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PS00007575A05

GL20-4TC Series

Temperature Detection Module

User Guide

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Preface

■ Introduction

The GL20-4TC series 4-channel thermocouple temperature detection module can be used with Easy series products and GL20 series communication interface modules such as GL20-RTU-ECT.

This guide describes the mechanical installation, electrical installation, program commissioning, troubleshooting, and version matching information 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	Electromagnectic 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-PN Communication Interface Module User Guide	PS00007594	Introduces the installation, wiring, and other information of the product.
GL20-RTU-ECT32 Series Communication Interface Module User Guide	PS00013434	Introduces the product information, mechanical installation, electrical installation, program commissioning, and troubleshooting of the product.
GL20-4TC Temperature Detection Module User Guide (This guide)	PS00007575	Introduces the mechanical installation, electrical installation, program commissioning, troubleshooting, and version matching information of the product.

■ Revision History

Date	Version	Revision
June 2025	A05	• Updated *"1.4 Environmental Specifications" on page 17*. • Updated *"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 *"1.4 Environmental Specifications" on page 17*.
January 2024	A02	• Modified *"3.3 Terminal Wiring" on page 26*. • Modified the operation steps in *" Program Commissioning" on page 28*. • Modified the matching version in *" Appendix: Version Matching Information" on page 39*.
November 2023	A01	**Added:** • Added *" Troubleshooting" on page 36*. • Added *" Appendix: Version Matching Information" on page 39*. **Modified:** • Modified the parameters in *"1.3 Technical Specifications" on page 13*. • Modified *"2.1 Installation Precautions" on page 19*.
February 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 Disclamer

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. Maintenance will be charged 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

DANGER

- 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 circuit 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.
- Ensure natural ventilation for the equipment.

Wiring

DANGER

- 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.
- Install the terminal cover attached to the product before power-on or operation after wiring is done. Failure to comply may result in electric shock.
- 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.

Wiring

- To avoid electric shock, cut off the power supply before connecting the equipment to the power supply.
- The input power supply of this product must be 24 VDC. Power supplies outside ±20% of 24 VDC can cause severe damage to the product. Therefore, check whether the DC power supply provided by the switching-mode power supply is stable at a regular interval.

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 or re-tightening screws on the terminal block or screws of the connector. 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

- 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.

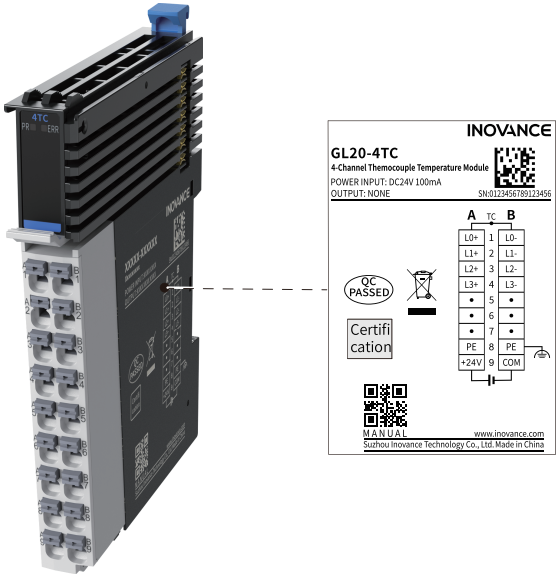
1 Product Information

1.1 Naming Rules and Nameplate

GL 20 -4 TC

① ② ③ ④

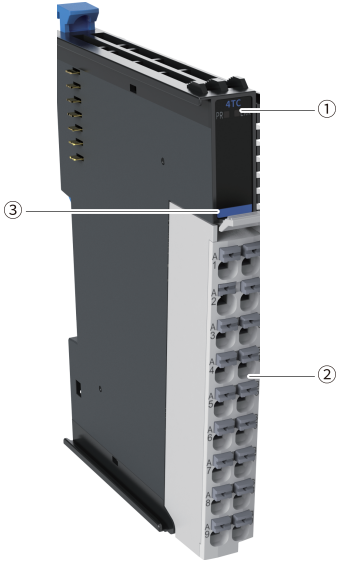
① **Product Information** GL: Inovance general local module	③ **Number of I/O Channels** 4: 4-channel input
② **Series Number** 20: 20 series module	④ **Module Type** TC: Thermocouple temperature detection



The data for ordering the product is shown in the following table.

Model	Description	Material Code	Applicable Model
GL20-4TC	GL20 series 4-channel thermocouple temperature detection module	01440338	It is applicable to Easy series products and GL20 series communication interface modules, such as GL20-RTU-ECT.

1.2 Components



No.	Component	Description			
①	Signal indicators	PR (POWER +RUN)	Power/Run indicator	Yellow-green	• Steady ON: The module is operating normally. • 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 when the module is faulty. For details, see "Troubleshooting" on page 36
②	I/O terminals	4 thermocouple inputs, as defined in "3.2 Terminal Definition" on page 25			
③	Color identification	Red: Digital output		Orange: Analog output	
		Gray: Digital input		Green: Analog input	
		White: Communication		Blue: Other modules	

Note

- Flashing quickly: The indicator is on for 200 ms and off for 200 ms.
- Flashing slowly: The indicator is on for 200 ms and off for 1 s.

