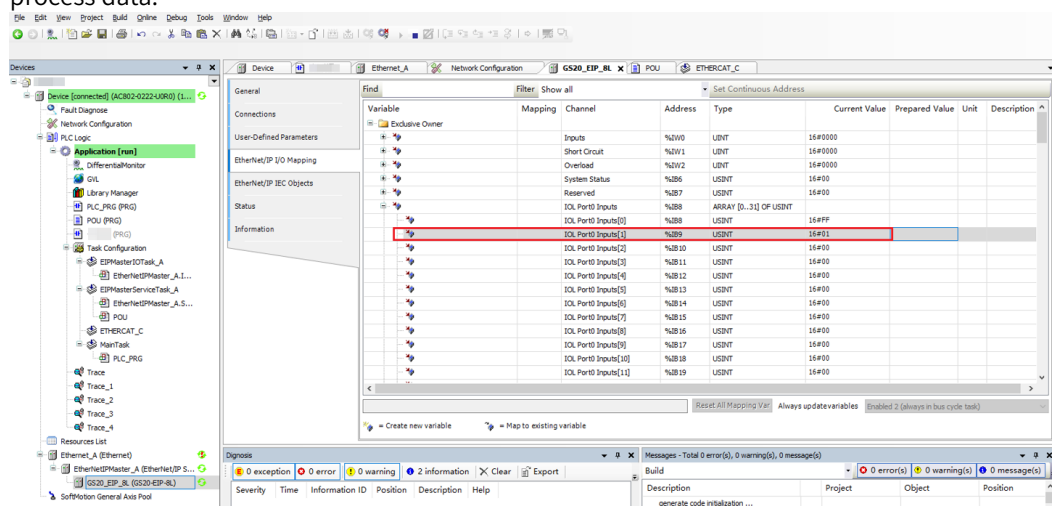
ii. Based on [“4.3.2 IO-Link Slave Configuration Parameter Writing” on page 30](#) and [“4.3.3 IO-Link Slave Configuration Parameter Reading” on page 31](#), configure the parameters related to the slave. In this example, the lower eight bits of the slave (Pin2) is configured as output and the higher eight bits (Pin4) is configured as input.

iii. To issue the output data, refer to [“4.2.3 Output Process Data” on page 27](#). In the "EtherNet/IP I/O Mapping" interface, select the output process data of IO-Link "IOL Port0 Outputs[0]" and

configure the online output to 255 (16#FF). Click  to enable the lower eight bits of the slave (Pin2) as the output, as shown below.



iv. Short one output and one input of the IO-Link slave to receive valid input data. In the "EtherNet/IP I/O Mapping" interface, click "IOL Port0 Inputs" to obtain valid IO-Link input process data.



4.4.2 Programming with Omron Sysmac Studio

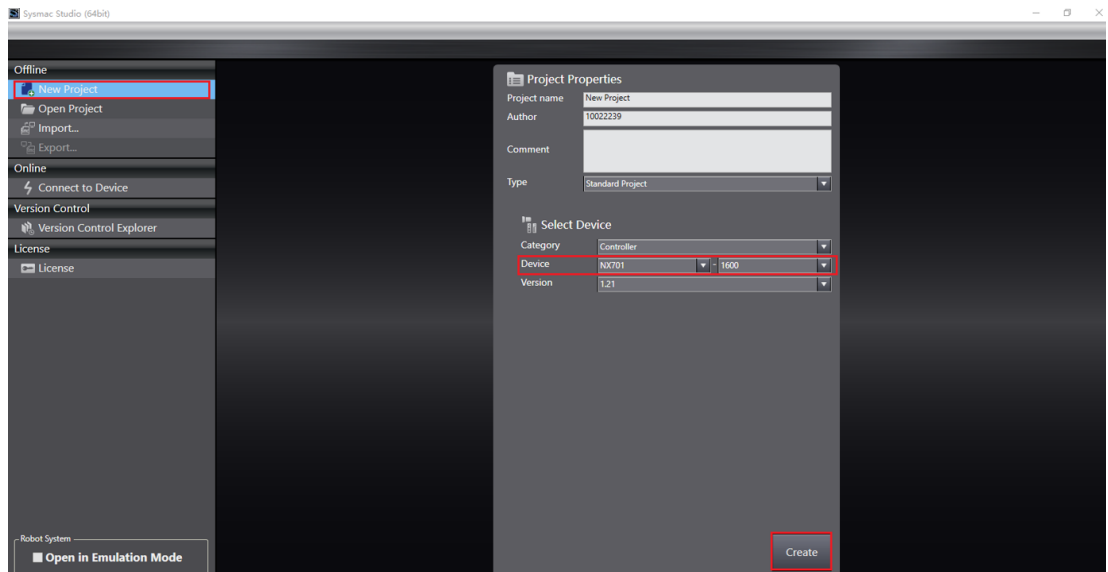
Prerequisites

- The cables are connected correctly.
- Sysmac Studio V1.5.2 and above is installed.
- The EDS file of the GS20-EIP-8L module is imported into InoProShop. The EDS file can be obtained under Software and Commissioning Tools on the GS20 series product page at www.inovance.com.
- EIP-Tools is downloaded and installed from ODVA official for IO-Link slave parameter configuration.

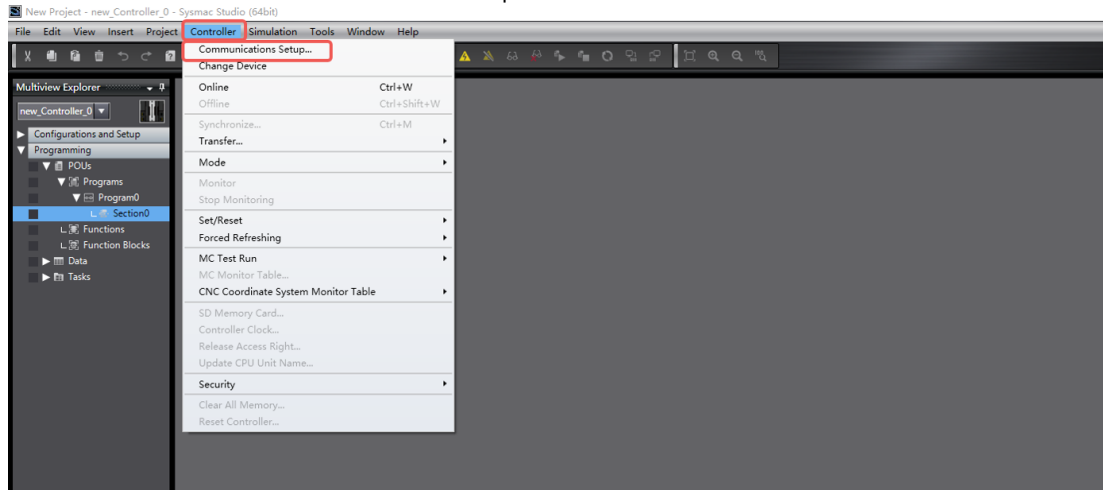
Procedure

1. Create a project.
 - a. Open the Sysmac Studio software and click "New Project". Select the corresponding Omron PLC model and version, and then click "Create".

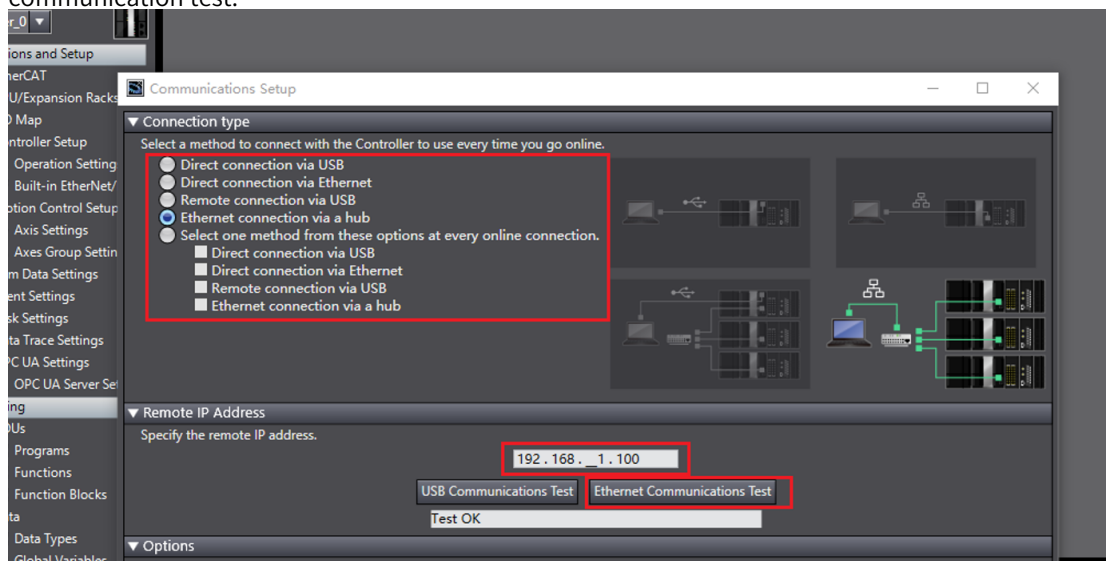
Program Commissioning





b. Select "Controller" > "Communications Setup".

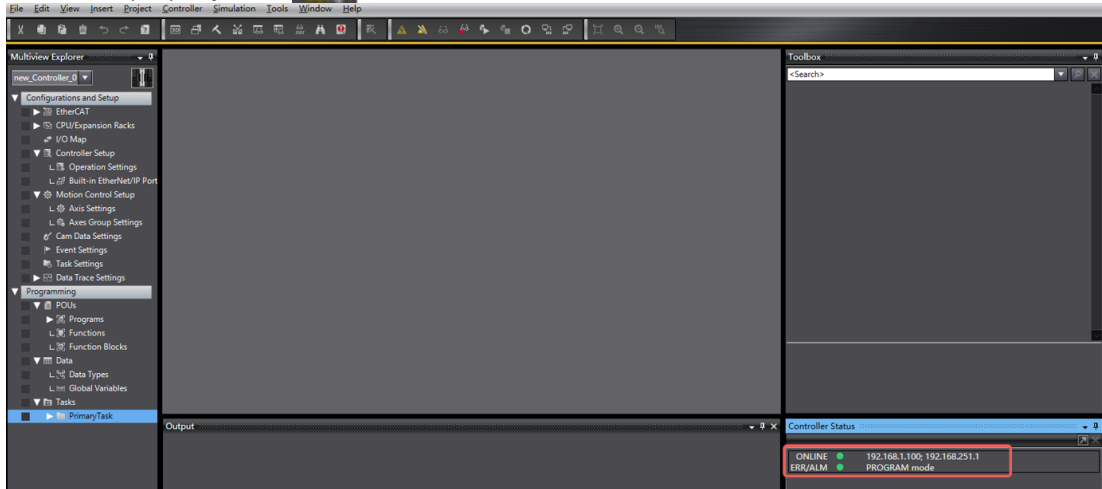


c. Select the corresponding connection type and enter the Omron host IP to perform the communication test.



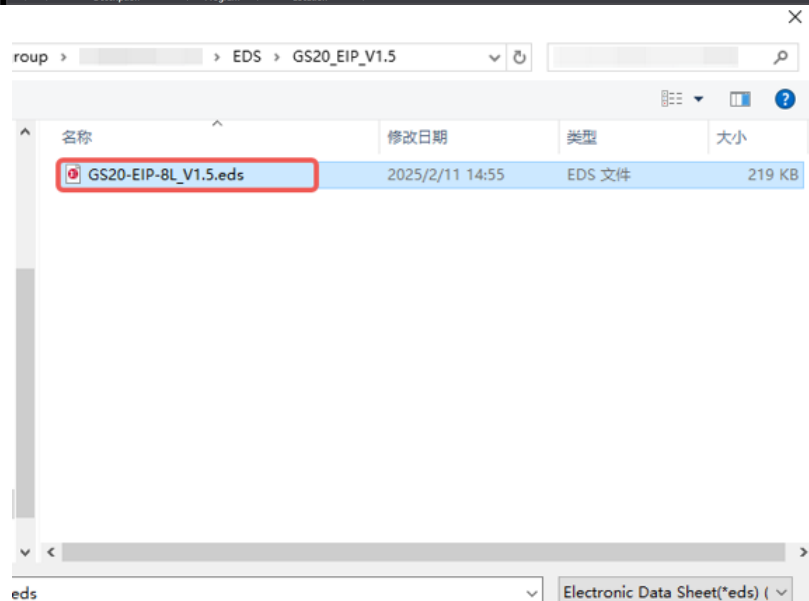
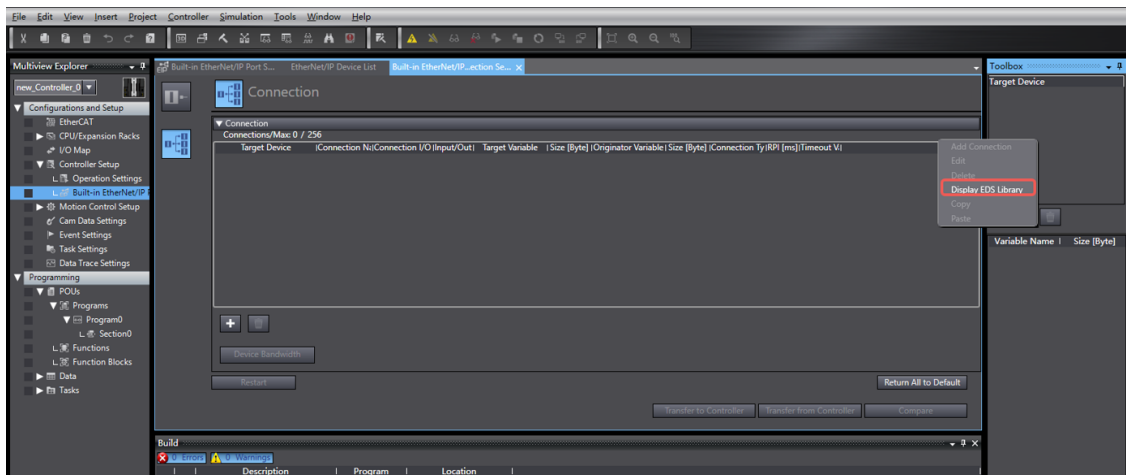
d. Set the computer to be in the same network segment as the Omron host.

e. Click  to monitor the connection status and operation mode on the right. When the PLC is connected properly, click .



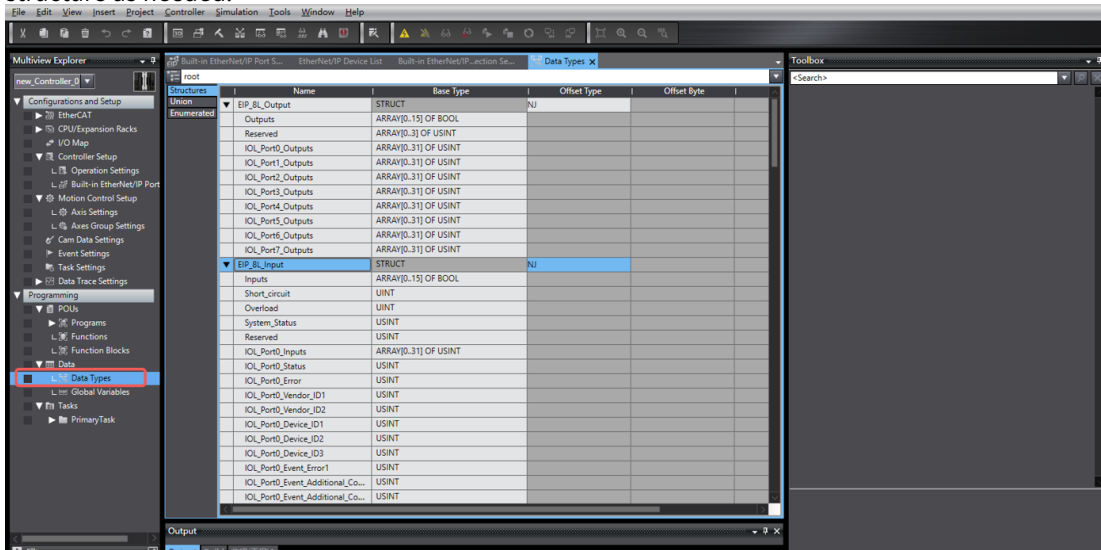
2. Import the EDS file

Right-click the right toolbox and select "Display EDS Library". In the pop-up window, click "Install" and select the EDS file to be installed. After installation, "Inovance" is displayed in the EDS library.

