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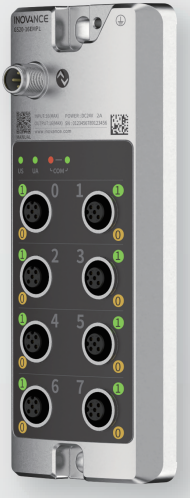

PS00009714A01

GS20-16EMPL
Digital Input and Output Module
User Guide

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Preface

■ About This Guide

The GS20-16EMPL is a transistor PNP 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 is used together with the Class A IO-Link master.

This guide describes the mechanical installation, electrical installation, and programming examples 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 models:** EN 61131-2 **220 VAC models:** 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. 610101 CSA C22.2 NO. 610102201
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 models:** EN 61131-2 EN 61000-3-2 EN 61000-3-3
	RoHS Regulation	Directive (RoHS) Regulations 2012	EN IEC 63000

■ More Data

Name	Data Code	Description
GS20-ECT-8L High Protection IO-Link Master Module User Manual	PS00007354	This guide describes the mechanical installation, electrical installation, configuration, commissioning, and troubleshooting of the product.

■ Revision History

Date	Version	Description
March 2024	A01	**Added the following content:** Added "*Appendix: Version Matching Information" on page 34*. **Updated the following content:** • Updated the port pin indicator in *"1.2 Components" on page 10*. • Updated the software specifications in *"1.3 Technical Specifications" on page 13*. • Updated *"4.2 Port Parameter Configuration" on page 23*. • Updated fault codes in *" Fault Diagnosis" on page 25*. • Updated the parameter settings in *"6.3 Product Data" on page 28*.
July 2023	A00	First 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 *http://www.inovance.com*.

■ 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 period expires.

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

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by 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 fee is charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

For details, see Product Warranty Card.

Fundamental Safety Instructions

■ Safety Disclaimer

1. Before installing, using, and maintaining this equipment, read the safety information and precautions thoroughly, and comply with them during operations.
2. To ensure personal and equipment safety, observe the notes indicated on the product labels and all the safety instructions in the user guide.
3. "CAUTION", "WARNING", and "DANGER" in the user guide only indicate some of the precautions that need to be followed; they just supplement the safety precautions.
4. Use this equipment according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
5. Inovance shall take no responsibility for any personal injury or property damage caused by improper use.

■ Safety Levels and Definitions

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

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

Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage. Please keep this guide well so that it can be read when necessary and forward this guide to the end user.

Control System Design
   • 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 a 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, design external protection circuit 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 to ensure that overvoltage due to lightning shock will not be applied to power supply input terminals, signal input terminals, and control output terminals of the PLC, therefore preventing damage to the equipment.

Installation

WARNING

- Installation must be carried out by the specialists who have received the necessary electrical training and understood enough electrical knowledge.
- 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 where there are dust, oil smoke, conductive dust, corrosive or combustible gases, or exposed to high temperature, condensation, wind & rain, or subject to vibration and impact. Electric shock, fire and malfunction may also result in damage or deterioration to the product.
- The PLC is open-type equipment that must be installed in a control cabinet with lock (cabinet housing protection > IP20). Only the personnel who have received the necessary electrical training and understood enough electrical knowledge can open the cabinet.

CAUTION

- 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.

Wiring

- Wiring must be carried out by personnel who have received the necessary electrical training and understood enough electrical knowledge.
- Disconnect all external power supplies of the system before wiring. Failure to comply may result in electric shock, module fault or malfunction.
- Perform good insulation on terminals so that insulation distance between cables will not reduce after cables are connected to terminals. Failure to comply may result in electric shock or damage to the equipment.

- To avoid electric shock, cut off the power supply before connecting the product to the power supply.
- The input power of the product must meet the specifications listed in this guide. If the power input does not meet the specifications, the equipment may be damaged. Thus, check regularly that the DC power provided by the switching-mode power supply unit is stable.

Operation and Maintenance

- Maintenance & inspection must be carried out by personnel who have the necessary electrical training and experience.
- 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 removing the module or connecting/removing the communication wirings. Failure to comply may result in electric shock or malfunction.

Safety Recommendations

- In the position where the operator directly contacts the machinery part, for example, where a machinery tool is loaded/unloaded, or where a machine runs automatically, manually-operated devices or similar must be installed independently of the PLC; therefore, the devices or similar can be used to start or stop the automatic operation of the system.
- If you need to modify the program while the system is running, use the lock function or other protective measures. Ensure that only authorized personnel can make the necessary modifications.

