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PS00009314A07

GS20-16EMNL
Digital Input and Output Module

User Guide

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Due to continuous updates and improvements of products and technologies, the content of this documentation may not fully match the actual products. In the event of any discrepancies, the actual products shall prevail.

The contents are subject to change without notice due to product upgrade.

■ Waste Disposal

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

■ Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel can identify the risks of the product/system and prevent possible dangers.

■ Proper Use of the Product

Proper transportation, storage, assembly, installation, commissioning, operation, and maintenance are required to ensure the safe operation of the product without any problems. The required ambient conditions must be met. All operations must follow the guidelines provided in this documentation.

Preface

■ Introduction

The GS20-16EMNL is a module with 16 configurable digital inputs and outputs (transistor NPN 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		Standards compliance
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		Standards compliance
EAC certification	-		-
UKCA certification	Safety regulations	Electrical Equipment (Safety) Regulations 2016	EN 61010-1 EN 61010-2-201
	EMC regulations	Electromagnetic Compatibility Regulations 2016	**24 VDC products:** EN 61131-2 **220 VAC products:** EN 61131-2 EN 61000-3-2 EN 61000-3-3
	RoHS regulations	Directive (RoHS) Regulations 2012	EN IEC 63000

■ More documents

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, 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.
GS20-16EMNL Digital Input and Output Module User Guide (This guide)	PS00009314	The guide describes the product information, mechanical installation, electrical installation, commissioning, and troubleshooting of the product.

■ Revision history

Date	Version	Revision
April 2026	A07	Updated *"1.1 General Safety Instructions" on page 7*.
January 2026	A06	Updated *" Troubleshooting" on page 39*.
November 2025	A05	• Updated product illustrations and product codes in *"2.1 Model and Nameplate" on page 19*, *"2.2 Components" on page 20* and *"7.2 Process Data" on page 42*. • *"4.3 Terminal Wiring" on page 33* Added tightening torque specifications to "Terminal Wiring" chapter. • Updated *"7.2 Process Data" on page 42*. • Updated *"7.3 Product Data" on page 47*.
July 2025	A04	• Updated *"7.2 Process Data" on page 42*. • Made minor corrections.
December 2024	A03	Made minor corrections.

Date	Version	Revision
August 2024	A02	• Updated the software specifications in *"2.3 Technical Specifications" on page 23*. • Updated "0x49: Mode configuration (R/W)" in *"7.3 Product Data" on page 47*.
March 2024	A01	• Updated the terminal pin indicator in *"2.2 Components" on page 20*. • Updated the software specifications in *"2.3 Technical Specifications" on page 23*. • Updated "Port Parameter Configuration". • Updated fault codes in *" Troubleshooting" on page 39*. • Updated the parameter settings in *"7.3 Product Data" on page 47*.
July 2023	A00	First release.

■ Access to the guide

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

- Visit **https://www.inovance.com/global**, and choose Service&Support > Support > Documentation Download.
- Scan the **QR code** on the product with your smartphone.
- Scan the QR code below to install **My Inovance** app, where you can search for and download the guide.

■ 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.

Even within the warranty period, maintenance can be charged for the following product damage:

- Damage caused by operations not following the instructions in the guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by using the product for unintended functions
- Damage caused by using the product outside the specified scope
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

When applicable, relevant maintenance fee will be charged according to the latest Price List of Inovance. If otherwise agreed upon, the agreed terms and conditions shall prevail.

For details, see the Warranty Card.

1 Fundamental Safety Instructions

1.1 General Safety Instructions

■ Safety disclaimer

1. Read and comply with the safety instructions during installation, operation, and maintenance of the product.
2. To ensure personal and equipment safety, observe all safety precautions marked on the product and described in this guide during installation, operation, and maintenance.
3. The "CAUTION", "WARNING", and "DANGER" are only supplements to the safety instructions.
4. Use this product 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



The "DANGER" sign indicates that failure to comply with the notice will result in death or serious injury.



The "WARNING" sign indicates that failure to comply with the notice could result in death or serious injury.



The "CAUTION" sign indicates that failure to comply with the notice could result in minor or moderate injury, or equipment damage.

Unpacking

WARNING

- Do not install the product in the case of any damage, rust, or signs of use on the product or accessories upon unpacking.
- Do not install the product in the case of water seepage into the product or missing or damaged components upon unpacking.
- Do not install the product in the case of any discrepancy between the product you received and the product name on the packing list.

CAUTION

- Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking.
- Unpack the package by following the unpacking sequence. Do not strike the package violently.
- Check for damage, rust, or dents on the surfaces of the product and accessories upon unpacking.
- After unpacking, check the contents against the packing list to ensure that the equipment and accessories are in the correct quantities, and that all documentation is complete.

Storage and transportation

WARNING

- Large or heavy equipment must be handled by qualified professionals using specialized hoisting equipment. Failure to comply could result in personal injury or equipment damage.
- Before hoisting the equipment, ensure that components such as the front cover and terminal blocks are secured firmly with screws. Loosely connected components may fall off and result in personal injury or equipment damage.
- Do not stand or stay below the product which is being hoisted.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply could result in personal injury or equipment damage.

Storage and transportation



- Handle the equipment with care and mind your step during transportation to prevent personal injury or equipment damage.
- When carrying the equipment with bare hands, hold the equipment casing firmly with care to prevent parts from falling. Failure to comply could result in personal injury.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply could result in equipment damage.
- Do not store or transport the equipment in locations where the equipment may be exposed to splashing water or rain, direct sunlight, strong electric field, strong magnetic field, or strong vibration.
- Store the equipment for up to three months. Take stricter protective measures and carry out the necessary inspections for a longer storage time.
- Pack the equipment securely and properly before transportation. Use a fully enclosed container for long-distance transportation.
- Never transport the equipment with other devices or items that could impact or cause harm to the equipment.

