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PS00012454A00

GL20-0404ETP-5V
4-Channel DI/DO Module

User Guide

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Preface

■ Introduction

GL20-0404ETP-5V series 4-channel digital and output module support digital transistor PNP output and can be used with Easy series products and GL20 series communication interface module such as GL20-RTU-ECT.

This guide describes the product information, mechanical installation, electrical installation, fault diagnosis, programming examples, and version information of the product.

■ Standard

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 **24 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 **24 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	Data Code	Description
GL20-RTU-ECT Communication Interface Module User Guide	PS00004985	This guide describes the installation, wiring and more of the product.

■ Revision History

Date	Version	Description
2023-07	A00	First release

■ Access to the Guide

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

- Visit *http://www.inovance.com*, go to Support > Download, search by keyword, and then download the PDF file.
- Scan the QR code on the product with your mobile phone.

■ Warranty

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 the Product Warranty Card.

Fundamental Safety Instructions

■ Safety Precautions

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

"DANGER" indicates that failure to comply with the notice can result in death or severe personal injury.

"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 indoor electrical environment (overvoltage category II). The power supply must have a system-level lightning protection device, assuring that overvoltage due to lightning shock cannot be applied to the PLC power supply input terminals, signal input terminals and output terminals and so forth, so as to avoid 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. 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 touches the machinery part, for example, where a machinery tool is loaded/unloaded, or where a machine runs automatically, manually-operated devices or similar must be installed independently of the PLC to start or stop the automatic operation of the system.
- If you need to modify the program while the system is running, use the lock function or other protective measures. Ensure that only authorized personnel can make the necessary modifications.

Disposal

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

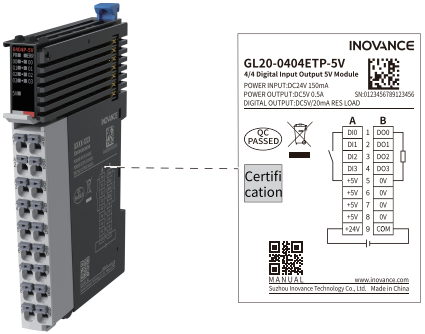
1 Product Information

1.1 Model and Nameplate

GL 20 -04 04 E TP - 5V

① ② ③ ④ ⑤ ⑥ ⑦

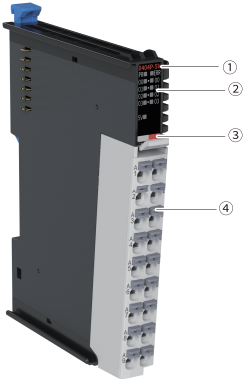
① **Product Information** GL: General local module	④ **I/O Points** 04: 4 outputs	⑦ **Input/Output Voltage** 5V: 5V input/output voltage
② **Serial Number** 20: 20 series module	⑤ **Module Type** E: Logic I/O expansion module	
③ **I/O Points** 04: 4 input	⑥ **Output Type** TP: Transistor output (source)	



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

Model	Description	Product Code	Applicable Model
GL20-0404ETP-5V	GL20 series 4-channel digital input and output module	01440506	GL20 series communication interface module, Easy series PLC

1.2 Components



No.	Interface	Description			
①	Signal Indicator	PR (POWER +RUN)	Power / running indicator	Yellow green	• ON: The module is in normal operation. • Flashing quickly: The module is addressed successfully. • Flashing slowly: The module is powered on but not addressed. • OFF: The module is not powered on or is faulty.
		ERR	Error indicator	Red	Module fault
②	IO signal	00 to 03	I/O signal indicator	Yellow green	• ON: Output active • OFF: Output inactive

No.	Interface	Description	
③	Color identification	Red: Digital output	Orange: Analog output
		Gray: Digital input	Green: Analog input
		White: Communication	Blue: Other module
④	Terminals	For details, see *"3.2 Terminal Definition" on page 22*	

Note

- Flashing quickly: on for 200 ms followed by off for 200 ms.
- Flashing slowly: on for 200 ms followed by off for 1000 ms.

