



PS00007195A02

GE20-3200END-M Digital Input Module User Guide

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Preface

■ Introduction

GL20-3200END-M series 32-channel digital input expansion module supports input of source type and can be used with GL20 series communication interface modules and Easy series PLC products.

This guide describes the mechanical installation, electrical installation and programming examples of the product.

■ Standard 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 Name		Standard
CE certification	EMC directive	2014/30/EU	24 VDC products EN 61131-2 24 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 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 Name	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.
GL20-RTU-PN Communication Interface Module User Guide	PS00007594	This guide describes the installation, wiring and more of the product.

■ Revision History

Date	Version	Description
April 2023	A02	New: Added General specifications in section 1.3 Update: ● Updated section 2.2 ● Updated section 3.1
January 2023	A01	Minor corrections.
January 2023	A00	First release.

■ How to Obtain

This guide is not shipped with the product. If you need to obtain the electronic PDF file, you can obtain it in the following 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 on the product with your mobile phone.

■ **Warranty Agreement**

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:

- Operations not following the user instructions
- Fire, flood, or abnormal voltage
- Use of the product for non-recommended functions
- Use of the product outside the scope of intended use
- Force majeure such as natural disasters, earthquake, lightning strike

The maintenance fee 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.

Fundamental Safety Instructions

■ Safety Precautions

1. Before installing, using, and maintaining this equipment, read the safety information and precautions thoroughly, and comply with them during operations.
2. To ensure the safety of humans and products, follow the signs on the product and all the safety instructions in this user guide.
3. "CAUTION", "WARNING", and "DANGER" items in the 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 injuries 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 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.

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.



- 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 indoor electrical environment (overvoltage category II). The power supply must have a system-level lightning protection device, assuring that overvoltage due to lightning shock cannot be applied to the PLC power supply input terminals, signal input terminals and output terminals and so forth, so as to avoid damage to the equipment.

Installation



- 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.



- 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



- 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.



- 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



- 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

- On-site manual devices or other backup means must be equipped in the position where the operator directly touches the mechanical parts, such as loading and unloading mechanical tools, or the position where the machine runs automatically. The manual devices and backup means, which can start or interrupt automatic operations of the system, must be independent of the programmable controller.
- 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 Model Number and Nameplate

GL 20 - 32 00 E ND - M

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① Product Information GL: General local module	③ I/O Points 32: 32 inputs	⑤ Module Type E: Logic I/O expansion module	⑦ Terminal Type M: Ejector header (For the PUSHIN terminal, this item is empty by default)
② Serial Number 20: 20 series module	④ I/O Points 00: 0 outputs	⑥ Output type ND: Transistor input (source/sink)	- -



INOVANCE

 SN:0123456789123456

GL20-3200END-M
32 Digital Input Module

POWER INPUT: NONE
OUTPUT: NONE

QC PASSED

Certification





MANUAL

SS1	01	02	SS1
DI37	05	06	DI27
...	...	...	...
DI31	17	18	DI21
DI30	19	20	DI20
...	...	...	...
SS0	23	24	SS0
DI17	25	26	DI07
...	...	...	...
DI11	37	38	DI01
DI10	39	40	DI00

NPN

↑ or

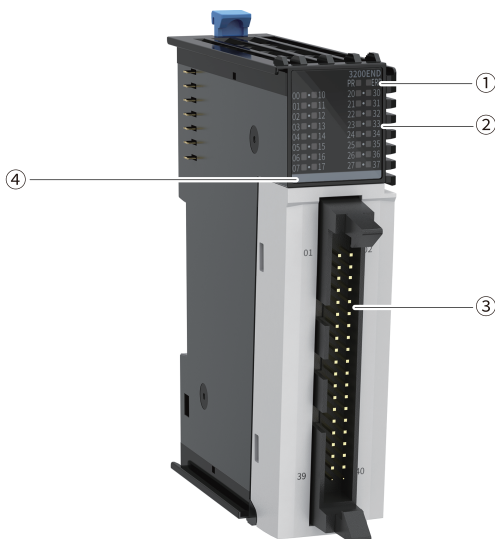
PNP

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

Model	Description	Product Code	Applicable Model
GL20-3200END-M	GL20 series 32-channel digital input module	01440378	Easy series products and GL20 series communication interface modules