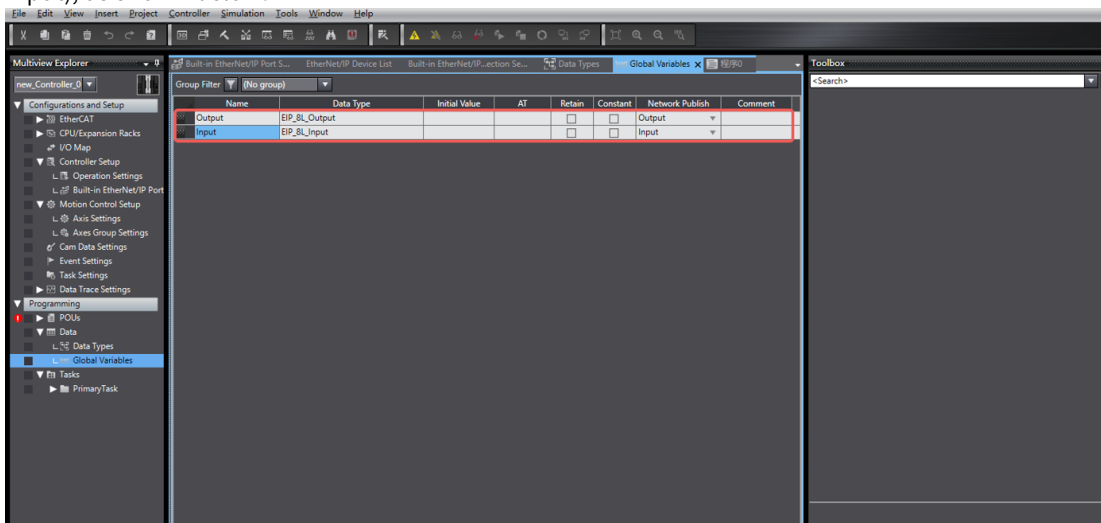


3. Configure the project.

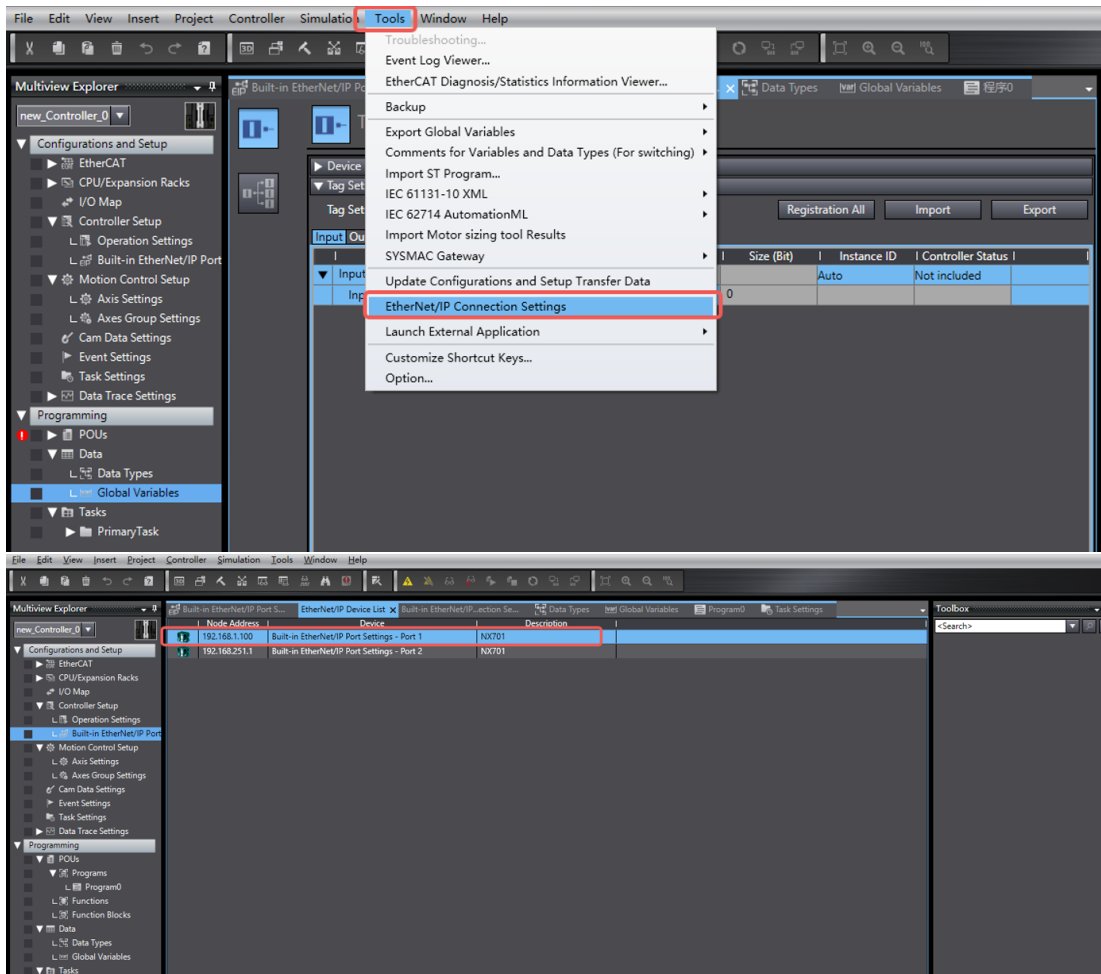
- a. Before using Omron for Ethernet/IP communication with GS20-EIP-8L, based on the input/output data area size of GS20-EIP-8L, click "Data Types" and create the corresponding input/output data structure as needed.



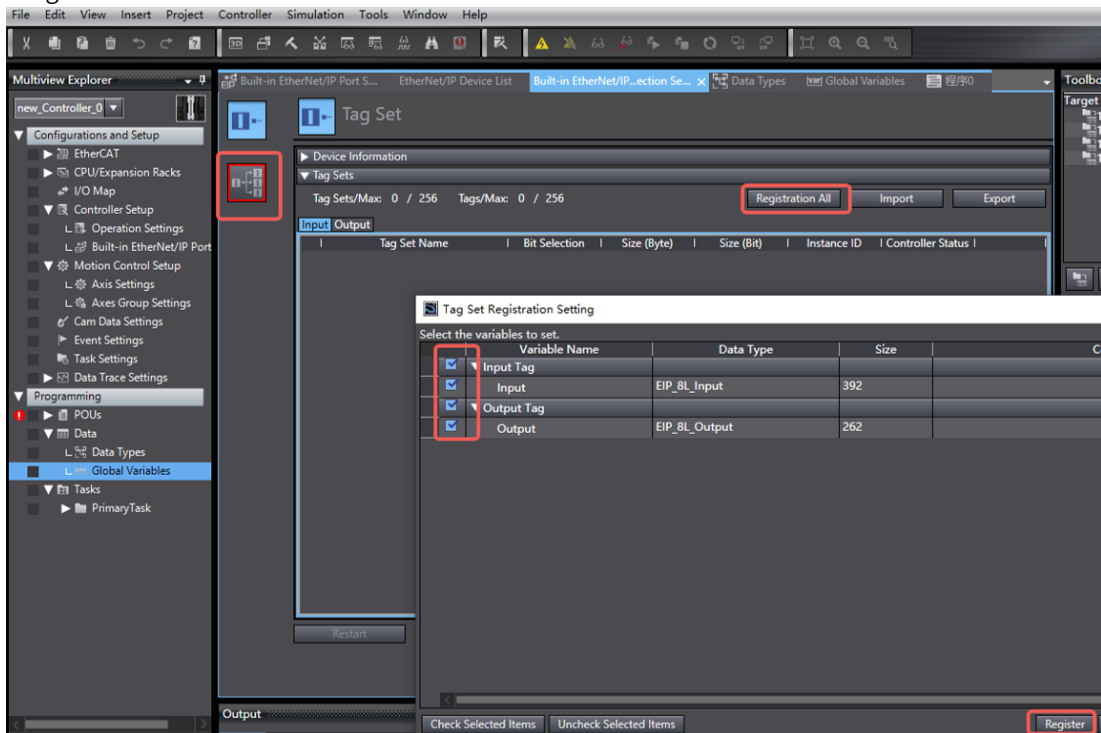
- b. Click "Global Variables", and create an output variable "Output" (data type: EIP_8L_Output; network publish: output) and an input variable "Input" (data type: EIP_8L_Input; network publish: input), as shown below.



- c. Select "Tools" > "Ethernet/IP Connection Settings". In the pop-up window, double-click the PLC to open the "Built-in EtherNet/IP Port Settings - Connection Settings" interface.

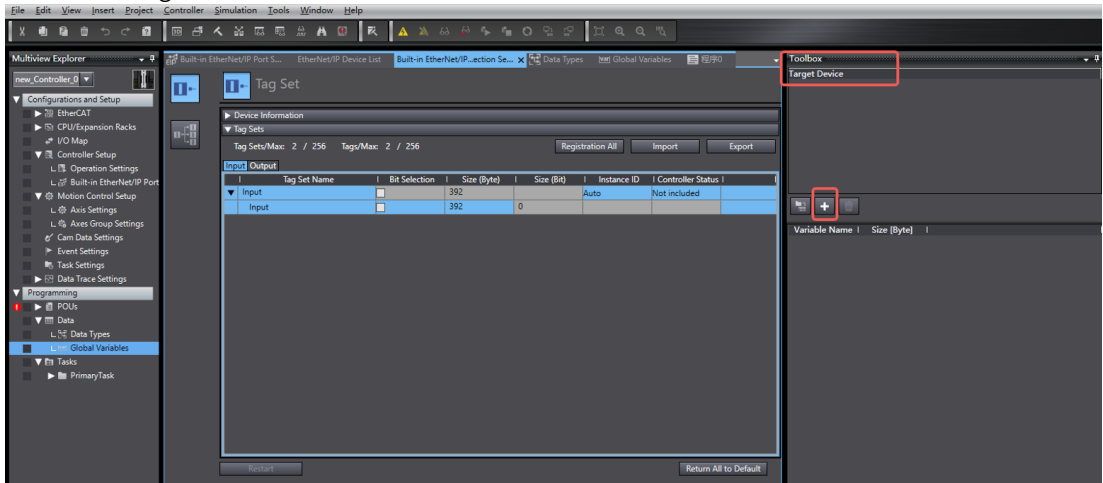


d. Click "Registration All" and select the input/output variables defined by the global variable. Click "Register".

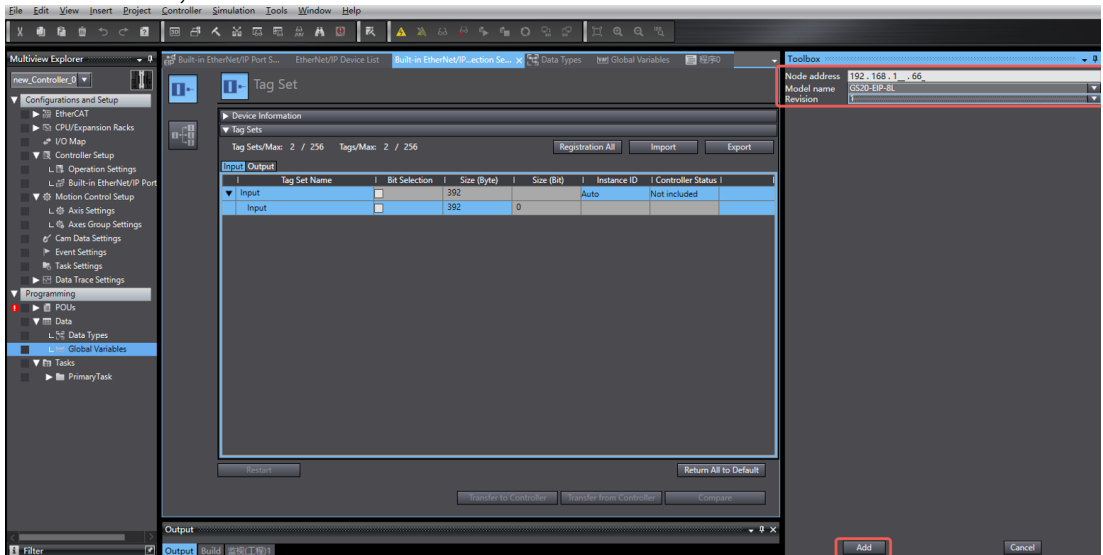


4. Add and configure the GS20-EIP-8L module.

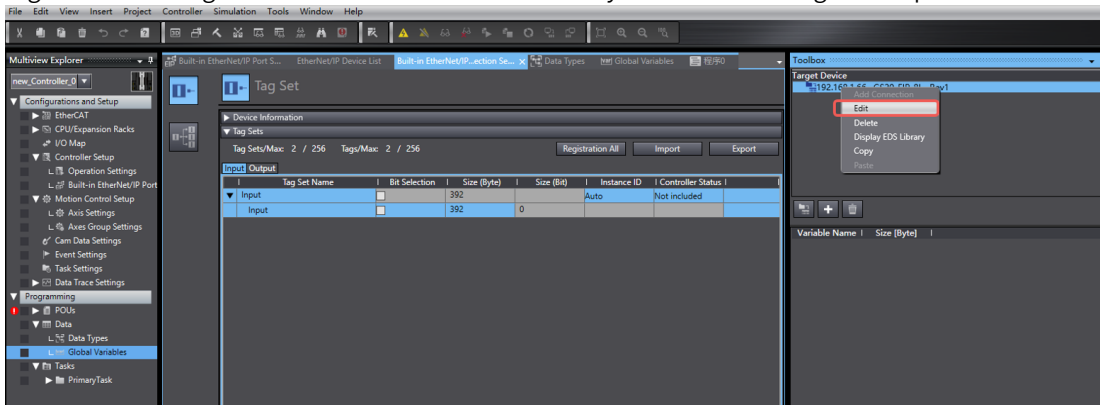
- a. In the right "Toolbox" pane, select "Target Device" and then click "+" to add a GS20-EIP-8L network configuration module.



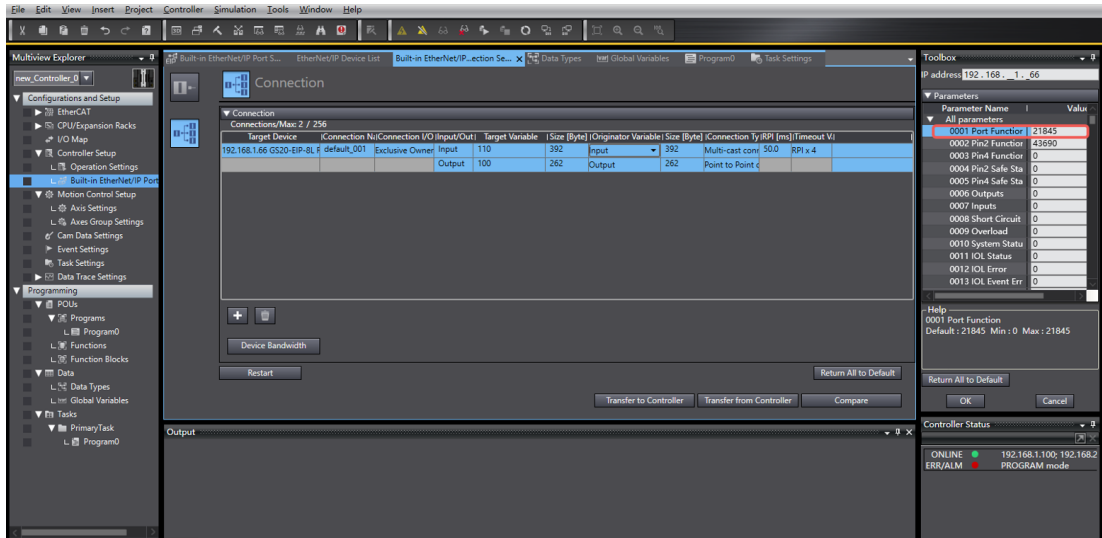
- b. Enter the IP address of the GS20-EIP-8L module (ensure the IP of the PLC, the IP of the network card, and the IP of the GS20-EIP-8L are in the same network segment). Select the model name and revision version, and click "Add".



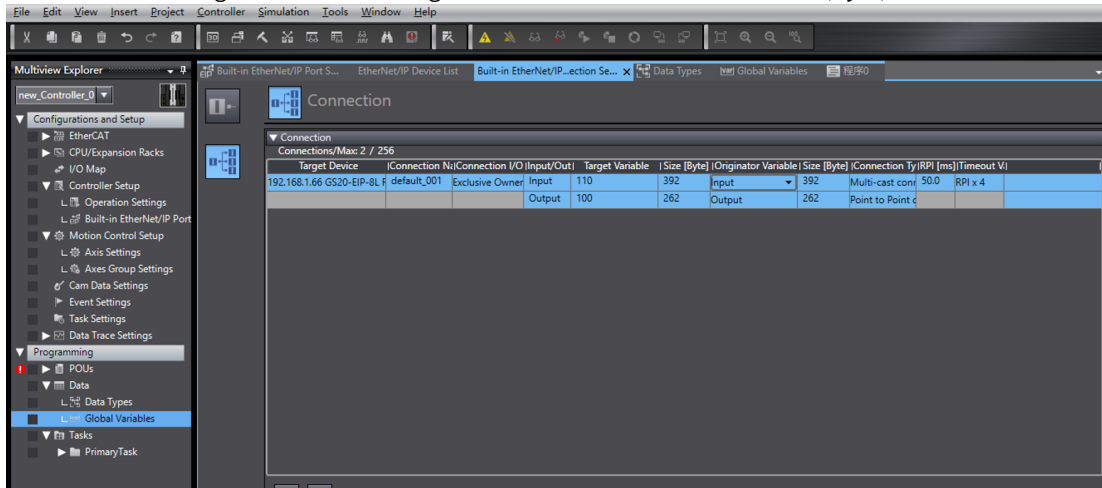
- c. Right-click the target device and select "Edit" to modify the module configuration parameters.