1.3 Technical Specifications

■ General Specifications

Item	Specification
IP rating	IP20
Dimensions (W x H x D)	12 mm × 100 mm × 75 mm
Weight	Approx. 65g

■ Power Supply Specifications

Item	Specification
Rated bus input voltage	5 VDC (4.75 VDC to 5.25 VDC)
Rated bus input current	100mA (typical@5 V)
Rated terminal input voltage	24 VDC (20.4 VDC to 28.8 VDC)
Rated terminal input current	150mA (typical@24 V)
Hot swap	Not supported

■ Input Specifications

Item	Specification
Input type	Digital input, 5 VDC
Input impedance	10K
Input current	50 μA (typical)
Input channels	4
Input mode	Source type (common terminal connected to 0V)
ON voltage	>2.4 VDC
OFF voltage	<0.8 VDC
Hardware response time	ON: 50 ns
Input isolation	Supported

■ Power Output Specifications

Item	Specification
Rated terminal output voltage	5 VDC±5%
Rated terminal output current	500 mA (max)
Power isolation	Not supported
Retentive at power failure	Not supported
Power diagnosis	Supported (5 V output detection, and 24 V input detection)

■ DO

Item	Specification
Output Type	Digital output, 5 VDC
Output current	20 mA (max)
Output mode	Source type (current flowing from output terminal to load)
Output channels	4
Output Voltage	5V DC

Item	Specification
Output load (resistive load)	20mA/point; 0.08A/module
Output load (lamp load)	0.1W/point; 0.4W/module
ON/OFF hardware response time	1μs/1μs
Isolation	Yes
Output action display	Output indicators are turned ON (via software control) when the outputs are in the driving state
Output derating	/
Protection	• Short circuit protection (with detection) • Overcurrent protection (without detection)

■ Software specifications

Item	Specification
Software input filter time	Options include Without filter, 0.25 ms, 0.5 ms, 1ms (factory setting), 2 ms, 4 ms, 8 ms, 16 ms, and 32 ms. The filter parameter applies to all channels.
Output mode upon stop	Output zero, output last value, output preset value
Preset value	0 or 1
Output port anomaly detection and indication	Supported
Output channel logic level configuration	Not supported
Independent channel enable configuration	Not supported
Diagnostic report configuration	Not supported
When in stop mode	• Outputs are not refreshed, inputs can be refreshed when in state SAFE-OPERATIONAL • Output according to output mode upon stop and present value, no refresh
I/O mapping	Supports bitwise, bytewise (first four bits) and wordwise (first four bits) addressing

1.4 Environmental Specifications

Item	Specification
Operating environment	No corrosive and flammable gas and no excessive conductive dust
Altitude	≤2000 m
Pollution degree	2 or less
Noise immunity	2 kV on power supply line (Conforms to IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC61131-2
Vibration resistance	IEC 60068-2-6 5 Hz to 8.4 Hz, 3.5 mm, 8.4 Hz to 150 Hz, 1 g, 10 times each in X, Y and Z directions
Shock resistance	IEC 60068-2-27 150 m/s^2, 11 ms, 3 times each in ±X, ±Y and ±Z directions, 18 times in total
Storage temperature/humidity	• Storage temperature: -40°C to +70°C • Relative humidity: <90% RH, non-condensing
Operating temperature/humidity	Operating temperature: -20°C to +55°C Relative humidity: 10% to 90% RH, non-condensing Note: Install a fan or air conditioner in the direction of the ventilation holes when the operating temperature is greater than the maximum allowable temperature.
Temperature range for different mounting modes	Horizontal mounting: -20°C to +55°C
	Non-horizontal mounting: -20°C to +45°C

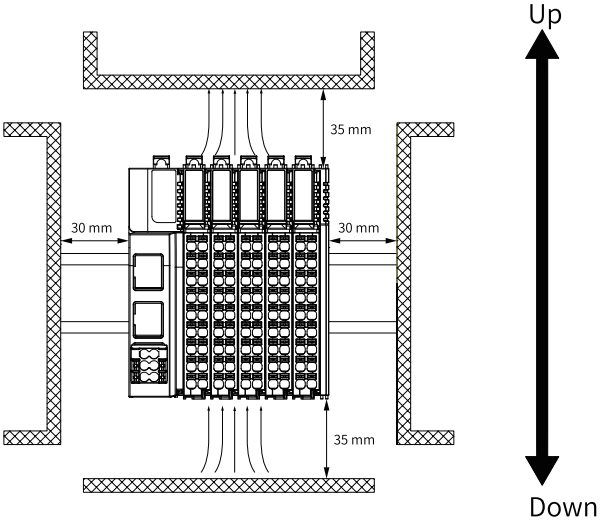
2 Mechanical Installation

2.1 Installation Requirements

The product can be mounted horizontally (i.e., along the horizontal DIN rail) or non-horizontally. Different mounting modes require different operating temperatures, see *"1.4 Environmental Specifications" on page 13*.