1.3 Technical Specifications

■ Basic specifications

Item	Specification
IP rating	IP20
Dimensions (W x H x D)	12 mm x 100 mm x 75 mm
Weight	About 60 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	95 mA (typical value @5 V)
Rated voltage of terminal input power supply	24 VDC (20.4 VDC to 28.8 VDC)
Rated current of terminal input power supply	100 mA (typical@24 V)
Rated voltage of terminal output power supply	/
Rated current of terminal output power supply	/
Hot swap	Not supported
Anti-reverse connection 24 V	Supported

■ Input specifications

Item	Specification
Input channel	4 channels
Digital resolution	24 bit
Display sensitivity	0.1°C, 0.1°F
Input terminal	Thermocouple input (types: B, E, N, J, K, R, S, T)

Item	Specification
Compensation method	Internal cold junction compensation
Accuracy (at normal temperature: 25°C)	(±0.1%)[1](±100mV full scale) + cold junction compensation error[2]
Accuracy (at operating temperature: -20°C to 55°C)	(±0.3%)[1](±100mV full scale) + cold junction compensation error[2]
Isolation	Isolated between I/O terminals and power supply, not isolated between channels
Input indicator	/
Input derating	/
Overflow and open circuit detection	Supported
Power consumption	< 0.9 W

Note

- [1]: Indicates ADC sampling accuracy, which is determined based on sensor type and thermocouple detection temperature range. For details, see "Accuracy calculation".
- [2]: The cold junction compensation error is determined based on the mounting direction, adjacent module type, and operating temperature range. For details, see "Accuracy calculation".

■ Software specifications

Item	Specification
Input PDO data volume	Max. 16 bytes
Diagnostic report function configuration	Supported
Diagnostic detection configuration	Overflow and open circuit detection supported
Sensor type configuration	Supported thermocouple types: B, E, N, J, K (default), R, S, T
Filter time	0 s to 100 s (configurable through software, default is 5 s)

Item	Specification
Overflow and underflow detection	Overflow and underflow faults are reported only when the overflow detection function is enabled.
Overflow detection configuration	Supported
Independent channel configuration	Supported
Temperature offset configuration	Supported
Temperature configuration range	-204.8 to +204.7 (temperature unit)
Sampling cycle	250 ms, 500 ms, 1000 ms/4 channels
Display mode	Centigrade degree (°C), Fahrenheit degree (°F)
Sensitivity accuracy	0.1°C, 0.1°F
Sampling refresh	Refresh asynchronously according to the sampling cycle, no need to refresh synchronously according to the bus cycle
Stop mode	Output based on the maximum value with no further refresh
Open circuit or overflow detection	Output based on the maximum value with no further refresh
System diagnosis	System power supply fault
Channel diagnosis	Beyond upper limit alarm, beyond lower limit alarm, open circuit alarm, overflow error
Software diagnosis	Not supported
Configuration diagnosis	Configuration fault identification, channel parameter configuration fault

■ Accuracy calculation

Within the operating temperature range, when the temperature change rate is less than 0.3°C/min, the accuracy of the product = ADC sampling accuracy + cold junction compensation error. According to the measurement principle, the module should be powered on for 45 minutes before temperature measurement.

- It is recommended to install the module horizontally in upright position (refer to *"Figure 2–1 " on page 23*) and use it adjacent to temperature modules within the operating temperature range. In this case, the cold junction compensation error is within ±3°C.

- It is not recommended to use the module adjacent to modules that consume more than 3.5W power, such as GL20-3232ETN module.

The following table shows the thermocouple detection range and ADC sampling accuracy.

Sensor Type	Detection Range	ADC Sampling Accuracy
B	200.0°C to 1800.0°C, 392.0°F to 3272.0°F	⩾ ±5°C @200°C ⩽ T ⩽ 400°C < ±5°C @400°C ⩽ T ⩽ 750°C < ±3°C @750°C ⩽ T ⩽ 1200°C < ±3.5°C @1200°C ⩽ T ⩽ 1800°C
E	-270.0°C to +1000.0°C, -454.0°F to +1832.0°F	⩾ ±1°C @–270 ⩽ T ⩽ –200 < ±1°C @–200 ⩽ T ⩽ 400 < ±1.5°C @400°C ⩽ T ⩽ 1000°C
N	-200.0°C to +1300.0°C, -328.0°F to +2372.0°F	< ±2°C @-200°C ⩽ T ⩽ -150°C < ±1.5°C @-150°C ⩽ T ⩽ 750°C < ±0.2% of displayed value @750°C ⩽ T ⩽ 1300°C
J	-210.0°C to +1200.0°C, -346.0°F to +2192.0°F	⩾ ±1°C @-210°C ⩽ T ⩽ -100°C < ±1°C @-100°C ⩽ T ⩽ 500°C < ±0.2% of displayed value @500°C ⩽ T ⩽ 1200°C
K	-270.0°C to +1370.0°C, -454.0°F to +2498.0°F	⩾ ±1.5°C @-270°C ⩽ T ⩽ -200°C < ±1.5°C @-200°C ⩽ T ⩽ -100°C < ±1°C @-100°C ⩽ T ⩽ 500°C < ±0.2% of displayed value @500°C ⩽ T ⩽ 1300°C ⩾ ±2.6°C @1300°C ⩽ T ⩽ 1370°C
R	-50.0°C to +1765.0°C, -58.0°F to +3209.0°F	⩾ ±4°C @-50°C ⩽ T ⩽ 0°C < ±4°C @0°C ⩽ T ⩽ 250°C < ±2°C @250°C ⩽ T ⩽ 500°C < ±3.5°C @500°C ⩽ T ⩽ 1700°C ⩾ ±3.5°C @1700°C ⩽ T ⩽ 1765°C

