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PS00007354A03

GS20-ECT-8L

High Protection IO-Link Master Module

User Guide

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Preface

■ Introduction

GS20-ECT-8L is an IP67 IO-Link master module that transfers EtherCAT communication to IO-Link communication. The module has 8 IO-Link ports and can connect up to 8 IO-Link devices (Class A).

This guide describes the product information, mechanical installation, electrical installation, configuration, commissioning, and troubleshooting of the product.

■ Standard

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	-		-

Certification	Directive		Standard
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 Documents

Document Name	Document Coding	Description
GR20-16EMNL Digital Input and Output Module User Guide	PS00007355	This guide describes the product information, mechanical installation, and electrical installation of the product.
GR20-16EMPL Digital Input and Output Module User Guide	PS00007356	This guide describes the product information, mechanical installation, and electrical installation of the product.
GS20-16EMNL Digital Input and Output Module User Guide	PS00009314	This guide describes the product information, mechanical installation, and electrical installation of the product.
GS20-16EMPL Digital Input and Output Module User Guide	PS00009714	This guide describes the product information, mechanical installation, and electrical installation of the product.
GS20-16EMNL-S Digital Input and Output Module User Guide	PS00018165	This guide describes the product information, mechanical installation, and electrical installation of the product.

Document Name	Document Coding	Description
GS20-16EMPL-S Digital Input and Output Module User Guide	PS00018166	This guide describes the product information, mechanical installation, and electrical installation of the product.
GS20-ECT-8L High Protection IO-Link Master Module User Guide	PS00007354	This guide describes the product information, mechanical installation, electrical installation, configuration, commissioning, and troubleshooting of the product.

■ Revision History

Revision date	Version	Description
October 2024	A03	Made minor corrections.
January 2024	A02	Modified the cable model in *"3.2 Cable Selection" on page 25*.
September 2023	A01	• Add *" Configure IO-Link in InoProShop" on page 30*. • Add *" Configure IO-Link in AutoShop" on page 51*.
		Modified IO-Link pin assignment in *"3.3 Terminal Assignment" on page 28*.
April 2023	A00	Initial release.

■ Access to the Guide

This guide is not delivered with the product. You can obtain the PDF version by the following methods:

- 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.

■ 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 will be charged after the warranty expires.

Within the warranty period, maintenance 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 the Product Warranty Card.

Fundamental Safety Instructions

■ Safety Disclaimer

1. Read and comply with the safety instructions during installation, operation, and maintenance of 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 can result in severe personal injury or even death.

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

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

Control System Design

DANGER

- Provide a safety circuit outside the PLC so that the control system can still work safely once external power failure or PLC fault occurs.
- Add a fuse or circuit breaker because the module may smoke or catch fire due to long-time overcurrent caused by operation above rated current or load short-circuit.

WARNING

- 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 machine.
- To ensure safe operation, for the output signals that may cause critical accidents, use external protection circuits and safety mechanism.
- Once PLC CPU detects abnormality 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 PLC 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 (overvoltage category II). The power supply must have a system-level surge protector, assuring that overvoltage due to lightning shock cannot be applied to the PLC's power supply input terminals, signal input terminals and output terminals, preventing damage to the equipment.

Installation

- Installation 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 removing/installing 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 equipment.
- The PLC is open-type equipment that must be installed in a control cabinet with lock (IP rating of the control cabinet enclosure > IP20). Only qualified professionals 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 foreign matters on ventilation surface. Failure to comply may result in poor ventilation, which may cause fire, fault and 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.
- Install the terminal cover attached to the product before power-on or operation after wiring is done. 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 equipment.

Wiring

- 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 ±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 screws of 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 programmable controller and can start or terminate the automatic running 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.

Disposal

- Treat the scrapped equipment 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 Product Function

■ Basic functions

- IO-Link communication
  - IO-Link master that can communicate with the IO-Link V1.0 and V1.1 devices
  - Equipped with 8 IO-Link ports to connect up to 8 IO-Link devices (Class A type)
  - Read-write of I/O-Link slave parameters available through this module
  - Slave standard upgrade function supported
- EtherCAT communication
  - Standard EtherCAT slave function supported, with EtherCAT slave version being V5.13
  - Two EtherCAT network interfaces (M8-4pin-D type)
  - Used for process data transmission between IO-Link device and EtherCAT device
  - Equipped with EtherCAT standard diagnostic function, allowing you to view the diagnosis information of IO-Link devices
  - Compliant with ETG5001-6220 standard protocol
- Parameter setting
  - Parameter configured through EtherCAT CoE function
  - Device parameter backup: automatic parameter restoration for connected IO-Link device
  - 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
  - Port connection and communication rate indicator
  - EtherCAT state and error indicator

- US/UA power supply voltage status indicator
- I/O-LINK port communication status, fault, short circuit/overcurrent indicator
- Standard EtherCAT diagnostic function supported

■ 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 power supply function

- Equipped with 8 IO-Link device power supplies
- Class-A IO-Link ports
- Short circuit detection available for the power supply of each port
- Short circuit overcurrent protection: short circuit overcurrent protection available for Pin1, Pin2 (DO mode) and Pin4 (DO mode)

1.2 Naming Rules and Nameplate

G S 20 - ECT 8 L

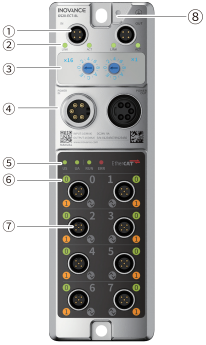
① ② ③ ④ ⑤ ⑥

① **Product Family** G: Inovance controller general-purpose module	④ **Communication Protocol** ECT: EtherCAT bus communication
② **Product Type** S: High protection	⑤ **Number of Conversion Channels** 8: 8 channels
③ **Series** 20: 20 series	⑥ **Module Type** L: IO-Link

The data for ordering the product is shown below.

Model	Description	Product Code	Applicable model
GS20-ECT-8L	GS20 series high protection IO 8-channel IO-Link master EtherCAT IP67 module	01440358	Class A IO-Link slave

1.3 Components



No.	Name	Description			
①	EtherCAT communication interface	IN OUT	Used for EtherCAT communication input and output. For pin assignment, see *"3.3 Terminal Assignment" on page 28*.		
②	EtherCAT communication indicator	LINK	Network connection indicator	Green	• Steady ON: Network connection succeeded • OFF: Network connection failed
		ACT	Data transmission indicator	Green	• Flashing: Data transmission in progress • OFF: No data transmission
③	DIP switch	Slave address setting switch (value range: 0–255) x16/x1: Slave address code plate switch. The code plate switch uses hexadecimal. The value of the x16 DIP switch represents the high 4 bits of the slave alias. The value corresponding to the x1 DIP switch represents the low 4 bits of the slave alias. Slave decimal address = (value corresponding to the x16 DIP switch) x 16 + (value corresponding to the x1 DIP switch) x 1 Example: Turn the x16 DIP switch to A (A = 10 in hexadecimal) and the x1 DIP switch to E (E = 14 in hexadecimal), then the slave alias is 0 x AE. The slave address in decimal is 10 x 16 + 14 = 174.			
④	Power supply interface	POWER IN POWER OUT	For power supply input/output[1], see the pin assignment in *"3.3 Terminal Assignment" on page 28*.		

No.	Name	Description			
⑤	Status indicator	US	System power supply indicator	Green/ red	• Steady green: US power supply voltage normal (18 V < US power supply voltage < 30.2 V) • Steady red: US power supply voltage > 30.2 V • Flashing in red[2]: 11 V < US power supply voltage < 18 V • Flashing in red [1]: US power supply voltage < 11 V • Off: no power supply
		UA	Actuator power supply indicator	Green/ red	• Steady green: UA power supply voltage normal (18 V < UA power supply voltage < 30.2 V) • Steady red: UA power supply voltage > 30.2 V • Flashing in red[2]: 11 V < UA power supply voltage < 18 V • OFF: UA power supply voltage < 11 V

No.	Name	Description			
⑤	Status indicator	RUN	EtherCAT status Indicators	Green	• OFF: EtherCAT slave in initialization state • Flashing: EtherCAT slave in pre-operational state • Single flashing: EtherCAT slave in safe operational state • Steady ON: EtherCAT slave in operational state • Quick flashing: EtherCAT slave in bootstrap state
		ERR	EtherCAT communication error indicator	Red	• Flashing: EtherCAT communication network error • OFF: EtherCAT communication network normal

No.	Name	Description			
⑥	IO-Link indicator	0	0 indicator	Yellow/ Red/ Green	• Steady yellow: Pin4 in input/output state 1 • Steady red: Pin4 overcurrent • Flashing in red: IO-Link error • Steady green: IO-Link communication connected • Flashing in green: IO-Link communication not connected • OFF: Pin4 in input/output state 0
		1	1 indicator	Yellow/ Red	• Steady yellow: Pin2 in input/output state 1 • Steady red: Pin2 overcurrent • Flashing in red: (LED1 and LED0 flashing simultaneously): Pin1 overcurrent • OFF: Pin2 in input/output state 0
⑦	IO-Link port	0/1/2/3/4/5/6/7	For I/O-Link data transmission, see the pin assignment in *"3.3 Terminal Assignment" on page 28*.		
⑧	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.		

The indicator's quick flashing/single flashing/flashing is defined as shown in the table below.

State	Description
Quick flashing	500 ms ON followed by 50 ms OFF, repeating periodically
Single flashing	500 ms ON followed by 1000 ms OFF, repeating periodically
Flashing	• US/UA indicator (flashing[1]): 250 ms ON followed by 250 ms OFF, repeating periodically. • EtherCAT indicator: 200 ms ON followed by 200 ms OFF, repeating periodically • IO-Link indicator & US/UA indicator (flashing[2]): 500 ms ON followed by 500 ms OFF, repeating periodically.

 : High temperature caution for the module.

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 (g)	Approx. 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	Maximum input 9 A, maximum output 9 A (external +24 V power supply disabled for IO-Link port)
US reverse polarity protection	Supported
US undervoltage detection	Undervoltage (lower than 18 V) detection supported by software

Item	Specification
Rated voltage of UA power supply	24 VDC (18 VDC to 30.2 VDC, common ground with US)
Maximum current of UA power supply	Maximum input 9 A, maximum output 9 A (DO disabled)
UA reverse polarity protection	Supported
UA undervoltage detection	Undervoltage (lower than 18 V) and voltage-loss (lower than 11 V) detection supported by software

■ Input specifications

Item	Specification
Input type	Digital input
Input mode	PNP
Maximum number of input channels	16
Input voltage class	24 VDC (18 VDC to 30.2 VDC) (SELV power supply)
Input current (typical value)	4 mA (typical@24 V)
ON voltage	>15 VDC
OFF voltage	<5 VDC
Hardware response time ON/OFF	100 μs/100 μs
Input impedance	5.3kΩ to 5.6kΩ
Isolation	Not supported
Input action display	When the input is in the driving state, the input indicator becomes on.
Input derating	/

■ Output specifications

Item	Specification
Output type	Digital output, transistor output
Output mode	PNP
Maximum number of output channels	16

Item	Specification
Output voltage class	24 VDC (18 VDC to 30.2 VDC)
Output load (resistive load)	2 A/channel; 9 A/module
Output load (inductive load)	24 W/point
Output load (lamp load)	18 W/point
Hardware response time ON/OFF	100 μs/100 μs
Leakage current at OFF	10 uA
Switching frequency	100 Hz for resistive load; 0.5 Hz for inductive load; 10 Hz for lamp load
Isolation	Not supported
Output action display	When the output is in the driving state, the output indicator becomes off.
Output derating	/
Fault Diagnosis	Output overcurrent
Protective function	Overcurrent protection

■ IO-Link specifications

Item	Specification
Number of ports	8
IO-Link version	1.1.3
Transmission rate	• COM1 (4.8 kBaud) • COM2 (38.4 kBaud) • COM3 (230.4 kBaud)
Magnitude of process data	• Input per port: 32 bytes max. • input per module: 8 x 32 byte (8 ports) max. • Output per port: 32 bytes max. • Output per module: 8 x 32 byte (8 ports) max.
Capacity of the memory for saving device parameters	2 kbyte (applicable to each port)
Unshielded drain wire length	20 m max.

