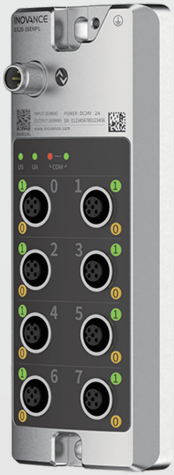
INOVANCE

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PS00009714A03

GS20-16EMPL

Digital Input and Output Module

User Guide

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Preface

■ Introduction

The GS20-16EMPL is a module with 16 configurable digital inputs and outputs (transistor PNP outputs). Each of the 16 channels can be configured as either an input or a sink output. The module can be used with the Class A IO-Link Master.

This guide describes the product information, mechanical installation, electrical installation, and commissioning 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 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 models:** 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
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.
GS20-ECT-8L-INT High Protection IO-Link Master Module User Guide	PS00016635	This guide describes the product information, mechanical installation, electrical installation, configuration, commissioning, and troubleshooting of the product.
GS20-PN-8L High Protection IO-Link Master Module User Guide	PS00018181	This guide describes the product information, mechanical installation, electrical installation, commissioning, and troubleshooting of the product.

Name	Code	Description
GS20-EIP-8L High Protection IO-Link Master Module User Guide	PS00018182	This guide describes the product information, mechanical installation, electrical installation, commissioning, and troubleshooting of the product.
GS20-16EMPL Digital Input and Output Module User Guide (This guide)	PS00009714	The guide describes the product information, mechanical installation, electrical installation, and commissioning of the product.

■ Revision History

Date	Version	Revision
December 2024	A03	Made minor corrections.
August 2024	A02	Updated "Software Specifications" in *"1.3 Technical Specifications" on page 14*.
March 2024	A01	• Updated port indicator descriptions in *"1.2 Components" on page 11*. • Updated "Software Specifications" in *"1.3 Technical Specifications" on page 14*. • Updated *"4.2 Port Parameter Configuration" on page 27*. • Updated *" Troubleshooting" on page 29*. • Updated parameter configurations in *"6.3 Product Data" on page 32*.
July 2023	A00	First 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.

■ 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 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 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.

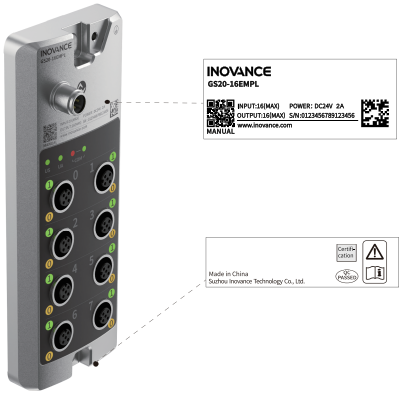
1 Product Information

1.1 Model and Nameplate

G S 20 - 16 E MP L

① ② ③ ④ ⑤ ⑥ ⑦

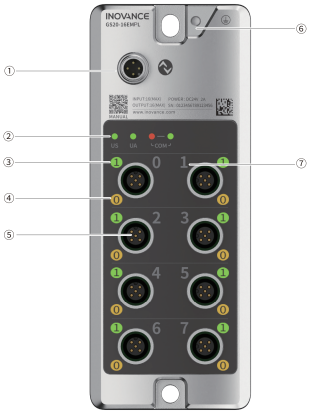
① **Product Family** G: Inovance controller general-purpose module	⑤ **Module Type** E: Logic I/O expansion module
② **Product Type** S: High protection module	⑥ **I/O Type** MP: Each channel can be configured as either a PNP input or a PNP output.
③ **Series** 20: 20 series	⑦ **Connection Type** L: IO-Link
④ **Number of I/O Channels** 16: 16 channels	-



The data for ordering the product is shown below.

