

GL10-0016ETN

Digital Output Module
User Guide



19011102A02

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Overview

Thank you for purchasing the GL10-0016ETN digital output expansion module developed by Inovance.

This product supports NPN outputs and can be used with modules such as GL10-RTU-ECT, GL10-RTU-COP, and GL10-RTU-DP to expand the number of digital output ports.

This guide describes the specifications, characteristics, and usage instructions of the module. For proper and safe operation, please read this guide carefully before use. Visit our website (www.inovance.com) for the latest version of the guide.

Safety Precautions

Safety disclaimer

- Before installation, operation, and maintenance, read through and comply with the safety instructions.
- To ensure personal and equipment safety, follow all the safety instructions marked on the product and described in this guide.
- The "CAUTION", "WARNING", and "DANGER" signs in this guide do not indicate all safety instructions; instead, they are only supplements to the safety instructions.
- Use this product in an environment that meets the design specifications. Malfunctions or damage caused by failure to follow relevant specifications is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper usage.

Safety levels and definition

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

CAUTION : "CAUTION" indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage.

Keep this user guide properly for future use and deliver it to the end user.

Control System Design

WARNING

- 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 an external fuse or circuit breaker to prevent the module from smoking or catching fire due to long-time overcurrent caused by operation above rated current or load short-circuit.

CAUTION

- Set an emergency stop circuit, a protection circuit, a forward/reverse operation interlocked circuit, and an upper/lower position limit interlocked circuit in the external circuits of PLC to prevent damage to the module.
- To ensure safe operation, use external protection circuits and safety mechanism for the output signals that may cause critical accidents.
- The CPU of the PLC may shut down all outputs upon detecting system abnormalities. When partial circuit faults occur in the PLC, outputs may become uncontrollable. Therefore, it is necessary to design an appropriate external control circuit to ensure normal operation.
- When the output units of the PLC (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 compliant with overvoltage category II. The power supply must have a system-level surge protector to ensure that overvoltage caused by lightning shock cannot be applied to power supply input terminals, signal input terminals, and control output terminals of the PLC, therefore preventing damage to the product.

Installation

WARNING

- Installation must be carried out by skilled personal who have undergone specialized electrical training and possess comprehensive electrical expertise.
- Disconnect all external power supplies of the system before installing/removing the module. Failure to do so may result in electric shock, module fault, or malfunction.
- Do not use the PLC in environments with dust, greasy smoke, conductive dust, corrosive or combustible gases, exposed to high temperature, condensation, wind & rain, or subject to vibration and shock. Electric shock, fire, and malfunction may also damage the product.
- The PLC is open-type equipment that must be installed in a control cabinet with lock (IP rating of the control cabinet enclosure > IP20). Only qualified professionals who have undergone specialized electrical training and possess comprehensive electrical expertise can open the cabinet.

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, or malfunction.
- Ensure there are no unwanted matters on ventilation surface. Failure to comply may result in poor ventilation, which may cause fire, fault, or 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

WARNING

- Wiring must be carried out by skilled personnel who have undergone specialized electrical training and possess comprehensive electrical expertise.
- Disconnect all external power supplies of the system before wiring. Failure to comply may result in electric shock, module fault, or malfunction.
- After wiring, install the terminal cover attached to the product before power-on or operation. Failure to comply may result in electric shock.
- Insulate the cable terminals properly to ensure the insulation distance between cables will not be shortened after cables are connected to the terminal block. Failure to comply may result in electric shock or damage to the product.

