



PS00016734A02

GR20T-ECT-0808EMN/1616EMN Digital Input and Output Module User Guide

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Preface

■ Introduction

The GR20T-ECT-0808EMN/1616EMN is a transistor NPN module with 16/32 digital inputs and outputs. The module adapts to AM600 series products.

This guide describes the product information, mechanical installation, electrical installation, programming, and commissioning 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 name	Directive name		Standards compliance
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	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
KC	-		-
EAC certification	-		-

Certification name	Directive name		Standards compliance
UKCA certification	Safety regulations	Electrical Equipment (Safety) Regulations 2016	EN 61010-1 EN 61010-2-201
	EMC regulations	Electromagnetic Compatibility Regulations 2016	24 VDC models: 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

Data name	Data code	Description
AM600 Series Programmable Controller (NPN Output) User Guide	19010723	The guide describes the product information, electrical and mechanical design, communication connection, programming tools, operation and maintenance, indicators, MFK keys, and module connection of the product.
GR20T-ECT-0808EMN/1616EMN Digital Input and Output Module User Guide	PS00016734	The guide describes the product information, mechanical installation, electrical installation, programming, and commissioning of the product.

Revision history

Date	Version	Description
Jan 2025	A02	"1.4 Environmental Specifications" on page 18 Added "Dust protection level of protective cover".
July, 2024	A01	Minor error corrections.
July, 2024	A00	Initial release.

■ Access to the guide

This guide is not delivered with the product. You can obtain the PDF version by the following methods:

- Do keyword search under Service and Support at www.inovance.com.
- Scan the QR code on the product with your smart phone.
- My Inovance APP: Scan the QR code below to install the 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. Maintenance will be charged after the warranty 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 Product Warranty Card.

Safety Instructions

■ Safety precautions

1. Read and follow the safety instructions when installing, operating, and maintaining the equipment.
2. To ensure personal and equipment safety, observe the notes indicated on the product labels and all the safety instructions in the user guide.
3. "CAUTION", "WARNING", and "DANGER" in the user guide only indicate some of the precautions that need to be followed; they just supplement the safety precautions.
4. Use this equipment according to the designated environment requirements.
Damage caused by improper use is not covered by warranty.
5. Inovance shall take no responsibility for any personal injury or property damage caused by improper use.

■ Safety levels and definitions



"DANGER" indicates that failure to comply with the notice can result in severe personal injury or even death.



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



"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 controller 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.



- 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 machine.
- 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 controller is designed to be used in an indoor electrical environment that is compliant with overvoltage category II. The power supply must have a system-level surge protection device to ensure that overvoltage caused by lightning shock cannot be applied to the controller power supply input terminals, signal input terminals, and control output terminals, preventing damage to the equipment.

Installation



- Installation must be carried out by qualified professionals.
- 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 controller 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 damage the product.
- The controller is open-type equipment that must be installed in a control cabinet with lock (IP rating of the control cabinet enclosure > IP20). Only qualified professionals can open the cabinet.



- 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 qualified professionals.
- 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 qualified professionals.
- Do not touch the terminals with power on. Failure to comply may result in electric shock or malfunction.
- Disconnect all external power supplies of the system before cleaning the module or fasten the module screw. Failure to comply may result in electric shock.
- Disconnect all external power supplies of the system before disassembling the module or connecting/disconnecting 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 programmable controller and can start or terminate the automatic running of the system.
- If you need to modify the program while the system is running, use the lock function or other protective measures. Ensure that only authorized personnel can make the necessary modifications.

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

G R 20 T - ECT - XXXX E MN

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① **Product family**

G: Inovance controller general-purpose module

② **Product type**

R: Remote module

③ **Series**

20: 20 series

④ **Product form**

T: Horizontal

⑤ **Communication protocol**

ECT: EtherCAT

⑥ **Number of inputs/outputs**

XXXX indicates 0808 or 1616.

- 0808: 8-channel inputs, inputs/outputs configurable for 8 channels
- 1616: 16-channel inputs, inputs/outputs configurable for 16 channels

⑦ **Product type**

E: Logic I/O expansion module

⑧ **Function type**

MN: Sink output configurable for inputs/outputs

GR20T-ECT-0808EMN model



GR20T-ECT-1616EMN model

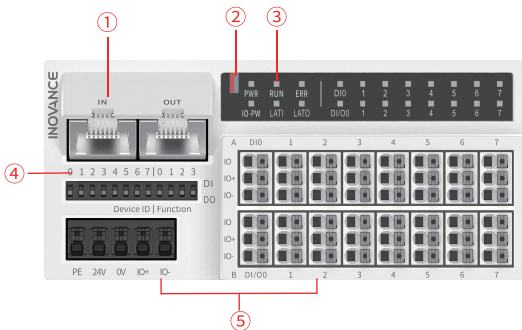








The order data of the product is described in the following table.

Model	Description	Product code	Applicable model
GR20T-ECT-0808EMN	GR20T series transistor NPN module with configurable 16 digital outputs and inputs	01440526	AM600 series
GR20T-ECT-1616EMN	GR20T series transistor NPN module with configurable 32 digital outputs and inputs	01440529	

1.2 Components

The GR20T-ECT-0808EMN and GR20T-ECT-1616EMN models share the same components. Take the GR20T-ECT-0808EMN model as an example for component description.



No.	Name	Description			
①	EtherCAT communication interface	IN		EtherCAT communication input	The IN interface supports EtherCAT communication data input with connection to PLC, communication interface module, or the upstream slave.
		OUT		EtherCAT communication output	The OUT interface supports EtherCAT communication data output with connection to the downstream slave.
②	Color identification	 Red: Digital output	 Orange: Analog output		
		 Gray: Digital input	 Green: Analog input		
		 White: Communication	 Blue: Other module		

No.	Name	Description		
③	Signal indicator	PWR	System power supply indicator	The indicator is steady on for power-on and off for power-off (24 VDC).
		RUN	Running state indicator	The ECT communication status indicator indicates status of the ECT simple slave. <ul style="list-style-type: none"> ● OFF: The ECT module is in the INIT state. ● Flashing: The ECT module is in the PREOP state. ● Single flashing: The ECT module is in the SafeOP state. ● Steady ON: The ECT module is in the operational state. ● Double flashing: The ECT module is in the bootstrap state.
		ERR	Fault indicator	The indicator is on when the module is faulty. For troubleshooting, see " Fault Diagnosis " on page 48
		IO-PWR	I/O power indicator	The indicator is steady on for power-on and off for power-off (24 VDC).
		LATI	ECT_IN network port indicator	<ul style="list-style-type: none"> ● Off: No connection ● Flashing: Connected with data being exchanged ● Steady on: Connected with no data exchange
		LATO	ECT_OUT network port indicator	<ul style="list-style-type: none"> ● Off: No connection ● Flashing: Connected with data being exchanged ● Steady on: Connected with no data exchange
		A0 to A7	Signal indicator of DI0 to DI7	The indicator turns green when there is DI input.
		B0 to B7	Signal indicator of DI/O0 to DI/O7	<ul style="list-style-type: none"> ● DIO configured as DI mode: The indicator turns green when the DI signal is active. ● DIO configured as DO mode: The indicator turns green when the DO signal is active.

