

User Guide

GL10-PS2 Power Module



19011108A02

1. Overview

Thank you for purchasing the GL10-PS2 power module, which is independently developed and produced by Inovance. Please read this manual carefully before using this product.

The GL10-PS2 module can work with modules including AM600CPU, AM600-RTU-ECT, AM600-RTU-COP and AM600-RTU-DP. It can provide power of 24 VDC and 2 A.

This manual mainly describes the product's specifications, characteristics and how-to-use. Read this manual carefully before use for your safety. See the Medium-Sized PLC Programming Manual to understand the use of the user program development environment and design method of the user program of the product. You can download the latest materials from www.inovance.com.

2. Safety Precautions

The safety precautions are divided into two classes: "WARNING" and "NOTICE". Please pay attention to the safety precautions before using the product.

- WARNING**

Wrong operations can cause death or serious injury;
- CAUTION**

Wrong operations can cause moderate or minor injury and equipment damage.

Accidents described in the "NOTICE" class may cause serious subsequent in some cases. Follow the safety instructions. Otherwise, death or heavy injury, damage to the product, machines and system can be caused.

Please keep this manual properly for reference when needed and deliver it to end users.

Control System Design

WARNING

- ◆ The safety circuit must be designed to ensure that the control system can continue working safely when the external power is off or the PLC is faulty;
- ◆ In case of long-time over-current on the output circuit caused by a current exceeding the rated value or short-circuit of the load equipment, the module may smoke or get on fire. Therefore, external safety devices should be used, such as fuses or breakers.

CAUTION

- ◆ The emergent braking circuit, protection circuit, interlock circuit for forward/reversal rotation, and top and bottom position interlock switches that can prevent damage to equipment should be configured in the external circuit of the PLC;
- ◆ Please configure the external protection circuit and safety mechanisms for output signals related to material accidents to ensure that the equipment can work safely;
- ◆ When the CPU of the PLC detects any system exceptions, all outputs may be closed; when the circuit of the controller is faulty, its outputs may become out of control. Therefore, an appropriate external control circuit should be designed to ensure that the equipment can work properly;
- ◆ When the PLC is used in an outdoor electric environment or level-II over-voltage environment, the power system should be equipped with anti-lighting devices to ensure that the over-voltage caused by the lightning does not affect ports of the PLC, including the power input, or signal inputs and control outputs of the PLC..

Installation

WARNING

- ◆ Only professional service engineers who have received related electrical training and knowledge can install the product;
- ◆ Before disassembling the module, the external power supply must be disconnected from the system. If the power supply is connected, it may lead to an electric shock or fault and false tripping;
- ◆ Do not use a PLC under following conditions: Environment with dust, oil smoke, conductive dust, erosive gas and flammable gases; environment exposure to high temperature, condensation, rain and wind; environment under vibration and shock. Electric shock, fire and misoperations can cause damage to the product;
- ◆ The PLC is an open-type device. To protect operators without adequate knowledge about electric devices from an electric shock, the PLC must be mounted in a control cabinet with a door lock. The casing of the cabinet must meet IP20 or above safety requirements. Only operators who have received related training about electric devices with adequate electric knowledge can open the cabinet.

CAUTION

- ◆ While handling bolt holes and connecting wires, do not let cuttings and wire crumbs fall into the PLC through ventilation holes. This may cause fire, faults and false tripping;
- ◆ After a new PLC is installed, the ventilation surface of the PLC must not be covered. Otherwise, the ventilation efficiency will be lowered, causing fire, faults and false tripping;
- ◆ When modules are being mounted, the modules must be firmly connected to their connectors and fixed on the hooks. If a module is not mounted correctly, it may cause false tripping, faults and the module to fall.

