

PS00009574A05

GL20-2SCOM Series Serial Communication Module User Guide

Suzhou Inovance Technology Co., Ltd.

Add.: No.52, Tian E Dang Road, Wuzhong District,
Suzhou 215104, P.R. China

Tel: (0512) 6637 6666 Fax: (0512) 6285 6720

www.inovance.com



Preface

■ Introduction

The GL20-2SCOM series 2-channel serial communication module supports RS232, RS485, and RS422 communication modes. It can be used with AM300/AM500/AM400/AM600/AC700/AC800/Easy series PLCs and GL20 series communication interface modules such as GL20-RTU-ECT. A GL20-RTU-ECT module supports up to four GL20-2SCOM modules.

This guide introduces the product information, mechanical installation, electrical installation, program commissioning, and troubleshooting of the product.

■ Standards Compliance

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 61131-2 220 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
	EMC Regulations	Electromagnetic Compatibility Regulations 2016	24 VDC products: EN 61131-2 220 VAC products: EN 61131-2 EN 61000-3-2 EN 61000-3-3
	RoHS Regulations	Directive (RoHS) Regulations 2012	EN IEC 63000

■ More Data

Name	Code	Description
GL20-RTU-ECT Series Communication Interface Module User Guide	PS00004985	Introduces the installation, wiring, and other information of the product.
GL20-RTU-ECT32 Series Communication Interface Module User Guide	PS00013434	Introduces the product information, installation, wiring, programming commissioning, and troubleshooting of the product.
GL20-2SCOM Series Serial Communication Module User Guide (This guide)	PS00009574	Introduces the product information, mechanical installation, electrical installation, programming commissioning, and troubleshooting of the product.

■ Revision History

Date	Version	Revision
April 2025	A05	● Modified "Program Commissioning" on page 32. ● Modified "3.3 Terminal Wiring" on page 26.
September 2024	A04	Made minor corrections.
June 2024	A03	● Modified the "Rated current of bus input power supply" of power supply specifications in "1.3 Technical Specifications" on page 13. ● Modified "2.1 Installation Precautions" on page 17. ● Added "6.1 Appendix 1: Response Time for GL20-2SCOM Module as a Virtual Slave" on page 44.
February 2024	A02	● Modified "1.2 Components" on page 10 ● Modified "1.3 Technical Specifications" on page 13. ● Modified "6.2 Appendix 2: Version Matching Information" on page 48.
December 2023	A01	● Added "2.1 Installation Precautions" on page 17. ● Made minor corrections.
July 2023	A00	First release

■ Access to the Guide

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

- Do keyword search under Service and Support at www.inovance.com.
- Scan the QR code on the product with your smart phone.
- Scan the QR code below to install My Inovance app, where you can search for and download user guides.



■ Warranty Disclaimer

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 unusual 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 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.

Safety Precautions

■ Safety Disclaimer

1. Read and follow the safety instructions when installing, operating, and maintaining the equipment.
2. To ensure your safety and prevent damage to the equipment, follow the marks on the equipment and all the safety instructions in this guide.
3. "CAUTION", "WARNING", and "DANGER" items in the guide do not indicate all safety precautions that need to be followed; instead, they just supplement the safety precautions.
4. Use this equipment according to the designated environment requirements; otherwise, a fault may occur. Malfunction or 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 severe personal injuries.



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



"CAUTION" indicates that failure to comply with the notice may result in minor or moderate personal injury or equipment damage. Keep this user guide properly for future use and deliver it 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 controller 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 an upper position limit and lower position limit interlocked circuit must be set in the external circuits of PLC to prevent damage to the equipment.
- To ensure safe operation, for the output signals that may cause critical accidents, use external protection circuits and safety mechanism.
- Once the CPU of the controller 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.
- If the 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 an indoor electrical environment (overvoltage category II). The power supply must have a system-level surge protector, assuring that overvoltage due to lightning shock cannot be applied to the PLC's power supply input terminals, signal input terminals, and output terminals, to prevent damage to the equipment.

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 disassembling 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 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 skilled personnel 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, and malfunction.
- Ensure there are no unwanted 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 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.
- 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 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



- 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 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 assembling/disassembling the module or connecting/removing the communication cables. 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, the on-site manual operating devices and any other alternative means must be carefully arranged and designed so that they are independent of the PLC and can start or terminate the automatic running of the system.
- If modification on the program is needed during system operation, use the lock function or other protective measures. Ensure that only authorized personnel can make the necessary modifications.

Disposal



CAUTION

- 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 Naming Rules and Nameplate

GL 20 - 2 SCOM

①

②

③

④

① **Product Information**

GL: Inovance general local module

② **Series Number**

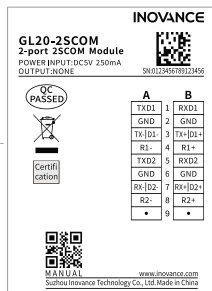
20: 20 series module

③ **Number of Channels**

2: Two channels

④ **Module Type**

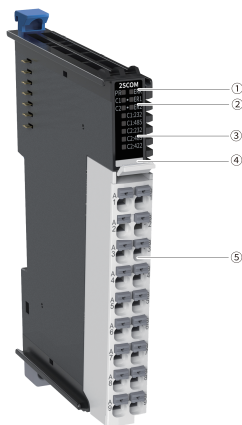
SCOM: RS232/RS485/RS422 communication module



The data for ordering the product is shown below.

Model	Description	Material Code	Applicable Model
GL20-2SCOM	GL20 series PLC serial communication module	01440463	It can be used with AM300/AM500/AM400/AM600/AC700/AC800/Easy series PLCs and GL20 series communication interface modules such as GL20-RTU-ECT. A GL20-RTU-ECT module supports up to four GL20-2SCOM modules.

1.2 Components



No.	Component	Description			
①	Signal indicator	PR (POWER +RUN)	Power/Run indicator	Yellow-green	● Steady 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	Fault indicator	Red	ON: The module is faulty. For troubleshooting, see " Troubleshooting " on page 41.
②	Serial communication indicator	C1/C2	Data communication indicator	Yellow-green	● ON: Data communication in progress ● OFF: No data communication
		ER1/ER2	Communication state indicator	Red	● ON: Communication is faulty. ● OFF: Communication is normal.

No.	Component	Description		
③	Terminal protocol indicator	C1:232	Yellow-green	COM_0 is set to use RS232 level for serial transmission.
		C1:485		COM_0 is set to use RS485 level for serial transmission.
		C2:232		COM_1 is set to use RS232 level for serial transmission.
		C2:485		COM_1 is set to use RS485 level for serial transmission.
		C2:422		COM_1 is set to use RS422 level for serial transmission.
④	Color identification	 Red: Digital output	 Orange: Analog output	
		 Gray: Digital input	 Green: Analog input	
		 White: Communication	 Blue: Other modules	
⑤	I/O terminals	For details, see <i>3.2 Terminal Definition on page 24.</i>		

Note

- Quick flashing: 200 ms ON followed by 200 ms OFF.
- Slow flashing: 200 ms ON followed by 1s OFF.