1.2 Components



No.	Name	Description			
①	Signal Indicator	PR (POWER +RUN)	Power / running indicator	Yellow green	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	Module fault
②	I/O signal indicator	00 to 37	I/O signal indicator	Yellow green	ON: Input/Output active OFF: Input/Output inactive
③	Terminals	/	32 inputs and 0 outputs	/	See Terminal Definition for detailed definition "3.2 Terminal Definition" on page 19
④	Color identification		Red: Digital output		Orange: Analog output
			Gray: 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 Specifications

■ General specifications

Item	Specification
IP rating	IP20
Dimensions (W x H x D)	24 mm x 100 mm x 75 mm
Weight	Approx. 82 g

■ Power supply specifications

Item	Specification
Rated bus input voltage	5 VDC (4.75 VDC to 5.25 VDC)
Rated bus input current	125 mA (typical@5 V)
Rated terminal input voltage	/
Rated terminal input current	/
Rated terminal output voltage	/
Rated terminal output current	/
Hot swap	Not supported

■ Input specification

Item	Specification
Input type	Digital input
Input mode	Sink/Source
Input channels	32
Input voltage class	24 VDC $\pm$ 10% (21.6 VDC to 26.4 VDC)
Input current (typical)	4 mA (typical@24 V)
ON voltage	15 VDC
OFF voltage	<5 VDC
ON/OFF hardware response time	100 μ s/100 μ s
Software filter time	Supported

Item	Specification
Input impedance	Reference: 5.3k to 5.6k
Isolation	Yes
Input action display	Input indicators are turned ON (via software control) when the inputs are in the driving state
Input derating	Full load when operating at 45°C, and the number of active input channels reduces to 50% (namely, 16 input channels available)

■ Software specifications

Item	Specification
Programming software version	AutoShop V4.8.1 and above InoProShop V1.7.3 and above
Software input filter time	Options include Without filter, 0.25 ms, 0.5 ms, 1ms (factory setting), 2 ms, 4 ms, 8 ms, 16 ms, and 32 ms. You can set two filter time parameters, each for 16 channels.
Input port anomaly detection and indication	/
Input channel logic level configuration	Not supported
Independent channel enable configuration	Not supported
Diagnostic report configuration	Not supported
Stop mode	Outputs are not refreshed, inputs can be refreshed when in state SAFE-OPERATIONAL
I/O mapping	Supports bitwise, byte-wise and word-wise addressing

1.4 Environmental Specifications

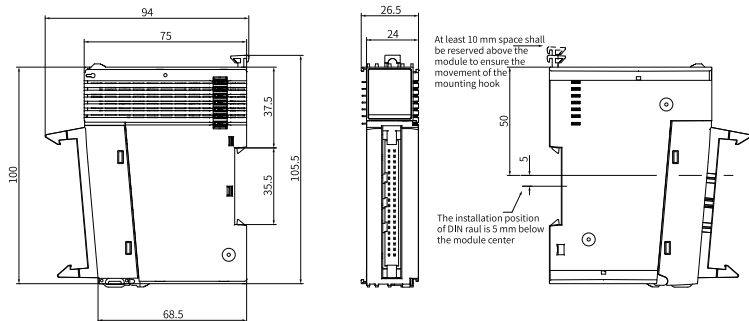
Item	Specification
Ambient operating temperature	-20°C to 55°C
Ambient operating humidity	10% to 90% RH (non-condensing)
Working environment	No corrosive and flammable gas and no excessive conductive dust
Ambient storage temperature	-40°C to 70°C (<90% RH, non-condensing)
Altitude	≤2000 m
Pollution degree	2 or less
Noise immunity	2 kV on power supply line (Conforms to 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

