



PS00007574A00

GL20-4PT Temperature Detection Module User Guide

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Preface

■ About this Guide

The GL20-4PT 4-channel resistance temperature detector 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 and programming examples 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
	Low Voltage Directive (LVD)	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 1004-1 UL 61010-2-201 UL 61010-2-030 CAN/CSA-C22.2 No. 61010-1 CSA C22.2 NO. 61010-2-201 CSA C22.2 NO. 61010-2-030

Certification	Directive	Standard
KCC Certification	-	-
EAC Certification	-	-

■ More Data

Data name	Data Code	Description
GL20-RTU-ECT Communication Interface Module User Guide	PS00004985	This guide describes the installation, wiring and more of the product.

■ Revision History

Date	Version	Description
December 2022	A00	First release.

■ How to obtain

This guide is not in the scope of delivery. If necessary, you can download the PDF file in two ways:

- Log in to Inovance's website (www.inovance.com), choose Support > Download, search by keyword, and then download the PDF file.
- Scan the QR code with a smartphone to obtain the document.

■ Warranty Instructions

The warranty period of the product is 18 months as of the date of manufacture (refer to the barcode on the equipment). If otherwise agreed upon, the agreed terms and conditions shall prevail. After the warranty period expires, maintenance will be charged.

Within the warranty period, maintenance will be charged for damages caused by the following:

- your failure to operate the product in accordance with the user guide
- events beyond our reasonable control, such as fire, flood and abnormal voltage

- function misuse
- out-of-range application
- other events of force majeure, including but not limited to lightning, earthquake and other extreme weather events

The maintenance fee is charged according to the latest Price List of Inovance. If otherwise agreed upon, the agreed terms and conditions shall prevail.


For details, see Product Warranty Card.

Safety Precautions


■ Safety Disclaimer

1. Read and comply with the safety instructions during installation, operation, and maintenance of the equipment.
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. "CAUTION", "WARNING", and "DANGER" items in this guide do not indicate all safety precautions that need to be followed; instead, they just supplement the safety precautions.
4. Use this product in environments meeting the design and specification requirements; otherwise, a fault may occur. Noncompliance-caused malfunction or damage to parts are not covered in product quality warranty.
5. Inovance shall take no responsibility of any personal injuries or property damages 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 injuries or damage to the equipment. Please keep this guide well so that it can be read when necessary and forward this guide to the end user.

During 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 PLC 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 a upper position limit and lower position limit interlocked circuit must be set in the external circuits of PLC to prevent damage to the machine.
- To ensure safe operation, for the output signals that may cause critical accidents, please design external protection circuit and safety mechanism.
- Once PLC CPU detects abnormality in the system , all outputs may be closed; however, when a fault occurs in the controller circuit, the output may not be under control. Therefore, it is necessary to design an appropriate external control circuit to ensure normal operation.
- If the PLC 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 can't 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 the specialists who have received the necessary electrical training and understood enough electrical knowledge.
- Disconnect all external power supplies of the system before removing/installing the module. Failure to do so may result in electric shock, module fault or malfunction.
- Do not use the PLC where there are dust, oil smoke, conductive dust, corrosive or combustible gases, or exposed to high temperature, condensation, wind & rain, or subject to vibration and impact. 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 personnel who have received the necessary electrical training and understood enough electrical knowledge 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 foreign 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

Danger

- Wiring must be carried out by personnel who have received the necessary electrical training and understood enough electrical knowledge.
- Disconnect all external power supplies of the system before wiring. Failure to comply may result in electric shock, module fault or malfunction.
- Perform good insulation on terminals so that insulation distance between cables will not reduce after cables are connected to terminals. Failure to comply may result in electric shock or damage to the equipment.



Caution

- To avoid electric shock, cut off the power supply before connecting the power supply of the HMI.
- 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.

During Operation and Maintenance



Caution

- Maintenance & inspection must be carried out by personnel who have the necessary electrical training and experience.
- 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 removing the module or connecting/removing the communication wirings. Failure to comply may result in electric shock or malfunction.

Safety Recommendations

- In positions where the mechanical parts is exposed to operators, such as positions for loading and unloading machinery tools, or where the machine operates automatically,
- If modification on the program is needed during system operation, use a password or other protective measures to ensure that only authorized operators can perform such modification.

