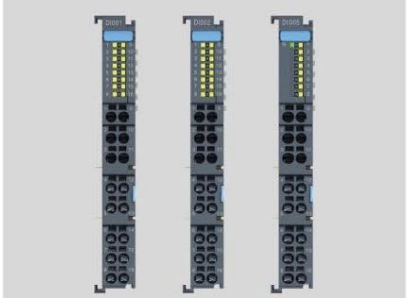

Module Manual for

LX Series Programmable Logic Controllers

Version：2025.01

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Chapter 1 Foreword

1.1 Purpose

This document will introduce the use of all hardware modules in the LX system, including product introduction, module components, technical parameters, indicators, wiring instructions, diagnostic information, etc. Please use it in conjunction with other supporting product materials to help you have a more comprehensive understanding of how to use the modules.

1.2 Object

This manual is intended for use by engineers or related professional technicians with expertise in automation and control systems.

1.3 Target Products

This manual is applicable to the following products:

- LX series PLC products

1.4 Statement of Use

- The contents of this manual have been tested according to regulations, and the diagrams are consistent with the software and hardware products described. However, errors are inevitable, and complete consistency cannot be guaranteed. If you have any suggestions for improving or correcting the contents of this manual, please let us know in time and we will make corrections in the next version.
- Due to product iteration updates, the relevant parameters and information in this manual may change without prior notice.
- Since the devices described in this manual can be used in a variety of ways, the user and the person responsible for the use of the devices must ensure that each method is admissible. HollySys will not be legally responsible for any direct or indirect losses resulting from the use or misuse of these devices.
- Due to uncertainties in the actual application, HollySys assumes no responsibility for the direct use of the data provided in this manual.

1.5 Safety Precautions

1.5.1 Safety Statement

1. Please read and comply with these safety precautions before using this product.
2. To ensure personal and device safety, please strictly abide by the safety precautions on the product label and in the manual when using this product.
3. The words "Note", "Caution", "Warning" and "Danger" in this manual do not represent all the safety precautions that shall be observed, but only serve as a supplement to all precautions.
4. This product shall be used in an environment that meets the design specifications. Otherwise, it may cause faults. Device damage caused by failure to comply with relevant regulations is not covered by the product quality guarantee.
5. HollySys shall not be responsible for any personal safety accidents or property losses caused by any operation that does not comply with the provisions of this manual or does not meet the requirements.

1.5.2 Warning

For your safety and to avoid property losses, please pay attention to the warnings in this manual. The following warnings are indicated according to the hazard level from high to low. When there are multiple hazard levels, only the highest level is prompted. If the highest level is a warning that may cause personal injury, there may also be a warning that may cause property loss.

Warnings on personal safety: Indicated by a warning triangle  .

Warnings on property loss: Without any warning triangle.

 Danger
It indicates that death or serious personal injury may be caused if operations are not carried out as specified.

 Warning
It indicates that death or serious personal injury may be caused if operations are not carried out as specified.

 Caution
It indicates that minor personal injuries may be caused if operations are not carried out as specified.

Note
It indicates that property losses may be caused if operations are not carried out as specified.

Chapter 2 Document Guide

2.1 Related Manuals

The available manuals for this product are displayed in the table below. Please choose and refer to them based on your specific usage requirement.

Manual Name	Purpose	Content
Communication Manual for LX Series Programmable Logic Controllers	Guide users to build the LX system communication network	Describe the communication networks supported by the LX system, including the introduction to communication protocols and function usage
Programming Manual for LX Series Programmable Logic Controllers	Learn about how to use the FA-AutoThink programming software	Describe the interface, functions, and related operations of FA-AutoThink programming software, including: Software interface introduction Project creation Programming Online commissioning function
Basic Instruction Manual for LX Series Programmable Logic Controllers	Learn about the use of basic instructions of the LX system	Describe the use of basic instructions, including: Instruction function Parameter Example
Motion Instruction Manual for LX Series Programmable Logic Controllers	Learn about the use of motion control instructions of the LX system	Describe the use of motion control instructions, including: Instruction function Parameter Example
PLCopen Instruction Manual for LX Series Programmable Logic Controllers	Learn about the use of PLCopen motion control instructions of the LX system	Describe the use of PLCopen motion control instructions, including: Parameter Function Example Notes for Use Reference

2.2 Usage Convention

The following symbols are used in this manual:

- Tip: This symbol indicates helpful tips or suggestions for using the product more efficiently.

2.3 How to Get the Manual

If you need the electronic PDF file of this manual, kindly access it through our website.

- The official website of HollySys (https://cn.hollysys.com/other/download.html) to download the file.

Chapter 3 Revision History

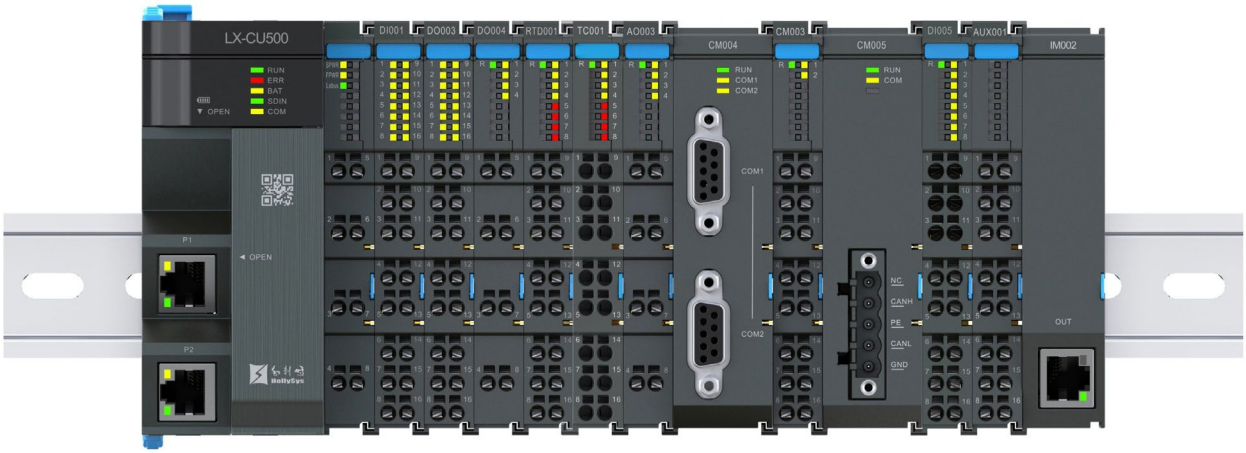
Version	Revision Date	Revision Content
V1.0	July 2023	Created
V1.1	December 2023	Added the Added the LX-CM010 co-processor module and LX-TC601 4-channel high-precision thermocouple type analog input module
V1.2	January 2024	Added principles for using power modules and modified the PO001 and ECI001 terminal signal schematic diagrams
V1.3	October 2024	Added LX-CU501, LX-CU430, LX-AUX101, LX-AUX102, LX-HUB106, LX-HUB107, LX-CM009
V1.4	January 2025	Added LX-CU510, LX-CU511 add the ethernet diagnostic information of controller Add channel configuration details to the LX-DO003 terminal component description

Chapter 4 Module Overview

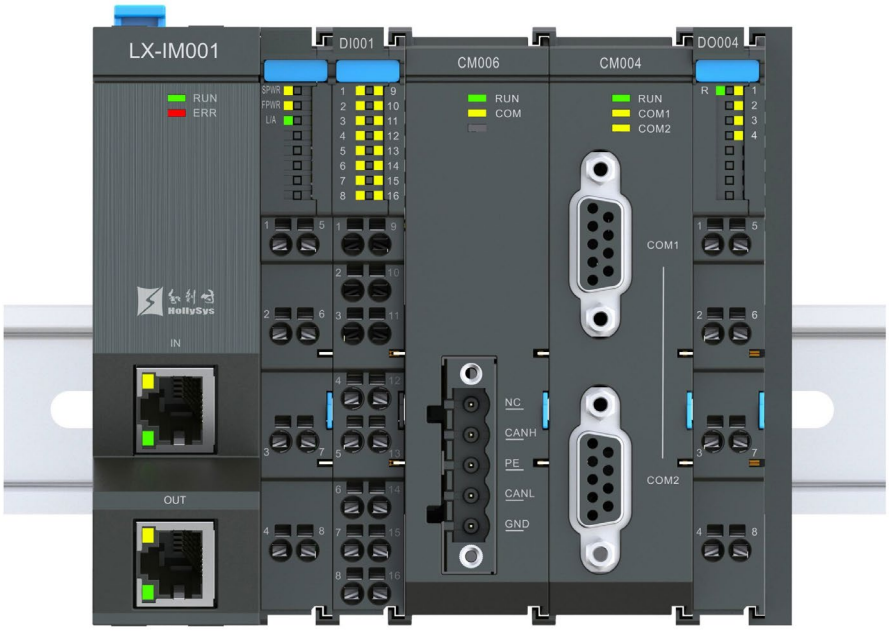
4.1 Hardware Composition

The LX control system consists of a control unit and an EtherCAT network unit. The control unit is the core of the control system for operation and control. It finalizes the construction of the minimum control system and carries out I/O expansion as well as complex control system construction through the EtherCAT network.

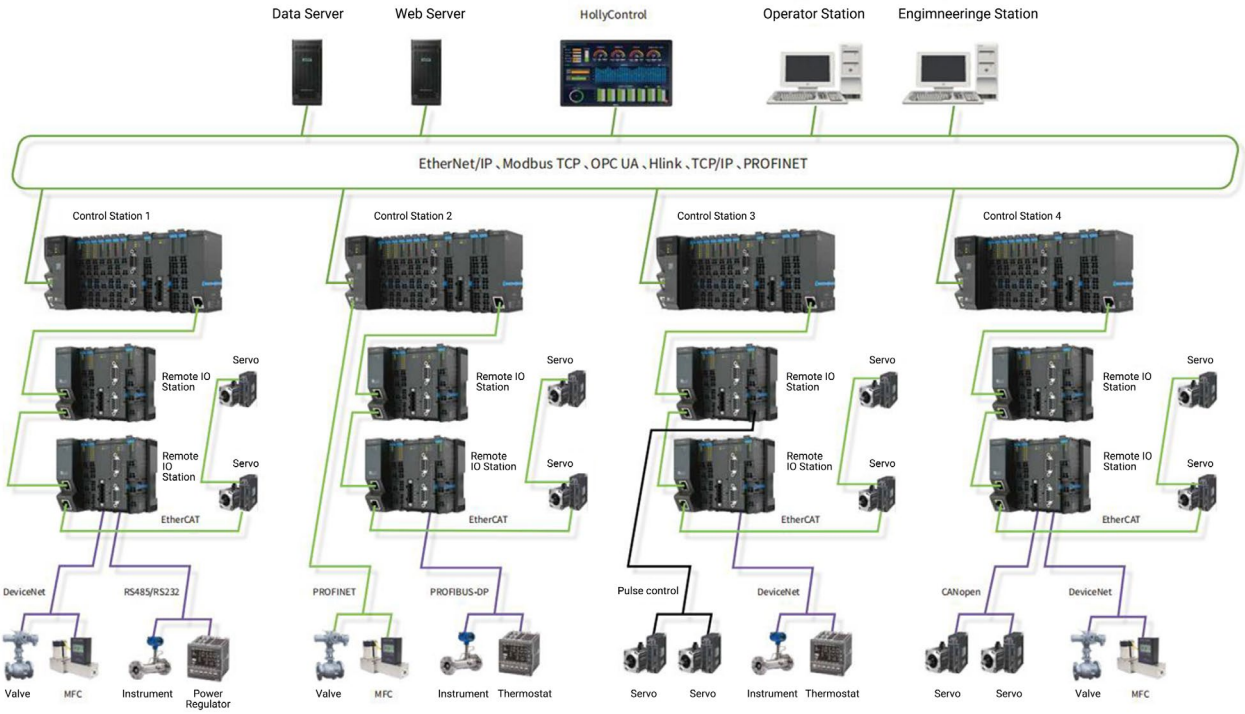
- Control unit: The control unit consists of a controller, I/O modules and power relay module. The controller and modules are installed on DIN rails, and the modules fit into each other, as shown in the figure below.
- Controller: including LX-CU500, LX-CU501,LX-CU430, LX-CU510, LX-CU511.
- I/O module: It mainly includes DI, DO, AI, AO, RTD, TC, pulse output, and incremental encoder input modules.
- Power relay module: It provides system power to the I/O module of the control unit.



- EtherCAT network unit: It extends I/O and network components downward through the EtherCAT coupler, including:
  - Coupler
  - I/O modules
  - Communication modules



4.2 Network Configuration



4.3 Product List

The LX control system includes such products as controller modules, communication modules, couplers,

I/O modules and power modules, as shown below:

CPU Module					
Type	**Module Name**	**Specifications**		**Certification**	**Dimensions W×H×D (mm)**
		Minimum Servo Cycle	Maximum Shafts		
Controller Module 	LX-CU500 CPU Module	500μs	64 axes	CE	56×109×90
	LX-CU501 Ring network CPU module	500μs	64 axes		
	LX-CU510 Enhanced high-performance controller	500μs	64 axes		
	LX-CU511 High-performance controller module for ring network	500μs	64 axes		
	LX-CU430 Basic high performance controller module	1ms	Bus Axes: 16 Virtual Axes: 64		

Digital Input Module					
Type	Module Name	Specifications		Certification	Dimensions W×H×D (mm)
		Channel Voltage	Channel Response Time		
DI Module 	LX-DI001 16-channel NPN DI module (24 V DC)	Logic 1 signal (minimum) 5 V DC at 1 mA Logic 0 signal (minimum) 11 V DC at 3 mA	0.5ms	CE	12×100×71
	LX-DI002 16-channel PNP DI module (24 V DC)	Logic 1 signal (minimum) ≥19.2V DC Logic 0 signal (minimum) ≤5V DC	0.5ms		
	LX-DI005 8-channel DI module (5 V DC)	Logic 1 signal (minimum) > 2.4 V DC (<1 mA) Logic 0 signal (minimum) > 0.8 V DC (<1 mA)	0.1ms		

Digital Output Module						
Type	Module Name	Specifications			Certification	Dimensions W×H×D (mm)
		Channel Type	Maximum Load Current	Load Voltage		
DO Module 	LX-DO003 16-channel DO module	High-side/Low-side	0.5 A/tag 4 A/ Common end	24VDC	CE	12×100×71
	LX-DO004 4-channel relay type DO module	Dry normally open contact	1A@ 230VAC 3A @30 V DC	230VDC/30VDC		

	LX-DO005 8-channel DO module (5 V DC)	High-side output	8 mA/tag 64 mA/ Common end	5VDC(±0.5V)		
Position Interface Module						
Type	Module Name	Specifications			Certification	Dimensions W×H×D (mm)
		Main Unit I/O Quantity		Maximum Channel Input Frequency		
Incremental Encoder Input Module 	LX-ECI001 2-channel 5 V incremental encoder input module	6DI		5MHz	CE	24×100×71
	LX-ECI002 2-channel 24 V incremental encoder input module	6DI		200KHz		
Pulse Output Module						
Type	Module Name	Specifications			Certification	Dimensions W×H×D (mm)
		Main Unit I/O Quantity		Maximum Channel Input Frequency		
Pulse Output Module 	LX-PO001 2-channel pule output module	6DI 6DO		4MHz	CE	24×100×71
Encoder Module						
Type	Module Name	Specifications			Certification	Dimensions W×H×D (mm)
		Encoding Mode	Communication Baud Rate	Supported encoder types		
Encoder Module 	LX-SSI001 2-channel SSI absolute encoder module	Configurable with Single-ring and multi-ring	2Mbps、1.5Mbps、1Mbps、500Kbps、400Kbps、300Kbps、250Kbps（default）、200Kbps、100Kbps、50 Kbps（Depending on whether the encoder supports it)	SSI interface bit width: 8 bits ~ 32 bits 25 bits by default	CE	24×100×71
Temperature Input Module						
Type	Module Name	Specifications			Certification	Dimensions W×H×D (mm)
		Resolution	Temperature Error	Switching Time		
Temperature Input Module	LX-RTD001 4-channel RTD AI module	0.01°C（termal resistance) 0.01Ω（resistance)	< ±0.5 °C （Pt sensors, 3-wire) < ±0.9°C （Ni sensors) < ±1 °C （Pt sensors, 2-wire)	single channel 200 ms Full channel 500ms	CE	12×100×71

	LX-TC001 4-channel TC AI module	0.01°C（TC） 0.001mV（voltage）	mV voltage: ±0.1%FS Type B: ±8.5°C; Type C: ±6.2°C; Type E: ±2.5°C; Type J: ±2.7°C; Type K: ±3°C; Type N: ±3°C; Type R: ±6.7°C; Type S: ±7.1°C; Type T: ±2.9°C	4-channel 200 ms 2-channel 100 ms		
	LX-TC601 4-channel high-accuracy TC AI module	0.01°C（TC） 0.001mV（voltage）	mV voltage: ±0.05%FS Type B: ±1.5°C; Type C: ±0.5°C; Type E: ±0.4°C; Type J: ±0.5°C; Type K: ±0.4°C; Type N: ±0.6°C; Type R: ±1.0°C; Type S: ±1.0°C; Type T: ±0.5°C	4-channel 200 ms 2-channel 100 ms		