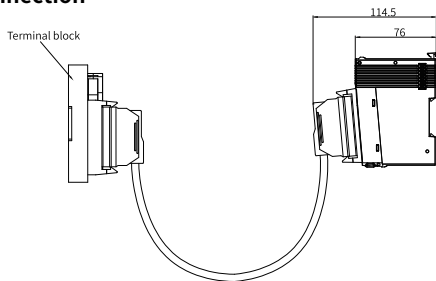
2.1 Mounting Dimensions

■ Module

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



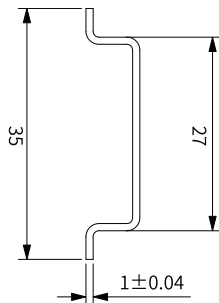
■ Cable Connection



2.2 Installation Method

■ Installing Modules Side-by-Side

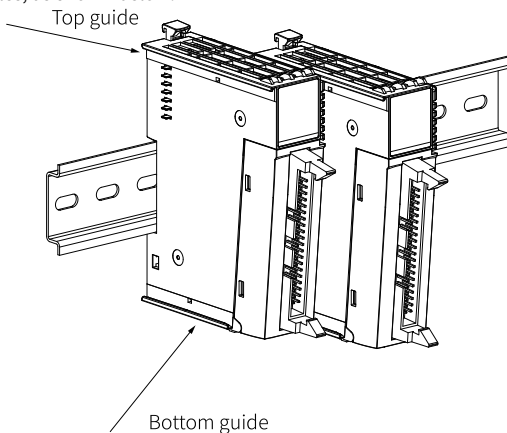
The module is mounted onto a DIN rail in conformity with IEC 60715 (width: 35 mm, thickness: 1 mm). The dimensions (unit: mm) are shown below.



Caution

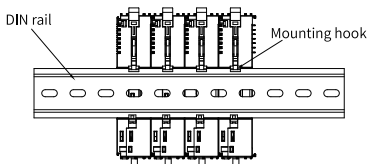
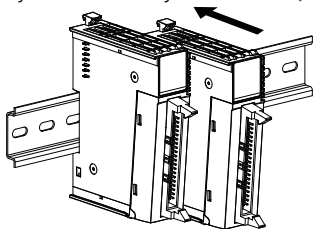
When installed on a DIN rail other than the recommended one (especially the one whose thickness is not 1.0 mm), the module will not fit in place as the mounting hook does not work.

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

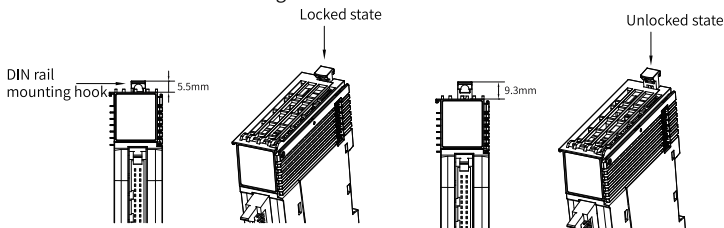


■ Installing Module onto DIN Rail

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.

Press down the mounting hook to lock the module to the DIN rail.

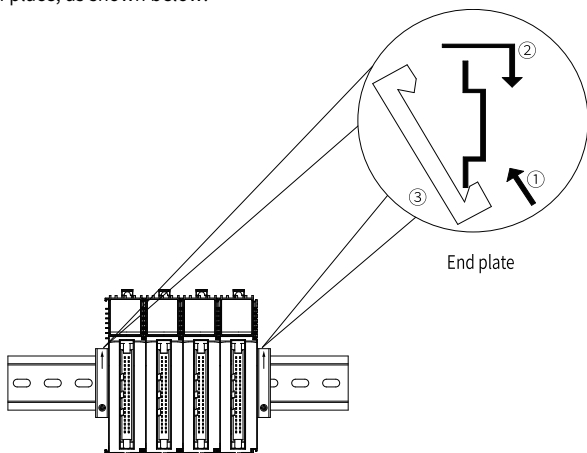


Caution

When the module is not installed on the rail, keep the mounting hook in the locked state. Keeping the mounting hook unlocked for a prolonged time may cause the hook to fail.

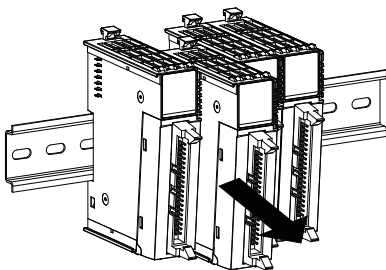
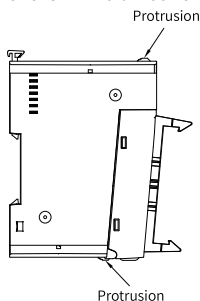
3. Mount an end plate on either side of the module assembly. To mount the end plate, hook the bottom of it to the bottom of the DIN rail, rotate the end plate to hook

