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PS00005506A04

Easy52X Series Programmable Controller

User Guide

Suzhou Inovance Technology Co., Ltd.

Add.:No.52, Tian'e Dang Road, Wuzhong District,
Suzhou 215104, P.R. China
Tel: (0512) 6637 6666 Fax: (0512) 6285 6720
www.inovance.com

Preface

■ Introduction

This product is a new generation of small-sized programmable logic controller (PLC) independently developed by Inovance. It supports EtherCAT bus control and network switching over dual network ports. It allows process encapsulation and reuse through the Function Block (FB) and Function (FC) features, and supports multi-layer network communication through the RS485, Ethernet, and EtherCAT ports. This product can accommodate a maximum of 16 expansion modules. For module types supported, see the section of "Local Expansion Modules" in the "H5U and Easy Series Programmable Logic Controller Programming and Application Guide". This product can also provide the RS485, RS232, CAN, digital input (DI), digital output (DO), analog input (AI), analog output (AO), real-time clock (RTC), and trans-flash (TF) card features through expansion cards.

This guide describes the installation and wiring of the product, including product information, mechanical installation, and electrical installation.

■ Compliance

The following table lists the certifications, directives, and standards applicable to this product. For certifications actually acquired for the product you purchased, see the certification marks on the product nameplate.

Certification	Directive		Standard
CE	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	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	-		UL 61010-1 UL 61010-2-201 CAN/CSA-C22.2 No. 61010-1 CSA-C22.2 No. 61010-2-201
KCC	-		-
EAC	-		-
UKCA	Safety Regulations	Electrical Equipment (Safety) Regulations 2016	EN 61010-1 EN 61010-2-201
	EMC Regulations	Electromagnetic Compatibility Regulations 2016	**24 VDC products:** EN 61131-2 **220 VAC products:** EN 61131-2 EN 61000-3-2 EN 61000-3-3
	RoHS Regulations	Directive (RoHS) Regulations 2012	EN IEC 63000

■ More Documents

Doc Name	Data Code	Description
GE20 Series Expansion Card User Guide	PS00006443	Describes the product information, installation and wiring, and programming examples of the GE20 series expansion card
H5U and Easy Series Programmable Logic Controller Programming and Application Guide	19012249	Describes the basics of PLC programming, quick start guide, communication, motion control, and high-speed counter usage
H5U and Easy Series Programmable Logic Controller Instruction Guide	19011939	Describes the basic instructions and complex instructions used for programming applications, as well as examples of these instructions
Easy52X Series Programmable Logic Controller User Guide (this guide)	PS00005506	Describes the installation and wiring of the product, including product information, mechanical installation, and electrical installation

■ Revision History

Date	Version	Description
July 2024	A04	**Addition** Added the I/O terminal wiring in *"3.2 Terminal Wiring" on page 31*. **Change** • Updated the note for power-off and restart in *"1.2 Components" on page 12*. • Updated the program data capacity in *"1.3.1 General Specifications" on page 16*. • Updated the number of axes supported in *"1.3.1 General Specifications" on page 16*. • Updated the rated current of bus input power for the GL20-3232ETN-M expansion module in *"1.3.2 Power Supply Specifications" on page 17*.

Date	Version	Description
February 2024	A03	**Addition** • Added the PNP model in *"1.1 Model Number and Nameplate" on page 11*. • Added the PNP specifications in the high-speed input item in *"1.3.1 General Specifications" on page 16*. • Added the PNP specifications in the high-speed input (X0 to X7) item in *"1.3.3 Input Specifications" on page 18*. • Added the PNP specifications in the output type item in *"1.3.4 Output Specifications" on page 19*. • Added the PNP output terminal wiring in 3.2 Terminal Wiring. • Added the Easy52X series programmable controller models and the GL20 series expansion module models in *" Appendix" on page 45*. **Change** • Updated the descriptions of status indicators in *"1.2 Components" on page 12*. • Updated the power supply specifications in *"1.3.2 Power Supply Specifications" on page 17*.
March 2023	A02	Updated the diagram of DIN rail buckles; added some product specification data
October 2022	A01	• Added support for CAN communication • Corrected minor errors
August 2022	A00	First release

■ Access to the Guide

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

- **Inovance website:** Visit *www.inovance.com*, go to "Support" > "Download", search by keyword, and then download the PDF file.
- **QR code:** Scan the QR code on the product with your smart phone to obtain the corresponding guide.
- **My Inovance app:** Scan the QR code below to install the My Inovance app, and search for the corresponding guide in the app.

■ Warranty

For faults and damage incurred during normal use in the warranty period, Inovance provides free repair service. (For details of the warranty period, see the purchase order.) A maintenance fee will be charged out of the warranty period.

Even in the warranty period, a maintenance fee will be charged for repair of the following damage:

- Damage caused by operations not following the instructions in the guide
- Damage caused by fire, flood, or abnormal 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 fee will be charged according to our latest Price List if not otherwise agreed upon.

For details, see the Product Warranty Card.

General Safety Precautions

■ Safety Disclaimer

1. Read the safety precautions before installing, operating, and maintaining this product.
2. To ensure personal and equipment safety, follow all safety precautions marked on the product and described in the user guide when installing, operating, and maintaining this product.
3. "CAUTION", "WARNING", and "DANGER" messages in the guide are only examples and do not cover all safety precautions.
4. Use this product in an environment that complies with the design specifications. Malfunctions or component damage caused by improper use is not covered by warranty.
5. Inovance shall not be liable for any physical injuries or property loss caused by improper use.

■ Safety Categories and Definitions

"DANGER" indicates that failure to comply with the notice will result in severe physical injuries or even death.

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

"CAUTION" indicates that failure to comply with the notice may result in minor or moderate physical injuries or equipment damage. Keep this guide properly for future reference and forward it to the end user.

Control System Design

- Design a safety circuit to ensure that the control system can still work safely when the external power supply is cut off or the programmable controller fails.
- The product may catch fire or emit smoke in case of prolonged overcurrent due to overload or short circuit of load. Therefore, configure an external safety device such as a fuse or circuit breaker.