CAUTION

- Do not drop metal filings or wire ends into ventilation holes of the PLC during wiring. Failure to comply may result in fire, fault, or malfunction.
- The external wiring specifications and installation method must comply with local regulations. For details, see the wiring section in this guide.
- To ensure safety of equipment and operator, use cables with sufficient diameter and connect the cables to ground reliably.
- Ensure that all cables are connected to the correct interface. Failure to comply may result in module fault or external equipment fault.
- Tighten bolts on the terminal block with the specified tightening torque. If the terminal is not tight, short-circuit, fire, or malfunction may occur. If the terminal is too tight, damage to the terminal and module, fall-off, short-circuit, fire, or malfunction may occur.
- If a connector is used to connect the product with an external equipment, use tools specified by the manufacturer for press-fitting and crimping, or wield properly. Improper connection may result in short-circuit, fire, or malfunction.
- A label on the top of the module is to prevent foreign matters entering the module. Do not remove the label during wiring. Remove the label before system operation for ventilation.
- Route control cables, communication cables, main circuit cables, and power cables through different routes with a clearance of at least 100 mm among different types of cables. Failure to comply may result in malfunction caused by noise.
- For scenarios with severe interference, select shielded cable for high-frequency signal input or output to enhance system anti-interference ability.

Operation and Maintenance

WARNING

- Operation and maintenance must be carried out by skilled personnel who have undergone specialized electrical training and possess comprehensive electrical expertise.
- Do not touch the terminals with power 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 the connector. Failure to comply may result in electric shock.
- Disconnect all external power supplies of the system before installing/removing the module or connecting/disconnecting the communication cables. Failure to comply may result in electric shock or malfunction.

CAUTION

- Read through the user guide before operations such as online modification, forced output, RUN, and STOP commands to ensure safety.
- Disconnect the power supply before installing/removing the expansion card.

Disposal

CAUTION

- Dispose of retired batteries as industrial waste according to local laws and regulations.

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Product Information

Model and nameplate

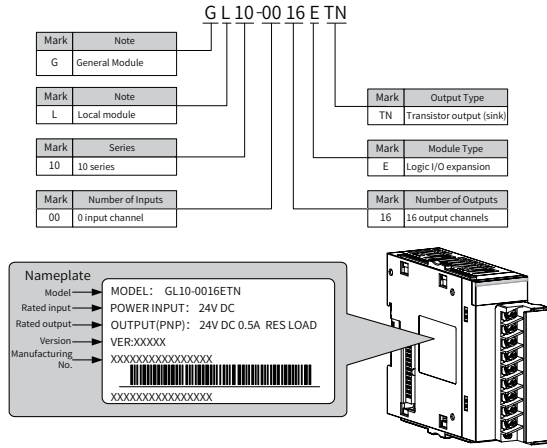


Figure 1 Model and nameplate

Model	Type	Description
GL10-0016ETN	Digital output module	16-point DO module; transistor output (sink mode)

External interfaces

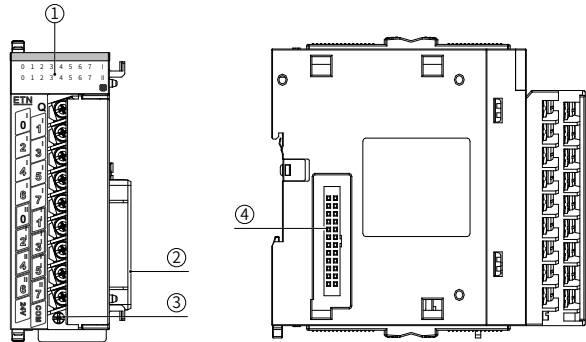


Figure 2 Module interfaces

No.	Interface	Description
①	Signal indicator	Indicates the output signal of each channel. The indicator turns on when the output is active and turns off when the output is inactive.
②	Back-end interface of local expansion module	Connects back-end modules, not supporting hot plugging
③	User output terminals	Divided in two groups, with eight output channels in each group
④	Front-end interface of local expansion module	Connects front-end modules, not supporting hot plugging

General specifications

Item		Specification
Number of output channels		16
Output connection mode		18-point terminal block
Output type		Transistor, low-side output
Power supply voltage		24 VDC (-15% to +20%)
Output voltage class		12 to 24 VDC (-15% to +20%)
Power consumption of internal 5 V power supply		115 mA (typical value)
Maximum leakage current upon OFF		Below 0.5 mA
ON response time		Below 0.5ms (hardware response time)
OFF response time		Below 0.5ms (hardware response time)
Maximum load	Resistive load	0.5 A/point, 2 A/common terminal
	Inductive load	12 W/24 VDC (in total)
	Lamp load	2 W/24 VDC (in total)
Isolation mode		Optocoupler isolation
Output indicator		Output indicator turns on when the optocoupler drive is activated.
Short circuit-proof output		/

Note: For information on environmental parameters, see the "Environmental Parameters" section in *GL10-RTU-ECTA EtherCAT Communication Module User Guide*.