Wiring

WARNING

- ◆ Only professional service engineers who have received related electrical training and knowledge can wire the product;
- ◆ All external power supplies must be disconnected from the system during the wiring process. If a power supply is connected, it may lead to an electric shock or fault and false tripping;
- ◆ The PLC can be powered on after installation and wiring. The terminal cover must be mounted before starting operations. If not, it may cause an electric shock;
- ◆ Cable terminals must be insulated to ensure that the insulation distance between cables does not decrease after the cables are connected. Otherwise, it may cause an electric shock or equipment damage;
- ◆ The input power distribution circuit should be equipped with suitable protective devices, generally including disconnectors with fusing and detection functions or external fuses. Factors including the rated current, overload capability and the short-circuit capability of the its preceding power distribution when choosing protective devices.

CAUTION

- ◆ Prevent dropping metal filings and wire ends drop into ventilation holes of the PLC at wiring. Failure to comply may result in fire, fault and malfunction.
- ◆ The external wiring specification 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.
- ◆ When connecting the cable, ensure that you have recognized the connector type correctly. Failure to comply may result in module and external equipment fault.
- ◆ Tighten bolts on the terminal block in the specified torque range. If the terminal is not tight, short-circuit, fire or malfunction may be caused. If the terminal is too tight, fall-off, short-circuit, fire or malfunction may be caused.
- ◆ If the connector is used to connect with external equipment, perform correct crimping or welding with the tool specified by manufacturer. If connection is in poor contact, short-circuit, fire or malfunction may be caused.
- ◆ A label on the top of the module is to prevent foreign matters entering the module. Do not remove the label during wiring. Remember to remove it before system operation, facilitating ventilation.
- ◆ Do not bundle control wires, communication wires and power cables together. They must be run with distance of more than 100 mm. Otherwise, noise may result in malfunction.
- ◆ Select shielded cables for high-frequency signal input/output in applications with serious interference so as to enhance system anti-interference ability.

Operation and Maintenance

WARNING

- ◆ and maintain the product;
- ◆ Touching terminals when the PLC is power-on may cause an electric shock or false tripping;
- ◆ All external power supplies must be disconnected from the system before cleaning modules or re-fastening bolts on the terminal block and mounting bolts on connectors. Otherwise, it may cause an electric shock;
- ◆ All external power supplies must be disconnected from the system before modules can be disassembled or communication cables can be connected or disconnected. Otherwise, it may cause an electric shock or false tripping.

Retirement

CAUTION

- ◆ The product should be disposed of as industrial waste;
- ◆ The retirement of batteries should comply with the local regulations.

3. Product Information

Model and Nameplate

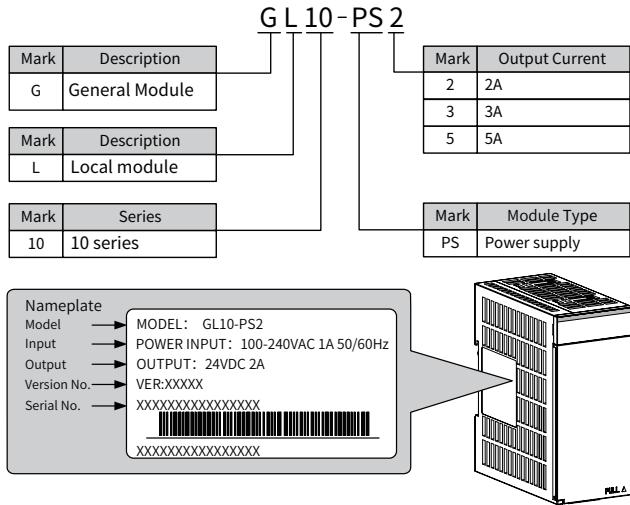


Figure 1 Model and nameplate

Model	Type	Description	Applicable for
GL10-PS2	Power module	220 V input; 24 V/2 A output	AM600