Voltage Distribution Module

Type	Module Name	Specifications		Certification	Dimensions W×H×D (mm)
		Voltage	Current loading capacity		
Voltage Distribution Module 	LX-AUX001 16-channel GND voltage distribution module	0V	10 A/channel, 10 A/module	CE	12×100×71
	LX-AUX101 16-channel GND potentiometric assignment enhancement module				
	LX-AUX002 16-channel positive 24 V voltage Distribution module	24V DC（19.2V~28.8V）			
	LX-AUX102 16 channel positive 24V potential assignment enhanced module				

Analog Input Module

Type	Module Name	Specifications						Certification	Dimensions W×H×D (mm)
		Range of measurement	Resolution	Accuracy	Input Mode	Switching Time	Input Impedance		
Voltage/Current Analog Input Module 	LX-AI001 4-channel voltage AI module	0~10V	24-bit	0.3% F.S.（full temperature range）	Single-ended differential connection	330μs/channel	> 1MΩ	CE	12×100×71
		-10~10V							
	LX-AI002 8-channel voltage AI module	0~10V							
		-10~10V							
	LX-AI003 4-channel current AI module	0~20mA					250±1Ω		
		4~20VmA							
	X-AI102 8-channel high performance voltage AI	0~10V	16-bit	The precision at ambient temperature (25 ± 5 ℃) is		≤60us/channel	> 1MΩ		

	module	-10~10V		0.1% FS Temperature range accuracy: 0.3% FS					
Analog Output Module									
Type	Module Name	Specifications						Certification	Dimensions W×H×D (mm)
		Range of measurement	Resolution	Accuracy	Switching Time	Loading capacity			
Voltage/Current AO Module 	LX-AO002 8-channel voltage AO module	±10V	16-bit	±0.3% F.S.	250μs/point	> 1KΩ		CE	12×100×71
	LX-AO102 8-channel high precision voltage AO module	±10V		The precision at ambient temperature (25 ± 5 ℃) is 0.1% FS Temperature range accuracy: 0.3% FS	≤ 60us				
	LX-AO003 4-channel voltage/current AO module	0~10V		±0.1% F. S.	100μs/point	Current type < 600Ω Voltage type > 1KΩ			
		-10~10V							
		0~20mA							
		4~20VmA							
Coupler Module									
Type	Module Name	Specifications						Certification	Dimensions W×H×D (mm)
		Communication Rate	Interfaces		Interface Type				
Coupler Module 	LX-IM001 EtherCAT coupler module	100Mbps	2		RJ45			CE	40×107×84
	LX-IM002 EtherCAT End coupler module		1		RJ45				20×100×69
Communication Module									
Type	Module Name	Specifications						Certification	Dimensions W×H×D (mm)
		The number of communication interfaces		Communication interface type	Standard				
Communication Module 	LX-CM001 2-channel RS-232 serial terminal communication module	2		Terminal	RS-232			CE	12×100×71
	LX-CM002 2-channel RS-232 serial DB9 communication module	2		DB9	RS-232				24×100×71

	LX-CM003 2-channel RS-485 serial terminal communication module	2	Terminal	RS-485		12×100×71
	LX-CM004 2-channel RS-485 serial DB9 communication module	2	DB9	RS-485		24×100×71
	LX-CM005 DeviceNet slave station communication module	1	Terminal	CAN		24×100×69
	LX-CM006 DeviceNet master station communication module	1	Terminal	CAN		24×100×69
	LX-CM009 Profibus DP master communication module	1	DB9	RS-485		24×100×69
	LX-CM010 CPU co-processor module (special network port)	2	P1：RJ45 P2：Enhanced network port connector	/		56×109×90
	LX-CM020 EtherCAT slave station communication module	2	RJ45	IEEE 802.3		24×100×69

Power Supply Module						
Type	Module Name	Specifications			Certification	Dimensions W×H×D (mm)
		Input Voltage	Maximum Current on System Side	Maximum Current on Field Side		
Power Module 	LX-PM003 Power relay module	24V DC（19.2~28.8V DC）	1.5A	10A	CE	12×100×71

HUB Module						
Type	Module Name	Specifications			Certification	Dimensions W×H×D (mm)
		Communication rate	The number of interfaces	Interface type		

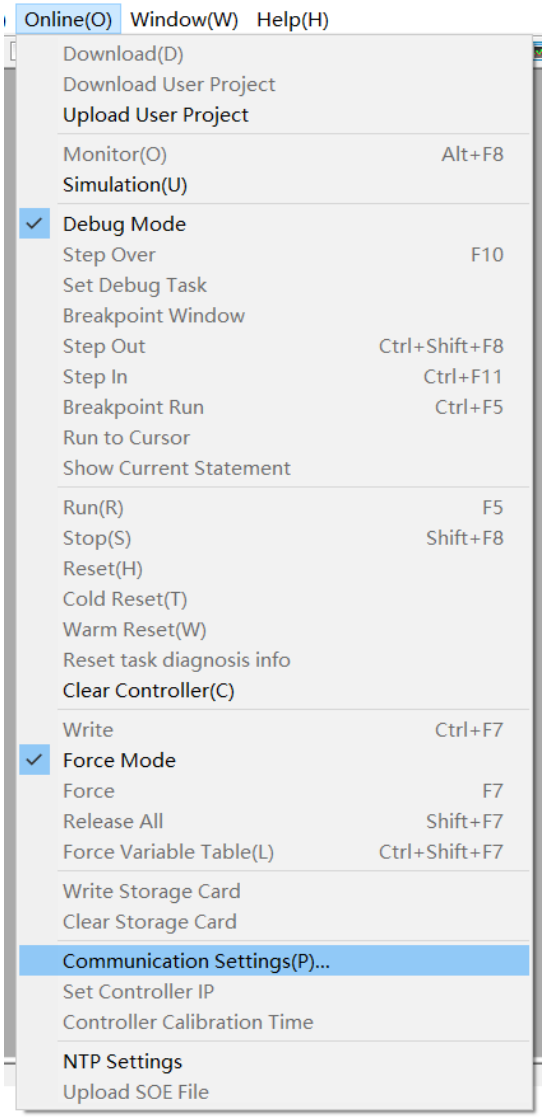
HUB Module 	LX-HUB106 6-channel EtherCAT HUB module	100Mbps	6 （1 in 5 out)	RJ45	CE	56×109×90
	X-HUB107 6-channel EtherCAT HUB module					48×78×90

Chapter 5 Controller

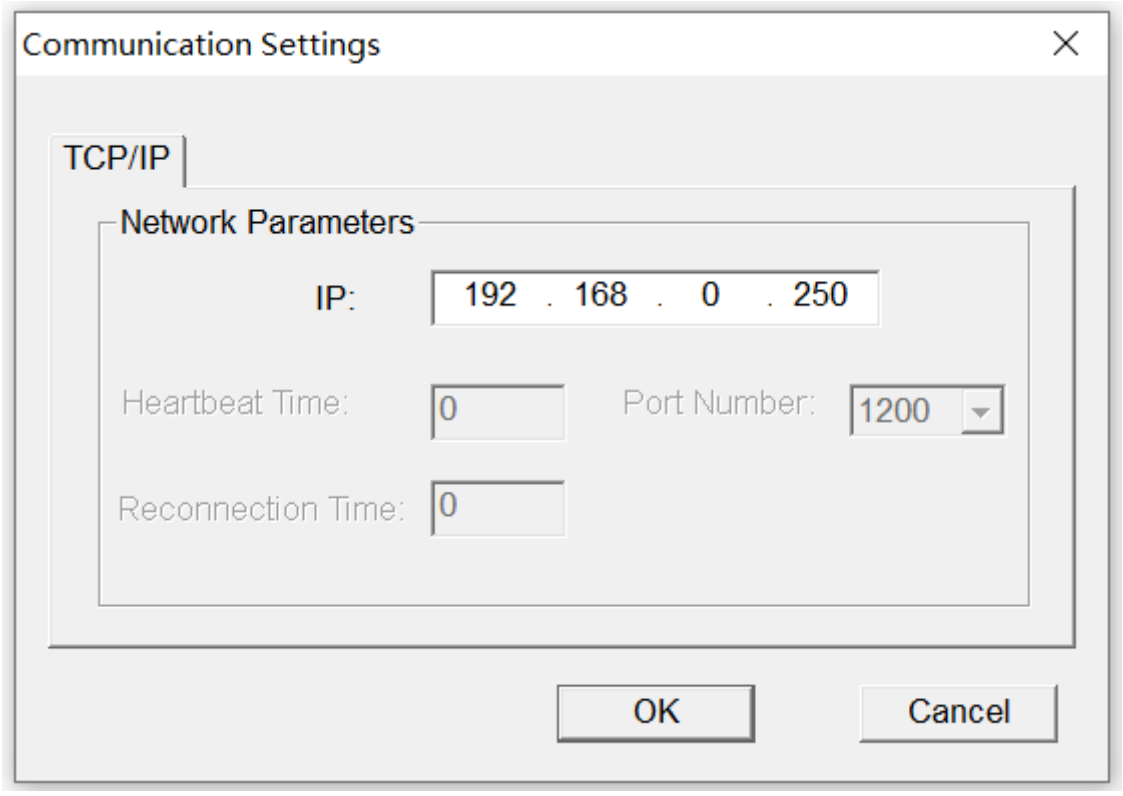
5.1 Controller First Power On Configuration Guidance

When the controller module is first powered on, the status of the module only BAT power indicator yellow light, need to set the controller information, below to LX-CU500 example.

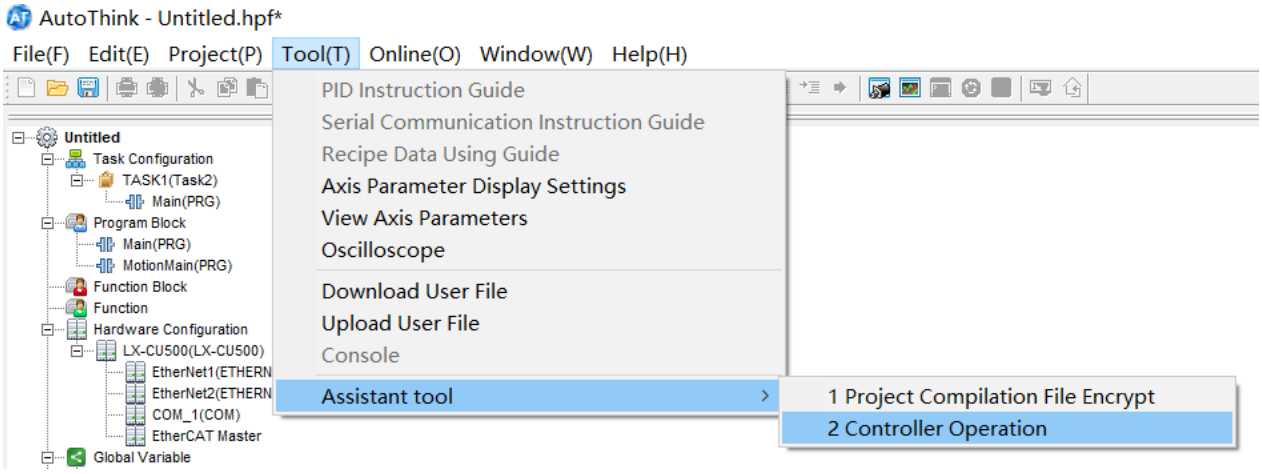
(1) Open AT to create the project and click on the toolbar: [Online] - [Communications Settings].



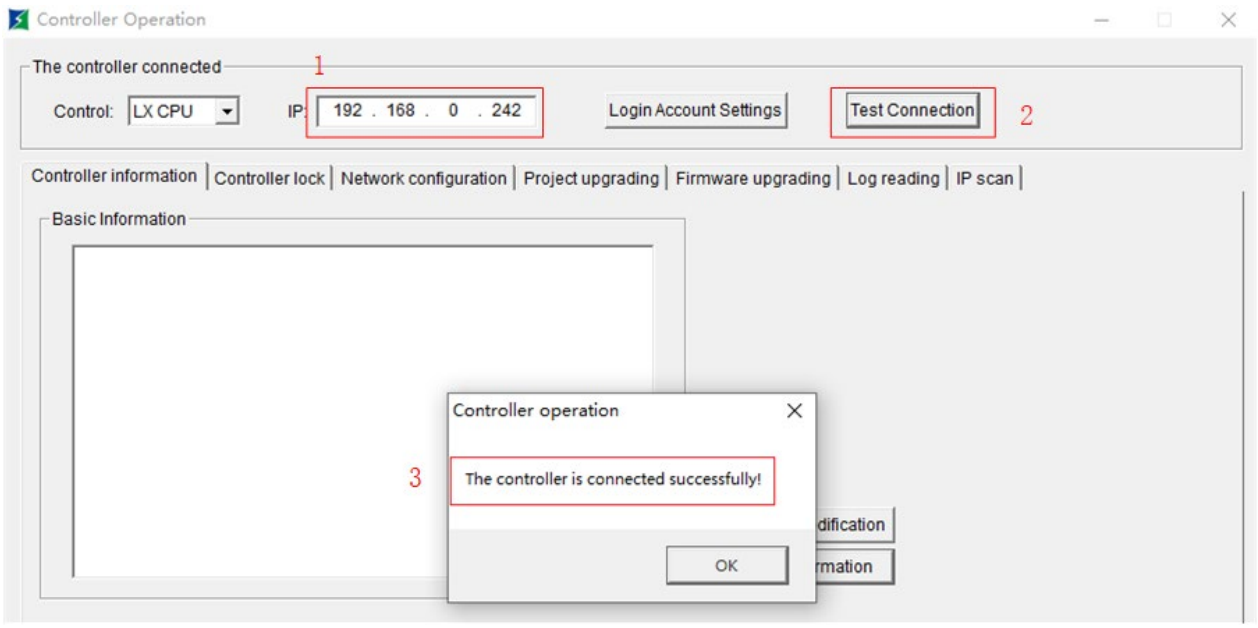
(2) Set the IP address as the default IP address for the connection network port.



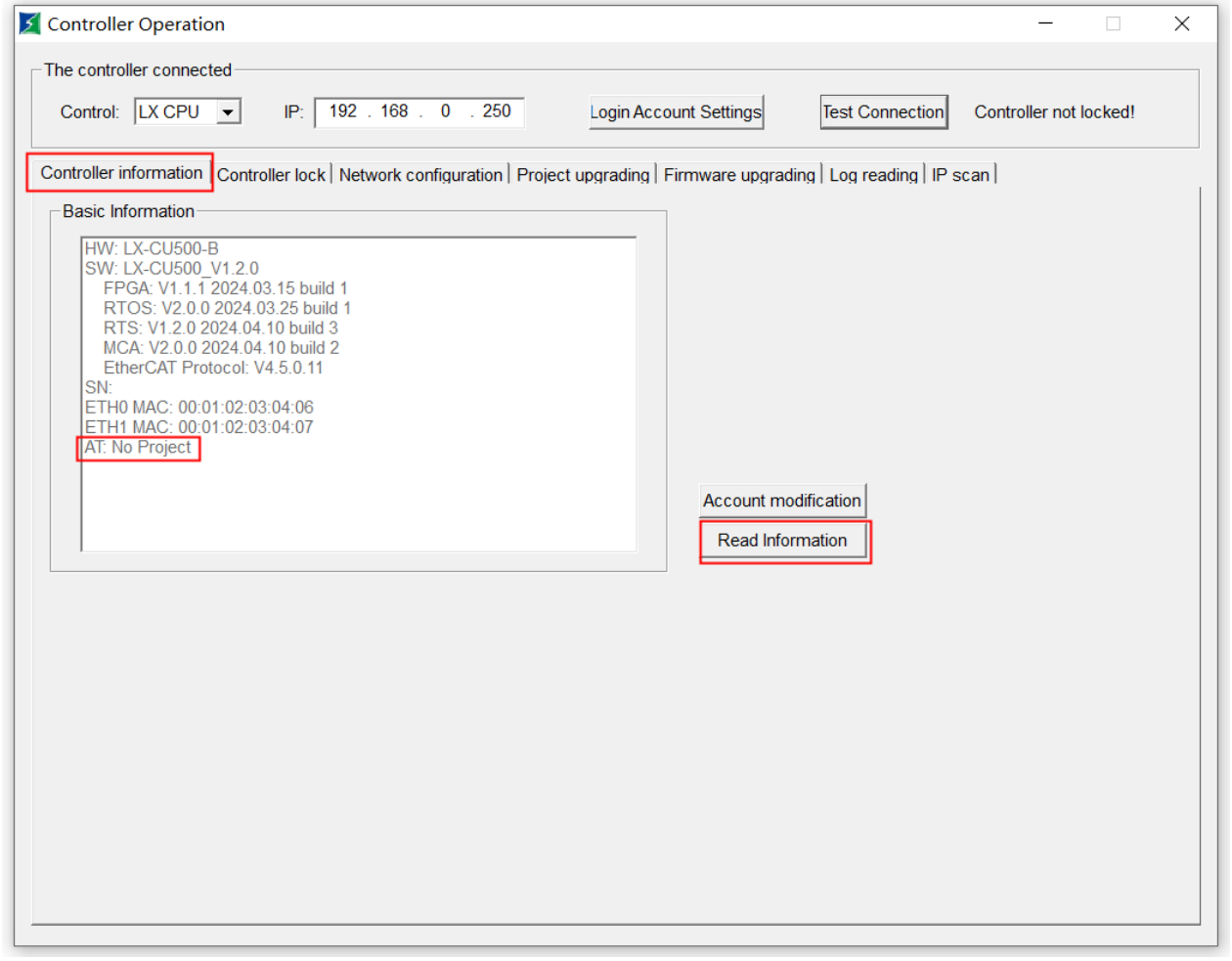
(3) Select the [Tool] –[Assistant tool]– [Controller Operation].