No.	Name	Description		
④	DIP switch	Device ID (0 to 7)	Slave address DIP switch	<ul style="list-style-type: none"> GR20T-ECT-0808EMN: The DIO0 to DIO7 can be set through the 4-bit DIP switch, two DIO channels can be set through the 1-bit DIP switch, and DIO0 to DIO1 can be set through Function0, and so on. GR20T-ECT-1616EMN: The DIO0 to DIO15 can be set through the 4-bit DIP switch, four DIO channels can be set through the 1-bit DIP switch, and DIO0 to DIO3 can be set through Function0, and so on.
		Function (0 to 3)	DIP switch for DIO switchover	
⑤	User terminal	For details, see "3.2 Terminal Definitions" on page 39		

Note

- Blinking: The indicator shall turn on for 200 ms, followed by off for 200 ms.
- Single flash: The indicator shall show one short flash (200 ms) followed by a long off phase (1000 ms).
- Double flash: The indicator shall show a sequence of two short flashes (200 ms), separated by an off phase (200 ms), and followed by a long off phase (1000 ms).

1.3 Technical Specifications

■ General specifications

Item	Specification
IP rating	IP20
Dimensions (W x H x D)	<ul style="list-style-type: none"> GR20T-ECT-0808EMN: 110 mm × 50 mm × 35.9 mm GR20T-ECT-1616EMN: 160 mm × 50 mm × 35.9 mm
Weight	<ul style="list-style-type: none"> GR20T-ECT-0808EMN: about 125 g GR20T-ECT-1616EMN: about 185 g

■ Power supply specifications

Item	Specification
Rated voltage of US power supply	24 VDC (20.4 VDC to 28.8 VDC)
Maximum current of US power supply	1 A (@24 V)
US reverse polarity protection	Supported
Rated voltage of UA power supply	24 VDC (20.4 VDC to 28.8 VDC, common ground with US) reverse polarity protection
Maximum current of UA power supply	<ul style="list-style-type: none"> ● GR20T-ECT-0808EMN: 2 A (@24 V) ● GR20T-ECT-1616EMN: 4 A (@24 V)
UA reverse polarity protection	Supported
Reversed polarity protection of system power supply	Supported
Short circuit protection of system power supply	Supported
Reversed polarity protection of I/O power supply	Supported
Short circuit protection of I/O power supply	Supported
DO overcurrent protection	Supported
DO short circuit protection	Supported

■ EtherCAT specifications

Item	Specification
Communication protocol	EtherCAT protocol (SDO not supported)
Communication speed	100 Mbps (100Base-TX)
Work mode	Full duplex
Transmission media	Shielded cables of Cat 5e or higher
Transmission distance	100 m
Terminal type	RJ45

■ Input specifications

Item	Specification
Configuration of inputs	Unavailable
Input type	Digital input
Input mode	NPN
Max. number of input channels	<ul style="list-style-type: none">● GR20T-ECT-0808EMN: 16● GR20T-ECT-1616EMN: 32
Input voltage class	24 VDC (20.4 VDC to 28.8 VDC)
Input current (typical)	4 mA (typical value@24 V)
Signal voltage "1"	< 5 VDC
OFF voltage	> 15 VDC
Hardware response time ON/OFF	100 μ s/100 μ s
Input impedance	6.6 k Ω to 7.6 k Ω
Isolation	Yes

Item	Specification
Input action display	When the input is in the driving state, the input indicator becomes on.
Input derating (without dust cover)	<ul style="list-style-type: none"> ● GR20T-ECT-0808EMN: Full load when working at 45°C (specifically, when all input channels are ON at the same time), and 50% derating when working at 55°C (specifically, the number of input channels that are ON at the same time is no more than 8). ● GR20T-ECT-1616EMN: Full load when working at 45°C (specifically, when all input channels are ON at the same time), and 50% derating when working at 55°C (specifically, the number of input channels that are ON at the same time is no more than 16).
Input derating (with dust cover)	<ul style="list-style-type: none"> ● GR20T-ECT-0808EMN: Full load when working at 45°C (specifically, when all input channels are ON at the same time), and 50% derating when working at 55°C (specifically, the number of input channels that are ON at the same time is no more than 8). ● GR20T-ECT-1616EMN: Full load when working at 35°C (specifically, when all input channels are ON at the same time), and 50% derating when working at 50°C (specifically, the number of input channels that are ON at the same time is no more than 16).

■ Output specifications

Item	Specification
Configuration of outputs	<ul style="list-style-type: none"> ● GR20T-ECT-0808EMN: input/output configurable for 8 channels (DIO configurable) ● GR20T-ECT-1616EMN: input/output configurable for 16 channels (DIO configurable)
Output type	Digital output, low side
Output mode	NPN
Max. number of output channels	<ul style="list-style-type: none"> ● GR20T-ECT-0808EMN: 8 ● GR20T-ECT-1616EMN: 16
Output Voltage Class	24 VDC (20.4 VDC to 28.8 VDC)
Output load (resistive load)	0.5 A/channel, 2 A /8 channels

Item	Specification
Output load (inductive load)	7.2 W/channel; 12 W/module
Output load (lamp load)	5 W/channel; 9 W/module
Hardware response time ON/OFF	100 μ s/100 μ s
Leakage current upon OFF	10 μ A
Switching frequency	Resistive load: 100 Hz; inductive load: 0.5 Hz; lamp load: 10 Hz
Isolation	Yes
Output action display	When the DO circuit is in the driving state, the output indicator becomes on.
Output derating (without dust cover)	<ul style="list-style-type: none"> ● GR20T-ECT-0808EMN: Full load when working at 45°C (that is, the output current does not exceed 2 A when all output channels are ON at the same time), and 50% derating when working at 55°C (that is, the output current does not exceed 1 A when all output channels are ON at the same time). ● GR20T-ECT-1616EMN: Full load when working at 45°C (that is, the output current does not exceed 4 A when all output channels are ON at the same time), and 50% derating when working at 55°C (that is, the output current does not exceed 2 A when all output channels are ON at the same time).
Output derating (with dust cover)	<ul style="list-style-type: none"> ● GR20T-ECT-0808EMN: Full load when working at 45°C (that is, the output current does not exceed 2 A when all output channels are ON at the same time), and 50% derating when working at 55°C (that is, the output current does not exceed 1 A when all output channels are ON at the same time). ● GR20T-ECT-1616EMN: Full load when working at 35°C (that is, the output current does not exceed 4 A when all output channels are ON at the same time), and 50% derating when working at 50°C (that is, the output current does not exceed 2 A when all output channels are ON at the same time).