1.3 Technical Specifications

■ General specifications

Item	Specification
IP rating	IP20
Dimensions (W x H x D)	12 mm x 100 mm x 75 mm
Weight	About 63 g

■ Power supply specifications

Item	Specification
Rated voltage of bus input power supply	5 VDC (4.75 VDC to 5.25 VDC)
Rated current of bus input power supply	170 mA (typical value @5 V)
Rated voltage of terminal input power supply	/
Rated current of terminal input power supply	/
Rated voltage of terminal output power supply	/
Rated current of terminal output power supply	/
Hot swap	Not supported

■ Interface specifications

Item	Specification
Number of channels	2 channels
Signal connection mode	Pluggable spring-clamp terminals

Item	Specification
Communication interface type	RS232, RS422, RS485 The module simultaneously supports two channels of serial communication with the following configurations: • Two channels of RS232 communication • Two channels of RS485 communication • One channel of RS232 communication and one channel of RS422 communication Note: Only COM_1 can be configured to RS422 mode. In this case, COM_0 can only be configured to RS232 mode. Otherwise, a terminal protocol configuration fault occurs.
Number of slaves	• Up to 31 Modbus slaves are supported in RS485 mode. • Only one Modbus slave is supported in RS232/RS422 mode.
Communication distance	• RS232: Max. 15 m • RS422/RS485: Max. 1200 m
Isolation	Channels are isolated from the internal circuit, but not isolated from each other.
Termination resistor	Configured by users through external wiring and shorted at the near end of the termination resistor terminal
Baud rate	4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, and 115200 bps
Data bit	7 bits or 8 bits, with 8 bits as the default (7-bit data must include parity, otherwise a serial port parameter configuration fault occurs)
Start bit	1 bit
Stop bit	1 or 2 bits, with 1 bit as the default
Parity bit	Options include: odd parity, even parity (default), and no parity
Independent channel enable configuration	Supported
Diagnostic report function configuration	Supported
Communication data refresh mode	Free refresh
Data flow control	Options include: no flow control (default), send/receive flow control, send flow control, and receive flow control

Item	Specification
Frame interval	Range: 0 to 10000, with a default value of 35 (in 0.1 byte)
Data packet size	Options include: 4, 8, 12, 16, 20 (default, in bytes), 24, 28, 32, 36, 40, 44, 48, 52, 56, and 60
Send/receive buffer size	2k bytes
Buffer overflow policy	Options include discarding new data (default) or old data.
Input PDO data volume	60 bytes
Output PDO data volume	60 bytes

1.4 Environmental Specifications

Item	Specification
Installation/application environment	Free from conductive dust, conductive fibers, explosive dust, flammable gases, water mist/greasy dirt, corrosive dusts/gases, strong vibration, and repetitive shock
Altitude	≤ 2,000 m
Pollution degree	2
Immunity	2 kV on power supply cable (compliant with IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC61131-2
Anti-static rating	Contact discharge +/-6 kV and air discharge +/-8 kV
Vibration resistance	- Application scenario: Tested according to IEC60068-2-6, 3.5 mm amplitude from 5 Hz to 8.4 Hz; 1 g acceleration from 8.4 Hz to 200 Hz; 10 cycles per axial direction - Transportation scenario: Tested according to IEC60068-2-64, 0.01 g²/Hz power spectral density from 5 Hz to 100 Hz; 0.001 g²/Hz power spectral density at 200 Hz; 1.14 g Grms
Shock resistance	Application/Transportation scenario: Tested according to IEC60068-2-27; 15 g peak acceleration, 11 ms pulse width, 18 cycles in total in X, Y and Z axial directions

Item	Specification
Operating temperature/humidity	● Temperature: -20°C to +55°C ● Humidity: < 95% RH (30°C), without condensation
Storage temperature/humidity	● Temperature: -20°C to +60°C ● Humidity: < 95% RH (30°C), without condensation
Transportation temperature/humidity	● Temperature: -40°C to +70°C ● Humidity: < 95% RH (40°C), without condensation

2 Mechanical Installation

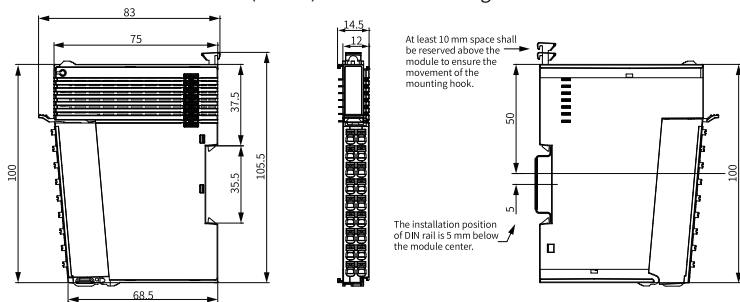
2.1 Installation Precautions

- Make sure the module is powered off before installing or removing.
- 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.
- Do not drop or shock the housing or terminals of the module to avoid damage.

2.2 Installation Dimensions

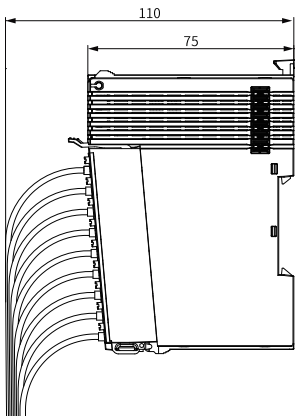
■ Module

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



■ Cable connection

Cable dimensions (in mm) are shown in the figure below.



2.3 Installation Method

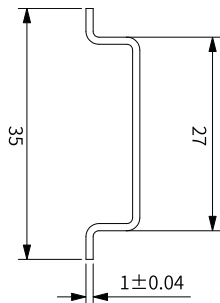


Caution

- The GL20-2SCOM communication module can only be installed in the first four slots.
- It is not recommended to add other devices on the bus when all four GL20-2SCOM modules are used as slaves (i.e. 8 slaves) on the same bus.

■ Installing modules side by side

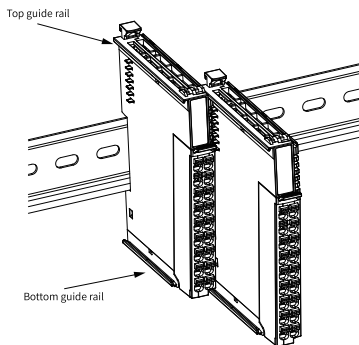
The module is mounted onto a DIN rail in conformity with IEC 60715 (width: 35 mm, thickness: 1 mm). The dimensions (unit: mm) are shown below.