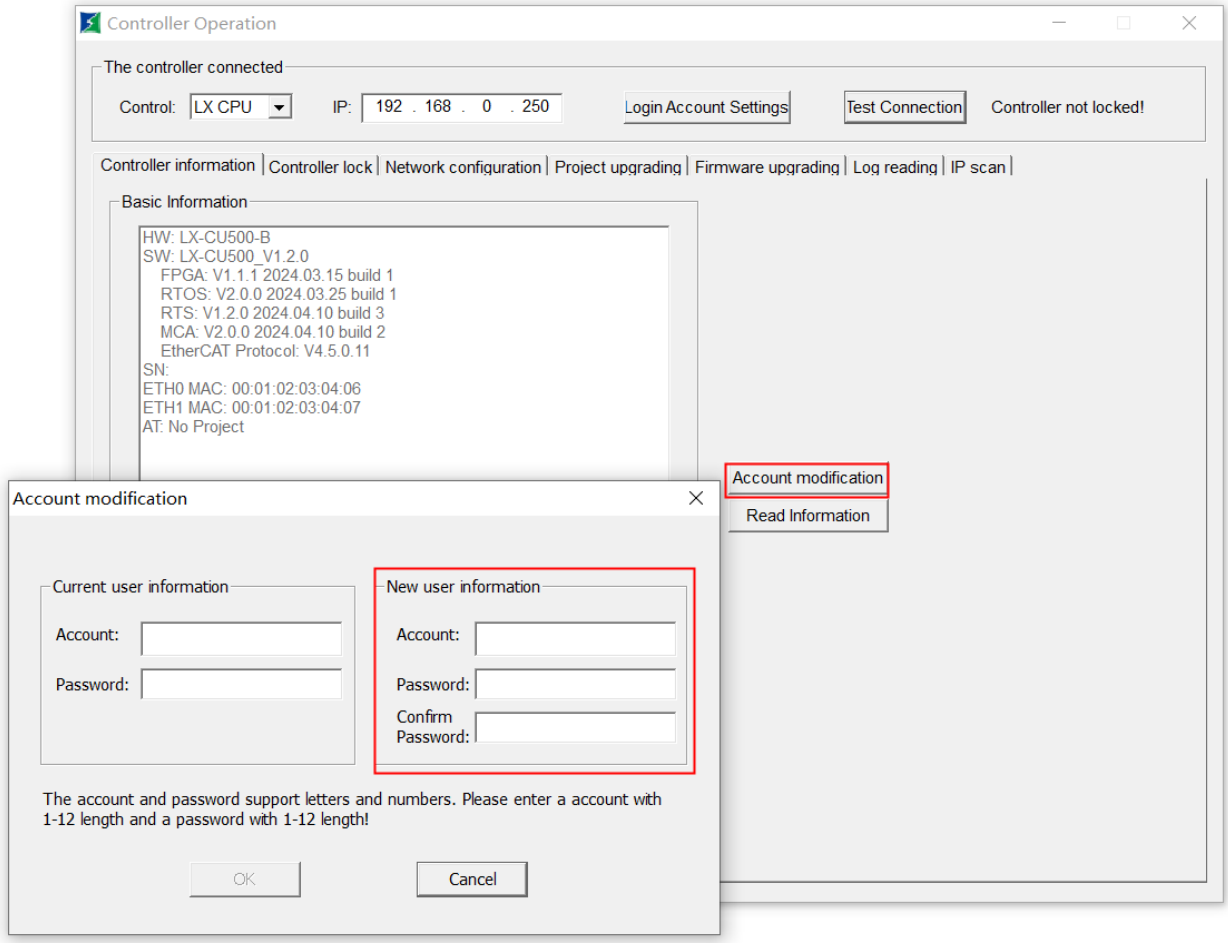
(4) In the Controller Settings window, connect the controller as shown below.



(5) Select the [Controller Information]–[Read Information], and display "AT: No Project" in the basic information (there is no project in the control system).

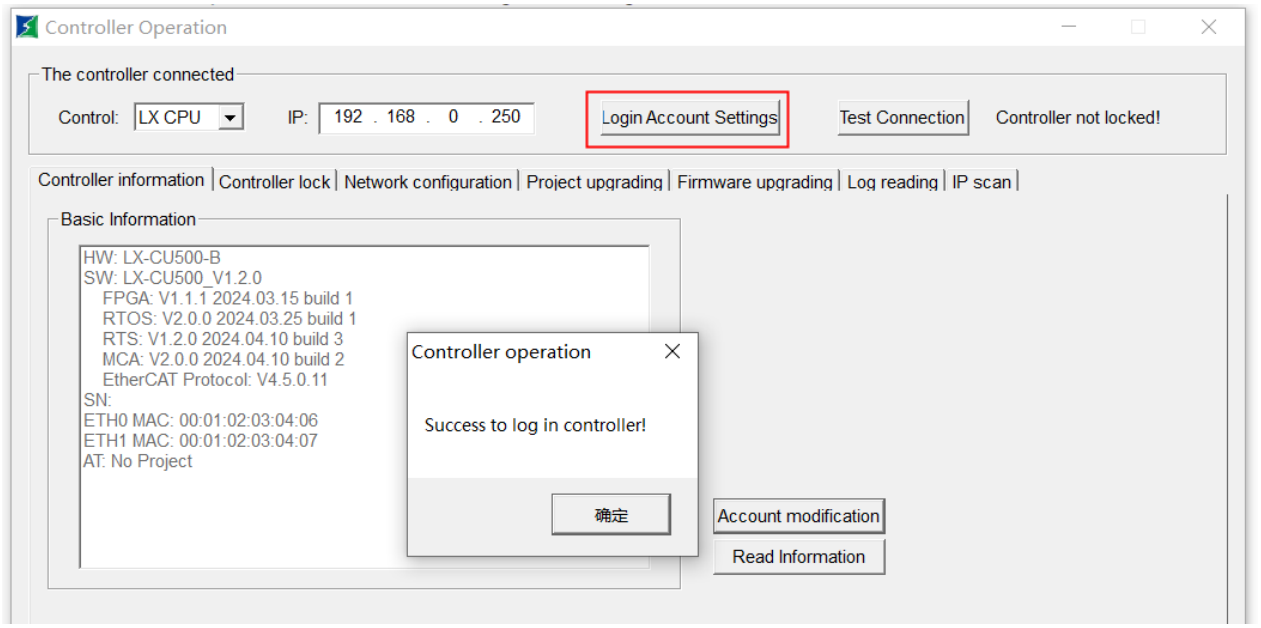


(6) Set up the controller login account and click Modify Account.



- The first power on only enter the new account information, user name and password set attention to account information set rules.

(7) Click Login Account Settings, enter the user name and password for the settings, and log in to the controller.



(8) After logging in the controller, the program can be compiled and downloaded normally. After downloading the program, the RUN indicator light is always on.

5.2 Notes for Use

Controller shall be used with attention to the following tips:

1. Timing mechanism
   - AT interface timing: regardless of the timing and controller system time is consistent, will start the system timing function.
   - NTP school time:
     - When NTP is calibrated for the first time, the system timing will not be activated until the time difference is more than 30 seconds.
     - When NTP is not the first time calibration, the time difference of calibration is more than 60 seconds, the system calibration function will be started.
   - EtherNet/IP master reconnection issues occur when the time difference between the controller system time and the calibration time is greater than or equal to the timeout of the EIP link (4 * RPI).
2. Tag newsletter

   The BOOL type binds to the direct address and then changes to the bit type, which requires the third-party client to re-import the xml file.
3. Synchronous unit
   - IO modules in the same synchronization unit group, where any module is offline, data acquisition for other modules may be affected.

- IO modules in different synchronous unit groups, in which any module is offline, other modules do not affect the data acquisition.
- Maximum support for 64 synchronization units, beyond the maximum limit will not be guaranteed.

5.3 LX-CU500 CPU Module

5.3.1 Product Overview

LX-CU500 is a CPU module of the LX series, which is the core of PLC for operation and control. It performs original data input, data operation, and new data output. The module has the features of compact size, high performance, fast response, and cost-effectiveness. It finds applications in high-performance equipment, complex machines, production line control, as well as various application scenarios such as PVD, CVD, cleaning machines, and etching machines.

The module supports multiple protocols including the Modbus TCP master-slave protocol, TCP/IP free port protocol, EtherNet/IP slave protocol, and Hlink communication protocol. By selecting different protocols, it can communicate with the corresponding devices. It achieves human-computer interaction (HMI) with the master control room through Ethernet, and data interaction with the communication module and high-speed module through the internal bus.

1. Basic Features

   LX-CU500 completes the "input-calculation-output" control process, providing an industrial memory card slot, supporting 512 KB MRAM, and provides dual redundant Ethernet interfaces and RS-485. By using different protocols, it can communicate with different devices. It can carry out I/O expansion through the EtherCAT network, and complete basic HMI through indicators, switches, etc.

   - Support SD card storage
   - Support dual Ethernet interfaces
   - Support Modbus TCP master-slave protocol, TCP/IP free port protocol EtherNet/IP master-slave protocol, HLink protocol
   - Support power failure protection
   - Support Ethernet interface expansion

2. Module components

   The module picture is shown below:

Block diagram

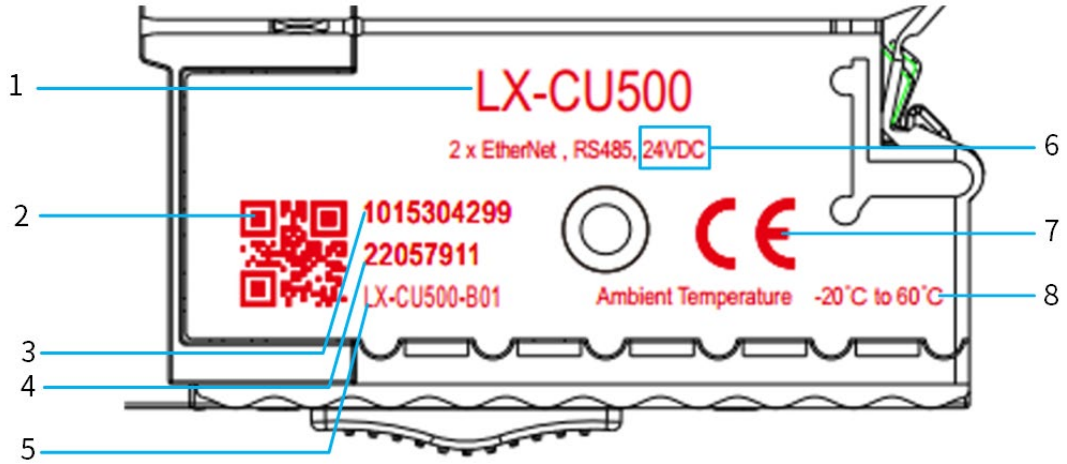
Module part description table

S/N	Component Name	Instructions
1	Module working status indicator	It indicates the operating status of the controller, including the running indicator (RUN), fault indicator (ERR), battery status indicator (BAT), SD card status indicator (SDIN), and communication status indicator (COM).
2	Ethernet interface	The module supports two northbound Ethernet interfaces (P1 and P2), the segment settings for two Ethernet interfaces are inconsistent, and the interface uses a standard RJ45 connector (with indicator). It supports ModbusTCP master-slave protocol, TCP/IP free port protocol, EtherNet/IP slave protocol, and Hlink protocol. The controller IP can be modified by referring to the <*LX Programming Manual for LX Programmable Logic Controllers*>
3	Power status indicator	It contains system power status indicator, field power indicator and backboard bus operating status indicator.

4	Power wiring terminal	It establishes the connection between the power supply of the system and the power supply in the field.
5	DIN rail left side mounting hook top	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to unlock the hook. To lock the module, push the handle inward to the bottom to set the hook to the locked position.
6	Side lock	Reserved components, one at the top and one at the bottom of the module, are used to lock the connection with the expansion module when the expansion module is installed on the left side of the controller.
7	RTC battery	The CR1225 button battery, which is recommended to be replaced once a year,should be inserted with attention to the positive and negative marks
8	Working mode switch	Three modes: running mode (RUN), programming mode (STOP), and reset mode (RST) See Operating Mode Switch
9	SD card button	Before inserting or removing the SD card, this button shall be pressed, otherwise, it may cause file loss or data errors in the SD card.
10	SD card slot	Controller firmware upgrade via SD card
11	RS-485 wiring terminal	It connects one RS-485 and supports ModbusRTU master-slave protocol, free port protocol, and ASCII.
12	RS-485 matching resistance dial switch	It is a two-position dial switch, which is set with the matching resistance by factory default and set to ON.
13	DIN rail right side mounting hook handle	This component is the handle operating end of the mounting hook on the right side of the DIN rail. When the module is installed on or removed from the DIN rail,pull or press the top of the top of the hook to unlock or lock it. This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status.

3. Nameplate

The nameplate is as shown below:



LX-CU500 nameplate sketch

The nameplate information described

S/N	Name	Description
1	Module model	CPU Module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	

6	Power voltage level	24 V DC
7	Certification standard	
8	Operating Temperature	-20°C ~ 60°C

5.3.2 Technical Indicators

1. General indicators

Item	Specifications
DDR	512 MB
MRAM	512KB
SD card	Up to 32 GB
Hot plug	Module does not support hotplug ,the Micro SD card supports hot swap
Program memory area (user)	6MB
Data storage area (M)	8MB
Data storage area (I)	256KB
Data storage area (Q)	256KB
Power failure protection area (R)	500KB
System clock accuracy	≤±60 seconds/month, timing supported
System timing method	NTP timing
Universal PID module	No quantity limit, advanced PID functionality
Continuous Maintenance of Power-off Protection Data	Supported
IO capacity	Maximum IO capacity not less than 10000 points
Backplane internal bus	Reserve support left communication card
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	56mm *109mm *90mm(W*H*D)

2. Power indicators

Item	Specifications
System power anti-reverse connection	Supported
System power input/output voltage	24 V DC (19.2 V~28.8 V)
System power output current	1.5A
Module power consumption (system side)	Max 7W
Field power anti-reverse connection	Supported
Field power input voltage	24 V DC (19.2 V~28.8 V)
Field power Loading current	Max 10A

3. Communication indicators

Item	Specifications
EtherCAT Communication	
The number of communication ports	1
Communication interface	Via LX-IM002 extension
Maximum number of supported axes	Virtual axis bus axis ≤ 64 axis

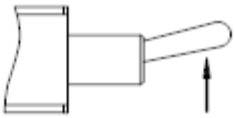
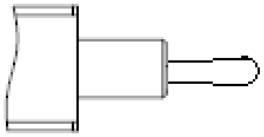
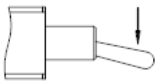
Support Services	FoE,CoE(PDO、SDO)
Maximum synchronization jitter	10us
Synchronous mode	FreeRUN、SM、DC
Physical layer	100BASE-TX
Baud rate	100Mbit/s(100Base-TX)
Duplex mode	Full duplex
Topological structure	Linear, star topology
Transmission medium	Super Class 5 shielded cable
Transmission distance	Less than 100M between two nodes
Slave station number	128
EtherCAT frame length	44 bytes to 1498 bytes
Synchro jitter of two slave stations	< 1us
Refresh time	1000 switch I/O, about 1ms 32 servo axes about 1 ms
Ring network function	No support
Automatic scanning function	Supported
Ethernet Bus 1 (P1\ P2 northbound network)	
Number of Ethernet bus communication ports	2-channel
Communication interface	RJ45
Communication cable	Super Class 5 shielded cable
Communication rate (bps)	10/100/1000 Mbps auto-negotiation
Serial Communication	
Number of serial communication interfaces	1
Type of interface	Pluggable terminal
Level standard	RS-485
Communication rate	1200bps、2400bps、4800bps、9600bps（Default）、19200bps、38400bps、57600bps、115200bps
Cable impedance	120 Ω
Isolation	Field side and system side isolation