WARNING

- Design an external emergency stop circuit, protective circuit, forward and reverse rotation interlock circuit, as well as up and down limit interlock circuit to be connected to the programmable controller.
- Design an external protective circuit and a safety mechanism for output signals that may cause major incidents.
- When the programmable controller CPU detects a system exception, it may turn off all outputs. When partial circuit of the controller malfunctions, the controller outputs may become uncontrollable. To ensure proper operation, it is necessary to design an appropriate external control circuit.
- If a programmable controller output unit such as the relay or transistor is damaged, its output cannot be controlled to turn ON or OFF.
- The programmable controller is intended for use in an indoor electrical environment with an overvoltage class of II. The power system must contain a lightning arrester to prevent lightening from causing overvoltage on the power supply input, signal input, and control output terminals of the programmable controller and damaging the equipment.

Installation

WARNING

- Only allow trained professionals with electrical expertise to install this product.
- Cut off all external power sources before you install or remove this product. Failure to comply may result in electric shock or faults or malfunctions of this product.
- Do not use the programmable controller in places with dirt, oily fume, conductive dust, corrosive gas, flammable gas, high temperature, condensation, wind and rain, vibration, or shock. Electric shock, fire, and improper operation will lead to damage and deterioration of the product.
- The programmable controller is an open-type device to be installed in a control cabinet with a door lock (housing IP rating higher than IP20). Only allow trained operators with electrical expertise to open the cabinet.

CAUTION

- During installation, prevent metal chippings and cable ends from falling into the vent of the product. Failure to comply may result in fire, faults, or malfunctions.
- After installation, ensure that no unwanted objects exist on the ventilation surface. Failure to comply may result in poor heat dissipation, fire, faults, or malfunctions.
- During installation, tightly connect the product and its connectors and firmly lock its hooks. Improper module installation may lead to malfunctions, faults, and detachment.

Wiring

- Only allow trained professionals with electrical expertise to conduct wiring for this product.
- Cut off all external power sources before wiring. Failure to comply may result in electric shock or equipment faults or malfunctions.
- Properly insulate the cable terminals and ensure a proper insulation distance between the cables connected to the terminal block. Failure to comply will result in electric shock or equipment damage.

- Turn off the main power supply before connecting it to the product. Failure to comply may result in electric shock.
- Select a proper power supply according to the power supply specifications of the product in the "Technical Specifications" section. If the selected power supply is beyond the required range, the product may be damaged. Regularly check whether the DC power provided by the switching-mode power supply unit is stable.

Operation and Maintenance

- Only allow trained professionals with electrical expertise to operate and maintain this product.
- Do not touch terminals when the power is on. Failure to comply may result in electric shock or malfunctions.
- Cut off all external power sources before you clean the product. Failure to comply may result in electric shock.
- Cut off all external power sources before you install or remove the product or communication cables. Failure to comply may result in electric shock or malfunctions.

Safety suggestions

- In places where operators have direct contact with mechanical parts, such as loading and unloading places and areas with automatic machinery operation, carefully configure an on-site manual operating device or alternative means that works independently of the programmable controller and can start or stop the automatic operation.
- If programs need to be modified when the system is running, apply a lock or take other necessary measures to ensure that only authorized personnel can perform such modification.

Disposal

- Dispose of this product as industrial wastes. Dispose of the battery separately in accordance with local laws and regulations.
- Recycle retired equipment in accordance with waste disposal standards of the industry to avoid environmental pollution.

1 Product Information

1.1 Model Number and Nameplate

■ Model number

Easy 52*X* – 0808 T*X*

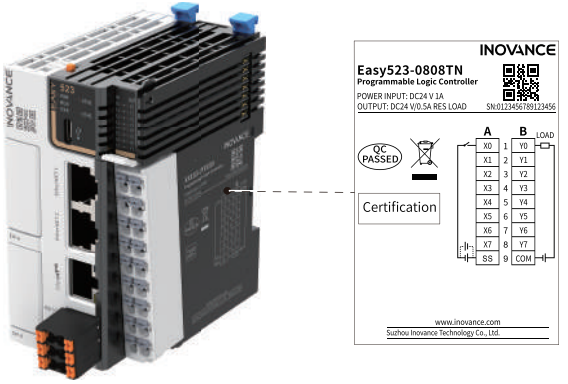
① ② ③ ④

① **Product series** Easy: Easy series programmable logic controller	③ **Input and output channels** 08: 8-channel input 08: 8-channel output
② **Model code** 5: 500 series platform 2: Two Ethernet ports X: Number of EtherCAT axes. "1" means 8 axes, "2" means 16 axes, and "3" means 32 axes.	④ **Output type** X indicates N or P. TN: Sink transistor TP: Source transistor

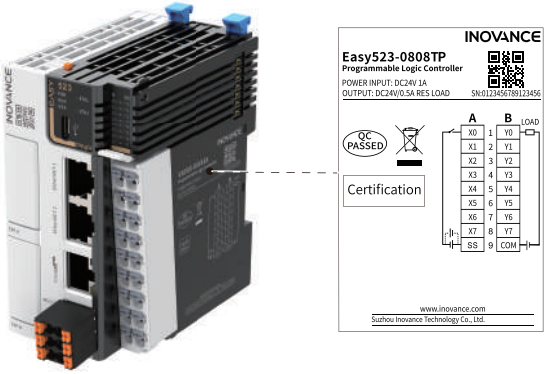
■ Nameplate

The Easy52X series have identical nameplates except for the model number and SN code. This section uses the Easy523 model as an example.

Easy523-0808TN



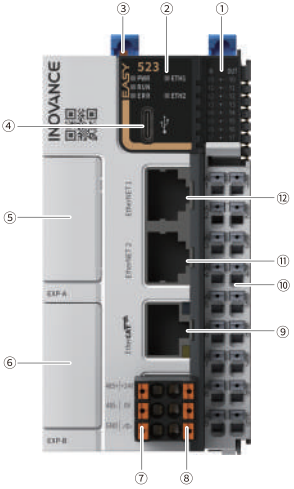
Easy523-0808TP



Model	Description	Code
Easy521-0808TN	Easy500 series 8-input 8-output 8-axis programmable controller	01440385
Easy522-0808TN	Easy500 series 8-input 8-output 16-axis programmable controller	01440383
Easy523-0808TN	Easy500 series 8-input 8-output 32-axis programmable controller	01440326
Easy521-0808TP	Easy500 series 8-input 8-output 8-axis programmable controller	01440606
Easy522-0808TP	Easy500 series 8-input 8-output 16-axis programmable controller	01440605
Easy523-0808TP	Easy500 series 8-input 8-output 32-axis programmable controller	01440604