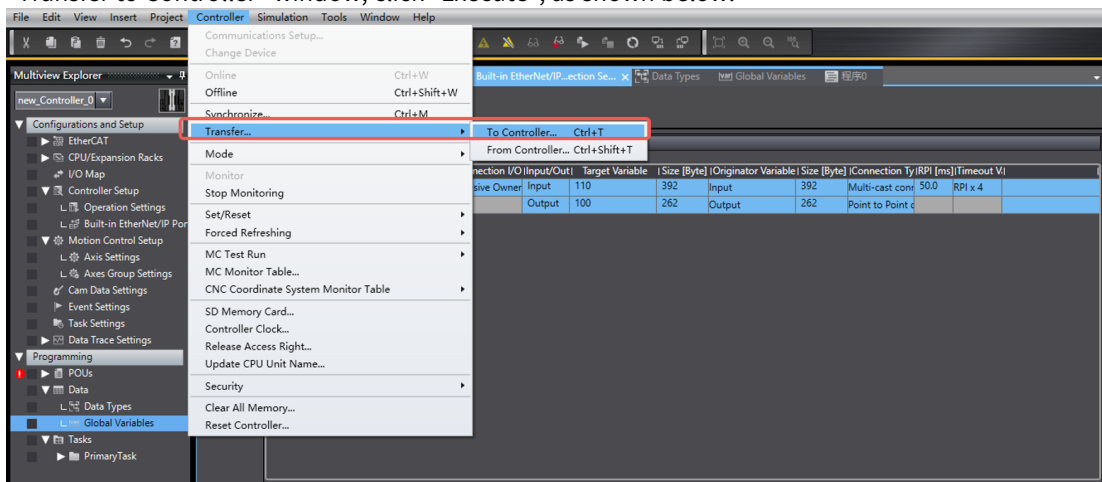
- d. Obtain the corresponding configuration input by bit according to the module configuration parameter description. The following example configures all ports as IO-Link.

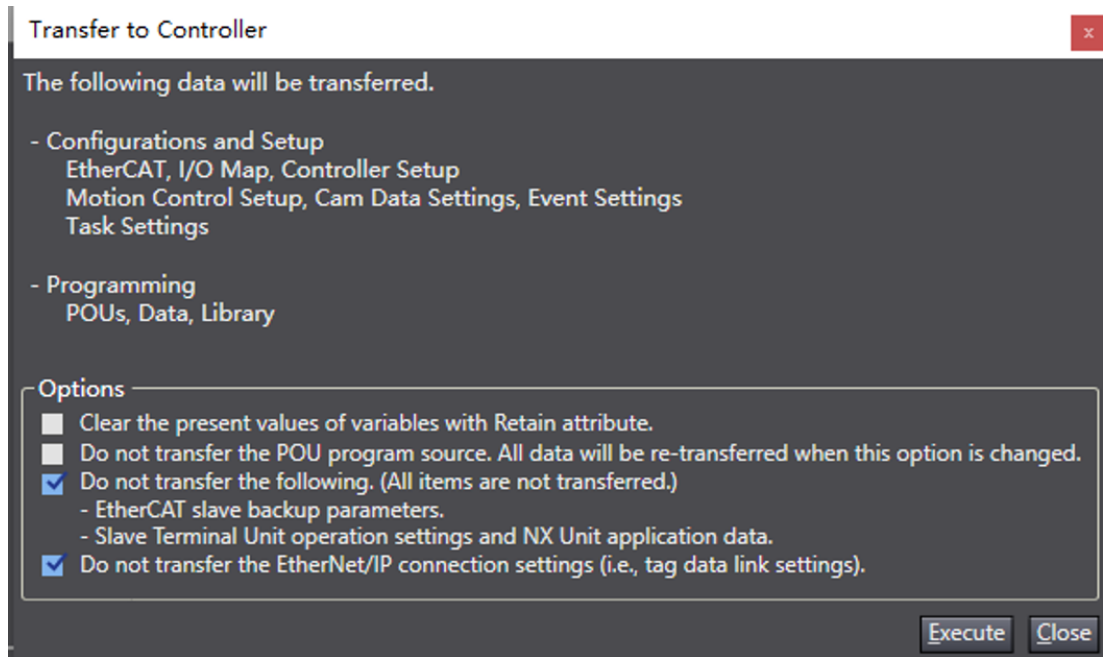


e. Select > . Set the target device to "192.168.1.66 GS20-EIP-8L". Set the input/output of "Original Variable" to input/output. Set "Target Variable" to "110" for input and "100" for output. Ensure that the target variable and originator variable have the same size (byte).

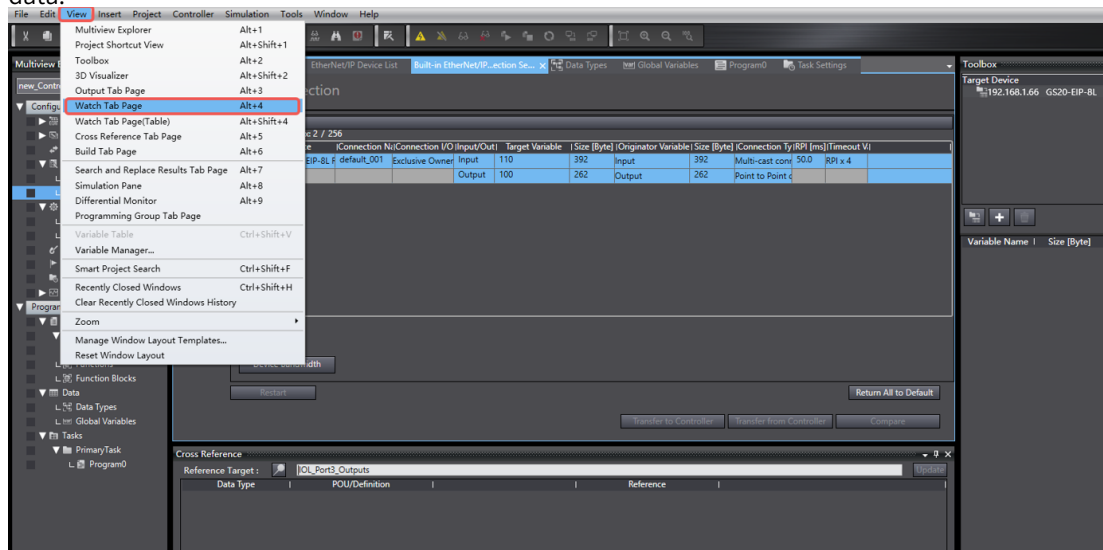


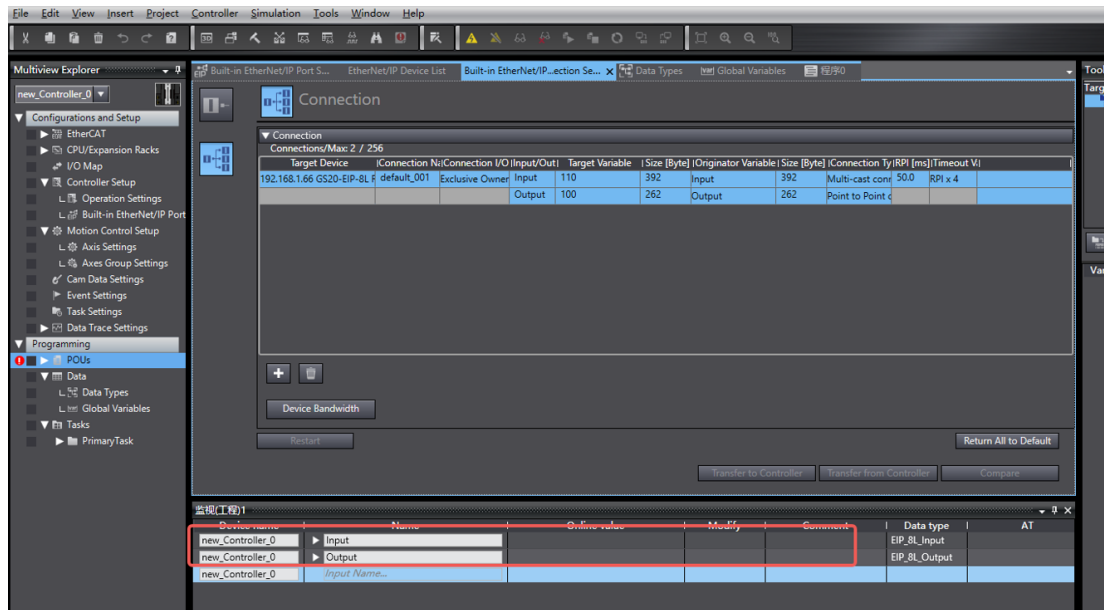
f. Click . Click or select "Controller" > "Transfer" > "To Controller...". In the pop-up "Transfer to Controller" window, click "Execute", as shown below.





g. Select "View" > "Watch Tab Page". Add input/output variables in the watch window to monitor data.

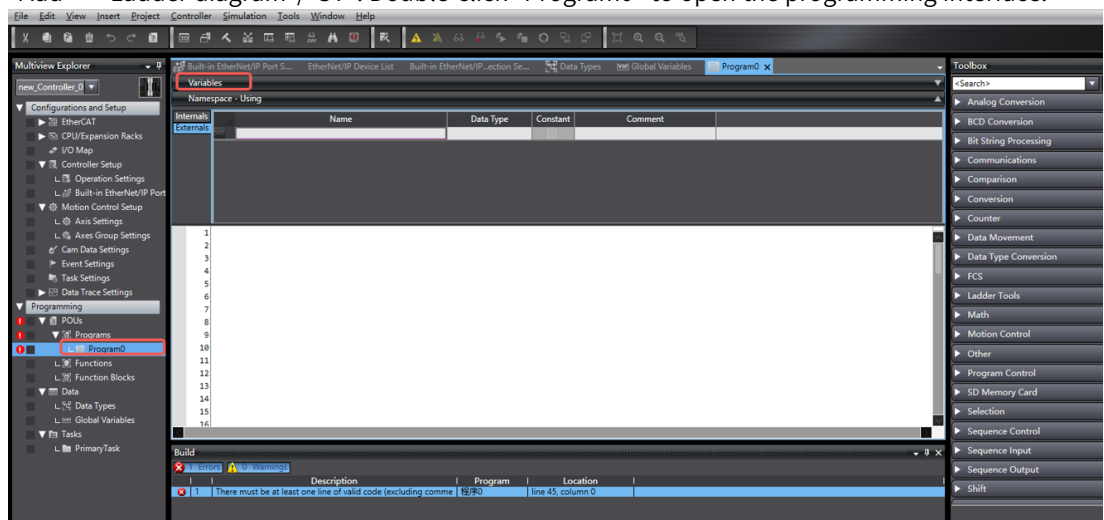




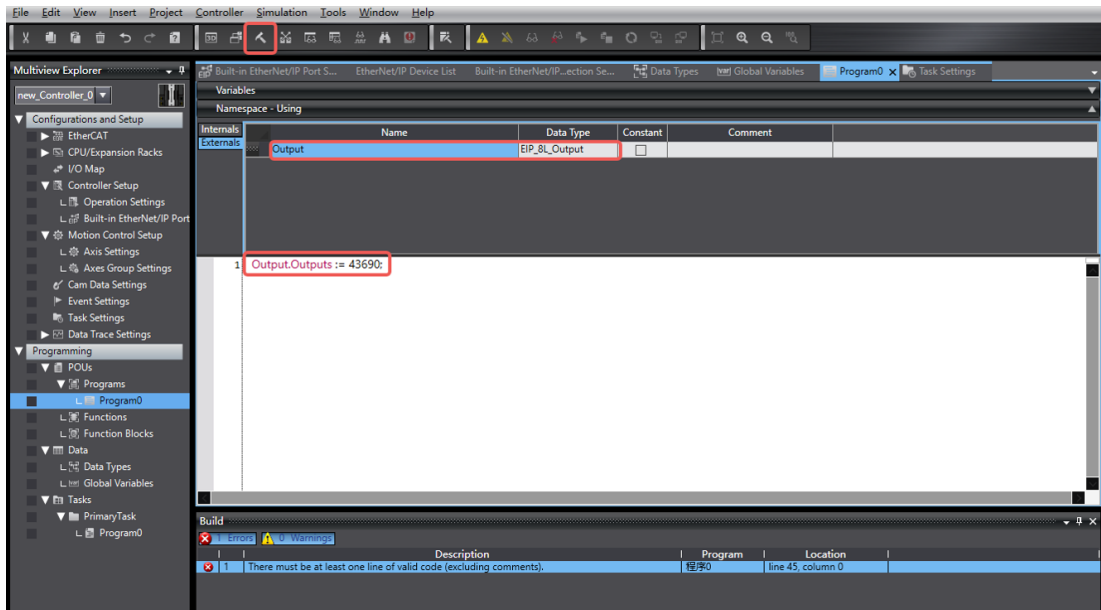
5. Compile a program for code variable mapping.

Use programs to implement the full output of Pin2.

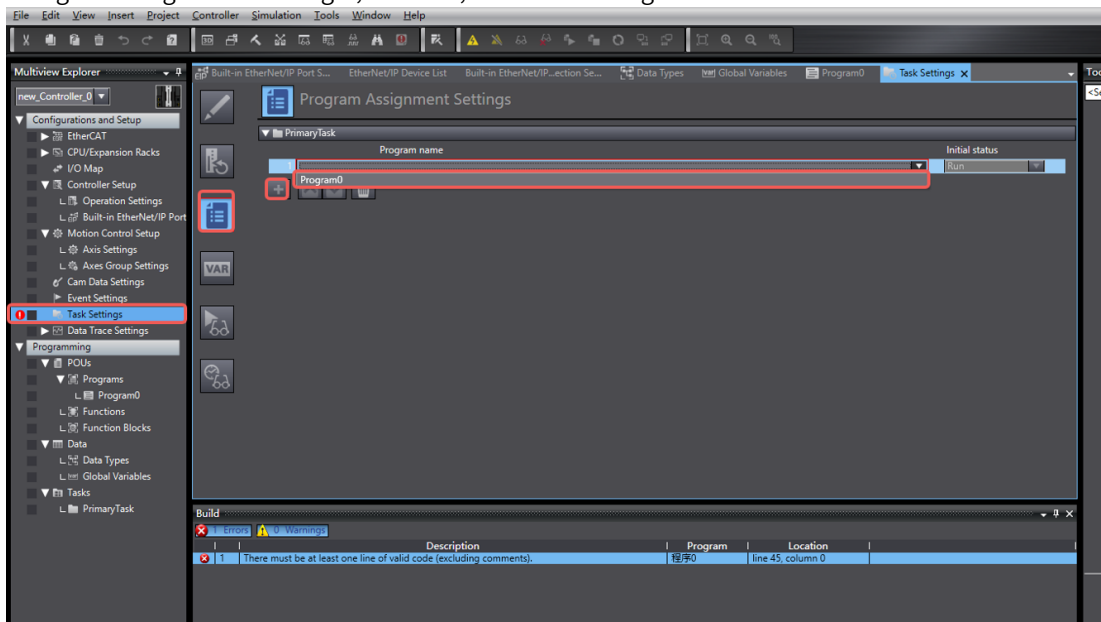
a. In the left "Multiview Explorer" pane, right-click "Programs" under the "POUs" directory and select "Add" > "Ladder diagram"/"ST". Double-click "Program0" to open the programming interface.



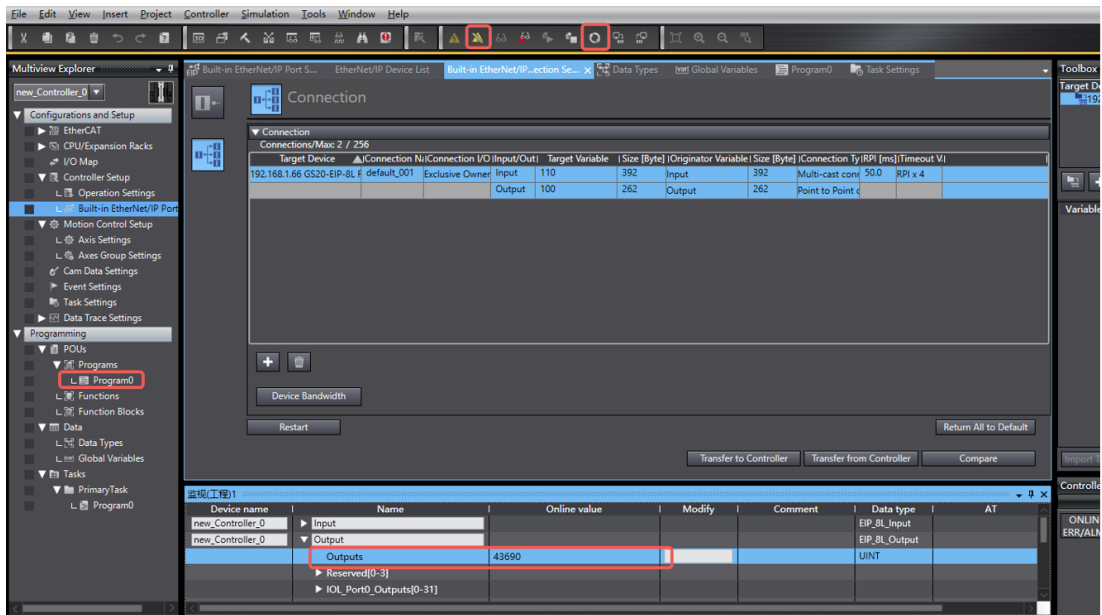
b. Click "Variables" to open the variable interface. Select "Externals" and enter the created global variable "Output" in the "Name" field. For details, see the corresponding Pin2 output bit in ["4.2.3 Output Process Data" on page 27](#). Assign the output value as 43690. After programming, click the compile button.



c. To add the program to tasks, click "Task Settings" in the left "Multiview Explorer" pane. Click "Program Assignment Settings", click "+", and select "Program0".



