

GL10-RTU-COP

CANopen Communication Module User Guide



19011280A02

Overview

Thank you for purchasing the GL10-RTU-COP communication module developed and manufactured independently by Inovance. This product is a CANopen bus slave expansion module. Each module can connect up to 16 DI/DO modules or up to 8 AI/AO modules.

This guide describes the specifications, characteristics and using methods of this module. Read this guide carefully before using to ensure more safe usage. You can download the latest materials from www.inovance.com.

Safety Precautions

Safety Disclaimer

1. Read the safety precautions before installing, operating, and maintaining this product.
2. To ensure personal and equipment safety, follow all safety precautions marked on the product and described in the user guide when installing, operating, and maintaining this product.
3. Note that "CAUTION", "WARNING", and "DANGER" only serve as supplements to the safety precautions.
4. Use this product in an environment that complies with the design specifications. Malfunctions or component damage caused by improper use is not covered by warranty.
5. Inovance shall not be liable for any physical injuries or property loss caused by improper use.

Safety Categories and Definitions

- WARNING** : Indicates the improper operation which, if not avoided, may cause death or serious injury;
- CAUTION** : Indicates the improper operation which, if not avoided, may cause moderate or minor injury, as well as equipment damage.

Keep this guide properly for future reference and forward it to the end user.

Control System Design

WARNING

- ◆ Design a safety circuit to ensure that the control system can still work safely upon an external power outage or programmable controller failure.
- ◆ The product may catch fire or emit smoke in case of prolonged overcurrent due to overload or short circuit of load. Therefore, configure an external safety device such as a fuse or circuit breaker.

CAUTION

- ◆ Design an external emergency stop circuit, protective circuit, forward and reverse rotation interlock circuit, as well as up and down limit interlock circuit to be connected to the programmable controller.
- ◆ Design an external protective circuit and a safety mechanism for output signals that may cause major incidents.
- ◆ When the programmable controller CPU detects a system exception, it may turn off all outputs. When partial circuit of the controller malfunctions, the controller outputs may become uncontrollable. To ensure proper operation, it is necessary to design an appropriate external control circuit.
- ◆ If a programmable controller output unit such as the relay or transistor is damaged, its output cannot be controlled to turn ON or OFF.
- ◆ The programmable controller is intended for use in an indoor electrical environment with an overvoltage class of II. The power system must contain a lightning arrester to prevent lightening from causing overvoltage on the power supply input, signal input, and control output terminals of the programmable controller and damaging the equipment.

Installation

WARNING

- ◆ Only allow trained professionals with electrical expertise to install this product.
- ◆ Cut off all external power sources before you install or remove this product. Failure to comply may result in electric shock or faults or malfunctions of this product.
- ◆ Do not use the programmable controller in places with dirt, oily fume, conductive dust, corrosive gas, flammable gas, high temperature, condensation, wind and rain, vibration, or shock. Electric shock, fire, and improper operation will lead to damage and deterioration of the product.
- ◆ The programmable controller is an open-type device to be installed in a control cabinet with a door lock (housing IP rating higher than IP20). Only allow trained operators with electrical expertise to 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.
- ◆ After installation, ensure that no unwanted objects exist on the ventilation surface. Failure to comply may result in poor heat dissipation, fire, faults, or malfunctions.
- ◆ During installation, tightly connect the product and its connectors and firmly lock its hooks. Improper module installation may lead to malfunctions, faults, and detachment.

Wiring

WARNING

- ◆ Only allow trained professionals with electrical expertise to conduct wiring for this product.
- ◆ Cut off all external power sources before wiring. Failure to comply may result in electric shock or equipment faults or malfunctions.
- ◆ Install the terminal cover delivered with the equipment when you energize and operate the equipment after wiring. Failure to comply may result in electric shock.
- ◆ Properly insulate the cable terminals and ensure a proper insulation distance between the cables connected to the terminal block. Failure to comply will result in electric shock or equipment damage.

CAUTION

- ◆ Prevent metal filings and wire ends from dropping into ventilation holes of the PLC during 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.
- ◆ Wire the module correctly after making clear of the connector type. 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 cable for high-frequency signal input/output in applications with serious interference so as to enhance system anti-interference ability.

Operation and Maintenance

WARNING

- ◆ Only allow trained professionals with electrical expertise to operate and maintain this product.
- ◆ Do not touch terminals when the power is on. Failure to comply may result in electric shock or malfunctions.
- ◆ Cut off all external power sources before you clean the module or re-tighten bolts and connectors to the terminal block. 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 malfunctions.

CAUTION

- ◆ Get acquainted with the guide and ensure safety before online modification, forcible output, and RUN/STOP operation.
- ◆ Disconnect the power supply before installing/removing the expansion card.