Model	Description	Product Code	Applicable Model
GS20-16EMPL	GS20 series transistor PNP module with 16 configurable digital inputs and outputs	01440360	Class A IO-Link Master

1.2 Components



No.	Component	Description			
①	IO-Link port	It is used for IO-Link data transmission. For details, see *"3.2 Terminal Definition" on page 22*			
②	State indicator	US	System power supply indicator	Green	• Solid on: Voltage is normal. • Single flashing: 11 V < voltage < 18 V • Flashing: Voltage > 30.2 V • Off: Voltage < 11 V. The module is abnormal.
		UA	Actuator power supply indicator	Green	• Solid on: Voltage is normal. • Single flashing: 11 V < voltage < 18 V • Flashing: Voltage > 30.2 V • Off: Voltage < 11 V
		COM	IO-Link communication indicator	Green/ red	• Steady green: No communication • Slow flashing green: The IO-Link communication is normal. • Flashing red: The module reports diagnostic information. • Off: No voltage present in module

No.	Component	Description			
③	Port indicator 1 [1]	1	Indicates the input/output state of pin 4 for each port.	Green/ Yellow/ Red	• Steady green: The pin input for the corresponding port is valid. • Steady yellow: The pin output for the corresponding port is valid. • Steady red: The pin for the corresponding port encounters a short circuit or overcurrent. In expert mode, steady red indicates the pin for the corresponding port is configured as an output but an input is detected. • Off: No input, output, or fault signal Note: Port indicators 0 and 1 both turning red indicates an overcurrent on pin 1 of the corresponding port, or a mismatch between the port's input/output configuration and the actual situation.
④	Port indicator 0 [1]	0	Indicates the input/output state of pin 2 for each port.		
⑤	I/O port	For details on the definition of each pin, see "3.2 Terminal Definition" on page 22			
⑥	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.		
⑦	Port number	0 to 7	There are eight digital I/O ports, each of which contains two configurable DI/DO.		

The flashing states of the indicator are described as follows:

State	Description
Single flashing	The indicator is on for 200 ms and off for 1000 ms, repeating this cycle.
Flashing	The indicator is on for 200 ms and off for 200 ms, repeating this cycle.
Slow flashing	The indicator is on for 900 ms and off for 100 ms, repeating this cycle.



- [1]: For stock products where the port indicators are labeled with "0" above and "1" below on the silkscreen, the indicator "0" corresponds to pin 4, and the indicator "1" corresponds to pin 2.
-  : High temperature caution for the module.

1.3 Technical Specifications

■ General Specifications

Item	Specification
Dimensions (W x H x D)	69.8 mm x 175.8 mm x 32.8 mm
Weight	About 425 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	2 A (max@24 V)
US reverse polarity protection	Supported
Undervoltage detection	Supported
Rated voltage of UA power supply	24 VDC (18 VDC to 30.2 VDC)
Maximum current of UA power supply	2 A (max@24 V)

Item	Specification
UA reverse polarity protection	Supported
Undervoltage detection	Supported

■ I/O Interface Specifications

Item	Specification
Number of I/O channels	16
Maximum number of input channels	16 (PNP)
Maximum number of output channels	16 (PNP)
Configuration of inputs and outputs	Supported

■ 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) (SELV power supply)
Input current (typical)	4 mA (typical value@24 V)
ON voltage	>15 VDC
OFF voltage	< 5 VDC
ON/OFF hardware response time	100 µs (max.)
Input impedance	6.6 kΩ to 7.6 kΩ
Isolation	Not isolated
Input indicator	The input indicator turns on when the DI circuit is in the active state.

■ 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	0.5 A/channel; 2 A/module
Inductive output load	5.04 W/channel; 12 W/module
Lamp output load	3.5 W/channel; 9 W/module
ON/OFF hardware response time	100 μs (max.)
Leakage current upon OFF	10 μA
Switching frequency	Resistive load: 100 Hz; inductive load: 0.5 Hz; lamp load: 10 Hz
Isolation	Not isolated
Output indicator	The output indicator turns on when the DO circuit is in the active state.

■ Software Specifications

Item	Specification
State inversion	The 0x40 parameter allows you to invert the input date.
Input/output configuration	The 0x41 parameter allows you to configure the I/O port as input or output.
Fault preset value	The 0x42 and 0x43 parameters allow you to configure the output state when a fault occurs. The function requires support from both master and slave stations to work.
Output readback	When the module is used for output, the output state is read back to the master through aperiodic data.