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 Model Number and Nameplate

GL 20 - 4 PT

①

②

③

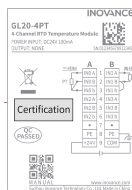
④

① Product Information
GL: General local module

③ I/O Points
4: 4 inputs

② Serial Number
20: 20 series module

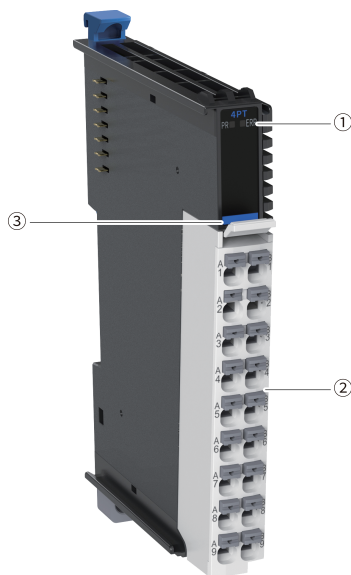
④ Module Type
PT: Resistance temperature detector









Based on the above description of model number and nameplate, the relevant ordering data of this product is described in the following table.

Modelodel	Description	Part Code	Applicable Model
GL20-4PT	GL20 series 4-input resistance temperature detector module	01440337	Easy series products and GL20 series communication interface modules such as GL20-RTU-ECT

1.2 Component Description



No.	Name	Description			
1	Signal indicators	PR (POWER +RUN)	Power / running indicator	Yellow green	<ul style="list-style-type: none"> ● 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	Error indicator	Red	ON when the module is faulty.
②	I/O terminal	4 RTD inputs, as defined in "3.2 Terminal Definition" on page 20			
③	Color identification		Red: Digital output		Orange: Analog output
			Grey: Digital input		Green: Analog input
			White: Communication		Blue: Other module

Note

- Flashing quickly: on for 200 ms followed by off for 200 ms.
- Flashing slowly: on for 200 ms followed by off for 1000 ms.

1.3 Technical Specifications

■ Power supply specifications

Item	Specification
Rated bus input voltage	5V DC (4.75 V DC to 5.25V DC)
Rated bus input current	85 mA (typical@5 V)
Rated terminal input voltage	24 VDC (20.4 V DC to 28.8 VDC)
Rated terminal input current	100 mA (typical@24 V)
Rated terminal output voltage	/
Rated terminal output current	/
Hot swap	Not supported
Anti-reverse connection 24 V	Supported

■ Input specifications

Item	Description
Input channels	4
Digital resolution	24 bits
Display sensitivity	0.1°C, 0.1°F
Input terminal	4-channel thermal resistor input
Sensor Type	Pt100, Pt500, Pt1000, Cu100, KTY84, NTC5K, NTC10K
Wiring method	Two wire/Three wire
Accuracy (room temperature 25°C)	Full scale* ($\pm 0.1\%$), (0 mV to 1000 mV full scale). Only ADC sampling accuracy is defined here. For specific temperature measurement accuracy, see " Detection range and accuracy " on page 12.
Accuracy (ambient temperature -20°C to 55°C)	Full scale* ($\pm 0.3\%$), (0 mV to 1000 mV full scale). Only ADC sampling accuracy is defined here. For specific temperature measurement accuracy, see " Detection range and accuracy " on page 12.

Item	Description
Sampling cycle	250ms, 500ms, 1000ms/4 channels (configurable through software)
Filter time	0s to 100s (configurable through software, default 5s)
Isolation mode	Isolation between I/O terminals and power supply, isolation between channels