Item	Specification
IO-Link port type	Class A
External +24 V supply current of IO-Link port (Pin1)	1.6 A

■ EtherCAT specifications

Item	Specification
Number of network ports	2 (M8-4pin-D type)
Communication Protocol	EtherCAT protocol
Supported services	FoE, CoE (PDO, SDO)
Synchronization mode	Distributed Clock (DC) synchronization for servo, input and output synchronization for I/O
Physical layer	100Base-TX
Baud rate	100 Mbps
Duplex mode	Full duplex
Topology	Line topology
Transmission medium	Flexible crossover cable, double-layer shielded (SFTP or SFTPP), Cat5e or above
Transmission distance	Less than 100 m between two nodes
EtherCAT frame length	44 bytes to 1498 bytes
Process data	Max. 1,486 bytes per Ethernet frame
DLR function	Supported
Automatic scanning function	Supported
EtherCAT conformance certification	Certified

1.5 Environmental Specifications

Item	Operating Specification	Transmission Specification	Storage Specification
IP rating	IP67 (with screws tightened)		
Pollution degree	2		

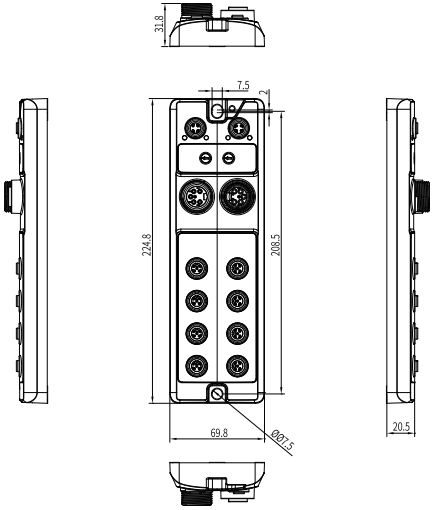
Item		Operating Specification	Transmission Specification	Storage Specification
Overvoltage category		I		
Immunity		2 kV on power supply line (IEC61000-4-4)		
Temperature		-25°C to +70°C	-40°C to +85°C	-40°C to +85°C
Humidity		10% to 90% RH (without condensation)		
Vibration	Frequency	5 Hz to 500 Hz	2M2	1M2
	Displacement	1 mm (direct installation) (5 Hz to 61 Hz)		
	Acceleration rate	15 g (direct installation) (61 Hz to 500 Hz)		
	Direction	3-axial directions		
Shock resistance		Application/Transportation scenario: Tested according to IEC60068-2-27; 15 g peak acceleration, 11 ms pulse width, 18 times in X/Y/Z-axis directions		
Altitude		0 m to 2000 m	0 m to 3000 m	

2 Mechanical Installation

2.1 Installation Dimensions

■ Module

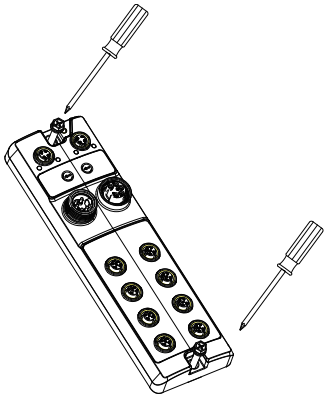
The installation dimensions (in mm) are shown in the figure below.

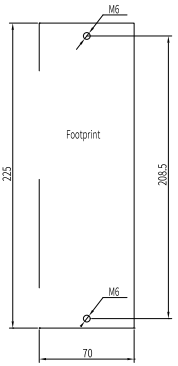


2.2 Installation Method

■ 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 208.5 mm. The following figure describes the installation and clearance (unit: mm).





■ Removal

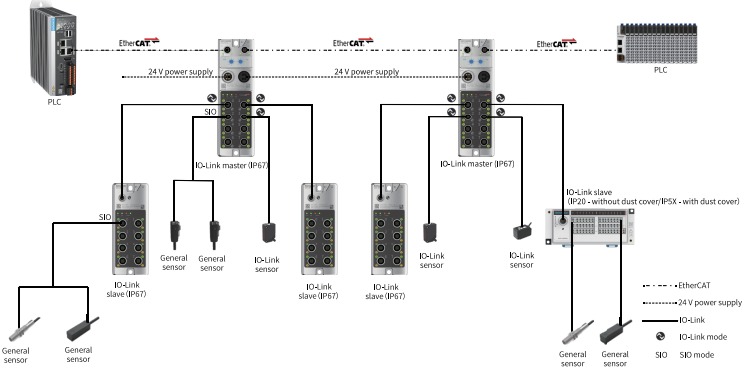
Remove the M6 screws using a Phillips screwdriver, and then detach the module.

3 Electrical Installation

3.1 IO-Link Topology

I/O-Link is a serial digital communication protocol that integrates intelligent sensors and actuators into automation systems. It is the first standardized I/O technology (IEC 61131-9) used for communication of sensors and actuators. It is used for periodic data exchange between the sensor/actuator and the PLC (Programmable Logic Controller). IO-Link is not a fieldbus, but an open point-to-point communication. This protocol is easy to use, stable, and reliable.

The IO-Link topology consists of the PLC, IO-Link master (GS20-ECT-8L), and IO-Link slave (GR20-16EMNL, GR20-16EMPL, GS20-16EMNL, or GS20-16EMPL), sensor/actuator, and IO-Link cable. The IO-Link master is connected to the PLC and IO-Link master through EtherCAT communication. The IO-Link master and IO-Link slave, the IO-Link master and the sensor/actuator and the IO-Link slave and sensor/actuator are connected through IO-Link communication. The IO-Link master/slave can directly power up the sensor/actuator. The IO-Link topology is shown in the following figure.



Note

The IO-Link port supports two operating modes: IO-Link mode and SIO mode (Standard I/O mode), which can be separately configured on any port.

3.2 Cable Selection

■ EtherCAT communication cable

The data for ordering the EtherCAT communication cable is as follows.

Model	Description	Length	Material Code
CAB-M12DMS4-M12DMS4-3	Cable assembly - EtherCAT cable - Male (straight) - 22AWG - Green - Male (straight) - 80°C (cables for cascading multiple IO-Link masters (EtherCAT 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 - EtherCAT cable - Male (straight) - 26AWG - Black - RJ45 - 80°C (PLC network port connected to EtherCAT communication cable of the master)	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 (cable used to power the master)	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

See the following table for meaning of the power supply cable colors.

No.	Color	Function
1	Black	0 V
2	Blue	0 V
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) - 16AWG - Black - Female (angled) - 80°C (cable used for cascading of 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 IO-Link master to IO-Link substation)	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 the IO-Link substation)	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:

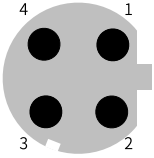
Model	Description	Material Code
CON-M12AFS4	4-pin female (straight) field-wirable plug	15051155
CON-M12AFL4	4-pin female (angled) field-wirable plug	15051157
CON-M12AMS5	5-pin male (straight) field-wirable plug	15051156
CON-M12AML5	5-pin male (angled) field-wirable plug	15051158
CON-M12AMS5-YF5	1-male-to-2-female M12 Y-type connector used for transitioning from CLASS A to CLASS B devices on the master	15051159
CON-M12AMS4-YM8BF3	Y splitter used for converting one M12 5-pin A-code male straight connector to two MB 3-pin female connectors	15051420
CON-M12AMS4-YM8BF4	Y splitter used for converting one M12 5-pin A-code male straight connector to two MB 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 used for converting one female straight connector to two male straight connectors, which is applicable to CLASS B devices on the substation	15051334

Note

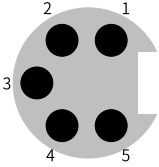
If you have additional requirements for cable selection, contact Inovance for customization.

3.3 Terminal Assignment

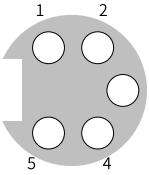
■ Assignment of EtherCAT pins

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

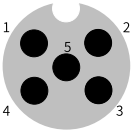
■ Assignment of power supply input pins

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

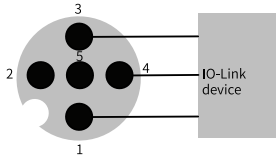
■ Assignment of power supply output pins

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

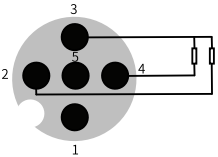
■ IO-Link port pins

Diagram	Pin	Func-tion	Description	Color definition
	1	L+	+24 V power supply (US+)	Brown
	2	I/Q	• 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	• SIO: Standard input/output mode • IO-Link communication mode	Black
	5	NC	Not connected (Class A)	Not defined
		2L-	+24 V power supply (UA-)	

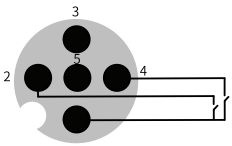
3.4 Terminal Wiring



Connecting IO-Link device



Connecting DO device



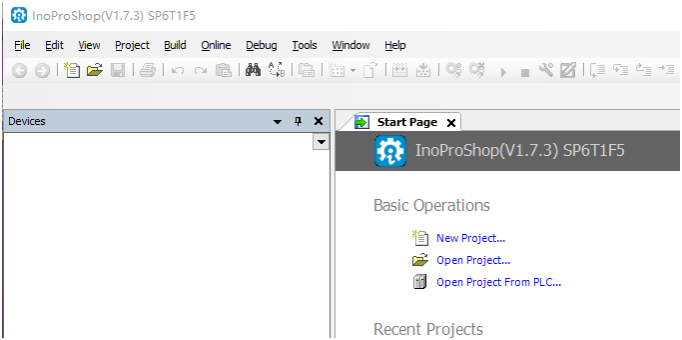
Connecting DI device

4 Programming Commissioning

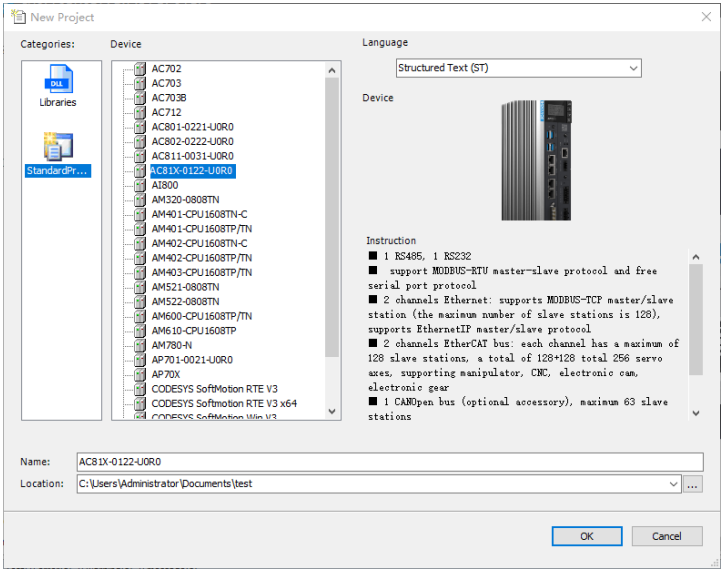
4.1 Configure IO-Link in InoProShop

4.1.1 Creating a Project

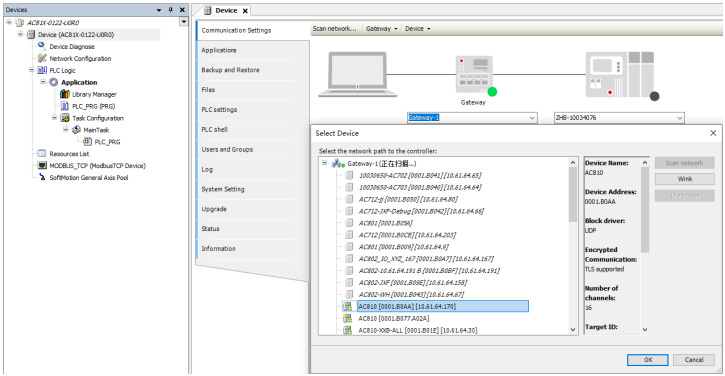
1. Double-click the InoProShop desktop shortcut (version V1.7.3 or later) to start the InoProShop programming software.
2. Select "File -> New Project" in the menu bar, or click in the toolbar, or click "New Project" in the workspace to open the "New Project" dialog.



3. Select "Standard Project" in the "Categories" column, select the PLC device in the "Device" column (take AC81X-0122-U0R0 as an example), and select the programming language in the Language column (take "Structured Text (ST)" as an example). Customize the project name and path for storage and click "OK".



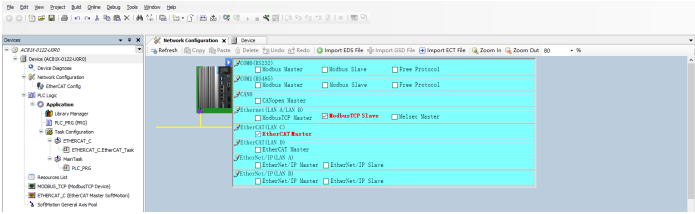
4. Double-click "Device", click "Scan Network", select the device name, and click "Wink". Check whether the PLC device indicator flashes. If yes, the communication between PC and the PLC has been established successfully. Click "OK" to complete the project creation.