Item	Specification
Undervoltage detection	When the voltage of the actuator power supply and system power supply is below 18 V, the state is read back to the master through aperiodic data.
Module type and basic information reading	When the master communicates with the slave normally, the master can establish communication with the module through configured parameters.
Diagnostic information acquisition (application layer)	Errors, alarms, and maintenance data are obtained through events and are sent from the slave to the master.
Diagnostic information acquisition (link layer)	The diagnostic information is acquired through aperiodic data.
Mode configuration	The 0x49 parameter allows you to configure the module to operate in simple mode or expert mode. • Simple mode: Parameter configurations are not required and invalid. All I/O channels can be used as inputs or outputs. • Expert mode: All parameters can be configured. By default, 16 inputs are configured. The I/O channels can be quickly configured as 8 inputs and 8 outputs, or 16 outputs.

1.4 Environmental Specifications

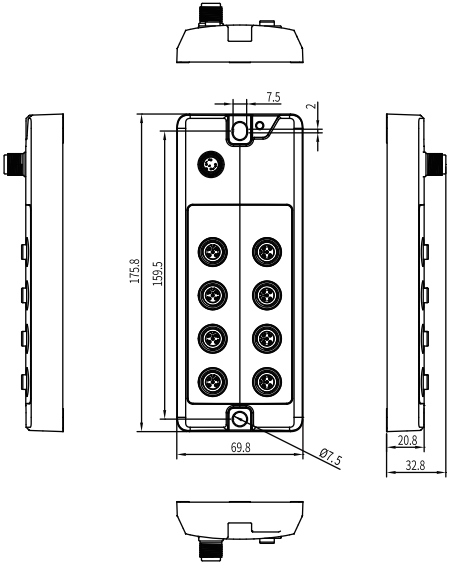
Item	Operating Specification	Transmission Specification	Storage Specification
IP rating	IP67 (with screws tightened)		
Pollution degree	2		
Overvoltage category	I		
Immunity	2 kV on power supply line (IEC61000-4-4)		

Item		Operating Specification	Transmission Specification	Storage Specification
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

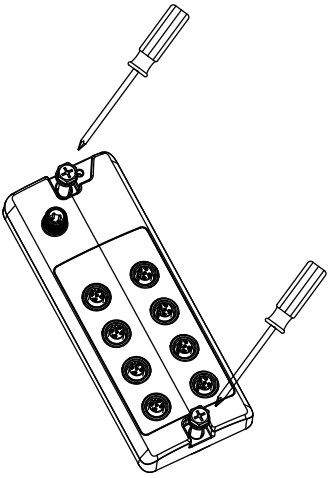
The installation dimensions (in mm) are shown in the figure below.

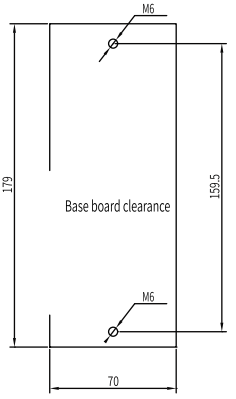


2.2 Installation Method

■ Installation

Install the module with two cross recessed hexagon SEMS screws (M6 x 30) with the washer diameter of 12 mm. The clearance between the two screws is 159.5 mm. The following figure describes the installation and clearance.





■ Removing the module

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

3 Electrical Installation

3.1 Cable Selection

■ IO-Link communication cable

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

Model	Description	Length	Material Code
CAB-M12AMS4-M12AFL4-3	Cable assembly - IO-Link cable - Male straight connector - 22AWG - Black - Female angled connector - 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 connector - 22AWG - Black - Female angled connector - 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

■ Connector

The data for ordering connectors is as follows:

Model	Description	Material Code
CON-M12AFS4	4-pin female straight connector allowing for custom wiring	15051155
CON-M12AFL4	4-pin female angled connector allowing for custom wiring	15051157
CON-M12AMS5	5-pin male straight connector allowing for custom wiring	15051156
CON-M12AML5	5-pin male angled connector allowing for custom wiring	15051158

Model	Description	Material Code
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

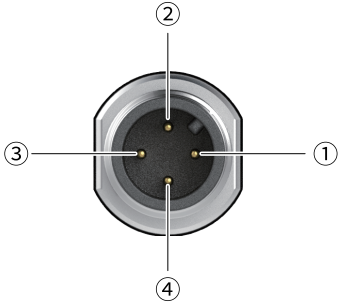
Note

If you have additional requirements for IO-Link cables, contact Inovance for customization.

3.2 Terminal Definition

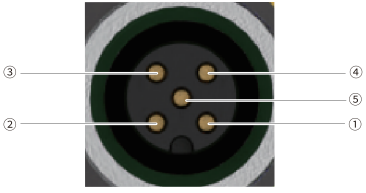
■ IO-Link interface pins

The IO-Link interface is an M12A male connector containing the following pins.