4. Motion indicators

Item	Specifications
Pulse function	Precision requirement (under 25 ℃ environment): not more than one millisecond
Motion control instruction	PLCopen
Servo period	Minimum support of 500μs
Motion control instruction	See Motion Control Instruction Manual
Maximum supported items of ECI module	Subject to the maximum number of slave stations supported
Total number of axes supported	64 axes supported, which can be virtual axes or bus axes
Motion control method	EtherCAT bus motion control and pulse control supported

5.3.3 Operating Mode Switch

Name	Meaning	Operating Instruction

<table>
<tr><td>  </td><td>Running mode</td><td>The POU and IEC tasks associated with MotionTask can be executed, but the specific status of the IEC task is determined by the IEC task itself;
In this state, the task can be controlled to start or stop through the AutoThink interface running menu;</td></tr>
<tr><td>  </td><td>Stop mode</td><td>The IEC operation stops. In this state, the POU and IEC tasks associated with the IEC task MotionTask are stopped and cannot be triggered to execute; the task cannot be controlled to start or stop through the AutoThink interface running menu;</td></tr>
<tr><td>  </td><td>Reset</td><td>To reset the controller:
Press STOP -> RST (hold for 3 seconds)-> STOP to perform a cold reset, reload and run the user project, clear the power failure protection data, and force the variable list to be released.
To reset factory settings:
Set the toggle switch to RST and press SD_E at the same time, and then the CPU enters the factory reset operation. During this process, the BAT light and SD light flash with a periodic frequency of 4 HZ. After the factory reset operation is completed, the SD light and BAT light stop flashing.
The impact of resetting factory settings on the controller is shown in the following table:
<table>
<tr><th></th><th>Factory Defaults</th></tr>
<tr><td>Controller lock</td><td>Clear</td></tr>
<tr><td>IP address</td><td>Network card 1: 192.168.0.250
Network card 2: 192.168.1.250</td></tr>
<tr><td>Subnet mask</td><td>255.255.255.0</td></tr>
<tr><td>Static routing table</td><td>Clear</td></tr>
<tr><td>User logic source project</td><td>Clear</td></tr>
<tr><td>User file</td><td>Clear</td></tr>
<tr><td>User data area</td><td>Initialize</td></tr>
<tr><td>Mandatory</td><td>Release all</td></tr>
</table>
• Note: Only after the power is off, can the IP address and subnet mask be restored to the default values and the static routing table be cleared.</td></tr>
</table>

5.3.4 Status Indicator

The indicators on the front panel of the controller display different statuses of the controller such as the working status, communication status, and power status. The indicator statuses are described as follows:

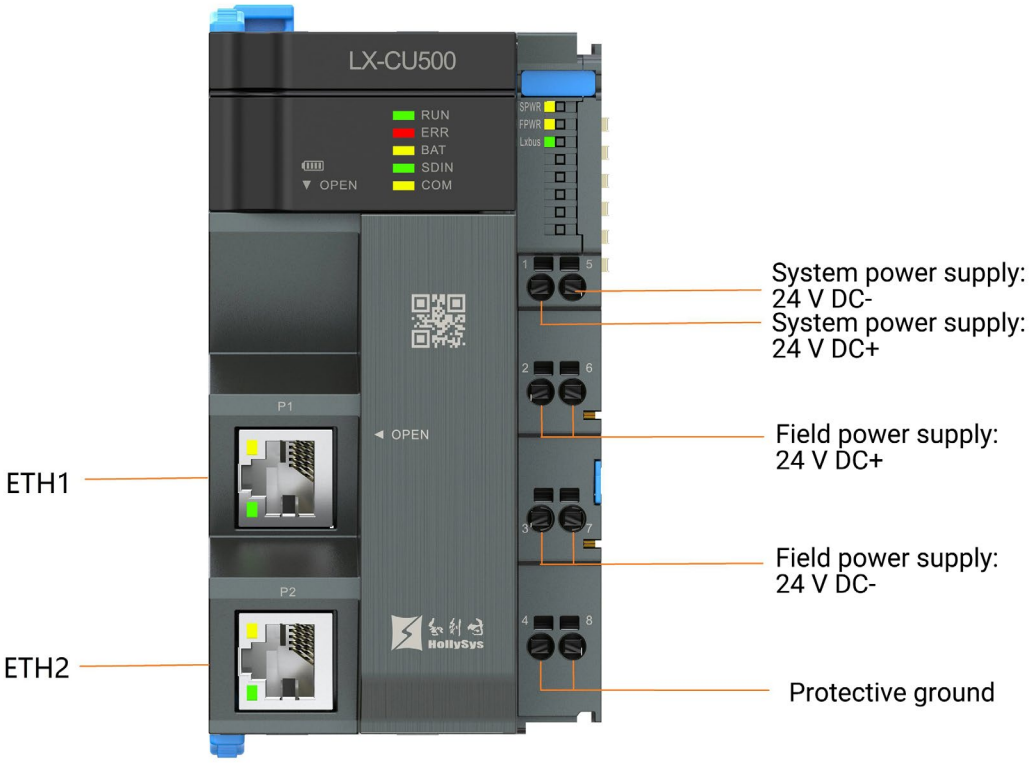
Name		Color	Meaning
RUN	Running status indicator	Green	Always on: The user project has been loaded but is not running Flashing: The user project is running Always off: The user project is not loaded
ERR	Module fault indicator	Red	Always on: It indicates that a fault has occurred Always off: It indicates no fault
BAT	Battery status indicator	Yellow	Always on: It indicates low battery power Always off: It indicates the battery power is normal
SDIN	SD card status indicator	Green	Always on: It indicates that the SD card has been inserted Always off: It indicates that the SD card is not inserted
COM	Communication status indicator	Yellow	Flashing: It indicates data transmission

			Always off: It indicates no data
SPWR	System power indicator	Yellow	Always on: The system side power supply is normal Always off: It indicates a system power fault
FPWR	Field power indicator	Yellow	Always on: The field side power supply is normal Always off: It indicates a field power fault
LXBUS	XBUS bus status indicator	Green	Always on: The XBUS connection has been established Flashing: There is data transmission on XBUS Always off: The XBUS bus is not connected

5.3.5 Description of Wiring Terminal

5.3.5.1 Power Wiring

The power wiring is shown in the figure below:



The definition of power terminals

Left Terminal Pin	Description of Signals	Right Terminal Pin	Description of Signals
1	24 V DC system power supply positive	5	24 V DC system power supply negative
2	24 V DC field power supply positive	6	24 V DC field power supply positive
3	24 V DC field power supply negative	7	24 V DC field power supply negative
4	Protective ground	8	Protective ground

- Terminal interface uses unshielded cable or shielded cable, cable length < 10m, wire diameter 0.3 to 1.0mm².

5.3.5.2 RS-485 wiring

The RS-485 wiring is shown in the figure below:

The definition of RS-485 terminals

Terminal Identification	Description of Signals	Description
+	RS-485 signal positive terminal	Bidirectional, RS-485 port A signal
-	RS-485 signal negative terminal	Bidirectional, RS-485 port B signal
G	Signal ground	Provide reliable grounding for signals

- Terminal type, material code see the module accessories chapter.

5.3.6 Battery

The module dedicated button battery is LXA-BC001,supports standard CR1225 button batteries and the batteries are replaceable.

- Note: In the controller system side power supply normal state, then the battery replacement.

5.3.6.1 Models and specifications

The model and specifications of the LXA-BC001 button battery for LX controller are shown in the table below. Other models or specifications are not recommended.

Model	Specifications
CR1225 button battery	Replace once a year

5.3.6.2 Purpose

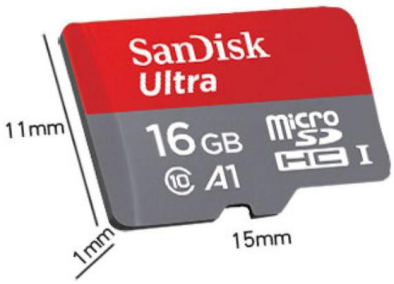
There is a battery slot on the front panel of the controller, which supports standard CR1225 button batteries with a minimum capacity of 40 mAh. The batteries are replaceable. The backup battery provides a power failure protection function for the real-time clock data. Even in the event of a power failure, the real-time clock data can still be maintained.

When the battery power is low, the BAT indicator will display an alarm. Please check regularly and replace the battery in time.

5.3.7 SD Memory Card

5.3.7.1 Models and specifications

- Capacity: 16 GB-32GB
- Specifications: 16-32 GB microSD HC memory card
- Performance speed: The reading speed is up to 98 MB/second, but the writing speed is slightly lower.
- Memory card size: 15 mm×11 mm×1.0 mm
- Operating temperature: -25°C~85°C
- Storage temperature: -40°C~+85°C
- After-sales: 10 years warranty service



5.3.7.2 Purpose

The SD card is the internal memory card of the controller and is used to store files or data. The controller firmware can be upgraded through this medium. The SD card is installed in the Micro SD card slot, supporting an maximum capacity of 32 GB, and allows hot-swapping.

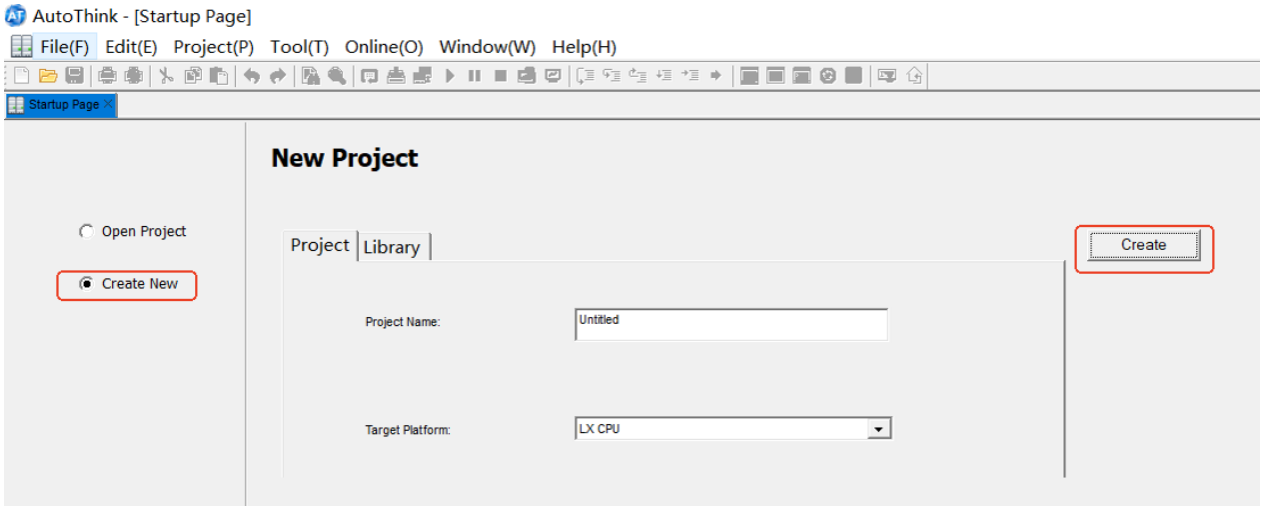
5.3.7.3 SD card button

Waiting for the SD card indicator to go off card holder before inserting or removing the SD card.

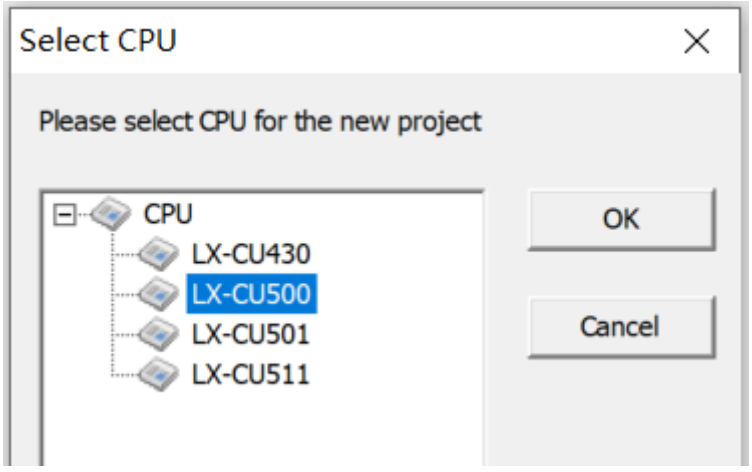
5.3.8 Engineering configuration

1. New construction project

(1) After starting AutoThink, select "New Project" - "Create" from the start page, and the Add CPU dialog will pop up to select the CPU you want to add.



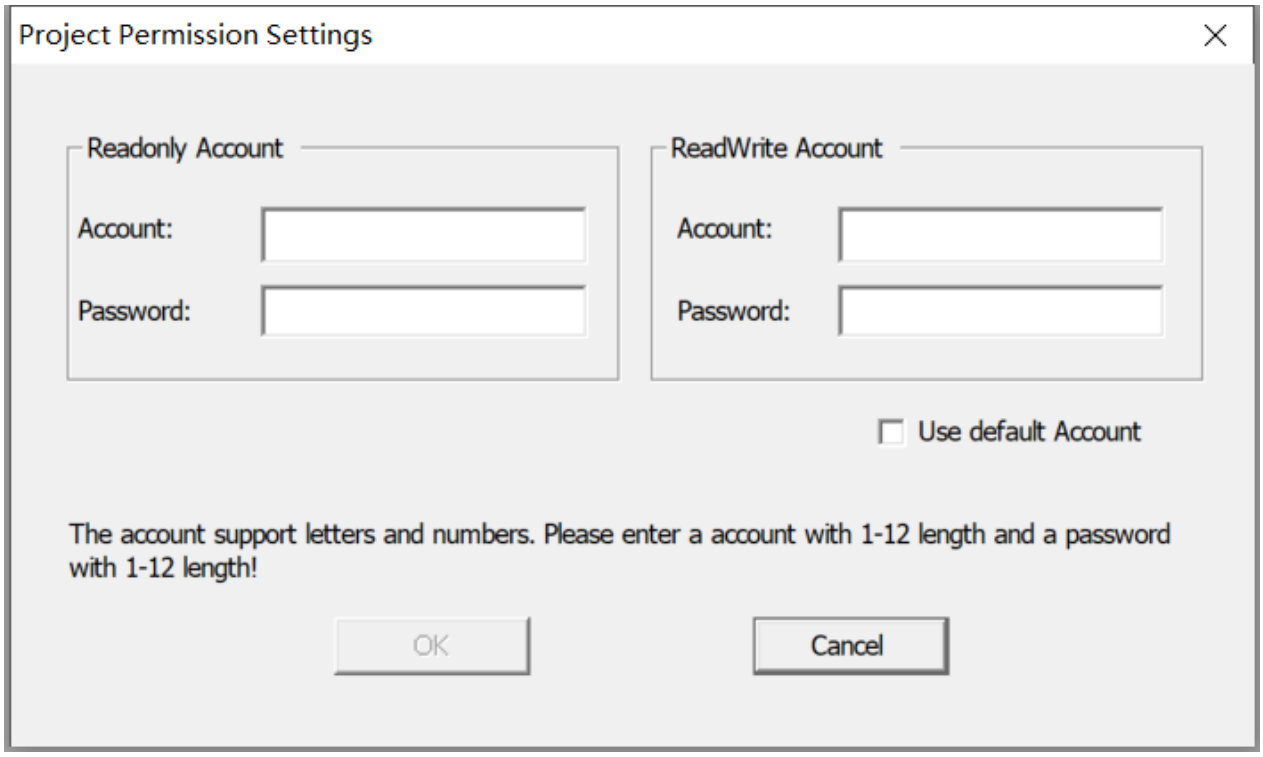
(a)



(b)

Add CPU

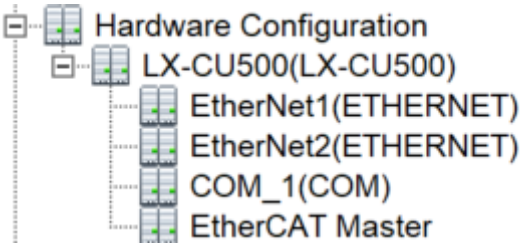
(2) Clicking the OK button to complete the project will bring up the Project Permission Settings dialog box.



- See <*LX Programming Manual for LX Programmable Logic Controllers*> for details of the new project.

2. Node Information Description

   EtherNet1 under the LX-CU500 tree node is P1, EtherNet2 is P2, and COM_1 is RS-485, as shown below.



3. Network configuration

   See <*Communication Manual for LX Progammable Logic Controllers*>.

