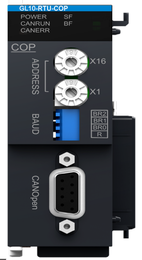
INOVANCE



GL10-RTU-COP

CANopen Communication Module User Guide

19011280A03

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.

Fundamental Safety Instructions

■ Safety Disclaimer

1) Read and comply with the safety instructions during installation, operation, and maintenance of the product.
2) To ensure the safety of humans and the products, follow the marks on the products and all the safety instructions in this document.
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

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

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

CAUTION 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 case of any damage, rust, or signs of use on the product or accessories upon unpacking.
- Do not install the product in 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.Once the CPU of the PLC detects an exception in the system, all outputs may be closed. When a fault occurs in the controller circuit, the output may not be under control. Therefore, it is necessary to set up an external control circuit to ensure normal operation.
- 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.
- Never stand or stay under the equipment while it 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.

CAUTION

- Handle the equipment with care during transportation and mind your step 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.
- 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

DANGER

- Provide a safety circuit and include an error handling program in the software to ensure that the product remains in a safe state in case of an external power failure or an internal fault.
- 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.

WARNING

- Any damaged output components such as relays or transistors in this product may result in uncontrolled output that stays in a constant ON or OFF state.
- The product design must comply with the overvoltage category requirements specified in the Environmental Specifications. The system-level power supply must have a lightning protection device, assuring that overvoltage due to lightning shock is not applied to the controller's terminals such as power supply input terminals, signal input terminals, and control output terminals, to prevent damage to the product.
- 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.

CAUTION

- 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

DANGER

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

WARNING

- 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 may 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 could result in equipment overheating or fire.
- Do not modify this equipment.
- Never loosen the fixing bolts on components and modules, 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 this 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.

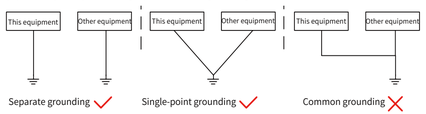
CAUTION

- 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 for effective ventilation and cooling.
- During installation, ensure the equipment is connected to the respective connector securely and hook the equipment firmly. Improper installation may cause the equipment malfunction, failure, or loosening.

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 could 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. Ground the equipment separately or to a single point. Common grounding must not be used.



- 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

- 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 of 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.

CAUTION

- Follow the proper electrostatic discharge (ESD) procedure, and wear an anti-static wrist strap to perform wiring. Failure to comply could damage the equipment or its internal circuits.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding purpose. Failure to comply will result in equipment malfunction.

Power-on

DANGER

- 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.

WARNING

- 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 components, 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 product 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.

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 a fire or heat oven. 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.
- Seek for medical treatment immediately if a button battery is swallowed by accident, because this may cause severe internal burns within two hours and even death.

CAUTION

- Keep batteries out of reach of children.
- If the battery compartment is not securely closed, stop using the product immediately and keep it out of reach of 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 of the connectors. 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 retired equipment as industrial waste. Dispose of used 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 could 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 running equipment may become very hot. Do not touch these hot areas. Failure to comply may cause burns.

Product Information

■ Model and Nameplate

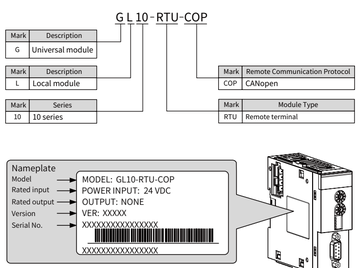


Figure 1 Description of model and nameplate

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

■ External Interface

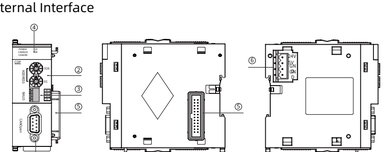


Figure 2 Diagram of digital output module interface

No.	Interface	Function	
①	DB9 connector	CANopen communication port	
②	Dialing switch	ADDR1	Station address can be set through 16-bit rotary DIP switch. Decimal slave address = ADDR1 x 16 + ADDR0 (address: 1–63).
		ADDR0	

③	DIP switch	DIP1	Termination resistor switch		
		DIP2	Set the baud rate to BR0.		
		DIP3	Set the baud rate to BR1.		
		DIP4	Set the baud rate to BR2.		
④	Signal indicator	POWER	Power indicator	Green	ON upon power-on
		CANRUN	CAN bus running indicator	Green	ON when the module is running properly
		CANERR	CAN bus error indicator	Red	ON when a CAN bus error occurs
		SF	Slave configuration error indicator	Red	ON if an error occurs when you configure the slave expansion module
		BF	Slave expansion bus error indicator	Red	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

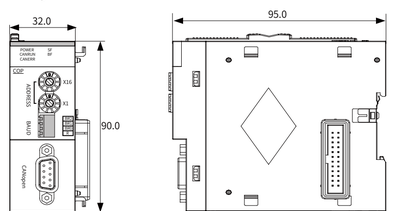


Figure 3 Mounting dimensions (in mm)

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.

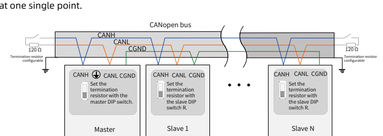


Figure 4 Connection of CANopen communication model

■ Description of CANopen Communication Interface

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

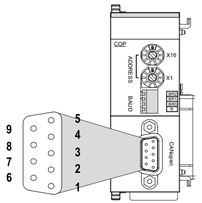
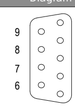


Figure 5 CANopen terminal definition on CPU module

■ Terminal Assignment

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

Diagram	Pin	Signal Definition
	Pin 2	CANL
	Pin 7	CANH
	Pin 3	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 / Communication Cable Resistance	16	32	64
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.

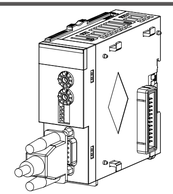


Figure 6 Diagram of DB9 connector connection

- ◆ 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:

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 guide

e) 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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