No.	Description
①	US system and sensor power supply, +24V
②	UA actuator power supply, +24V
③	GND
④	C/Q, IO-Link data transmission

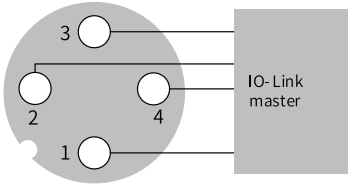
■ Port pins



No.	Description
①	+24V
②	Input 0/Output 0
③	0 V, GND
④	Input 1/Output 1
⑤	Grounding

3.3 Terminal Wiring

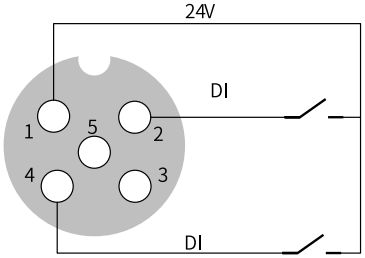
■ Connecting IO-Link devices



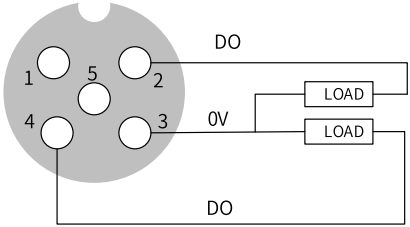
Note

When the DO mode is used, the power supply through pin 2 must be connected.

■ Connecting DI devices



■ Connecting DO devices



4 Program Commissioning

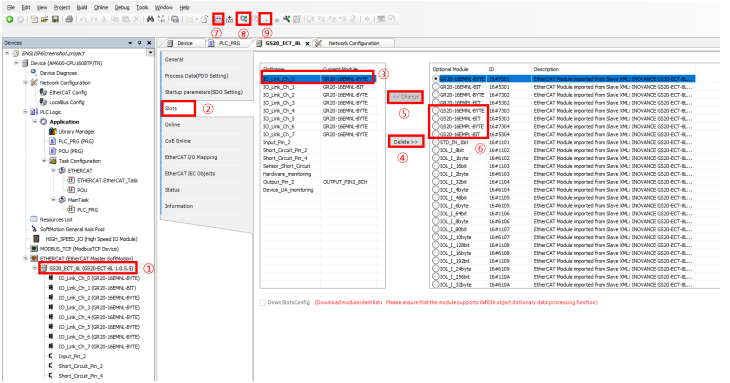
4.1 IO-Link Communication Configuration and Operation

■ Prerequisite

- Connect the cable properly.
- Install InoProShop V1.7.3 and above.
- Connect to the AC810 PLC properly.
- The PLC is scanned and connected to the I/O-Link master of the GS20-ECT-8L model.

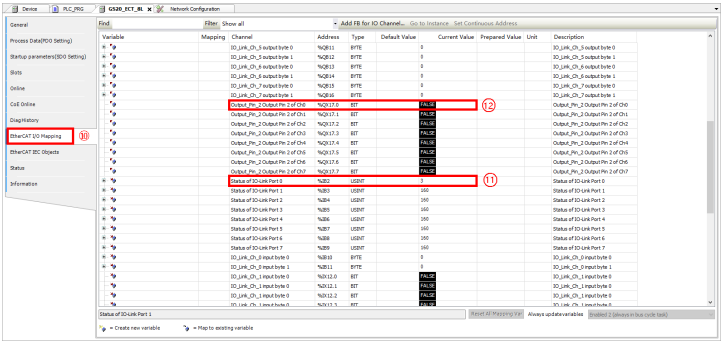
■ Steps

1. Double-click **GS20_ECT_8L (GS20-ECT-8L 1.0.5.5** (①), click **Slots** (②), select the slot to be modified (③), and then click **Delete** (④). Select the module to be configured (⑥) and click **Change** (⑤). Click the compile button (⑦), ensure there are no errors, and then click the download button (⑧). After the download is complete, click the operation button (⑨).