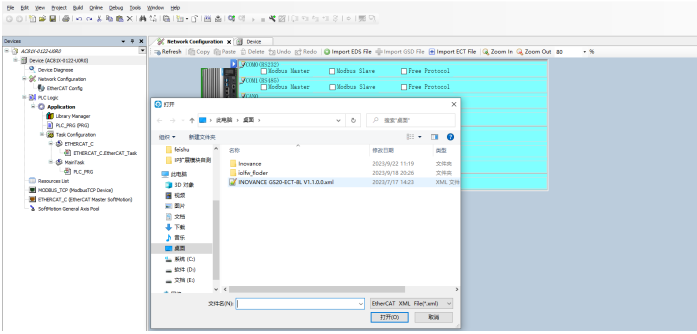
4.1.2 Loading the Master

1. Set PLC as EtherCAT master.

   a. Double-click "Network Configuration" in the navigation tree of "Device", click the middle device icon, and select "EtherCAT master" for the corresponding network port on the configuration interface to configure the PLC as the EtherCAT master.

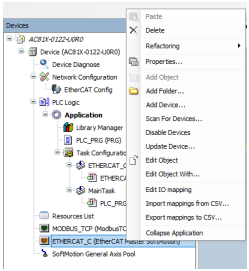


   b. (This step is skipped for published products.) Click "Import ECT File" and select the xml file of GS20-ECT-8L in the corresponding file folder. Click "Open" to add the xml file of GS20-ECT-8L.

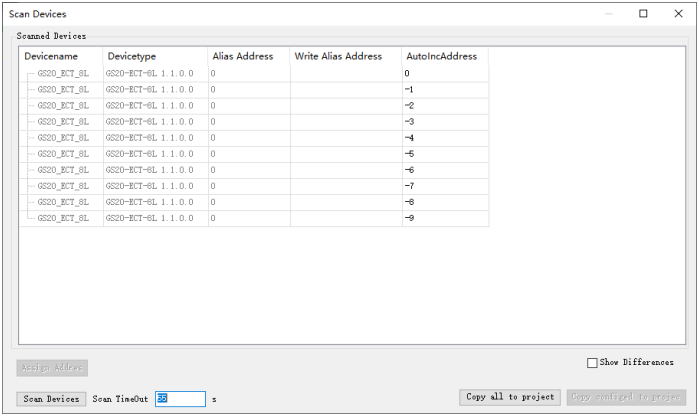


2. Setting IO-Link master

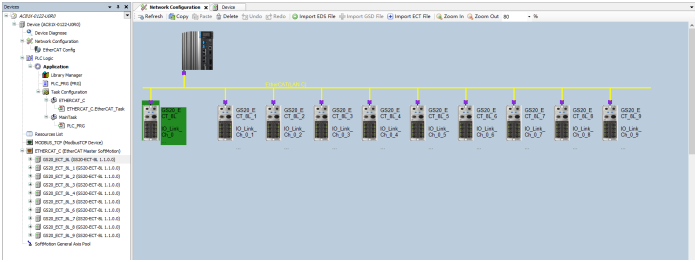
a. Right-click ETHERCAT_C in the navigation tree of "Device" and select "Scan for Devices" to open this interface.



b. On the "Scan for Device" interface, click "Scan Devices", and then click "Copy all to project" to finish loading the master.



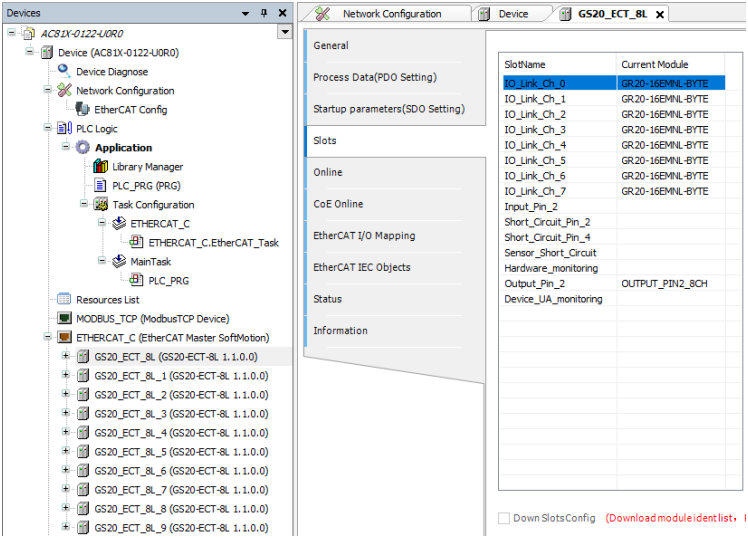
c. The corresponding master number is displayed in "ETHERCAT_C" or "Network Configuration" in the navigation tree of "Device".



4.1.3 Configuring the Master

■ Introduction to slots

There are 14 slots in GS20-ETC-8L. Double-click the master name in ETHERCAT_C in the navigation tree of "Device" (take GS20_ECT_8L as an example), and click Slot Configuration in the pop-up window to view the "Slot Name" and "Current Module". The description of each slot is shown in the following table.



Slot Name	Description
IO_Link_Ch_0 to IO_Link_Ch_7	Port mode, optional Pin4 modes include: • Configured as Inovance IO-Link slave module: GR20-16ENL/GR20-16EMPL/GS20-16EMNL/GS20-16EMPL, where "N" is active low and "P" is active high. • Configured as standard input: STD_IN_1bit • Configured as standard output: STD_OUT_1bit • Configured as IO_Link input: For example, IOL_I_1byte represents the IO_Link input configured with one byte. • Configured as IO_Link output: For example, IOL_O_1byte represents IO_Link output configured with one byte. • Configured as I/O_Link input/output: For example, I/O_1/_1byte represents I/O_Link input/output configured with one byte.
Input_Pin_2	Pin2 input
Short_Circuit_Pin_2	Pin2 short circuit monitoring
Short_Circuit_Pin_4	Pin4 short circuit monitoring

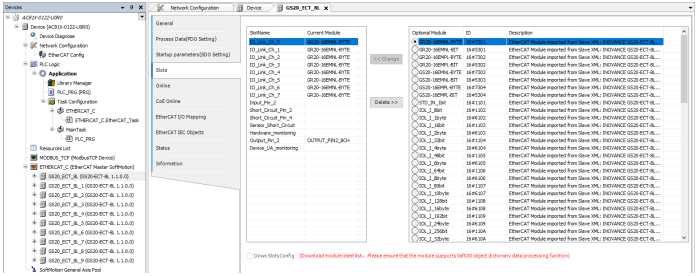
Slot Name	Description
Sensor_Short_Circuit	Pin1 short circuit monitoring
Hardware_ monitoring	Hardware state monitoring (including US and UA power supply voltage and module temperature)
Output_Pin_2	Pin2 output
Device_UA_ monitoring	Slave UA power supply voltage fault monitoring function (when the slave reports UA voltage overvoltage or undervoltage fault, the corresponding process data bit will be set to true)

■ Slot configuration

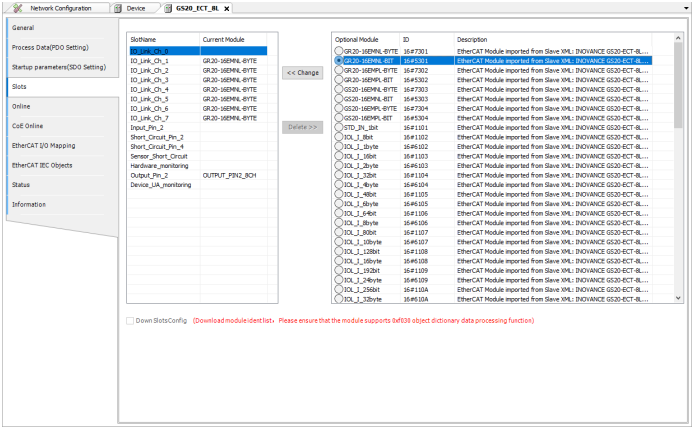
There are two methods to configure the master slot.

- Method 1

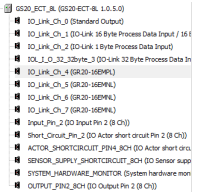
1. Double-click the master name in "ETHERCAT_C" in the navigation tree of "Device", and click "Slot Configuration" in the pop-up window to select the corresponding slot.
2. (Optional) Click "Slot Name" to select the corresponding slot. Click "Delete" to delete the original slot configuration. If the "Optional Module" column for the slot is empty, skip this step.



3. When the "Current Module" corresponding to the selected "Slot Name" is empty, check the desired mode/module in the "Optional Module" column on the right, then click "Change" to complete the slot configuration.

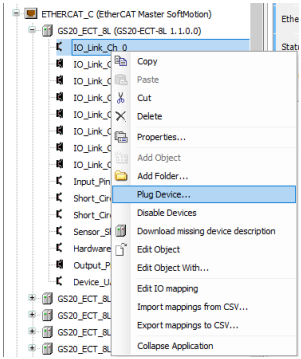


4. After the slot configuration has been completed, click ⊞ to expand the master module configured (take GS20_ECT_8L as an example) in the navigation tree of "Device" on the left to view the configuration results.

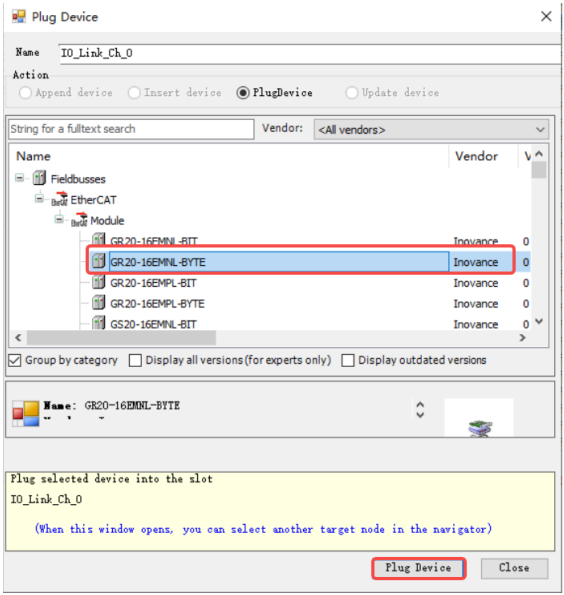


- Method 2

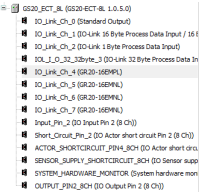
1. In the navigation tree on the left, click ⊞ to expand ETHERCAT_C->GS20_ECT_8L, right-click the corresponding slot, and click "Plug Device".



2. On the "Plug Device" page, select the corresponding slot configuration and click "Plug Device" to complete the slot configuration.

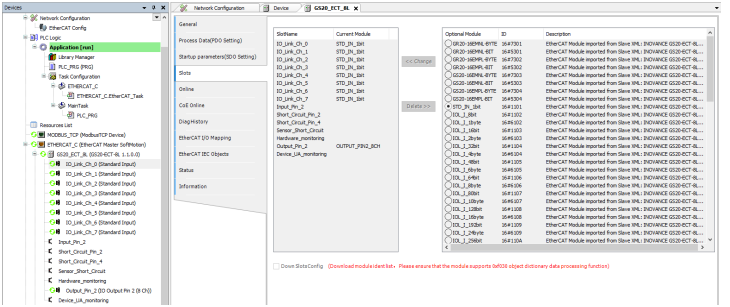


3. After the slot configuration has been completed, click ⊞ to expand the master module configured (take GS20_ECT_8L as an example) in the navigation tree of "Device" on the left to view the configuration results.

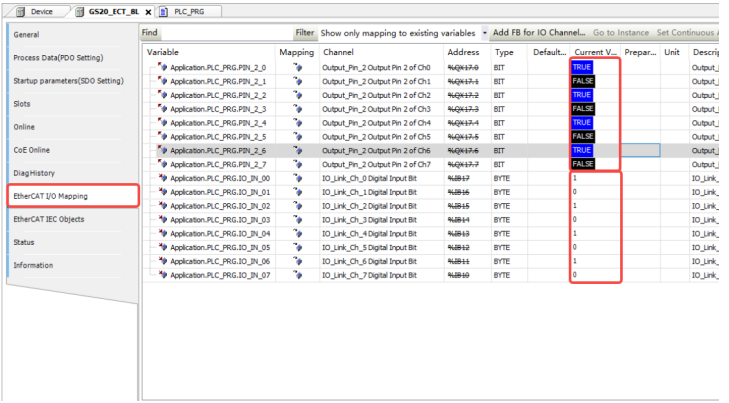


■ I/O terminal configuration of GS20-ECT-8L master

1. In the navigation tree of "Device" on the left, Click ⊞ to expand ETHERCAT_C. Double-click "GS20-ECT-8L" master and click "Slot Configuration" in the pop-up window. Configure "Current Module" of any port or multiple ports in IO_Link_Ch_0 to IO_Link_Ch_7 as the input mode as shown in *"4.1.3 Configuring the Master" on page 34*.