External Ports

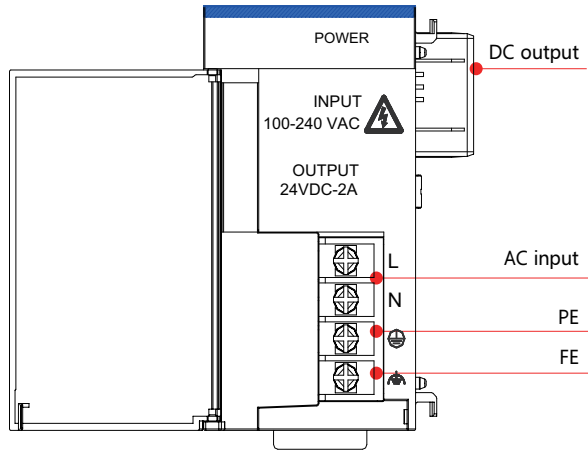


Figure 2 Ports of the power module

The power module has two terminals. One is the input port, the other one is the output port. The AC input port should meet the following requirements:

Port	Definitions of functions
AC input port	100-240 VAC input
	Protective ground (connecting to the AC input power ground cable)
	Functional ground (connecting to the PLC casing)

The DC output port should meet the following requirements:

Network	Type	Function	Remarks
24 V	Output	24 VDC output	-
5 V	Output	5 VDC output	For modules without 5 V terminal, the internal terminal is empty.
GND	Output	DC output ground	-
GND	Output	DC output ground	-

General Specifications

Item	Specifications
Input power	100~240 VAC(-15%~+10%)
Input frequency	50/60 Hz(-5%~+5%)
Output voltage	24 VDC±5%
Rated Output Current	2 A
Efficiency	Above 70%
Over-current protection	Yes
Fuse	Built-in

Electric Specifications

Item	Name	Rated	Testing conditions	Remarks
Insulation resistor	Primary side- SELV	$\geq 2 \times 106\Omega$	Environment temperature: 25±5 °C. Relative humidity:Lower than 90% (non-condensing), testing voltage: 500 VDC	Based on your needs
	Primary side- PE	$\geq 2 \times 106\Omega$		
Withstand voltage	Reinforced insulation	Primary side- SELV: 3250 VDC (or 2300 VAC) or 1 minute		No discharge arc or penetration, the leakage current is smaller than 10mA.
	Basic insulation	Primary side- PE (or grounding casing):1900 VDC (or 1350 VAC) for 1 minute		
Pulse	Reinforced insulation	Primary side- SELV: 4250 V pulse		No discharge arc or penetration
	Basic insulation	Primary side- PE (or grounding casing):2500 V pulse		
Range of rated input voltage	AC input	100-240 VAC		-
Rated input current		Maximum 1.0 A		-
IP level		IP20		-
Pollution		PD2		-
Elevation		2000 m (80 kPa)		-
Over-voltage class		Pluggable or fixed devices powered from indoor sockets		-
Highest working temperature		55 °C full load		-
Over-current protection device		Fuse		-

4. Mechanical Design Reference

Installation Dimensions

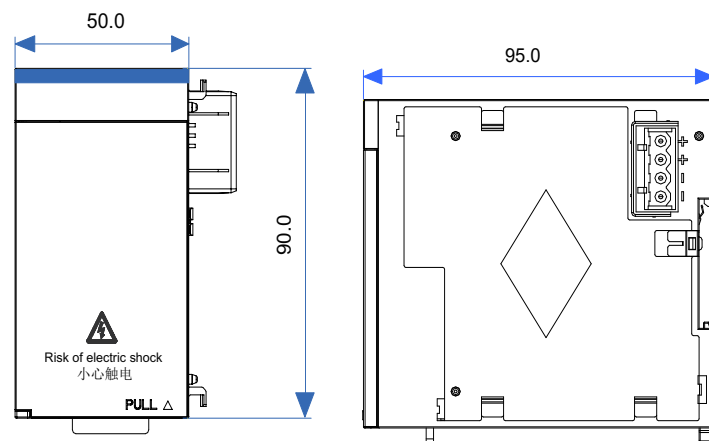


Figure 3 Installation dimensions (unit: mm)

5. Mechanical Design Reference

Selection of Cables

The following table shows the recommended power cables for reference:

Material	Model	Cable diameter		Manufacturer	Wire crimper
		Chinese standard/MM ²	USA standard/AWG		
Fork lug	TNS2-4	1.0-2.0	17-14	Suzhou Yuanli	RYO-8 YYT-8

- ◆ The above lugs are applicable for power modules. The rated temperature is above 75 degrees Celsius. The sectional area of the grounding cable should be larger than 2 mm².