Sensor Type	Detection Range	ADC Sampling Accuracy
S	-50.0°C to +1765.0°C, -58.0°F to +3209.0°F	⩾ ±4°C @-50°C ⩽ T ⩽ 0°C < ±4°C @0°C ⩽ T ⩽ 250°C < ±2°C @250°C ⩽ T ⩽ 500°C < ±3.5°C @500°C ⩽ T ⩽ 1700°C ⩾ ±3.5°C @1700°C ⩽ T ⩽ 1768°C
T	-270.0°C to +400.0°C, -454.0°F to +752.0°F	⩾ ±1°C @-270°C ⩽ T ⩽ -200°C < ±1°C @-200°C ⩽ T ⩽ 400°C

The following table shows the cold junction compensation error.

Installation Direction	Adjacent Module Type	Cold Junction Compensation Error (-20°C to 0°C)	Cold Junction Compensation Error (0°C to 55°C)
Horizontal, upright	Temperature module	±3°C	±1.75°C
	Non-temperature module	±6.5°C	±4.5°C
Non-horizontal, upright	Temperature module	±5.5°C	±4°C
	Non-temperature module	±5.5°C	±4.5°C

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

Item	Specification
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 g^2/Hz power spectral density from 5 Hz to 100 Hz; 0.001 g^2/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
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

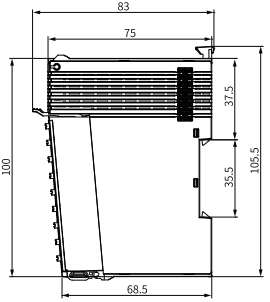
2.1 Installation Precautions

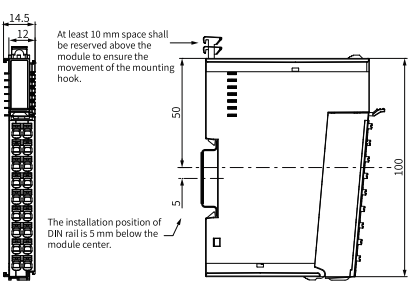
- Make sure the module is powered off before installing or removing.
- Do not hot swap the modules. Otherwise, the modules may be damaged by overcurrent or overvoltage, and the communication interface module or PLC may be subject to restart, user data loss or corruption.
- Do not drop or shock the housing or terminals of the module to avoid damage.

2.2 Installation Dimensions

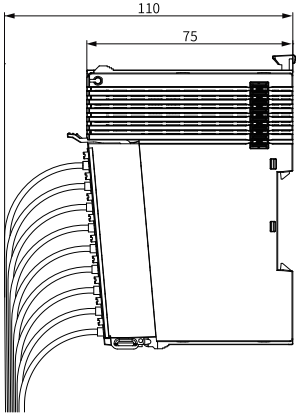
■ Module

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



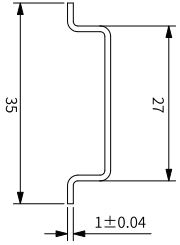


■ **Cable connection**



2.3 Installation Method

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

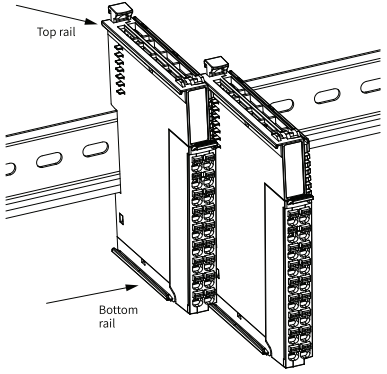


Caution

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

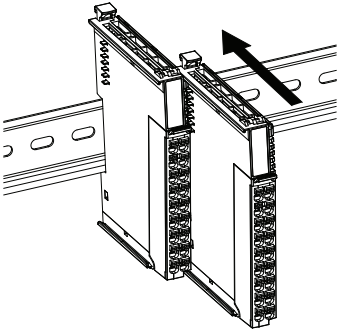
■ Installing modules side by side

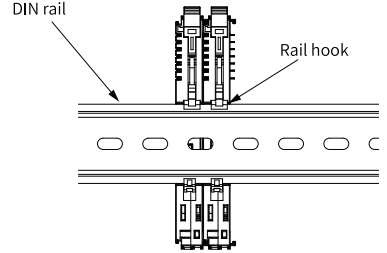
Install modules side by side by sliding them along the top and bottom guide rails of adjacent modules.



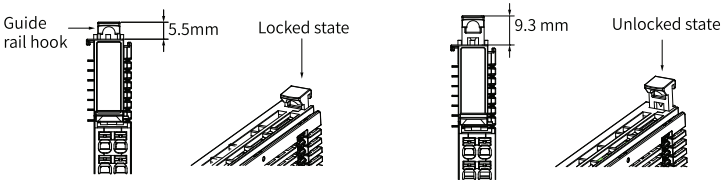
■ Installing modules onto DIN Rail

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.



- 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 DIN rail, keep the rail hook in locked state. A hook that kept in unlocked state for a long period of time may fail to function properly.