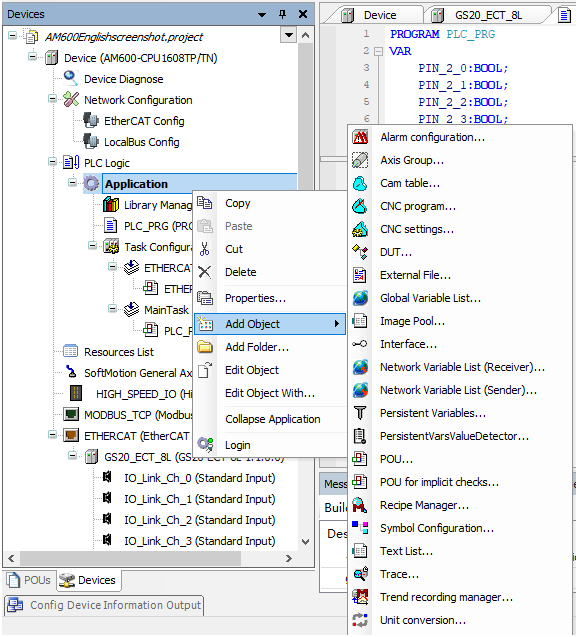
2. Log in to the PLC device, open the master configuration interface, and click "EtherCAT I/O Mapping" to enable Pin2 of the 8 master ports (that is, the corresponding value in the "Current Value" column is TRUE, as shown in the blue status indicator in the following figure, which indicates Pin2 output enable), and check whether the corresponding data of Pin4 is consistent with the output of Pin2 (TRUE corresponds to 1, FALSE corresponds to 0), as shown in the following figure.



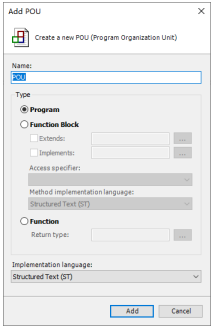
4.1.4 Writing the Program

Write a PLC program to control operation of the device through codes.

1. In the navigation tree of "Device" on the left, right-click "Application", and select "Add Object > POU...".



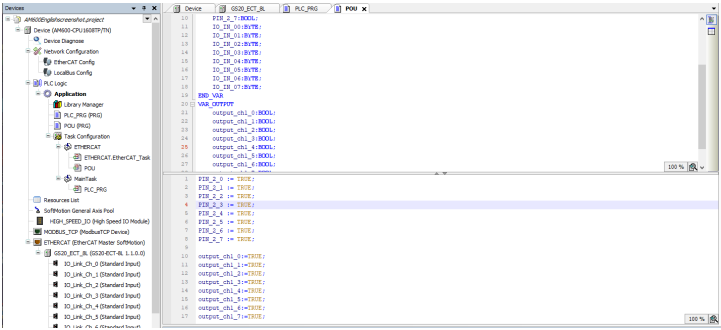
2. Set the name of the program, select "Program" for "Type" and "Structured Text (ST)" for "Implementation language", and then click "Add" to add the program.



3. In the navigation tree of "Device" on the left, you can view the organizational unit added, define variables, and write user programs. After you finish writing, drag the program files to "EtherCAT_C" or "MainTask" under "Task Configuration".

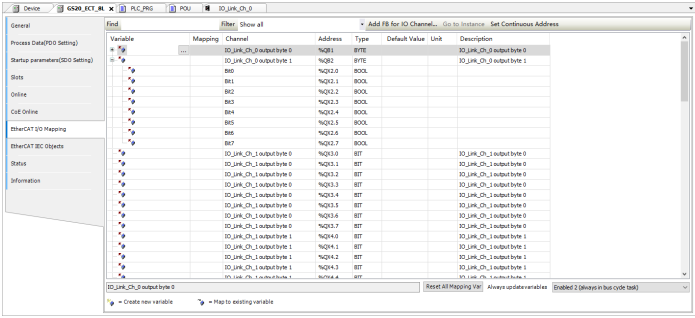
Note

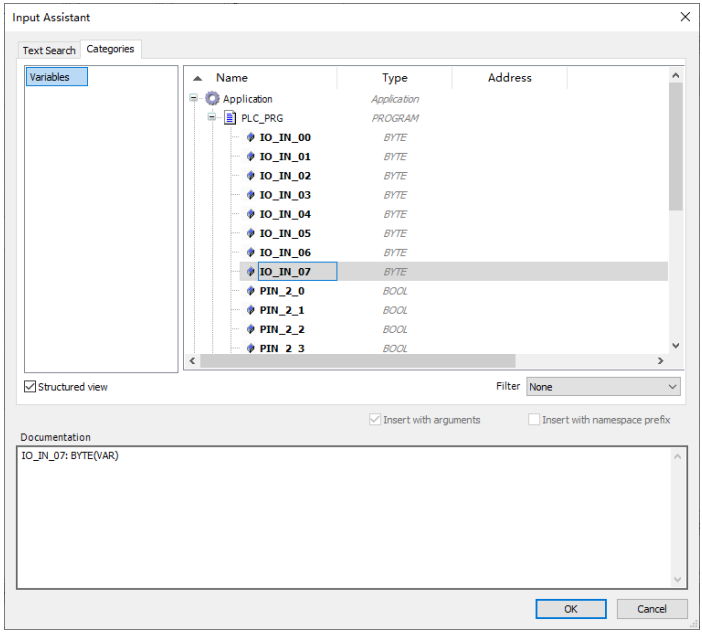
After compiling, when the program file is dragged into EtherCAT_C group under “Task configuration”, it must be dragged to ETHERCAT_C.EtherCAT_Task.



4. Configure the EtherCAT I/O mapping relation.

a. In the navigation tree of "Device" on the left, click ⊞ to expand "ETHERCAT_C". Double-click the "GS20-ECT-8L" master, click "EtherCAT I/O Mapping" in the pop-up window, and then double-click the port to be configured in the "Variables" column. Click ... (when the mapped variable type is BOOL, you need to click ⊞ in the "Variable" column to expand and complete the mapping) to display the "Input Assistant" interface.

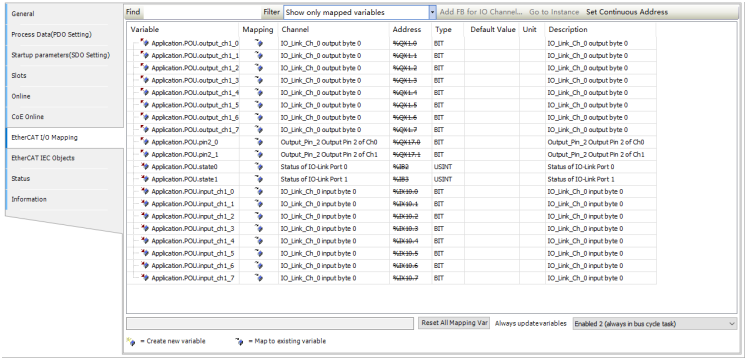




b. In the "Input Assistant" interface, click "Category", select "Variables", and then click ⊞ to expand "Application>POU". Select the corresponding variable, and click "OK" or directly double-click the corresponding variable to complete the EtherCAT I/O mapping.

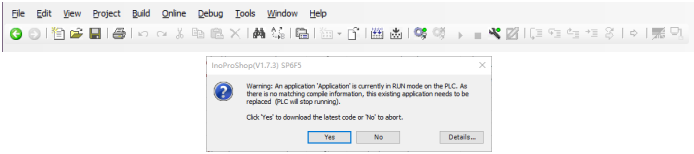
Note

Take the operation where channel 0 is configured as GR20_16EMPL and channel 1 is configured as GR20_16EMPL as an example to map the corresponding input/output variables. If the slave is configured with output, set the output_pin2_chn of the corresponding port.



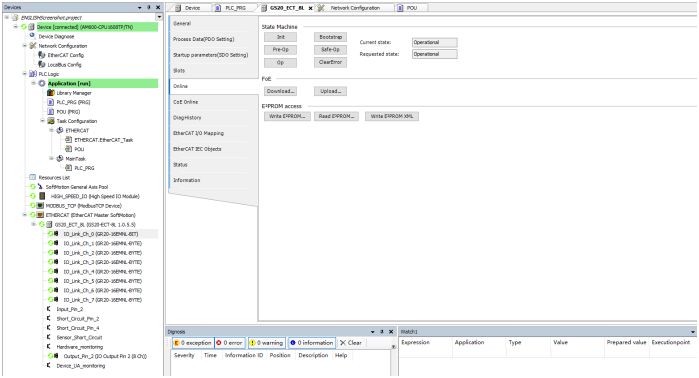
5. Compile and download the program.

a. Click , and icons in the toolbar. Click "Yes" in the dialog box displayed to download the program to the PLC.



b. Log in to the PLC and the ERR indicator of the IO-Link master connected to the PLC flashes in red. After the program is downloaded, click to run the program.

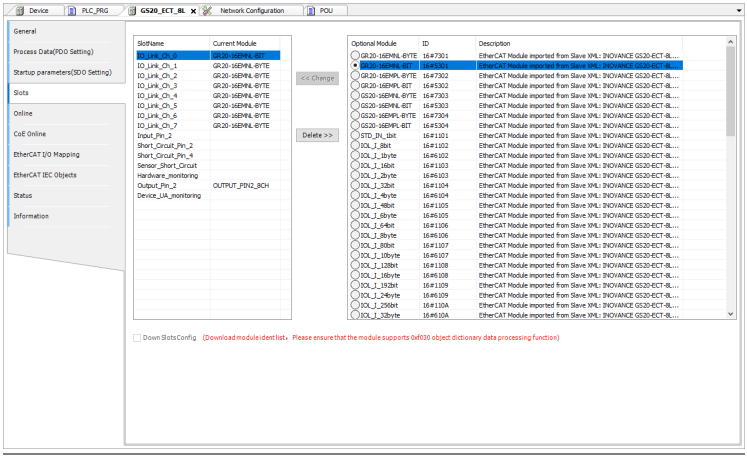
c. In the navigation tree of "Device" on the left, double-click "GS20-ECT-8L". In the pop-up window, click "Online" to view the "State Machine" configuration box with "Init" (initialization), "Pre-Op" (pre-operational), "Safe-Op" (safe operational) and "Op" (operational) states. Meanwhile, the "RUN" state can also be seen in the navigation tree of "Device" on the left.



d. The RUN indicator of the IO-Link master flashes from green to steady green, and the port "0" indicator configured as the "IO-Link" mode flashes in green.

Note

The "IO-Link" mode indicates that ports 0 to 7 are configured as non-SDT_OUT_1bit or STD_IN_1bit. Others are all configured as “IO-Link” mode, as shown below.



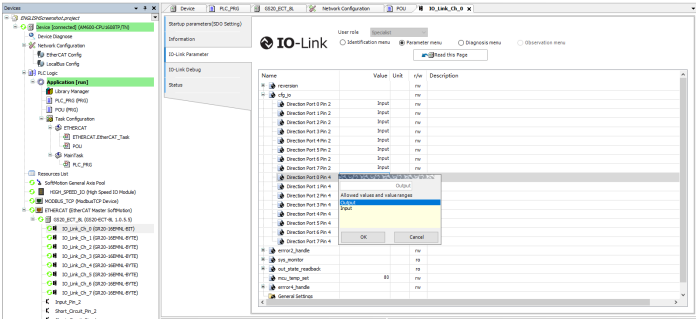
e. Connect the I/O-Link slave with model GR20-16EMPL at port 0.

Note

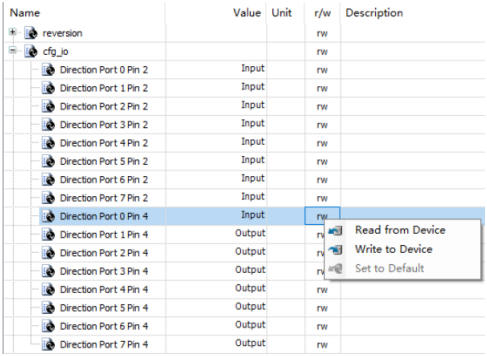
The "0" indicator on port 0 of the device changes from flashing green to solid green, and the "1" indicator on port 0 is solid yellow (Output_pin2_chn is set in the example). The US indicator of the IO-Link slave is solid green, and the COM indicator flashes in green, indicating that I/O-Link communication is normal.

