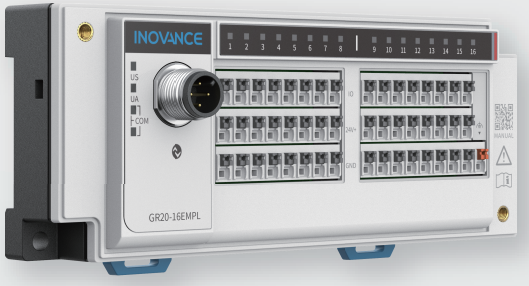
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PS00007356A03

GR20-16EMPL
Digital Input and Output Module
User Guide

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Preface

■ About This Guide

The GR20-16EMPL is a transistor PNP module with 16 digital inputs and outputs. Each of the 16 channels can be configured as either an input or an output. The module is used together with the Class A IO-Link master.

This guide describes the mechanical installation, electrical installation, configuration, commissioning, troubleshooting, and object list 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 EN 61131-2
	EMC regulations	Electromagnetic Compatibility Regulations 2016	**24 VDC products:** EN 61131-2 **220 VAC products:** EN 61131-2 EN 61000-3-2 EN 61000-3-3
	RoHS regulations	Directive (RoHS) Regulations 2012	EN IEC 63000

■ More Data

Name	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
November 2023	A03	Corrected some minor errors.
September 2023	A02	**Modified the following content:** • Added the error code "0x7710" in *"Fault Diagnosis" on page 29*. • Modified the index "0x42" and added the index "0x43" in *"6.3 Product Data" on page 31*.

Date	Version	Description
January 2023	A01	Corrected some minor errors. Added environmental specifications.
November 2022	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*.
- Scan the QR code on the product with your smart phone.
- Scan the QR code below to install the app, where you can search for and download manuals.

■ 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. You will be charged for any repair work 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, please 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 fasten the module screw. 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, the onsite 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 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.

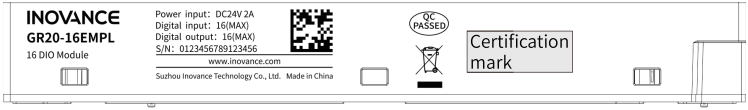
1 Product Information

1.1 Naming Rules and Nameplate

G R 20 - 16 E MP L

① ② ③ ④ ⑤ ⑥ ⑦

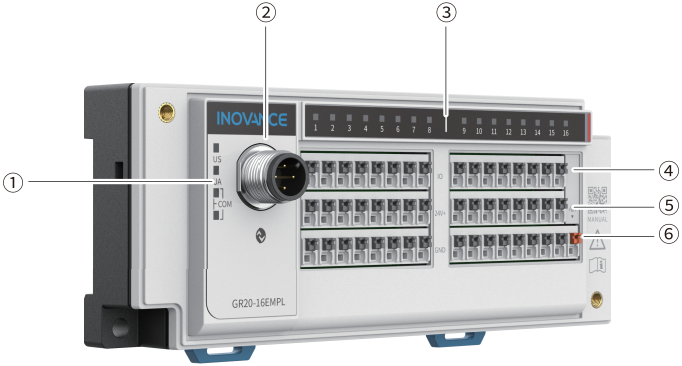
① **Product name** G: Inovance controller common module	⑤ **Module type** E: Logic I/O expansion module
② **Product type** R: Remote module	⑥ **I/O type** MP: Each channel can be configured as either a PNP input or output.
③ **Series** 20: 20 series	⑦ **Connection type** L: IO-Link
④ **I/O channel quantity** 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
GR20-16EMPL	GR20 series transistor PNP module with configurable 16 digital outputs and inputs	01440361	Class A I/O-Link master

1.2 Components



No.	Name	Description			
①	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: No power supply is provided.
		UA	Activator power supply indicator	Green	• Solid on: Voltage normal • Single flashing: 11 V < voltage < 18 V • Flashing: Voltage > 30.2 V • OFF: No power supply is provided.
		COM	I/O-Link communication indicator	Green/ Red	• Steady green: No communication • Slow flashing green: The IO-Link communication is normal. • Slow flashing red: The module has reported a fault. • Off: The module has no voltage.
②	I/O-Link port	It is used for I/O-Link data transmission. For details, see *"3.2 Port Definitions" on page 26*.			
③	I/O indicator	1 to 16	I/O signal indicator	Green	• Solid on: State 1 • Off: State 0
④	IO port	I/O	16 configurable channels		