Disposal

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

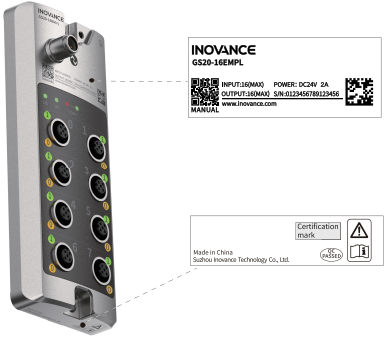
1 Product Information

1.1 Naming Rules and Nameplate

G S 20 - 16 E MP L

① ② ③ ④ ⑤ ⑥ ⑦

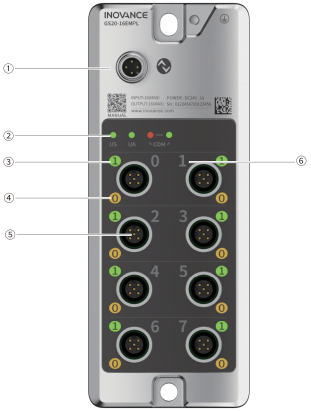
① **Product name** G: Inovance controller common module	⑤ **Module type** E: Logic I/O expansion module
② **Product type** S: High protection module	⑥ **I/O type** MP: Each channel can be configured as either a PNP input or a PNP output.
③ **Series** 20: 20 series	⑦ **Connection type** L: IO-Link
④ **I/O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



Based on the naming rules and nameplate, the order data of the product is described in the following table.

Model	Description	Product code	Applicable Model
GS20-16EMPL	GL20 series transistor PNP module with configurable 16 digital outputs and inputs	01440360	Class A IO-Link Master

1.2 Components



No.	Name	Description			
①	IO-Link port	It is used for IO-Link data transmission. For details, see *"3.2 Port Definitions" on page 19*.			
②	Status indicator	US	System power supply indicator	Green	• Solid on: Voltage normal • Single flashing: 11 V < voltage < 18 V • Flashing: Voltage > 30.2 V • Off: Voltage < 11 V. The module is abnormal.
		UA	Activator power supply indicator	Green	• Solid on: Voltage 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 has reported a fault. • Off: The module has no voltage.

No.	Name	Description			
③	Port pin indicator	0	Pin 4 indicator for port 0. The definition of the upper left indicator for port 1 to port 7 is the same as that of pin 4 indicator for port 0.	Green/ Yellow/ Red	• Steady green: The port pin input is valid. • Steady yellow: The port pin output is valid. • Steady red: The port pin is shorted or encounters an overcurrent fault. Or the port pin is configured as an output but an input is detected in the expert mode. • Off: No input, output, or fault signal Note: When red indicators 0 and 1 become on, the port pin 1 encounters an overcurrent fault or the input/output configuration for the port does not match the actual situation.
④	Port pin indicator	1	Pin 2 indicator for port 0. The definition of the lower left indicator for port 1 to port 7 is the same as that of pin 2 indicator for port 0.		
⑤	I/O port	I/O port 2. For details on port pin definitions, see *"3.2 Port Definitions" on page 19*.			
⑥	Port number	0 to 7	There are eight digital I/O ports, each of which contains two configurable DI/DO.		

Note

- Single flashing: The indicator is on for 200 ms and off for 1000 ms and repeats this cycle.
- Flashing: The indicator is on for 200 ms and off for 200 ms and repeats this cycle.
- Slow flashing: The indicator is on for 900 ms and off for 100 ms and repeats this cycle.

1.3 Technical Specifications

■ Basic 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 (@24 V)
US reverse polarity protection	Supported
Undervoltage detection of US power supply	Supported
Rated voltage of UA power supply	24 VDC (18 VDC to 30.2 VDC)
Maximum current of UA power supply	2 A (@24 V)
UA reverse polarity protection	Supported
Undervoltage detection of UA power supply	Supported

■ DI/DO

Item	Specification
I/O channel quantity	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

Item	Specification
Input voltage	24 VDC (18 VDC to 30.2 VDC)
Input current (typical)	4 mA (@24 V)
Signal ON voltage	> 15 VDC
Signal OFF voltage	< 5 VDC
Hardware response time	100 µs (max.)
Input impedance	6.6 kΩ to 7.6 kΩ
Isolation	No
Input action display	When the DI circuit is in the driving state, the input indicator becomes on.