■ Software specifications

Item	Specification
PDO data size: input	<ul style="list-style-type: none"> ● GR20T-ECT-0808EMN: 4Byte ● GR20T-ECT-1616EMN: 6Byte
PDO data size: output	<ul style="list-style-type: none"> ● GR20T-ECT-0808EMN: 5Byte ● GR20T-ECT-1616EMN: 8Byte
ECT simple slave	Meets ECT certification requirements of conformance.
Basic ECT function	Supports the ECT ring-type networking.
Channel configuration	Use the DIP switch to configure channels near the switch as inputs and outputs. Each DIP switch supports configurations for four channels.
Output preset value (0)	Configure the output preset value through PDO.
Output maintaining (0)	Configure the output maintaining function through PDO.
Input filter (I)	Configure an input filter through PDO. The filter can be set to a value including no-filter, 0.25 ms, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, and 32 ms. The default value is 1 ms and adopted when the module is enabled.
I/O indicator management	Indicates input and output signals; the indicator becomes on upon input or output.
Station number setting	Set the station number through the DIP switch. When one of the DIP switches is at non-zero position, station number can be set to a value ranging from 1 to 255.
	Set the station number through the software tool. When all DIP switches are at zero position, station number can be set to a value ranging from 1 to 65535.

1.4 Environmental Specifications

Item	Specification
Operating environment	No corrosive and flammable gas and no excessive conductive dust
Max. altitude	≤ 2000 m
Pollution degree	Level 2

Item	Specification
Noise immunity	2 kV on power supply cable (compliant with IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC61131-2
Dust protection level	IP20
Vibration resistance	<ul style="list-style-type: none"> ● Operating scenario: Tested according to IEC 60068-2-6. 5 Hz to 8.4 Hz, 3.5 mm, 8.4 Hz to 200 Hz, 1g, 10 cycles each in X, Y and Z directions. ● Transport: Tested according to IEC 60068-2-64. Test conditions: 5 Hz to 100 Hz, 0.01g²/Hz; 200Hz, 0.001g²/Hz, 1.14g, 30 min each in X, Y and Z directions.
Shock resistance	<ul style="list-style-type: none"> ● Operating scenario: Tested according to IEC 60068-2-27. Test conditions: 15 g peak acceleration, 11 ms pulse width, total 18 shocks in X, Y and Z directions. ● Transport scenario: Tested according to IEC 60068-2-27. 15 g peak acceleration over a period of 11 ms, 18 shocks in total for X, Y and Z directions.
Operating temperature/humidity	<ul style="list-style-type: none"> ● Temperature: -20°C to +55°C ● Relative humidity: 10% to 90% RH, non-condensing <p>Note: Install a fan or air conditioner in the direction of the ventilation holes when the operating temperature is greater than the maximum allowable temperature.</p>
Storage temperature/humidity	<ul style="list-style-type: none"> ● Temperature: -40°C to +70°C ● Relative humidity: <90% RH, non-condensing

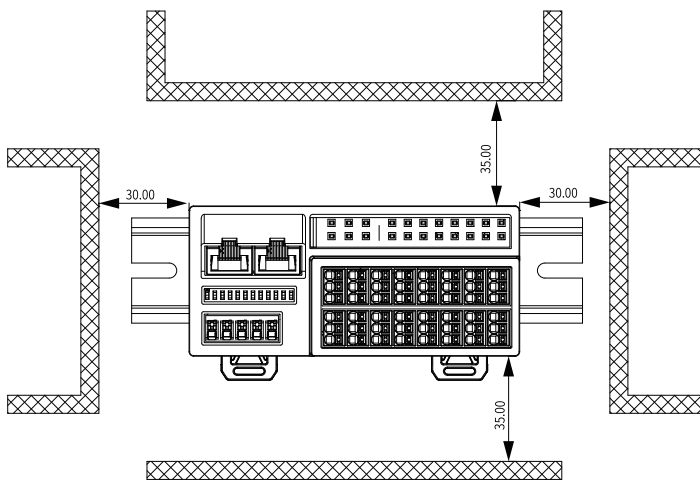
Item	Specification																									
Installation position and limit	Installation position	For requirements on installation position, see "2.1 Requirements on Mounting Options" on page 21.																								
Limits	Limits	<p>Derating is performed based on the actual I/O points (D0+DI), as shown in the following figure.</p> <p>Relationship between actual I/O channels and operating temperature</p> <table border="1"> <caption>Data points from the derating graph</caption> <thead> <tr> <th>Operating temperature (°C)</th> <th>Actual I/O channel (28.8V)</th> <th>Actual I/O channel (≤25.2V)</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>32</td> <td>32</td> </tr> <tr> <td>20</td> <td>32</td> <td>32</td> </tr> <tr> <td>30</td> <td>32</td> <td>32</td> </tr> <tr> <td>35</td> <td>32</td> <td>32</td> </tr> <tr> <td>45</td> <td>20</td> <td>32</td> </tr> <tr> <td>55</td> <td>14</td> <td>16</td> </tr> <tr> <td>60</td> <td>14</td> <td>16</td> </tr> </tbody> </table> <p>Legend: I/O power supply voltage - - - ≤25.2V — 28.8V</p>	Operating temperature (°C)	Actual I/O channel (28.8V)	Actual I/O channel (≤25.2V)	10	32	32	20	32	32	30	32	32	35	32	32	45	20	32	55	14	16	60	14	16
Operating temperature (°C)	Actual I/O channel (28.8V)	Actual I/O channel (≤25.2V)																								
10	32	32																								
20	32	32																								
30	32	32																								
35	32	32																								
45	20	32																								
55	14	16																								
60	14	16																								

2 Mechanical Installation

2.1 Requirements on Mounting Options

■ Recommended mounting option

It is recommended to install the product horizontally. To ensure normal ventilation and heat dissipation and allow sufficient wiring space, reserve enough clearance (in mm) around the product, as shown in the following figure. Different mounting options require different operating temperatures, see ["1.4 Environmental Specifications" on page 18](#).

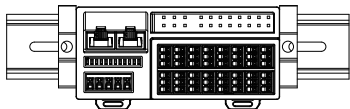


Note

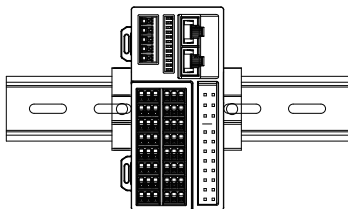
If there is a high-temperature heat source (heater, transformer, large resistor, etc.) in vicinity of the product, keep the product away from the heat source by at least 100 mm.

■ Other mounting options

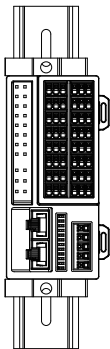
Other mounting options require the same clearance as the recommended mounting option and are shown in the following figure.



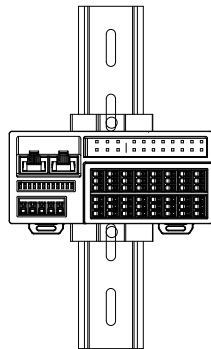
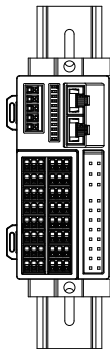
Horizontal DI rail + Horizontal module



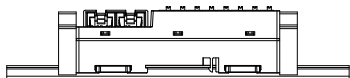
Horizontal DI rail + Vertical module



Vertical DI rail + Vertical module



Vertical DI rail + Horizontal module



Bottom of the electric cabinet

Note

The preceding mounting options allow the installation of external screws.