No.	Name	Description			
⑤	24V terminal	24V+	24 VDC power supply +	-	-
⑥	Grounding terminal	• GND (gray) • PE (orange)	-	-	-

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
IP rating	IP20
Dimensions (W x H x D)	150 mm x 60 mm x 29 mm
Weight	About 150 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, common ground with US)

Item	Specification
Maximum current of UA power supply	2 A (@24 V)
UA reverse polarity protection	Supported
Undervoltage detection of UA power supply	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)
Input current (typical)	4 mA (@24 V)
Signal ON voltage	> 15 VDC
Signal OFF voltage	< 5 VDC
Hardware response time	100 us
Input impedance	6.6 kΩ to 7.6 kΩ
Isolation	Not supported
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 class	24 VDC (18 VDC to 30.2 VDC)
Output load (resistive load)	0.5 A/channel; 2 A/module
Output load (inductive load)	7.2 W/channel; 12 W/module
Output load (lamp load)	5 W/channel; 9 W/module

Item	Specification
Hardware response time	100 us
Leakage current of signal OFF	10 uA
Switching frequency	Resistive load: 100 Hz; inductive load: 0.5 Hz; lamp load: 10 Hz
Isolation	Not supported
Output action display	When the DO circuit is in the driving state, the output indicator becomes on.

■ Software specifications

Item	Specification
Input/output configuration	The I/O channel of the module can be configured as input or output based on the actual application.
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.
State reverse	The I/O channel state of the module can be reversed based on the actual I/O channel state. For example, assume that the external input is 0x00. When the state reverse function is disabled, the input process data is 0x00. When the state reverse function is enabled, the input process data is 0xFF.
Output feedback	When the module is used for output, the output status is fed back to the master through aperiodic data.

Item	Specification
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. The activator power supply state is displayed by bits 2 and 3, and the system power supply state is displayed by bits 0 and 1.
Module type and basic information reading	When the master communicates with the slave normally, the master can read the basic information of the slave through the index. The basic information includes the Vendor ID, Device ID. Vendor name, Vendor text, Product name, Product ID, Hardware Revision, and Firmware Revision.
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.

1.4 Environmental Specifications

Item	Operating Specification	Transportation Specification	Storage Specification
IP rating	IP20 (without dust cover) IP5X (with dust cover)		
Pollution degree	2		
Overvoltage category	II		
Temperature	-20°C to +55°C	-40°C to +70°C	-25°C to +70°C
Humidity	10% to 95% RH, non-condensing		

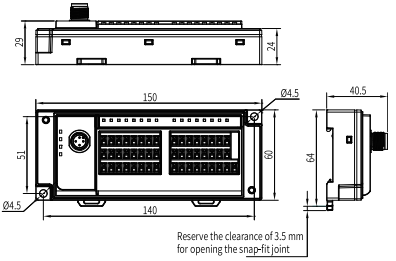
Item		Operating Specification	Transportation Specification	Storage Specification
Vibration	Frequency	5 Hz to 200 Hz	2M2	1M2
	Displacement	3.5 mm (direct installation) (<9 Hz)		
	Acceleration	1 g (direct installation) (>9 Hz)		
	Direction	3-axial directions		
Shock (collision)		15 g, 11 ms, half sine 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 Dimensions

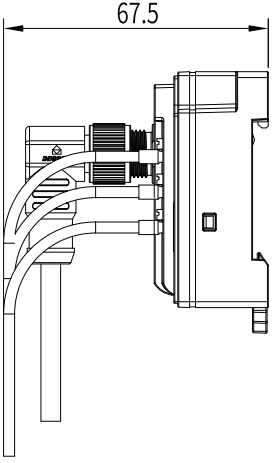
■ Module

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



■ Cable

The following figure describes the dimensions of the M12A four-conductor cable with the female 90 degree angle connector (in mm).