Design



- Design a safety circuit and add an error handling program in the software to ensure the product remains in a safe state upon external power failure or product faults.
- If a sustained overcurrent occurs due to overload or load short circuit, the product may smoke or catch fire. An external safety device (such as a fuse or circuit breaker) must be installed.



Design

- When an output unit such as a relay or transistor in the equipment is damaged, the output may become uncontrollable and remain ON or OFF for a long period.
- The equipment design must comply with the overvoltage category requirements specified in the environmental specifications. The power supply must have a system-level lightning protection device, assuring that overvoltage due to lightning shock cannot be applied to the power supply input terminals, signal input terminals, or output terminals, to prevent equipment damage.
- Ensure that appropriate actions have been taken to prevent product malfunction caused by a communication fault between the product and related devices. Failure to comply could cause personal injury or equipment damage.



Switches that could cause personal injury or equipment damage must not be configured on the touch screen. Use independent switches for performing critical operations. Failure to comply could result in accidents caused by wrong outputs or faults.

Installation



This equipment must be operated only by trained and qualified electrical personnel. Non-professionals must not operate this equipment.



Installation

- Read through the guide and safety instructions before installation.
- Do not install this equipment in places with strong electric or magnetic field.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Before installation, ensure that the installation site meets the required environmental conditions. Failure to comply could result in equipment damage.
- Do not wear loose clothes or accessories during installation. Failure to comply could result in electric shock.
- When installing the equipment in an enclosed environment (such as a cabinet or case), use cooling devices (such as fans or air conditioners) to cool the space and meet the installation environment requirements. Failure to do so can result in equipment overtemperature or fire accidents.
- Do not retrofit the equipment.
- Never loosen or turn the fixing bolts on product components, or any bolts marked in red.
- This equipment must be installed inside an indoor cabinet or terminal equipment. The cabinet or terminal equipment itself must be provided with the necessary protective enclosures, such as a fireproof enclosure, an electrical protective enclosure, and a mechanical protective enclosure. The IP rating of these enclosures must comply with the relevant IEC standards, and applicable local laws and regulations.
- Before installing devices with strong electromagnetic interference, such as a transformer, install a shielding device for the equipment to prevent malfunction.
- Install the equipment onto a non-combustible object such as metal. Keep the equipment away from combustible objects. Failure to comply could result in fire.
- For products not supporting hot swapping, disconnect all external power supplies of the system before installing/removing the product. Failure to comply could result in electric shock, product failure, or malfunction.

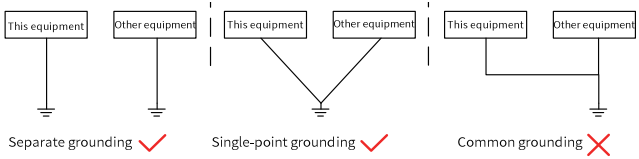


- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the product and causing faults. After installation, remove the cloth or paper on the top of the equipment to prevent the ventilation holes from being blocked, which could cause overheating due to poor heat dissipation.
- During installation, ensure the equipment is connected to the respective connector securely and hook the equipment firmly. Improper installation may result in malfunction, failure, or detachment.

Wiring

DANGER

- This equipment must be operated only by trained and qualified electrical personnel. Non-professionals must not operate this equipment.
- Before wiring, disconnect all the power supplies of the equipment. Wait for at least the time designated on the warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safe voltage range. Failure to comply can result in electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power ON. Failure to comply could result in electric shock.
- Ensure that the equipment is grounded properly. Failure to comply could result in electric shock. Separate grounding or single-point grounding, other than common grounding, is recommended.



- 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 could result in electric shock or equipment damage.
- Install the terminal cover attached to the equipment before power-on or operation after wiring is completed. Failure to comply could result in electric shock.

WARNING

Wiring

- Never connect the power cable to output terminals of the equipment. Failure to comply could cause equipment damage or even fire.
- Cables used for wiring must comply with the requirements for the cross-sectional area and shielding. The shielding layer of the shielded cable must be reliably grounded at one end.
- Tighten the terminal screws with the torque specified in the user guide. Insufficient or excessive torque may cause overheating and damage to the joint, which could result in fire.
- After wiring is done, ensure that all cables are connected properly and no screws, washers or exposed cables are left inside the equipment. Failure to comply could result in electric shock or equipment damage.



- Follow the proper electrostatic discharge to perform wiring. Failure to comply could damage the equipment or its internal circuits.
- Use shielded twisted pair cables for the control circuit. Connect the shield to the grounding terminal of the equipment. Failure to comply may result in equipment malfunction.

Power-on



- This equipment must be operated only by trained and qualified electrical personnel. Non-professionals must not operate this equipment.
- Before power-on, ensure that the equipment is installed and wired properly.
- Ensure that the power supply meets equipment requirements before power-on to prevent equipment damage or fire accident.
- Do not open the cabinet door or protective cover of the product, touch any wiring terminal of the product, or remove any components or parts while the product is powered on. Failure to comply could result in personal injury or even death.



Perform a trial run after wiring to ensure the equipment operates safely. Failure to comply could result in personal injury or equipment damage.

Operation

DANGER

- The equipment must be operated only by professionals. Failure to comply can result in injury or death.
- Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply could result in electric shock.