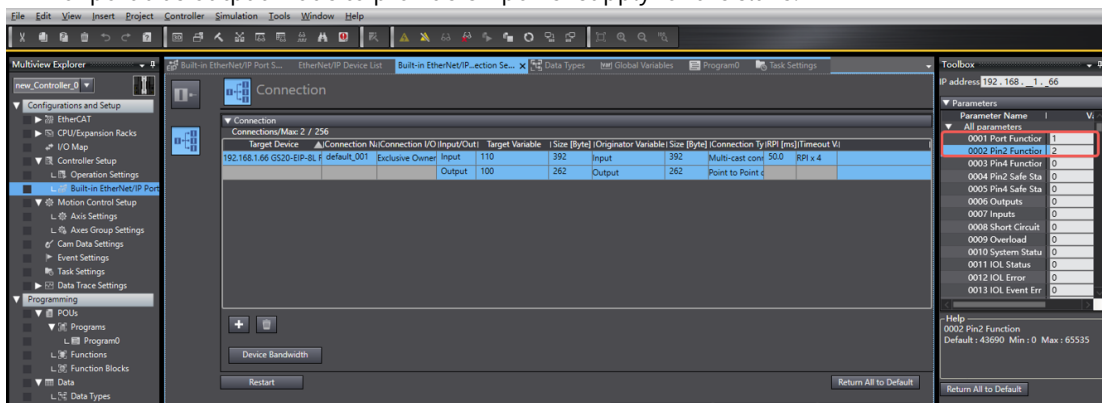
d. Click the online button to log in to the PLC, and then click the sync button. After successful operation, check that Pin2 of all ports of the GS2-EIP-8L module have output.



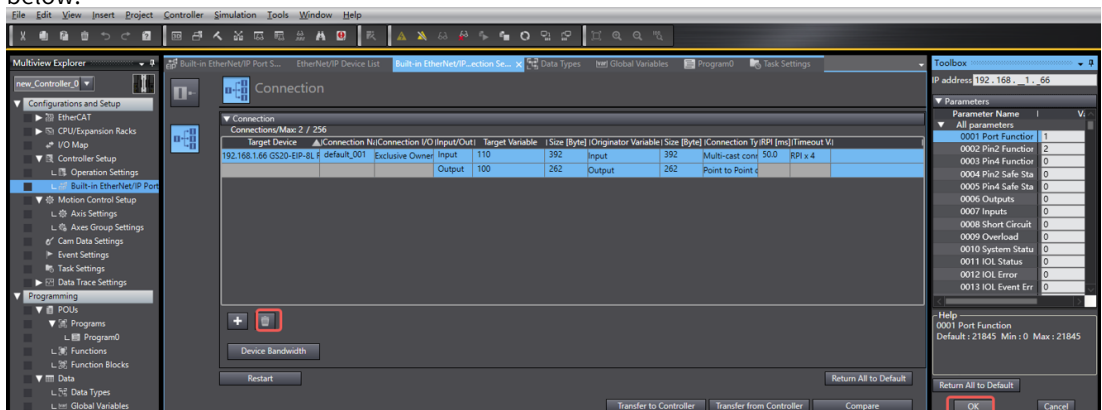
6. Use the GS20-EIP-8L module with an Inovance IO-Link slave.

In the following example, the port 0 of the GS20-EIP-8L module is configured as IO-Link mode, which connects to an IO-Link slave and provides UA power supply for the slave.

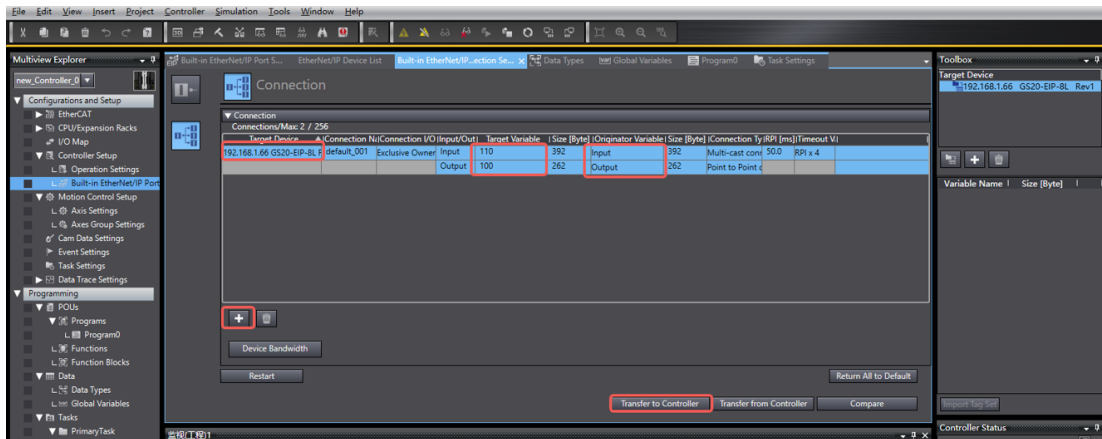
a. Based on [“4.2.1 Configuration Data” on page 22](#), configure port 0 as IO-Link mode and configure Pin2 of port 0 as output mode to provide UA power supply for the slave.



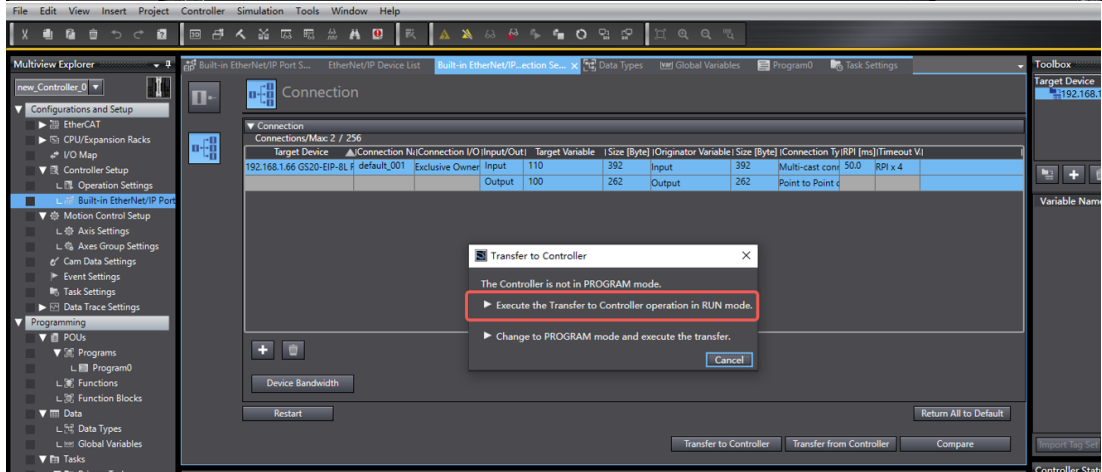
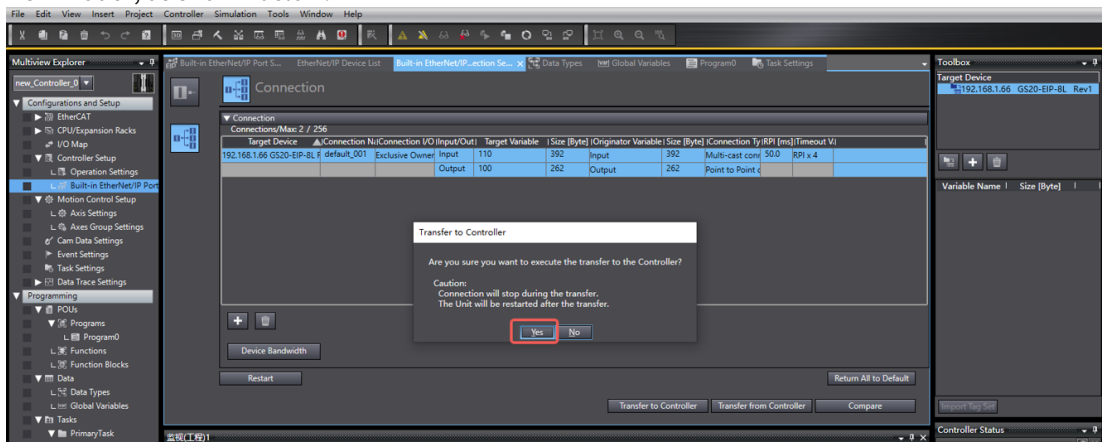
b. Click "OK". Modify the configuration parameters and delete the original connection, as shown below.



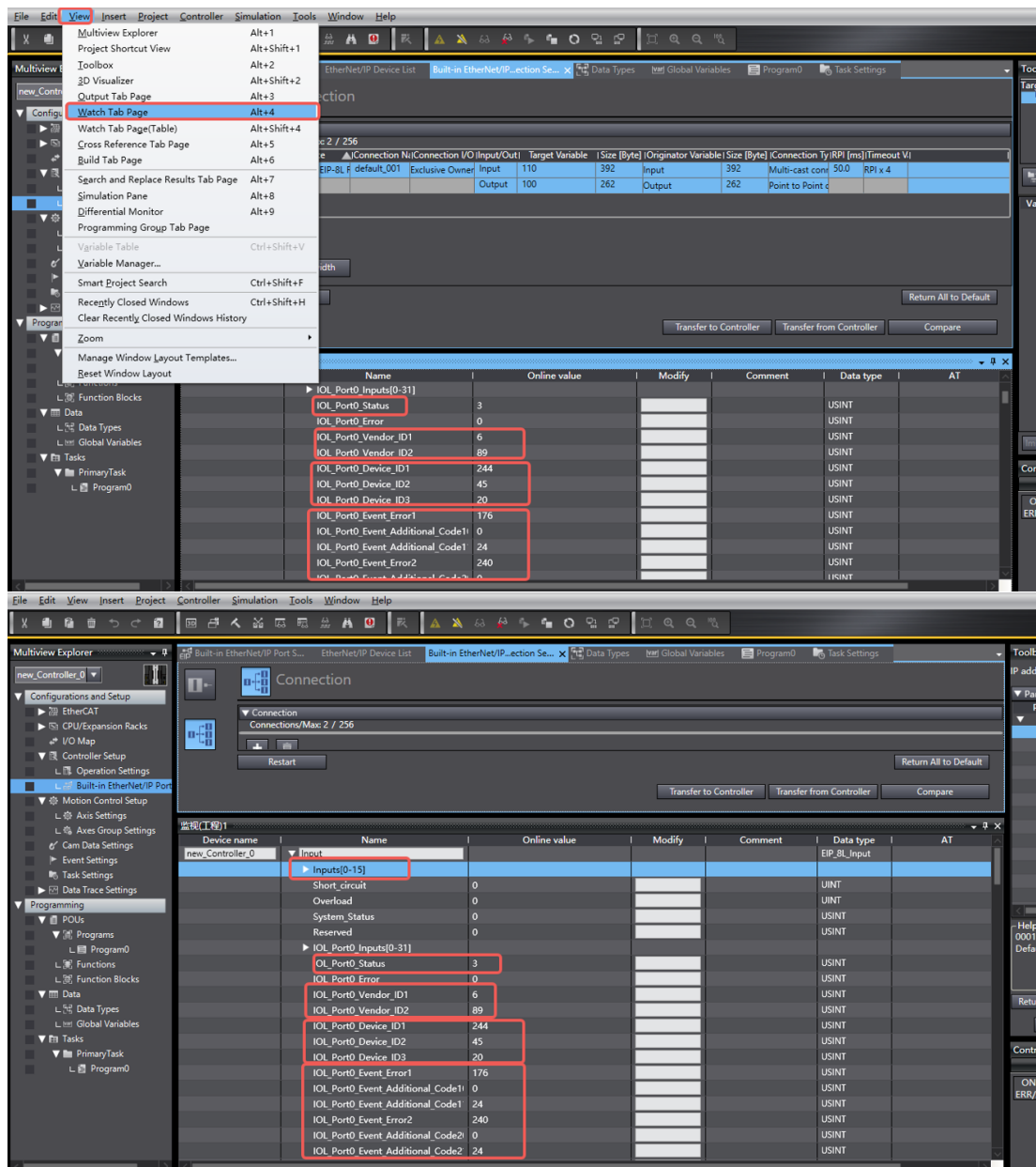
c. Click "+" to add the target device. Enter the original variable and target variable, and click "Transfer to Controller".



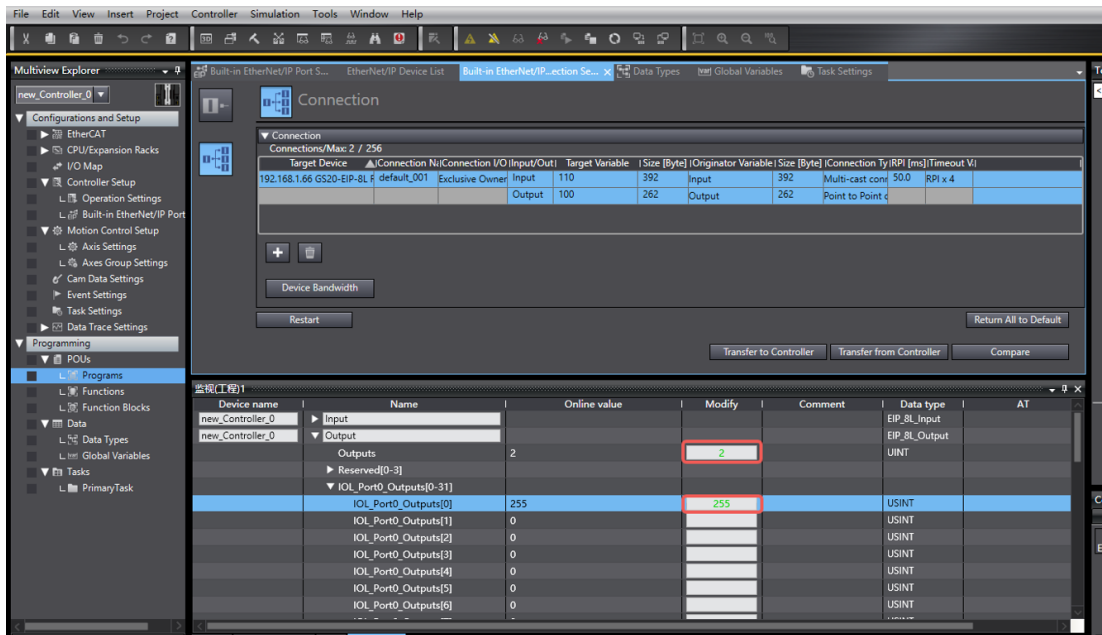
d. In the pop-up window, select "Yes" and select "Execute the Transfer to Controller Operation in RUN Mode", as shown below.



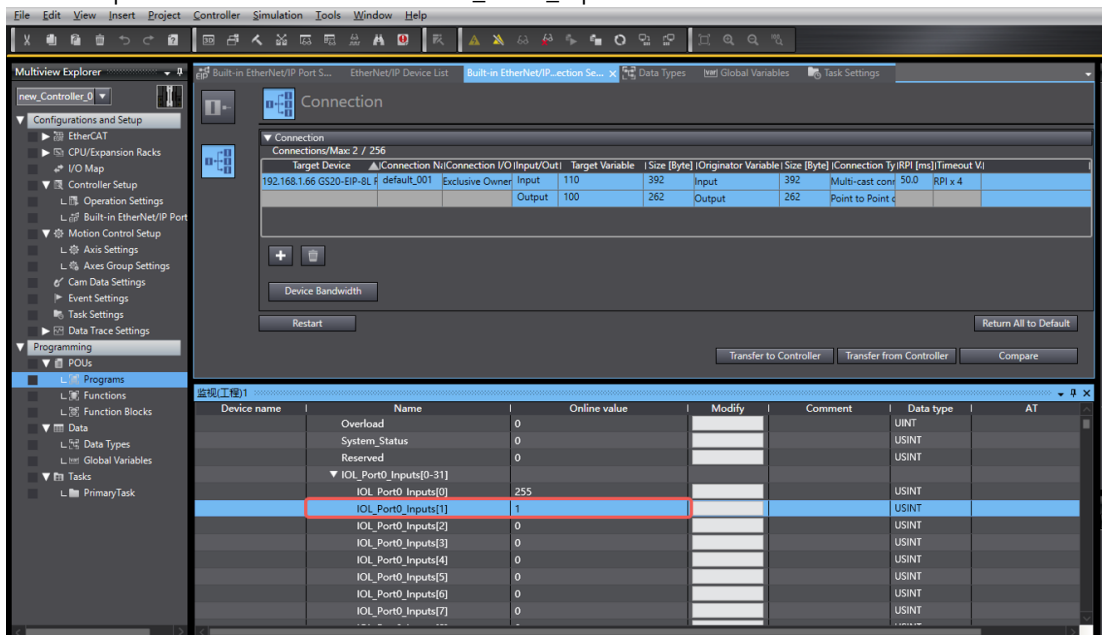
e. Once the configuration parameters are successfully modified and issued, select "View" > "Watch Tab Page". Add the created global variables "Input" and "Output". Expand "Input" to obtain the input data for IO-Link slaves connected on port 0. For details, see [4.2.2 Input Process Data](#) on page 25. Obtain the connection status, device information, and diagnostic information of the slave.