■ Optimal mounting option

It is recommended to install the product horizontally. To ensure normal ventilation and heat dissipation and allow sufficient wiring space, reserve enough clearance around the PLC, as shown in the following figure.

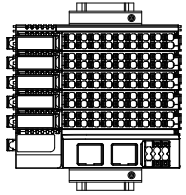


Note

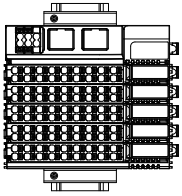
If there is a high-temperature heat source (heater, transformer, large resistor, etc.) in vicinity of the product, keep the product away from the heat source by at least 100 mm.

■ Other mounting options

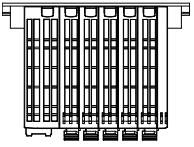
Other mounting options require the same clearance as the optimal mounting option and are shown in the following figure.



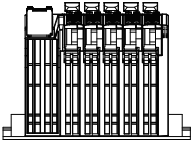
Vertical direction 1



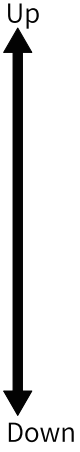
Vertical direction 2



Cabinet top



Cabinet bottom



Caution

In case of vertical installation:

- If the module is mounted to the PLC, make sure the PLC is arranged below all I/O modules (see vertical direction 1). The number of modules must not exceed 6, and the type of modules is not limited.
- Hold the cables with a cable duct to prevent the weight of cables being applied to the lower end plate, which may result loose of the product from the DIN rail.

2.2 Installation Precautions

- Before installing or removing the module, ensure that the module is powered off.

Caution

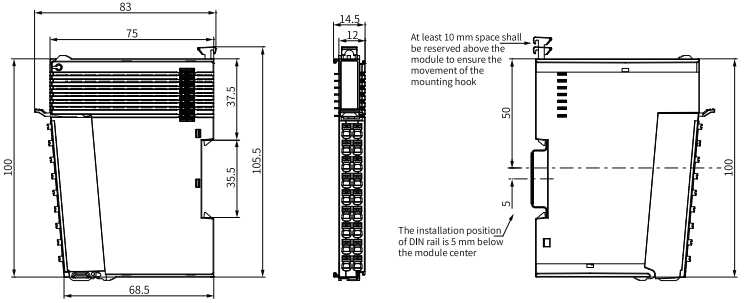
Do not hot swap the modules. Otherwise, the modules may be damaged by overcurrent or overvoltage, and the communication interface module or PLC may be subject to restart, user data loss or corruption.

- Prevent the enclosure or terminals of the module from dropping or suffering from impact or shock.

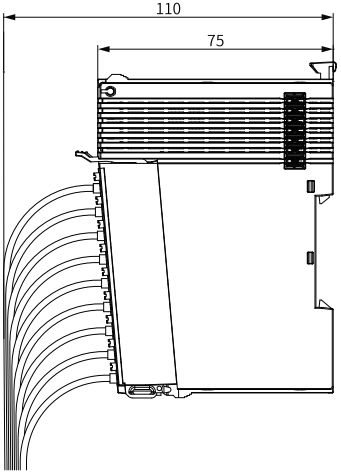
2.3 Mounting Dimensions

■ Module

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

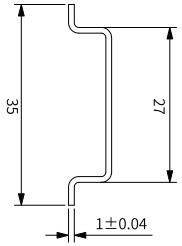


■ **Cable Connection**



2.4 Installation Method

The module is mounted onto a DIN rail in conformity with IEC 60715 (width: 35 mm, thickness: 1 mm). The dimensions (unit: mm) are shown below.