WARNING

- Do not touch the enclosure, fan, or resistor with bare hands. Failure to comply could result in burns.
- Prevent metal or other objects from falling into the equipment during operation. Failure to comply could result in fire or equipment damage.
- During operation, do not bring live parts into contact with the metal enclosure of the product. Failure to comply could result in fire or product damage.

CAUTION

- Operate the equipment within the specified environmental conditions. Failure to comply could result in equipment failure or damage.
- Touch the HMI panel with hands only. Failure to comply could cause panel damage, which is out of the warranty range.

Safety recommendations

- In positions where the operator directly touches the mechanical parts, for example, where a mechanical device is loaded/unloaded, or where a machine runs automatically, manually-operated devices or other alternative means must be carefully designed so that they are independent of the equipment 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 protection measures to ensure that only authorized personnel can make the necessary modifications.

Battery usage

WARNING

- Do not use batteries that do not meet the product requirements. Failure to comply could result in death, personal injury, explosion, or fire.
- Do not throw batteries into fire or hot ovens. Do not crush or cut the battery. Failure to comply could result in death, personal injury, explosion, or fire.
- Do not expose the battery to extremely high temperatures. Failure to comply could result in death, personal injury, explosion, or fire.
- Do not swallow batteries. Failure to comply could result in chemical burns.
- If a button battery is swallowed by accident, seek medical treatment immediately. Failure to comply may result in severe internal burns within two hours, which may cause death.

CAUTION

- Keep the batteries away from children.
- If the battery compartment is not shut tight, stop using the product and keep it away from children.

Maintenance

DANGER

- Maintenance must be performed only by trained and qualified electrical personnel.
- Do not maintain the equipment with power ON. Failure to comply could result in electric shock.
- Before maintenance, disconnect all the power supplies of the equipment and wait for at least the time specified on the warning label.
- Disconnect all external power supplies of the system before cleaning the equipment or re-tightening screws on the terminal block or screws for connector installation. Failure to comply could result in electric shock.
- Disconnect all external power supplies of the system before removing or installing the product, or connecting or disconnecting cables. Failure to comply could result in electric shock or malfunction.

WARNING

Perform routine and periodic inspection and maintenance on the equipment according to maintenance requirements and keep a maintenance record.

Repair

DANGER

- Repair must be performed only by trained and qualified electrical personnel.
- Do not repair the equipment with power ON. Failure to comply could result in electric shock.
- Before inspection or repair, disconnect all the power supplies of the equipment and wait for at least the time specified on the warning label.

WARNING

- Submit a request for repair based on the warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage circuit breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply could result in equipment damage, personal injury, or death.
- Troubleshooting and repair of a faulty or damaged equipment must be performed by professionals based on the repair instructions, with the repair records kept properly.
- Replace quick-wear parts of the equipment according to the replacement instructions.
- Do not use damaged equipment. Failure to comply could result in death, personal injury, or severe equipment damage.
- Recheck the wiring and reset the parameters after equipment replacement.

Disposal

WARNING

- Dispose of the retired equipment in accordance with applicable national regulations and standards. Failure to comply could result in property damage, personal injury, or death.
- Recycle retired equipment in accordance with industry waste disposal standards to avoid environmental pollution.
- Treat the scrapped equipment as industrial waste. Dispose of the batteries according to local laws and regulations.

■ Safety Label

To ensure safe operation, comply with safety labels on the equipment and do not damage or remove the labels. The following table describes the meanings of the safety labels.

Safety Label	Description
	• Before using the equipment, read the guide and safety precautions carefully. Failure to comply may result in personal injury, death, or equipment damage. • Do not touch the terminals or remove the cover with power-on or within 10 min after power-off. Failure to comply could result in electric shock. • The surface of the product may become very hot during operation. Do not touch these hot areas, as this may cause burns!

1.2 Industrial Information Security

The product provides an interface to connect to the network and transmits data through the network interface. To protect factories, systems, machines, and networks from cyber attacks and ensure safe operation, a proper industrial information security protection mechanism must be implemented.

Customers are responsible for providing and maintaining a secure connection between the product and their network or any other network to protect their factories, systems, machines, and networks from unauthorized access. The system or machine can be connected to the enterprise network or the Internet only when secure connections are establishes and appropriate security measures are taken (such as using anti-virus software or installing firewalls).

Inovance continuously develops and improves products and solutions to improve safety. It is strongly recommended to keep your products updated and always use the latest version.



Tampering with software (such as viruses, Trojans, and Worms) can lead to unsafe drive state, which can put the device in an unsafe operation state. This may result in death, serious injury, and property damage. Observe the following strictly.

- Always use the latest software version. If the product version is no longer supported or the latest version of the program is not applied, customers are at increased risk of cyber-attacks.
- Take proper protection measures (including but not limited to deploying antivirus software, firewall, WAF, IPS/IDS, situational awareness system, ID verification, and data encryption) to prevent files in the mobile storage device from being damaged by malware and protect products, networks, systems, and interfaces from unauthorized access, disturbance, intrusion, data disclosure, or information theft.
- Check all safety-related interfaces and settings after commissioning.

2 Product Information

2.1 Model and Nameplate

G S 20 - 16 E MN L

① ② ③ ④ ⑤ ⑥ ⑦

① **Product family** 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** MN: Each channel can be configured as either an NPN input or an NPN output.
③ **Series** 20: 20 series	⑦ **Connection type** L: IO-Link
④ **Number of I/O channels** 16: 16 channels	-

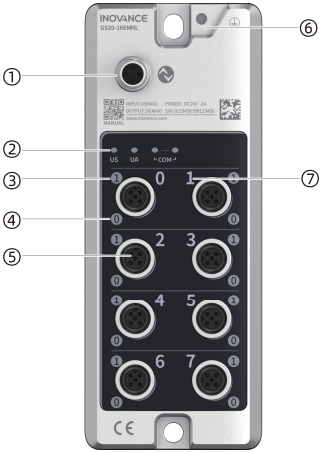


Based on the above description of model number and nameplate, the relevant ordering data of this product is described in the table below.