1.2 Components

Components are identical for the entire Easy52X series. This section uses the Easy523-0808TN model as an example for illustration.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No.	Port Type	Mark	Meaning	Indicator Color	Description
①	I/O indicator	IN/OUT	I/O status	Yellow-green	• Steady ON: Input or output active • OFF: Input or output inactive
②	Operation status indicator	PWR	Power supply normal	Yellow-green	• Steady ON: Power supply normal • OFF: Power supply off or abnormal
		RUN	Normal running	Yellow-green	• Steady ON: User program running • OFF: User program stopped
		ERR	Running error	Red	• OFF: No major error • Blinking[1]: Major error
		ETH1	Ethernet 1 link	Yellow-green	• Steady ON: Connected • Blinking: Communication in progress • OFF: Disconnected
		ETH2	Ethernet 2 link	Yellow-green	• Steady ON: Connected • Blinking: Communication in progress • OFF: Disconnected
③	DIP switch	RUN/STOP	Run/Stop control	-	-
④	Type-C port		Communication with PC	-	-
⑤/-⑥	Expansion card slot	01/02	Expansion card slots, used to expand features	-	For expansion card options, see "*Appendix*" on page 45.

No.	Port Type	Mark	Meaning	Indicator Color	Description
⑦	RS485	RS485+	RS485 communication signal+	-	-
		RS485–	RS485 communication signal–	-	-
		GND	RS485 communication ground	-	-
⑧	Power terminal	+24V	24 VDC power supply+	-	-
		0V	24 VDC power supply–	-	-
		⏚	PE	-	-
⑨	EtherCAT port	EtherCAT	EtherCAT communication	-	-
⑩	I/O terminal	-	8-channel input and 8-channel output	-	For details, see *"3.1 Terminal Arrangement" on page 30*.
⑪/-⑫	Ethernet port	EtherNET1/ EtherNET2	RJ45 ports used for Ethernet communication	-	-

Caution

[1]: If the product malfunctions and needs to be powered off and restarted, be sure to turn off the power and unplug the USB power cable, and wait for at least 10 seconds after the power indicator is off before proceeding with the power-on and startup operation.

1.3 Product Specifications

1.3.1 General Specifications

Item	Easy521-0808TX	Easy522-0808TX	Easy523-0808TX
Program data capacity	• User program: 200 kB steps • Customized variables: 2 MB (including 128 kB retentive at power failure) • Soft elements: approx. 150 kB (retentive at power failure after No. 1000; non-retentive at power failure when only powered by USB)		
Instruction processing speed	20,000 steps executed in 1.6 ms		
Bit operation	0.113 μs/instruction		
Word transmission	0.232 μs/instruction		
Floating point operation	0.578 μs/instruction		
Ethernet	Support for EtherNet/IP, Modbus TCP, Socket, and PROFINET slaves, FINS TCP and FINS UDP slaves, program upload and download, and firmware upgrade		
EtherCAT communication	Support for one EtherCAT master and a maximum of 72 EtherCAT slaves		
Number of axes supported (pulse + EtherCAT bus)	Maximum 8 axes Maximum 8 bus axes, 8 profile axes, 5 local pulse axes, and 16 virtual axes	Maximum 16 axes Maximum 16 bus axes, 16 profile axes, 5 local pulse axes, and 16 virtual axes	Maximum 32 axes Maximum 32 bus axes, 32 profile axes, 5 local pulse axes, and 32 virtual axes
Serial communication	Support for a maximum of three channels (one on the PLC itself and two through the expansion cards) **Note**: Expansion with the GL20-2S485 and GL20-2SCOM serial modules is supported.		
CAN communication	Support for one master through an expansion card (requiring the firmware version of 5.66.0.0 or later and AutoShop version of 4.8.0.0 or later) • CANlink: Maximum 62 slaves • CANopen: Maximum 30 slaves and 16 axes		

Item	Easy521-0808TX	Easy522-0808TX	Easy523-0808TX
High-speed input	• Easy52X-0808TN: Single-phase 8-channel at 200 kHz • Easy52X-0808TP: Single-phase 8-channel at 100 kHz		
High-speed output	5 axes at 200 kHz; PWM supported		
Expansion module	Maximum 16 local expansion modules		
Expansion card	Maximum two expansion cards		
Programming language	LD, SFC; FB/FC supported (LD)		
Type-C	Support for user program upload and download and firmware upgrade through the Type-C port or a GE20-TF memory expansion card		
IP rating	IP20		
Dimensions (W x H x D)	53 mm x 100 mm x 80 mm		
Weight	Approx. 197 g		

1.3.2 Power Supply Specifications

Item	Specifications
Rated voltage of terminal input power	24 VDC±10% (21.6 VDC to 26.4 VDC)
Rated current of terminal input power	1 A (maximum value at 24 VDC)
Rated voltage of bus output power	5 VDC (4.75 VDC to 5.25 VDC)
Rated current of bus output power[1]	2 A (typical value at 5 V)
24 V input power protection	Protection against short circuit and reverse connection
Hot swapping	Not supported

Note

[1]: Expansion modules are powered by the Easy programmable logic controller. Therefore, the sum of the rated current values of the bus input power for expansion modules must not be greater than the current value specified in the table (⩽ 2 A). For example, the rated current of the bus input power for the GL20-3232ETN-M expansion module is 250 mA, so at most eight such modules can be connected to the Easy series programmable logic controller (2 A/250 mA = 8).

1.3.3 Input Specifications

Item		Specifications
Input type		Digital input
Number of input channels		8
Input mode		Sink/Source
Input voltage class		24 VDC±10% (21.6 VDC to 26.4 VDC)
High-speed input (X0 to X7)	Input current when input is ON	• Easy52X-0808TN: > 4 mA • Easy52X-0808TP: > 2.5 mA
	Input current when input is OFF	• Easy52X-0808TN: < 2.5 mA • Easy52X-0808TP: < 1.5 mA
	Hardware response time	2 μs (RC time)
	Maximum input frequency	• Easy52X-0808TN: 200 kHz • Easy52X-0808TP: 100 kHz
	Input impedance	• Easy52X-0808TN: 3.4 kΩ • Easy52X-0808TP: 5.7 kΩ
ON voltage		⩾ 15 VDC
OFF voltage		⩽ 5 VDC
Software filter time		• Low-speed: 2 ms to 1,000 ms • High-speed: 2 μs to 1,000 μs
Isolation mode		Capacitive isolation for integrated chip

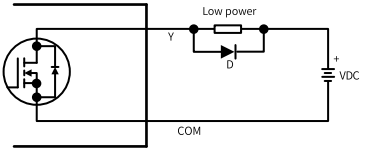
Item	Specifications
Common terminal mode	8-point/common terminal (positive/negative polarity of input power being changeable)
Input action display	The input indicator lights up (controlled by software) when the input is in drive state.