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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,

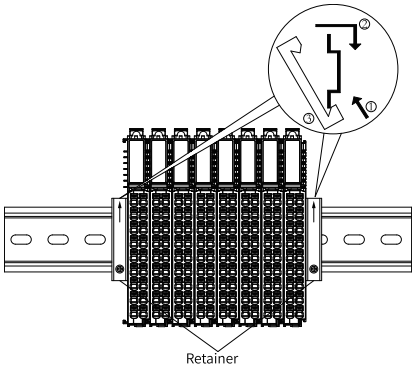
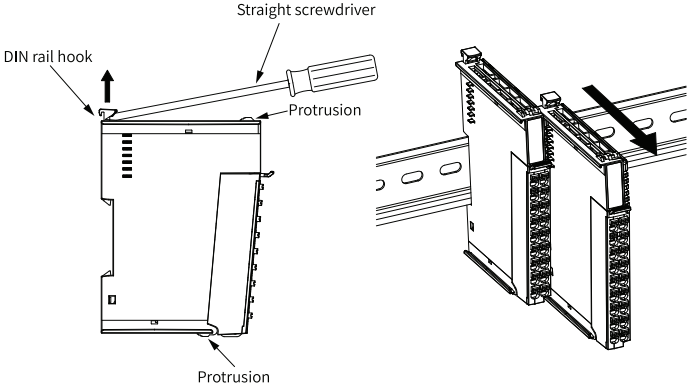


Figure 2-1 Installing end plate

■ Removing modules

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



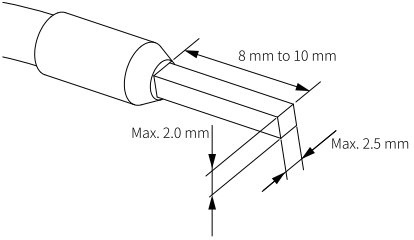
3 Electrical Installation

3.1 Cable Selection

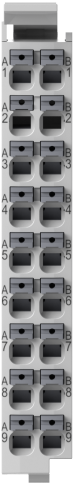
The cable lug and cable diameter included in the following table are only for reference.

Material Name	Applicable 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



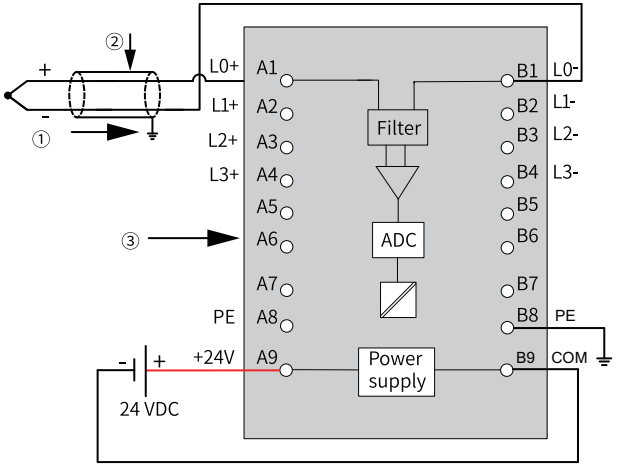
Left Signal	Left Terminal	Right Terminal	Right Signal
L0+	A1	B1	L0-
L1+	A2	B2	L1-
L2+	A3	B3	L2-
L3+	A4	B4	L3-
•	A5	B5	•
•	A6	B6	•
•	A7	B7	•
PE	A8	B8	PE
+24V	A9	B9	COM

3.3 Terminal Wiring

■ Wiring precautions

- Do not bundle the expansion cable together with power cables (with high voltage, large current) that produce strong interference signals; otherwise, the expansion cable may be influenced by noise, surge, and induction. Separate it from other cables and avoid cabling in parallel.
- Use recommended cables and adapter boards for connection. It is recommended that shielded cables be used as expansion cables to enhance anti-interference capacity.
- Apply single-point grounding for the shielding of shielded cable and solder sealed cable.

■ Circuit block diagram and wiring diagram



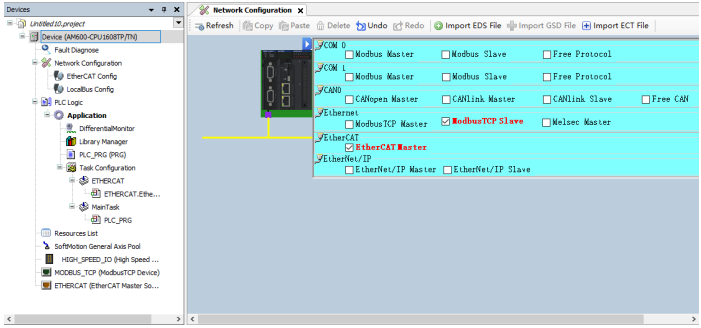
Name	Description
①	Use shielded compensating cables and connect the shield to PE. It is recommended to connect the PE terminal of the module to the external PE.
②	Compensating cables are required to extend thermocouples; otherwise, temperature measurements may be abnormal.
③	A5 to A7 and B5 to B7 are empty terminals with no electrical connections.

4 Program Commissioning

The following is an example where AM600 is used as the master control module along with the GL20-4TC module in InoProShop.