- f. Based on [“4.3.1 ODVA EIP-Tools Connection” on page 28](#), configure the parameters related to the slave. In this example, the lower eight bits of the IO-Link slave (Pin2) is configured as output and the higher eight bits (Pin4) is configured as input.
- g. To issue the output data, expand "Output" data in the "Watch" window. Based on the description of standard output data in [“4.2.3 Output Process Data” on page 27](#), enter "2" in the "Modify" field and press Enter to output to Pin2 of port 0 of the GS20-EIP-8L module, providing UA power supply for the IO-Link slave. Based on the description of IO-Link output process data in [“4.2.3 Output Process Data” on page 27](#), enter "255" in "Modify" field of "IOL_Port0_Outputs[0]". Press Enter to output a valid lower 8-bit data to the slave via IO-Link.



h. Short-circuit one output pin and one input pin of the IO-Link slave to receive the corresponding IO-Link input process data. Expand the "Input" data in the "Watch" window and the corresponding IO-Link input data can be detected in "IOL_Port0_Inputs".



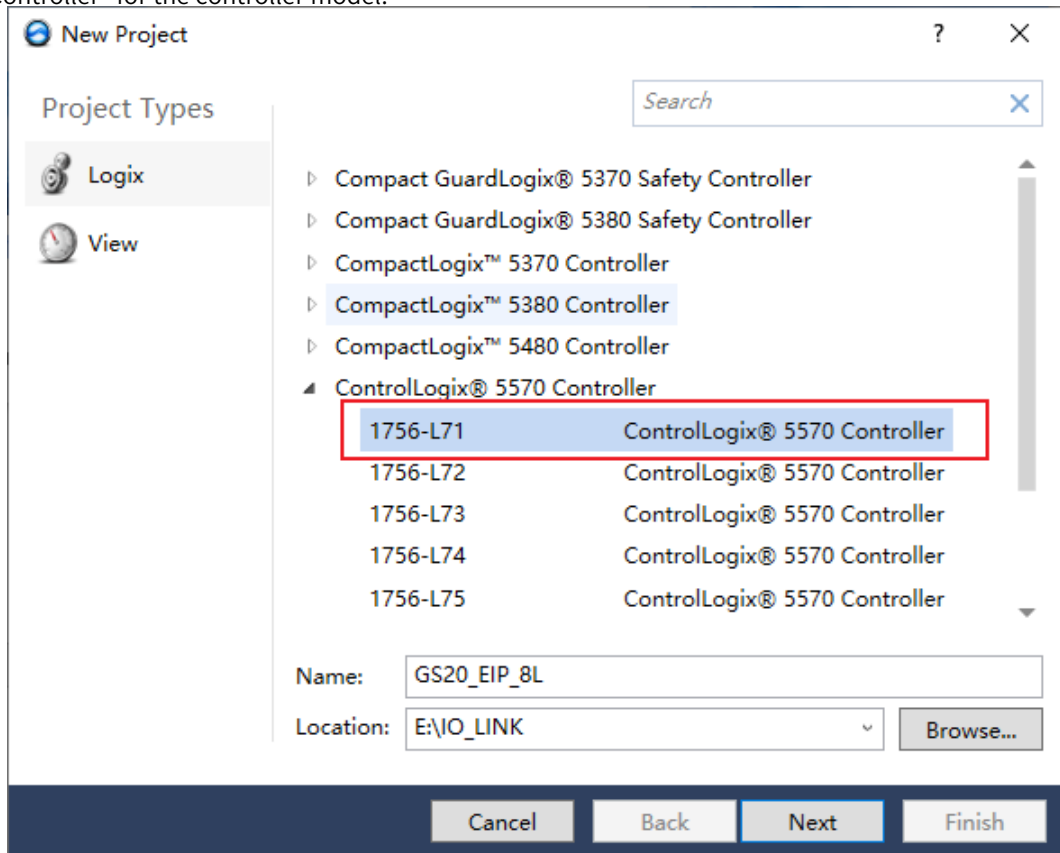
4.4.3 Programming with Rockwell Studio 5000

Prerequisites

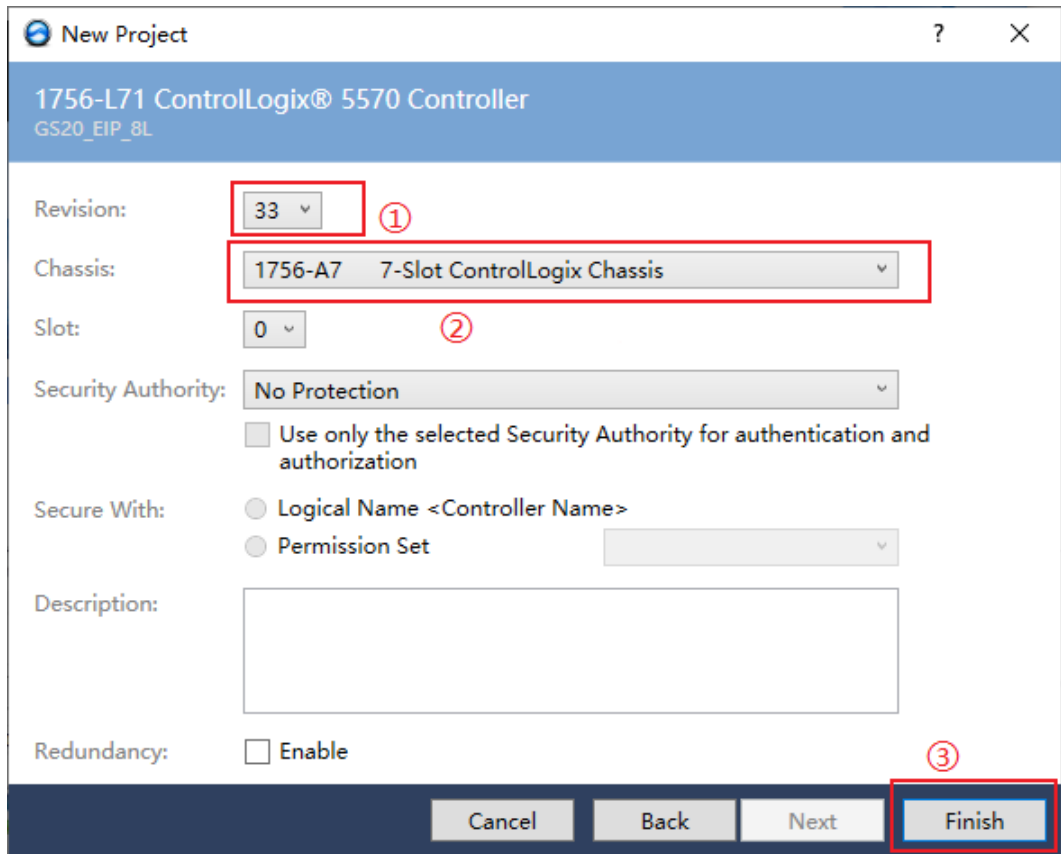
- The cables are connected correctly.
- Rockwell Studio V33.00.00 and above is installed.
- The EDS file of the GS20-EIP-8L module is imported into InoProShop. The EDS file can be obtained under Software and Commissioning Tools on the GS20 series product page at www.inovance.com.
- EIP-Tools is downloaded and installed from ODVA official for IO-Link slave parameter configuration.

Procedure

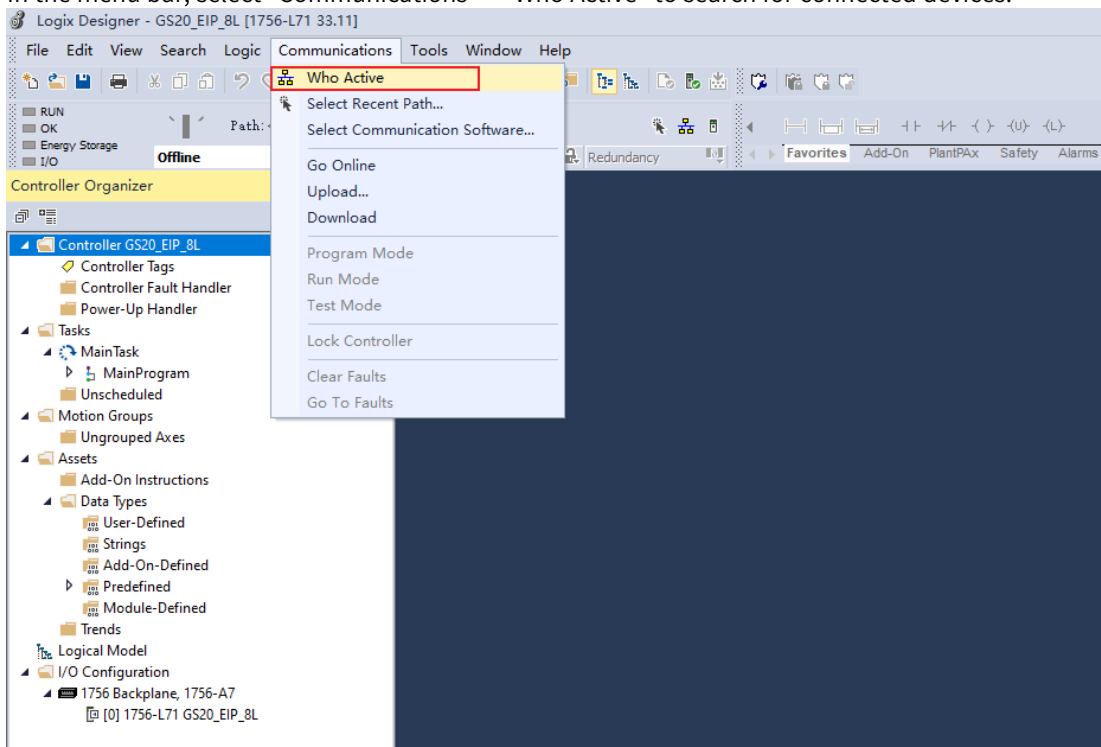
1. Create a project.
 - a. Open the Studio 5000 software, click "New Project", and select "1756-L71 ControlLogix5570 Controller" for the controller model.



- b. Select the corresponding software version (①) and the matching PLC module (②) as needed, and click "Finish" (③).



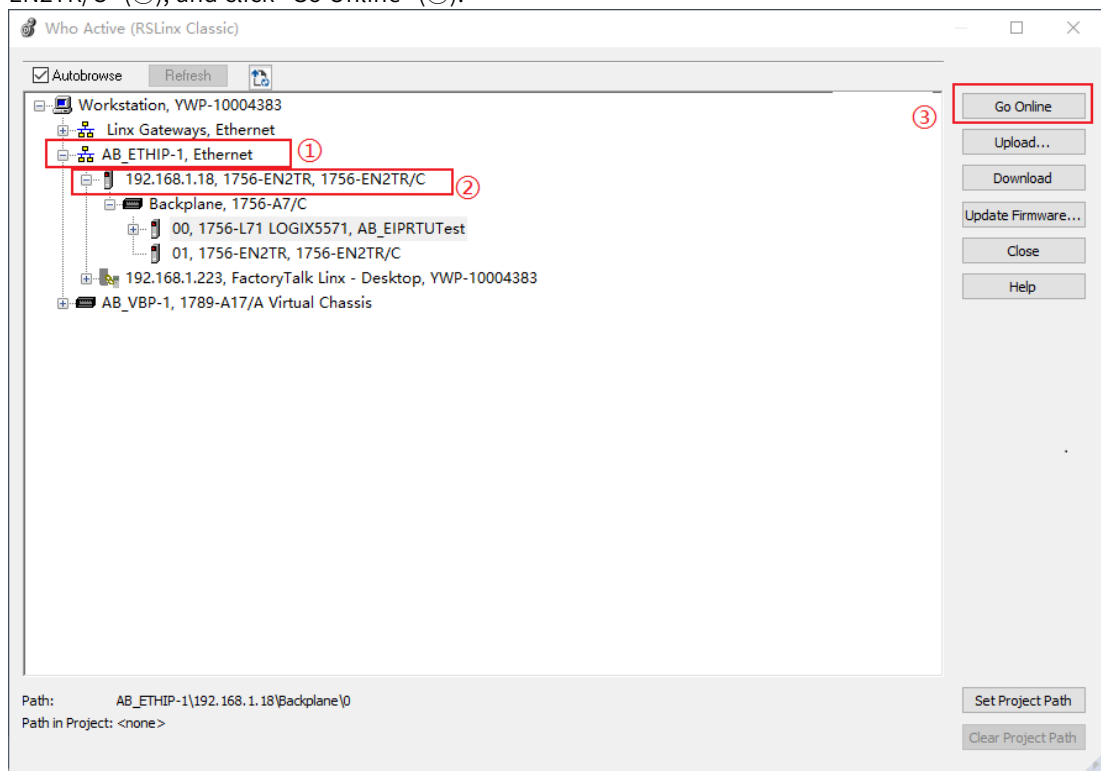
c. In the menu bar, select "Communications" > "Who Active" to search for connected devices.



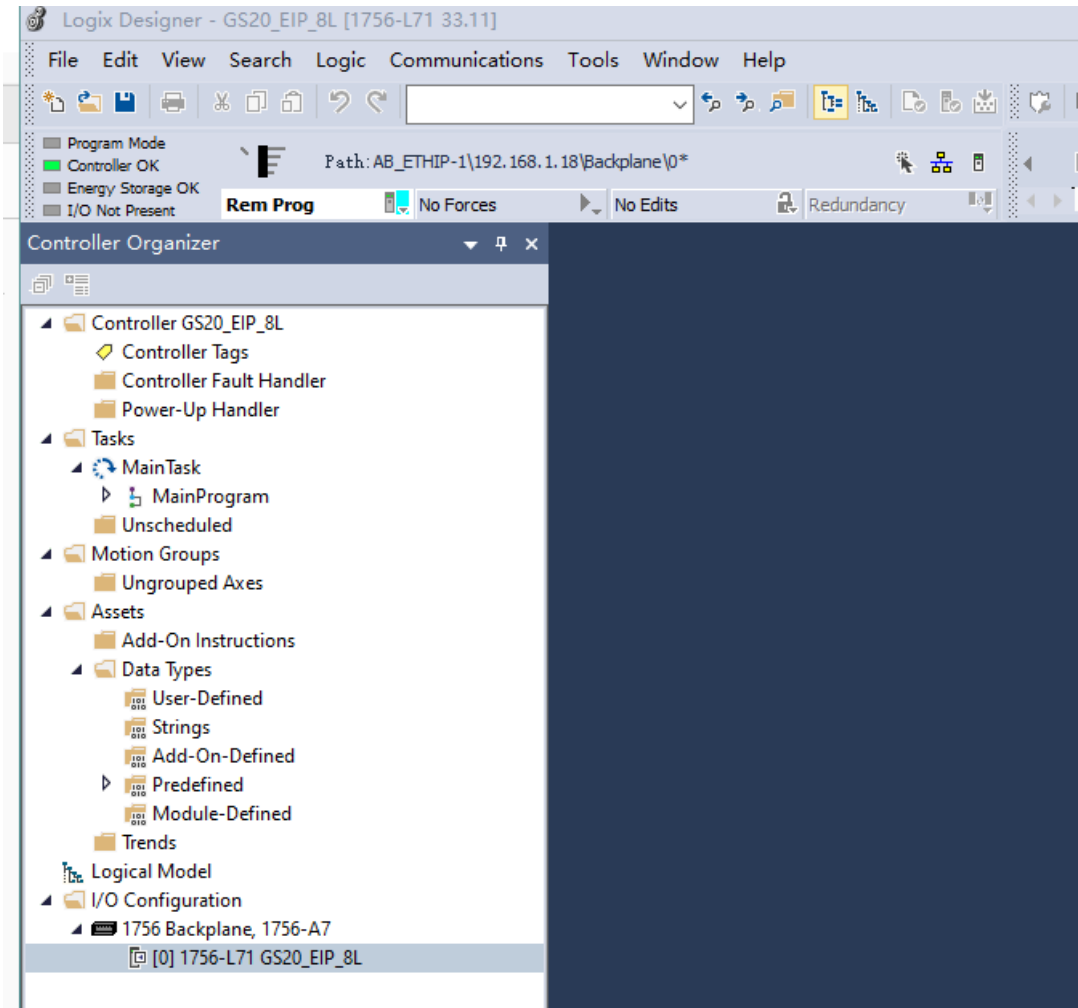
d. Set the local network card to the same network segment as the PLC device.

Select "Control Panel" > "Network and Sharing Center" > "Ethernet". Click "Properties (P)" and select "Internet Protocol version 4 (TCP/IPv4)" in the "Ethernet Properties" dialog box. In the pop-up window, select "Use the following IP address (S)", set the "IP address (I)", and click "OK".

e. Select "AB_ETHIP.1.Ethernet" (①), click the detected PLC model "192.168.1.18, 1756-EN2TR, 1756-EN2TR/C" (②), and click "Go Online" (③).