5.3.9 Diagnostic Information

The LX-CU500 module can perform module diagnosis. The diagnostic information is shown in the following table:

Type	Parameters	Fault Name	Diagnostic Information
Device Diagnosis	AT_CPURun	Running status	0: Unknown status 1: Running 2: Stopped
	AT_CPUKey	Toggle switch status	0: Unknown status 1: RUN 2: STOP
	AT_BatteryAlarm	Battery power alarm status	0: No battery 1: Normal battery power 2: Insufficient battery power
	AT_SDState	SD card status	0: Inserted 1: Not Inserted
	AT_CPUTemp	Controller CPU temperature	It indicates the actual temperature of the current controller
	AT_CPUMemUsage	Usage rate of user data area (M, I, Q, R, G, S)	Usage rate = used (M + I + Q + R + G + S) *100 / max((M + I + Q + R + G + S))
	AT_CPUNtpStatus	NTP colibration result	0: Fault 1: Success
	AT_CPUFatalErr	Controller critical fault	bit0: Toggle switch fault, TRUE: Fault, FALSE: Normal bit1: Dual-network fault, TRUE: Fault, FALSE: Normal bit2: System power failure, TRUE: Fault, FALSE: Normal
	AT_CPUErr	General controller fault	bit0: RTC initialization fault, TRUE: Fault, FALSE: Normal bit1: zero fault, TRUE: fault, FALSE: normal bit2: Local Ethernet 1 fault, TRUE: Fault, FALSE: Normal When setting 1, it means that the network card 0 fails. The specific failure conditions are as follows: 1 System Startup Phase: Indicates that network card 0 is initializing and is not ready to complete. 2 System Operation Phase: Indicates a network card 0 failure. bit3: local Ethernet 2 fault, TRUE: fault, FALSE: normal

			When setting 1, it means that the network card 1 fails. The specific failure conditions are as follows: 1 System Startup Phase: Indicates that network card 1 is initializing and is not ready to complete. 2 System Operation Phase: Indicates a network card 1 failure. bit4: field power fault, TRUE: fault, FALSE: normal
	AT_CPUTimePulse	Clock pulse	Provide square wave signals with a 1:1 duty ratio at different cycle times of 1 minute, 1 second, 0.2 seconds, 0.1 seconds, 0.02 seconds, and 0.01 seconds.
	AT_TimeOfLastSystemPowerFault	Time of the last system power failure	-
EtherNet Diagnosis	NetWorkStatus1/2	EtherNet1/2 Status	0:normal, 1: fault
	BandWidth1/2	EtherNet1/2 Bandwidth	Unit: PPS
	TxRxTotalPackets1/2	Total number of TX and RX packets on EtherNet1/2	-
	TxRxPackets1/2	Total number of TX and RX packets on EtherNet1/2 in real time	-
	TxRxPacketsMax1/2	Maximum number of TX and RX packets on EtherNet1/2	-
	TxRxPacketsAverage1/2	Average number of TX and RX packets on EtherNet1/2	-
	TxRxMulticastPackets1/2	Total number of TX and RX multicast packets on EtherNet1/2	-
	TxRxBroadcastPackets1/2	Total number of TX and RX broadcast packets on EtherNet1/2	-
	RxTotalPackets1/2	Total number of RX packets on EtherNet1/2	-
	RxPackets1/2	Total number of RX packets on EtherNet1/2 in real time	-
	RxPacketsMax1/2	Maximum number of RX packets on	-

		EtherNet1/2	
	RxPacketsAverage1/2	Average number of RX packets on EtherNet1/2	-
	RxMulticastPackets1/2	Total number of RX multicast oackets on EtherNet1/2	-
	RxBroadcastPackets1/2	Total number of RX broadcast packets on EtherNet1/2	-
	TxTotalPackets1/2	Total number of TX packets on EtherNet1/2	-
	TxPackets1/2	Total number of TX packets on EtherNet1/2 in real time	-
	TxPacketsMax1/2	Maximum number of TX packets on EtherNet1/2	-
	TxPacketsAverage1/2	Average number of TX packets on EtherNet1/2	-
	TxMulticastPackets1/2	Totalnumber of TX multicast packets on EtherNet1/2	-
	TxBroadcastPackets1/2	Totalnumber of TX broadcast packets on EtherNet1/2	-

5.4 LX-CU501 CPU Module

5.4.1 Product Overview

LX-CU501 is the CPU module of LX series PLC products, which is the core of PLC operation and control to complete original data input, data operation and new data output. It achieves human-computer interaction with the master control room through Ethernet, and data interaction with the communication module and high-speed module through the internal bus.

1. Basic Features

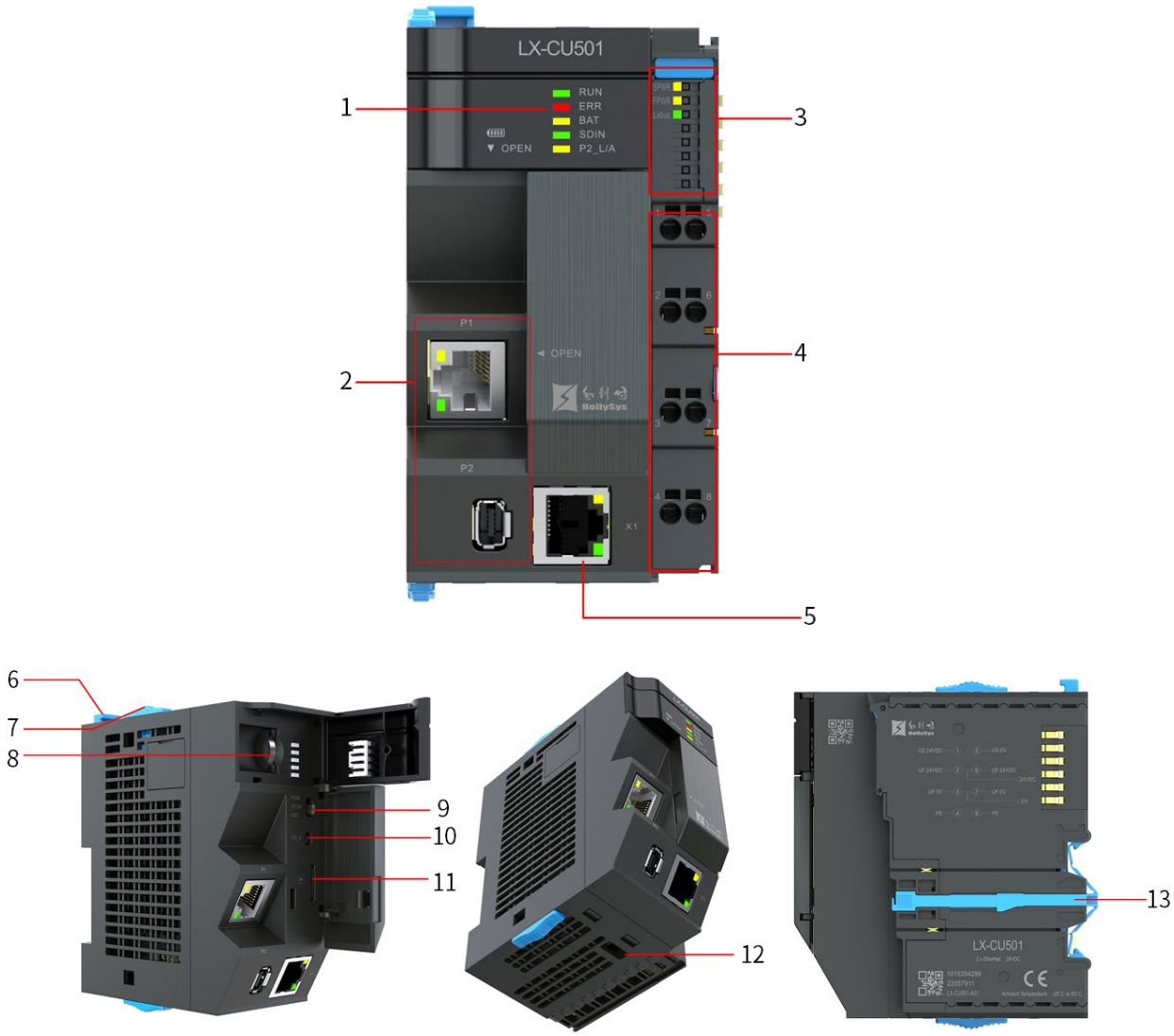
   LX-CU501 completes the input-computation-output control process with the following main functions:

   - The CPU and its constituent minimum system, provides the high speed computation resources;
   - Exchange data with other extended communication modules through internal bus;

- Support Flash, SD card storage;
- Support dual Ethernet interface;
- The basic human-computer interaction is accomplished through the indicator light and switch.

2. Module components

The module picture is shown below:



Block diagram

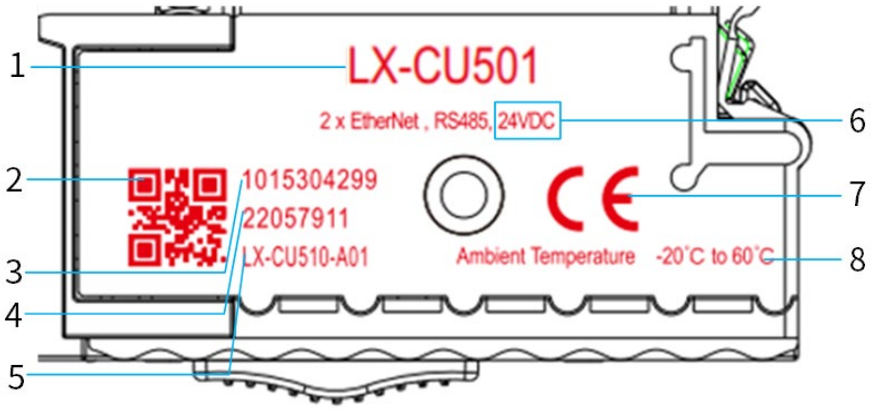
Module part description table

S/N	Component Name	Instructions
1	Module working status indicator	It indicates the operating status of the controller, including the running indicator (RUN), fault indicator (ERR), battery status indicator (BAT), SD card status indicator (SDIN), and P2 communication status indicator (P2_L/A).
2	Ethernet interface	The module supports two northbound Ethernet interfaces (P1 and P2), the segment settings for two Ethernet interfaces are inconsistent, the P1 uses a standard RJ45 connector (with

		indicator) and P2 with enhanced network port connector. It supports ModbusTCP master-slave protocol, TCP/IP free port protocol, EtherNet/IP slave protocol, and Hlink protocol. The controller IP can be modified by referring to the <*LX Programming Manual for LX Programmable Logic Controllers*> 14.5
3	Power status indicator	It contains system power status indicator, field power indicator and backboard bus operating status indicator.
4	Power wiring terminal	It establishes the connection between the power supply of the system and the power supply in the field.
5	EtherCAT IN	EtherCAT Loop Port
6	DIN rail left side mounting hook top	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to unlock the hook. To lock the module, push the handle inward to the bottom to set the hook to the locked position.
7	Side lock	Reserved components, one at the top and one at the bottom of the module, are used to lock the connection with the expansion module when the expansion module is installed on the left side of the controller.
8	RTC battery	The CR1225 button battery, which is recommended to be replaced once a year,should be inserted with attention to the positive and negative marks
9	Working mode switch	Three modes: running mode (RUN), programming mode (STOP), and reset mode (RST) See Operating Mode Switch
10	SD card button	Before inserting or removing the SD card, this button must be pressed, otherwise, it may cause file loss or data errors in the SD card.
11	SD card slot	Controller firmware upgrade via SD card
12	RS-485 wiring terminal	It connects one RS-485 and supports ModbusRTU master-slave protocol, and well as the free port protocol.
13	DIN rail right side mounting hook handle	This component is the handle operating end of the mounting hook on the right side of the DIN rail. When the module is installed on or removed from the DIN rail,pull or press the top of the top of the hook to unlock or lock it. This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status.

3. Nameplate

The nameplate is as shown below:



LX-CU501 nameplate sketch

The nameplate information described

S/N	Name	Description
1	Module model	CPU Module
2	SN identification code	Scan the QR code to get the SN plain code

3	SN plain code	
4	Order number	
5	Version number	
6	Power voltage level	24 V DC
7	Certification standard	
8	Operating Temperature	-20°C ~ 60°C

5.4.2 Technical Indicators

1. General indicators

Item	Specifications
DDR	512 MB
MRAM	512KB
SD card	Up to 32 GB
IO capacity	Maximum IO capacity not less than 10000 points
Backplane internal bus	Reserve support left communication card
Hot plug	Module does not support hotplug ,the Micro SD card supports hot swap
Program memory area (user)	6MB
Data storage area (M)	8MB
Data storage area (I)	256KB
Data storage area (Q)	256KB
Power failure protection area (R)	500KB
Continuous Maintenance of Power-off Protection Data	Supported
Real-time clock data format	Month: Day: Hour: Minutes: Seconds, BCD Code
System clock accuracy	≤±60 seconds/month, timing supported
System timing method	NTP timing, or manual timing with the AutoThink software
Universal PID module	No quantity limit, no special PID module
Power-down duration	1 year
Level of protection	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	56mm *109mm *90mm(W*H*D)

2. Power indicators

Item	Specifications
System power anti-reverse connection	Supported
System power input/output voltage	24 V DC (19.2 V~28.8 V)
System power output current	Max 1.5A
Module power consumption (system side)	Max 7W
Field power anti-reverse connection	Supported
Field power input voltage	24 V DC (19.2 V~28.8 V)
Field power Loading current	Max 10A

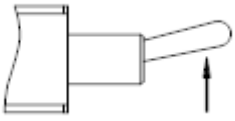
3. Communication indicators

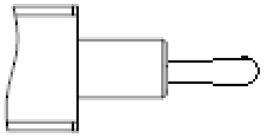
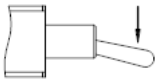
Item	Specifications
Ethernet Bus 1 (P1\ P2 northbound network)	
Number of Ethernet bus communication ports	2-channel(P1/P2)
Communication interface	P1:RJ45 P2: Enhanced network port connector
Communication cable	P1: Super Class 5 shielded cable; P2: Customized cable
Communication rate (bps)	10/100/1000 Mbps auto-negotiation
EtherCAT Communication	
The number of communication ports	1
Communication interface	RJ45,Via LX-IM002 extension
Communication rate (bps)	100Mbps(default)
Maximum number of supported axes	Virtual axis bus axis ≤ 64 axis
Support Services	FoE,CoE(PDO、SDO)
Maximum synchronization jitter	10us
Synchronous mode	FreeRUN、SM、DC
Physical layer	100BASE-TX
Baud rate	100Mbit/s(100Base-TX)
Duplex mode	Full duplex
Topological structure	Ring,Linear, star topology
Transmission medium	Super Class 5 shielded cable
Transmission distance	Less than 100M between two nodes
Slave station number	63
EtherCAT frame length	44 bytes to 1498 bytes
Synchro jitter of two slave stations	< 1us
Refresh time	1000 switch I/O, about 1ms 32 servo axes about 2 ms
Ring network function	Supported
Automatic scanning function	Supported

4. Motion indicators

Item	Specifications
Pulse function	Precision requirement (under 25 ℃ environment): not more than one millisecond
Motion control instruction	PLCopen
Servo period	Minimum support of 500μs
Motion control instruction	See Motion Control Instruction Manual
Maximum number of axes supported	64 axes
Motion control method	EtherCAT bus motion control and pulse control supported

5.4.3 Operating Mode Switch

Name	Meaning	Operating Instruction
	Running mode	The POU and IEC tasks associated with MotionTask can be executed, but the specific status of the IEC task is determined by the IEC task itself; In this state, the task can be controlled to start or stop through the AutoThink interface running menu;

<table>
<tr><td>  </td><td>Stop mode</td><td>The IEC operation stops. In this state, the POU and IEC tasks associated with the IEC task MotionTask are stopped and cannot be triggered to execute; the task cannot be controlled to start or stop through the AutoThink interface running menu;</td></tr>
<tr><td>  </td><td>Reset</td><td>To reset the controller:
Press STOP -> RST (hold for 3 seconds)-> STOP to perform a cold reset, reload and run the user project, clear the power failure protection data, and force the variable list to be released.
To reset factory settings:
Set the toggle switch to RST and press SD_E at the same time, and then the CPU enters the factory reset operation. During this process, the BAT light and SD light flash with a periodic frequency of 4 HZ. After the factory reset operation is completed, the SD light and BAT light stop flashing.
The impact of resetting factory settings on the controller is shown in the following table:
<table>
<tr><th></th><th>Factory Defaults</th></tr>
<tr><td>Controller lock</td><td>Clear</td></tr>
<tr><td>IP address</td><td>Network card 1: 192.168.0.250
Network card 2: 192.168.1.250</td></tr>
<tr><td>Subnet mask</td><td>255.255.255.0</td></tr>
<tr><td>Static routing table</td><td>Clear</td></tr>
<tr><td>User logic source project</td><td>Clear</td></tr>
<tr><td>User file</td><td>Clear</td></tr>
<tr><td>User data area</td><td>Initialize</td></tr>
<tr><td>Mandatory</td><td>Release all</td></tr>
</table>
• Note: Only after the power is off, can the IP address and subnet mask be restored to the default values and the static routing table be cleared.</td></tr>
</table>