Model	Description	Product code	Applicable model
GS20-16EMNL-INT	GS20 series transistor NPN module with configurable 16 digital outputs and inputs	01441090	Class A IO-Link Master

2.2 Components

The module contains the following components.



No.	Name	Description			
①	IO-Link port	It is used for IO-Link data transmission. For details, see *"4.2 Terminal Assignment" on page 32*			
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 indicator 1 [1]	1	Indicates the input/output state of pin 4 for each port.	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 indicator 0 [1]	0	Indicates the input/output state of pin 2 for each port.		
⑤	I/O port	I/O port 2. For details on pin definitions, see *"4.2 Terminal Assignment" on page 32*			
⑥	Grounding terminal	⏚	Use M4×8 SEMS screws for grounding. Ensure the protective grounding terminal is well grounded during installation. The grounding impedance should be 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:

Status	Definition
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.
Flashing slowly	The indicator is on for 900 ms and off for 100 ms, repeating this cycle.

Caution

- [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.

2.3 Technical Specifications

■ General specifications

Item	Specification
IP rating	IP67
Dimensions (W x H x D)	69.8 mm x 175.8 mm x 32.8 mm
Weight	Approx. 433 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	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	Supported

■ DI/DO

Item	Specification
I/O channel quantity	16
Maximum number of input channels	16 (NPN)
Maximum number of output channels	16 (NPN)
Configuration of inputs and outputs	Yes

■ Input specifications

Item	Specification
Input type	Digital input
Input mode	NPN
Number of input channels	16
Input voltage class	24 VDC (18 VDC to 30.2 VDC) (SELV power supply)
Input current (typical)	4 mA (typical value@0 V)
ON-state voltage	< 5 VDC
OFF-state voltage	>15 VDC
Hardware response time (ON/OFF)	100 μs (max.)
Input impedance	6.6 kΩ to 7.6 kΩ
Isolation	No
Input status display	When the drive state is inputted, the input indicator turns on.

■ Output specifications

Item	Specification
Output type	Digital output, transistor output
Output mode	NPN
Number of output channels	16

Item	Specification
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
Hardware response time (ON/OFF)	100 μs (max.)
OFF-state leakage current	10 μA
Switching frequency	Resistive load: 100 Hz; inductive load: 0.5 Hz; lamp load: 10 Hz
Isolation	No
Output action display	The output indicator turns on when the DO circuit is in the driving state.

■ 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 parameters allow you to configure the output state when a fault occurs. 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.

Item	Specification
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 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.

2.4 Environmental Specifications

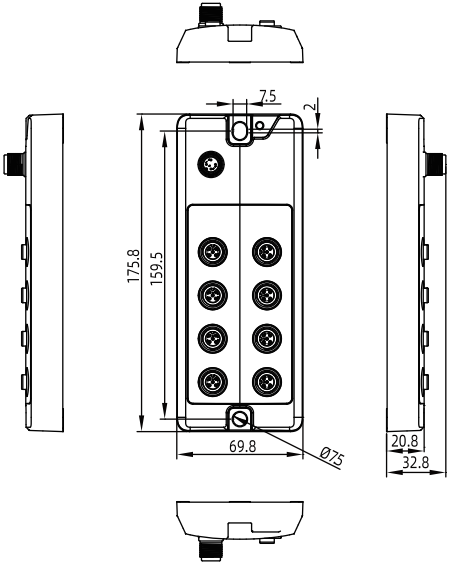
Item	Operation specification	Transmission specification	Storage specification
IP rating	IP67 (with screws tightened)		
Pollution degree	2		
Overvoltage category	I		
Immunity	2 kV on power supply line (IEC61000-4-4)		
Temperature	-25°C to +70°C	-40°C to +85°C	-40°C to +85°C
Humidity	10% to 90% RH (non-condensing)		

Item		Operation specification	Transmission specification	Storage specification
Vibration	Frequency	5 Hz to 500 Hz	2 M2	1 M2
	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 resistance		Application/Transportation scenario: Tested according to IEC60068-2-27; 15 g peak acceleration, 11 ms pulse width, 18 shocks in total in X, Y and Z axes.		
Altitude		0 m to 2000 m	0 m to 3000 m	

3 Mechanical Installation

3.1 Installation Dimensions

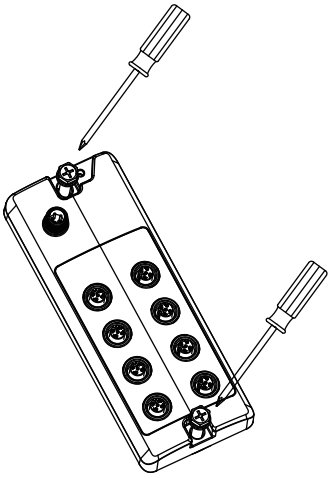
The following figure describes the module installation dimensions (in mm).

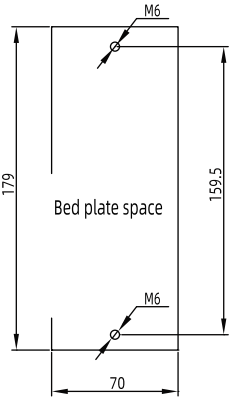


3.2 Installation Method

■ Installation

Install the module with two cross recessed hexagon SEMS screws (M6 x 25) with the washer diameter of 11 mm. The clearance between the two screws is 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.