2. Click **EtherCAT I/O Mapping** (⑩) and locate **Status of IO-Link Port 0** (⑪). If the current value is 3, the IO-Link communication is in the OP state. If the slave port is

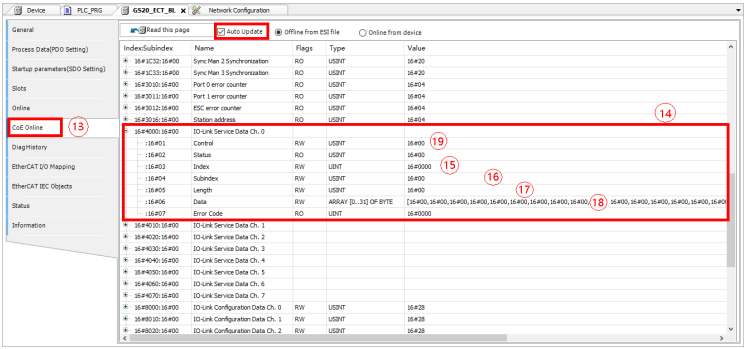
configured as DO, change the **Current Value** cell of **Output_Pin_2 Output Pin 2 of Ch0** (⑫) to **TRUE**.



4.2 Port Parameter Configuration

Click **CoE Online** (⑬). Locate and expand **16#4000 IO-Link service Data Ch.0** (⑭).

- Enter the index of the slave to be operated on in the **Value** cell of **Index** (⑮).
- Enter the subindex of the slave to be operated on in the **Value** cell of **Subindex** (⑯).
- Enter the length of the data to be operated on in the **Value** cell of **Length** (⑰).
- Enter the data content to be operated on in the **Value** cell of **Data** (⑱).
- Enter 0 and then 2 in the **Value** cell of **Control** (⑲), which indicates that the data at ⑱ will be written to the slave specified by **Index** (⑮) and **Subindex** (⑯). Enter 0 and then 3 in the **Value** cell of **Control** (⑲), which indicates that the data in the slave specified by **Index** (⑮) and **Subindex** (⑯) will be displayed in the **Value** cell of **Data** (⑱).



Note

For details on port parameter configurations, see *"6.3 Product Data" on page 32*. The 0x49 parameter is used to select a work mode. By default, it is set to simple mode and requires no configuration.

5 Troubleshooting

■ Common Faults

If the US indicator is on, the UA indicator is off, and the COM indicator is flashing red, check whether the master's pin 2 corresponding to the slave outputs valid signals.

■ Fault List

Fault Code	Fault Type	Description	Solution
0x4210	Warning	Overtemperature	The ambient temperature is high. Lower down the temperature before using the module.
0x4220	Warning	Low temperature	The ambient environment is low. Increase the temperature before using the module.
0x5011	Error	Loss of retentive data upon power failure	Retention of configuration parameters fails. Re-configure the parameters.
0x5100	Error	Device power supply error	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	Warning	System power supply overvoltage	The US power supply voltage of the module is higher than the normal operating voltage. Reduce the US power supply voltage. Note: This fault is reported in the fault log and only occurs in medium-sized PLCs.
0x5111	Warning	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	Error	Short circuit	The module encounters a short circuit. Check the external wiring.

Fault Code	Fault Type	Description	Solution
0x6320	Error	Parameter error	The module parameters are configured incorrectly. Configure the parameters correctly according to the product data.
0x6321	Error	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.

6 Object List

6.1 Protocol Stack Data

Baud Rate	COM2 (38.4 kBaud)
Minimum Cycle Time	3 ms
IO-Link Version	1.1.3
Minimum Cycle Time for Process Data	12 ms
Vendor ID	0x0659
Device ID	-

6.2 Process Data

Input Data	Byte	0							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 2 of port 7	Pin 2 of port 6	Pin 2 of port 5	Pin 2 of port 4	Pin 2 of port 3	Pin 2 of port 2	Pin 2 of port 1	Pin 2 of port 0
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 4 of port 7	Pin 4 to port 6	Pin 4 to port 5	Pin 4 to port 4	Pin 4 to port 3	Pin 4 to port 2	Pin 4 to port 1	Pin 4 to port 0
Output Data	Byte	0							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 2 of port 7	Pin 2 of port 6	Pin 2 of port 5	Pin 2 of port 4	Pin 2 of port 3	Pin 2 of port 2	Pin 2 of port 1	Pin 2 of port 0
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 4 of port 7	Pin 4 of port 6	Pin 4 to port 5	Pin 4 to port 4	Pin 4 to port 3	Pin 4 to port 2	Pin 4 to port 1	Pin 4 to port 0

	Input data refers to the data sent from the slave to the master; output data refers to the data sent from the master to the slave.