Caution

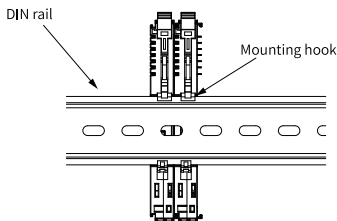
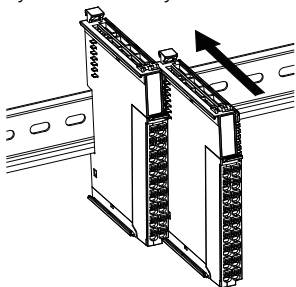
When installed on a DIN rail other than the recommended one (especially the one whose thickness is not 1.0 mm), the product will not fit in place as the mounting hook does not work.

Install modules side by side by sliding them along the top and bottom guide rails of adjacent modules.

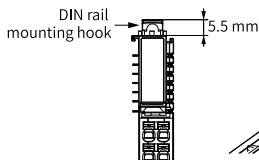


■ Installing modules onto DIN Rail

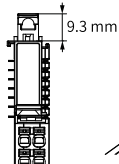
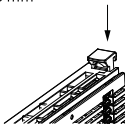
1. Align the module with the DIN rail and push the module in the direction indicated by the arrow until you hear a click, as shown below.



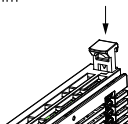
2. Make sure the DIN rail mounting hook of the module is locked. The locked and unlocked states of the mounting hook are shown below.



Locked state



Unlocked state



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

To lock the module to the DIN rail, press down the mounting hook.

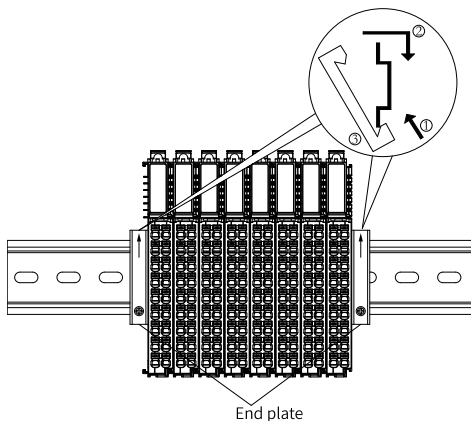


Caution

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.

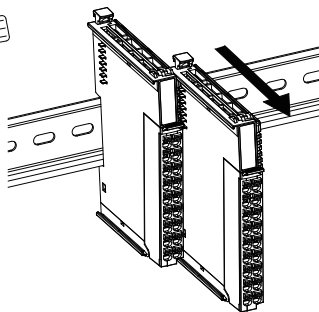
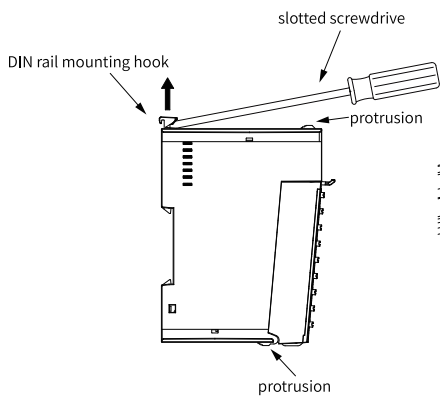
3. Install a DIN rail end plate on both sides of the PLC or the module.

To install 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 modules

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, as shown below.



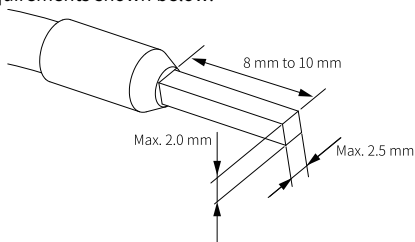
3 Electrical Installation

3.1 Cable Selection

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

Material Name	Applicable Cable Diameter		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	

To use other types of tubular lugs, crimp the lug to the cables according to the shape and dimension requirements shown below.



3.2 Terminal Definition

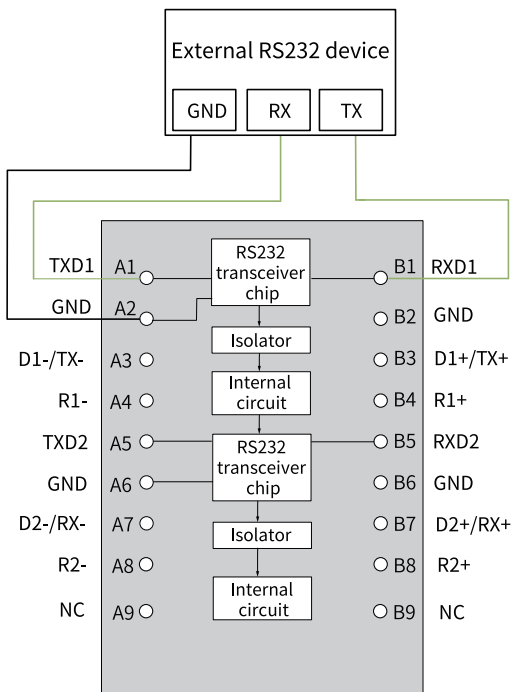


Left Indicator	Left Signal	Left Terminal	Right Terminal	Right Signal	Right Indicator
RS232 TX of COM_0	TXD1	A1	B1	RXD1	RS232 RX of COM_0
Reference ground	GND	A2	B2	GND	Reference ground
D1-: RS485 data negative of COM_0 TX-: RS422 TX negative of COM_1	D1-/TX-	A3	B3	D1+/TX+	D1+: RS485 data positive of COM_0 TX+: RS422 TX positive of COM_1
RS485 termination resistor negative of COM_0/RS422 TX termination resistor negative of COM_1	R1-	A4	B4	R1+	RS485 termination resistor positive of COM_0/RS422 TX termination resistor positive of COM_1
RS232 TX of COM_1	TXD2	A5	B5	RXD2	RS232 RX of COM_1
Reference ground	GND	A6	B6	GND	Reference ground
D2-: RS485 data negative of COM_1 RX-: RS422 RX negative of COM_1	D2-/RX-	A7	B7	D2+/RX+	D2+: RS485 data positive of COM_1 RX+: RS422 RX positive of COM_1

Left Indicator	Left Signal	Left Terminal	Right Terminal	Right Signal	Right Indicator
RS485 termination resistor negative of COM_1/RS422 RX termination resistor negative of COM_1	R2-	A8	B8	R2+	RS485 termination resistor positive of COM_1/RS422 RX termination resistor positive of COM_1
•	/	A9	B9	/	•

3.3 Terminal Wiring

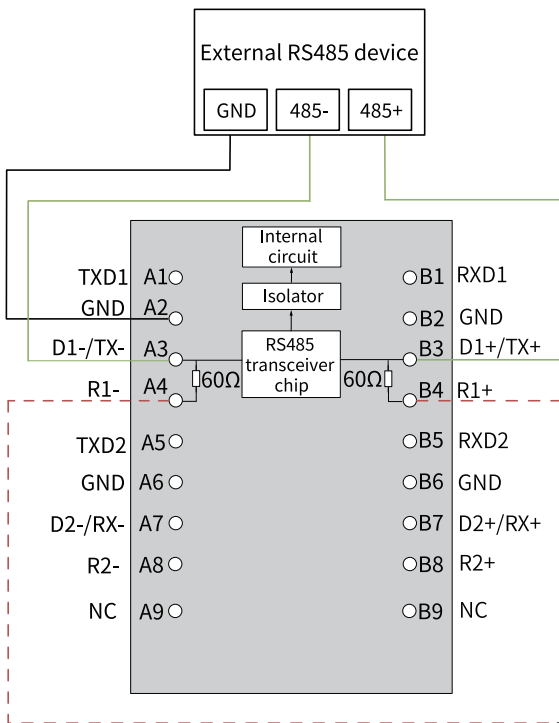
■ Wiring diagram for GL20-2SCOM module and external RS232 device



Note

- For RS232 communication via COM_0, terminals A1, B1, and GND are used.
- For RS232 communication via COM_1, terminals A5, B5, and GND are used.
- The green lines in the diagram indicate communication cables.