■ Detection range and accuracy

Sensor Type	Detection Range	Accuracy
Pt100	-200.0°C to 850.0°C, -328.0°F to 1562.0°F	$\pm 1^{\circ}\text{C}@ T < 300^{\circ}\text{C}$ $\pm 2^{\circ}\text{C}@ 300^{\circ}\text{C} \leq T \leq 700^{\circ}\text{C}$ $\pm 2.5^{\circ}\text{C}@ T > 700^{\circ}\text{C}$
Pt500	-200.0°C to 850.0°C, -328.0°F to 1562.0°F	$\pm 1^{\circ}\text{C}@ T < 300^{\circ}\text{C}$ $\pm 2^{\circ}\text{C}@ 300^{\circ}\text{C} \leq T \leq 700^{\circ}\text{C}$ $\pm 2.5^{\circ}\text{C}@ T > 700^{\circ}\text{C}$
Pt1000	-200.0°C to 850.0°C, -328.0°F to 1562.0°F	$\pm 1^{\circ}\text{C}@ T < 300^{\circ}\text{C}$ $\pm 2^{\circ}\text{C}@ 300^{\circ}\text{C} \leq T \leq 700^{\circ}\text{C}$ $\pm 2.5^{\circ}\text{C}@ T > 700^{\circ}\text{C}$
Cu100	-50.0°C to 150.0°C, -58.0°F to 302.0°F	$\pm 1^{\circ}\text{C}@ -50^{\circ}\text{C} \leq T \leq 150^{\circ}\text{C}$
KTY84	0.0°C to 200.0°C, 32.0°F to 392.0°F	$\pm 1.5^{\circ}\text{C}@ 0^{\circ}\text{C} \leq T \leq 200^{\circ}\text{C}$
NTC5K (B value: 2000)	-30.0°C to 200.0°C, -22.0°F to 392.0°F	$\pm 1.5^{\circ}\text{C}@ -30^{\circ}\text{C} \leq T \leq 200^{\circ}\text{C}$
NTC5K (B value: 3950)	-15.0°C to 100.0°C, 5.0°F to 212.0°F	$\pm 1.5^{\circ}\text{C}@ -15^{\circ}\text{C} \leq T \leq 100^{\circ}\text{C}$
NTC5K (B value: 6000)	0.0°C to 100.0°C, 32.0°F to 212.0°F	$\pm 1.5^{\circ}\text{C}@ 6^{\circ}\text{C} \leq T \leq 100^{\circ}\text{C}$
NTC10K (B value: 2000)	-25.0°C to 200.0°C, -13.0°F to 392.0°F	$\pm 1.5^{\circ}\text{C}@ -25^{\circ}\text{C} \leq T \leq 200^{\circ}\text{C}$

Sensor Type	Detection Range	Accuracy
NTC10K (B value: 3950)	0.0°C to 150.0°C, 32.0°F to 302.0°F	$\pm 1.5^{\circ}\text{C}@ 6^{\circ}\text{C} \leq T \leq 150^{\circ}\text{C}$
NTC10K (B value: 6000)	6.0°C to 100.0°C, 42.8°F to 212.0°F	$\pm 1.5^{\circ}\text{C}@ 6^{\circ}\text{C} \leq T \leq 100^{\circ}\text{C}$

■ Software specifications

Item	Description
Diagnostic report configuration	Supported
Diagnostic detection configuration	Supports overlimit and wire break detection
Overlimit detection configuration	Supported
Independent channel configuration	Supported
Temperature drift configuration	Supported
Temperature setting range	-204.8 to +204.7 temperature units
Sampling cycle	250ms, 500ms, 1000ms/4 channels
Display mode	Celsius (°C), Fahrenheit (°F)
Sensitivity	0.1°C, 0.1°F
Sampling refresh	Refresh asynchronously according to the sampling time, not required to refresh synchronously according to the bus cycle
Stop mode	Continue refreshing according to sampling cycle
Wire break or overlimit	Output at maximum value, no longer refreshed
System diagnostics	System power exception
Channel diagnostics	Beyond upper limit alarm, beyond lower limit alarm, wire break alarm, overflow error
Software diagnostics	Not supported
Configuration diagnostics	Configuration error identification, channel parameter configuration error

1.4 Environmental Specifications

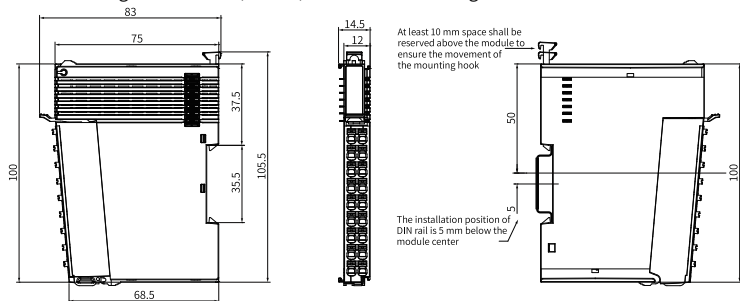
Item	Specification
Operating temperature	-20°C to 55°C
Operating humidity	10% to 90% RH (condensation)
Working environment	No corrosive and flammable gas and no excessive conductive dust
Storage temperature	-40°C to 70°C (<90% RH, non-condensing)
Altitude	≤2000 m
Pollution degree	2 or less
Noise immunity	2 kV on power supply line (IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC61131-2
Vibration resistance	IEC 60068-2-6 5 Hz to 8.4 Hz, 3.5 mmp, 8.4 Hz to 150 Hz, 1g, 10 times each in X, Y and Z directions
Shock resistance	IEC 60068-2-27 150 m/s ² , 11 ms, 3 times each in ±X, ±Y and ±Z directions, 18 times in total