Cable Processing

Cable processing steps:

- 1) Stripping the insulation layer. The exposed part should be 6 mm long;
- 2) Insert the cable into the cable pipe;
- 3) Penetrate the conductive part of the cable via the round hole of the lug. Use the recommended wire crimper to crimp the cable;
- 4) Insert the cable into the 20 mm $\Phi 3$ heat-shrinkable tube. The part that covers the copper pipe of the lug will shrink after being heated;

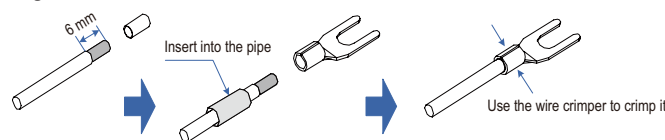


Figure 4 Cable processing

Terminal Signal Layout

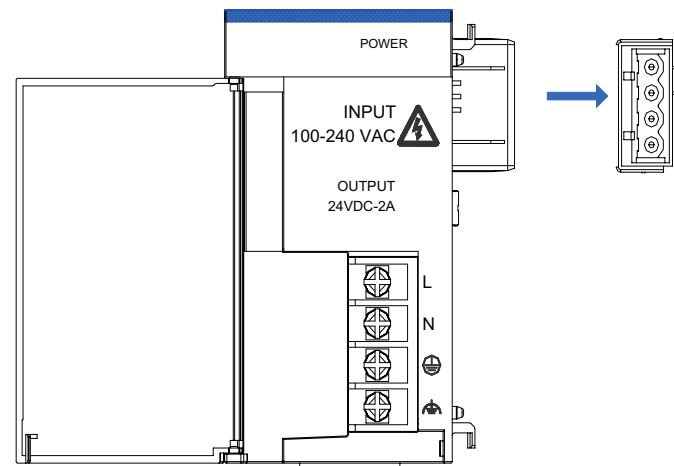


Figure 5 Terminal signal layout

Terminal Definitions

Mark	Type	Function
L	Input	AC L input
N	Input	AC N input
⏏	Ground	Protective ground (connecting to the AC input power ground cable)
⏏	Ground	Functional ground (connecting to the PLC casing)
+24V	Output	24 VDC positive
GND	Output	24 VDC ground

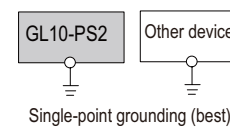
Wiring Precautions

- 1) All external power supplies must be switched off before installation and wiring process to prevent electric shock and module damage;
- 2) Thick cable (2 mm² at most) should be used as the 110V/220 VAC power cable. The cable should be twisted at the connection terminal to connect the terminal at a smaller length. This can prevent short circuit caused by loose screws;
- 3) Do not bundle the 110V/220 VAC power cables together with 24 VDC and IO signal cables and communication cable. The distance between the cables should be as large as possible within the permitted range;
- 4) Only the copper cable of above 75°C can be used. The screw fastening torque of the power terminal should be 9.5 kg·cm (8.25 in·lbs);
- 5) When the GL10 series module is used in a scenario with a strong interference source (such as AC drive), it is recommended to use a noise filter to depress the interference noise. For details, please refer to the insulation transformer;
- 6) After the power is switched on, if the 24 VDC indicator LED is ON, it means the power supply is working. If it is OFF, the power input is exceptional and the module may be faulty.

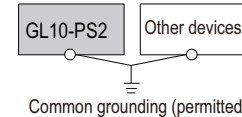
Grounding

- 1) Terminal L and N of the AC power (100-240 VAC, 50/60 Hz) should be connected to the terminal L and N of the power module. The grounding cable of the power supply must be connected to the terminal ⏏ of the module;
- 2) Terminal ⏏ of the power module should be connected to the outer casing as the reference ground according to the following grounding principles;

- The diameter of the grounding cable must not be smaller than the diameter of the power terminal L and N;
- Use single-point grounding when multiple devices are used concurrently;



- When single-point grounding cannot be used, use common grounding shown on the right side.