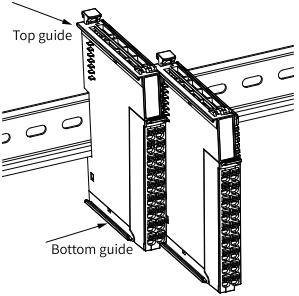


Caution

When installed on a DIN rail other than the recommended one (especially the one whose thickness is not 1.0 mm), the product will not fit in place as the mounting hook does not work.

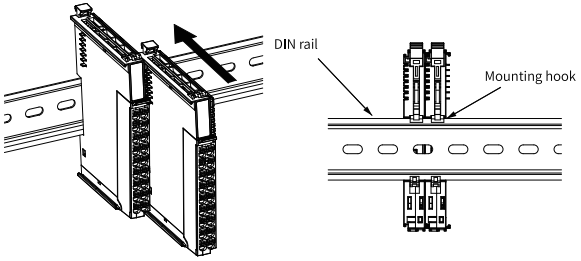
■ Installing Modules Side-by-Side

You can install multiple modules side by side with the help of top and bottom guides on the modules, as shown below.

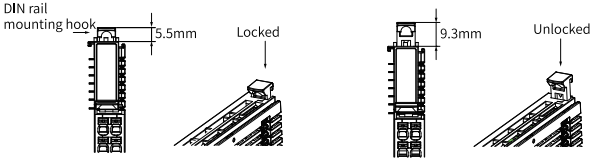


■ Installing Module onto DIN Rail

1. Align the module with the DIN rail and push it in the direction indicated by the arrow until you hear a click,



2. Make sure the DIN rail mounting hook of the module is locked. The locked and unlocked states of the mounting hook are shown below.



- If the mounting hook is pressed down, it is locked.
- If the mounting hook is lifted up, it is unlocked.

Press down the mounting hook to lock the module to the DIN rail.

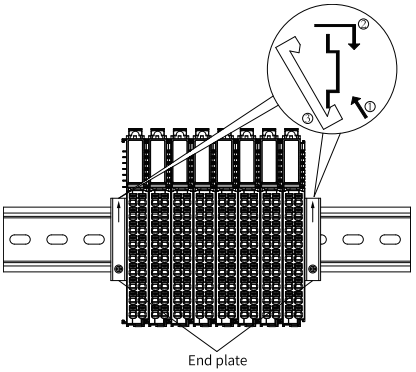
Caution

When the module is not installed on the rail, keep the mounting hook in the locked state. Keeping the mounting hook unlocked for a prolonged time may cause the hook to fail.

---

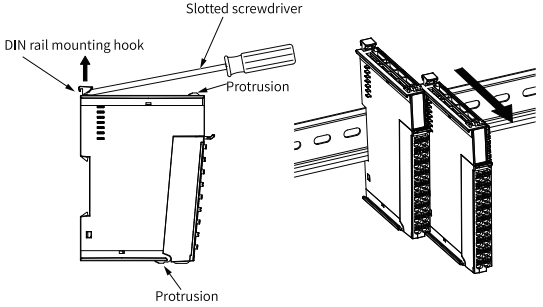
3. Mount an end plate on either side of the PLC or the module.

To mount the end plate, hook the bottom of it to the bottom of the DIN rail, rotate the end plate to hook the top of it to the top of the DIN rail, and then tighten the screw to lock the end plate in place,



■ Removing the Module

Pry the DIN rail mounting hook upwards with a tool such as slotted screwdriver, hold the protrusions and pull the module out straight forward, and then press down the top of the DIN rail mounting hook.