4 Electrical Installation

4.1 Cable Selection

■ IO-Link communication cable

The data for ordering IO-Link communication cables are as follows.

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

■ Plug and connector assembly

The data for ordering connectors are as follows.

Model	Description	Material Code
CON-M12AFS4	4-core female straight connector, which can be connected directly	15051155
CON-M12AFL4	4-core female elbow connector, which can be connected directly	15051157

Model	Description	Material Code
CON-M12AMS5	5-core male straight connector, which can be connected directly	15051156
CON-M12AML5	5-core male elbow connector, which can be connected directly	15051158
CON-M12AMS5-YF5	Y splitter that converts one 5-pin male M12 connector to two 5-pin female M12 DIO connectors	15051159
CON-M12AMS4-YM8F3	Y splitter that converts one M12 5-pin A-code male straight connector to two M8 3-pin female connectors	15051420
CON-M12AMS4-YM8F4	Y splitter used for converting one M12 5-pin A-code male straight connector to two M8 4-pin female connectors	15051419
CON-M8AMS3	M8 3-pin assembled connector	15051445
CON-M8AMS4	M8 4-pin assembled connector	15051448
CON-M12AFS5-YM5	Y splitter that converts one 5-pin female connector to two 5-pin male straight connectors. It can be used to connect the class A master to class B valve terminal slave.	15051334
IPT210-A-CAB-M12AMS5-M12AFS5-1.5	Connector that converts 5-pin male straight connector to 5-pin female straight connector. It can be used to connect the IO-Link master to valve terminal.	72235829
IPT210-A-CAB-M12AFS5-1.5	Connector that converts 5-pin female straight connector to discrete cable. It can be used to power the valve terminal.	72235870

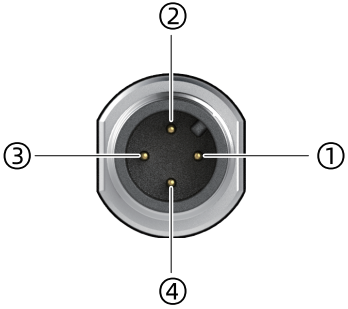
Note

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

4.2 Terminal Assignment

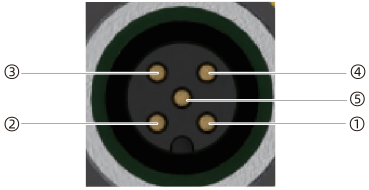
■ IO-Link port pins

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



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

■ Port pins



No.	Description
①	+24 V
②	Input 0/Output 0

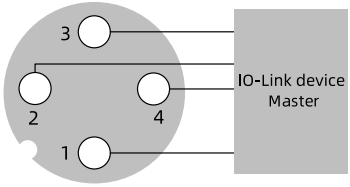
No.	Description
③	0 V, GND
④	Input 1/Output 1
⑤	Grounding

Note

This pin assignment applies to the default mode of Inovance, which is "simple mode/ expert mode 1". For other modes, see *"7.2 Process Data" on page 42*.

4.3 Terminal Wiring

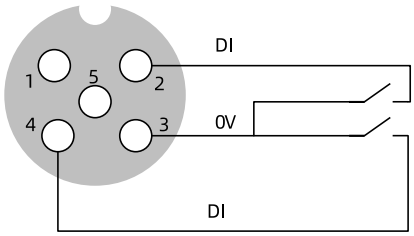
■ Connecting IO-Link devices



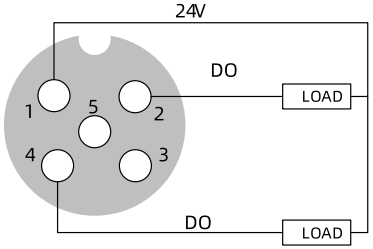
Note

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

■ Connecting DI devices



■ Connecting DO devices



Note

This product adopts M12 A-coded connectors for IO-Link and I/O ports. The recommended tightening torque for the connector cable is 0.5 N·m, with a maximum of 0.8 N·m. Exceeding 1.0 N·m may pose a risk of damaging the circuit board.

Note

This module supports the ADP (adaptive DIO) technology developed by Inovance. In the mode configuration, when the mode is set to simple mode or expert mode 2, the operation depends on the device type connected to the wiring terminals:

- When a DI device is connected, the input state can be read by directly assigning a value to the variable "IO_Link_CHN_input byte" in the PLC program.
- When a DO device is connected, the output state can be read by directly assigning a value to the variable "IO_Link_CHN_output byte" in the PLC program.

The ADP technology automatically adapts to the port function. You can access the corresponding variables in the program without modifying the hardware configuration or adjusting the jumper.

5 Program Commissioning

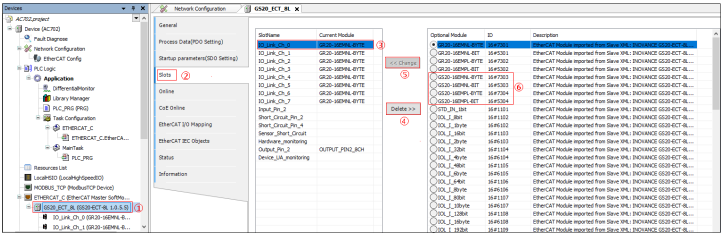
5.1 IO-Link Communication Configuration and Operation