■ Wiring diagram for GL20-2SCOM module and external RS485 device



Note

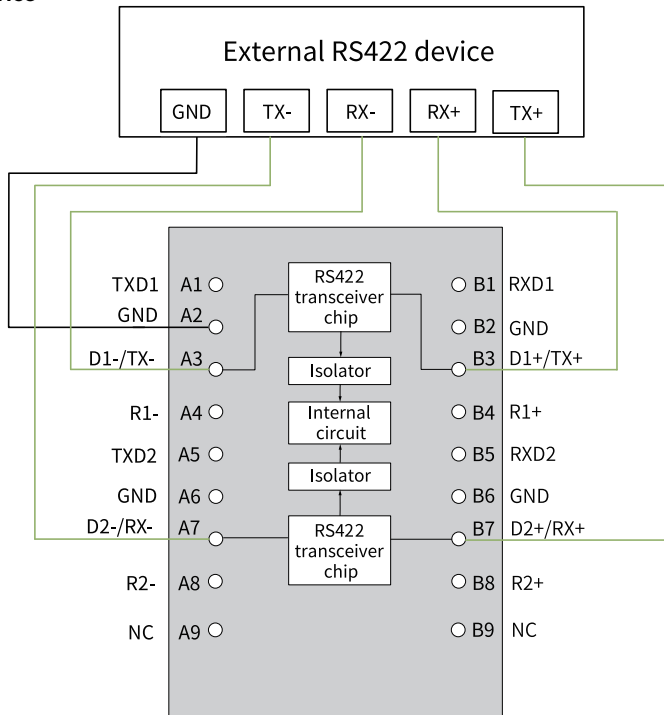
- For RS485 communication via COM_0, terminals A3, B3, A4, B4, and GND are used.
- For RS485 communication via COM_1, terminals A7, B7, A8, B8, and GND are used.



Caution

When the RS485 device is the master or the last node of salves, short terminals A4 and B4 (A8 and B8) to enable the 120 Ω termination resistor.

■ Wiring diagram for GL20-2SCOM module and external RS422 device



Note

For RS422 communication via COM_1, terminals A3, B3, A7, B7, and GND are used.



Caution

Only COM_1 can be configured to RS422 mode. In this case, COM_0 can only be configured to RS232 mode.

3.4 RS485 Communication

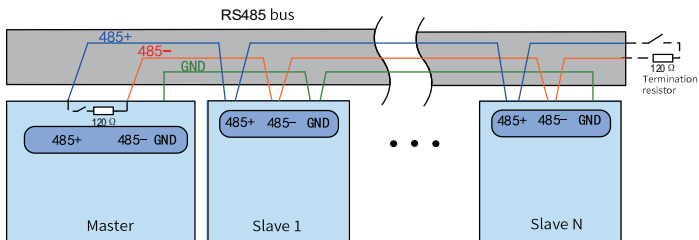


Caution

- Do not bundle the extension cable together with power cables (high voltage, large current) which produce strong interference signals. Separate it from other cables and avoid cabling in parallel.
 - Select recommended cables and pinboards for connection. It is recommended that shielded cables be used as extension cables to enhance capacity of resisting interference.
-

It is recommended to use a shielded twisted pair cable for the RS485 bus and use a twisted pair cable to connect the RS485+ and RS485– terminals. Connect a 120 Ω termination resistor to both ends of the bus to prevent signal reflection. Connect the signal reference grounds of all nodes together. Up to 31 nodes can be connected and the distance between branches must be less than 3 m.

The RS485 bus topology is shown below.

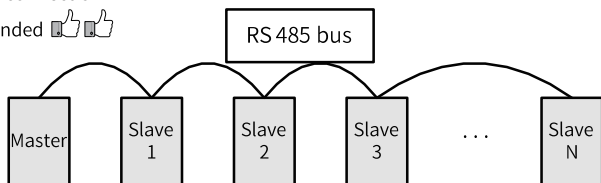


Multi-node connection

In case of a large number of nodes, connect the RS485 bus using the daisy chain mode. If branches needs to be connected, keep the branch line as short as possible (less than 3 m). Star connections are prohibited. Common bus structures are shown in the following figures.

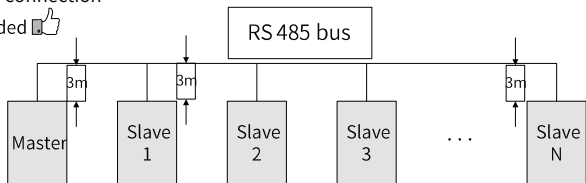
- Daisy chain connection

Recommended  



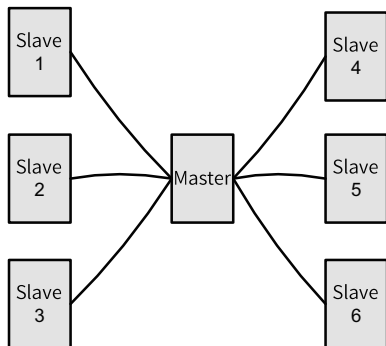
- Branch cable connection

Recommended 



- Star connection (prohibited)

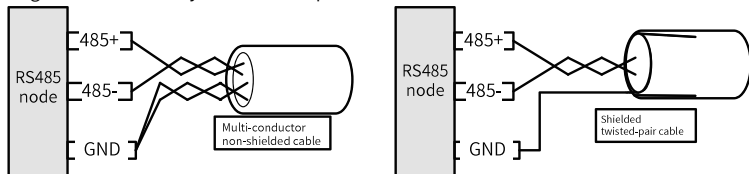
Prohibited



■ Terminal wiring

Ensure that the RS485 bus contains three cables and the terminals are connected correctly. For shielded cables, the shielding layer must be connected to the GND terminal, rather than controller enclosure, ground terminals, or any other location.

Due to the cable attenuation, use AGW26 or thicker cables if the connection length is larger than 3 m. Always use twisted pair cables to connect 485+ and 485-.