■ 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)
Output load (resistive load)	0.35 A/channel; 2 A/module
Output load (inductive load)	5.04 W/channel; 12 W/module
Output load (lamp load)	3.5 W/channel; 9 W/module
Hardware response time	100 µs (max.)
Leakage current of signal OFF	10 µA
Switching frequency	Resistive load: 100 Hz; inductive load: 0.5 Hz; lamp load: 10 Hz
Isolation	No
Output action display	When the DO circuit is in the driving state, the output indicator becomes on.

■ Software specifications

Item	Specification
State reverse	The 0x40 parameter allows you to reverse input data.
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 allow you to configure the output status when communication is disconnected due to a fault. In this case, the DO output value is no longer updated. The function is valid only when both the master and slave stations support the function.
Output status feedback	When the module is used for output, the output status is fed back to the master through aperiodic data.
Undervoltage detection	When the voltage of the activator power supply and system power supply is below 18 V, the status is fed 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 work mode of the module. Simple mode: Parameter configurations are not required and the parameter configuration function is 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		Operation Specification	Transportation Specification	Storage Specification
IP rating		IP67 (with screws tightened)		
Pollution degree		2		
Overvoltage category		II		
Temperature		-25°C to +70°C	-40°C to +85°C	-40°C to +85°C
Vibration	Frequency	5 Hz to 500 Hz	2M2	1M2
	Displacement	1 mm (direct installation) (5 Hz to 61 Hz)		
	Acceleration	15 g (direct installation) (61 Hz to 500 Hz)		
	Direction	3-axial directions		
Shock (collision)		15 g, 11 ms, half sine wave, 3-axial directions		
Altitude/Air pressure		0 m to 2000 m	0 m to 3000 m (> 70 kPa)	

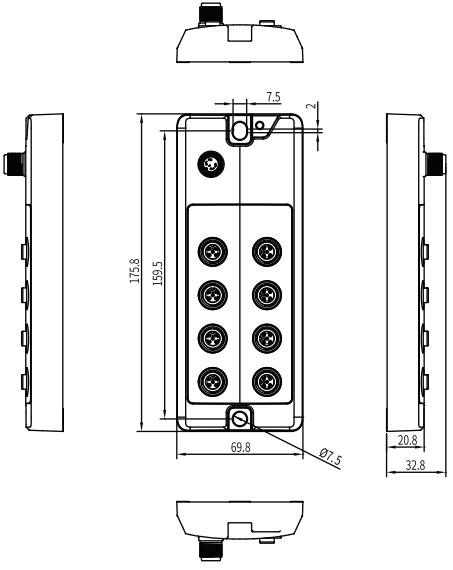
2 Mechanical Installation

2.1 Installation Precautions

- Before installing or removing the module, ensure that the module is powered off.
- Prevent the enclosure or terminals of the module from dropping or suffering from impact or shock.

2.2 Installation Dimensions

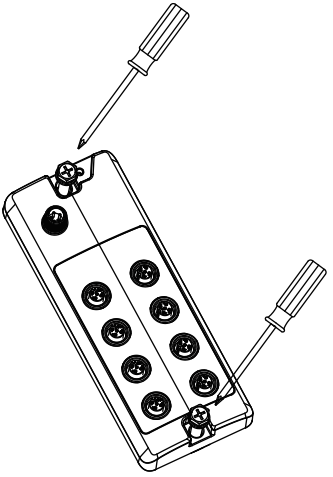
The following figure describes the module installation dimensions (in mm).

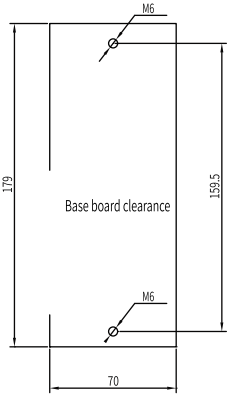


2.3 Installation Methods

■ 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.





■ Removal

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

3 Electrical Installation

3.1 Cable Selection

■ IO-Link cable

The M12A four-conductor cable with the female 90 degree angle connector is used, as described below.