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Mechanical Design

■ Installation dimensions

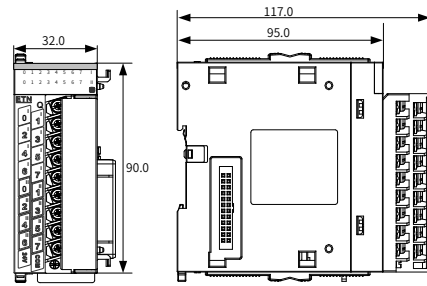


Figure 3 Installation dimensions (in mm)

Electrical Design

■ Cable selection

Material Name	Model	Applicable Diameter		Manufacturer	Crimping Tool
		mm ²	AWG		
Forked cable lug	TNS1.25-3	0.5 to 0.75	22 to 18	Suzhou Yuanli	RYO-8 YYT-8

Those cable lugs are applicable to digital/analog modules. The rated temperature of cables is required to be above 75°C.

■ Cable preparation

Procedure:

- ◆ Remove the insulation layer to expose 6 mm of the conductor.
- ◆ Pass the cable through a cable marking sleeve.
- ◆ Insert the exposed conductor into the hole of the cable lug, and then crimp it with recommended crimping tool.
- ◆ Use a heat-shrinkable tube (Φ3) of 20 mm long to wrap the conductor of the cable lug and then perform thermal shrinkage.

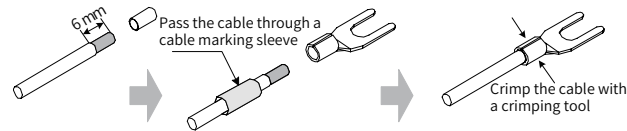


Figure 4 Cable preparation

- ◆ Pass the cable lug through the terminal block and tighten it with a screwdriver. The maximum tightening torque is 0.8 N · m.