2 Mechanical Installation

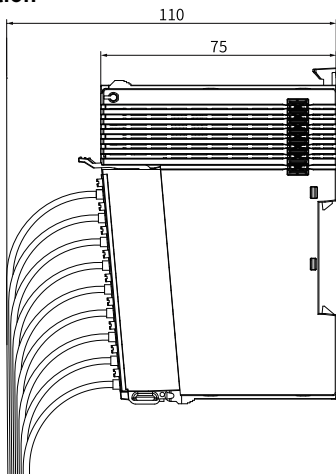
2.1 Mounting Dimensions

■ Module

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

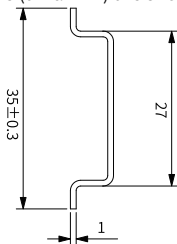


■ Cable Connection



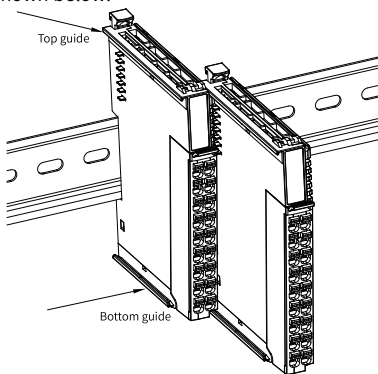
2.2 Installation Method

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



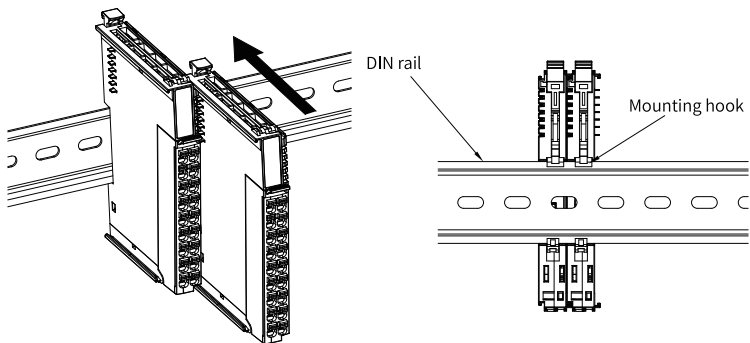
■ Installing Modules Side-by-Side

You can install multiple modules side by side with the help of top and bottom guides on the modules, as shown below.



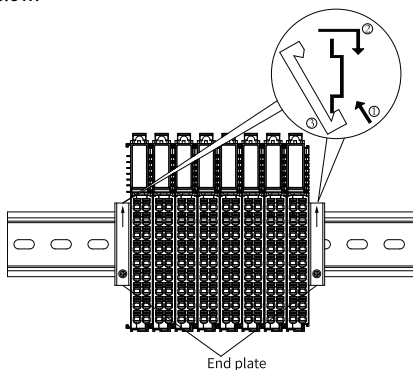
■ Installing Module onto DIN Rail

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.



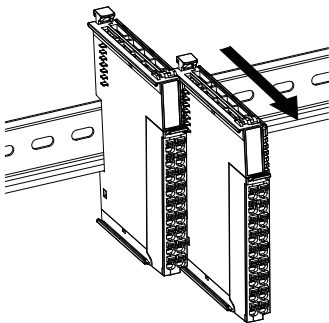
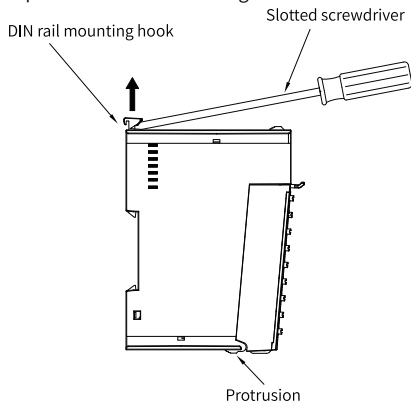
Note: After the module is installed, the DIN rail mounting hook will automatically move downward to lock the module to the rail. If the hook does not move downward, press down the top of the hook to ensure that the module is installed in place.