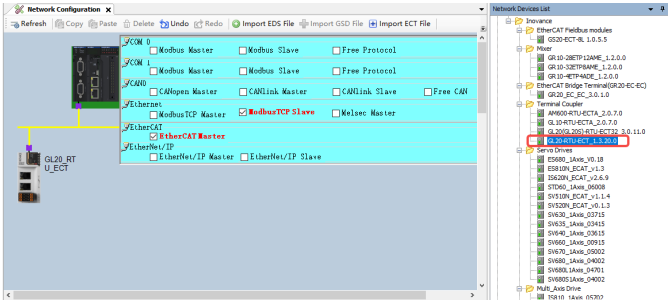
1. Enable the AM600 PLC as the EtherCAT master and add the GL20-RTU-ECT communication interface module.

   a. In the left **Devices** pane, double-click **Network Configuration** and click the AM600 PLC figure in the upper left corner of the interface. Check the "EtherCAT Master" to enable the PLC as an EtherCAT master.

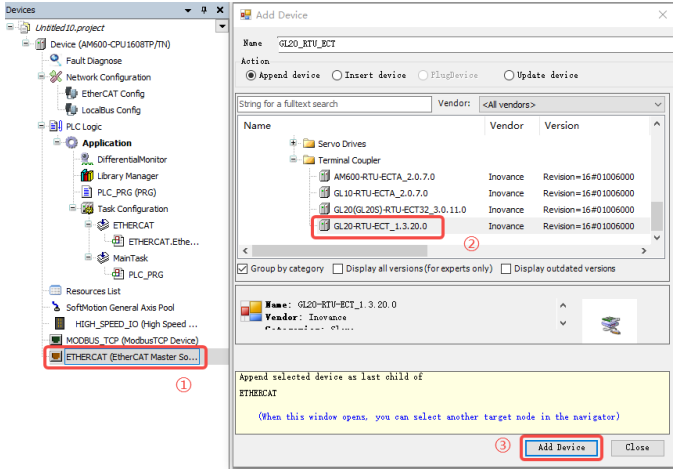


   b. Add the GL20-RTU-ECT communication interface module.

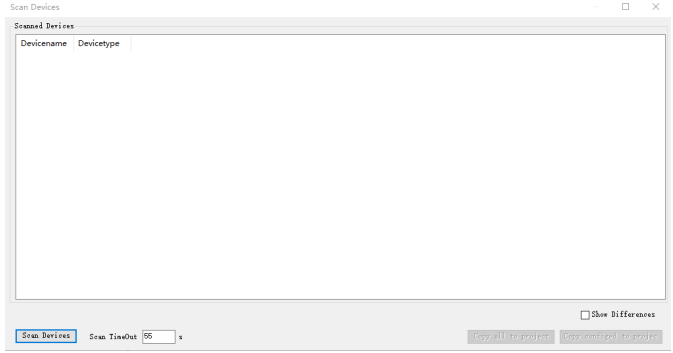
   - Method 1: In the right **Network Devices List**, double-click "GL20-RTU-ECT" to add the module.



- Method 2: In the left **Devices** pane, right-click **ETHERCAT(EtherCAT Master SoftMotion)** ① and select **Add Device**. Select "GL20_RTU_ECT _*x.x.x.x* " ② in the pop-up dialog box and click **Add Device** ③.

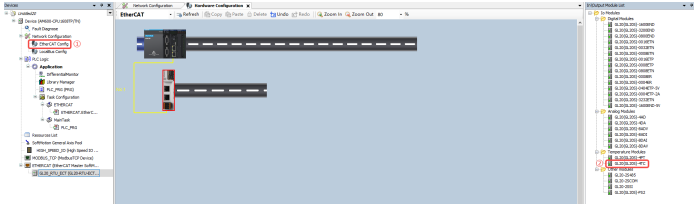


- Method 3: In the left **Devices** pane, right-click **ETHERCAT(EtherCAT Master SoftMotion)** and select **Scan For Devices**. Click **Scan Devices**, select the GL20-RTU-ECT module, and click **Copy Scan Device**.

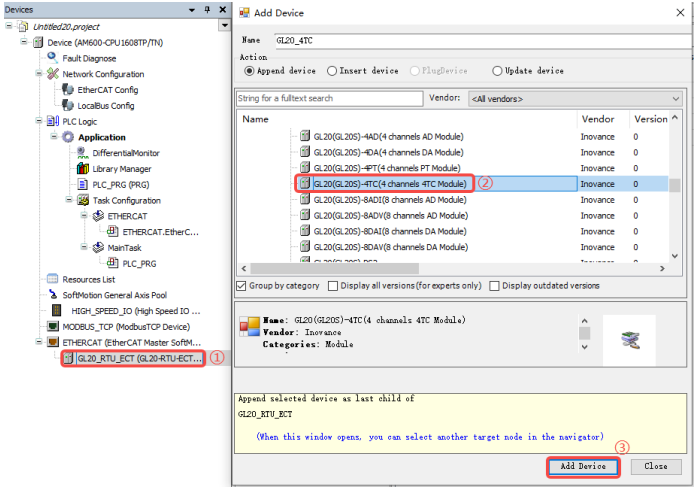


2. Add the GL20-4TC module.

- Method 1: Open the **Hardware Configuration** pane by double-clicking **EtherCAT Config** ① in the left **Devices** pane, or double-clicking the GL20-RTU-ECT figure in the **Network Configuration** pane. In the right **In\Output Module List**, double-click "GL20-4TC" ② or drag and place it after the GL20-RTU-ECT module.