4.1.5 Configuring GS20-16EMNL Slave

1. After the slave is loaded, this step is completed in the slot configuration phase. For details, see slot configuration in *"4.1.3 Configuring the Master" on page 34*.
2. Configure GS20-16EMNL slave
   a. Connect the master to Pin2 of the slave port (For details, see "Configuration of the I/O port of GS20-ECT-8L Master" in *"4.1.3 Configuring the Master" on page 34*).
   b. In the navigation tree of "AC810.project" on the left, Click ⊞ to expand ETHERCAT_C->GS20-ECT-8L_0. Double-click IO_Link_Ch_0 to enter the slave I/O_Link configuration interface.
   c. Click "IO_Link Parameter", check the "Parameter menu", and click "Read this Page" to read the parameters. Click ⊞ to expand "cfg_io". Click a port of the slave to perform configuration, select "Output" or "Input", and click "OK".



   d. Right-click the "Read/Write" column, select "Write to Device" to write the current configuration to the slave. After a pop-up window indicates the writing process is done, the configuration is succeeded.



3. Validate the correctness of slave configuration.

Note

Take the eight low bits (PIN2, configured as output) and eight high bits (PIN4, configured as input) of IO-Link slave GS20-16EMNL as an example, perform short connection to check whether ports 0 and 1 of GS20-ECT-8L are configured properly.

---

a. Short Pin2 and Pin4 of each port of GS20-16EMNL with a jumper bar.

b. Validate whether port 0 of GS20-ECT-8L is configured correctly.

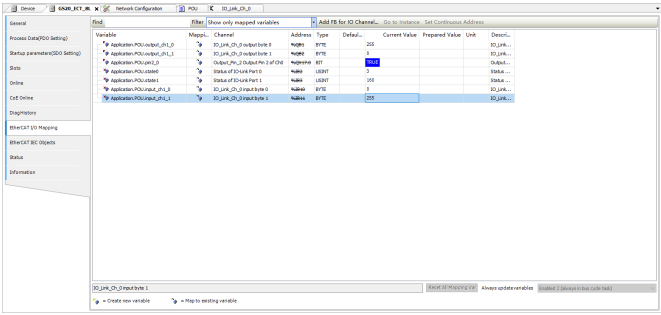
1). Connect the I/O-Link interface of the GS20-16EMNL to the port 0 of GS20-ECT-8L through the I/O-Link communication cable.

2). Double-click "GS20-ECT-8L" and click "EtherCAT I/O Mapping" in the pop-up window. Set the low 8 bits of port 0 of GS20-ECT-8L to "255" by byte, and output signal "1" to the 8 I/O ports of IO-Link slave of GS20-16EMN.

3). Check the state of the high 8 bits of input data of GS20-ECT-8L port and the I/O indicator of the I/O slave of GS20-16EMN.

- If the high 8 bits of input data of port 0 of GS20-ECT-8L is "255" and the I/O indicator of the I/O-Link slave of GS20-16EMN is all turned on, the configuration is correct.

- If not, the configuration is incorrect. In this case, check the connection of the device and validate again after a re-configuration.



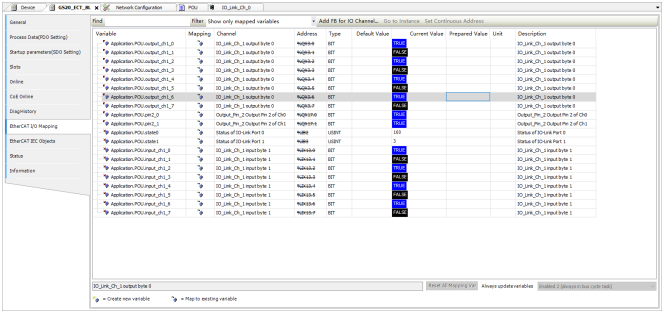
c. Validate whether port 1 of GS20-ECT-8L is configured correctly.

1). Connect the I/O-Link interface of the GS20-16EMNL to the port 1 of GS20-ECT-8L through the I/O-Link communication cable.

2). Double-click "GS20-ECT-8L" and click "EtherCAT I/O Mapping" in the interface that opens. The low 8 bits of output data of port 1 of GS20-ECT-8L are set by bit as shown in the following figure. Output "TRUE" or "FALSE" signals to the 8 I/O ports of the IO-Link slave of GS20-16EMNL.

3). Check the high 8 bits of input data of port 1 of GS20-ECT-8L and the I/O indicator state of the IO-Link slave of GS20-16EMNL.

- If the high 8 bits of input data and the low 8 bits of output data of port 1 of the master (GS20-ECT-8L) are the same, and the I/O indicator of the I/O-Link slave of GS20-16EMNL is displayed the same as the low 8 bits of output data, the configuration is correct.
- If not, the configuration is incorrect. In this case, check the connection of the device and validate again after a re-configuration.



Note

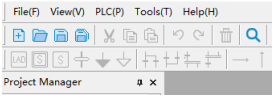
The port condition of GS20-16EMNL slave (port 0 as example) is shown below.

Drawing	Process data	Port indicator	Port pin
	BYTE1	0 indicator (ch0-ch7)	Pin4 (ch0-ch7)
	BYTE0	1 indicator (ch0-ch7)	Pin2 (ch0-ch7)

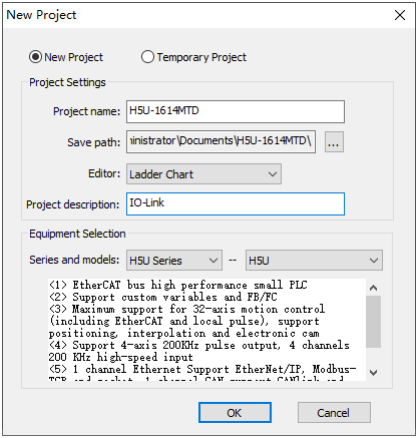
4.2 Configure IO-Link in AutoShop

4.2.1 Creating a Project

1. Double-click the AutoShop desktop shortcut to start the AutoShop software.
2. Click "File -> New Project", or click to create a new project.

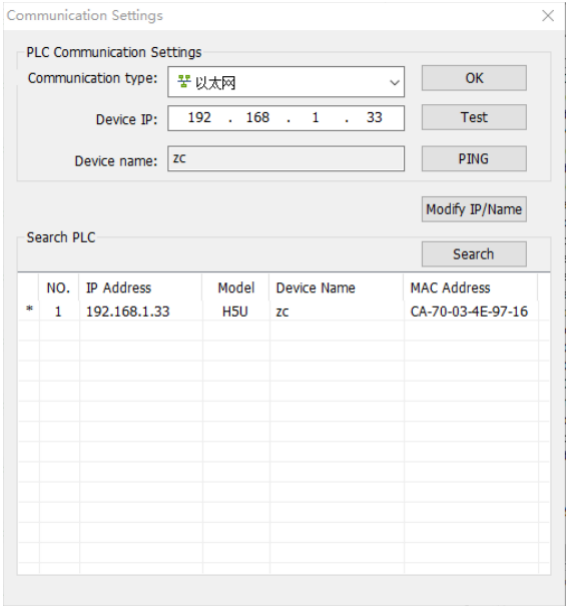


3. In the "New Project" interface, complete the corresponding settings and click "OK" to complete the new project creation.



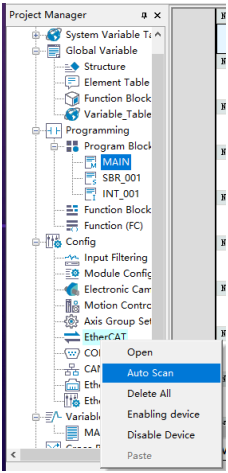
Item		Description
Project type		• New project • Temporary project
Project settings	Project name	User-defined
	Save path	User-defined
	Editor	• Ladder diagram: It is a programming language similar to that of the relay circuit, which is commonly used in PLC program design. • LiteST: Provides excellent sequential logic control through graphic type programming. • Sequential function diagram: The structure text language is the most widely used language in CodeSYS. It can greatly reduce the amount of codes used in complex control systems and simplify complex problems.
	Project description	Project description
	Device model selection	Select series and device model.

4. Click in the shortcut menu, select the corresponding "Communication type", click "Search", and select the corresponding device in the list below. Click "Test" and you can see that the PLC device displays 0 alternately, indicating that the connection is good. Click "OK" to complete the connection.

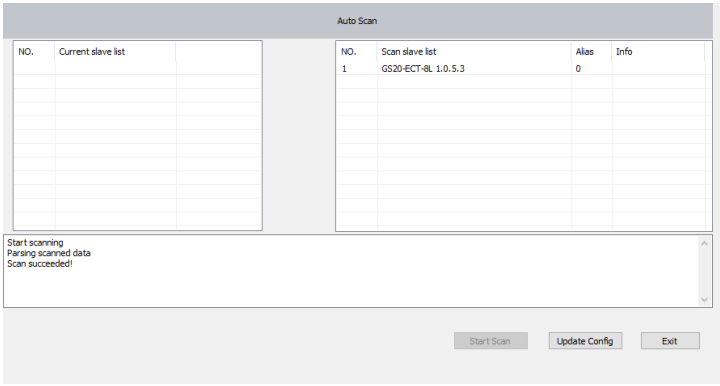


4.2.2 Loading the Master

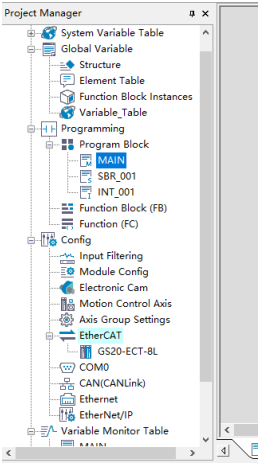
1. In the navigation tree of "Project Manager" on the left, click ⊞ to expand the "Config" group, then right-click on "EtherCAT" and select "Auto Scan".



2. Click "Start Scan" in the pop-up window, After the scan is complete, select the device from the slave list and click "Update Config" to complete the addition of the master station device.

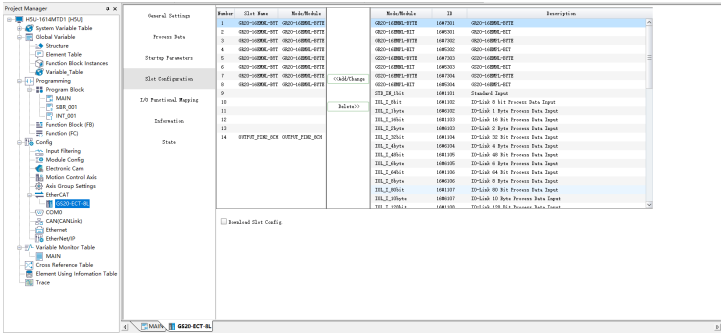


3. After adding the master, click in the "Project Manager" on the left to expand EtherCAT to view the device model added.



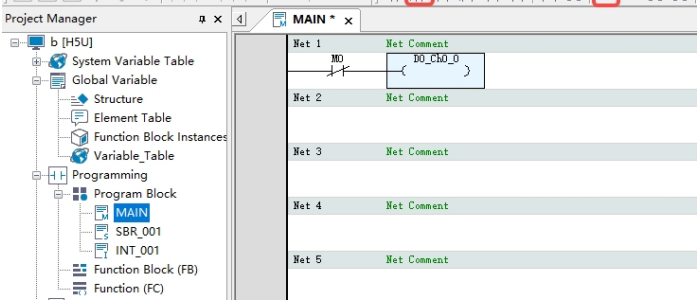
4.2.3 Configuring the Master

1. In the navigation tree of "Project Manager" on the left, click to expand "Config -> EtherCAT". Double-click the master "GS20-ECT-8L" and click "Slot Configuration" function, and then select the corresponding slot and click "Delete" to delete the original slot configuration.
2. For the slots with configurations deleted (where "Mode/Module" corresponding to "Slot Name" is empty), you can select the device to be inserted on the right side. After selection, click "Add/Change" to complete the corresponding slot configuration.