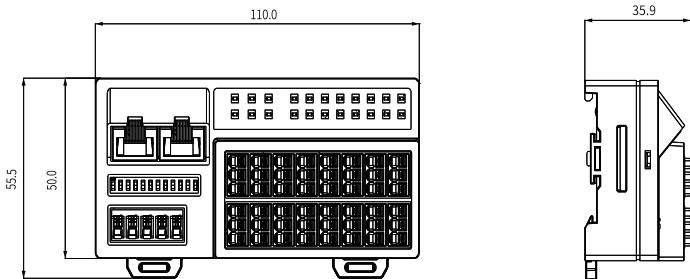
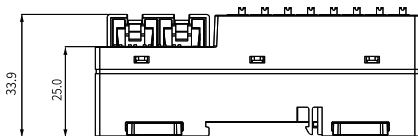
2.2 Installation Precautions

- Before installing or removing the module, ensure that the module is powered off.
- 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.
- Prevent the enclosure or terminals of the module from dropping or suffering from impact or shock.

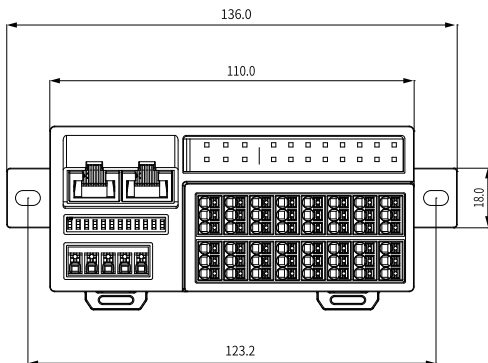
2.3 Mounting Dimensions

The following figure shows the module mounting dimensions (in mm).

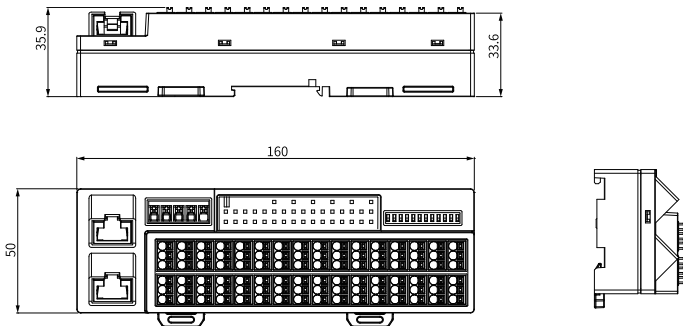
- GR20T-ECT-0808EMN model
 - Outline dimensions of the module



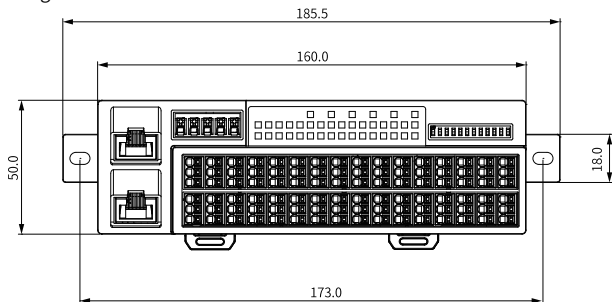
- Mounting dimensions of external screws



- GR20T-ECT-1616EMN model
- Outline dimensions of the module



■ Mounting dimensions of external screws



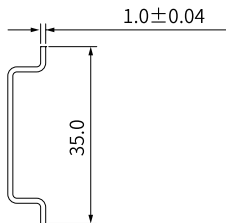
2.4 Installation Method

The GR20T-ECT-0808EMN and GR20T-ECT-1616EMN models share the same structure. Take the GR20T-ECT-0808EMN model as an example for installation instructions.

■ Installing the module

The module can be installed in three modes including horizontal module mounting with horizontal DIN rail, vertical module mounting with horizontal DIN rail, and screw mounting.

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.

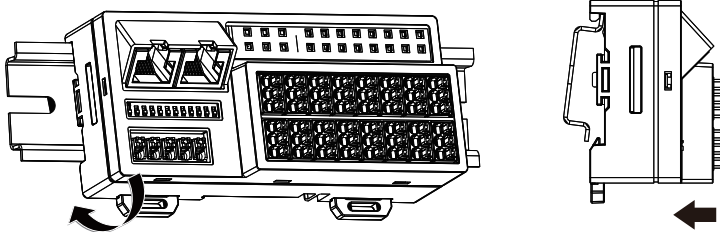


Caution

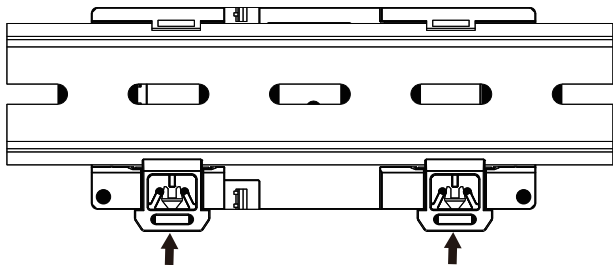
The module is mounted onto a DIN rail in conformity with IEC 60715 (thickness: 1 mm). If the thickness of the DIN rail is not as required, the product will not fit in place and function properly as the snap-fit joint does not work.

● Horizontal DIN rail+Horizontal module mounting

Hang the slot at the top of the module on the rail, rotate the module, and press down the bottom until you hear a click of the DIN rail snap-fit joint rebounding, as shown in the following figure.

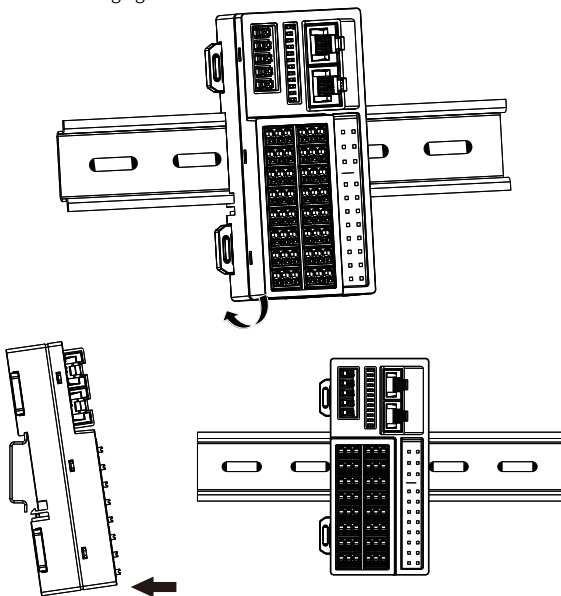


After the module is installed, the DIN rail snap-fit joint will automatically move upwards to lock the module to the rail. If the snap-fit joint does not move upwards, press the bottom of the snap-fit joint upwards to lock the module, as shown in the following figure.

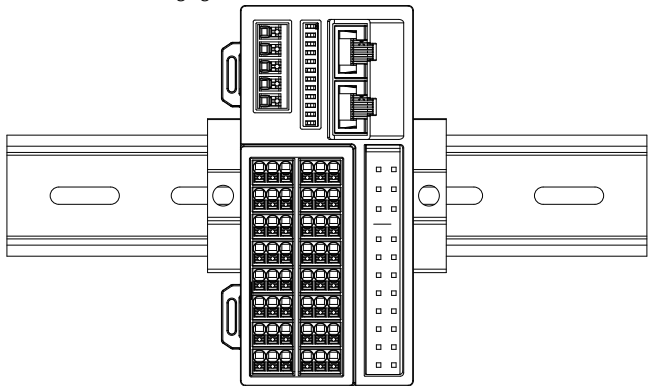


- **Horizontal DIN rail+Vertical module mounting**

1. Hang the slot at the upper part of the module on the rail, rotate the module, and press down the bottom until you hear a click of the DIN rail snap-fit joint rebounding, as shown in the following figure.