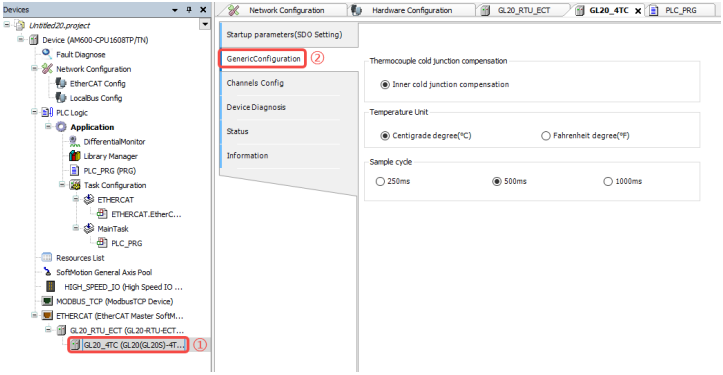


- Method 2: In the left **Devices** pane, right-click "GL20_RTU_ECT" ① and select **Add Device**. Select "GL20-4TC" ② in the pop-up dialog box and click **Add Device**.



- Method 3: In the left **Devices** pane, right-click **ETHERCAT(EtherCAT Master SoftMotion)** and select **Scan For Devices**. Click **Scan Devices**, select the GL20-4TC module, and click **Copy Scan Device**.

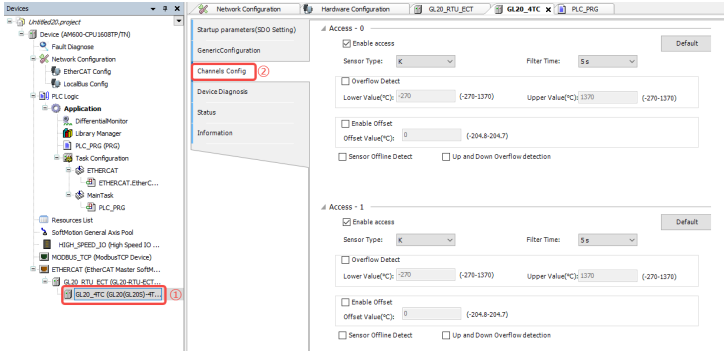
3. Double-click the GL20-4TC module ① in the left **Devices** pane to set **GenericConfiguration** ②.



The parameters for channel configuration are shown in the following table.

Name	Description	Configuration
Cold junction compensation of thermocouple	Cold junction compensation method of thermocouple sensor	Currently, only internal cold junction compensation is supported. External compensation is not supported.
Temperature Unit	The unit of temperature data collected by the module	Supported temperature units: • Centigrade degree (°C) • Fahrenheit degree (°F)
Sampling cycle	Sampling and polling time of temperature data for the 4-channel module	Supported sampling cycles: • 250 ms • 500 ms • 1000 ms

4. Double-click the GL20-4TC module ① in the left **Devices** pane to set **Channels Config** ②.



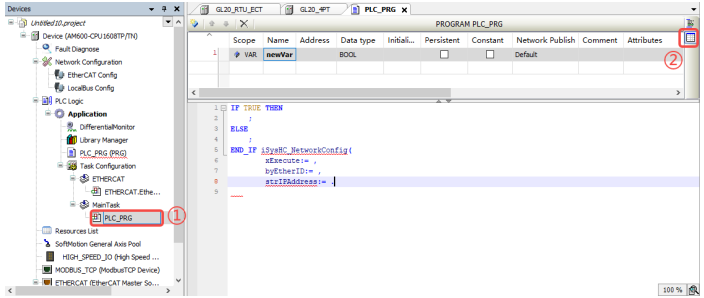
The parameters for channel configuration are shown in the following table.

Name	Description	Configuration
Enable Access	Whether to enable the channel	• Check to enable the channel • Uncheck to disable the channel
Sensor Type	Type of sensor connected to the module channel	Supported types: K, J, E, B, N, S, and T.
Filter Time	Sampling filter time for module analog channel	Unit: s; Range: 0 s to 100 s
Overflow Detect	Whether to detect the channel data overflow	• Check to enable overflow detection • Uncheck to disable overflow detection
Lower Value (°C)	Lower limit of channel data	Range: -270°C to +1370°C
Upper Value (°C)	Upper limit of channel data	Range: -270°C to +1370°C
Enable Offset	Whether to enable the channel data offset	• Check to enable temperature offset • Uncheck to disable temperature offset
Offset Value (°C)	Offset of channel data	Range: -204.8°C to +204.7°C

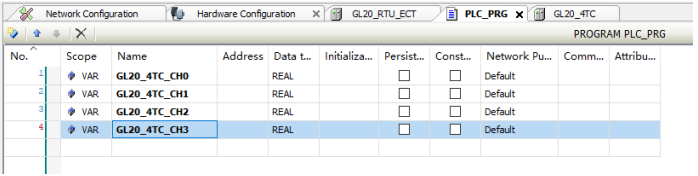
Name	Description	Configuration
Sensor Offline Detect	Whether to enable the open circuit detection of the channel	• Check to enable sensor open circuit detection • Uncheck to disable sensor open circuit detection
Up and Down Overflow detection	Whether to detect overflow and underflow of the channel data	• Check to enable overflow detection • Uncheck to disable overflow detection

5. Create new variables.

a. In the left **Devices** pane, double-click **PLC_PRG** ① and click  ② in the upper right corner to switch to table mode.