■ Prerequisites

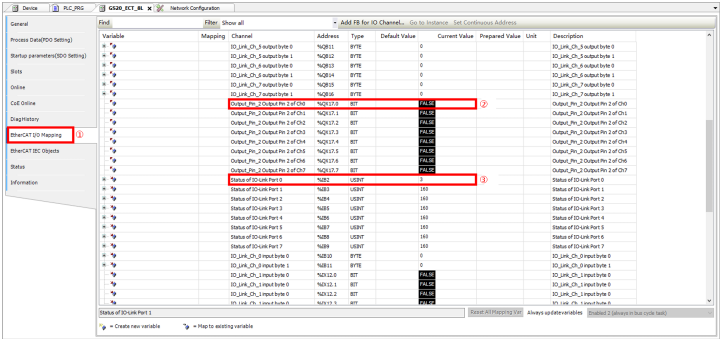
- Connect the cable properly.
- Install InoProShop V1.7.3 and above.
- Successfully connected to the PLC.
- The PLC is scanned and connected to the I/O-Link master of the GS20-ECT-8L model.

■ Procedure

1. Double-click GS20_ECT_8L (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 icon (⑦), click the download icon (⑧) after ensuring correct configurations, and then click the operation icon (⑨) after the downloading is complete.



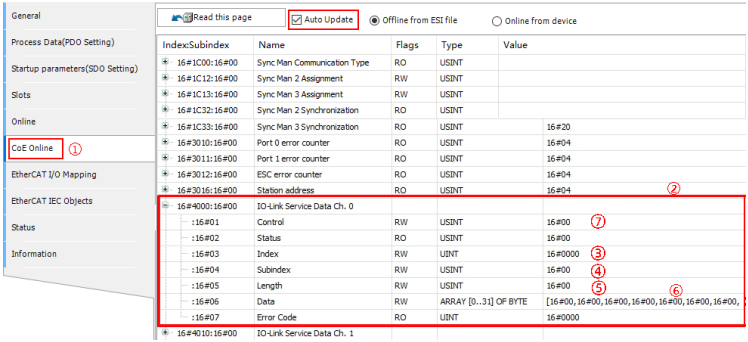
2. Click EtherCAT I/O Mapping (①) and locate Status of IO-Link Port 0 (②). If the current value is 3, the IO-Link communication is in the OP state. If the slave port is configured as DO, change the Current Value cell of Output_Pin_2 Output Pin 2 of Ch0 (③) to TRUE.



5.2 Port Parameter Configuration

Click CoE Online (①). Locate and expand 16#4000 IO-Link service Data Ch. 0 (②).

- Enter the index number of the slave to be operated on in the Value cell of Index (③).
- Enter the sub-index number of the slave to be operated on in the Value cell of Subindex (④).
- Enter the length of the data to be operated on in the Value cell of Length (⑤).
- Enter the data content to be operated on in the Value cell of Data (⑥).
- Enter 0 and then 2 in the Value cell of Control (⑦), which indicates that the data at ⑥ will be written to the Value cell of Index (③) and the Value cell of Subindex (④). Enter 0 and then 3 in the Value cell of Control (⑦), which indicates that the data in the Value cell of Index (③) and the data in the Value cell of Subindex (④) will be displayed in the Value cell of Data (⑥).



Note

For details on port parameter configurations, see *"7.3 Product Data" on page 47*. 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.

6 Troubleshooting

■ Common faults

Fault 1: When the GS20-ECT-8L master connects to an IO-Link slave, the UA and US indicators of the master are solid on, but the UA, US, and COM indicators of the slave are off.

Analysis:

- Cause: The GS20-ECT-8L module is not in safe-operational (SAFEOP) or operational (OP) state.
- Description: The GS20-ECT-8L module needs to enter SAFEOP or OP state to power the slave. Otherwise, the module cannot supply power normally.

Solution:

After downloading the PLC program, ensure that the GS20-ECT-8L module is in OP state (with the RUN indicator solid on). If the module is not running, refer to the "EtherCAT Diagnosis" section in *GS20-ECT-8L High Protection IO-Link Master Module User Guide* .

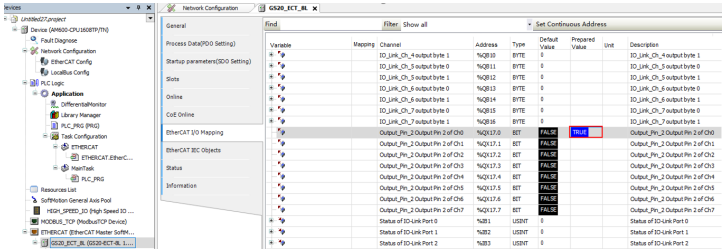
Fault 2: When the GS20-ECT-8L master connects to a GS20/GR20 slave, the UA, US, and RUN indicators of the master are solid on, while the US indicator of the slave is solid on, the UA indicator is off, and the COM indicator is flashing in red.

Analysis:

- Cause: The Pin 2 of the port corresponding to the IO-Link master is not enabled.
- Description: When the IO-Link master connects to the GS20/GR20 slave, it is necessary to set the Pin 2 of the corresponding master port to high level in the PLC program to provide I/O side power to the slave.

Solution:

1. Log in to the PLC device and open the configuration interface of the master. Click "EtherCAT I/O Mapping" to enable the Pin 2 of the corresponding master port (by setting the "Output_Pin_2 Output Pin 2 of Chn" variable to TRUE).



2. Observe the state of master/slave:
   - Master: The UA indicator is solid on.
   - Slave: The US and UA indicators are solid on, and the COM indicator is flashing in green.
   - If the indicators are as above, it indicates that communication has been successfully established and is available for normal use.
3. If the indicators are not as above, check whether the IO-Link communication cable connection between the master and slave is secure and undamaged; check whether the power cable of the master is damaged.