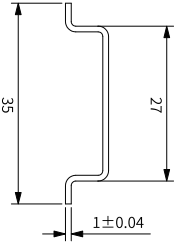
2.2 Module Installation

■ Installing the module

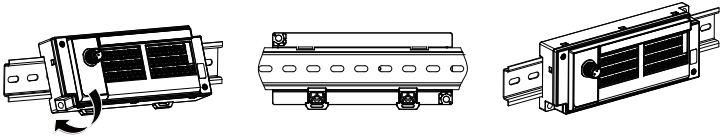
You can install the module by using the DIN rail or by using screws.

- **DIN guide rail-based installation**

  The DIN rail must comply with IEC 60715 (width: 35 mm, thickness: 1 mm). The dimensions (unit: mm) are shown below.

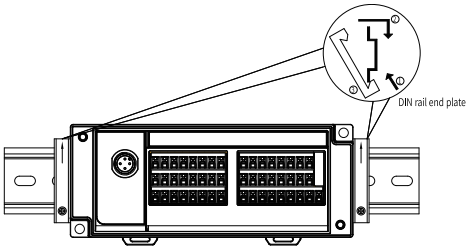


  Hang the slot at the top of the module on the DIN rail and rotate the module backward until you hear a click, as shown in the following figure.



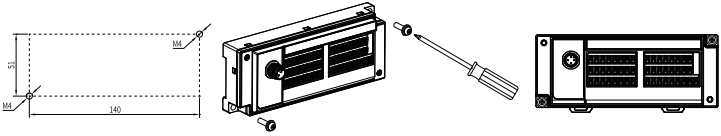
  Note: After the module is installed, the DIN rail snap-fit joint will automatically move upwards to lock the module to the rail. If the snap-fit joint does not move upwards, press the top of the snap-fit joint upwards to lock the module.

  Mount a DIN rail end plate on both ends of the module. To mount the DIN rail end plate, hook the bottom of it to the bottom of the DIN rail, rotate the end plate to hook the top of the end plate to the top of the DIN rail, and then tighten the screw to lock the end plate in place, as shown below.



- **Screw-based installation**

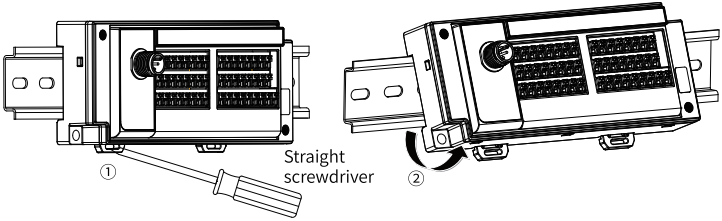
  Screws and washers (optional) specifications: M4 screw length: ⩾ 14 mm; washer diameter: ⩽ 9 mm. Screw mounting hole specifications: 140 mm x 51 mm diagonal holes. See the following mounting hole dimensions and mounting diagram.



■ Removing the module

- **DIN rail-based removal**

  Pry the DIN rail snap-fit joint downwards with a tool such as a slotted screwdriver, and then rotate the module forward to remove it, as shown in the following figure.



- **Screw-based removal**

  Remove the M4 screws using a screwdriver, and then detach the module.

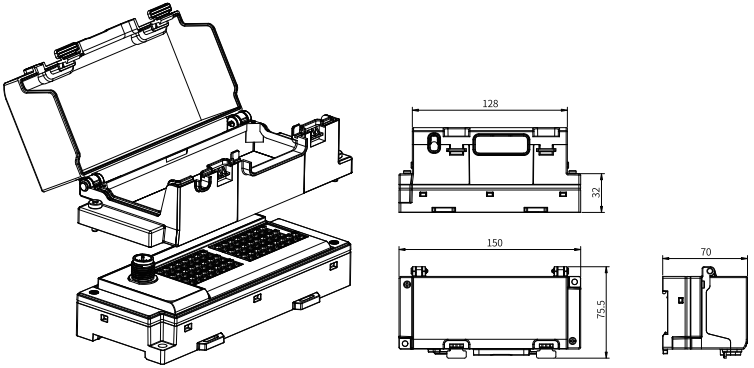
2.3 Dust Cover Installation (Optional)

The GR20-FCZ series dust cover is available. The order data is shown in the following table.