1.3.4 Output Specifications

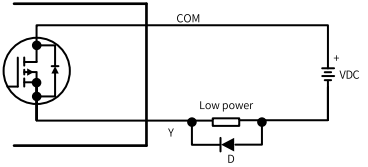
Item		Specifications
Output type		• TN: Transistor NPN output • TP: Transistor PNP output
Number of output channels		8
Output voltage class		24 VDC±10% (21.6 VDC to 26.4 VDC)
High-speed output (Y0 to Y7)	Output load (resistive load)	0.5 A/point; 2 A/8-point
	Output load (inductive load)	7.2 W/point; 24 W/8-point
	Output load (lamp load)	5 W/point; 18 W/8-point
	Hardware response time (ON/OFF)	< 1 μs (OFF→ON); < 2 μs (ON→OFF)
	Load current requirements	Load current ⩾ 12 mA when the output is greater than 10 kHz
	Maximum output frequency	200 kHz for resistive load; 0.5 Hz for inductive load; 10 Hz for lamp load
Leakage current during OFF		< 30 μA at rated 24 V
Maximum residual voltage during ON		< 0.5 VDC
Isolation mode		Digital isolator
Common terminal mode		8-point/common terminal (polarity of output power supply being negative)
Short circuit protection		Protection against short circuit of each channel, recovered after power-off
External inductive load protection		A flywheel diode[1] is required when an external inductive load is connected.
Output action display		The output indicator lights up (controlled by software) when the output is in drive state.

[1]: Use a 1N4001 (50 V/1 A) or similar diode, as marked by "D" in the following figure.

- **Easy52X-0808TN**



- **Easy52X-0808TP**

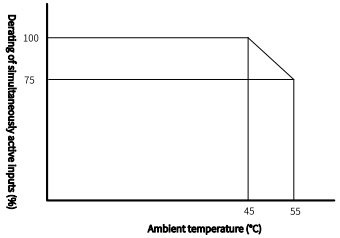


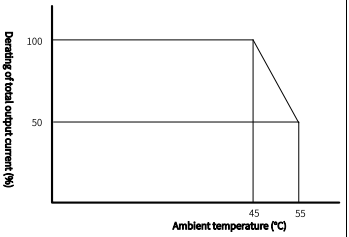
2 Mechanical Installation

2.1 Installation Environment Requirements

When installing the programmable controller on the guide rail, take the operability, maintainability, and environment adaptation into account.

Item	Specifications
Operating environment	Places without corrosive or inflammable gas or severe conductive dust
Altitude	Maximum 2,000 m (80 kPa)
Pollution degree	PD2
Interference immunity	2 kV on power supply line (IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC 61131-2
Vibration resistance	IEC 60068-2-6; 5 Hz to 8.4 Hz: 3.5 mm; 8.4 Hz to 150 Hz: 1·g; three axes: X, Y, and Z; 10 sweeps/axis
Shock resistance	IEC 60068-2-27; 150 m/s^2; 11 ms; six directions: ±X, ±Y, and ±Z; 3 cycles/direction, totaling 18 cycles
Overcurrent protection device	1.5 A fuse
Storage temperature and humidity	• Temperature: –20°C to +60°C • Relative humidity: < 90%, non-condensing
Transportation temperature and humidity	• Temperature: –40°C to +70°C • Relative humidity: < 95%, non-condensing
Ambient temperature and humidity	• Temperature: –20°C to +55°C (for horizontal installation), –20°C to +45°C (for non-horizontal installation) • Relative humidity: < 95%, non-condensing **Note: When the ambient temperature exceeds the upper limit, a forced draft fan or air conditioner must be installed in the heat dissipation hole direction.**

Item	Specifications
Installation position and limit	Installation position: The PLC can be installed in four directions. For details, see *"2.2 Installation Position Requirements" on page 23*. Limit: Horizontal installation: • Input derating: When the ambient temperature is 45°C, the PLC can work at full load. When the ambient temperature is 55°C, the number of simultaneously active inputs shall be reduced to 75% (that is, no more than six inputs), at a derating rate of 2.5% per 1°C of temperature rise.  (To be continued)

Item	Specifications
(Continued)	Continued • Output derating: When the ambient temperature is 45°C, the PLC can work at full load (that is, the total current of the eight outputs not higher than 2 A). When the ambient temperature is 55°C, the total current of simultaneously active outputs shall be reduced to 50% (that is, the total current of the eight outputs not higher than 1 A), at a derating rate of 5% per 1°C of temperature rise.  Non-horizontal installation: A maximum of six inputs can be in active state simultaneously, and the maximum allowed output current is 1 A. A maximum of six modules can be installed.

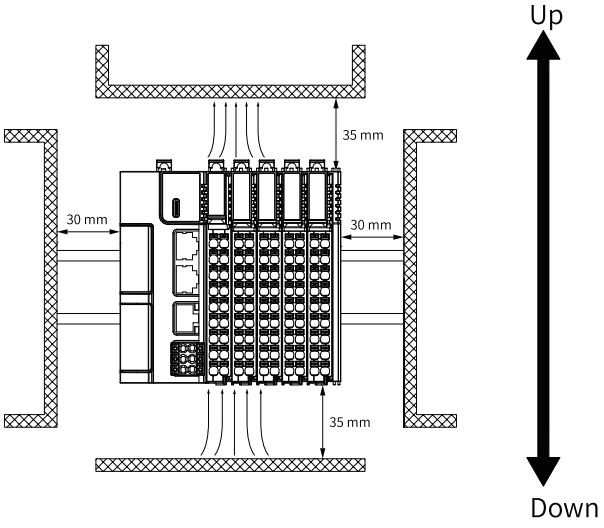
2.2 Installation Position Requirements

This product can be installed in four positions (modes): horizontal (recommended), vertical, cabinet top, and cabinet bottom. Different modes have different ambient temperature requirements. For details, see *"2.1 Installation Environment Requirements" on page 21*.

■ Optimal installation position

The optimal installation mode is horizontal, adopting natural convection for heat dissipation. To ensure normal ventilation and heat dissipation and sufficient wiring

space, sufficient clearance must be reserved around the product, as shown in the following figure.