2. Install and secure the side plates on guide rails on both sides of the module properly, as shown in the following figure.

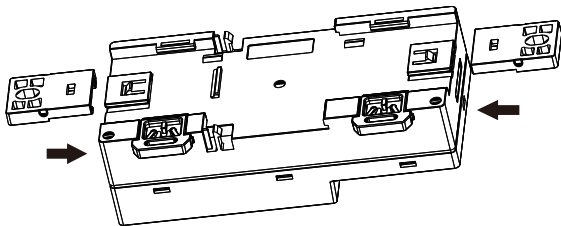


Note

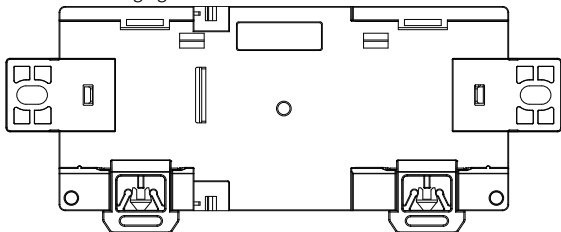
- After the module is installed in place, the snap-fit joint will automatically rebound to lock the module to the rail.
- Ensure that the network port faces up when the module is mounted vertically onto the horizontal DIN rail.

• Screw mounting

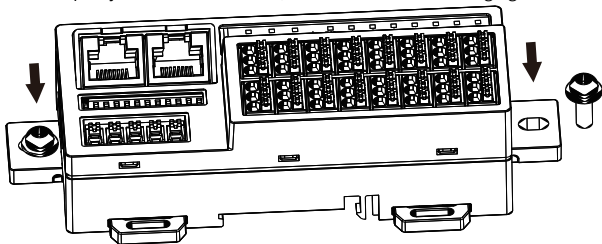
1. Take out the snap-fit joints (standard by default) from the accessory kit, and push them into the bottom of the module in the direction indicated by the following figure.



2. Push the snap-fit joints onto the module until you hear a click of the joint rebounding, as shown in the following figure.



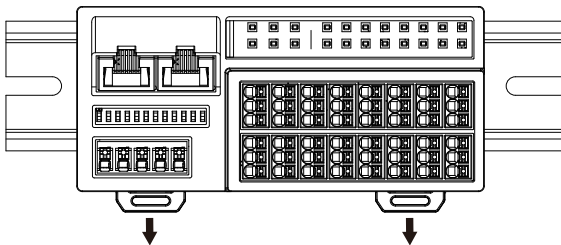
3. Secure the snap-fit joints with M4 screws, as shown in the following figure.



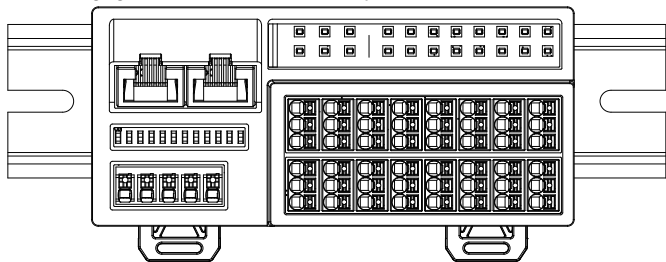
■ Removing the module

● Horizontal DIN rail+Horizontal module removal

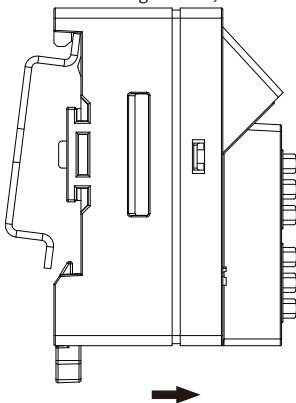
1. Pry the DIN snap-fit joint downwards with a disassembly tool such as screwdriver to release the joint, as shown in the following figure.



The following figure indicates that the snap-fit joint has been released.

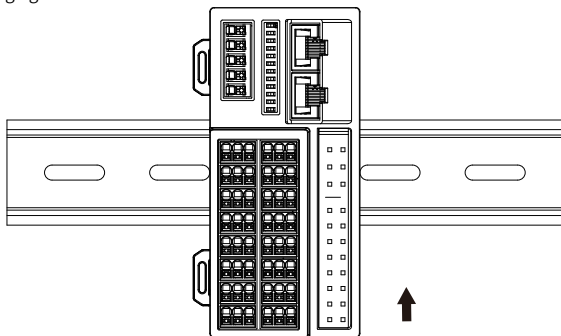


2. Rotate and remove the module out of the guide rail, as shown in the following figure.

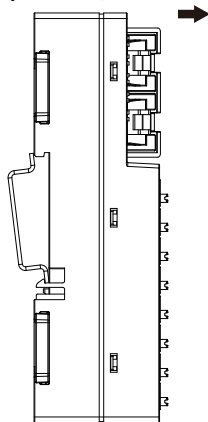


- **Horizontal DIN rail+Vertical module removal**

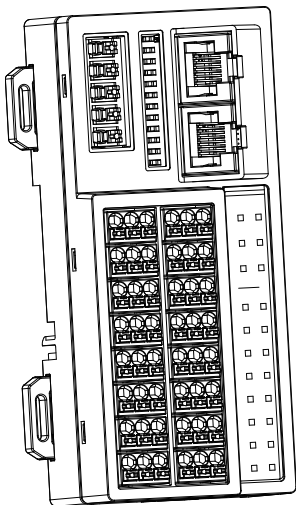
1. Remove all cables from the module.
2. Push the module upwards in the direction indicated by the arrow, as shown in the following figure.



3. When pushing the module upwards, move the top of the module away from the guide rail in the direction indicated by the arrow, as shown in the following figure.

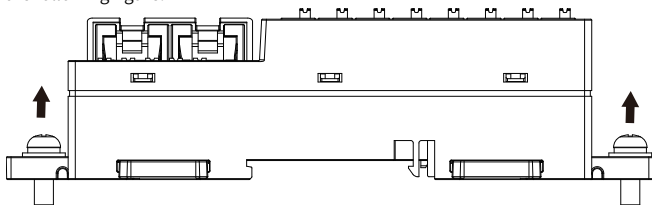


4. Rotate and remove the module out of the guide rail, as shown in the following figure.

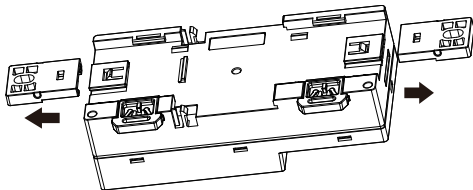


- **Screw-based removal**

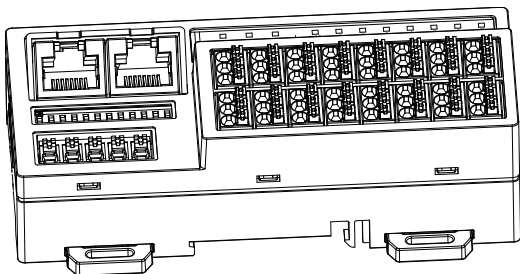
1. Remove the two M4 screws on both sides of the module using a screwdriver, as shown in the following figure.