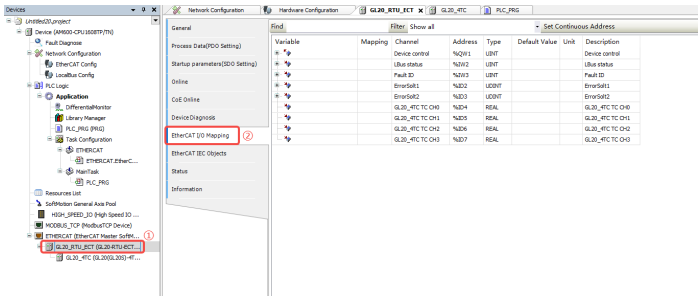


b. Add custom input variables **GL20_4TC_CH0, GL20_4TC_CH1**, **GL20_4TC_CH2**, and **GL20_4TC_CH3**. Set the scope to **VAR** and data type to **REAL**, as shown below.

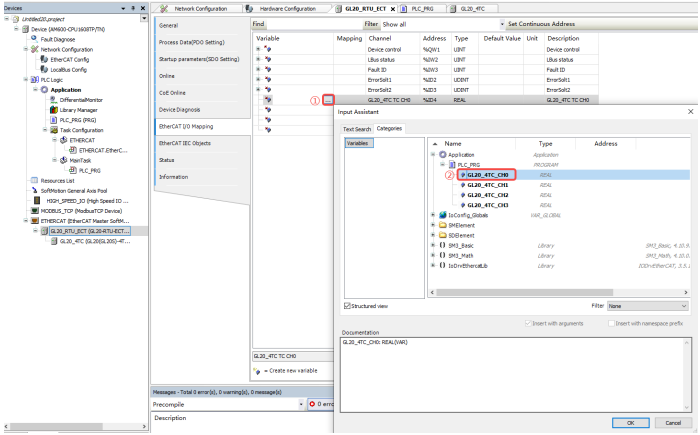


6. Map variables to the corresponding input channels.

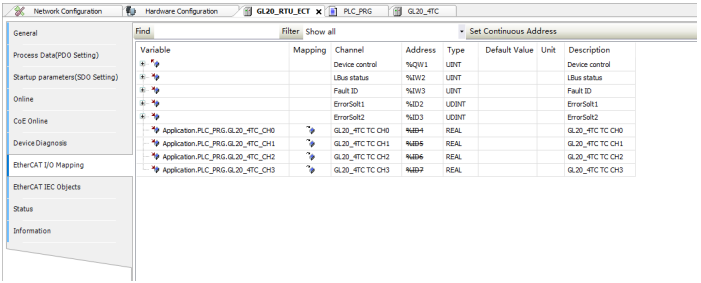
a. In the left **Devices** pane, double-click **GL20_RTU_ECT** ① and click the **EtherCAT I/O Mapping** tab ②.



b. On the **EtherCAT I/O Mapping** tab, double-click a variable entry and click ... ① to open the **Input Assistant** dialog box. Choose **Application** > **PLC_PRG** > specific variables ② and click **OK** ③.



In the **EtherCAT I/O Mapping** tab, map the input variables **GL20_4TC_CH0**, **GL20_4TC_CH1**, **GL20_4TC_CH2** and **GL20_4TC_CH3** to the input channels of the configured module, as shown in the figure below.



7. Double-click **PLC_PRG** in the left **Devices** pane and complete the programming on the **PLC_PRG** page.
8. Check, compile, log in, download, and run the program.

   a. Click  on the toolbar at the top of the interface to check whether the program is correct.

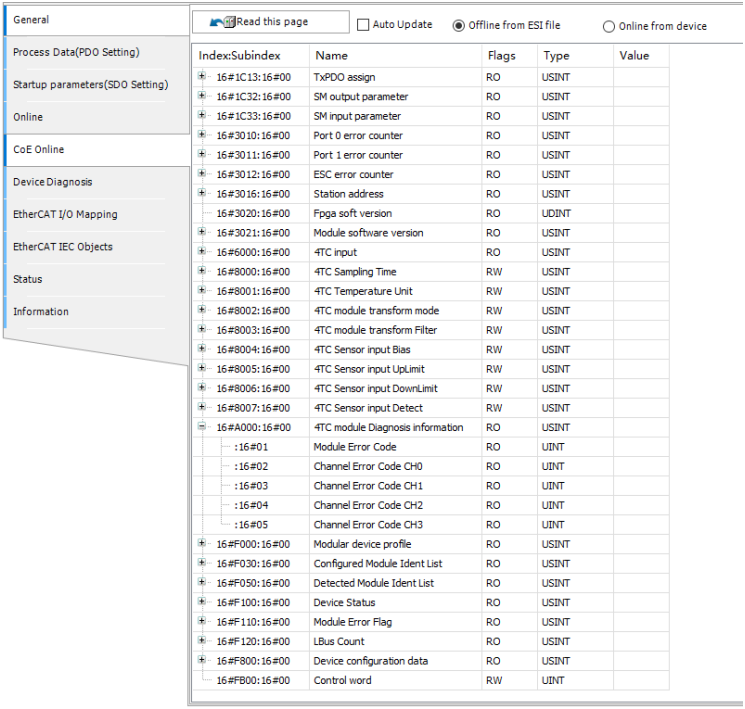
   b. Click  on the toolbar to compile all the code into PLC executable code.

   c. Click  on the toolbar, and follow the interface prompts to log in to the PLC and download the program.

   d. Click  on the toolbar to execute the program.