Mount an end plate on either side of the module assembly. To mount 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, as shown below.



■ Removing Module

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.



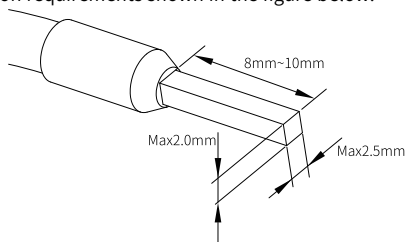
3 Electrical Installation

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	

If you use other types of tubular lug, crimp the lug to the cables according to the shape and dimension requirements shown in the figure below.



3.2 Terminal Definition



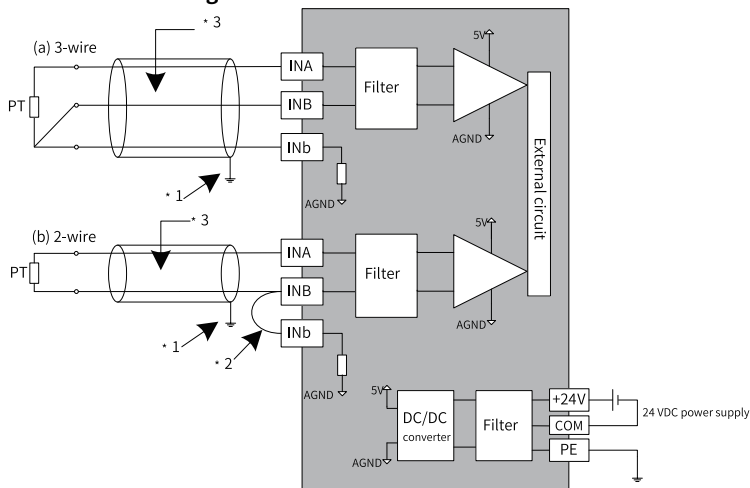
Left Signal	Left Terminal	Right Terminal	Right Signal
IN0 A	A1	B1	IN1 A
IN0 B	A2	B2	IN1 B
IN0 b	A3	B3	IN1 b
IN2 A	A4	B4	IN3 A
IN2 B	A5	B5	IN3 B
IN2 b	A6	B6	IN3 b
•	A7	B7	•
PE	A8	B8	PE
24 V +	A9	B9	COM

3.3 Terminal Wiring

■ Cautions for Wiring

- Do not bundle the extension cable together with power cables (high voltage, large current) which produce strong interference signals; otherwise, it may be influenced by noise, surge and induction. 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 interference resistance.
- Apply single-point grounding for the shielding of shielded cable and solder sealed cable.

■ External Wiring



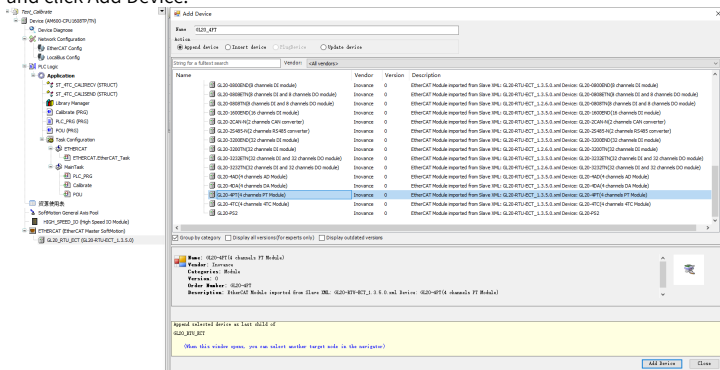
- *1 Cables is required to be shielded. It is recommended to connect the shield to PE.
- *2 If two-wire connection is used, short the INB and INb channels. In this case, the resistance on the cable may affect the measurement.

- *3 Use a cable having three low-resistance wires that have no difference in resistance.

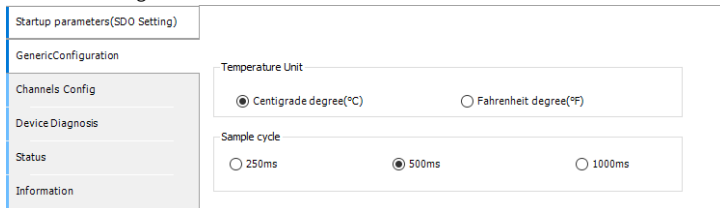
4 Programming Examples

The following takes input channels 0, 1, 2, 3 of the GL20-4PT module as an example, with AM600 as the main control module.