Note

- For Pin2 output, see "Module Configuration Function" of the GS20-PN-8L Series High Protection IO-Link Master Module User Guide.
- For Pin2 output, see "Data Configuration" of the GS20-EIP-8L Series High Protection IO-Link Master Module User Guide.
- For Pin2 output, see "GS20-16EMNL Slave Configuration" of the GS20-ECT-8L Series High Protection IO-Link Master Module User Guide.

■ Issue Code

The issue codes of the slave are reported to the master, where you can view the issue information, as shown below.

Code	Type	Description	Solution
0x4210	Alarm	Overtemperature	The ambient temperature is too high. Decrease the temperature before using the module.
0x4220	Alarm	Undertemperature	The ambient environment is too low. Increase the temperature before using the module.
0x5011	Fault	Loss of retentive data upon power failure	Retention of configuration parameters fails. Re-configure the parameters.
0x5100	Fault	Device power supply fault	The UA power supply of the module fails. Enable the power supply to Pin2 on the master or use the external UA power supply.
0x5110	Alarm	System power supply overvoltage	The US power supply voltage of the module is higher than the normal operating voltage. Decrease the US power supply voltage. Note: This alarm is reported in the log and only occurs in medium-sized PLCs.
0x5111	Alarm	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	Fault	Short circuit	The module encounters a short circuit. Check the external wiring.
0x6320	Fault	Parameter fault	The module parameters are configured incorrectly. Configure the parameters correctly according to the product data.
0x6321	Fault	Parameter loss	In expert mode, an input signal is detected for a channel configured as output. Modify the input/output configuration parameter 0x41 according to actual usage.

7 Object List

7.1 Protocol Stack Data

Baud rate	COM2 (38.4 kbaud)
Minimum cycle time for process data	3 ms
IO-Link version	1.1.3
Vendor ID	0x0659
Device ID	-

7.2 Process Data

■ Simple mode/Expert mode1

Variable	Pin	Indicator
Byte1_0	Pin 4 of port 0	1（Port 0）
Byte0_0	Pin 2 of port 0	0（Port 0）
Byte1_2	Pin 4 of port 2	1（Port 2）
Byte0_2	Pin 2 of port 2	0（Port 2）
Byte1_4	Pin 4 of port 4	1（Port 4）
Byte0_4	Pin 2 of port 4	0（Port 4）
Byte1_6	Pin 4 of port 6	1（Port 6）
Byte0_6	Pin 2 of port 6	0（Port 6）



Indicator	Pin	Variable
1（Port 1）	Pin 4 of port 1	Byte1_1
0（Port 1）	Pin 2 of port 1	Byte0_1
1（Port 3）	Pin 4 of port 3	Byte1_3
0（Port 3）	Pin 2 of port 3	Byte0_3
1（Port 5）	Pin 4 of port 5	Byte1_5
0（Port 5）	Pin 2 of port 5	Byte0_5
1（Port 7）	Pin 4 of port 7	Byte1_7
0（Port 7）	Pin 2 of port 7	Byte0_7

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.								

Note

- Modules manufactured by Inovance after 2024 default to the simple mode and support ADP functionality, which means no input/output mode configuration is required.
- When set to the expert mode 1, the input/output functions can be modified through the "I/O Configuration" parameter.

■ Expert mode 2

Variable	Pin	Indicator
Byte0_1	Pin 2 of port 0	1 (Port 0)
Byte0_0	Pin 4 of port 0	0 (Port 0)
Byte0_5	Pin 2 of port 2	1 (Port 2)
Byte0_4	Pin 4 of port 2	0 (Port 2)
Byte1_1	Pin 2 of port 4	1 (Port 4)
Byte1_0	Pin 4 of port 4	0 (Port 4)
Byte1_5	Pin 2 of port 6	1 (Port 6)
Byte1_4	Pin 4 of port 6	0 (Port 6)



Indicator	Pin	Variable
1 (Port 1)	Pin 2 of port 1	Byte0_3
0 (Port 1)	Pin 4 of port 1	Byte0_2
1 (Port 3)	Pin 2 of port 3	Byte0_7
0 (Port 3)	Pin 4 of port 3	Byte0_6
1 (Port 5)	Pin 2 of port 5	Byte1_3
0 (Port 5)	Pin 4 of port 5	Byte1_2
1 (Port 7)	Pin 2 of port 7	Byte1_7
0 (Port 7)	Pin 4 of port 7	Byte1_6

Input data	Byte	0							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 2 of port 3	Pin 4 of port 3	Pin 2 of port 2	Pin 4 of port 2	Pin 2 of port 1	Pin 4 of port 1	Pin 2 of port 0	Pin 4 of port 0
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 2 of port 7	Pin 4 of port 7	Pin 2 of port 6	Pin 4 of port 6	Pin 2 of port 5	Pin 4 of port 5	Pin 2 of port 4	Pin 4 of port 4
Output data	Byte	0							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 2 of port 3	Pin 4 of port 3	Pin 2 of port 2	Pin 4 of port 2	Pin 2 of port 1	Pin 4 of port 1	Pin 2 of port 0	Pin 4 of port 0
	Byte	1							
	Bit	7	6	5	4	3	2	1	0
	Pin	Pin 2 of port 7	Pin 4 of port 7	Pin 2 of port 6	Pin 4 of port 6	Pin 2 of port 5	Pin 4 of port 5	Pin 2 of port 4	Pin 4 of port 4
	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.								