Model	Description	Product code
GR20-FCZ	GR20-FCZ series dust cover	01480038

The dust cover is designed to prevent dust, splashing, and impact. It is made of transparent PC, which allows you to observe the running state of the module at any time. It is suitable for non-standard equipment and intelligent production lines.

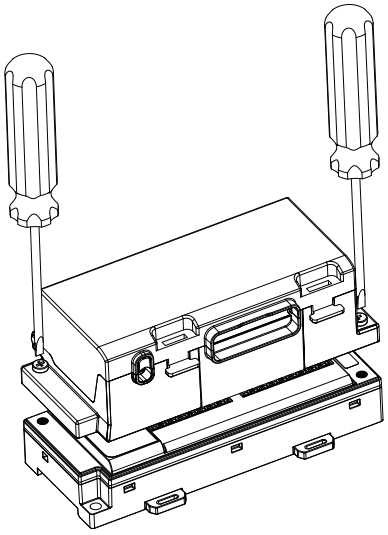
Install the dust cover on the module. Cabling space for IO-Link and input/output cables is reversed on the dust cover, allowing you to open/close the dust cover without tools and to maintain the module without removing the dust cover. The following figure shows the product diagram and dimensions.



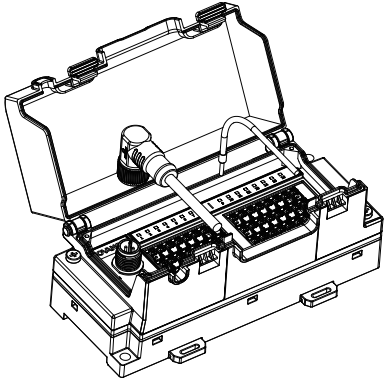
The dust cover comes with two captive screws. It supports two installation scenarios: Cable disconnection before installation and cable connection before installation.

■ Cable disconnection before installation

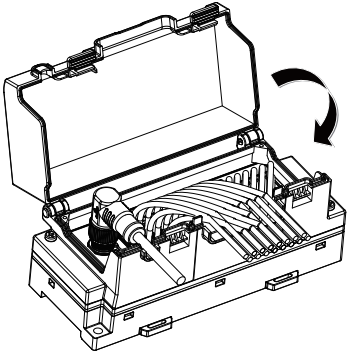
1. Use a Phillips screwdriver to secure the dust cover (torque: 5 kgf.cm) to the module with two screws.

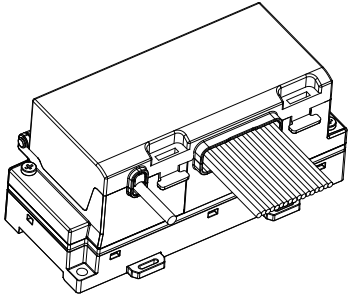


2. Connect the IO-Link communication, I/O, 24 V power supply+, and grounding cables.



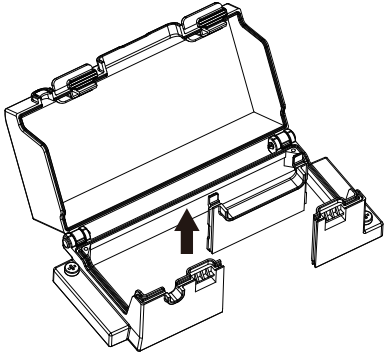
3. Rotate the upper cover of the dust cover in the direction of the arrow and lock the cover.