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

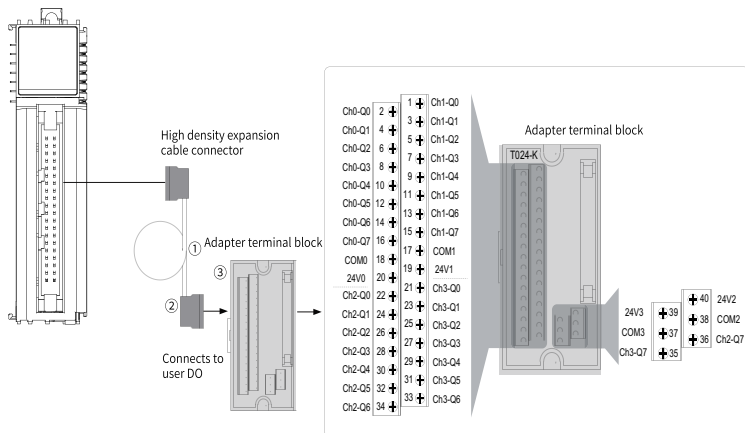
3.1 External Terminal Block and Cable Selection

The following table describes the order data of the terminal block and the cable.

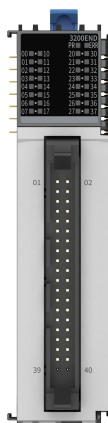
Name	Material Code	Specification and ModelModel	Description	Remarks
Cable (connector not provided)	15310167	CAB-MIL40-MIL40-0.5	40PIN MIL cable (500 mm)	High density adapter cable, including two 40PIN MIL connectors (500 mm)
	15310166	CAB-MIL40-MIL40-2	40PIN MIL cable (2000 mm)	High density adapter cable, including two 40PIN MIL connectors (2000 mm)
Terminal block	15020452	T024-K	40PIN MIL-to-screw terminal block	T024-K

■ Terminal Block Connection

After installation, connect the module to the external I/O terminal block through a connecting cable. This module supports one external terminal block. When the T024-K adapter terminal block is used for connection, the correspondence between the terminals of the terminal block and the terminals of the module is shown in the figure below (When other types of adapter terminal blocks are used, check the terminal correspondence.)

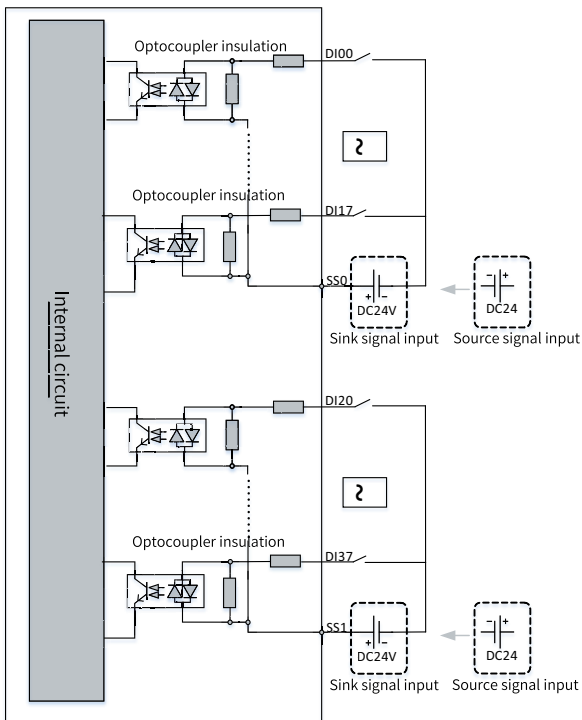


3.2 Terminal Definition



Left Indicator	Left Signal	Left Terminal	Right Terminal	Right Signal	Right Indicator
/	/	01	02	/	/
/	SS1	03	04	SS1	/
37	DI37	05	06	DI27	27
36	DI36	07	08	DI26	26
35	DI35	09	10	DI25	25
34	DI34	11	12	DI24	24
33	DI33	13	14	DI23	23
32	DI32	15	16	DI22	22
31	DI31	17	18	DI21	21
30	DI30	19	20	DI20	20
/	/	21	22	/	/
/	SS0	23	24	SS0	/
17	DI17	25	26	DI07	07
16	DI16	27	28	DI06	06
15	DI15	29	30	DI05	05
14	DI14	31	32	DI04	04
13	DI13	33	34	DI03	03
12	DI12	35	36	DI02	02
11	DI11	37	38	DI01	01
10	DI10	39	40	DI00	00