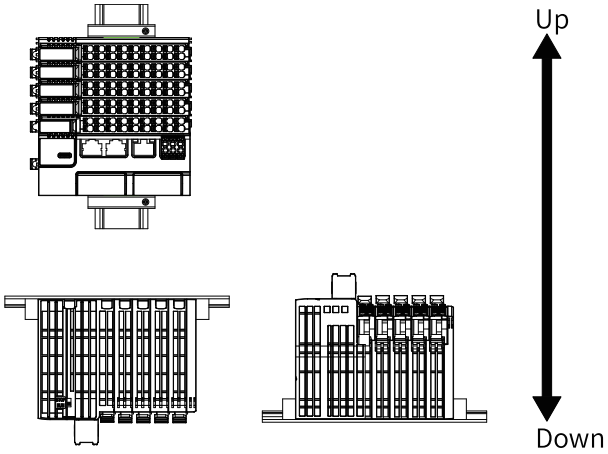


Note

Keep the PLC away from high-temperature heating sources (heater, transformer, large resistor, etc.) by at least 100 mm.

■ Other installation positions

For other installation positions, the same clearance requirements as the optimal installation position apply. Other installation positions are shown in the following figure.



Caution

In case of vertical installation:

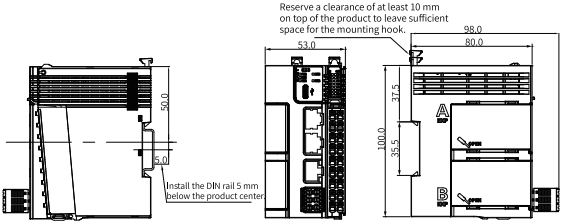
- Install the PLC below all I/O modules.
- Hold the cables with a cable duct to prevent the weight of cables being applied to the lower end plate. Failure to comply may cause displacement of the PLC from the DIN rail, leading to maloperation of the PLC.

2.3 Installation Precautions

- Before installing or removing the PLC and modules, ensure that they are powered off.
- Do not hot-swap the modules, as hot-swapping may cause reboot of the PLC and loss or damage of user data.
- To avoid damage to the PLC and modules, prevent their enclosures and terminals from falling off or being impacted.

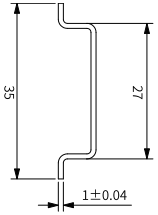
2.4 Installation Dimensions

Installation dimensions are shown below in millimeters (mm).



2.5 Installation Method

The DIN rail in compliance with IEC 60715 is used to install the PLC. The following figure shows the dimensions (width of 35 mm and thickness of 1 mm) of the rail.

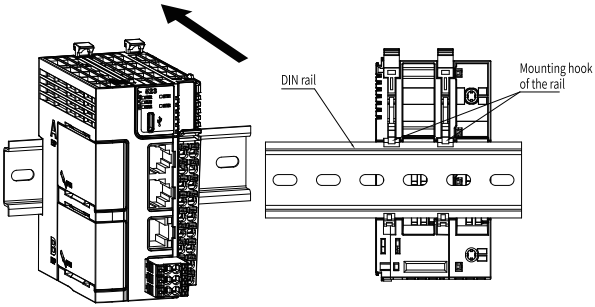


Caution

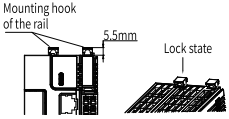
When installed on a DIN rail other than the recommended one (especially the one whose thickness is not 1.0 mm), the module will not fit in place as the mounting hook does not work.

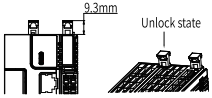
■ Installing the PLC

1. Align the PLC with the DIN rail and push the PLC toward the direction marked by the arrow until you hear a click sound, as shown in the following figure.



2. Confirm that the DIN rail buckles of the PLC are locked. The following figures show the locked and unlocked states of the buckles.





- The buckles are locked when pressed down.
- The buckles are unlocked when lifted up.

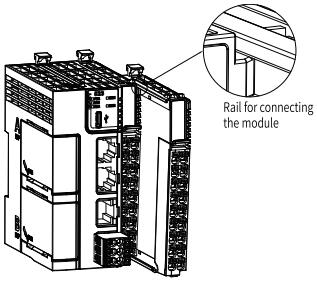
Pressing the buckles locks them.

Caution

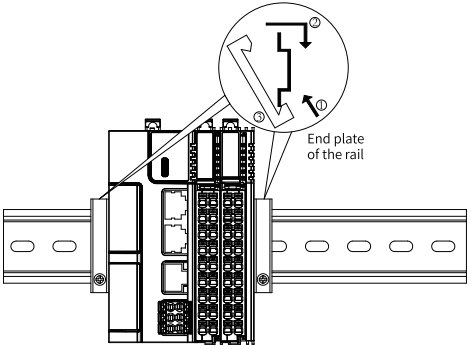
Keep the mounting hook locked when the controller is not mounted on the rail. If the mounting hook is kept unlocked for an extended period of time, it may malfunction.

■ Inserting modules to the PLC

Modules are slid onto the PLC through the rails on the top and bottom of the modules, as shown in the following figure.

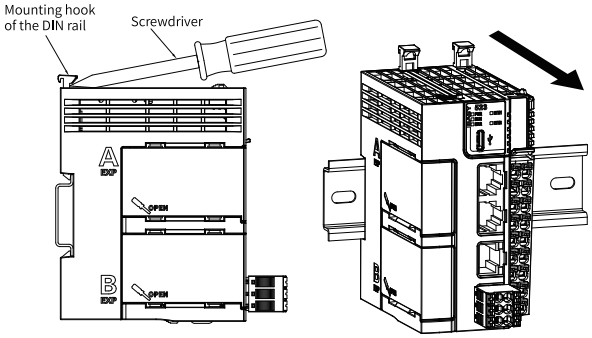


Install a DIN rail retainer on each side of the PLC or the PLC and module assembly. When you install a rail retainer, hook the bottom of the retainer to the bottom of the rail, rotate the retainer to make its top hook the top of the rail, and then tighten the screw to fasten the rail retainer, as shown in the figure below.



■ Removal

Use a straight screwdriver or similar tool to pry up the rail buckles, pull the PLC forward, and press the buckles down after the PLC is pulled out.