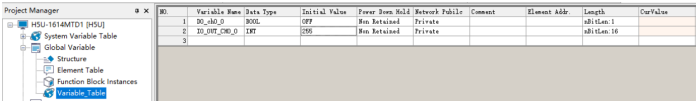


3. GS20-ECT-16L master IO configuration (taking Pin2 of port 0 of the master as an example)

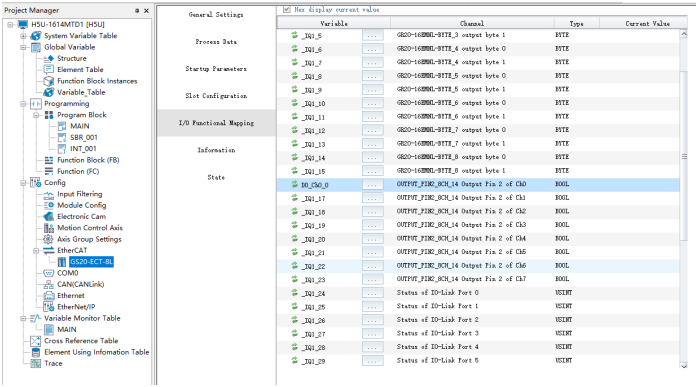
a. In the navigation tree of "Project Manager" on the left, click ⊞ to expand "Programming > Program Blocks", double-click "MAIN" to open the programming interface, and add network component as shown in the figure below.



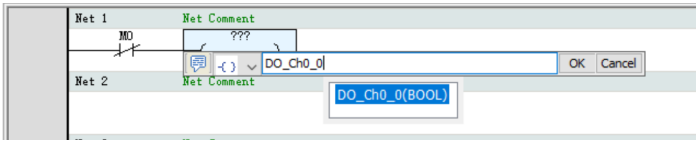
b. In the navigation tree of "Project Manager" on the left, click ⊞ to expand "Global Variable", and double-click "Variable_Table" to add the corresponding variable (e.g., D0_Ch0_0). Then click "Data Type" and "Initial Value" to set the corresponding parameters.



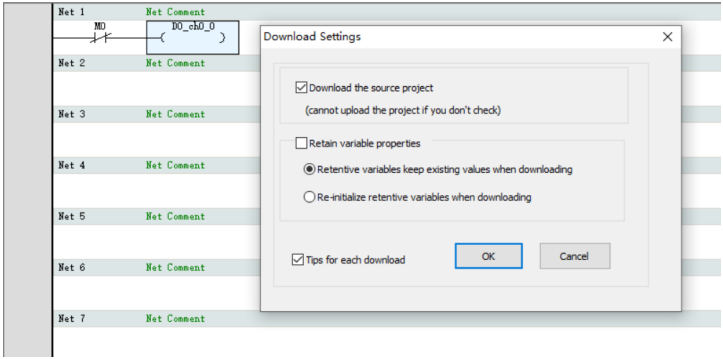
c. After the parameter setting, in the navigation tree of "Project Manager" on the left, click ⊞ to expand "Config -> EtherCAT" sequentially. Then click the master device "GS20-ECT-8L", select "I/O Functional Mapping" in the configuration interface, locate the port that needs mapping, click ... in the "Variable" column, and enter the variable name (D0_Ch0_0) added in the previous step to complete the port mapping.



d. Configure the coil ???() in the programming interface by double-clicking the component and entering the variable name (D0_Ch0_0) added in the previous step into the variable field. Click "OK" to complete the configuration.



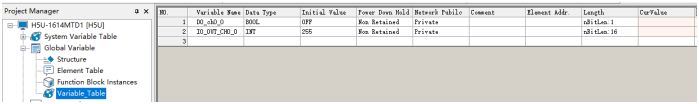
4. To download the program, click the icon in the menu bar to open the "Download Settings" interface. Check "Download the project source code" and "Retentive variables keep existing values when downloading", and click "OK" to download.



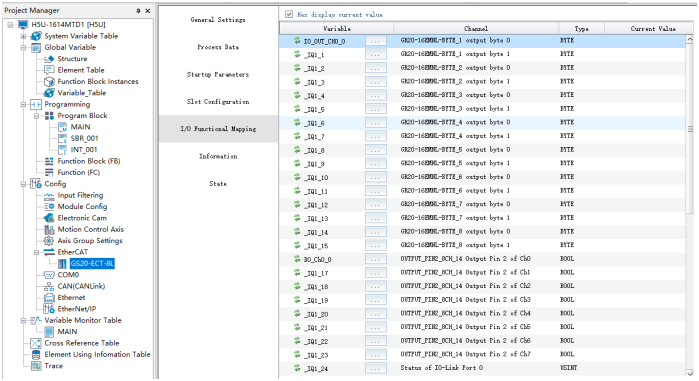
5. Check Pin2 output indicator of port 0 of "GS20-ECT-8L".
   - The indicator lights up, which indicates that the configuration is successful.
   - The indicator is off, which indicates that the configuration is incorrect. Check the connection and configure it again.

4.2.4 Configuring GS20-16EMNL Slave

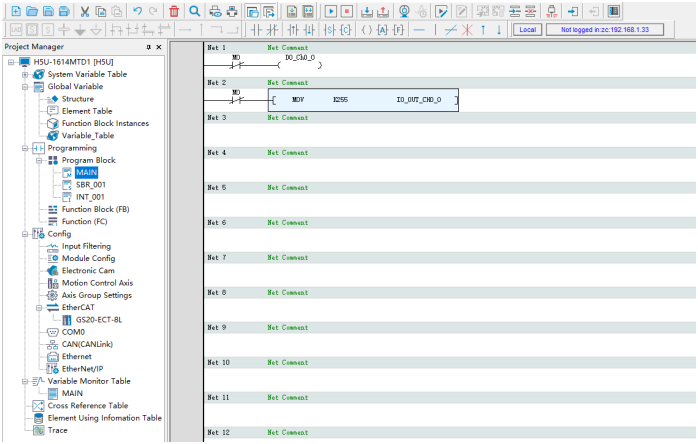
1. After the slave is loaded, this step is completed in the slot configuration phase. For details, see slot configuration in *"4.2.3 Configuring the Master" on page 56*.
2. I/O operation of the slave port of GS20-16EMNL (connect the master port 0 to the slave, take slave BYTE0 as output and slave BYTE1 as input to short the output and input)
   a. In the navigation tree of "Project Manager" on the left, click to expand "Global Variable", and click "Variable_Table" to add an INT-type variable (e.g., IO_OUT_CH0_0) and set the variable parameters.



b. In the navigation tree of "Project Manager" on the left, click ⊞ to expand "Configuration > EtherCAT", select the master device "GS20-ECT-8L", and click "I/O Functional Mapping" in the configuration interface, then click ... of the channel to be mapped and input the variable name added in the previous step (IO_OUT_CH0_0) to complete port mapping.



c. In the navigation tree of "Project Manager" on the left, click ⊞ to expand "Programming > Program Blocks", double-click "MAIN" to open the programming interface, and configure "Net 2" as shown in the figure below.



d. Click  to download the program and observe the I/O condition of the slave port after running. Check the input data state of the high 8 bits of port 0 of GS20-ECT-8L and the I/O slave indicator of GS20-16EMNL.

- If the high 8 bits of input data and low 8 bits of output data of the port 0 of the GS20-ECT-8L are the same, and the IO-Link slave I/O indicator of GS20-16EMNL is displayed according to the low 8 bits of output data, the configuration is correct.
- Otherwise, the configuration is incorrect. Check the connection again and perform the preceding steps again.

5 Fault Diagnosis

5.1 EtherCAT Diagnosis

LED Indicator		Description	Possible Cause	Solution
RUN	OFF	The EtherCAT slave is in the initialization state.	The EtherCAT master is not connected to the EtherCAT slave.	• Check that the configuration and parameter assignment are correct. • Check that the communication address configuration is correct. • Check that the network cable specifications (M12 interface, with a shielded Cat5e network cable) and length (within 100 m) meet the requirements.
	Flashing in green	The EtherCAT slave is in the pre-operational state.	The EtherCAT slave is in a non-OP state.	• Check that the EtherCAT slave configuration is correct. • Check that the slave is not faulty. • Check that all EtherCAT slaves are configured.
	Single flashing in green	The EtherCAT slave is in the safe operational state.		

LED Indicator		Description	Possible Cause	Solution
ERR	Flashing in red	The EtherCAT communication network is abnormal.	• The EtherCAT master does not exchange data with the EtherCAT slave station. • The EtherCAT communication receives non-executable state transition commands. • The EtherCAT has a synchronization error. • A watchdog error occurs in the EtherCAT communication.	• Check that the M12 network cable plug is correctly inserted. • Check that the network cable is intact. • Check that the PDO configuration is correct. • Restart the power supply.

5.2 IO-Link Diagnosis

The following table lists the fault codes and their definitions.

Type	Fault Code	Description
System	0x0002	US power supply voltage too high
	0x0003	US power supply voltage too low
	0x0004	UA power supply voltage too high
	0x0005	UA power supply voltage too low
	0x0006	MCU temperature exceeding 80°C
	0x000c	Pin2 short-circuited
IO-Link master	0x1800	Device not detected by the port
	0x1801	Parameter loading failed
	0x1802	Invalid vendor ID
	0x1803	Invalid DEVICE ID
	0x1804	Pin4 short-circuited
	0x1805	PHY chip overtemperature
	0x1806	Pin1 short-circuited
	0x1807	Pin1 overcurrent
	0x1808	Slave event overflow
	0x1811	Pin4 short-circuited (DO mode)
	0x1813	Pin4 overcurrent (DO mode)
	0x6000	Invalid cycle time
	0x6001	Slave version error

6 Object List

6.1 EtherCAT Object Dictionary Data (CoE Object)

The EtherCAT IO-Link Master's object dictionary contains addressable objects accessible via SDO services, including both standard objects and manufacturer-specific objects. The standard objects are described in the ETG standard ETG.1000.6 (Application Layer Protocol Specification), and support is provided for modular device profile-specific objects as outlined in the ETG standard ETG.5001-6220. It also supports manufacturer-specific objects described in detail below, which are addressed using a combination of index and sub-index. Sub-index 0 indicates the number of sub-index or the highest sub-index number.

Index 0x1000 EtherCAT Slave Device Type					
Index	**Name**	**Description**	**Data Type**	**Mark**	**Default Value**
1000:00	Device type	Device type of EtherCAT slave	UDINT	RO	0x1389 (5001dec)
Index 0x1001 Error Register					
Index	**Name**	**Description**	**Data Type**	**Mark**	**Default Value**
1001:00	Error register	Error register	USINT	RO	0x00
Index 0x1001 EtherCAT Slave Device Name					
Index	**Name**	**Description**	**Data Type**	**Mark**	**Default Value**
1008:00	Device name	Device name	STRING(11)	RO	GS20-ECT-8L
Index 0x1008 EtherCAT Slave Hardware Version Information					
Index	**Name**	**Description**	**Data Type**	**Mark**	**Default Value**
1009:00	Hardware version	Hardware version of EtherCAT slave	STRING(16)	RO	A00.01
Index 0x100A EtherCAT Slave Protocol Stack Software Version Information					

Index	Name	Description	Data Type	Mark	Default Value
100A:00	Slave version	Software version of EtherCAT slave protocol stack	STRING(4)	RO	5.13
Index 0x100B IO-Link Master Product Version Information					
Index	**Name**	**Description**	**Data Type**	**Mark**	**Default Value**
100B:00	Software version	Number of sub-indexes	USINT	RO	0x04
100B:01	App version	Application software version	UDINT	RO	0x10100000
100B:02	FPGA version	FPGA software version	UDINT	RO	0x10100000
100B:03	IOLM version	Software version of IO-Link master	UDINT	RO	0x0305
Index 0x1018 EtherCAT Slave Identification Information					
Index	**Name**	**Description**	**Data Type**	**Mark**	**Default Value**
1018:00	Identity	Number of sub-indexes	USINT	RO	0x04 (4dec)
1018:01	Vendor ID	Vendor ID of EtherCAT slave	UDINT	RO	0x00100000
1018:02	Product code	Product code of EtherCAT slave	UDINT	RO	0x10F42EE1
1018:03	Revision	Firmware version of product application	STRING(11)	RO	1.1.0.0

1018:04	Serial number	Serial number	UDINT	RO	0x15FA66
Index 0x10F3 Diagnosis History					
Index	**Name**	**Description**	**Data Type**	**Mark**	**Default Value**
10F3:00	Diagnosis history	Number of sub-indexes	USINT	RO	0x16
10F3:01	Maximum message	Maximum number of diagnosis messages	USINT	RO	0x14 (20dec)
10F3:02	Newest message	Sub-index of the latest diagnosis message	USINT	RO	0x00000000 (0dec)
10F3:03	Newest acknowl-edged message	Latest acknowl-edged message	USINT	RW	0x00000000 (0dec)
10F3:04	New message available	New diagnosis information	BOOL	RO	0
10F3:05	Flags	Settings for sending and storing diagnosis messages	UINT	RW	0x00000000 (0dec)
10F3:06	Diagnosis message 01	Diagnosis message 1	ARRAY [0..27] OF BYTE	RO	0x00000000 (0dec)
. . .	. . .	. . .	. . .	. . .	. . .
10F3:40	Diagnosis message 64	Diagnosis message 64	ARRAY [0..27] OF BYTE	RO	0x00000000 (0dec)
Index 0x3010 ESC Port 0 Error Counter					
Index	**Name**	**Description**	**Data Type**	**Mark**	**Default Value**