1. Right-click GL20_RTU_ECT and select Add Device, then select GL20-4PT module and click Add Device.



2. Double-click the GL20-4PT module, select the temperature unit and sampling period in the Generic Configuration section, and select the sensor type in the Channels Config section.



Startup parameters(SDO Setting)

Generic Configuration

Channels Config

Device Diagnosis

Status

Information

Access - 0

☒ Enable access Default

Sensor Type: Pt100 Filter Time: 5 s

☐ Overflow Detect

Lower Value(°C): -200 (-200-850) Upper Value(°C): 850 (-200-850)

☐ Enable Offset

Offset Value(°C): 0 (-204.8-204.7)

☐ Sensor Offline Detect

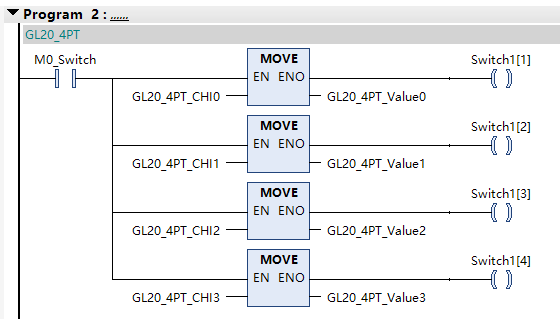
3. Add custom input variables GL20_4PT_CHI0, GL20_4PT_CHI1, GL20_4PT_CHI2, and GL20_4PT_CHI3.

#	Scope	Name	Address	Data type	Initialization	Persistent	Constant	Comment	Attributes
4	VAR	GL20_4PT_Value1		REAL		<input type="checkbox"/>	<input type="checkbox"/>		
5	VAR	GL20_4PT_Value2		REAL		<input type="checkbox"/>	<input type="checkbox"/>		
6	VAR	GL20_4PT_Value3		REAL		<input type="checkbox"/>	<input type="checkbox"/>		
7	VAR	GL20_4PT_CHI0		REAL		<input type="checkbox"/>	<input type="checkbox"/>		
8	VAR	GL20_4PT_CHI1		REAL		<input type="checkbox"/>	<input type="checkbox"/>		
9	VAR	GL20_4PT_CHI2		REAL		<input type="checkbox"/>	<input type="checkbox"/>		
10	VAR	GL20_4PT_CHI3		REAL		<input type="checkbox"/>	<input type="checkbox"/>		
11	VAR	GL20_4PT_Value0		REAL		<input type="checkbox"/>	<input type="checkbox"/>		
12	VAR	GL20_4PT_Value1		REAL		<input type="checkbox"/>	<input type="checkbox"/>		
13	VAR	GL20_4PT_Value2		REAL		<input type="checkbox"/>	<input type="checkbox"/>		
14	VAR	GL20_4PT_Value3		REAL		<input type="checkbox"/>	<input type="checkbox"/>		
15	VAR	HI_Switch		BOOL		<input type="checkbox"/>	<input type="checkbox"/>		
16	VAR	Switch1		ARRAY[1..16] OF BOOL		<input type="checkbox"/>	<input type="checkbox"/>		

4. Map the input variables GL20_4PT_CHI0, GL20_4PT_CHI1, GL20_4PT_CHI2, GL20_4PT_CHI3 to the input channels of the configured module to complete variable mapping.

General	Find	Filter	Show all	Add FB for IO Channel... Go to Instance			
Process Data(PDO Setting)	Variable	Mapping	Channel	Address	Type	Default Value	Description
Startup parameters(SDO Setting)			Device control	%QW1	UINT		Device control
Online			LBUS status	%IW2	UINT		LBUS status
CoE Online			Fault ID	%IW3	UINT		Fault ID
Device Diagnosis			GL20_4PT PT CH0	%ID2	REAL		GL20_4PT PT CH0
EtherCAT I/O Mapping			GL20_4PT PT CH1	%ID3	REAL		GL20_4PT PT CH1
EtherCAT IEC Objects			GL20_4PT PT CH2	%ID4	REAL		GL20_4PT PT CH2
Status			GL20_4PT PT CH3	%ID5	REAL		GL20_4PT PT CH3
Information							

5. Define the input variables with LD programming language.



6. After successful compiling, download the project and run it.