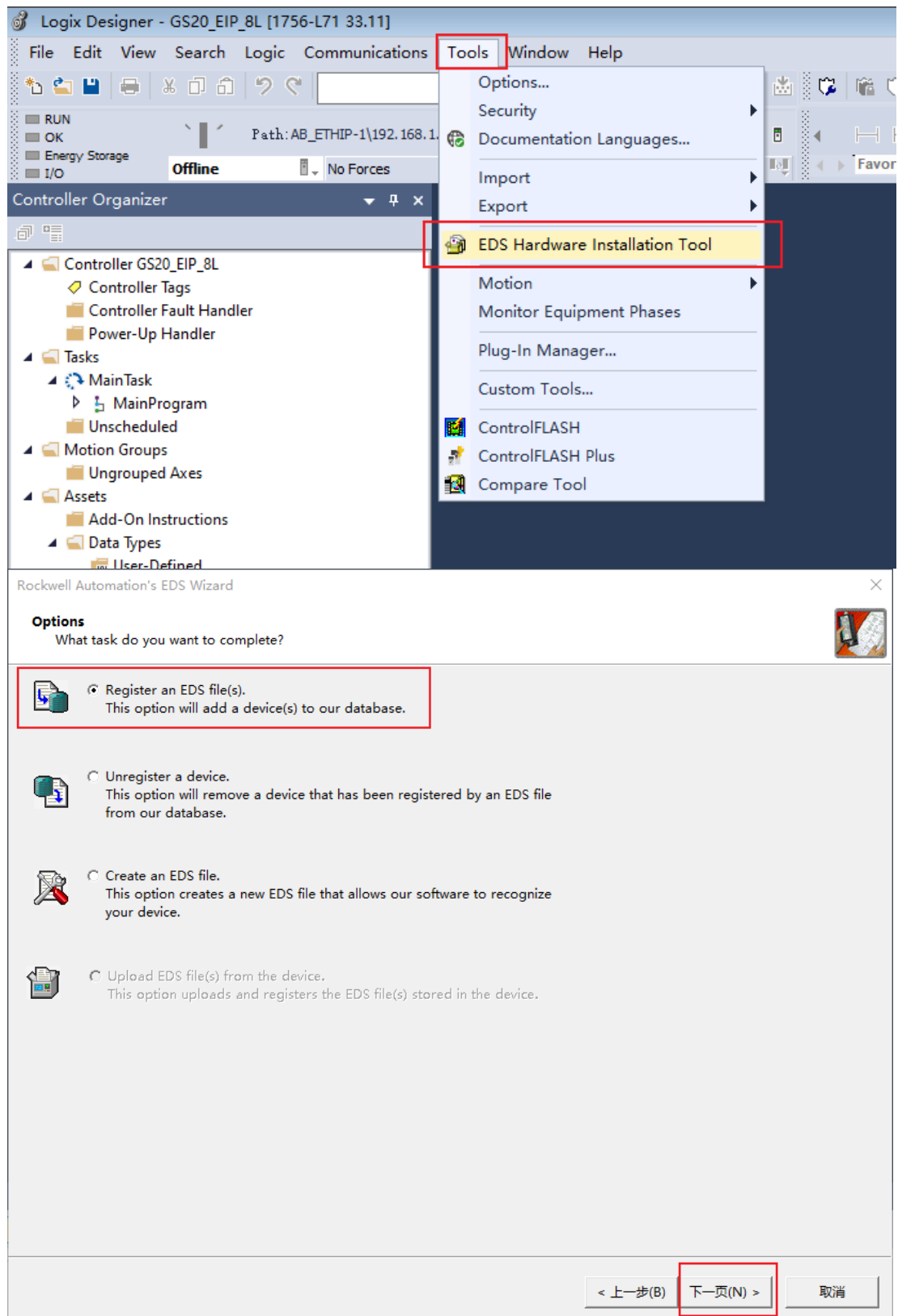


f. The background status is shown below.

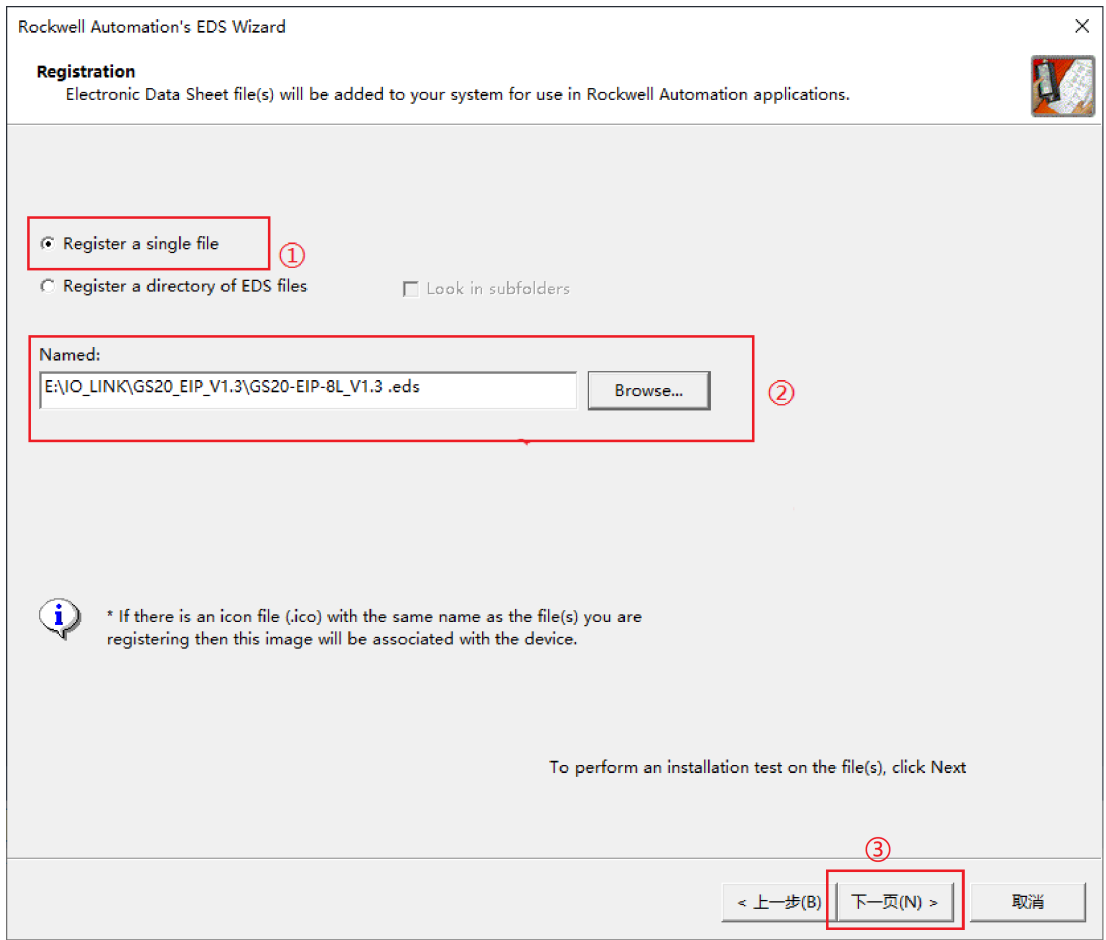


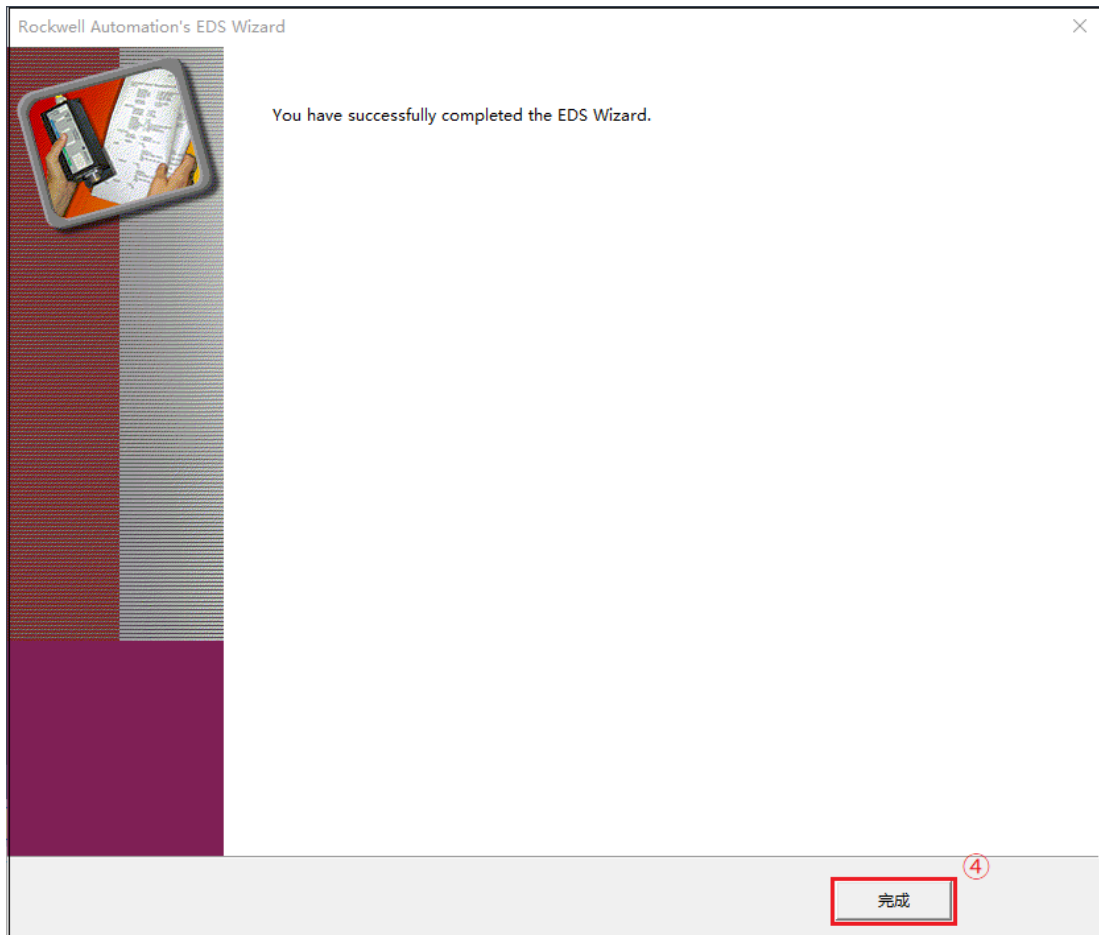
2. Import the EDS file

- a. Select "Tools" > "EDS Hardware Installation Tool" (①), select "Register an EDS file(s)" (②), and click "Next (N)" (③).



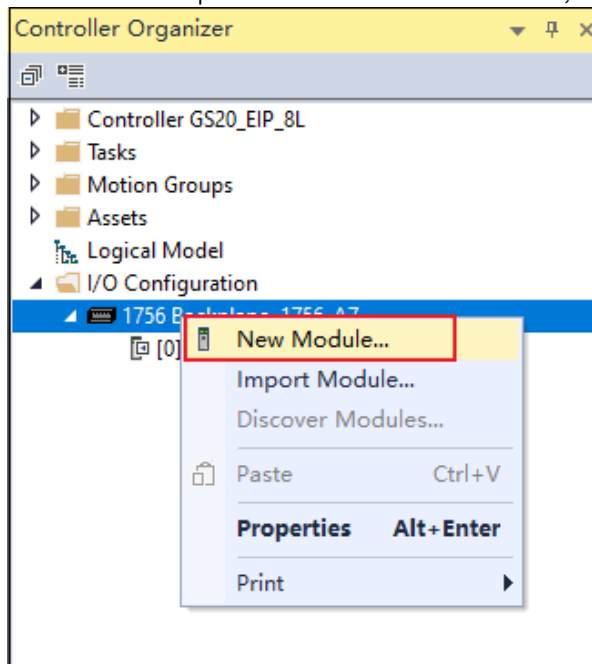
- b. Click "Register a single file" (①), click "Browse" to select the EDS file for the device (②) and then click "Next" (③).



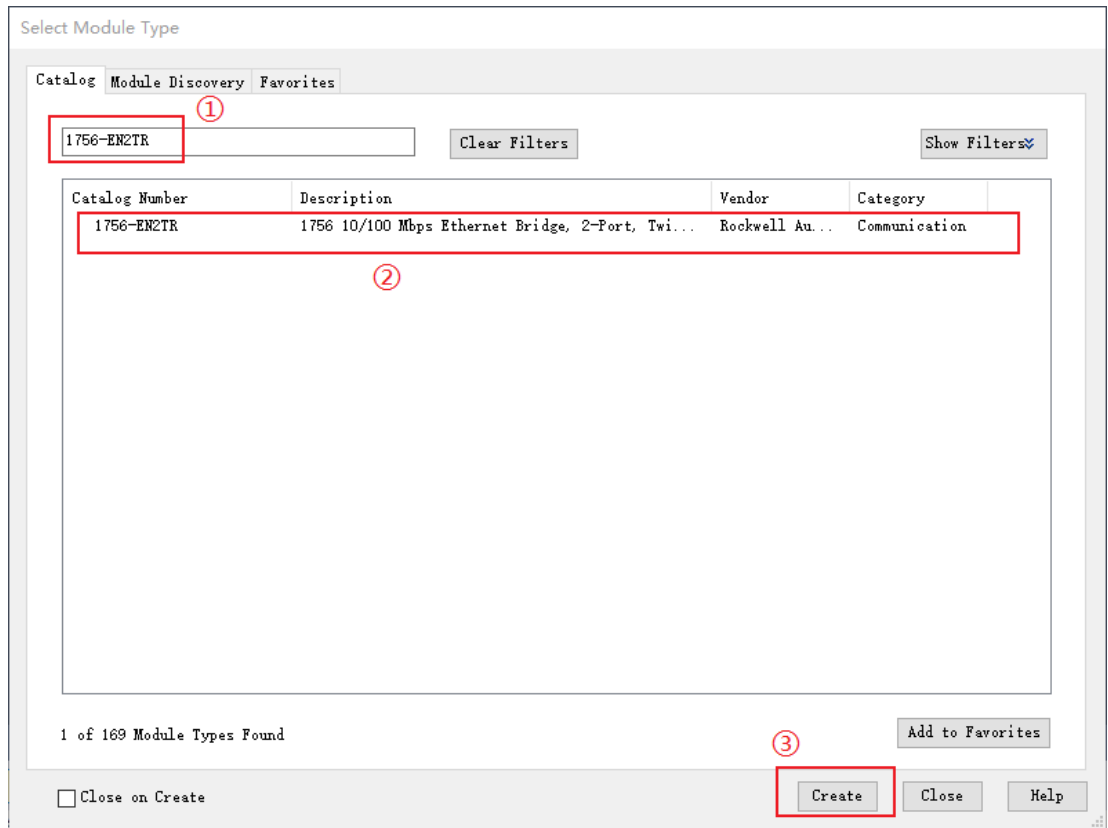


3. Configure the project.

a. Select "I/O Configuration" > "1756 Backplane" on the left of the interface, and click "New Module".



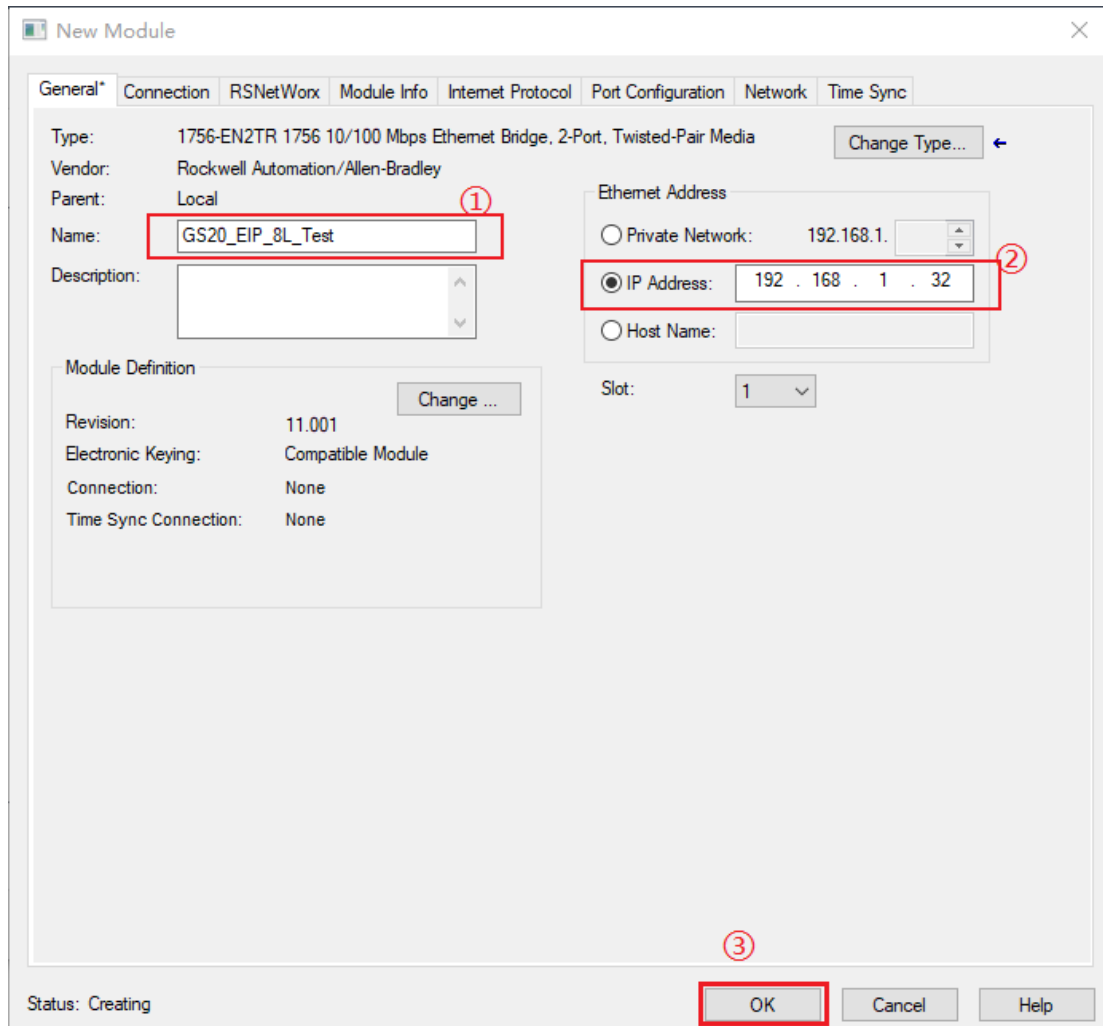
b. In the "Catalog" tab of the "Select Module Type" window, search for "1756-EN2TR" (①), select "1756-EN2TR" (②), and click "Create" (③).