5.4.4 Status Indicator

The indicators on the front panel of the controller display different statuses of the controller such as the working status, communication status, and power status. The indicator statuses are described as follows:

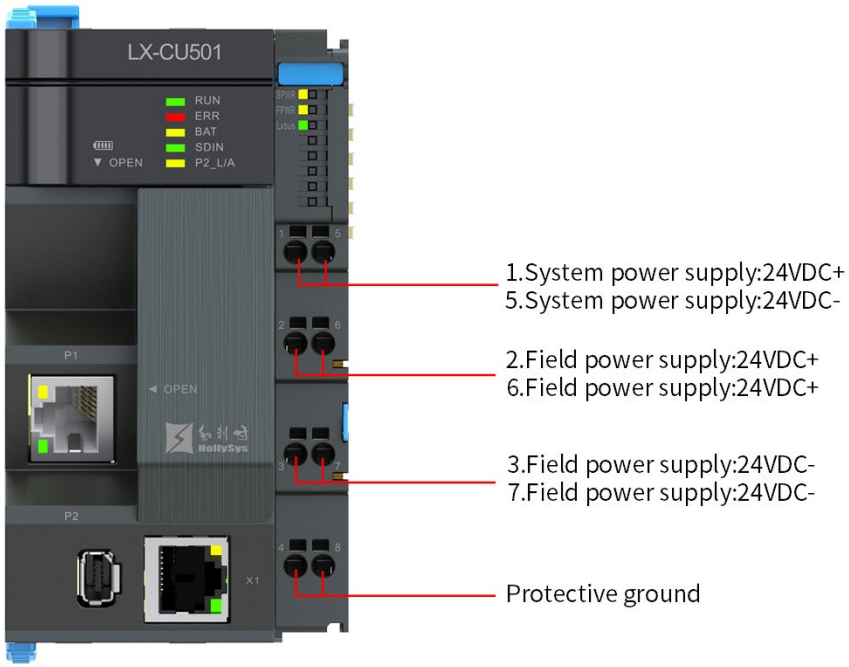
Name		Color	Meaning
RUN	Running status indicator	Green	Always on: The user project has been loaded but is not running Flashing: The user project is running Always off: The user project is not loaded Flash (4Hz): Loading works
ERR	Module fault indicator	Red	Always on: It indicates that a fault has occurred Always off: It indicates no fault
BAT	Battery status indicator	Yellow	Always on: It indicates low battery power Always off: It indicates the battery power is normal
SDIN	SD card status indicator	Green	Always on: It indicates that the SD card has been inserted Always off: It indicates that the SD card is not inserted
P2_L/A	P2 communication status indicator	Yellow	Always on: P2 network port Link Flashing: P2 network port has data transmission Always off: P2 network port inconnection
COM	Communication status indicator	Yellow	Flashing: It indicates data transmission Always off: It indicates no data
SPWR	System power indicator	Yellow	Always on: The system side power supply is normal

			Always off: It indicates a system power fault
FPWR	Field power indicator	Yellow	Always on: The field side power supply is normal Always off: It indicates a field power fault
Lxbus	Bus status indicator	Green	Always on: The Lxbus connection has been established Flashing: There is data transmission on Lxbus Always off: The Lxbus is not connected

5.4.5 Description of Wiring Terminal

5.4.5.1 Power Wiring

The power wiring is shown in the figure below:



The definition of power terminals

Left Terminal Pin	Description of Signals	Right Terminal Pin	Description of Signals
1	24 V DC system power supply positive	5	24 V DC system power supply negative
2	24 V DC field power supply positive	6	24 V DC field power supply positive
3	24 V DC field power supply negative	7	24 V DC field power supply negative
4	Protective ground	8	Protective ground

- Terminal interface uses unshielded cable or shielded cable, cable length < 10m, wire diameter 0.3 to 1.0mm².

5.4.6 Battery

The module dedicated button battery is LXA-BC001,supports standard CR1225 button batteries and the batteries are replaceable.

- Note: In the controller system side power supply normal state, then the battery replacement.

5.4.6.1 Models and specifications

The battery models and specifications that the LX controller is compatible with are shown in the table below. It is not recommended to use other battery models or specifications.

The model and specifications of the LXA-BC001 button battery for LX controller are shown in the table below. Other models or specifications are not recommended.

Model	Specifications
CR1225 button battery	Replace once a year

5.4.6.2 Purpose

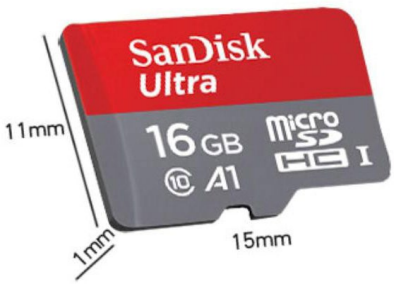
There is a battery slot on the front panel of the controller, which supports standard CR1225 button batteries with a minimum capacity of 40 mAh. The batteries are replaceable. The backup battery provides a power failure protection function for the real-time clock data. Even in the event of a power failure, the real-time clock data can still be maintained.

When the battery power is low, the BAT indicator will display an alarm. Please check regularly and replace the battery in time.

5.4.7 SD Memory Card

5.4.7.1 Models and specifications

- Capacity: 16 GB-32GB
- Specifications: 16-32 GB microSD HC memory card
- Performance speed: The reading speed is up to 98 MB/second, but the writing speed is slightly lower.
- Memory card size: 15 mm×11 mm×1.0 mm
- Operating temperature: -25°C~85°C
- Storage temperature: -40°C~+85°C



- After-sales: 10 years warranty service

5.4.7.2 Purpose

The SD card is the internal memory card of the controller and is used to store files or data. The controller firmware can be upgraded through this medium. The SD card is installed in the Micro SD card slot, supporting an maximum capacity of 32 GB, and allows hot-swapping.

5.4.7.3 SD card button

Waiting for the SD card indicator to go off card holder before inserting or removing the SD card.

5.4.8 Engineering configuration

See LX-CU500.

5.4.9 Diagnostic Information

The LX-CU501 module can perform module diagnosis. The diagnostic information is shown in the following table:

Type	Parameters	Fault Name	Diagnostic Information
Device Diagnosis	AT_CPURun	Running status	0: Unknown status 1: Running 2: Stopped
	AT_CPUKey	Toggle switch status	0: Unknown status 1: RUN 2: STOP
	AT_BatteryAlarm	Battery power alarm status	0: No battery 1: Normal battery power 2: Insufficient battery power
	AT_SDState	SD card status	0: Inserted 1: Not Inserted
	AT_CPUTemp	Controller CPU temperature	It indicates the actual temperature of the current controller
	AT_CPUMemUsage	Usage rate of user data	Usage rate = used (M + I + Q + R + G + S)

		area (M, I, Q, R, G, S)	*100 / max((M + I + Q + R + G + S))
	AT_CPUNtpStatus	NTP colibration result	0: Fault 1: Success
	AT_CPUFatalErr	Controller critical fault	bit0: Toggle switch fault, TRUE: Fault, FALSE: Normal bit1: Dual-network fault, TRUE: Fault, FALSE: Normal bit2: System power failure, TRUE: Fault, FALSE: Normal
	AT_CPUErr	General controller fault	bit0: RTC initialization fault, TRUE: Fault, FALSE: Normal bit1: zero fault, TRUE: fault, FALSE: normal bit2: Local Ethernet 1 fault, TRUE: Fault, FALSE: Normal When setting 1, it means that the network card 0 fails. The specific failure conditions are as follows: 1 System Startup Phase: Indicates that network card 0 is initializing and is not ready to complete. 2 System Operation Phase: Indicates a network card 0 failure. bit3: local Ethernet 2 fault, TRUE: fault, FALSE: normal When setting 1, it means that the network card 1 fails. The specific failure conditions are as follows: 1 System Startup Phase: Indicates that network card 1 is initializing and is not ready to complete. 2 System Operation Phase: Indicates a network card 1 failure. bit4: field power fault, TRUE: fault, FALSE: normal
	AT_CPUTimePulse	Clock pulse	Provide square wave signals with a 1:1 duty ratio at different cycle times of 1 minute, 1 second, 0.2 seconds, 0.1 seconds, 0.02 seconds, and 0.01 seconds.
	AT_TimeOfLastSystemPowerFault	Time of the last system power failure	-
EtherNet Diagnosis	NetWorkStatus1/2	EtherNet1/2 Status	0:normal, 1: fault
	BandWidth1/2	EtherNet1/2 Bandwidth	Unit: PPS
	TxRxTotalPackets1/2	Total number of TX and RX packets on	-

		EtherNet1/2	
	TxRxPackets1/2	Total number of TX and RX packets on EtherNet1/2 in real time	-
	TxRxPacketsMax1/2	Maximum number of TX and RX packets on EtherNet1/2	-
	TxRxPacketsAverage1/2	Average number of TX and RX packets on EtherNet1/2	-
	TxRxMulticastPackets1/2	Total number of TX and RX multicast packets on EtherNet1/2	-
	TxRxBroadcastPackets1/2	Total number of TX and RX broadcast packets on EtherNet1/2	-
	RxTotalPackets1/2	Total number of RX packets on EtherNet1/2	-
	RxPackets1/2	Total number of RX packets on EtherNet1/2 in real time	-
	RxPacketsMax1/2	Maximum number of RX packets on EtherNet1/2	-
	RxPacketsAverage1/2	Average number of RX packets on EtherNet1/2	-
	RxMulticastPackets1/2	Total number of RX multicast oackets on EtherNet1/2	-
	RxBroadcastPackets1/2	Total number of RX broadcast packets on EtherNet1/2	-
	TxTotalPackets1/2	Total number of TX packets on EtherNet1/2	-
	TxPackets1/2	Total number of TX packets on EtherNet1/2 in real time	-
	TxPacketsMax1/2	Maximum number of TX packets on EtherNet1/2	-
	TxPacketsAverage1/2	Average number of TX packets on EtherNet1/2	-

	TxMulticastPackets1/2	Totalnumber of TX multicast packets on EtherNet1/2	-
	TxBroadcastPackets1/2	Totalnumber of TX broadcast packets on EtherNet1/2	-

5.5 LX-CU510 Enhanced high-performance controller

5.5.1 Product Overview

LX-CU510 is an enhanced high-performance controller module of the LX series PLC products. It is the core of PLC computing and control, responsible for the input of raw data, data processing, and output of new data. The CPU module completes human-machine interaction with the control room via Ethernet and interacts with communication modules and high-speed modules through the internal bus.

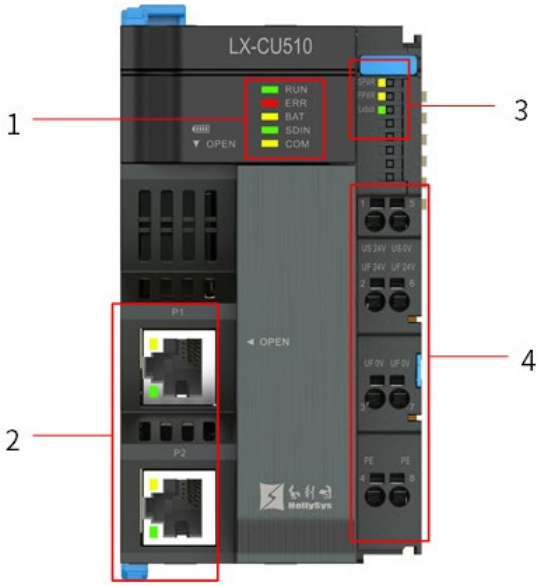
1. Basic Features

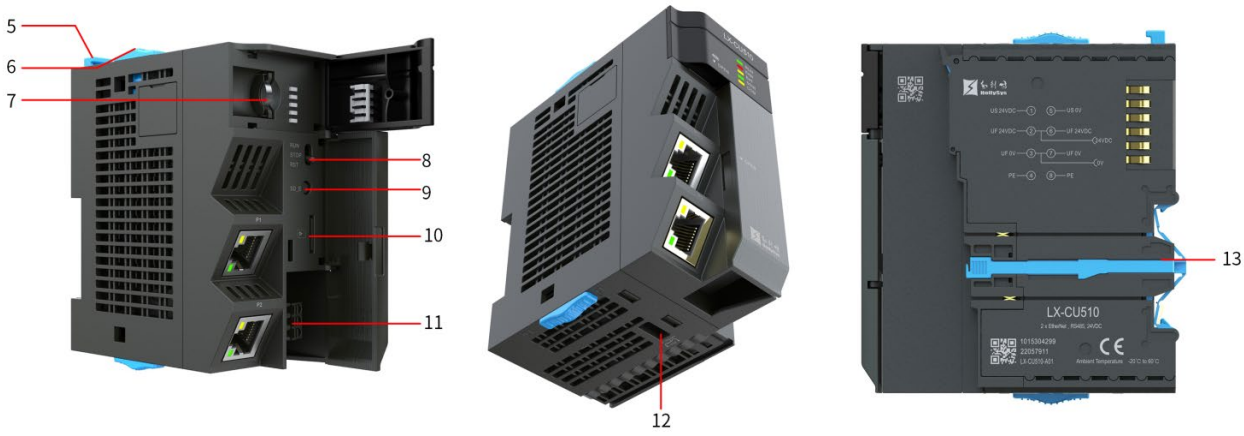
LX-CU510 completes the "input-calculation-output" control process, with the main functions as follows:

- CPU and its minimal system, providing resources required for high-speed computing;
- Exchanging data with other expansion communication modules through internal buses;
- Supporting Flash and SD card storage;
- Supporting dual Ethernet interfaces;
- Completing basic human-machine interaction through indicators, switches, etc.

2. Module components

The module picture is shown below:





Block diagram

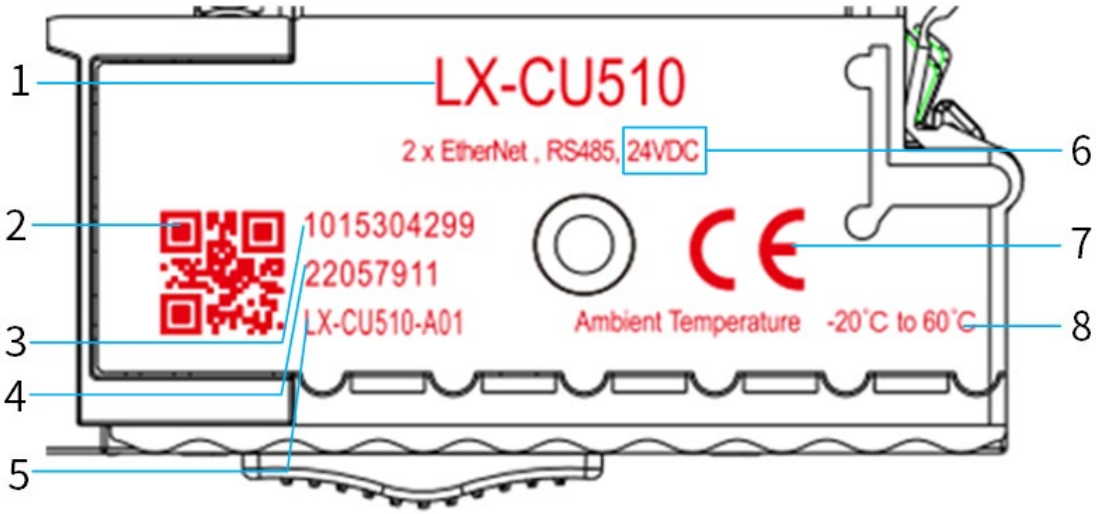
Module part description table

S/N	Component Name	Instructions
1	Module working status indicator	It indicates the operating status of the controller, including the running indicator (RUN), fault indicator (ERR), battery status indicator (BAT), SD card status indicator (SDIN), and communication status indicator (COM).
2	Ethernet interface	The module supports two northbound Ethernet interfaces (P1 and P2), the segment settings for two Ethernet interfaces are inconsistent, and the interface uses a standard RJ45 connector (with indicator). It supports ModbusTCP master-slave protocol, TCP/IP free port protocol, EtherNet/IP slave protocol, and Hlink protocol. The controller IP can be modified by referring to the <*LX Programming Manual for LX Programmable Logic Controllers*>
3	Power status indicator	It contains system power status indicator, field power indicator and backboard bus operating status indicator.
4	Power wiring terminal	It establishes the connection between the power supply of the system and the power supply in the field.
5	DIN rail left side	This component is used to control the hook on the right side of the DIN mounting rail of the

	mounting hook top	module. To remove the module, pull the handle outward to unlock the hook. To lock the module, push the handle inward to the bottom to set the hook to the locked position.
6	Side lock	Reserved components, one at the top and one at the bottom of the module, are used to lock the connection with the expansion module when the expansion module is installed on the left side of the controller.
7	RTC battery	The CR1225 button battery, which is recommended to be replaced once a year,should be inserted with attention to the positive and negative marks
8	Working mode switch	Three modes: running mode (RUN), programming mode (STOP), and reset mode (RST) See Operating Mode Switch
9	SD card button	Before inserting or removing the SD card, this button shall be pressed, otherwise, it may cause file loss or data errors in the SD card.
10	SD card slot	Controller firmware upgrade via SD card
11	RS-485 wiring terminal	It connects one RS-485 and supports ModbusRTU master-slave protocol, free port protocol, and ASCII.
12	RS-485 matching resistance dial switch	It is a two-position dial switch, which is set with the matching resistance by factory default and set to ON.
13	DIN rail right side mounting hook handle	This component is the handle operating end of the mounting hook on the right side of the DIN rail. When the module is installed on or removed from the DIN rail,pull or press the top of the top of the hook to unlock or lock it. This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status.