3010:00	Port0 error counter	Number of sub-indexes	USINT	RO	0x04 (4dec)
3010:01	Port0 invalid frame counter	Number of invalid frames for ESC port 0	USINT	RO	0x00 (0dec)
3010:02	Port0 Rx error counter	Number of error frames for ESC port 0	USINT	RO	0x00 (0dec)
3010:03	Port0 forwarded Rx error counter	Number of loopback error frames for ESC port 0	USINT	RO	0x00 (0dec)
3010:04	Port0 lost link counter	Number of lost frames for ESC Port 0	USINT	RO	0x00 (0dec)
Index 0x3011 ESC Port 0 Error Counter					
Index	**Name**	**Description**	**Data Type**	**Mark**	**Default Value**
3011:00	Port1 error counter	Number of sub-indexes	USINT	RO	0x04 (4dec)
3011:01	Port1 invalid frame counter	Number of invalid frames for ESC port 1	USINT	RO	0x00 (0dec)
3011:02	Port1 Rx error counter	Number of error frames for ESC port 1	USINT	RO	0x00 (0dec)
3011:03	Port1 forwarded Rx error counter	Number of loopback error frames for ESC port 1	USINT	RO	0x00 (0dec)
3011:04	Port1 lost link counter	Number of lost frames for ESC Port 1	USINT	RO	0x00 (0dec)
Index 0x3012 ESC Error Counter					

Index	Name	Description	Data Type	Mark	Default Value
3012:00	ESC error counter	Number of sub-indexes	USINT	RO	0x04 (4dec)
3012:01	ECAT processing unit error counter	ECAT processing unit error counter	USINT	RO	0x00 (0dec)
3012:02	PDI error counter	PDI error counter	USINT	RO	0x00 (0dec)
3012:03	Watchdog counter process data	Number of watchdogs for process data	USINT	RO	0x00 (0dec)
3012:04	Watchdog counter PDI	Number of PDI watchdogs	USINT	RO	0x00 (0dec)
Index 0x3016 Station Address					
Index	**Name**	**Description**	**Data Type**	**Mark**	**Default Value**
3016:00	Station address	Number of sub-indexes	USINT	RO	0x04 (4dec)
3016:01	Rotary switch value	DIP switch value	USINT	RO	0x00 (0dec)
3016:02	Configured station address	Configured station address	USINT	RO	0x00 (0dec)
3016:03	Configured station alias	Configured station alias	USINT	RO	0x00 (0dec)
3016:04	Alias in EEPROM	Alias in EEPROM	USINT	RO	0x00 (0dec)

The following table lists configuration data of the IO-Link port.

Index 0x80n0 Ch.n IO-Link Port Configuration Data (for 0 ⩽ n ⩽ 7)					
Index	**Name**	**Description**	**Data Type**	**Mark**	**Default Value**

0x80-n0:00	IO Settings Ch.1- 8	Number of sub-indexes	USINT	RW	0x28 (40dec)
0x80-n0:04	Device ID	Device ID of IO-Link device	UDINT	RW	0x00000000 (0dec)
0x80-n0:05	Vendor ID	Vendor ID of IO-Link device	UDINT	RW	0x00000000 (0dec)
0x80-n0:06	Product ID	Product ID of IO-Link device	USINT	RW	0x00000000 (0dec)
0x80-n0:08	Serial number	Serial number of IO-Link device	USINT	RW	0x00000000 (0dec)
0x80-n0:20	IO-Link revision	Revision of specification for IO-Link device communication • Bit 0 to bit 3: Minor revision • Bit 4 to bit 7: Major revision	USINT	RW	0x00 (0dec)
0x80-n0:21	Frame capability	Reserved	USINT	RW	0x00 (0dec)
0x80-n0:22	Min cycle time	Cycle time① between IO-Link master and slave, transmitted by IO-Link data frames of minimum cycle • Bit 6 and bit 7: Time base • Bit 0 and bit 5: Scaling factor • 0x00: The IO-Link master automatically uses the update time of the IO-Link device.	USINT	RW	0x00 (0dec)
0x80-n0:23	Offset time	Reserved	USINT	RW	0x00 (0dec)
0x80-n0:24	Process data in length	Number of bits in input process data transmitted by IO-Link data frames, recorded as 255 for 256 bits	USINT	RW	0x00 (0dec)
0x80-n0:25	Process data out length	Number of bits in output process data transmitted by IO-Link data frames, recorded as 255 for 256 bits	USINT	RW	0x00 (0dec)
0x80-n0:26	Compati-ble ID	Reserved	UINT	RW	0x0000 (0dec)

0x80-n0:27	Reserved	Reserved	UINT	RW	0x0000 (0dec)
0x80-n0:28	Master control	**Bit 0 to bit 3:** 0: Port not used 1: Port configured as DI mode 2: Port configured as DO mode 3: Port configured as IO-Link automatic mode 4: Port configured as IO-Link verification mode **Bit 4 to bit 7:** 0: Process data invalid upon network disconnection 1: Output 0 upon network disconnection 2: Output last cycle upon network disconnection **Bit 8 to bit 15:** 0: Device parameter verification disabled 1: V1.0 verification for Vendor/ Device ID 2: V1.1 verification for Vendor/ Device ID 3: Slave configuration data backup and restoration enabled 4: Slave configuration data restoration only enabled *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.	UINT	RW	0x0000 (0dec)

Index 0x90n0 Ch.n IO-Link Port Configuration Data (for 0 ⩽ n ⩽ 7)

Index	Name	Description	Data Type	Mark	Default Value

0x90-n0:00	IO Settings Ch.1- 8	Number of sub-indexes	USINT	R	0x28 (40dec)
0x90-n0:04	Device ID	Retrieved device ID of IO-Link slave	UDINT	R	0x00000000 (0dec)
0x90-n0:05	Vendor ID	Retrieved vendor ID of IO-Link slave	UDINT	R	0x00000000 (0dec)
0x90-n0:06	Product ID	Retrieved product ID of IO-Link slave (Functionality not implemented)	USINT	R	0x00000000 (0dec)
0x90-n0:08	Serial number	Retrieved serial number of IO-Link slave (Functionality not implemented)	USINT	R	0x00000000 (0dec)
0x90-n0:20	IO-Link revision	Revision of specification for IO-Link device communication • Bit 0 to bit 3: Minor revision • Bit 4 to bit 7: Major revision	USINT	R	0x00 (0dec)
0x90-n0:21	Frame capability	Reserved	USINT	R	0x00 (0dec)
0x90-n0:22	Min cycle time	Cycle time① between IO-Link master and slave, transmitted by IO-Link data frames of minimum cycle • Bit 6 and bit 7: Time base • Bit 0 and bit 5: Scaling factor	USINT	R	0x00 (0dec)
0x90-n0:23	Offset time	Reserved	USINT	R	0x00 (0dec)
0x90-n0:24	Process data in length	Retrieved number of bits in input process data transmitted by IO-Link data frames, displayed as 255 for 256 bits	USINT	R	0x00 (0dec)
0x90-n0:25	Process data out length	Retrieved number of bits in output process data transmitted by IO-Link data frames, displayed as 255 for 256 bits	USINT	R	0x00 (0dec)

0x90-n0:26	Compati-ble ID	Reserved	UINT	R	0x0000 (0dec)
0x90-n0:27	Reserved	Reserved	UINT	R	0x0000 (0dec)

①For the cycle time, refer to the table below.

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

6.2 Configuration Data for Process Data Communication

In EtherCAT PDO communication, management is divided into three parts: PDO assignment, PDO mapping, and process data object dictionary. PDO assignment and PDO mapping are described and sampled as follows:

■ PDO assignment

PDO assignment is used to configure PDO mapping, and is divided into two object dictionaries: Receive PDO assignment and Transmit PDO assignment, with corresponding indexes of 0x1C12 and 0x1C13 respectively.

Index 0x1C12 RxPDO Assignment				
Index	**Name**	**Description**	**Data Type**	**Default Value**
0x1C12:00	Sub-index 00	Output process data assignment	USINT	0x08 (8dec)
0x1C12:01	Sub-index 01	Index 1 output process data assignment	DT1C12ARR	0x1600 (5632dec)
0x1C12:02	Sub-index 02	Index 2 output process data assignment	DT1C12ARR	0x1601 (5633dec)

0x1C12:03	Sub-index 03	Index 3 output process data assignment	DT1C12ARR	0x1602 (5634dec)
0x1C12:04	Sub-index 04	Index 4 output process data assignment	DT1C12ARR	0x1603 (5633dec)
0x1C12:05	Sub-index 05	Index 5 output process data assignment	DT1C12ARR	0x1604 (5634dec)
0x1C12:06	Sub-index 06	Index 6 output process data assignment	DT1C12ARR	0x1605 (5635dec)
0x1C12:07	Sub-index 07	Index 7 output process data assignment	DT1C12ARR	0x1606 (5634dec)
0x1C12:08	Sub-index 08	Index 8 output process data assignment	DT1C12ARR	0x1607 (5635dec)
Index 0x1C13 TxPDO Assignment				
Index	**Name**	**Description**	**Data Type**	**Default Value**
0x1C13:00	Sub-index 00	Input process data assignment	USINT	0x08 (8dec)
0x1C13:01	Sub-index 01	Index 1 input process data assignment	DT1C13ARR	0x1A00 (6656dec)
0x1C13:02	Sub-index 02	Index 2 input process data assignment	DT1C13ARR	0x1A01 (6657dec)
0x1C13:03	Sub-index 03	Index 3 input process data assignment	DT1C13ARR	0x1A02 (6657dec)
0x1C13:04	Sub-index 04	Index 4 input process data assignment	DT1C13ARR	0x1A03 (6658dec)

0x1C13:05	Sub-index 05	Index 5 input process data assignment	DT1C13ARR	0x1A04 (6658dec)
0x1C13:06	Sub-index 06	Index 6 input process data assignment	DT1C13ARR	0x1A05 (6659dec)
0x1C13:07	Sub-index 07	Index 7 input process data assignment	DT1C13ARR	0x1A06 (6659dec)
0x1C13:08	Sub-index 08	Index 8 input process data assignment	DT1C13ARR	0x1A07 (6660dec)

■ PDO mapping

PDO mapping is used to map the process data object dictionary required for communication. The mapping types are categorized into Receive PDO mapping (RxPDO mapping) and Transmit PDO mapping (TxPDO mapping), with index ranges of 0x1600-0x17FF and 0x1A00-0x1BFF respectively.