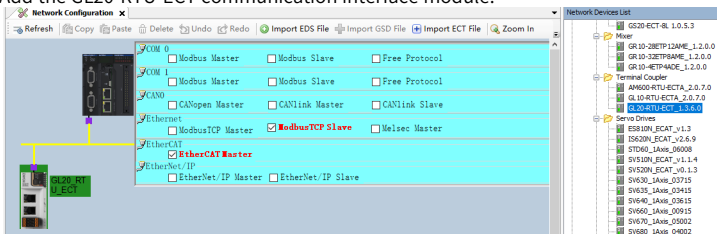


1. Recommended cable 1: Use multi-conductor twisted pair cables, with one twisted pair connected to 485+ and 485-, and others twisted together to connect GND.
2. Recommended cable 2: Use shielded twisted pair cables, with the twisted pair connected 485+ and 485-, and the shield connected to CGND. In applications where shielded cables are used, the shield can be connected to GND only. Never connect the shield to the ground.

4 Program Commissioning

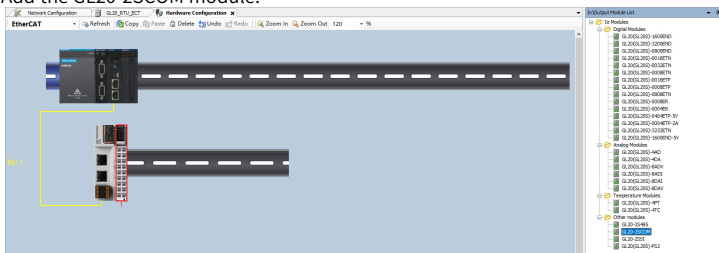
■ Adding the GL20-2SCOM module

1. Add the GL20-RTU-ECT communication interface module.



- In the left **Devices** pane, double-click **Network Configuration** and click the PLC figure in the upper left corner of the interface. Check the "EtherCAT Master" to enable the PLC as an EtherCAT master.
- In the **Network Devices List**, double-click "GL20-RTU-ECT_x.x.x.x" to add the module.

2. Add the GL20-2SCOM module.

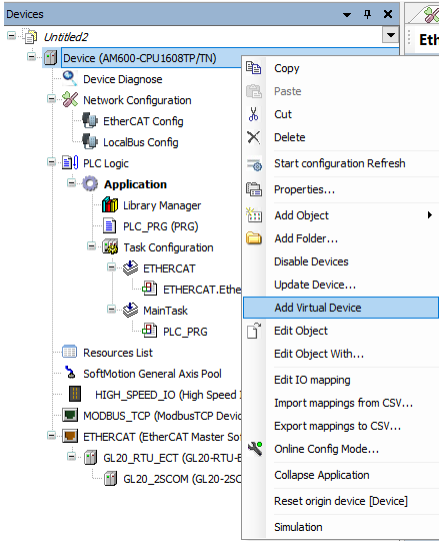


- Double-click the GL20-RTU-ECT module figure to open the **Hardware Configuration** page.
- In the **In/Output Module List**, double-click the GL20-2SCOM module, or drag and place it to the right side of the GL20-RTU-ECT module.

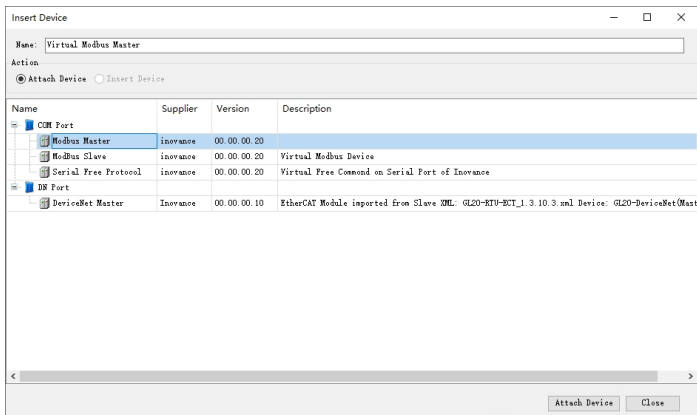
■ Configuring the Modbus master

1. Set the interface of the GL20-2SCOM module as the Modbus master.

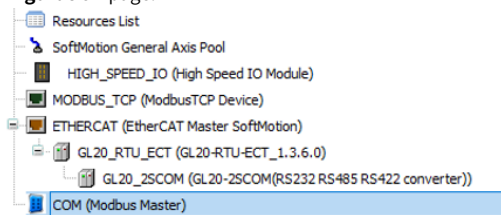
a. Right click **Device** and select **Add Virtual Device**.



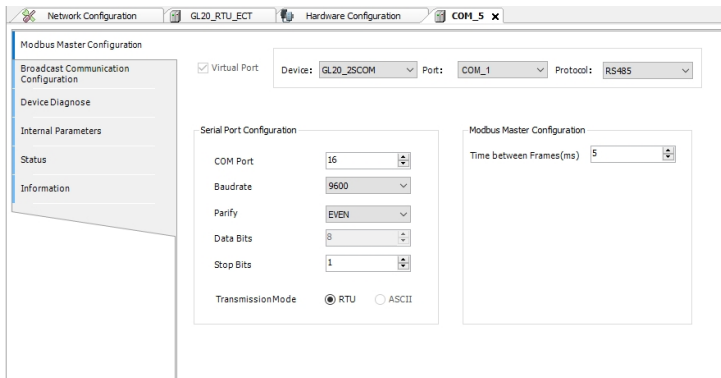
b. In the pop-up window, double-click **Modbus Master**.



- c. Double-click **COM (Virtual Modbus Master)** to open the **Modbus Master Configuration** page.



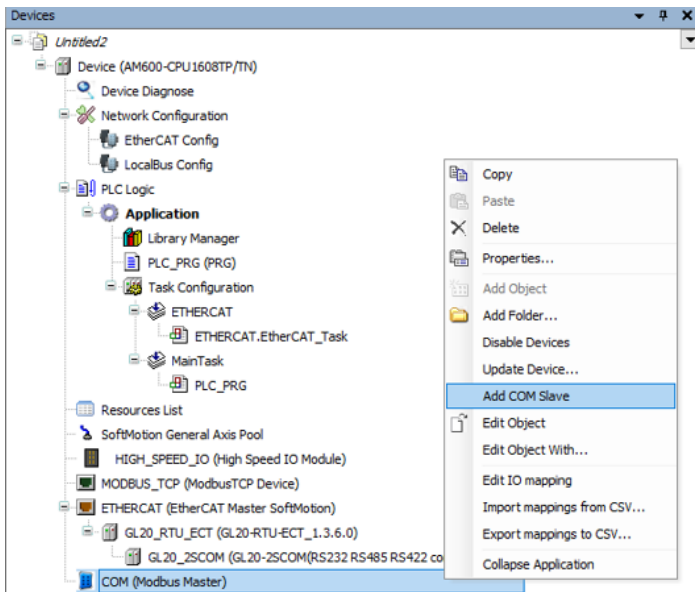
2. Configure the Modbus master.