Model	Description	Material Code
PM-M12A-04P-FR-ML-8A03-00A(H)	Cable assembly - IO-Link cable - Male straight connector - 3 m-22AWG - Black - Female 90 degree angle connector - 85°C	15310142

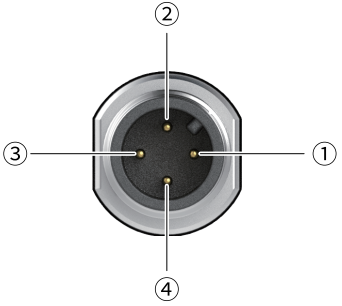
Note

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

3.2 Port Definitions

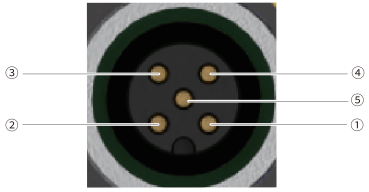
■ IO-Link port pins

The IO-Link port is an M12A male port. The following figure describes pin numbers and the following table describes pins in details.



Pin No.	Pin Signal
①	System and sensor power supply US, +24V
②	Activator power supply UA, +24V
③	GND
④	C/Q, IO-Link data transmission

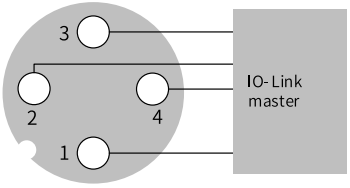
■ **User port pins**



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

3.3 Port Wiring

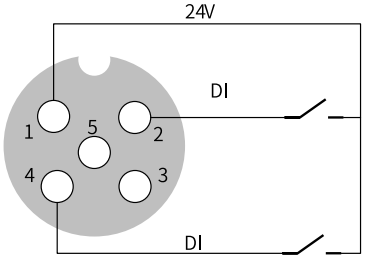
■ **Connecting IO-Link devices**



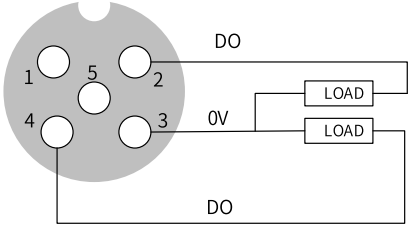
Note

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

■ Connecting DI devices

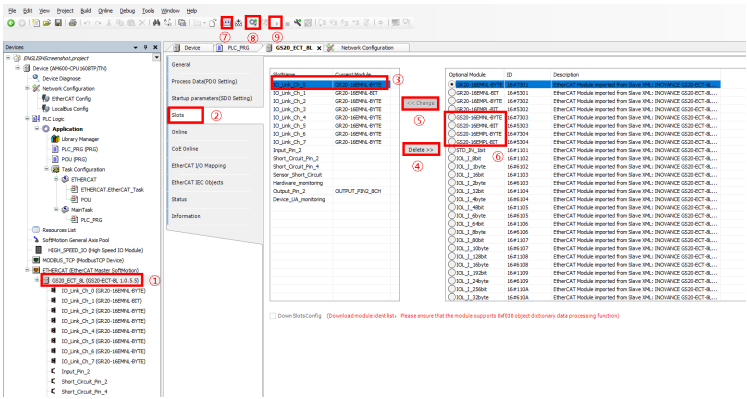


■ Connecting DO devices

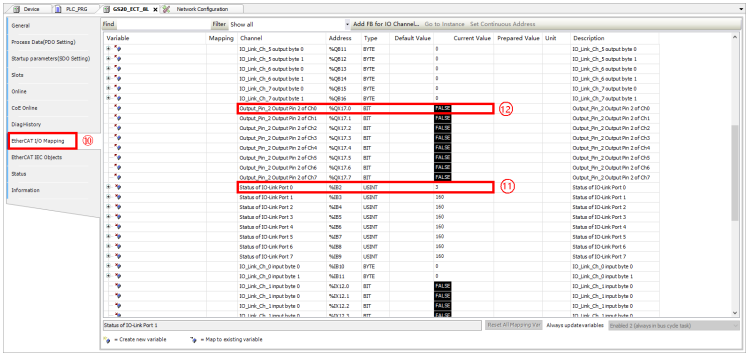


4 Program Commissioning

4.1 IO-Link Communication Configuration and Operation

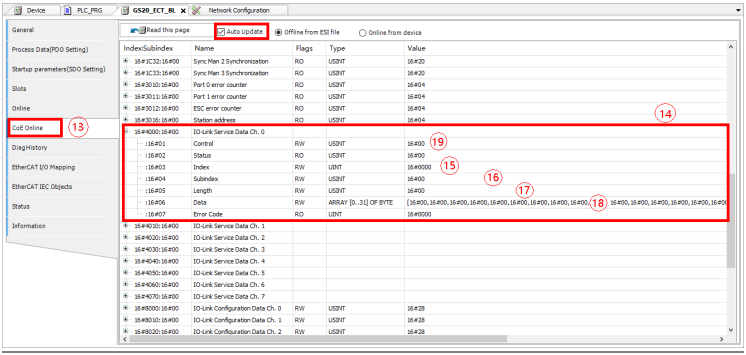


Double-click **GS20_ECT_8L (GS20-ECT-8L 1.0.5.3)** (①), click **Slots** (②), select the slot to be modified (③), and then click **Delete** (④). Select the module to be configured (⑥), and click **Change** (⑤). Click the compile button (⑦), click the download button (⑧) after ensuring correct configurations, and then click the operation button (⑨) after the downloading is complete.



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



Note

For details on port parameter configurations, see *"6.3 Product Data" on page 28*. The 0x49 parameter is used to select a work mode. In the simple mode, parameters are invalid. In the expert mode, parameters can be configured.

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

- Enter the index number of the slave to be operated on in the **Value** cell of **Index** (⑮).
- Enter the sub-index number 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 **Value** cell of **Index** (⑮) and the **Value** cell of **Subindex**

(⑯). Enter 0 and then 3 in the **Value** cell of **Control** (⑲), which indicates that the data in the **Value** cell of **Index** (⑮) and the data in the **Value** cell of **Subindex** (⑯) will be displayed in the **Value** cell of **Data** (⑱).

5 Fault Diagnosis

Fault Code	Fault Type	Fault 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 data for which retention upon power-off is configured	Configuration of retention upon power-off fails. Re-configure the parameter for retention upon power-off.
0x5100	Error	Device power supply error	The UA power supply of the module fails. Connect the power supply of the master pin 2 or connect 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.
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.

Fault Code	Fault Type	Fault Description	Solution