The object dictionary for PDO mapping contains the indexes, sub-indexes, and data lengths of process data objects required for PDO communication. Its basic structure is as follows:

Bit	31	…	16	15	…	8	7	…	0
De-scrip-tion	Index			Sub-index			Object length		

Index 0x1A0n Ch.n Input Process Data Mapping (for 0 ⩽ n ⩽ 7)				
Index	**Name**	**Description**	**Data Type**	**Default Value**
0x1A0n:00	Sub-index 00	Input process data mapping	USINT	0x00 (0dec)
0x1A0n:01	Sub-index 01	Index 1 input process data mapping	UDINT	0x70n0:01.08
. . .	…	…	…	…

0x1A0n:40	Sub-index 64	Index 64 input process data mapping	UDINT	0x70n0:40.08
Index 0x1A10 Pin2 Input Process Data Mapping (8 Ch)				
Index	**Name**	**Description**	**Data Type**	**Default Value**
0x1A10:00	Sub-index 00	Pin2 input process data mapping	USINT	0x08 (8dec)
0x1A10:01	Sub-index 01	Pin2 input process data mapping through channel 0	BIT	0x2000:01.01
0x1A10:02	Sub-index 02	Pin2 input process data mapping through channel 1	BIT	0x2010:01.01
0x1A10:03	Sub-index 03	Pin2 input process data mapping through channel 2	BIT	0x2020:01.01
0x1A10:04	Sub-index 04	Pin2 input process data mapping through channel 3	BIT	0x2030:01.01
0x1A10:05	Sub-index 05	Pin2 input process data mapping through channel 4	BIT	0x2040:01.01
0x1A10:06	Sub-index 06	Pin2 input process data mapping through channel 5	BIT	0x2050:01.01

0x1A10:07	Sub-index 07	Pin2 input process data mapping through channel 6	BIT	0x2060:01.01
0x1A10:08	Sub-index 08	Pin2 input process data mapping through channel 7	BIT	0x2070:01.01
Index 0x1A13 Pin1 Short-Circuit Status Process Data Mapping (8 Ch)				
Index	**Name**	**Description**	**Data Type**	**Default Value**
0x1A13:00	Sub-index 00	Pin1 short-circuit status process data mapping	USINT	0x08 (8dec)
0x1A13:01	Sub-index 01	Pin1 short-circuit status process data mapping through channel 0	BIT	0x2001:02.01
0x1A13:02	Sub-index 02	Pin1 short-circuit status process data mapping through channel 1	BIT	0x2011:02.01
0x1A13:03	Sub-index 03	Pin1 short-circuit status process data mapping through channel 2	BIT	0x2021:02.01

0x1A13:04	Sub-index 04	Pin1 short-circuit status process data mapping through channel 3	BIT	0x2031:02.01
0x1A13:05	Sub-index 05	Pin1 short-circuit status process data mapping through channel 4	BIT	0x2041:02.01
0x1A13:06	Sub-index 06	Pin1 short-circuit status process data mapping through channel 5	BIT	0x2051:02.01
0x1A13:07	Sub-index 07	Pin1 short-circuit status process data mapping through channel 6	BIT	0x2061:02.01
0x1A13:08	Sub-index 08	Pin1 short-circuit status process data mapping through channel 7	BIT	0x2071:02.01
Index 0x1A14 System Hardware Status Monitoring Process Data Mapping				
Index	**Name**	**Description**	**Data Type**	**Default Value**
0x1A14:00	Sub-index 00	System hardware monitoring status process data mapping	USINT	0x03 (3dec)

0x1A14:01	Sub-index 01	System power supply voltage monitoring status process data mapping	UDINT	0x2A02:01.08
0x1A14:02	Sub-index 02	Actuator power supply voltage monitoring status process data mapping	UDINT	0x2A02:02.08
0x1A14:03	Sub-index 03	MCU internal temperature monitoring status process data mapping	UDINT	0x2A02:03.08
Index 0x1A80 Master-Slave Communication Status Monitoring Process Data Mapping				
Index	**Name**	**Description**	**Data Type**	**Default Value**
0x1A81:00	Sub-index 00	Master-slave communication status monitoring process data mapping	USINT	0x08 (8dec)
0x1A81:01	Sub-index 01	Master-slave communication status monitoring process data mapping through channel 0	UDINT	0xF100:01.08
0x1A81:02	Sub-index 02	Master-slave communication status monitoring process data mapping through channel 1	UDINT	0xF100:02.08

0x1A81:03	Sub-index 03	Master-slave communication status monitoring process data mapping through channel 2	UDINT	0xF100:03.08
0x1A81:04	Sub-index 04	Master-slave communication status monitoring process data mapping through channel 3	UDINT	0xF100:04.08
0x1A81:05	Sub-index 05	Master-slave communication status monitoring process data mapping through channel 4	UDINT	0xF100:05.08
0x1A81:06	Sub-index 06	Master-slave communication status monitoring process data mapping through channel 5	UDINT	0xF100:06.08
0x1A81:07	Sub-index 07	Master-slave communication status monitoring process data mapping through channel 6	UDINT	0xF100:07.08

0x1A81:08	Sub-index 08	Master-slave communication status monitoring process data mapping through channel 7	UDINT	0xF100:08.08
Index 0x160n Ch.n Output Process Data Mapping (for 0 ⩽ n ⩽ 7)				
Index	**Name**	**Description**	**Data Type**	**Default Value**
0x160n:00	Sub-index 00	Output process data mapping	USINT	0x00 (0dec)
0x160n:01	Sub-index 01	Index 1 output process data mapping	UDINT	0x60n0:01.08
. . .	…	…	…	…
0x160n:20	Sub-index 32	Index 32 output process data mapping	UDINT	0x60n0:40.08
Index 0x1620 Pin2 Output Process Data Mapping (8 Ch)				
Index	**Name**	**Description**	**Data Type**	**Default Value**
0x1620:00	Sub-index 00	Pin2 output process data mapping	USINT	0x08 (8dec)
0x1620:01	Sub-index 01	Pin2 output process data mapping through channel 0	BIT	0x3008:01.01
0x1620:02	Sub-index 02	Pin2 output process data mapping through channel 1	BIT	0x3018:01.01

0x1620:03	Sub-index 03	Pin2 output process data mapping through channel 2	BIT	0x3028:01.01
0x1620:04	Sub-index 04	Pin2 output process data mapping through channel 3	BIT	0x3038:01.01
0x1620:05	Sub-index 05	Pin2 output process data mapping through channel 4	BIT	0x3048:01.01
0x1620:06	Sub-index 06	Pin2 output process data mapping through channel 5	BIT	0x3058:01.01
0x1620:07	Sub-index 07	Pin2 output process data mapping through channel 6	BIT	0x3068:01.01
0x1620:08	Sub-index 08	Pin2 output process data mapping through channel 7	BIT	0x3078:01.01

6.3 IO-Link Slave Configuration Data

Index 0x40n0 Ch.n IO-Link Port Slave Configuration Parameter Read/Write (for 0 ⩽ n ⩽ 7)					
Index	**Name**	**Description**	**Data Type**	**Mark**	**De-fault Value**

0x40-n0:00	subindex0	Number of sub-indexes	USINT	RO	0x07 (7dec)
0x40-n0:01	Control	• 0: No operation • 0 to 2: Write parameter • 0 to 3: Read parameter	UDINT	RW	0x00 (0dec)
0x40-n0:02	Status	• 0x00: No error • 0x02: Read success • 0x40: Error	UDINT	RW	0x00 (0dec)
0x40-n0:03	Index	Slave index	USINT	RW	0x00 (0dec)
0x40-n0:04	Subindex	Slave sub-index	USINT	RW	0x00 (0dec)
0x40-n0:05	Length	Data length (unit: byte)	UINT	RW	0x00 (0dec)
0x40-n0:06	Data	Data	ARRAY [0..31] OF BYTE	RW	0x00 (0dec)
0x40-n0:07	Error Code	• 0x1: Operation not supported • 0x3: Device access failure • 0x4: Operation unauthorized • 0x5: Slave device not in OP state • 0x34: length error • 0x36: Invalid operation due to busy master • 0x39: Port disabled	UINT	RO	0x00 (0dec)

6.4 Process Data

The input data of the IO-Link master represents the TxPDO of the IO-Link slave. If an IO-Link slave with TxPDO is connected, the IO-Link master port must be configured with a mode with input data. For the definition of TxPDO data of the IO-Link slave, see the following table. N represents the port number of the IO-Link master.

Index 0xF100 Channel N I/O-Link Communication Status (for 0 ⩽ n ⩽ 7)				
Index	**Name**	**Description**	**Data Type**	**Default Value**
0xF100:00	Sub-index 00	Highest sub-index supported	USINT	0x08 (8dec)

0xF100:01	Sub-index 01	Master and slave communication status display **Bit 0 to bit 3: IO-Link status** 0: Port inactive 1: Input mode 2: Output mode 3: Communication OP 4: Communication fault **Bit 4 to bit 7: Error code** 00: No error 1: Watchdog error 2: Buffer overflow 3: Invalid device ID 4: Invalid vendor ID 5: Inactive version 6: Invalid frame function 7: Invalid cycle time 8: Invalid input process data length 9: Invalid output process data length 10: No device detected 11: /	USINT	0x00 (0dec)
…	…		…	…
0xF100:08	Sub-index 08		USINT	0x00 (0dec)
Index 0x20n0 Ch.n Pin2 Status Monitoring Input Process Data (for 0 ⩽ n ⩽ 7)				

Index	Name	Description	Data Type	Default Value
0x20n0:00	Sub-index 00	Highest sub-index supported	USINT	0x02 (2dec)
0x20n0:01	Sub-index 01	Pin2 input process data • 0: Inactive • 1: Active	USINT	0x00 (0dec)
0x20n0:02	Sub-index 02	Short circuit status when Pin2 is configured as output • 0: No short circuit information • 1: Short circuit 0x20n0	USINT	0x00 (0dec)
Index 0x20n1 Ch.n Pin4 and Pin1 Short-Circuit Status Monitoring (for 0 ⩽ n ⩽ 7)				
Index	**Name**	**Description**	**Data Type**	**Default Value**
0x20n1:00	Sub-index 00	Highest sub-index supported	USINT	0x02 (2dec)
0x20n1:01	Sub-index 01	Short circuit status when Pin4 is configured as output • 0: No short circuit information • 1: Short circuit	USINT	0x00 (0dec)
0x20n1:02	Sub-index 02	Pin1 short circuit state • 0: No short circuit information • 1: Short circuit	USINT	0x00 (0dec)
Index 0x2A02 Hardware Status Monitoring				

Index	Name	Description	Data Type	Default Value
0x2A02:00	System hardware monitor	Highest sub-index supported	USINT	0x03 (3dec)
0x2A02:01	System hardware monitor_UA status_2A02_01	Actuator power supply voltage detection • 00: 18 V < UA < 30.2 V • 01: 11V < UA < 18V • 10: UA > 30.2 V • 11: UA < 11 V	USINT	0x00 (0dec)
0x2A02:02	System hardware monitor_US status_2A02_02	System power supply voltage detection • 00: 18 V < US < 30.2 V • 01: 11V < US < 18V • 10: US > 30.2 V • 11: US < 11 V	USINT	0x00 (0dec)
0x2A02:03	System hardware monitor_ Temperature state_2A02_03	MCU internal temperature detection • 00: 0°C < Internal temperature < 85°C • 01: Internal temperature < 0°C • 10: Internal temperature > 85°C • 11: Reserved	USINT	0x00 (0dec)
Index 0x30n8 Ch.n Pin2 DO mode output process data (for 0 ⩽ n ⩽ 7)				

Index	Name	Description	Data Type	Default Value
0x30n8:00	Sub-index 00	Highest sub-index supported	USINT	0x01 (1dec)
0x30n8:01	Sub-index 01	Pin2 output process data • 0: Inactive • 1: Active	BIT	0
Index 0x60n0 Ch.n IO-link Input Process Data (for 0 ⩽ n ⩽ 7)				
Index	**Name**	**Description**	**Data Type**	**Default Value**
0x60n0:00	Sub-index 00	Highest sub-index supported	USINT	0x00 (0dec)
0x60n0:01	TxPDO 01	IO-Link input process data [00]	UDINT	0x00 (0dec)
…	…	…	…	…
0x60n0:20	TxPDO 32	IO-Link input process data [32]	UDINT	0x00 (0dec)
Index 0x70n0 Ch. n output process data (for 0 ⩽ n ⩽ 7)				
Index	**Name**	**Description**	**Data Type**	**Default Value**
0x70n0:00	Sub-index 00	Highest sub-index supported	USINT	0x00 (0dec)
0x70n0:01	RxPDO 01	IO-Link output process data [00]	UDINT	0x00 (0dec)
…	…	…	…	…
0x70n0:20	RxPDO 32	IO-Link output process data [32]	UDINT	0x00 (0dec)

The following table lists configuration data of the IO-Link port.

Index 0x20n3 Ch. n Pin4 used as the configuration parameter in DO mode (for 0 ⩽ n ⩽ 7)					
Index	**Name**	**Description**	**Data Type**	**Mark**	**Default Value**

0x20-n3:00	I/O setting of channels 1 to 8	Number of sub-indexes	USINT	RW	0x1 (1dec)
0x20-n3:01	Pin4 safety state	Pin4 is configured as the preset value for the safety state upon output. • 0x00: Output 0 upon communication error • 0x01: Output 1 upon communication error • 0x02: Last output value used upon communication error	UDINT	RW	0x00 (0dec)
Index 0x20n2 Ch. n Pin2 used as the configuration parameter in DO mode (for 0 ⩽ n ⩽ 7)					
Index	**Name**	**Description**	**Data Type**	**Mark**	**Default Value**
0x20-n2:00	I/O setting of channels 1 to 8	Number of sub-indexes	USINT	RW	0x1 (1dec)
0x20-n2:01	Pin2 safety state	Bit0 to Bit1 • 0: Output 0 upon communication error • 1: Output 1 upon communication error • 2: Last output value used upon communication error Bit2 • 0: DO controlled by process data upon normal communication • 1: DO forced output upon normal communication	UDINT	RW	0x00 (0dec)