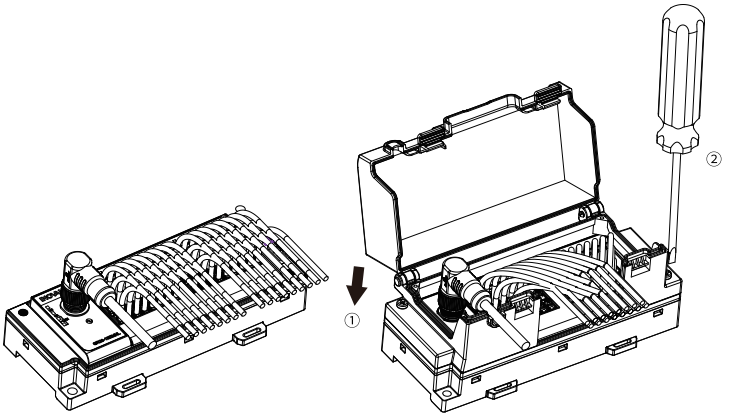


■ Cable connection before installation

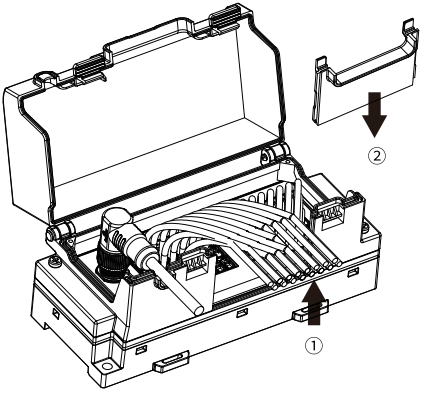
1. Take out the side cover of the dust cover in the direction indicated by the arrow.



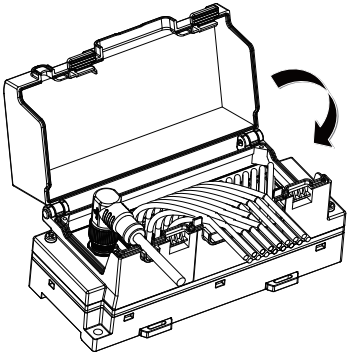
2. Route the IO-Link communication cable through the left front slot of the dust cover and route the I/O, 24 V power supply+, and grounding cables through the opening of the dust cover. Use a Phillips screwdriver to secure the dust cover to the module with two screws (torque: 5 kgf.cm).

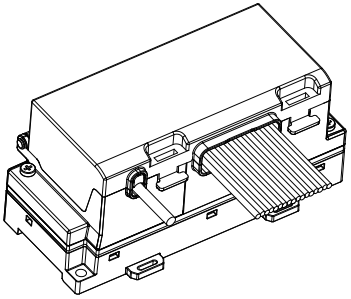


3. Lift up the I/O, 24 V power supply +, and grounding cables from the opening of the dust cover, insert the side cover back to the dust cover, and then route the cables through the cable slot of the side cover.



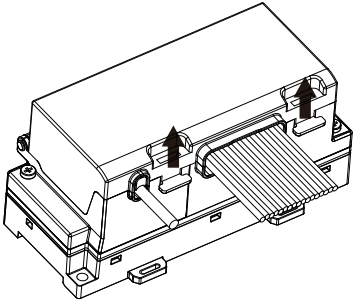
4. Rotate the upper cover of the dust cover in the direction of the arrow and lock the cover.

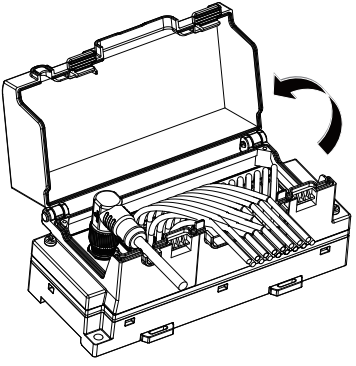




■ Maintaining the cable

To maintain the cable, lift up the two snap-fit joints and open the upper cover of the dust cover.





3 Electrical Installation

3.1 Cable Selection

■ I/O-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

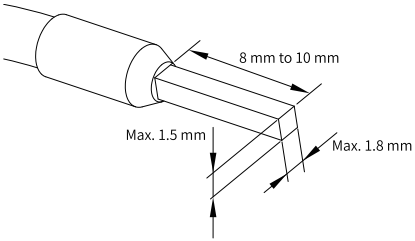
If you have additional requirements for IO-Link cables, contact Inovance for customization.

■ IO/24 V power supply +/grounding cable

The cable lug and cable diameter described in the following table are only for reference.