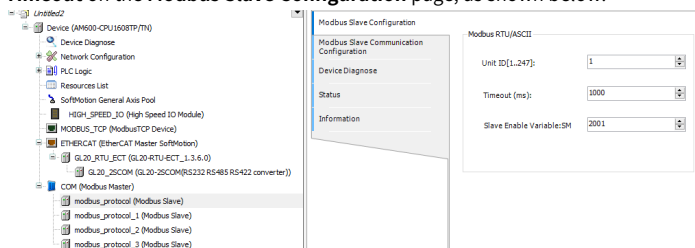
- a. Select "GL20-2SCOM" for **Device**, and "COM_0" or "COM_1" for **Port**.
- b. Select "RS232", "RS485", or "RS422" for **Protocol** of the selected port.
- c. Configure the communication parameters of the port.

3. Add Modbus slaves to the Modbus network.

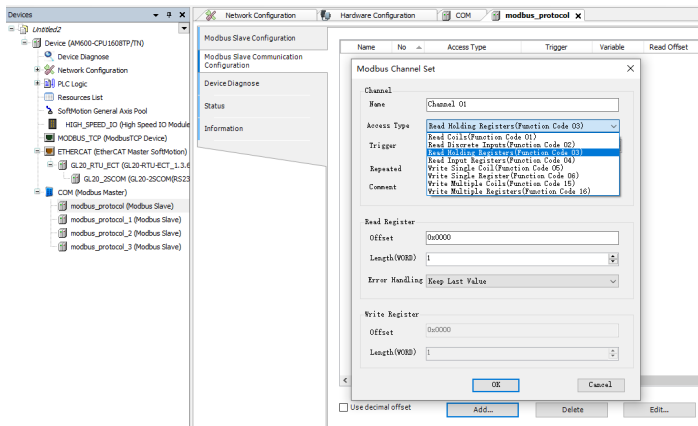
- a. Right click **COM (Virtual Modbus Master)**, select **Add COM Slave**, and add the actual slave in the Modbus network, as shown below.



- b. In the left **Devices** pane, double-click the added slave to set **Unit ID** and **Timeout** on the **Modbus Slave Configuration** page, as shown below.

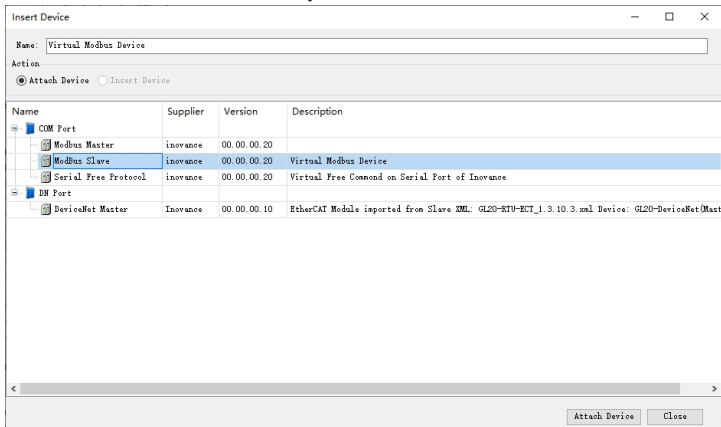


- c. On the **Modbus Slave Communication Configuration** tab, click **Add** to add Modbus commands.

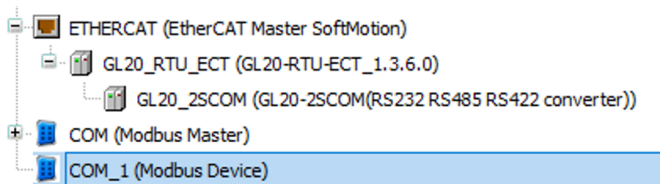


■ Configuring the Modbus slave

1. Add a ModBus slave in the same way as the ModBus master.



2. Double-click **COM (Virtual Modbus Device)** to open the **Modbus Slave Configuration** page.



3. Configure the Modbus slave, as shown below.

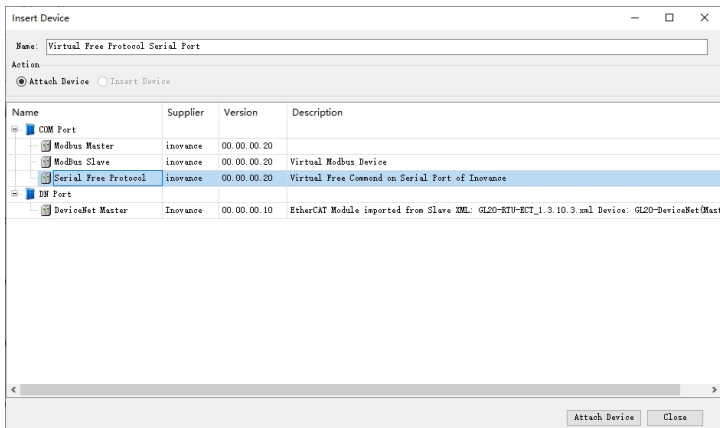
- Select "GL20-2SCOM" for **Device**, and "COM_0" or "COM_1" for **Port**.
- Select "RS232", "RS485", or "RS422" for **Protocol** of the selected port.
- Configure the communication parameters of the port.

Note

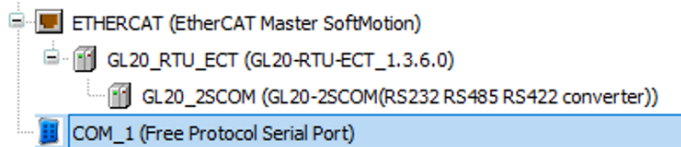
When a port of the module is configured as a Modbus slave, the external ModBus master must avoid writing to coils or registers that are already mapped to the EtherCAT network.

■ Configuring the free protocol

- Add a free protocol in the same way as the ModBus master.



2. Double-click **COM (Virtual Free Protocol Serial Port)** to open the **Free Protocol Configuration** page.



3. Configure the free protocol.

Network Configuration GL20_RTU_ECT Hardware Configuration COM_1 x

Free Protocol Configuration

Internal Parameters

Status

Information

☒ Virtual Port

Device: GL20_2SCOM Port: COM_1 Protocol: RS485

Serial Port Configuration

COM Port: 16

Baudrate: 9600

Parity: EVEN

Data Bits: 8

Stop Bits: 1

Free Protocol Configuration

Register Type: %MW

Receive Count Register: 1000

Receive Buffer Address: 1001

Max Receive Length: 256

Send Count Register: 1300

Send Buffer Address: 1301

Max Send Length: 256

Note: The unit of send/receive length is BYTE!

Note: The buffer size is supposed to be greater than send length + send length/12

- Select "GL20-2SCOM" for **Device**, and "COM_0" or "COM_1" for **Port**.
- Select "RS232", "RS485", or "RS422" for **Protocol** of the selected port.
- Configure the communication parameters of the port.

5 Troubleshooting

When the ERR indicator of the module or the ER1/ER2 serial communication indicator is ON, the module reports a fault code. The fault code can be obtained through the diagnostic data object dictionary value in the **CoE Online** interface, as shown below.