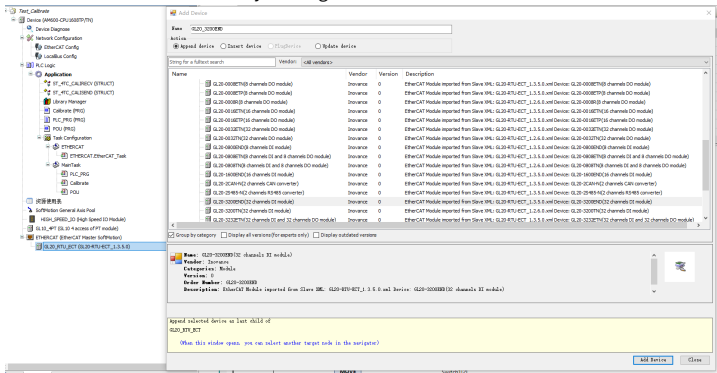
3.3 Terminal Wiring



4 Programming Examples

The following is an example where AM600 is used as the master control module along with the GL20-3200END module.

1. Add GL20-3200END module by adding it under the GL20_RTU_ECT module.



2. Double click the module to set the filter time of the channels.

Startup parameters(SDO Setting)

Channels Config

Status

Information

Access - 1

Filter Time: 1ms

Access - 2

Filter Time: 1ms

Access - 3

Filter Time: 1ms

Out Status after stop or disconnection - Channel 0

☐ Output last value
 ☒ Output preset value
 ☐ Bitwise setting

Preset value:

Group	0	1	2	3	4	5	6	7
I	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE

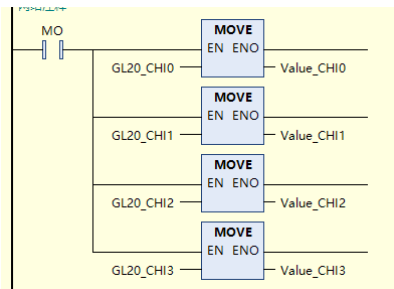
3. Add custom input variables GL20_CHI0, GL20_CHI1, GL20_CHI2, and GL20_CHI3.

PROGRAM POU									
	Scope	Name	Address	Data type	Initialization	Persistent	Constant	Comment	Attributes
17	VAR	M0_Switch		BOOL		☐	☐		
18	VAR	Switch1		ARRAY[1..16] OF BOOL		☐	☐		
19	VAR	GL20_3200_CHI0		USINT		☐	☐		
20	VAR	GL20_3200_CHI1		USINT		☐	☐		
21	VAR	GL20_3200_CHI2		USINT		☐	☐		
22	VAR	GL20_3200_CHI3		USINT		☐	☐		

4. Map the variables GL20_CHI0, GL20_CHI1, GL20_CHI2, and GL20_CHI3 to the input channels of the configured module.

General	Find	Filter	Show all	Add FB for IO Channel... Go to Instance			
Process Data(PDO Setting)	Variable	Channel	Address	Type	Default Value	Unit	Description
Startup parameters(SDO Setting)	+	Device control	%QW1	UINT			Device control
Online	+	LBUS status	%LW10	UINT			LBUS status
CoE Online	+	Fault ID	%LW11	UINT			Fault ID
Device Diagnosis	+	Application.POU.GL20_3200_CH00	?	GL20_3200END Digital input CH0-8bit	%IB24	USINT	GL20_3200END Digital input CH0-8bit
	+	Application.POU.GL20_3200_CH01	?	GL20_3200END Digital input CH1-8bit	%IB25	USINT	GL20_3200END Digital input CH1-8bit
	+	Application.POU.GL20_3200_CH02	?	GL20_3200END Digital input CH2-8bit	%IB26	USINT	GL20_3200END Digital input CH2-8bit
	+	Application.POU.GL20_3200_CH03	?	GL20_3200END Digital input CH3-8bit	%IB27	USINT	GL20_3200END Digital input CH3-8bit
EtherCAT I/O Mapping							
EtherCAT IEC Objects							
Status							
Information							

5. Define the input and output variables with the LD programming language as shown in the figure below.



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