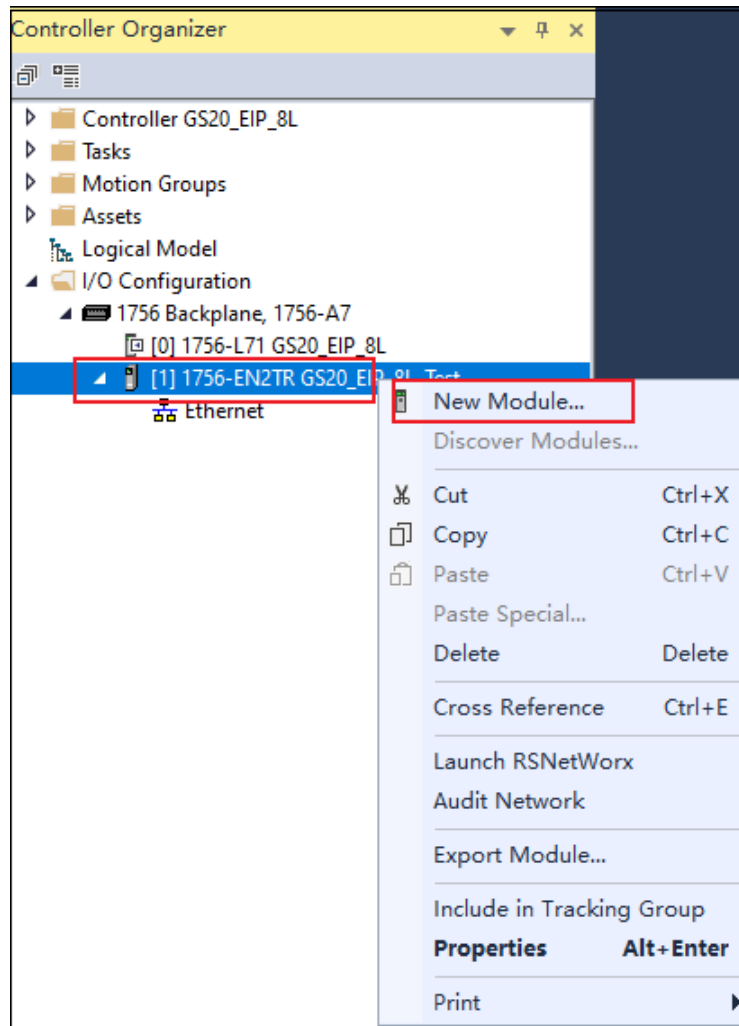
Caution

This device requires the addition of an Ethernet module for use. Some other devices can directly search for the GS20-EIP-8L without adding the module.

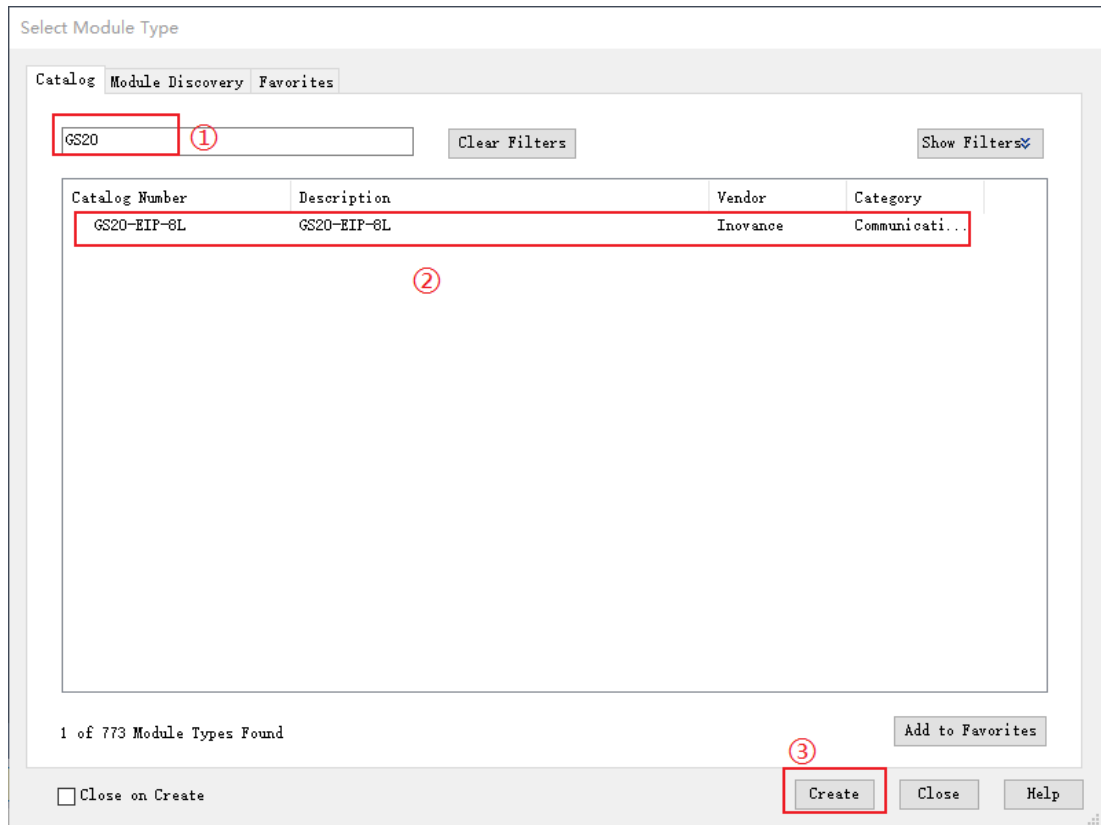
- c. In the "General" tab of the "New Module" window, enter the module "Name" (1) and "IP Address" (2) with the same IP as the device, and then click "OK".



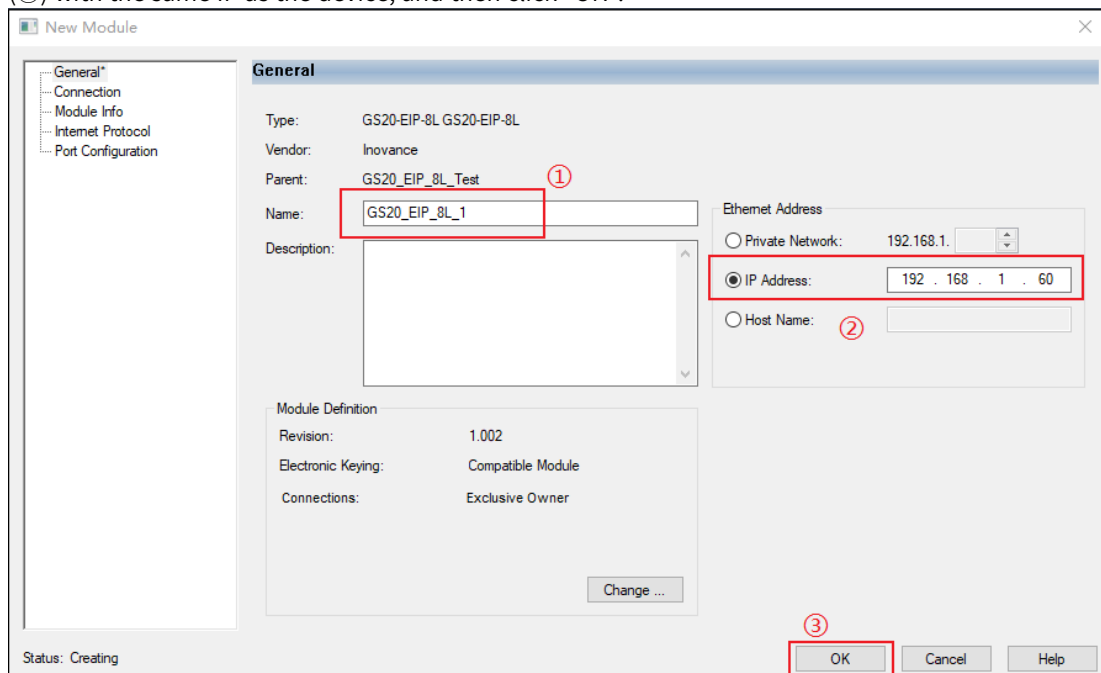
d. Select "I/O Configuration" > "1756 Backplane" on the left of the interface, and click "New Module".



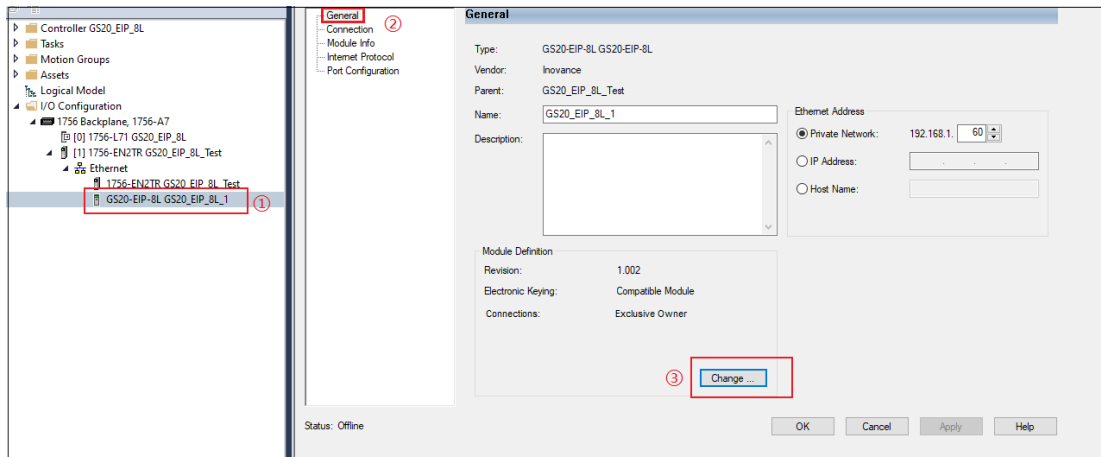
e. In the "Catalog" tab of the "Select Module Type" window, search for "GS20", select "GS20-EIP-8L", and click "Create".



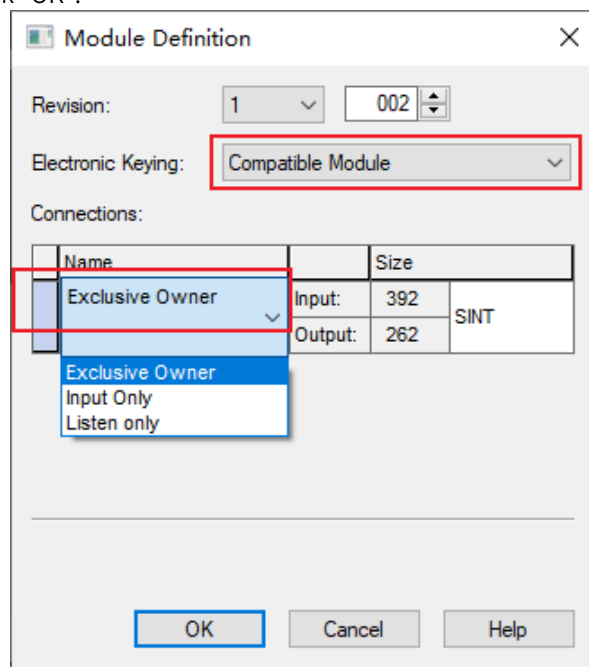
- f. In the "General" tab of the "New Module" window, enter the module "Name" (1) and "IP Address" (2) with the same IP as the device, and then click "OK".



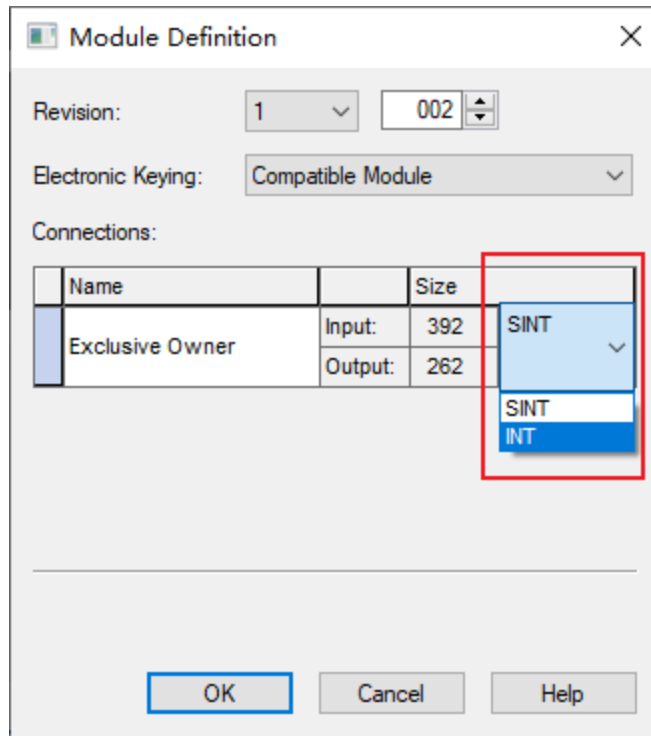
- g. To modify the module configuration parameters, double-click the module (1), select "General" (2), and click "Change".



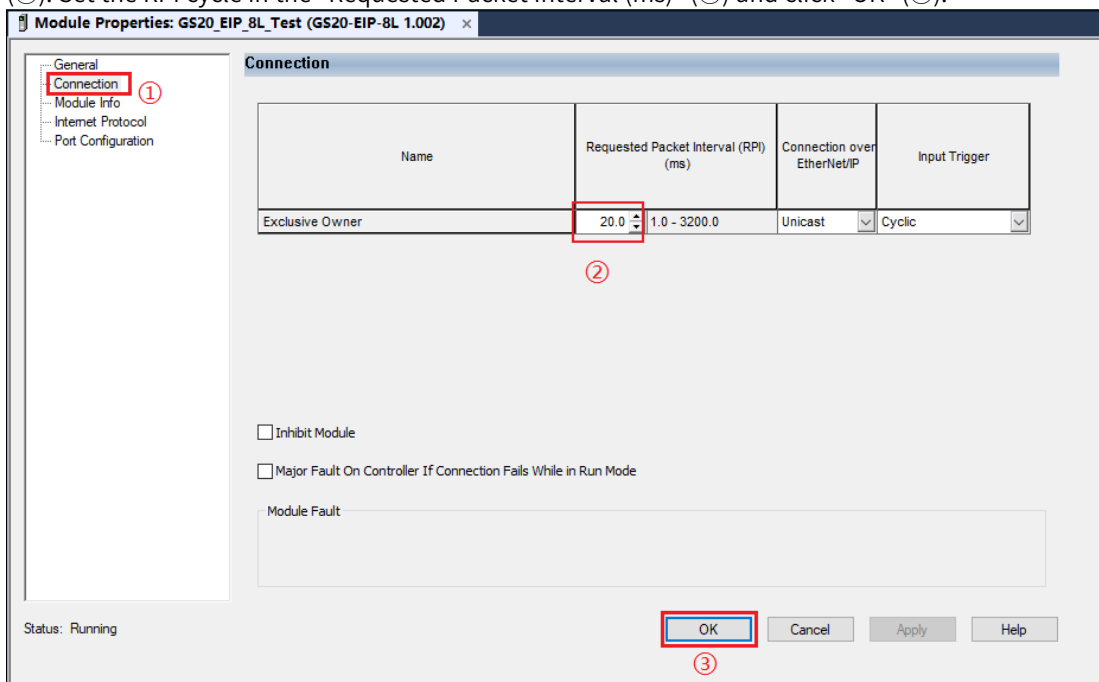
1). In the "Module Definition" dialog box, select the connection method, set the default parameters, and click "OK".



2). To modify the input/output data display length, click the lower triangle to select the data length, and click "OK".