3. Nameplate

The nameplate is as shown below:



LX-CU510 nameplate sketch

The nameplate information described

S/N	Name	Description
1	Module model	Enhanced high-performance controller
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Power voltage level	24 V DC

7	Certification standard	
8	Operating Temperature	-20°C ~ 60°C

5.5.2 Technical Indicators

1. General indicators

Item	Specifications
DDR	512 MB
MRAM	512KB
SD card	Up to 32 GB
Hot plug	Module does not support hotplug ,the Micro SD card supports hot swap
Program memory area (user)	6MB
Data storage area (M)	8MB
Data storage area (I)	256KB
Data storage area (Q)	256KB
Power failure protection area (R)	500KB
System clock accuracy	≤±60 seconds/month, timing supported
System timing method	NTP timing
Universal PID module	No quantity limit, advanced PID functionality
Continuous Maintenance of Power-off Protection Data	Supported
IO capacity	Maximum IO capacity not less than 10000 points
Backplane internal bus	Reserve support left communication card
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	56mm *109mm *90mm(W*H*D)

2. Power indicators

Item	Specifications
System power anti-reverse connection	Supported
System power input/output voltage	24 V DC (19.2 V~28.8 V)
System power output current	Max 1.5A
Module power consumption (system side)	Max 7W
Field power anti-reverse connection	Supported
Field power input voltage	24 V DC (19.2 V~28.8 V)
Field power Loading current	Max 10A

3. Communication indicators

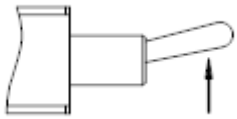
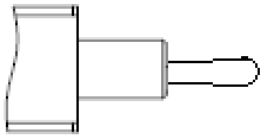
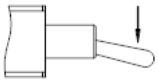
Item	Specifications
EtherCAT Communication	
The number of communication ports	1
Communication interface	Via LX-IM002 extension
Maximum number of supported axes	Virtual axis bus axis ≤ 64 axis

Support Services	FoE,CoE(PDO、SDO), when FoE and CoE communicate simultaneously, the priority of FoE communication is higher than that of CoE communication
Maximum synchronization jitter	10us
Synchronous mode	FreeRUN、SM、DC
Physical layer	100BASE-TX
Baud rate	100Mbit/s(100Base-TX)
Duplex mode	Full duplex
Topological structure	Linear, star topology, support hotlinking
Transmission medium	Super Class 5 shielded cable
Transmission distance	Less than 100M between two nodes
Slave station number	300
Process data	A single Ethernet frame is up to 1486 bytes
EtherCAT frame length	44 bytes to 1498 bytes
Synchro jitter of two slave stations	< 1us
Refresh time	1000 switch I/O, about 1ms 32 servo axes about 1 ms
Ring network function	No support
Automatic scanning function	Supported
Redundant network port	Does not support station fault recovery and diagnosis
Periodic data command quantity	No more than 129
Ethernet Bus 1 (P1\ P2 northbound network)	
Number of Ethernet bus communication ports	2-channel
Communication interface	RJ45
Communication cable	Super Class 5 shielded cable
Communication rate (bps)	10/100/1000 Mbps auto-negotiation
Serial Communication	
Number of serial communication interfaces	1
Type of interface	Pluggable terminal
Level standard	RS-485
Communication rate	1200bps、2400bps、4800bps、9600bps（Default）、19200bps、38400bps、57600bps、115200bps
Cable impedance	120 Ω
Isolation	Field side and system side isolation

4. Motion indicators

Item	Specifications
Pulse function	Precision requirement (under 25 ℃ environment): not more than one millisecond
Motion control instruction	PLCopen
Servo period	Minimum support of 500μs, 500us bus cycle supports 8 slave stations or 4 servos, does not support synchronization units and hot links
Motion control instruction	See Motion Control Instruction Manual
Total number of axes supported	64 axes supported
Motion control method	EtherCAT bus motion control and pulse control supported

5.5.3 Operating Mode Switch

Name	Meaning	Operating Instruction
	Running mode	The POU and IEC tasks associated with MotionTask can be executed, but the specific status of the IEC task is determined by the IEC task itself; In this state, the task can be controlled to start or stop through the AutoThink interface running menu;
	Stop mode	The IEC operation stops. In this state, the POU and IEC tasks associated with the IEC task MotionTask are stopped and cannot be triggered to execute; the task cannot be controlled to start or stop through the AutoThink interface running menu;
	Reset	To reset the controller: Press **STOP** -> **RST** (hold for 3 seconds)-> **STOP** to perform a cold reset, reload and run the user project, clear the power failure protection data, and force the variable list to be released. To reset factory settings: Set the toggle switch to **RST** and press **SD_E** at the same time, and then the CPU enters the factory reset operation. During this process, the **BAT** light and **SD** light flash with a periodic frequency of 4 HZ. After the factory reset operation is completed, the **SD** light and **BAT** light stop flashing. The impact of resetting factory settings on the controller is shown in the following table:

	Factory Defaults
Controller lock	Clear
IP address	Network card 1: 192.168.0.250 Network card 2: 192.168.1.250
Subnet mask	255.255.255.0
Static routing table	Clear
User logic source project	Clear
User file	Clear
User data area	Initialize
Mandatory	Release all

- Note: Only after the power is off, can the IP address and subnet mask be restored to the default values and the static routing table be cleared.

5.5.4 Status Indicator

The indicators on the front panel of the controller display different statuses of the controller such as the working status, communication status, and power status.

The table of indicator statuses

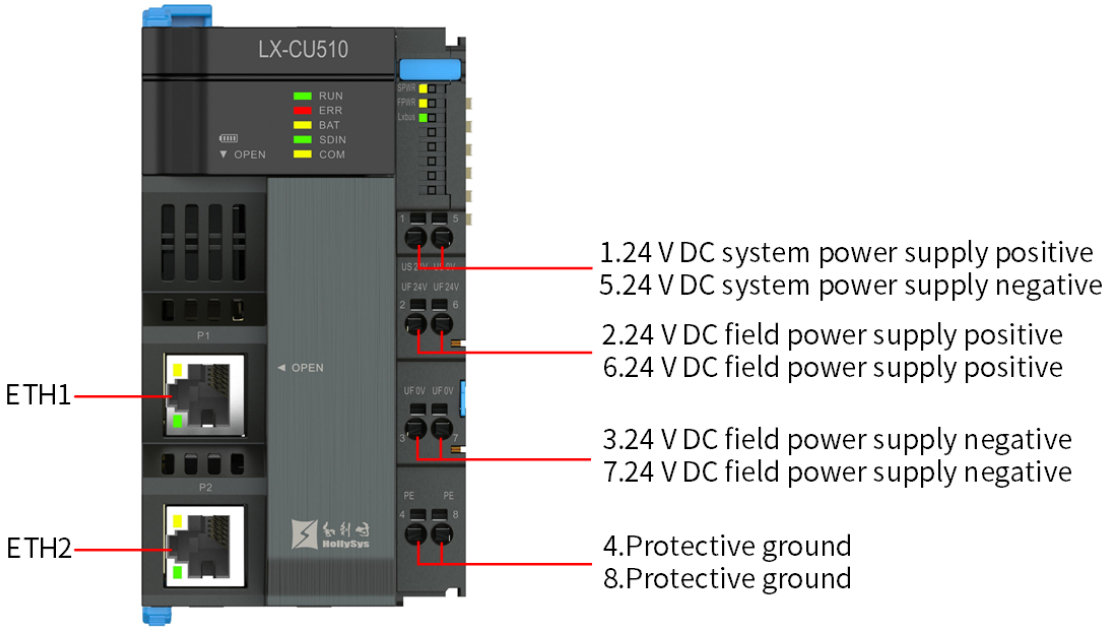
Name		Color	Meaning
RUN	Running status indicator	Green	Always on: The user project has been loaded but is not running Flashing: The user project is running Always off: The user project is not loaded

ERR	Module fault indicator	Red	Always on: It indicates that a fault has occurred Always off: It indicates no fault
BAT	Battery status indicator	Yellow	Always on: It indicates low battery power Always off: It indicates the battery power is normal
SDIN	SD card status indicator	Green	Always on: It indicates that the SD card has been inserted Always off: It indicates that the SD card is not inserted
COM	Communication status indicator	Yellow	Flashing: It indicates data transmission Always off: It indicates no data
SPWR	System power indicator	Yellow	Always on: The system side power supply is normal Always off: It indicates a system power fault
FPWR	Field power indicator	Yellow	Always on: The field side power supply is normal Always off: It indicates a field power fault
LXBUS	XBUS bus status indicator	Green	Always on: The XBUS connection has been established Flashing: There is data transmission on XBUS Always off: The XBUS bus is not connected

5.5.5 Description of Wiring Terminal

5.5.5.1 Power Wiring

The power wiring is shown in the figure below:



The definition of power terminals

Left Terminal Pin	Description of Signals	Right Terminal Pin	Description of Signals
1	24 V DC system power supply positive	5	24 V DC system power supply negative
2	24 V DC field power supply positive	6	24 V DC field power supply positive
3	24 V DC field power supply negative	7	24 V DC field power supply negative
4	Protective ground	8	Protective ground

- Terminal interface uses unshielded cable or shielded cable, cable length < 10m, wire diameter 0.3 to 1.0mm².

5.5.5.2 RS-485 wiring

The RS-485 wiring is shown in the figure below:

The definition of RS-485 terminals

Terminal Identification	Description of Signals	Description
+	RS-485 signal positive terminal	Bidirectional, RS-485 port A signal
-	RS-485 signal negative terminal	Bidirectional, RS-485 port B signal
G	Signal ground	Provide reliable grounding for signals

- Terminal type, material code see the module accessories chapter.

5.5.6 Battery

The module dedicated button battery is LXA-BC001,supports standard CR1225 button batteries and the batteries are replaceable.

- Note: In the controller system side power supply normal state, then the battery replacement.

5.5.6.1 Models and specifications

The model and specifications of the LXA-BC001 button battery for LX controller are shown in the table below. Other models or specifications are not recommended.

Model	Specifications
CR1225 button battery	Replace once a year

5.5.6.2 Purpose

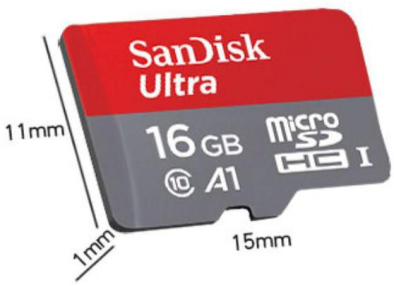
There is a battery slot on the front panel of the controller, which supports standard CR1225 button batteries with a minimum capacity of 40 mAh. The batteries are replaceable. The backup battery provides a power failure protection function for the real-time clock data. Even in the event of a power failure, the real-time clock data can still be maintained.

When the battery power is low, the BAT indicator will display an alarm. Please check regularly and replace the battery in time.

5.5.7 SD Memory Card

5.5.7.1 Models and specifications

- Capacity: 16 GB-32GB
- Specifications: 16-32 GB microSD HC memory card
- Performance speed: The reading speed is up to 98 MB/second, but the writing speed is slightly lower.
- Memory card size: 15 mm×11 mm×1.0 mm
- Operating temperature: -25°C~85°C
- Storage temperature: -40°C~+85°C
- After-sales: 10 years warranty service



5.5.7.2 Purpose

The SD card is the internal memory card of the controller and is used to store files or data. The controller firmware can be upgraded through this medium. The SD card is installed in the Micro SD card slot, supporting an maximum capacity of 32 GB, and allows hot-swapping.

5.5.7.3 SD card button

Waiting for the SD card indicator to go off card holder before inserting or removing the SD card.

5.5.8 Engineering configuration

See LX-CU500.

5.5.9 Diagnostic Information

The LX-CU510 module can perform module diagnosis. The diagnostic information is shown in the following table:

Type	Parameters	Fault Name	Diagnostic Information
Device Diagnosis	AT_CPURun	Running status	0: Unknown status 1: Running 2: Stopped
	AT_CPUKey	Toggle switch status	0: Unknown status 1: RUN 2: STOP
	AT_BatteryAlarm	Battery power alarm status	0: No battery 1: Normal battery power 2: Insufficient battery power
	AT_SDState	SD card status	0: Inserted 1: Not Inserted
	AT_CPUTemp	Controller CPU temperature	It indicates the actual temperature of the current controller
	AT_CPUMemUsage	Usage rate of user data area (M, I, Q, R, G, S)	Usage rate = used (M + I + Q + R + G + S) *100 / max((M + I + Q + R + G + S))
	AT_CPUNtpStatus	NTP colibration result	0: Fault 1: Success
	AT_CPUFatalErr	Controller critical fault	bit0: Toggle switch fault, TRUE: Fault, FALSE: Normal bit1: Dual-network fault, TRUE: Fault, FALSE: Normal bit2: System power failure, TRUE: Fault,

			FALSE: Normal
	AT_CPUErr	General controller fault	bit0: RTC initialization fault, TRUE: Fault, FALSE: Normal bit1: zero fault, TRUE: fault, FALSE: normal bit2: Local Ethernet 1 fault, TRUE: Fault, FALSE: Normal When setting 1, it means that the network card 0 fails. The specific failure conditions are as follows: 1 System Startup Phase: Indicates that network card 0 is initializing and is not ready to complete. 2 System Operation Phase: Indicates a network card 0 failure. bit3: local Ethernet 2 fault, TRUE: fault, FALSE: normal When setting 1, it means that the network card 1 fails. The specific failure conditions are as follows: 1 System Startup Phase: Indicates that network card 1 is initializing and is not ready to complete. 2 System Operation Phase: Indicates a network card 1 failure. bit4: field power fault, TRUE: fault, FALSE: normal
	AT_CPUTimePulse	Clock pulse	Provide square wave signals with a 1:1 duty ratio at different cycle times of 1 minute, 1 second, 0.2 seconds, 0.1 seconds, 0.02 seconds, and 0.01 seconds.
	AT_TimeOfLastSystemPowerFault	Time of the last system power failure	-
EtherNet Diagnosis	NetWorkStatus1/2	EtherNet1/2 Status	0:normal, 1: fault
	BandWidth1/2	EtherNet1/2 Bandwidth	Unit: PPS
	TxRxTotalPackets1/2	Total number of TX and RX packets on EtherNet1/2	-
	TxRxPackets1/2	Total number of TX and RX packets on EtherNet1/2 in real time	-
	TxRxPacketsMax1/2	Maximum number of TX and RX packets on EtherNet1/2	-
	TxRxPacketsAverage1/2	Average number of TX	-

		and RX packets on EtherNet1/2	
	TxRxMulticastPackets1/2	Total number of TX and RX multicast packets on EtherNet1/2	-
	TxRxBroadcastPackets1/2	Total number of TX and RX broadcast packets on EtherNet1/2	-
	RxTotalPackets1/2	Total number of RX packets on EtherNet1/2	-
	RxPackets1/2	Total number of RX packets on EtherNet1/2 in real time	-
	RxPacketsMax1/2	Maximum number of RX packets on EtherNet1/2	-
	RxPacketsAverage1/2	Average number of RX packets on EtherNet1/2	-
	RxMulticastPackets1/2	Total number of RX multicast oackets on EtherNet1/2	-
	RxBroadcastPackets1/2	Total number of RX broadcast packets on EtherNet1/2	-
	TxTotalPackets1/2	Total number of TX packets on EtherNet1/2	-
	TxPackets1/2	Total number of TX packets on EtherNet1/2 in real time	-
	TxPacketsMax1/2	Maximum number of TX packets on EtherNet1/2	-
	TxPacketsAverage1/2	Average number of TX packets on EtherNet1/2	-
	TxMulticastPackets1/2	Totalnumber of TX multicast packets on EtherNet1/2	-
	TxBroadcastPackets1/2	Totalnumber of TX broadcast packets on EtherNet1/2	-

5.6 LX-CU511 High-performance controller module for ring network

5.6.1 Product Overview

LX-CU511 is the CPU module of the LX series PLC products, serving as the core for PLC computation and control. It accomplishes the input of raw data, data processing, and output of new data. The CPU module communicates with the main control room's human-machine interface via Ethernet and interacts with communication modules and high-speed modules through an internal bus.