Hardware Configuration

GL20_RTU_ECT x

Network Configuration

General

Process Data(PDO Setting)

Startup parameters(SDO Setting)

Online

CoE Online

Device Diagnosis

EtherCAT I/O Mapping

EtherCAT IEC Objects

Status

Information

Read this page

Auto Update

Offline from ESI file

Online from device

Index/Subindex	Name	Flags	Type	Value
16#3011:16#00	Port 1 error counter	RO	USINT	
16#3012:16#00	ESC error counter	RO	USINT	
16#3016:16#00	Station address	RO	USINT	
16#3020:16#00	Fpga soft version	RO	UDINT	
16#3021:16#00	Module software version	RO	USINT	
16#6000:16#00	2SCOM RX_data	RO	USINT	
16#7000:16#00	2SCOM TX_data	RO	USINT	
16#8000:16#00	2SCOM setpar1	RW	USINT	
16#A000:16#00	2SCOM module Diagnosis information	RO	USINT	
:16#01	2SCOM Module Diagnosis information	RO	UINT	
:16#02	2SCOM-0 Diagnosis information	RO	UINT	
:16#03	2SCOM-1 Diagnosis information	RO	UINT	
:16#04	2SCOM-0 Miss Frame count	RO	UINT	
:16#05	2SCOM-1 Miss Frame count	RO	UINT	
:16#06	reserve Diagnosis information0	RO	UINT	
:16#07	reserve Diagnosis information1	RO	UINT	
:16#08	reserve Diagnosis information2	RO	UINT	
:16#09	reserve Diagnosis information3	RO	UINT	

Index	0xA000+0x40*n: 2SCOM Module Diagnosis Information				
Subindex	Name	Data Type	Access Mode	Mapping	Default Value
0	Subindex 000	UINT	RO	Not supported	8
1	2SCOM Module Diagnosis Information	UINT	RO	Not supported	0
2	2SCOM-0 Diagnosis Information	UINT	RO	RO	0
3	2SCOM-1 Diagnosis Information	UINT	RO	Not supported	0

Index	0xA000+0x40*n: 2SCOM Module Diagnosis Information				
Subindex	Name	Data Type	Access Mode	Mapping	Default Value
4	2SCOM-0 Miss Frame Count	UINT	RO	Not supported	0
5	2SCOM-1 Miss Frame Count	UINT	RO	Not supported	0
6	Reserve Diagnosis Information	UINT	RO	RO	0

■ Module fault code

Code	Description	Solution
0x5003	The isolated power supply of the module is faulty.	Check the isolated power supply of the module.

■ Module channel fault code

Code	Description	Solution
0x2030	The serial parameters are incorrectly configured for the channels of the module.	Check the configured parameters.
0x2031	The data packet size is incorrectly configured for the channels of the module.	
0x2032	The timeout parameter is incorrectly configured for the channels of the module.	
0x2033	The port protocol is incorrectly configured for the channels of the module.	

■ Module channel communication data diagnostic code

Code	Description	Solution
0x6040	The serial parameters are incorrectly configured for the channels of the module.	Decrease the length of data sent from the module, or increase the sending interval or baud rate.
0x6041	The data packet size is incorrectly configured for the channels of the module.	Decrease the length of data sent to the module or increase the sending interval.

Code	Description	Solution
0x6042	The timeout parameter is incorrectly configured for the channels of the module.	Check the counter value of the frames written to the module on the EtherCAT bus.
0x6043	The port protocol is incorrectly configured for the channels of the module.	Check the segnum value of the frames written to the module on the EtherCAT bus.
0x6044	Noise detected on the module channel	Check if there is noise interference on the corresponding serial port.
0x6045	Parity bit error detected on the module channel	Check if the parity bit parameters of the serial ports are configured consistently.

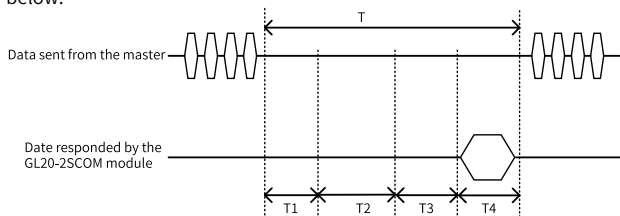
Note

1. When it is detected that the sending buffer of channel 0 of the 2SCOM module is full, the object dictionary 0xA000 subindex 2 will display 0x6040, indicating that a sending buffer full fault occurs in channel 0.
2. When it is detected that the TXPDO data frame counter of channel 0 of the 2SCOM module is discontinuous, the object dictionary 0xA000 subindex 2 will display 0x6042, indicating that a frame loss occurs in channel 0. For each missing frame, the miss frame counter value of 0xA000 subindex 4 is incremented by one. The counter resets to zero after reaching its maximum value of 65,535.

6 Appendix

6.1 Appendix 1: Response Time for GL20-2SCOM Module as a Virtual Slave

When the GL20-2SCOM module is used as a remote virtual slave through the GL20-RTU-ECT communication interface module, a specific response time (T) is required to process commands from the master. To ensure normal response, the command interval must be longer than T. The response time (T) consists of T1, T2, T3, and T4, as shown below.



- T1: The time for the module to transmit the data received by the serial port to the PLC
- T2: The time for the PLC to process the received data and send a response frame
- T3: The time for the response frame to be transmitted to the module
- T4: The time for the module to send the received response frame through the serial port

Recommended command interval

When the GL20-2SCOM module is used as a virtual slave and the interval for Modbus response frames (hereinafter referred to as frame interval) is 1 ms, the interval for commands sent by the master must exceed the following values in different EtherCAT cycles (hereinafter referred to as ECT cycle).

- When the length of data sent by the module through the serial port is 255:

ECT Cycle \ Baud Rate	115200	57600	38400	19200	9600
1 ms	50 ms	70 ms	100 ms	160 ms	300 ms
2 ms	75 ms	95 ms	125 ms	185 ms	325 ms
4 ms	115 ms	135 ms	165 ms	225 ms	365 ms

6 ms	160 ms	180 ms	210 ms	270 ms	410 ms
8 ms	205 ms	225 ms	255 ms	315 ms	455 ms
10 ms	245 ms	265 ms	295 ms	355 ms	495 ms

- When the length of data sent by the module through the serial port is 125:

ECT Cycle \Baud Rate	115200	57600	38400	19200	9600
1 ms	35 ms	50 ms	60 ms	90 ms	165 ms
2 ms	60 ms	75 ms	85 ms	115 ms	190 ms
4 ms	100 ms	115 ms	125 ms	145 ms	230 ms
6 ms	145 ms	160 ms	170 ms	200 ms	285 ms
8 ms	190 ms	205 ms	215 ms	245 ms	330 ms
10 ms	230 ms	245 ms	255 ms	285 ms	370 ms

- When the length of data sent by the module through the serial port is 65:

ECT Cycle \Baud Rate	115200	57600	38400	19200	9600
1 ms	30 ms	40 ms	45 ms	60 ms	100 ms
2 ms	55 ms	65 ms	70 ms	85 ms	130 ms
4 ms	95 ms	105 ms	120 ms	115 ms	170 ms
6 ms	140 ms	150 ms	155 ms	170 ms	225 ms
8 ms	185 ms	195 ms	200 ms	215 ms	270 ms
10 ms	225 ms	235 ms	240 ms	255 ms	310 ms

- When the length of data sent by the module through the serial port is 8:

ECT Cycle \Baud Rate	115200	57600	38400	19200	9600
1 ms	25 ms	30 ms	30 ms	30 ms	35 ms
2 ms	50 ms	55 ms	55 ms	55 ms	60 ms
4 ms	90 ms	95 ms	95 ms	95 ms	100 ms
6 ms	135 ms	140 ms	140 ms	140 ms	145 ms
8 ms	180 ms	185 ms	185 ms	185 ms	190 ms
10 ms	220 ms	225 ms	225 ms	225 ms	230 ms

Note

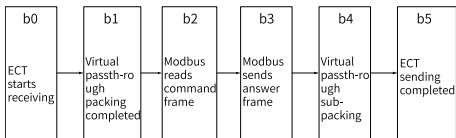
- The above table shows the response time when the baud rate is between 9600 and 115200 and the time consumed for frame splitting and frame combining is the maximum. If there are strict and precise requirements for response time, it should be calculated according to data length, times of frame splitting and actual baud rate according to the following calculation formula.
- When the ECT period is between two adjacent values, look up the table according to the larger one. For example, if the ECT period is 5 ms, look up the table according to 6 ms.
- For frame interval of a different value, add the difference between the current value and the different value to the current lookup result. For example, if the frame interval is 5 ms, the baud rate is 115200, the ECT period is 1 ms and the response data length is 255, the response time should be at least $(50 \text{ ms} + 4 \text{ ms}) = 54 \text{ ms}$.
- When ECT period is more than 10 ms, please calculate the response time according to the following calculation formula.

Response time calculation formula

Response time (T) = $12 \times \text{ECT cycle} + \text{Frame interval} + \text{Frame segmentation and reassembly time} + \text{Serial port transmission time}$

Time calculation for each stage

- T1 is determined by the ECT cycle. Data from the GL20-2SCOM module is first transmitted via the local bus to the GL20-RTU-ECT module, which then transmits the data to the PLC over EtherCAT. Max. $T1 = 5 \times \text{ECT cycle}$.
- T2 is determined by the ECT cycle and the frame interval. The process is shown below.



Frame interval: b2 to b3

Max. T2 = 5 × ECT cycle + frame interval.

- T3 is determined by the ECT cycle. Max. T3 = 2 × ECT cycle.
- T4 is the time (in ms) for the module to send the received response frame through the serial port. The calculation formula is as follows:

$$T4 = \left(\left(\frac{\text{Number of bits in 1 byte}}{\text{x number of bytes}} \right) \times 1000 \right) \div \text{Baud rate}$$

Assuming 8 bytes of data is transmitted at a baud rate of 115200 with 1 start bit, 1 stop bit, 8 data bits, and even parity, the value of T4 is:

$$T4 = ((11 \times 8) \times 1000) \div 115200 = 0.7639 \text{ ms}$$

- Frame segmentation and reassembly time

Each ECT cycle allows only 24 bytes of data exchange between a port of the module and the PLC master. If a frame contains over 24 bytes of data, it needs to be segmented or reassembled for transmission.

■ Frame segmentation time calculation

If a command frame contains over 24 bytes of data, the module needs to segment the frame for transmission to the PLC master. This leads to an additional fragmentation time to T1: for X bytes of data, the frame fragmentation time is the smallest integer greater than X/24 times the ECT cycle. For example, a frame containing 255 bytes of data needs to be segmented into 11 frames ($255/24 = 10.625$), which takes a fragmentation time of 11 ECT cycles.

■ Frame reassembly time calculation

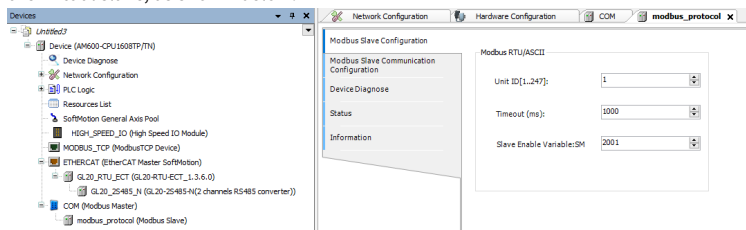
If a response frame contains over 24 bytes of data, the PLC master needs to segment the frame for transmission to the module. Then, the module needs to reassemble all segments before sending them to the serial port. This leads to an additional reassembly time to T3: for Y bytes of data, the frame reassembly time is smallest integer greater than Y/24 times the ECT cycle. For example, a frame containing 255 bytes of data needs to be segmented into 11 frames ($255/24 = 10.625$) and then reassembled, which takes a reassembly time of 11 ECT cycles.

The calculation of the response time (T) involves either frame segmentation or reassembly time. For example, when reading from multiple registers, the time

for reassembling the response frame is included. When writing to multiple registers, the time for segmenting the command frame is included.

Timeout configuration for the Modbus master

When an Inovance medium-sized PLC is used as the master, the **Timeout** parameter (that is, the interval of frames sent by the Modbus master) on the **Modbus Slave Configuration** interface should be set larger than the response time of the module as the virtual slave, as shown below.



6.2 Appendix 2: Version Matching Information

Contact Inovance technical support to obtain the firmware of GL20-2SCOM module and the firmware of communication interface module. XML files and the AutoShop/InoProShop software can be downloaded from the software and debugging tools tab on the GL20 series product page at <https://www.inovance.com>. The following table describes the version matching information.

Name	Firmware Version	XML/GSD File Version	AutoShop/ InoProShop Version
GL20-2SCOM module (this module)	Board software: 1.0.0.9 and later	-	-
Communication interface module	- GL20-RTU-ECT: Board software 2.4.18.0 and later - GL20-RTU-ECT32: Board software 2.5.9.0 and later	- GL20-RTU-ECT: 1.3.20.0 and later - GL20-RTU-ECT32: 3.0.2.0 and later	- AutoShop: V4.10.1.0 and later - InoProShop: V1.7.3 SP6 and later
Easy series PLC	V6.1.0.0 and later	-	AutoShop: V4.10.1.0 and later

Name	Firmware Version	XML/GSD File Version	AutoShop/ InoProShop Version
AM300/AM500 PLC	V1.2.0.0 and later	-	InoProShop: V1.7.3 SP6 and later
AM400/AM600 PLC	V1.40.2.0 and later	-	InoProShop: V1.7.3 SP6 and later
AC series programmable controller	V1.26.3.0 and later	-	InoProShop: V1.7.3 SP6 and later