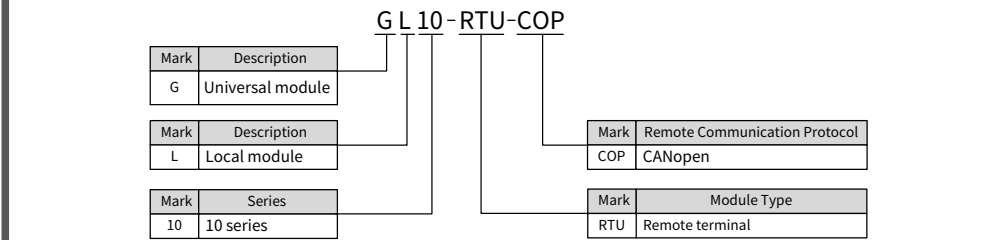
Disposal

CAUTION

- ◆ Dispose of this product as industrial wastes. Dispose of the battery separately in accordance with local laws and regulations.

Product Information

Model and Nameplate



Nameplate

Model

MODEL: GL10-RTU-COP

Rated input

POWER INPUT: 24 VDC

Rated output

OUTPUT: NONE

Version

VER: XXXXX

Serial No.

XXXXXXXXXXXXXXXXXX

Figure 1 Description of model and nameplate

Model	Category	Description
GL10-RTU-COP	CAN communication module	CANopen protocol communication interface module

External Interface

Figure 2 Diagram of digital output module interface

No.	Interface	Function			
①	DB9 connector	CANopen communication port			
②	Dialing switch	ADDR1 ADDR0	Station address can be set through 16-bit rotary DIP switch. Decimal slave address = ADDR1 x 16 + ADDR0 (address: 1–63).		
③	DIP switch	DIP1 DIP2 DIP3 DIP4	Termination resistor switch Set the baud rate to BR0. Set the baud rate to BR1. Set the baud rate to BR2.		
④	Signal indicator	POWER CANRUN CANERR SF BF	Power indicator CAN bus running indicator CAN bus error indicator Slave configuration error indicator Slave expansion bus error indicator	Green Green Red Red Red	ON upon power-on ON when the module is running properly ON when a CAN bus error occurs ON if an error occurs when you configure the slave expansion module Blinking if an error occurs on the slave expansion module
⑤	Local expansion module back-end interface	Connected to a back-end module, not supporting hot plugging			
⑥	Input terminal of 24 V internal power supply	Connected to a power module			

General Specifications

Item	Specifications
Power supply specifications	24 VDC (20.4 VDC to 28.8 VDC) (–15% to +20%)
Internal 5 V power supply	1,200 mA (rated value)
Protocol for communication with CPU module	CANopen
CANopen communication rate	10 kbps, 20 kbps, 50 kbps, 125 kbps, 250 kbps, 500 kbps, 800 kbps, and 1 Mbps
Max. number of stations supported by CANopen network	63
Station ID range	1–127. The station ID can be set with 2 round DIP switches.
Expandability of subsequent I/O modules	Up to 16 I/O modules can be added. The actual number and configuration depend on each module's power consumption.
CANopen network port	One DB9 male socket

Mechanical Design Reference

■ Mounting Dimensions

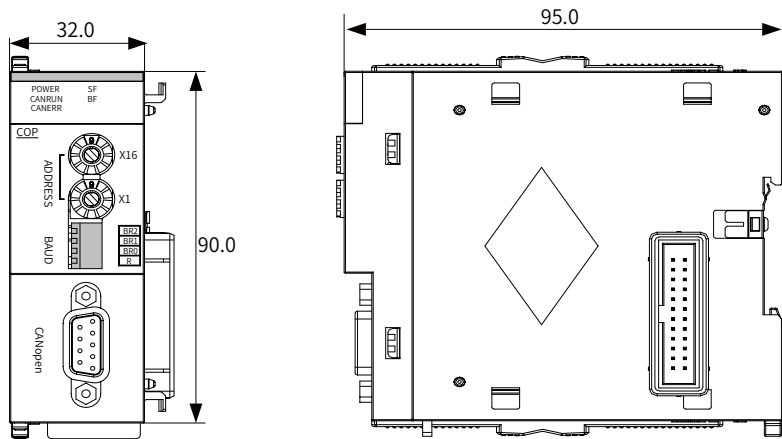


Figure 3 Mounting dimensions (in mm)

Electrical Design Reference

■ Diagram of Networking Through CANopen Bus

The following figure shows the CAN bus topology. It is recommended to use the shielded twisted pair cable as the CAN bus. Connect two 120 Ω termination resistors at each end of the bus to avoid signal reflection. Ground the shield at one single point.

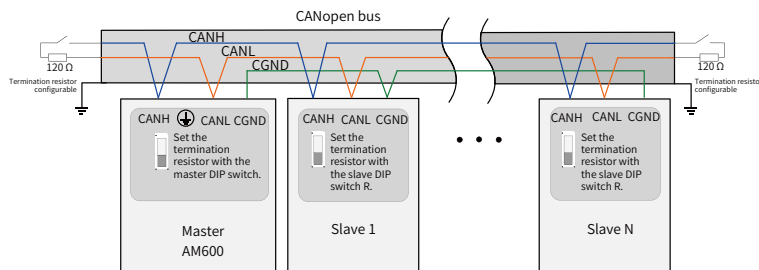


Figure 4 Connection of CANopen communication model

■ Description of CANopen Communication Interface

The GL10-RTU-COP module uses DB9 connector for data transmission.