2. Remove the snap-fit joints manually, as shown in the following figure.



The module has been removed successfully, as shown in the following figure.



2.5 Dust Cover Installation (Optional)

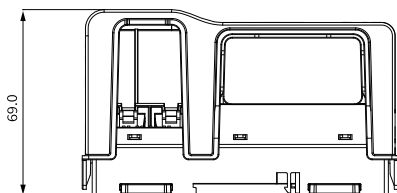
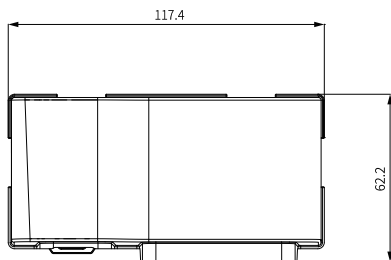
The following table shows the order data of the dust cover available for this product.

Option model	Description	Product code	Applicable model
GR20T-ECT-16P-FCZ	GR20T-ECT-16P-FCZ-GR20T series dust cover	01480056	GR20T-ECT-0808EMN
GR20T-ECT-32P-FCZ	GR20T-ECT-32P-FCZ-GR20T series dust cover	01480057	GR20T-ECT-1616EMN

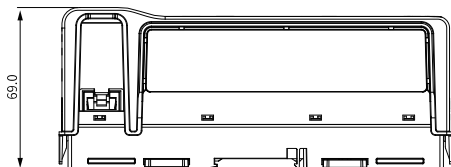
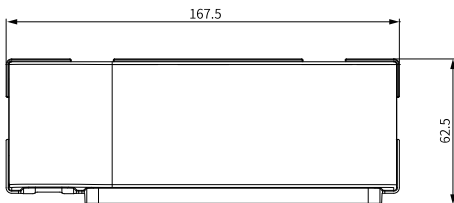
The dust cover is designed to prevent dust, splashing, and impact. It is made of transparent PC, which allows you to observe the running state of the module at any time. It is suitable for non-standard equipment and intelligent production lines.

■ Dust cover dimensions

- GR20T-ECT-16P-FCZ



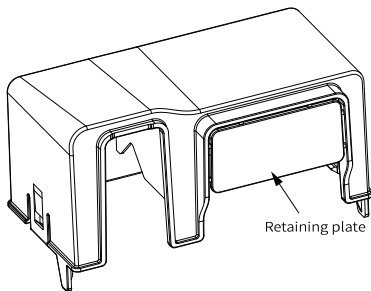
- GR20T-ECT-32P-FCZ



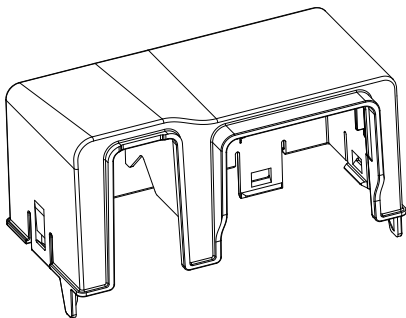
The GR20T-ECT-0808EMN and GR20T-ECT-1616EMN models share the same dust cover structure. Take the GR20T-ECT-0808EMN model as an example for dust cover installation instructions.

- **Before installation**

- The dust cover with a retaining plate (equipped by default) at the cable outlet can be used together with I/O cables of diameters no more than 0.35 mm^2 to connect the module, as shown in the following figure.

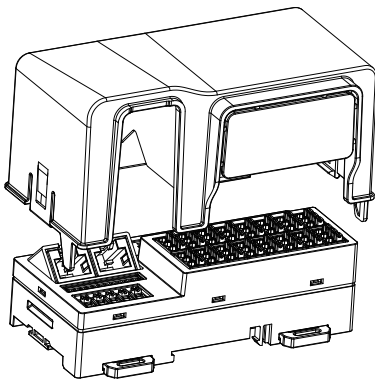


- The dust cover without retaining plate (which can be removed manually or with a tool) can be used together with I/O cables of diameters no more than 0.75 mm^2 to connect the module, as shown in the following figure.

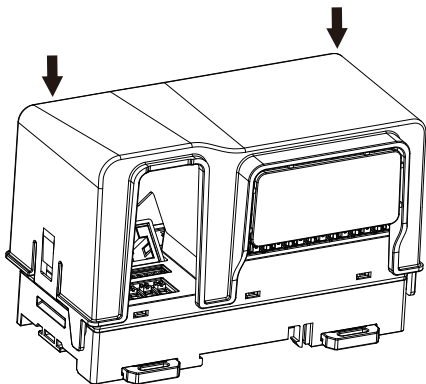


- **During installation**

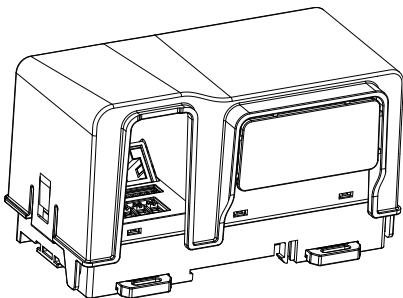
1. Align the dust cover with the module, and route the network cable and I/O cable through the cable slots, as shown in the following figure.



2. Press on both sides of the dust cover in the direction indicated by the arrow until you hear clicks, as shown in the following figure.

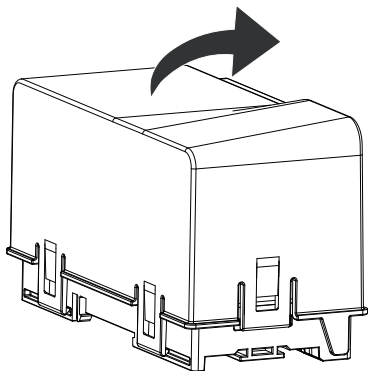


If the dust cover is installed in place, the four snap-fit joints of the dust cover will fit into the concaved slot, as shown in the following figure.



- **Removing the dust cover**

Rotate the dust cover in the direction indicated by the arrow to release the two snap-fit joints from the slot, as shown in the following figure.



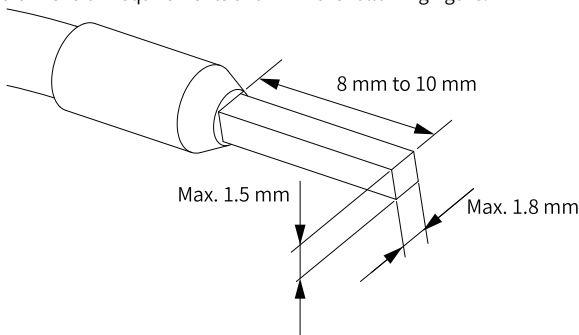
3 Electrical Installation

3.1 Cable Selection

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

Material name	Applicable cross sectional area of the cable		KST		Suzhou Yuanli	
	mm ²	AWG	Model	Crimping pliers	Model	Crimping pliers
Tubular lug	0.3	22	E0308	KST2000L	0308	YAC-5
	0.5	20	E0508		0508	
	0.75 ^[1]	18	E7508		7508	

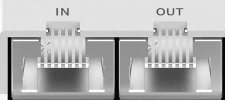
If you use other types of tubular lug, crimp the lug to the cables according to the shape and dimension requirements shown in the following figure.