Material Name	Cable Diameter		KST		Suzhou Yuanli	
	mm^2	AWG	Model	Crimping Tool	Model	Crimping Tool
Tubular lug	0.3	22	E0308	KST2000L	0308	YAC-5
	0.5	20	E0508		0508	
	0.75	18	E7508		7508	
	1.0	18	E1008		1008	

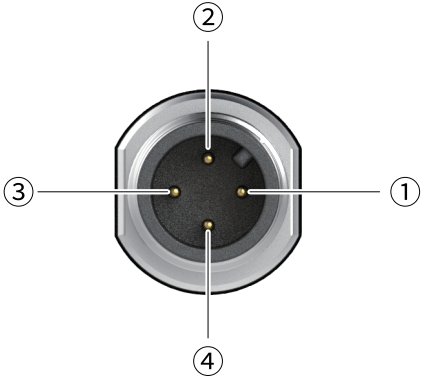
If you use other types of tubular lug, crimp the lug to the cables according to the shape and dimension requirements shown in the figure below.



3.2 Port Definitions

■ IO-Link port pins

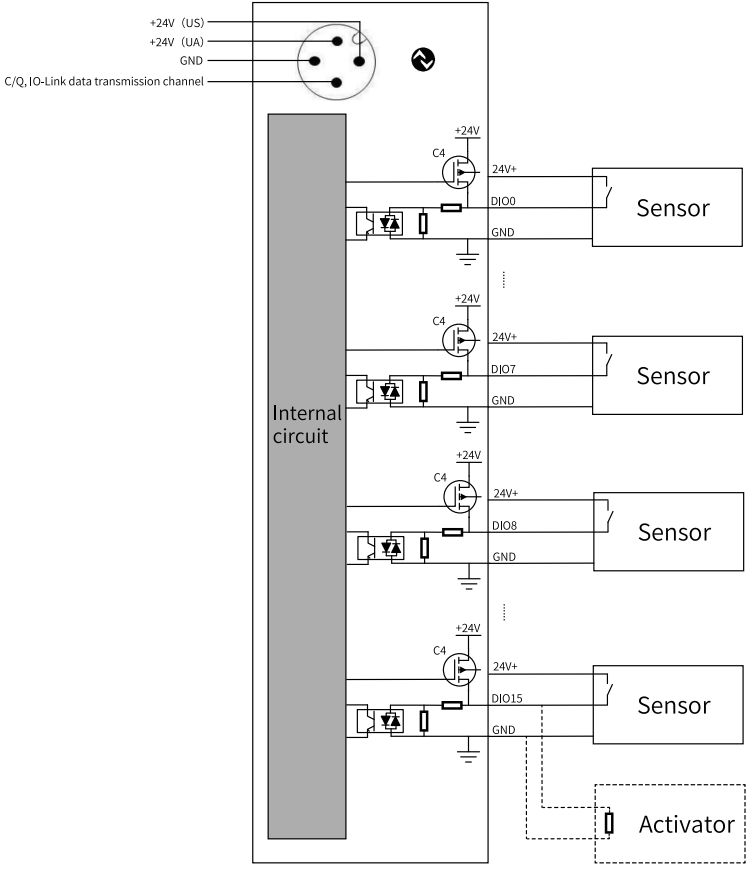
The IO-Link port is an M12A male port. The following figure describes pin numbers and the following table describes pins in details.



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

3.3 Port Wiring

When the sensor is connected, configure the port as an input channel. When the activator is connected, configure the port as an output channel.



4 Configuration and Commissioning

The configuration and commissioning are described when the module is used together with the GS20-ECT-8L high protection IO-Link master and the medium-sized PLC of Inovance. For details, see the configuration and commissioning section in the GS20-ECT-8L High-Protection IO-Link Master User Guide.

5 Fault Diagnosis

The following table lists the fault codes and their definitions.

Fault Code	Description
0x4210	Overtemperature
0x4220	Low temperature
0x5011	Loss of data for which retention upon power-off is configured
0x5100	Power supply error
0x5110	System power supply overvoltage
0x5111	System power supply undervoltage
0x5000	Device function fault
0x6320	Parameter error
0x7710	Short circuit
0x8C10	The process variable range exceeds the limit.

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	3 ms
Vendor ID	0x0659
Device ID	-

6.2 Process data

Input Data	Byte	0							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO15	DIO14	DIO13	DIO12	DIO11	DIO10	DIO9	DIO8
-	Input data refers to the data sent from the slave to the master.								