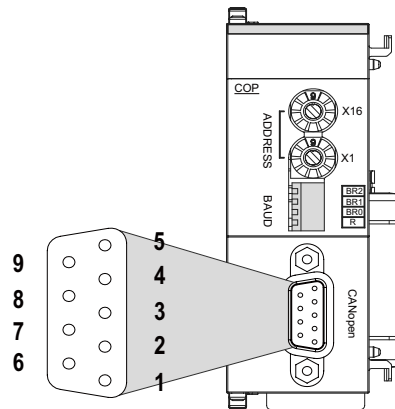


Figure 5 CANopen terminal definition on CPU module

■ Terminal Assignment

CANopen transmits data through the DB9 connector. The following table lists pins of the DB9 connector.

Diagram	Pin	Signal Definition
9	5	CANL
8	4	
7	3	
6	2	CANH
	1	
		GND

It is recommended to use shielded twisted pairs to connect the CAN bus. Connect two 120 Ω termination resistors at each end of the bus to prevent signal reflection. Typically, ground the shield in the single-point grounding mode.

Do not bundle the bus cables together with AC power cords and high voltage cables; otherwise, communication signals may be affected by interference.

The following table lists the relationship between the values set by CANopen module's DIP switch and communication baud rates.

DIP Switch Value (BR2/BR1/BR0)	0	1	2	3	4	5	6	7
Baud Rate (bps)	1 Mbps	800 kbps	500 kbps	250 kbps	125 kbps	50 kbps	20 kbps	10 kbps

The following table lists the relationship between CANopen transmission rates and transmission distances.

Baud Rate (bps)	Maximum Bus Length (m)
1 Mbps	30
500 kbps	80
250 kbps	150
125 kbps	300
50 kbps	1,000

The following table describes the relationship between the number of CANopen nodes, cable impedance, and transmission distance.

Max. Number of Nodes	16	32	64
Communication Cable Resistance			
33 Ω /km	575 m	530 m	460 m
70 Ω /km	270 m	250 m	215 m
88 Ω /km	215 m	200 m	170 m
93 Ω /km	205 m	185 m	160 m
157 Ω /km	120 m	110 m	95 m

■ Communication Connection

1) Connection of DB9 connector

- ◆ Plug the DB9 connector with wire into the DB9 plug of module (pay attention to the connector orientation).
- ◆ Tighten the screws at both sides of the DB9 connector.

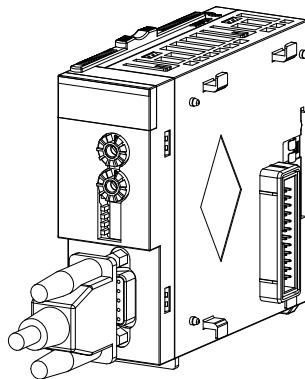


Figure 6 Diagram of DB9 connector connection

- ◆ Disassembly procedure: Loosen the screws at both sides of the DB9 connector, and hold the plastic part of DB9 to pull out the connector along a horizontal direction with the module.

2) Communication cable fixing requirements

To avoid the influence on the communication cable due to other stresses and ensure the stability of communication, secure the cable near the equipment before CANopen communication.

■ Fault Indication and Countermeasures for CANopen Remote Communication Expansion Module

LED ON/OFF State	CANRUN LED (Green) Meaning	CANERR LED (Red) Meaning
Steady OFF	-	No error
Steady ON	The CAN bus is in normal operation.	The CAN bus is not connected.
Blinking	Pre-operational state	Pre-operational state
Single flash	The CAN bus is in stop state.	At least one error counter of the CAN controller reaches the limit or exceeds the threshold (too many error frames).
Double flash	-	Error control event (node monitoring or heartbeat event)
Triple flash	-	Timeout error for communication with synchronizing object

INOVANCE Warranty Agreement

Inovance provides an 18-month free warranty (subject to information indicated by the barcode on the equipment) to the equipment itself from the date of manufacturing for the failure or damage under normal use conditions. During the warranty period, if the product fails or is damaged under the condition of normal use by following the instructions, Inovance will be responsible for free maintenance.

Within the warranty period, a maintenance fee will be charged for damage caused by the following reasons:

- Improper use or repair/modification without prior permission
- Fire, flood, abnormal voltage, natural disasters, and secondary disasters
- Hardware damage caused by dropping or transportation after procurement
- Operations not following the user guide
- Factors out of the equipment (for example, external device factors)

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

The maintenance fee will be charged according to the latest Maintenance Price List of Inovance.

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

For service-related issues, contact Inovance's agent or Inovance directly.

By purchasing this product, you agree to this warranty agreement. Inovance reserves the rights for explanation of this agreement.

INOVANCE Warranty Card

Customer info.	Company add.:	
	Company name: Post code:	Contact:
		Tel:
Product info.	Product model:	
	Barcode (paste the barcode here)	
	Agent:	
Fault info.	(Maintenance date and description):	
	Maintained by:	

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