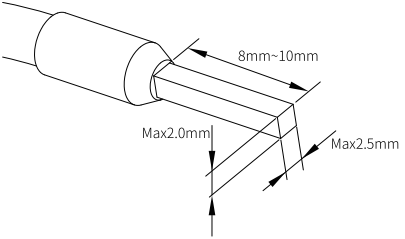
3 Electrical Installation

3.1 Cable Selection

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

Material Name	Applicable Cross Sectional Area of the Cable		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	
	1.5	16	E1508		1508	

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 Terminal Definition

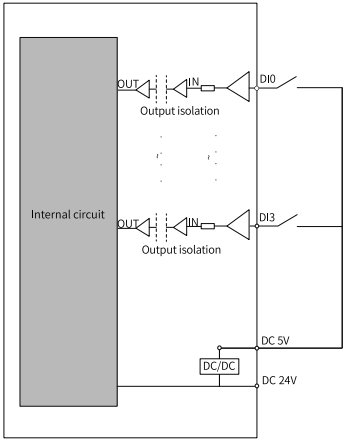
Left Signal	Left Terminal	Right Terminal	Right Signal
DI0	A1	B1	DO0
DI1	A2	B2	DO1
DI2	A3	B3	DO2
DI3	A4	B4	DO3
+5V	A5	B5	0V
+5V	A6	B6	0V
+5V	A7	B7	0V
+5V	A8	B8	0V
24V	A9	B9	COM

Caution

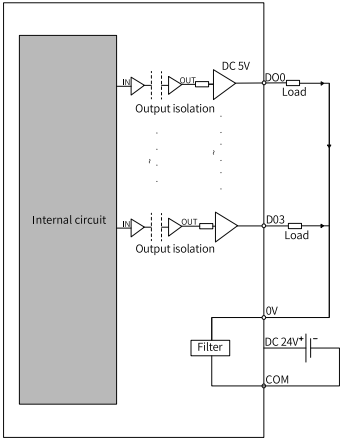
When the positive terminal of the 24V power supply is connected to terminals A1, A2, A3, A4, B1, B2, B3, B4, B5, B6, B7, or B8, the module may be damaged.

3.3 Terminal Wiring

- Input:

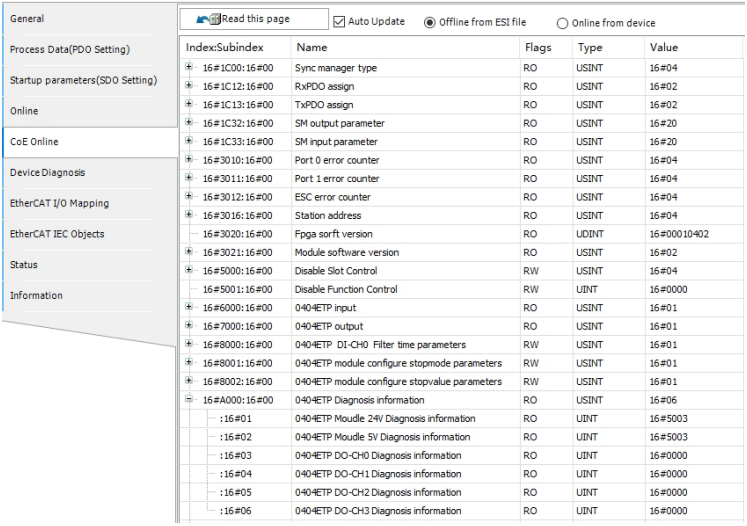


- Output:


Internal circuit
IN
OUT
DC 5V
DO0
Load
Output isolation
IN
OUT
D03
Load
Output isolation
0V
Filter
DC 24V
+
−
COM

4 Fault Diagnosis

When the ERR indicator of the module is ON, it indicates that the module encounters a fault. The module reports a fault code. You can get the fault code through the diagnostic data object dictionary value displayed on the "CoE Online" interface, as shown below. For the module installed in slot n (n=1-32), the object dictionary definition for index 0xA000+0x40*n is shown in the table below.



Index	0xA000+0x40*n: 0404ETP-5V Diagnostic Information				
Sub-index	Name	Data type	Access mode	Mapping	Default
0	0404ETP fault code	USINT	RW	No	6
1	0404ETP external 24V module fault information	UINT	RO	No	0

Index	0xA000++0x40*n: 0404ETP-5V Diagnostic Information				
Sub-index	Name	Data type	Access mode	Mapping	Default
2	0404ETP external 5V module fault information	UINT	RO	No	0
3	0404ETP module channel 0 output fault information	UINT	RO	No	0
4	0404ETP module channel 1 output fault information	UINT	RO	No	0
5	0404ETP module channel 2 output fault information	UINT	RO	No	0
6	0404ETP module channel 3 output fault information	UINT	RO	No	0