[1]: For 18 AWG cables with a diameter of 0.75 mm², it is recommended to use naked cable connectors rather than tubular lugs.

3.2 Terminal Definitions

The GR20T-ECT-0808EMN and GR20T-ECT-1616EMN models share the same components. Take the GR20T-ECT-0808EMN model as an example for component description.



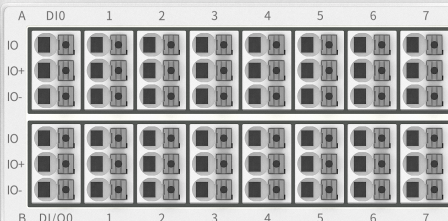
0 1 2 3 4 5 6 7 | 0 1 2 3



Device ID | Function



PE 24V 0V IO+ IO-



Signal	Terminal	Terminal	Signal
DI0	A0	B0	DI/O0
DI1	A1	B1	DI/O1
DI2	A2	B2	DI/O2
DI3	A3	B3	DI/O3
DI4	A4	B4	DI/O4
DI5	A5	B5	DI/O5
DI6	A6	B6	DI/O6
DI7	A7	B7	DI/O7

Refer to the following table for the correspondence between power supply terminals and signal indicators.

Power supply terminal	Description	Signal indicator
PE	Protective grounding	-
24V	System power supply +	PWR
0V	System power supply -	PWR
IO+	Field power supply +	IO-PW
IO-	Field power supply -	IO-PW

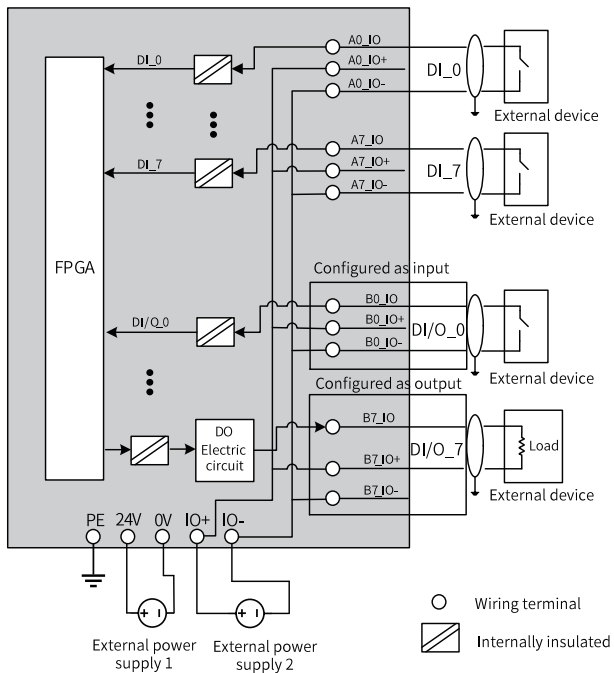
3.3 Terminal Wiring

■ Wiring precautions

- 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 capacity of resisting interference.
- Apply single-point grounding for the shielding of shielded cable and solder sealed cable.

■ External wiring

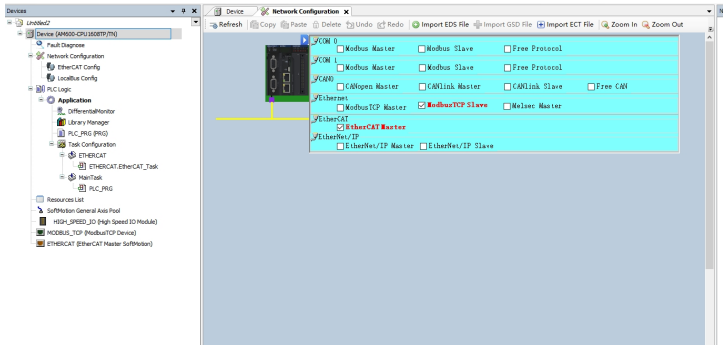
The GR20T-ECT-1616EMN and GR20T-ECT-0808EMN models share the same external wiring. The following figure takes the external wiring of GR20T-ECT-0808EMN model as an example.



4 Program Commissioning

The following is an example where AM600 master is used as the primary control module.

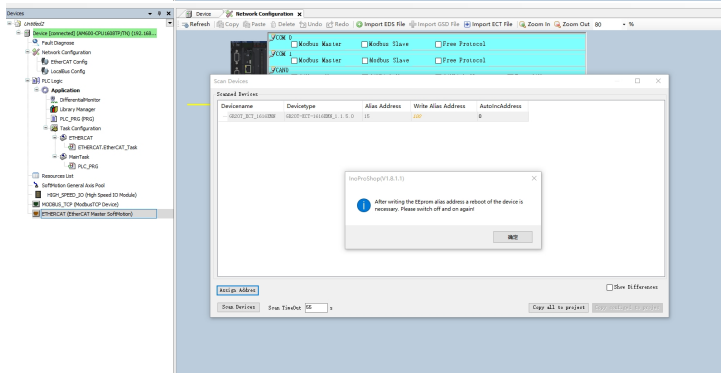
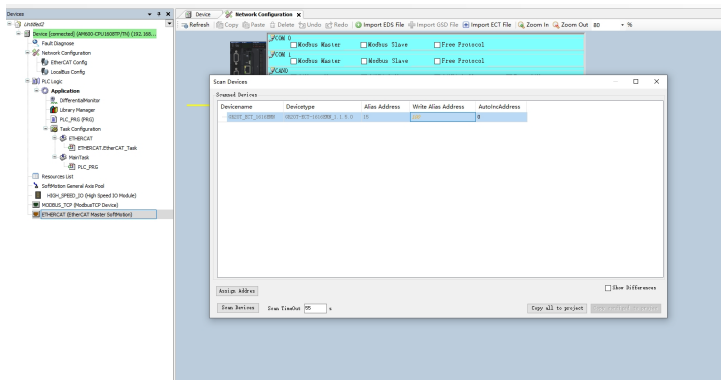
1. In the **Device** pane, double-click **Network Configuration**, then check **EtherCAT Master** checkbox to enable the controller as an EtherCAT master.




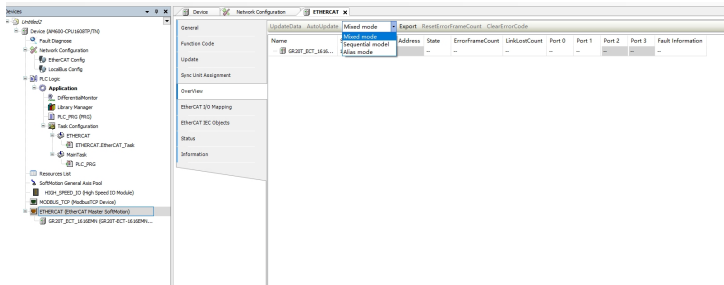
2. In the **Device** pane, right-click **EtherCAT** (EtherCAT Master SoftMotion) and select **Scan Devices**. The **Scan Devices** dialog pops up, as shown in the following figure.
 - a. Click **Scan Devices**. After the module is successfully scanned, click **Copy all to device**.
 - b. Set the slave alias.