Output Data	Byte	0							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO15	DIO14	DIO13	DIO12	DIO11	DIO10	DIO9	DIO8
-	Output data refers to the data sent by 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	0	Vendor name	8 bytes		INOVANCE
0x11	0	Vendor text	16 bytes		www.inovance.com
0x12	0	Product name	21 bytes		GR20-16EMNL
0x13	0	Product ID	7 bytes		01440355
0x14	0	Product text	23 bytes		GL20-16DIO:IO Sensor/Actuator Hub IP20 16Bit
0x16	0	Hardware Revision	4 bytes		1.0.0.0
0x17	0	Firmware Revision	4 bytes		1.0.0.0
0x40	0	Inversion	2 bytes	0x0000-0xFFFF	0x0000
0x41	0	Configuration Input/Output	2 bytes	0x0000-0xFFFF	0x0000
0x42	0	DIO0-DO07 Safe State	2 bytes	0x0000-0xFFFF	0x0000
0x43	0	DIO8-DIO15 Safe State	2 bytes	0x0000-0xFFFF	0x0000
0x44	0	Under Voltage	2 bytes	0x0000-0xFFFF	0x0000
0x47	0	Feedback	2 bytes	0x0000-0xFFFF	0x00000000
0x48	0	Temperature detection	2 bytes	0x0000-0xFFFF	0x0000

Input data	Byte	0							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO15	DIO14	DIO13	DIO12	DIO11	DIO10	DIO9	DIO8

Output data	Byte	0							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO15	DIO14	DIO13	DIO12	DIO11	DIO10	DIO9	DIO8

0x40: Status reverse (R/W)	Byte	0							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
	Default	0	0	0	0	0	0	0	0
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO15	DIO14	DIO13	DIO12	DIO11	DIO10	DIO9	DIO8
	Default	0	0	0	0	0	0	0	0
	0 = Disable reverse; 1 = Enable reverse								

0x41: Input and output configuration (R/W)	Byte	0							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
	Default	0	0	0	0	0	0	0	0
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO15	DIO14	DIO13	DIO12	DIO11	DIO10	DIO9	DIO8
	Default	0	0	0	0	0	0	0	0
	0: Input; 1: Output								

0x42: Action of DIO0 to DIO7 (R/W) when a fault occurs	Byte	0						
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO3		DIO2		DIO1		DIO0	
	Subindex	4		3		2		1	
	Default	00		00		00		00	
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO7		DIO6		DIO5		DIO4	
	Subindex	8		7		6		5	
	Default	00		00		00		00	
	00: Low level; 01: High level; 10: Last state; 11: Reserved								

0x43: Action of DIO8 to DIO15 (R/W) when a fault occurs	Byte	0						
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO11		DIO10		DIO9		DIO8	
	Subindex	4		3		2		1	
	Default	00		00		00		00	
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO15		DIO14		DIO13		DIO12	
	Subindex	8		7		6		5	
	Default	00		00		00		00	
	00: Low level; 01: High level; 10: Last state; 11: Reserved								

0x44: System monitoring (R)	Byte	0						
	Bit	7	6	5	4	3	2	1	0
	Pin	-	-	-	-	-	-	-	T
	Default	-	-	-	-	-	-	-	0
	Byte	1						
	Bit	7	6	5	4	3	2	1	0
	Pin	-	-	-	-	UA		US	
	Default	-	-	-	-	0	0	0	0
	US: System power supply voltage. 00: Normal; 01: Below 18 V; 10: Above 30.2 V; 11: Reserved.								
	UA: Activator power supply voltage. 00: Normal; 01: Below 18 V; 10: Above 30.2 V; 11: Reserved.								
	T: MCU temperature. 0: MCU temperature below setpoint; 1: MCU temperature above setpoint.								
	-: Reserved								

0x47: Output state feedback (R)	Byte	0						
	Bit	7	6	5	4	3	2	1	0
	Pin	DIO7	DIO6	DIO5	DIO4	DIO3	DIO2	DIO1	DIO0
	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	DIO15	DIO14	DIO13	DIO12	DIO11	DIO10	DIO9	DIO8
	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	