Note

- Modules manufactured by Inovance after October 2025 can be set to expert mode 2 via the "mode configuration (R/W) 0x49" parameter.
- Expert mode 2 defaults to the simple mode and supports ADP functionality, which means no input/output mode configuration is required.

■ Expert mode 3

Variable	Pin	Indicator
Byte1_0	Pin 2 of port 0	1 (Port 0)
Byte0_0	Pin 4 of port 0	0 (Port 0)
Byte1_2	Pin 2 of port 2	1 (Port 2)
Byte0_2	Pin 4 of port 2	0 (Port 2)
Byte1_4	Pin 2 of port 4	1 (Port 4)
Byte0_4	Pin 4 of port 4	0 (Port 4)
Byte1_6	Pin 2 of port 6	1 (Port 6)
Byte0_6	Pin 4 of port 6	0 (Port 6)



Indicator	Pin	Variable
1 (Port 1)	Pin 2 of port 1	Byte1_1
0 (Port 1)	Pin 4 of port 1	Byte0_1
1 (Port 3)	Pin 2 of port 3	Byte1_3
0 (Port 3)	Pin 4 of port 3	Byte0_3
1 (Port 5)	Pin 2 of port 5	Byte1_5
0 (Port 5)	Pin 4 of port 5	Byte0_5
1 (Port 7)	Pin 2 of port 7	Byte1_7
0 (Port 7)	Pin 4 of port 7	Byte0_7

Input data	Byte	0							
	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
	Byte	1							
	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
Output data	Byte	0							
	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
	Byte	1							
	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
	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.								

Note

- Modules manufactured by Inovance after October 2025 can be set to expert mode 3 via the "mode configuration (R/W) 0x49" parameter.
- Expert mode 3 does not support ADP functionality, causing the I/O input/ output modes to be configured via the "Input/Output Mode Configuration" parameter.

7.3 Product Data

Index	Sub-index	Object	Length	Value 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		Website: https://www.inovance.com/global
0x12	-	Product Name	21 bytes		GS20-16EMNL
0x13	-	Product ID	7 bytes		01440359
0x14	-	Product Text	23 bytes		GS20-16DIO:IO Sensor/Actuator Hub IP67 16Bit NPN
0x16	-	Hardware Revision	4 bytes		1.0.0.0
0x17	-	Firmware Revision	4 bytes		1.0.0.0
0x40	0	Inversion	2 bytes	0x0000 to 0xFFFF	0x0000
0x41	0	Configuration	2 bytes	0x0000 to 0xFFFF	0x0000
0x42	0	Pin 2 Safe State	2 bytes	0x0000 to 0xFFFF	0x0000
0x43	0	Pin 4 Safe State	2 bytes	0x0000 to 0xFFFF	0x0000
0x44	0	Under Voltage	2 bytes	0x0000 to 0xFFFF	0x0000
0x47	0	Feedback	2 bytes	0x0000 to 0xFFFF	0x0000
0x48	0	MCU Temperature Setting	2 bytes	0x0000 to 0xFFFF	0x0050
0x49	0	Mode Configuration	2 bytes	0x0000 to 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
	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: Normal; 1: Reversed								

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
	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: 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	
	Subindex	8		7		6		5		4		3		2		1	
	Default	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	
	Subindex	8		7		6		5		4		3		2		1	
	Default	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.

0x44: System monitoring (R)	Byte	0								1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
	Pin	-	-	-	-	-	-	-	T	-	-	-	-	UA		US	
	Subindex	-	-	-	-	-	-	-	1	-	-	-	-	3		2	
	Default	-	-	-	-	-	-	-	0	-	-	-	-	0	0	0	0
	US: System power supply voltage. 00: Normal; 01: 11 V < voltage < 18 V; 10: Above 30.2 V; 11: Below 11 V.																
	UA: Actuator power supply voltage. 00: Normal; 01: 11 V < voltage < 18 V; 10: Above 30.2 V; 11: Below 11 V.																
	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	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: Output 0; 1: Output 1								

0x48: MCU temperature setting (R/W)	Byte	1								0							
	Bit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pin	-		-		-		-		-		-		-			
	Subindex	-		-		-		-		-		-		-			
	Default	0x50															
	Function	Set MCU operating temperature detection upper limit (not storage temperature): 120°C															

0x49: Mode Configuration (R/W)	Byte	1								0							
	Bit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pin	-		-		-		-		-		-		-			
	Subindex	-		-		-		-		-		-		-			
	Default	0															
	Function	0: Simple mode 1: Expert mode 3: 0808, configured as eight inputs and eight outputs 5: 0016, configured as 16 outputs 8: Expert mode 2 (supported only in software version 1.5.0.0 or later) 9: Expert mode 3 (supported only in software version 1.5.0.0 or later) Note: 0, 1, 3, 5, 8, and 9 are decimal values. Note: In simple mode and expert mode 2, parameters 0x41 to 0x43 are unavailable. If the configuration is not set as mentioned above, a 0x6320 fault is reported, requiring you to revert to the last valid configuration.															

8 Appendix: Version Matching Information

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

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

Service and Support

Should you encounter a safety accident during the use or operation of the product, or face challenges in operating and maintaining the equipment, which remain unresolved after the relevant documentation is consulted, we provide multiple channels to ensure prompt resolution:

- Channel #1: Contact service@inovance.com.
- Channel #2: Visit https://www.inovance.com/global to access document downloads, after-sales support, spare parts ordering, repair applications, and authenticity verification services.
- Channel #3: Download My Inovance app (https://zshc-eu.inovance.com/download-pc/) where you can access products info and documentation, and query product parameters.

We are committed to providing you with quick and professional technical support, and we look forward to your satisfaction and trust.