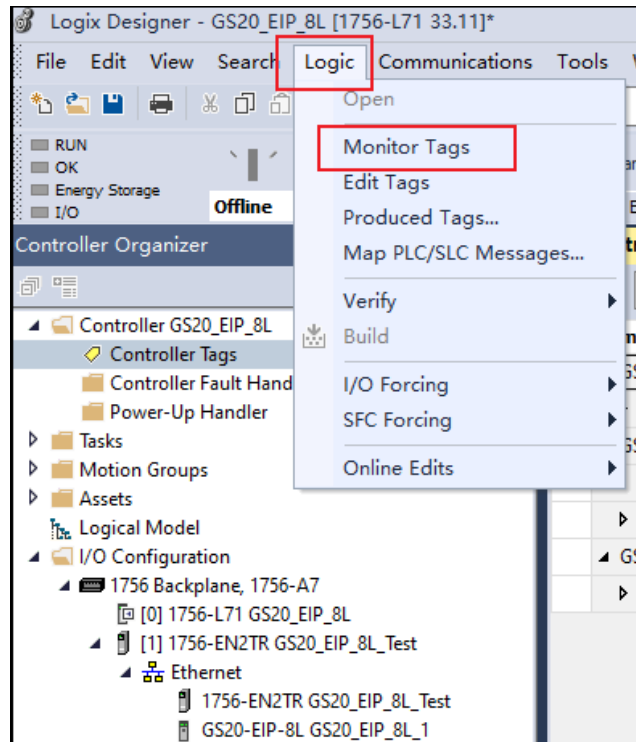


- h. To modify the device communication RPI cycle, double-click the device and click "Connection" (1). Set the RPI cycle in the "Requested Packet Interval (ms)" (2) and click "OK" (3).



4. Configure the mapping data.

- a. Select "Logic" > "Monitor Tags" from the menu bar.



b. The configuration interface includes the module configuration data (C), input channel (I), output channel (O), and the corresponding byte size (Data Type).

All module configuration data in the software is of SINT type. Take module configuration data as an example.

Parameters C.Data[1] and C.Data[0] correspond to the higher and lower eight bits of an INT type data respectively. In the configuration data, the first 10 bytes are of INT type, so two parameters correspond to one set of parameter mapping, while the other SINT types correspond to the module USINT one-by-one.

The "Port Function" of each port of the module is configured as IO-Link mode (binary: 01010101010101; decimal: 21845; hexadecimal: 5555). The values of the two channels are both 55 and the "Style" value is set to HEL (hexadecimal). So C.Data[0] and C.Data[1] shall both be filled with 55.

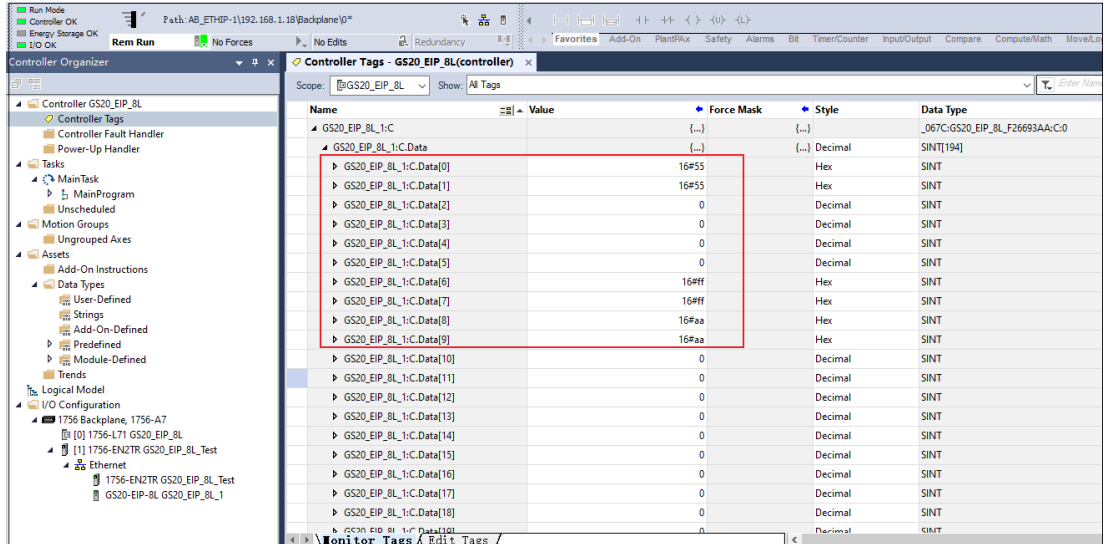
For input and output process channels, synchronous conversion is required for display.

Name	Value	Force Mask	Style	Data Type
GS20_EIP_8L_1:C		{...}	{...}	._067C:GS20_EIP_8L_F26693AA:C:0
GS20_EIP_8L_1:C.Data		{...}	{...} Decimal	SINT[194]
GS20_EIP_8L_1:I		{...}	{...}	._067C:GS20_EIP_8L_60531A4C:I:0
GS20_EIP_8L_1:I.ConnectionFaulted	0		Decimal	BOOL
GS20_EIP_8L_1:I.Data		{...}	{...} Decimal	SINT[392]
GS20_EIP_8L_1:O		{...}	{...}	._067C:GS20_EIP_8L_D343DA45:O:0
GS20_EIP_8L_1:O.Data		{...}	{...} Decimal	SINT[262]

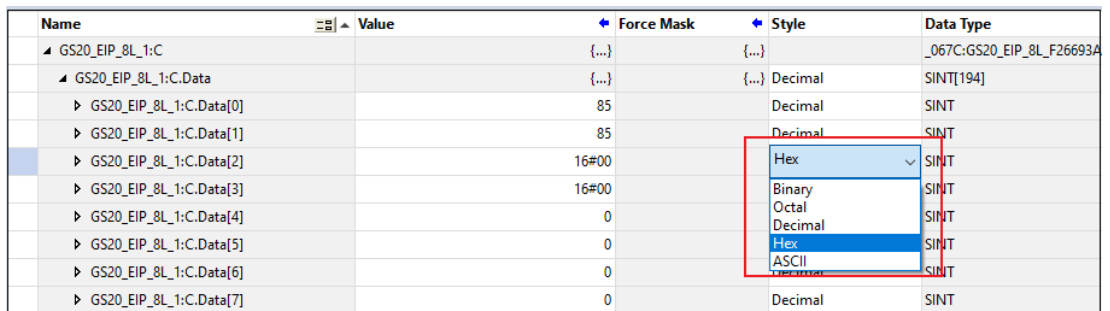
No.	Name
①	Port Function
②	Pin2 Safe Function
③	Pin4 Safe Function
④	Pin2 Function

No.	Name
⑤	Pin4 Function
⑥	IOL Port 0 Cycle Time

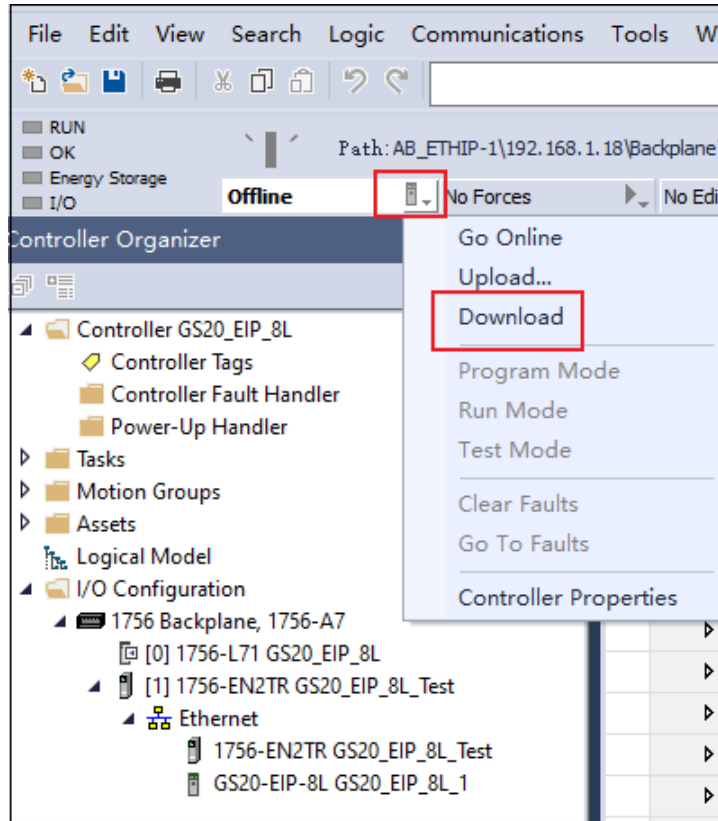
Configure the "Port Function" as IO-Link mode, Pin2/Pin4 output function upon network disconnection as outputting 0 V, Pin2 function as "output enable", and Pin4 function as "output mode", as shown below.



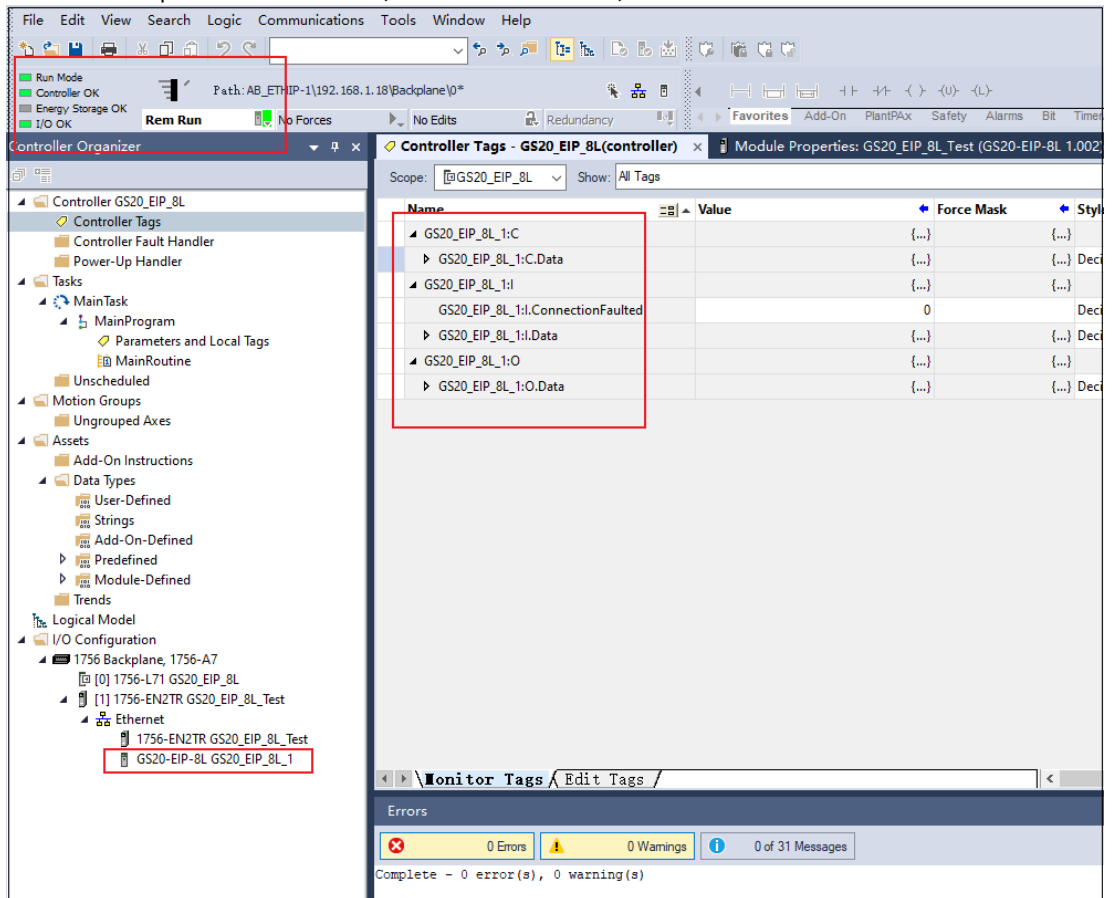
"Style" adjusts the display format to facilitate the calculation of channel mapping values.



c. Click "Download" to compile and download the program to the PLC device.



d. After the completion of download, switch to Run mode, as shown below.



e. The process data output write values for IO-Link port 0 is shown below.

The screenshot displays the 'Controller Tags' window for the 'GS20_EIP_8L(controller)'. The interface includes a 'Controller Organizer' on the left and a main table of tags. The table has the following columns: Name, Value, Force Mask, Style, and Data Type. The 'Value' column for the highlighted rows contains the number 127.

Name	Value	Force Mask	Style	Data Type
GS20_EIP_8L_1:C		(...)	(...)	_D67C:GS20_EIP_8L_F26693AA:C:0
GS20_EIP_8L_1:I		(...)	(...)	_D67C:GS20_EIP_8L_60531A4C:I:0
GS20_EIP_8L_1:O		(...)	(...)	_D67C:GS20_EIP_8L_D343DA45:O:0
GS20_EIP_8L_1:O.Data		(...)	(...)	Decimal SINT[262]
GS20_EIP_8L_1:O.Data[0]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[1]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[2]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[3]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[4]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[5]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[6]	127	127	Decimal	SINT
GS20_EIP_8L_1:O.Data[7]	127	127	Decimal	SINT
GS20_EIP_8L_1:O.Data[8]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[9]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[10]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[11]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[12]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[13]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[14]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[15]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[16]	0	0	Decimal	SINT
GS20_EIP_8L_1:O.Data[17]	0	0	Decimal	SINT

5 WEB Function

This product supports online viewing of product information, upgrading device firmware, and modifying the IP address.

The system provides two types of access permissions: normal mode and expert mode. Upgrading device firmware and modifying the IP address require users to log in with expert mode permissions.

- Normal mode: The login password is "inogsnormal". Users can only view product information, that is the "Home" and "Product Introduction" tabs on the WEB interface.
- Expert mode: The login password is "inogsexpert". Users can view product information, upgrade device firmware, and modify the IP address.

Interface Introduction

- On the "Home" tab, users can view product information, including the indicators of the equipment (①), information about the slaves connected to each port (②), and basic data (③).
- On the "Equipment Maintenance Information" tab (in expert mode), users can view master's device information (①), upgrade the device firmware (②), and modify the IP address (③).
 - To upgrade device firmware, contact Inovance technical engineers.
 - To modify the IP address, refer to ["IP Address Modification" on page 76](#).
- On the "Product Introduction" tab, users can view information about the GS20 series of high-protection IO products.

User Login

Access the WEB interface using the IP address (default IP address is 192.168.1.66). Click "Login" and enter the password.

- Normal mode: The login password is "inogsnormal".
- Expert mode: The login password is "inogsexpert".

IP Address Modification

In expert mode, click "Device Maintenance Information". In the "IP Modification" window, users can change the IP address, subnet mask, and gateway address.

- IP address: When the device's DIP switch is not set to 0, only the first three digits of the IP address can be modified. When the DIP switch is set to 0, the entire IP address can be modified, but the fourth segment cannot be set to 0 or 255.
- Subnet mask: It must follow the binary format of continuous "1"s in higher bits + continuous "0"s in lower bits, preventing alternating (e.g. 11100111) or discontinuous (e.g. 11101000) masks.
- Gateway address: It must be in the same subnet as the IP address, meaning it shares the same first three digits with the IP address.

Note

The modified IP address will take effect the next time the module is powered on. The new IP address is required to access the WEB interface.

6 Troubleshooting

There is a set of diagnostic messages for each IO-Link port, which is reported through input process data. Each port can store up to three diagnostic messages. The specific fault codes are shown in the table below.

Source	Fault Code	Description	Solution
IO-Link master	0x1800	Device not detected by the port	Check whether the port device configured as IO-Link is connected.
	0x1802	Invalid vendor ID	Check whether the configured Vendor ID is consistent with the connected port device when I/O-Link validation mode is enabled.
	0x1803	Invalid Device ID	Check whether the configured device ID is consistent with the connected port device when I/O-Link validation mode is enabled.
	0x6000	Invalid cycle time	Check whether the configured cycle time meets the communication requirements of the connected port when I/O-Link validation mode is enabled.
	0x6001	Incorrect slave version	Check whether the version of the IO-Link slave device connected to the port meets the requirements when I/O-Link validation mode is enabled.
	0x1806	Pin1 short-circuited	Check whether Pin1 encounters a short circuit.
	0x1807	Pin1 overcurrent	Check whether Pin1 encounters an overcurrent.

Source	Fault Code	Description	Solution
IO-Link slave	0x4210	Overtemperature	The ambient temperature is too high. Decrease the temperature before using the module.
	0x4220	Undertemperature	The ambient environment is too low. Increase the temperature before using the module.
	0x5011	Loss of retentive data upon power failure	Retention of configuration parameters fails. Re-configure the parameters.
	0x5100	Device power supply fault	The UA power supply of the module fails. Enable the power supply to pin 2 on the master or use the external UA power supply.
	0x5110	System power supply overvoltage	The US power supply voltage of the module is higher than the normal operating voltage. Decrease the US power supply voltage.
	0x5111	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.
	0x7710	Short circuit	The module encounters a short circuit. Check the external wiring.
	0x6320	Parameter fault	The module parameters are configured incorrectly. Configure the parameters correctly according to the product data.
	0x6321	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.

7 Appendix: Version Matching Information

You can get the module firmware from Inovance technical support engineers. The InoProShop software can be downloaded from the software and commissioning tool interface of any medium-sized PLC series at <https://www.inovance.com>. The following table describes the version matching information.

Module Firmware Version	InoProShop version
2.0.0.0 and later	V1.7.3 SP2 and later

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.



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