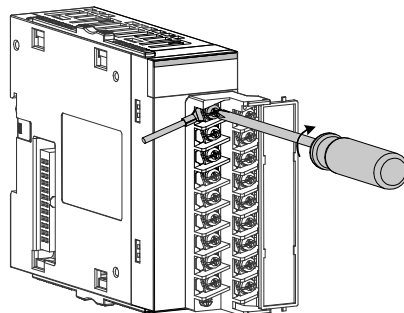


Figure 5 Connecting cable to terminal block

■ Terminal arrangement

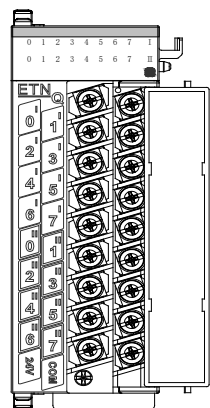


Figure 6 Terminal arrangement

■ Terminal assignment

No.	Name	Type	Function	Remark
1st group of output interfaces				
1	Q0	Output	User output 0 in the 1st group	Sink, low-end output
2	Q1	Output	User output 1 in the 1st group	Sink, low-end output
3	Q2	Output	User output 2 in the 1st group	Sink, low-end output
4	Q3	Output	User output 3 in the 1st group	Sink, low-end output
5	Q4	Output	User output 4 in the 1st group	Sink, low-end output
6	Q5	Output	User output 5 in the 1st group	Sink, low-end output
7	Q6	Output	User output 6 in the 1st group	Sink, low-end output
8	Q7	Output	User output 7 in the 1st group	Sink, low-end output
2nd group of output interfaces				
9	Q0	Output	User output 0 in the 2nd group	Sink, low-end output
10	Q1	Output	User output 1 in the 2nd group	Sink, low-end output
11	Q2	Output	User output 2 in the 2nd group	Sink, low-end output
12	Q3	Output	User output 3 in the 2nd group	Sink, low-end output
13	Q4	Output	User output 4 in the 2nd group	Sink, low-end output
14	Q5	Output	User output 5 in the 2nd group	Sink, low-end output
15	Q6	Output	User output 6 in the 2nd group	Sink, low-end output
16	Q7	Output	User output 7 in the 2nd group	Sink, low-end output
Power supply interfaces				
17	24V	Power supply	24 VDC power supply	24 VDC power supply input
18	COM	Power supply	Power supply GND	Common terminal of 24 VDC power supply

■ External wiring

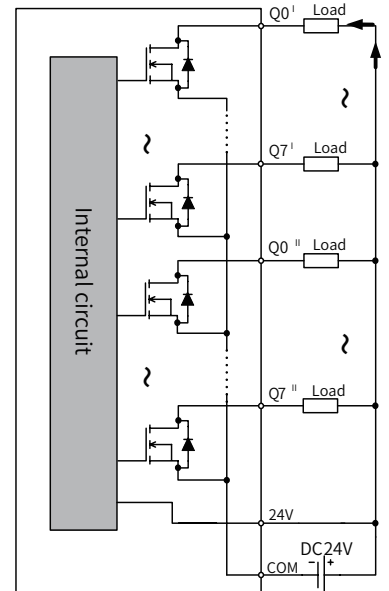


Figure 7 Output wiring diagram

■ Wiring precautions

- 1) Do not bundle the expansion cable together with power cables (with high voltage and large current) that produce strong interference signals. Separate it from other cables and avoid cabling in parallel.
- 2) Use recommended cables and adapter boards. Use shielded cables as terminal cables to increase the anti-interference ability.

■ Electric shock protection for inductive load

When the inductive load is applied, stopping the load will produce a large back EMF between contacts, accompanied by arc discharge. This may result in contact failure or sag, shortening the contact lifetime. Therefore, it is necessary to connect a flywheel diode in parallel with the load to extend the product lifetime. The reverse voltage of the flywheel diode must be 5 to 10 times of load voltage and the forward current must be larger than load current.

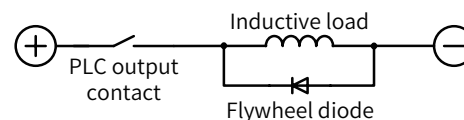


Figure 8 Electric shock protection for inductive load

INOVANCE Warranty Agreement

Inovance provides an 18-month free warranty (subject to information indicated by the barcode on the product or the contract terms) to the equipment itself from the date of manufacturing for the failure or damage under normal use conditions.

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

- a) Damage caused by improper use or unauthorized disassembly, repair, or retrofit;
- b) Damage caused by fire, flood, abnormal voltage, other disasters, or secondary disasters;
- c) Hardware damage caused by equipment fall-off or that caused during transportation;
- d) Damage caused by failure to operate the product according to the user guide provided by Inovance;
- e) Faults and damage caused by external factors, such as peripheral devices;

If the equipment is faulty or damaged, fill in the Product Warranty Card correctly.

The maintenance fee is charged based on the latest Maintenance Price List of Inovance.

The Product Warranty Card is not re-issued. Keep the card and present it to the maintenance personnel during maintenance.

If there is any problem during the service, contact Inovance or Inovance agents.

Customers purchasing the product are assumed to agree on terms and conditions of this warranty agreement. This agreement shall be interpreted by Inovance.

INOVANCE Product Warranty Card

Customer Information	Company address:	
	Company name:	Contact person:
	Post code:	Tel.:
Product Information	Product model:	
	Product barcode (attached here):	
	Agent name:	
Fault Information	(Service date and description):	
	Serviced by:	

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