Mounting hook
of the DIN rail
Screwdriver
A
EXP
OPEN
B
EXP
OPEN

3 Electrical Installation

3.1 Terminal Arrangement

Left Signal	Left Terminal	Right Terminal	Right Signal
X0 input	1A	1B	Y0 output
X1 input	2A	2B	Y1 output
X2 input	3A	3B	Y2 output
X3 input	4A	4B	Y3 output
X4 input	5A	5B	Y4 output
X5 input	6A	6B	Y5 output
X6 input	7A	7B	Y6 output
X7 input	8A	8B	Y7 output
Input common terminal	9A	9B	Output common terminal

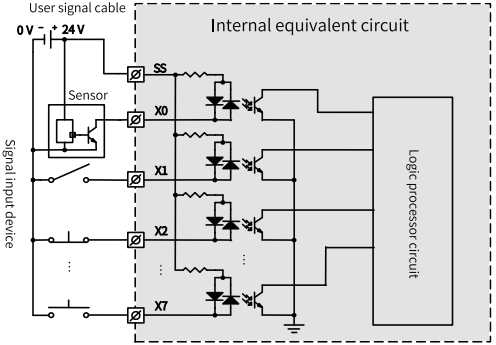
Caution

- The length of a high-speed I/O interface extension cable must be within 3.0 m.
- To prevent interference, route the I/O interface extension cable and the power cable (high-voltage/high-current cables) through different non-parallel routes.

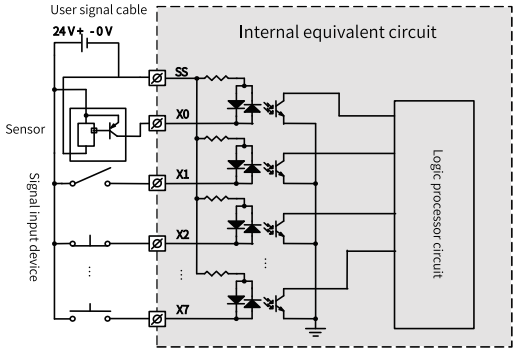
3.2 Terminal Wiring

■ Input terminal circuit diagram

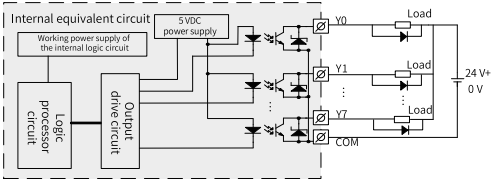
- **Input terminal circuit diagram for sink wiring**



- **Input terminal circuit diagram for source wiring**



■ Output terminal circuit diagram

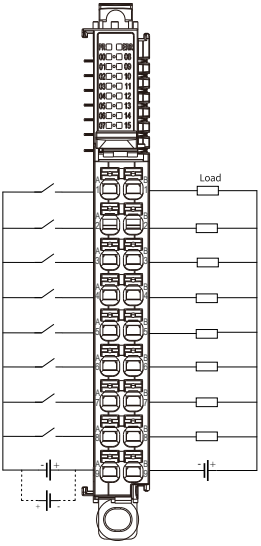


Note

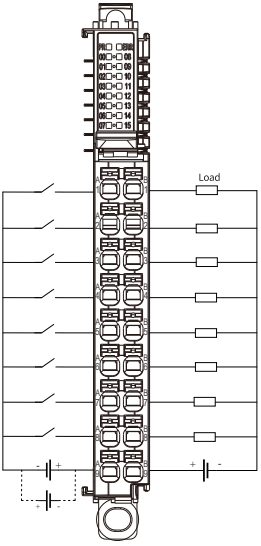
An external flywheel diode is required when an inductive load is connected. In this case, use a 1N4001 or similar diode.

■ Input and output terminal wiring diagram

- **Easy52X-0808TN**



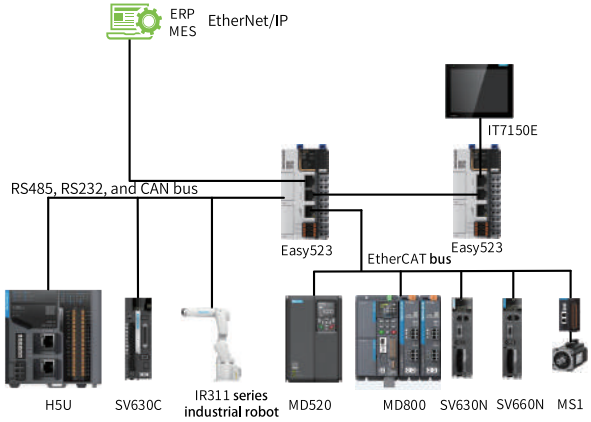
- **Easy52X-0808TP**


Load

4 Communication Connection

4.1 Communication Networking

This product uses the Ethernet port to connect to other stations or ERP or MES systems. It uses the EtherCAT port to connect to other slaves, such as the MD520 and MD800 series AC drives, SV630N and SV660N series servos, and other EtherCAT-enabled modules. It uses the GE20 series expansion card and RS485, RS232, or CAN communication to connect to the H5U, SV630C, and IR311 series robots. The schematic diagram is shown below.



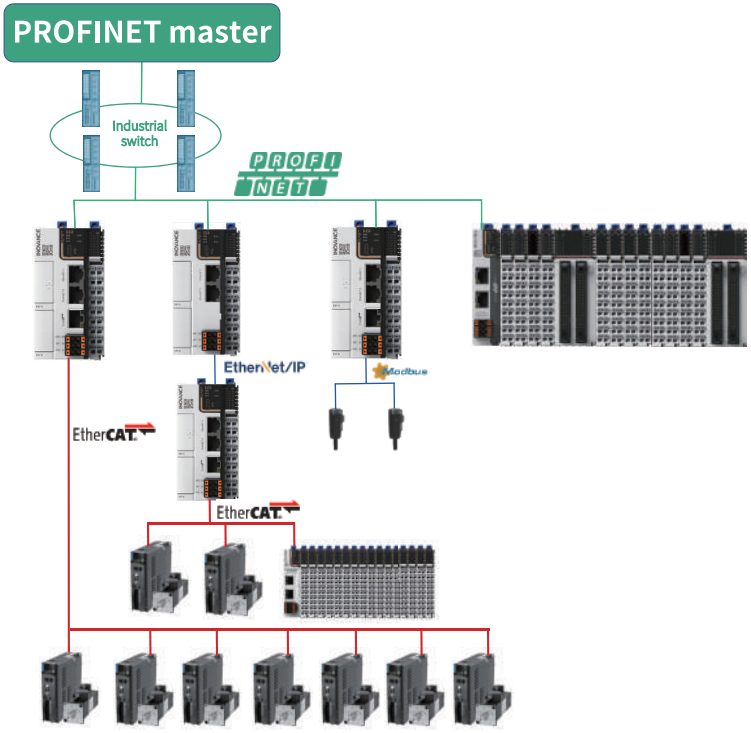
■ OPC UA topology

The MES system connects to the Easy320 and Easy52X series PLCs through the OPC UA server, as shown in the following figure.