5 Troubleshooting

When the ERR indicator is ON, the module is faulty. The module reports a fault code. You can get the fault code through the diagnostic data object dictionary value displayed on the **CoE Online** interface, as shown below. For the module installed in slot n (n = 0 to 31), the object dictionary definition for index 0xA000+0x40*n is shown in the table below.



Index:Subindex	Name	Flags	Type	Value
16#1C13:16#00	TxPDO assign	RO	USINT	
16#1C32:16#00	SM output parameter	RO	USINT	
16#1C33:16#00	SM input parameter	RO	USINT	
16#3010:16#00	Port 0 error counter	RO	USINT	
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	4TC input	RO	USINT	
16#8000:16#00	4TC Sampling Time	RW	USINT	
16#8001:16#00	4TC Temperature Unit	RW	USINT	
16#8002:16#00	4TC module transform mode	RW	USINT	
16#8003:16#00	4TC module transform Filter	RW	USINT	
16#8004:16#00	4TC Sensor input Bias	RW	USINT	
16#8005:16#00	4TC Sensor input UpLimit	RW	USINT	
16#8006:16#00	4TC Sensor input DownLimit	RW	USINT	
16#8007:16#00	4TC Sensor input Detect	RW	USINT	
16#A000:16#00	4TC module Diagnosis information	RO	USINT	
:16#01	Module Error Code	RO	UINT	
:16#02	Channel Error Code CH0	RO	UINT	
:16#03	Channel Error Code CH1	RO	UINT	
:16#04	Channel Error Code CH2	RO	UINT	
:16#05	Channel Error Code CH3	RO	UINT	
16#F000:16#00	Modular device profile	RO	USINT	
16#F030:16#00	Configured Module Ident List	RO	USINT	
16#F050:16#00	Detected Module Ident List	RO	USINT	
16#F100:16#00	Device Status	RO	USINT	
16#F110:16#00	Module Error Flag	RO	USINT	
16#F120:16#00	LBus Count	RO	USINT	
16#F800:16#00	Device configuration data	RO	USINT	
16#FB00:16#00	Control word	RW	UINT	

For the module in slot n (n = 0 to 31), the object dictionary definition for index 0xA000 +0x40*n is shown in the table below.

Index	0xA000+0x40*n: 4TC Diag data				
Subindex	Name	Data Type	Access Mode	Mapping	Default Value
0	Subindex 000	USINT	RO	NO	5
1	Module Error Code	UINT	RO	NO	0x0000
2	Channel Error Code CH0	UINT	RO	NO	0x0000
3	Channel Error Code CH1	UINT	RO	NO	0x0000
4	Channel Error Code CH2	UINT	RO	NO	0x0000
5	Channel Error Code CH3	UINT	RO	NO	0x0000

Note

The TC thermocouple input supports module fault detection and channel fault detection.

The module exception diagnostic code is defined as follows:

Diagnostic Code	Fault Description	Solution
0x5003	Module 24 V power supply failure	Check the external power supply wiring and the power supply voltage.

The channel exception diagnostic codes are defined as follows:

Diagnostic Code	Fault Description	Solution
0x6001	Channel open-circuited	Check the signal wiring and ensure the sensor type is correct.
0x6002	Channel short-circuited	This fault is not applicable to the GL20-4TC module.
0x6003	Channel data exceeds upper limit	Check the sensor, wiring, or reconfigure the upper limit.

Diagnostic Code	Fault Description	Solution
0x6004	Channel data exceeds lower limit	Check the sensor, wiring, or reconfigure the lower limit.
0X6005	Overflow	Check whether the selected sensor range is exceeded.
0X6006	Underflow	Check whether the selected sensor range is undershot.

6 Appendix: Version Matching Information

Contact Inovance technical support to obtain the firmware of GL20-4TC 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.

■ Locally adapted versions

Product Name	Board Software Version	Logic Software/ Programming Software Version	XML/GSD File Version
Local module	-	0.1.2.0 and later	-
Easy series PLC	V6.1.0.1 and later	AutoShop: V4.8.2.3 and later	-
AM300/AM500 series PLC	V1.2.0.0 and later	InoProShop: V1.7.3 SP6 and later	-
AM780 series PLC	V1.10.0.0 and later	InoProShop: V1.7.3 SP4 and later	-

■ Remotely adapted versions

Product Name	Board Software Version	Logic Software/ Programming Software Version	XML/GSD File Version
Local module	-	0.1.2.0 and later	-
GL20-RTU-ECT	2.4.13.0 and later	0.1.3.2 and later	1.3.9.0 and later
GL20-RTU-ECT32	2.5.9.0 and later	0.1.4.2 and later	16 and 32_3.0.4.0 and later
GL20-RTU-PN	2.1.1.0 and later	-	20230323 and later
Easy series PLC	V6.1.0.1 and later	AutoShop: V4.8.2.3 and later	-
AM300/AM500 series PLC	V1.2.0.0 and later	InoProShop: V1.7.3 SP6 and later	-
AM780 series PLC	V1.10.0.0 and later	InoProShop: V1.7.3 SP4 and later	-