Module Fault Code

Fault Code	Fault Description	Solution
0x5003	External 24 V power failure	Check the isolated power supply of the module

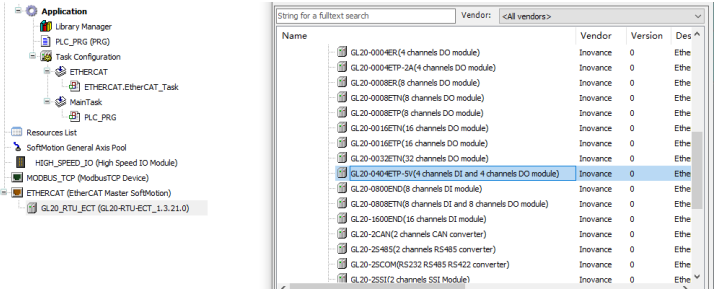
Module Channel Fault Code

Fault Code	Fault Description	Solution
0x6002	Channel shorted	• Check the external wiring of the module channel • If external wiring is correct, it is recommended to check the internal hardware of the module or replace the module

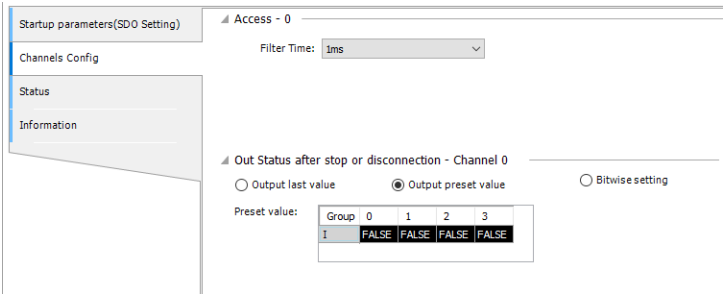
5 Programming Examples

The following is an example where AM600 is used as the master control module along with the GL20-0404ETP-5V module.

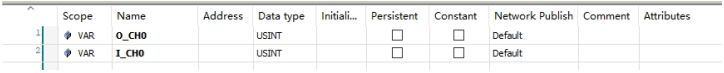
1. Add the GL20-0404ETP-5V module.



2. Double click the module and set Out Status after stop or disconnection.

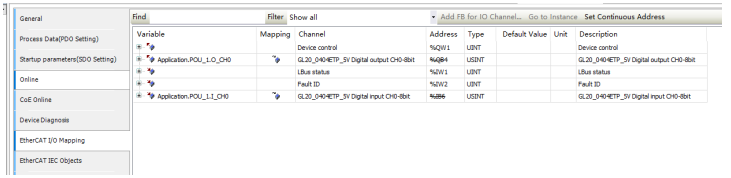


3. Add custom variables O_CH0 and I_CH0.

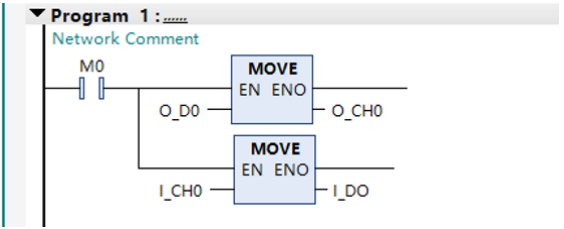


	Scope	Name	Address	Data type	Initiali...	Persistent	Constant	Network Publish	Comment	Attributes
1	VAR	O_CH0		USINT		☐	☐	Default		
2	VAR	I_CH0		USINT		☐	☐	Default		

4. Map the variables O_CH0 and I_CH0 to the output channels of the configured module.



5. Define variables O_CH0 and I_CH0 with the LD programming language as shown in the figure below.



6. After successful compiling, download the project and run it.

6 Appendix: Version Information

You can get the firmware of module and the firmware of communication interface module from Inovance technical support, and get XML file and InoProShop from *https://www.inovance.com*. The following table describes the version matching information.

Module Firmware Version	Communication Interface Module Firmware Version	XML/GSD File Version	InoProShop Version
Logic software: 0.1.11.0 and later	GL20-RTU-ECT: board software 2.4.11.0 and later	GL20-RTU-ECT: 1.3.16.0 and later	V1.7.3 SP5 and later