6.3 Product Data

Index	Sub-index	Object	Length	Range	Default Value
0x07	-	Vendor ID	2 bytes	-	0x0659
0x08	-	Device ID	2 bytes		0xF42D10
0x10	-	Vendor Name	8 bytes		INOVANCE
0x11	-	Vendor Text	16 bytes		www.inovance.com
0x12	-	Product Name	21 bytes		GS20-16EMPL
0x13	-	Product ID	7 bytes		01440360
0x14	-	Product Text	23 bytes		GS20-16Port:IO Sensor/Actuator Hub IP67 16Bit PNP
0x16	-	Hardware Revision	4 bytes		1.0.0.0
0x17	-	Firmware Revision	4 bytes		1.0.0.0
0x40	0	Inversion	2 bytes	0x0000-0xFFFF	0x0000
0x41	0	Configuration	2 bytes	0x0000-0xFFFF	0x0000
0x42	0	Pin 2 Safe State	2 bytes	0x0000-0xFFFF	0x0000
0x43	0	Pin 4 Safe State	2 bytes	0x0000-0xFFFF	0x0000
0x44	0	Under Voltage	2 bytes	0x0000-0xFFFF	0x0000
0x47	0	Feedback	2 bytes	0x0000-0xFFFF	0x0000
0x48	0	MCU Temperature Setting	2 bytes	0x0000-0xFFFF	0x0050
0x49	0	Mode Configuration	2 bytes	0x0000-0xFFFF	0x0000

0x40: Status Inversion (R/W)	Byte	0							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 2 of port 7	Pin 2 of port 6	Pin 2 of port 5	Pin 2 of port 4	Pin 2 of port 3	Pin 2 of port 2	Pin 2 of port 1	Pin 2 of port 0
	Subindex	8	7	6	5	4	3	2	1
	Default	0	0	0	0	0	0	0	0
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 4 of port 7	Pin 4 to port 6	Pin 4 to port 5	Pin 4 to port 4	Pin 4 to port 3	Pin 4 to port 2	Pin 4 to port 1	Pin 4 to port 0
	Subindex	16	15	14	13	12	11	10	9
	Default	0	0	0	0	0	0	0	0
	0 = Disable inversion; 1 = Enable inversion								

0x41: Input and output configuration (R/W)	Byte	0							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 2 of port 7	Pin 2 of port 6	Pin 2 of port 5	Pin 2 of port 4	Pin 2 of port 3	Pin 2 of port 2	Pin 2 of port 1	Pin 2 of port 0
	Subindex	8	7	6	5	4	3	2	1
	Default	0	0	0	0	0	0	0	0
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 4 of port 7	Pin 4 to port 6	Pin 4 to port 5	Pin 4 to port 4	Pin 4 to port 3	Pin 4 to port 2	Pin 4 to port 1	Pin 4 to port 0
	Subindex	16	15	14	13	12	11	10	9
	Default	0	0	0	0	0	0	0	0
	0 = Input; 1 = Output								

Note

When the activator power supply UA is normal and output process data is set, output will be valid.

0x42: Action of pin 2 for port 0 to port 7 (R/W) when a fault occurs	Byte	1								0							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
	Pin	Pin 2 of port 7		Pin 2 of port 6		Pin 2 of port 5		Pin 2 of port 4		Pin 2 of port 3		Pin 2 of port 2		Pin 2 of port 1		Pin 2 of port 0	
	Sub-index	8		7		6		5		4		3		2		1	
	De-fault	00		00		00		00		00		00		00		00	
	00 = Low level; 01 = High level; 10 = Last state; 11 = Reserved																

Note

The master must support the action to be taken upon a fault. If a preset value is configured, a 0x6320 parameter diagnosis error will be reported.