- Do not use the grounding method shown on the right side.

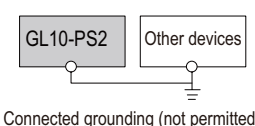


Figure 6 Grounding requirements of the power module

Mounting of the Power Filter

When the GL10 series module is used in a scenario with a strong interference source (such as AC drive), it is recommended to use a noise filter to depress the interference noise.

The filter should be installed as close to the GL10 power module as possible. Use screws to fix it on the conductive back. The screw areas should be coated properly to ensure effective grounding. The incoming cable of the filter should be laid separately from the outlet cable to prevent direct coupling of the noise of the incoming cable on the outlet cable.

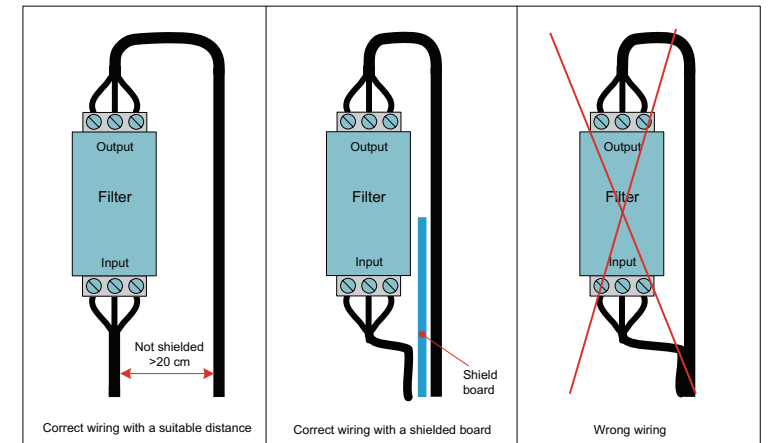


Figure 7 Mounting of the power filter

Insulation Transformer

The insulation transformer can reduce conducted noise (especially surge noise). Surge noise may cause false tripping of the PLC. The insulation transformer should be connected as follows to reduce surge noise. The insulation transformer can reduce the impact of thunder and lightning

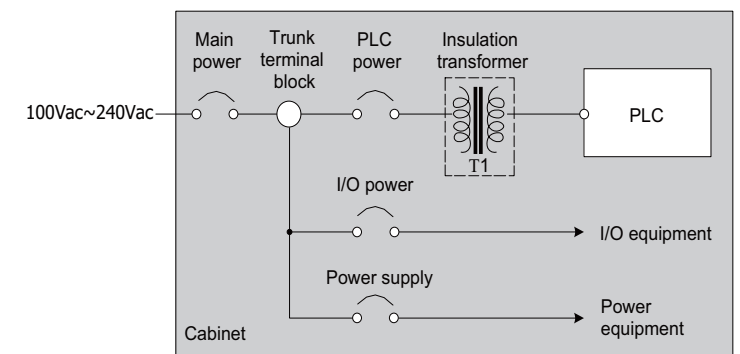


Figure 8 Working principle of insulation transformer

INOVANCE Warranty Agreement

- 1) Inovance provides an 18-month free warranty to the equipment itself from the date of manufacturing for the failure or damage under normal use conditions.
- 2) Within the warranty period, maintenance will be charged for the damage caused by the following reasons:
 - a. Improper use or repair/modification without prior permission
 - b. Fire, flood, abnormal voltage, natural disasters and secondary disasters
 - c. Hardware damage caused by dropping or transportation after procurement
 - d. Operations not following the user instructions
 - e. Damage out of the equipment (for example, external device factors)
- 3) The maintenance fee is charged according to the latest Maintenance Price List of Inovance.
- 4) If there is any problem during the service, contact Inovance's agent or Inovance directly.
- 5) Inovance reserves the rights for explanation of this agreement.

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