0x7710	Error	Short circuit	The module encounters short circuit. Check the external wiring.
0x6320	Error	Parameter error	The module parameters have been configured incorrectly. Configure the parameters correctly according to the product data.
0x6321	Error	Parameter loss	In the 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 Period	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 of port 6	Pin 4 of port 5	Pin 4 of port 4	Pin 4 of port 3	Pin 4 of port 2	Pin 4 of port 1	Pin 4 of 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 of port 5	Pin 4 of port 4	Pin 4 of port 3	Pin 4 of port 2	Pin 4 of port 1	Pin 4 of 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
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 reverse (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
	Subin-dex	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 of port 5	Pin 4 of port 4	Pin 4 of port 3	Pin 4 of port 2	Pin 4 of port 1	Pin 4 of port 0
	Subin-dex	16	15	14	13	12	11	10	9
	Default	0	0	0	0	0	0	0	0
	0 = Disable reverse; 1 = Enable reverse								

0x41: Input and output config-uration (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
	Subin-dex	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 of port 5	Pin 4 of port 4	Pin 4 of port 3	Pin 4 of port 2	Pin 4 of port 1	Pin 4 of port 0
	Subin-dex	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 of ports 0 to 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 ports 0 to 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 of port 5		Pin 4 of port 4		Pin 4 of port 3		Pin 4 of port 2		Pin 4 of port 1		Pin 4 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.

<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: Activator 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">-: Reserved</td></tr>
</table>

0x47: Output state feed-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 of port 5	Pin 4 of port 4	Pin 4 of port 3	Pin 4 of port 2	Pin 4 of port 1	Pin 4 of port 0
	Subindex	16	15	14	13	12	11	10	9
	Default	0	0	0	0	0	0	0	0
	0: 0 is output; 1: 1 is output.								

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

<table>
<tr><td rowspan="12">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>1600</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 1600, 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: 0x41 to 0x43 are not available in the simple mode. In the expert mode, all configuration parameters are available. If the configuration values are not set according to the preceding descriptions, a 0x6320 parameter error is reported.</td></tr>
</table>

7 Appendix: Version Matching Information

You can get the firmware of the GS20-16EMPL module from Inovance technical support engineers and the InoProShop software from the software and commissioning tool interface of the GS20 at *https://www.inovance.com*. The following table describes the version matching information.

GS20-16EMPL Module Firmware Version	InoProShop Version
Logic software version: 1.2.0.0	V1.7.3 SP2 and later