0x43: Action of pin 4 for port 0 to port 7 (R/W) when a fault occurs	Byte	1								0							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
	Pin	Pin 4 of port 7		Pin 4 of port 6		Pin 4 to port 5		Pin 4 to port 4		Pin 4 to port 3		Pin 4 to port 2		Pin 4 to port 1		Pin 4 to port 0	
	Sub-index	8		7		6		5		4		3		2		1	
	De-fault	00		00		00		00		00		00		00		00	
	00 = Low level; 01 = High level; 10 = Last state; 11 = Reserved																

Note

The master must support the action to be taken upon a fault. If a preset value is configured, a 0x6320 parameter diagnosis error will be reported.

<table>
<tr><td rowspan="6">0x44: System monitoring (R)</td><td>Byte</td><td colspan="8">0</td><td colspan="8">1</td></tr>
<tr><td>Bit</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>Pin</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>T</td><td>-</td><td>-</td><td>-</td><td>-</td><td colspan="2">UA</td><td colspan="2">US</td></tr>
<tr><td>Subindex</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td><td colspan="2">3</td><td colspan="2">2</td></tr>
<tr><td>Default</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>0</td><td>-</td><td>-</td><td>-</td><td>-</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td colspan="17">US: System power supply voltage. 00: Normal; 01: 11 V < voltage < 18 V; 10: Above 30.2 V; 11: Below 11 V.</td></tr>
<tr><td colspan="17">UA: Actuator power supply voltage. 00: Normal; 01: 11 V < voltage < 18 V; 10: Above 30.2 V; 11: Below 11 V.</td></tr>
<tr><td colspan="17">T: MCU temperature. 0: MCU temperature below setpoint; 1: MCU temperature above setpoint.</td></tr>
<tr><td colspan="17">-: Not in use</td></tr>
</table>

0x47: Output state read-back (R)	Byte	0							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 2 of DO7	Pin 2 of DO6	Pin 2 of DO5	Pin 2 of DO4	Pin 2 of DO3	Pin 2 of DO2	Pin 2 of DO1	Pin 2 of DO0
	Subindex	8	7	6	5	4	3	2	1
	Default	0	0	0	0	0	0	0	0
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 4 of port 7	Pin 4 of port 6	Pin 4 to port 5	Pin 4 to port 4	Pin 4 to port 3	Pin 4 to port 2	Pin 4 to port 1	Pin 4 to port 0
	Subindex	16	15	14	13	12	11	10	9
	Default	0	0	0	0	0	0	0	0
	0 = Output 0; 1 = Output 1								

0x48: MCU temperature setting (R/W)	Byte	0	1
	Default	80	
	-	Unit: °C	

<table>
<tr><td rowspan="11">0x49: Mode Configuration (R/W)</td><td>Byte</td><td colspan="8">0</td></tr>
<tr><td>Bit</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>Pin</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>0016</td><td>0808</td><td>Mode configuration</td></tr>
<tr><td>Default</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Byte</td><td colspan="8">1</td></tr>
<tr><td>Bit</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>Pin</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Default</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td colspan="9">0: Simple mode; 1: Expert mode</td></tr>
<tr><td colspan="9">For pin 0808, 0 indicates quick configuration is disabled; 1 indicates eight inputs and eight outputs are configured by quick configuration. The function of pin 0808 is valid only when the expert mode is selected. Low-order four bits of pin 2 and pin 4 indicate the input mode, and high-order four bits of pin 2 and pin 4 indicate the output mode. If pin 0808 is configured, the configuration through 0x41 becomes invalid.</td></tr>
<tr><td colspan="9">For pin 0016, 0 indicates quick configuration is disabled; 1 indicates 16 outputs are configured by quick configuration. The function of pin 1600 is valid only when the expert mode is selected. Pin 2 and Pin 4 indicate operation in output mode. If pin 1600 is configured, the configuration through 0x41 becomes invalid.</td></tr>
<tr><td colspan="9">Note: All parameters are available in expert mode, while in simple mode, parameters 0x41 to 0x43 are unavailable. If the configuration are not set as mentioned above, a 0x6320 error is reported, requiring you to revert to the last valid configuration.</td></tr>
</table>

7 Appendix: Version Information

You can get the firmware of the GS20-16EMPL module from Inovance technical support engineers. The InoProShop software can be downloaded from the "Software and Debugging Tools" interface of any medium-sized PLC series at *https://www.inovance.com/portal/product/list?pathIds=1,26,157&typeId=26*. The following table describes the version matching information.

Module Firmware Version	InoProShop Version
1.3.0.0	V1.7.3 SP2 and later