Slave alias can be set through the DIP switch and software.

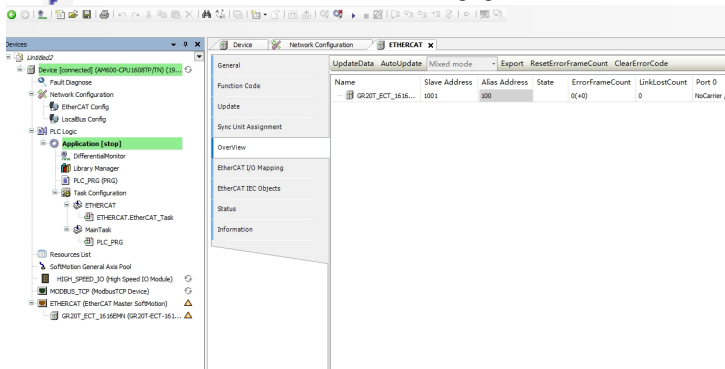
- When the DIP switch is at non-zero position, use the alias set by the DIP switch. Otherwise, use the slave alias set by the software.
- To set slave alias through the software, fill in the alias address in **Write Alias Address**. Then, click **Assign Address** and **OK**. Power on the slave again and scan the device.



3. After the module is added successfully, the slave is configured in **Mixed mode** by default. To configure a slave in **Alias mode**, double-click **EtherCAT** (EtherCAT Master SoftMotion) in the **Device** pane. Then, click **Overview** on the **EtherCAT** tab to select the alias mode. Fill in the alias address for each slave and click  in the toolbar, as shown in the following figure.



4. Click  to start the module, as shown in the following figure.



5. Double-click the EtherCAT slave that has been scanned and successfully added in the **Device** pane. Then, click **EtherCAT I/O Mapping** on the **GR20T-ECT-0808EMN** tab to configure parameters and read the uploaded data of the module. The following table describes functions of each variables when the DIO channel is configured as output.

Parameter name	Description
DO output channel set value	The parameter indicates the set value of the DO output channel. For GR20T-ECT-0808EMN modules, the 8 DIO outputs are set through bit0 to bit7 of this variable, for which bit8 to bit15 are invalid. For GR20T-ECT-1616EMN modules, the 16 DIO outputs are set through bit0 to bit15.
DO stopmode after EtherCAT lost link	The parameter indicates the out status after disconnection of the output channel. For GR20T-ECT-0808EMN modules, the 8 DIO output modes are set through bit0 to bit7 of this variable, for which bit8 to bit15 are invalid. For GR20T-ECT-1616EMN modules, the 16 DIO output modes are set through bit0 to bit15. The preset value is outputted when the value is 1, and the output retains when the value is 0.
DO stopvalue after EtherCAT lost link	The parameter indicates the output preset value after disconnection of the output channel. For GR20T-ECT-0808EMN modules, the preset value of 8 DIO outputs is set through bit0 to bit7 of this variable, for which bit8 to bit15 are invalid. For GR20T-ECT-1616EMN modules, the preset value of 16 DIO outputs is set through bit0 to bit15. The value 1 indicates that the output is high level, and the value 0 indicates that the output is low level.

The DI input filter time represents the input filter time of the DI channel and DIO channel, as shown in the following table.

Filter time	Description	Filter time	Description
0x0000	Maintaining	0x0010	The filter time is 2 ms.
0x0001	No filter	0x0020	The filter time is 4 ms.
0x0002	The filter time is 0.25 ms.	0x0040	The filter time is 8 ms.
0x0004	The filter time is 0.5 ms.	0x0080	The filter time is 16 ms.
0x0008	The filter time is 1 ms.	0x00100	The filter time is 32 ms.

The following table describes the upload parameters of the DI or DIO channel.

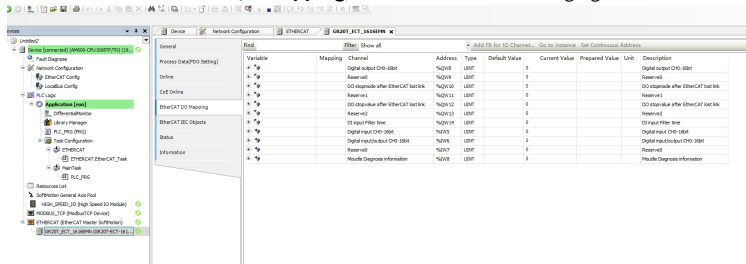
Parameter name	Description
DI channel input value	The parameter indicates the signal value of DI input. For GR20T-ECT-0808EMN modules, the 8 DI inputs are set through bit0 to bit7 of this variable, for which bit8 to bit15 are invalid. For GR20T-ECT-1616EMN modules, the 16 DI inputs are set through bit0 to bit15.
DIO channel input value	The parameter indicates the signal value of DIO input. For GR20T-ECT-0808EMN modules, the 8 DIO inputs are set through bit0 to bit7 of this variable, for which bit8 to bit15 are invalid. For GR20T-ECT-1616EMN modules, the 16 DIO inputs are set through bit0 to bit15.

The screenshot shows the 'EtherCAT I/O Mapping' configuration for a GR20T-ECT-0808EMN module. The table below represents the data shown in the software interface.

Variable	Mapping	Channel	Address	Type	Default Value	Current Value	Prepared Value	Unit	Description
Digital input CH0-18bit	+ #	Digital input CH0-18bit	%I01	UBIT	0				Digital input CH0-18bit
Reserved	+ #	Reserved	%I02	UBIT	0				Reserved
DI stopvalue after EtherCAT testlink	+ #	DI stopvalue after EtherCAT testlink	%I03	UBIT	0				DI stopvalue after EtherCAT testlink
Reserved	+ #	Reserved	%I04	UBIT	0				Reserved
DI stopvalue after EtherCAT testlink	+ #	DI stopvalue after EtherCAT testlink	%I05	UBIT	0				DI stopvalue after EtherCAT testlink
Reserved	+ #	Reserved	%I06	UBIT	0				Reserved
DI input filter time	+ #	DI input filter time	%I07	UBIT	0				DI input filter time
Digital input CH0-18bit	+ #	Digital input CH0-18bit	%I08	UBIT	0				Digital input CH0-18bit
Digital input/output CH0-18bit	+ #	Digital input/output CH0-18bit	%I09	UBIT	0				Digital input/output CH0-18bit
Reserved	+ #	Reserved	%I10	UBIT	0				Reserved
HwDc Diagnose information	+ #	HwDc Diagnose information	%I14	UBIT	0				HwDc Diagnose information

5 Troubleshooting

When the ERR indicator is ON, it indicates that the module encounters a fault. In this case, a fault code is reported and can be accessed through **Module Diagnosis information in EtherCAT I/O Mapping**, as shown in the following figure.



The following table describes the fault codes of the module.

Fault code	Description	Solution
0x0000	No fault	-
0x0001	24 V power supply not connected	Check whether the 24 V power supply of the module is connected properly.
0x0002	DO output overcurrent	Check whether the output connection is short-circuited.