Easy300 series Easy500 series

■ PROFINET topology

The PROFINET master connects to the Easy523 and Easy320 series PLCs and the GL20 series modules through PROFINER. It connects to other slaves, such as SV630N, SV660N, and other servos, as well as other EtherCAT-enabled modules through the EtherCAT port, as shown in the following figure.

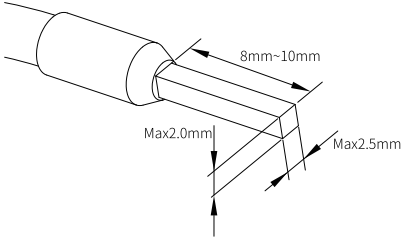


4.2 Cable Selection

The cable lugs and cable sizes in the following table are for reference only. Select proper cables based on actual situations.

Material Name	Applicable Cable Size	
	mm^2	AWG
Tubular lug	0.3	22
	0.5	20
	0.75	18
	1.0	17
	1.5	16

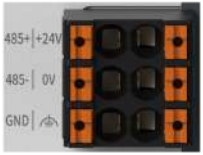
If other tubular lugs are used, crimp them to twisted cables. The following figure shows requirements of the shape and size.



4.3 Cable Connection

■ RS485 communication

The RS485 communication port and the 24 V power supply port are located on the left and right of the same terminal block, respectively.



- Terminal assignment

Signal	Left Terminal	Right Terminal	Signal
RS485 differential pair positive signal	RS485+	+24V	24 VDC power supply +
RS485 differential pair negative signal	RS485–	0V	24 VDC power supply–
RS485 communication ground	GND		PE

- Communication specifications

Item	Description
Number of channels	Three (The PLC itself supports one channel and can support two more channels including RS232 through expansion cards.)
Hardware port	Two 3-pin terminals (shared with the power supply)
Isolation mode	No isolation
Termination resistor	No (The PLC can be used as the master or slave.)
Number of slaves	Maximum 31 (The cable length for each slave branch must be less than 3 m.)
Baud rate	9,600 bps, 19,200 bps, 38,400 bps, 57,600 bps, 115,200 bps
Short circuit protection	Protection against incorrect connection to the 24 V terminal

- Wiring

  Select proper communication cables according to *"4.2 Cable Selection" on page 37* and insert the cables to the corresponding communication ports.

■ Ethernet communication

For reliable communication, use Cat 5 shielded twisted pair cables with injection molded, iron-shelled connectors as Ethernet cables.

- Connection: Insert the cable connector into the Ethernet port (RJ45 connector) until you hear a click sound.

- Removal: Press the retaining latch of the cable connector while pulling out the connector in the direction parallel to the port.

4.4 EtherCAT Communication

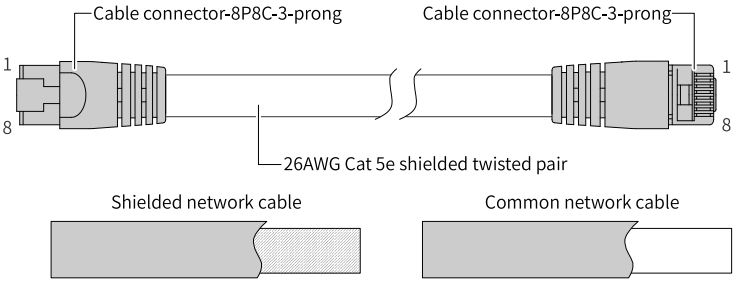
■ EtherCAT specifications

Item	Description
Communication protocol	EtherCAT protocol
Service supported	CoE (PDO and SDO)
Synchronization mode	Distributed clock (DC) for the servo and input/ output synchronization for I/O
Physical layer	100BASE-TX
Baud rate	100 Mbps (100BASE-TX)
Duplex mode	Full duplex
Topology	Linear topology
Transmission media	Network cable (For details, see "Wiring".)
Transmission distance	Less than 100 m between two nodes
Number of slaves	Maximum 72
EtherCAT frame length	44 bytes to 1,498 bytes
Process data	Maximum 1,486 bytes per Ethernet frame

■ Wiring

The PLC can communicate with the EtherCAT bus through the CN3 port. The following describes requirements of the communication network cables.

Communication network cable requirements



Signal pin assignment

Pin	Signal	Signal Direction	Signal Description
1	TD+	Output	Data transmission+
2	TD-	Output	Data transmission–
3	RD+	Input	Data receive+
4	-	-	Reserved
5	-	-	Reserved
6	RD-	Input	Data receive–
7	-	-	Reserved
8	-	-	Reserved

Length requirements

The cable between devices must not exceed 100 m when the EtherCAT bus is used. Exceeding this length will attenuate signals and affect normal communication.

Technical requirements

100% continuity test; no short circuit, open circuit, misalignment or poor contact. Cables of the following specifications are recommended.

Item	Specifications
Cable type	Flexible crossover cable, S-FTP, Cat 5e
Compliance	EIA/TIA568A, EN50173, ISO/IEC11801 EIA/TIA Bulletin TSB EIA/TIA SB40-A&TSB36

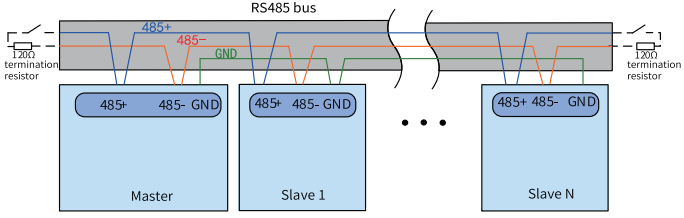
Item	Specifications
Conductor size	26 AWG
Conductor type	Twisted pair
Number of pairs	4

4.5 RS485 Communication

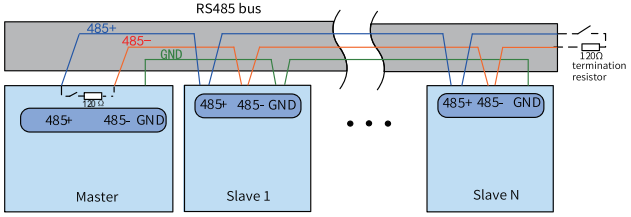
It is recommended to use a shielded twisted pair cable as the RS485 bus, and use twisted pair cables to connect the RS485+ and RS485– terminals. Connect a 120 Ω termination resistor to each end of the bus to prevent signal reflection. Connect the RS485 signal reference grounds of all nodes together. A maximum of 31 nodes can be connected and the cable length of any node branch must be less than 3 m.

The following figure shows the RS485 bus topology.

Local RS485 communication of Easy series PLC



RS485 communication of GE20 series extension card



5 Operation and Maintenance

5.1 Program Run and Stop

After writing a program while the PLC is in the "STOP" state, execute the shutdown operation as described in the following table.

Status	Operation
To run the system	1. Set the system to the "RUN" state. 2. Confirm that the RUN indicator is yellow-green and steady on.
To stop running	Set the system to the "STOP" state, or stop the PLC in the background by using the host controller.

5.2 User Program Download with an SD Card

Prerequisites

An SD (TF) card is prepared (requirements: SD card capacity ⩽ 32 GB; FAT32 file system).

Procedure

1. Generate a "Down/Updown" file with AutoShop (For details, see Chapter 20 "Application of the Download File Generation Feature" in the *H5U and Easy Series Programmable Logic Controller Programming and Application Guide*).
2. Create a "PLCProgram" directory in the root directory of the SD card and copy the "Down/Updown" file to the "PLCProgram" directory.
3. Insert the SD card into a TF expansion card, and then install the TF expansion card onto the PLC.

Install the TF extension card with power off.

4. Re-power on the PLC. The PLC starts downloading the user program from the SD card, and the RUN indicator blinks fast at 4 Hz during the download process.

5. After successful download, the RUN indicator blinks slowly at 1 Hz and the PLC enters the "STOP" state. Then, remove the SD card.

   If the ERR indicator blinks slowly, it is indicated that the download has failed. Check whether the downloaded file is applicable to the PLC model and whether the login password of the downloaded file is the same as the login password of the PLC. If all the check items are correct, but the download still fails, contact our technical support for help.

6. Re-power on the PLC and the PLC restores normal operation.

5.3 Firmware Programming with an SD Card

1. Load a firmware programming SD card (maximum capacity of 32 GB, file format of FAT32) onto a TF expansion card and install the TF card onto the PLC.

- Keep the PLC powered-off while installing the TF expansion card.
- The original application will be deleted after firmware programming is completed.

2. Re-power on the PLC.

   The RUN and ERR indicators on the PLC blink fast for three seconds, indicating the start of firmware programming. Then, the RUN and ERR indicators are steady on, indicating that the firmware programming is in progress. Finally, the RUN and ERR indicators start to blink slowly, indicating that the firmware programming is completed.

3. After the firmware programming is completed, power off the PLC and remove the SD card.
4. Re-power on the PLC.

6 Appendix

■ Easy52X series programmable controllers

Model	Description	Code
Easy521-0808TN	Easy500 series 8-input 8-output 8-axis programmable controller	01440385
Easy522-0808TN	Easy500 series 8-input 8-output 16-axis programmable controller	01440383
Easy523-0808TN	Easy500 series 8-input 8-output 32-axis programmable controller	01440326
Easy521-0808TP	Easy500 series 8-input 8-output 8-axis programmable controller	01440606
Easy522-0808TP	Easy500 series 8-input 8-output 16-axis programmable controller	01440605
Easy523-0808TP	Easy500 series 8-input 8-output 32-axis programmable controller	01440604

■ GE20 series expansion cards

Type	Model	Description	Code	Slot	ID
Digital input/ output	GE20-4DI	4-channel input 24 VDC input Source/Sink	01480032	A/B	13
	GE20-4DO-TN	4-channel sink transistor output 24 VDC output	01480033	A/B	5
Analog input/ output	GE20-2AD1DA-I	2-channel analog input and 1-channel analog output (current type)	01480027	A/B	11
	GE20-2AD1DA-V	2-channel analog input and 1-channel analog output (voltage type)	01480028	A/B	3

Type	Model	Description	Code	Slot	ID
Communication	GE20-CAN-485	CAN and RS485 communication (RJ45)	01480034	A	15
	GE20-232/485	RS232 or RS485 communication	01480029	A/B	7
	GE20-232/485-RTC	RS232 or RS485 communication (with RTC)	01480035	B	14
Storage	GE20-TF	TF expansion card	01480030	B	1
	GE20-TF-RTC	Memory expansion card (with integrated RTC)	01480050	B	6
Clock	GE20-RTC	Clock expansion card	01480031	B	9

Note

The ID is "0" when there is no expansion card. For expansion card IDs, see the relevant expansion card user guides.

■ GL20 series expansion modules

Module	Model	Description	Code
Digital	GL20-0016ETP	16-channel digital output (PNP)	01440292
	GL20-1600END	16-channel digital input	01440291
	GL20-0016ETN	16-channel digital output (NPN)	01440293
	GL20-0800END	8-channel digital input	01440381
	GL20-0008ETP	8-channel digital output (PNP)	01440380
	GL20-0008ETN	8-channel digital output (NPN)	01440379
	GL20-0808ETN	8-channel digital input and 8-channel digital output (NPN)	01440339
	GL20-0008ER	8-channel relay output module	01440334
	GL20-3200END	32-channel digital input	01440378
	GL20-0032ETN	32-channel digital output (NPN)	01440377
	GL20-0404ETP-5V	5 VDC; 4-channel digital input and 4-channel digital output (available soon)	01440506
	GL20-3232ETN-M	32-channel digital input and 32-channel digital output (NPN), with external terminal block wiring	01440290
Analog	GL20-4AD	4-channel analog input	01440288
	GL20-4DA	4-channel analog output	01440287
	GL20-8ADV	8-channel analog input	01440482
	GL20-8ADI	8-channel analog input	01440489

Module	Model	Description	Code
Temperature measurement	GL20-4PT	4-channel thermistor input type	01440337
	GL20-4TC	4-channel thermocouple input type	01440338
Communication	GL20-2SCOM	2-channel serial module (third-party products not supported)	01440463
	GL20-2S485	2-channel RS485 expansion module, currently only supporting EtherCAT couplers (third-party products not supported)	01440398
Process module	GL20-2SSI	2-channel SSI communication	01440445