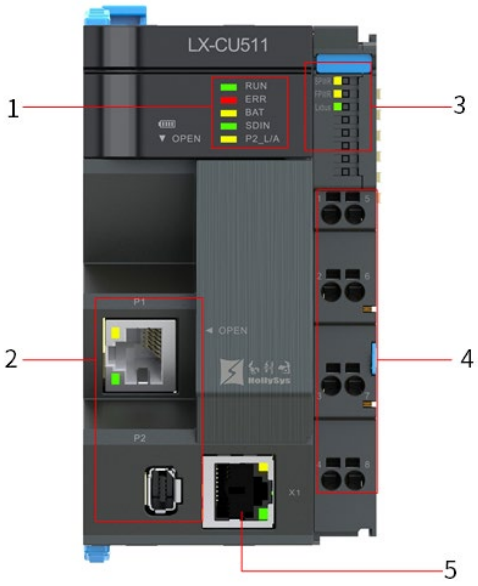
1. Basic Features

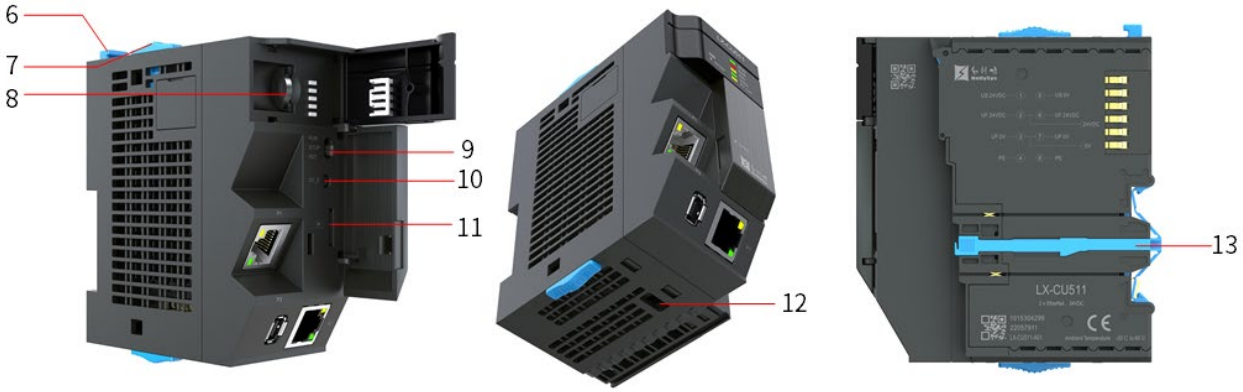
   LX-CU511 completes the "input-calculation-output" control process, with main functions as follows:

   - CPU and its minimal system provide resources required for high-speed computing;
   - Exchanges data with other expansion communication modules through internal bus;
   - Supports Flash and SD card storage;
   - Supports dual Ethernet interfaces;
   - Completes basic human-machine interaction through LEDs, switches, etc.

2. Module components

   The module picture is shown below:





Block diagram

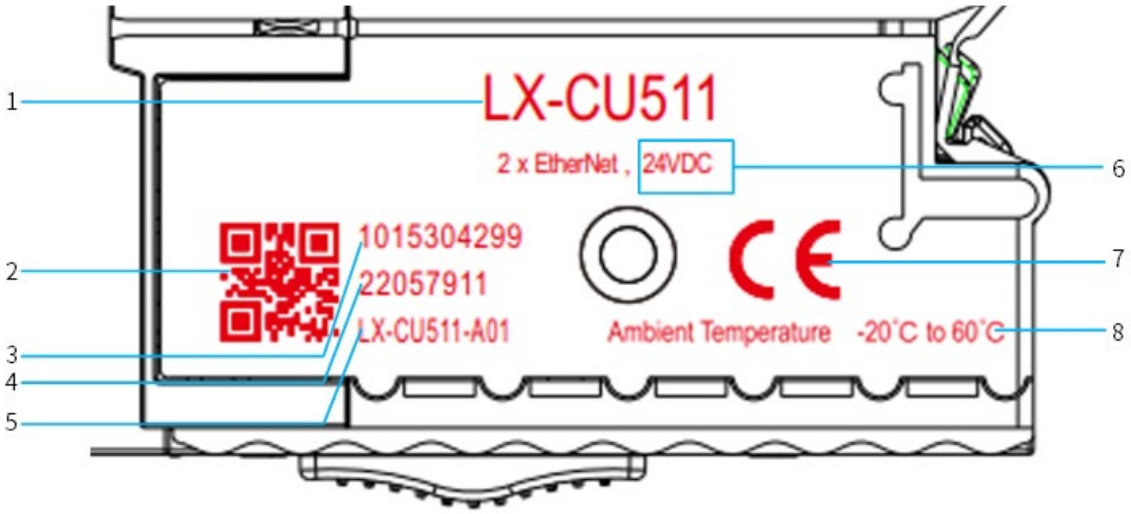
Module part description table

S/N	Component Name	Instructions
1	Module working status indicator	It indicates the operating status of the controller, including the running indicator (RUN), fault indicator (ERR), battery status indicator (BAT), SD card status indicator (SDIN), and communication status indicator (P2_L/A).
2	Ethernet interface	The module supports two northbound Ethernet interfaces (P1, P2). The P1 interface uses a standard RJ45 connector (with indicator lights), and P2 uses an enhanced network port connector.
3	Power status indicator	It contains system power status indicator, field power indicator and backboard bus operating status indicator.
4	Power wiring terminal	It establishes the connection between the power supply of the system and the power supply in the field.
5	DIN rail left side mounting hook top	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to unlock the hook. To lock the module, push the handle inward to the bottom to set the hook to the locked position.
6	Side lock	Reserved components, one at the top and one at the bottom of the module, are used to lock the connection with the expansion module when the expansion module is installed on the left side of the controller.
7	RTC battery	The CR1225 button battery, which is recommended to be replaced once a year,should be inserted with attention to the positive and negative marks

8	Working mode switch	Three modes: running mode (RUN), programming mode (STOP), and reset mode (RST) See Operating Mode Switch
9	SD card button	Before inserting or removing the SD card, this button shall be pressed, otherwise, it may cause file loss or data errors in the SD card.
10	SD card slot	Controller firmware upgrade via SD card
11	RS-485 wiring terminal	It connects one RS-485 and supports ModbusRTU master-slave protocol, free port protocol, and ASCII.
12	RS-485 matching resistance dial switch	It is a two-position dial switch, which is set with the matching resistance by factory default and set to ON.
13	DIN rail right side mounting hook handle	This component is the handle operating end of the mounting hook on the right side of the DIN rail. When the module is installed on or removed from the DIN rail,pull or press the top of the top of the hook to unlock or lock it. This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status.

3. Nameplate

The nameplate is as shown below:



LX-CU511 nameplate sketch

The nameplate information described

S/N	Name	Description
1	Module model	High-performance controller module for ring network
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Power voltage level	24 V DC
7	Certification standard	
8	Operating Temperature	-20°C ~ 60°C

5.6.2 Technical Indicators

1. General indicators

Item	Specifications
DDR	512 MB
MRAM	512KB
SD card	Up to 32 GB
IO capacity	Maximum IO capacity not less than 10000 points
Hot plug	Module does not support hotplug ,the Micro SD card supports hot swap
Program memory area (user)	6MB
Data storage area (M)	8MB
Data storage area (I)	256KB
Data storage area (Q)	256KB
Power failure protection area (R)	500KB
Real-time clock data format	Month: Day: Hour: Minutes: Seconds, BCD Code
System clock accuracy	≤±60 seconds/month, timing supported
System timing method	NTP timing, or manual timing with the AutoThink software
Universal PID module	No quantity limit, no special PID module
Power-down duration	1 year
Continuous Maintenance of Power-off Protection Data	Supported
Level of protection	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	56mm *109mm *90mm(W*H*D)

2. Power indicators

Item	Specifications
System power anti-reverse connection	Supported
System power input voltage	24 V DC (19.2 V~28.8 V)
System power output voltage	24 V DC (19.2 V~28.8 V)
System power output current	Max 1.5A
Module power consumption (system side)	Max 7W
Field power anti-reverse connection	Supported
Field power input voltage	24 V DC (19.2 V~28.8 V)
Field power Loading current	Max 10A

3. Communication indicators

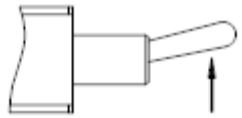
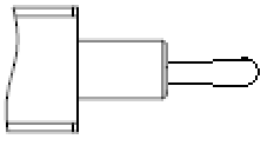
Item	Specifications
Ethernet Bus 1 (P1\ P2 northbound network)	
Number of Ethernet bus communication ports	2-channel(P1\P2)
Communication interface	P1: RJ45 P2: Enhanced network port connector
Communication cable	P1: Super Class 5 shielded cable; P2: Customized cable
Communication rate (bps)	10/100/1000 Mbps auto-negotiation
EtherCAT ring network port	
The number of communication ports	1

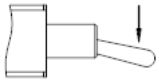
Communication interface	RJ45, via LX-IM002 extension
Maximum number of supported axes	Virtual axis bus axis ≤ 64 axis
Support Services	FoE,CoE(PDO、SDO), when FoE and CoE communicate simultaneously, the priority of FoE communication is higher than that of CoE communication
Maximum synchronization jitter	150us
Synchronous mode	FreeRUN、SM、DC
Physical layer	100BASE-TX
Baud rate	100Mbit/s(100Base-TX)
Duplex mode	Full duplex
Topological structure	Linear, star topology, support hotlinking
Transmission medium	Super Class 5 shielded cable
Transmission distance	Less than 100M between two nodes
Slave station number	300
EtherCAT frame length	44 bytes to 1498 bytes
Process data	A single Ethernet frame is up to 1486 bytes
Synchro jitter of two slave stations	< 24us
Refresh time	1000 switch I/O, about 1ms 32 servo axes about 1 ms
Ring network function	Support
Automatic scanning function	Supported
Redundant network port	Does not support station fault recovery and diagnosis
Periodic data command quantity	No more than 129

4. Motion indicators

Item	Specifications
Pulse function	Precision requirement (under 25 ℃ environment): not more than one millisecond
Motion control instruction	PLCopen
Servo period	Minimum support of 500μs
Motion control instruction	See Motion Control Instruction Manual
Total number of axes supported	64 axes supported, which can be virtual axes or bus axes
Motion control method	EtherCAT bus motion control and pulse control supported

5.6.3 Operating Mode Switch

Name	Meaning	Operating Instruction
	Running mode	The POU and IEC tasks associated with MotionTask can be executed, but the specific status of the IEC task is determined by the IEC task itself; In this state, the task can be controlled to start or stop through the AutoThink interface running menu;
	Stop mode	The IEC operation stops. In this state, the POU and IEC tasks associated with the IEC task MotionTask are stopped and cannot be triggered to execute; the task cannot be controlled to start or stop through the AutoThink interface running menu;

<table>
<tr>
<td>  </td>
<td>Reset</td>
<td>To reset the controller:
Press STOP -> RST (hold for 3 seconds)-> STOP to perform a cold reset, reload and run the user project, clear the power failure protection data, and force the variable list to be released.
To reset factory settings:
Set the toggle switch to RST and press SD_E at the same time, and then the CPU enters the factory reset operation. During this process, the BAT light and SD light flash with a periodic frequency of 4 HZ. After the factory reset operation is completed, the SD light and BAT light stop flashing.
The impact of resetting factory settings on the controller is shown in the following table:
<table>
<tr><th></th><th>Factory Defaults</th></tr>
<tr><td>Controller lock</td><td>Clear</td></tr>
<tr><td>IP address</td><td>Network card 1: 192.168.0.250
Network card 2: 192.168.1.250</td></tr>
<tr><td>Subnet mask</td><td>255.255.255.0</td></tr>
<tr><td>Static routing table</td><td>Clear</td></tr>
<tr><td>User logic source project</td><td>Clear</td></tr>
<tr><td>User file</td><td>Clear</td></tr>
<tr><td>User data area</td><td>Initialize</td></tr>
<tr><td>Mandatory</td><td>Release all</td></tr>
</table>
• Note: Only after the power is off, can the IP address and subnet mask be restored to the default values and the static routing table be cleared.</td>
</tr>
</table>

5.6.4 Status Indicator

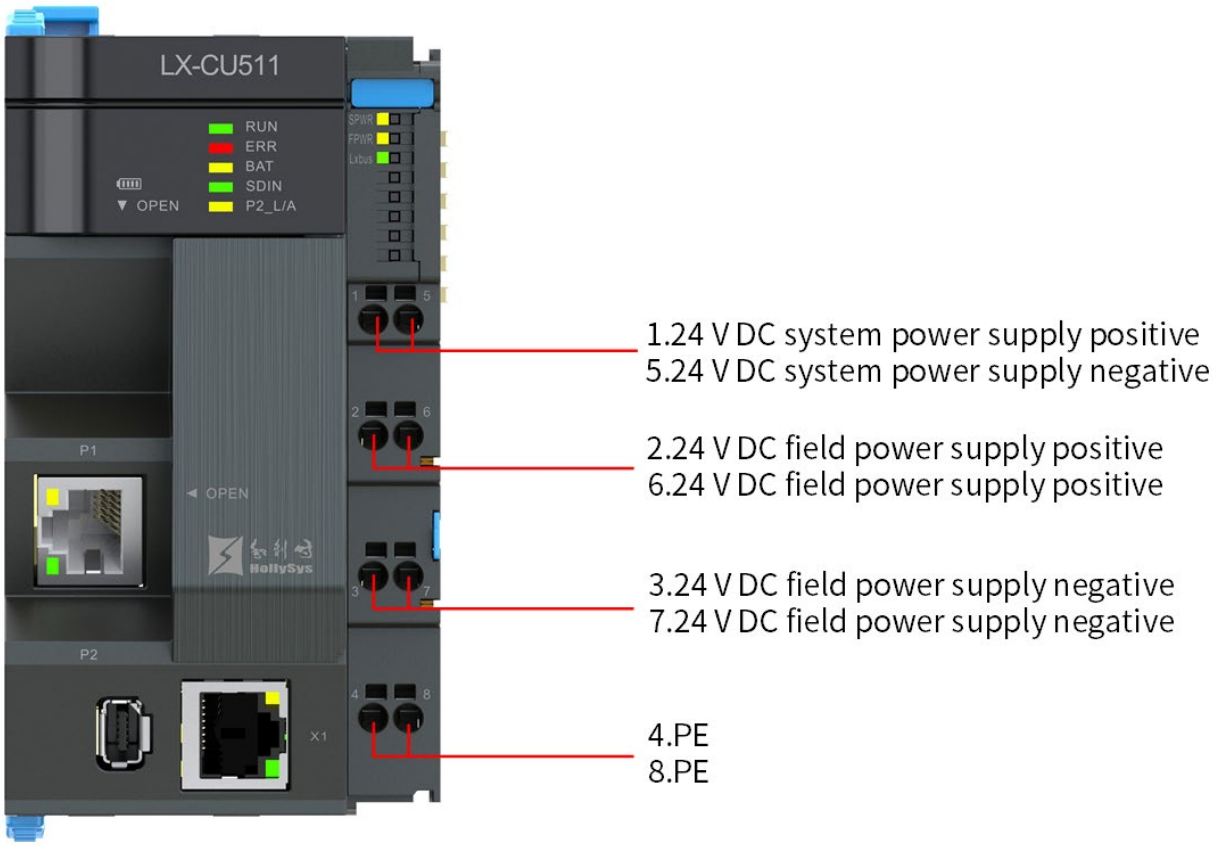
The indicators on the front panel of the controller display different statuses of the controller such as the working status, communication status, and power status. The indicator statuses are described as follows:

Color	Name	Meaning
Green	RUN	Always on: The user project has been loaded but is not running Flashing: The user project is running Always off: The user project is not loaded
Red	ERR	Always on: It indicates that a fault has occurred Always off: It indicates no fault
Yellow	BAT	Always on: It indicates low battery power Always off: It indicates the battery power is normal
Green	SDIN	Always on: It indicates that the SD card has been inserted Always off: It indicates that the SD card is not inserted
Yellow	P2_L/A	Always on: P2 network port is connected normally Flashing: There is data transmission on the P2 network port Always off: There is no connection to the P2 network port
Yellow	SPWR	Always on: The system side power supply is normal Always off: It indicates a system power fault
Yellow	FPWR	Always on: The field side power supply is normal Always off: It indicates a field power fault
Green	Lxbus	Always on: The LxBus connection has been established Flashing: There is data transmission on LxBus Always off: The LxBus bus is not connected

5.6.5 Description of Wiring Terminal

5.6.5.1 Power Wiring

The power wiring is shown in the figure below:



The definition of power terminals

Left Terminal Pin	Description of Signals	Right Terminal Pin	Description of Signals
1	24 V DC system power supply positive	5	24 V DC system power supply negative
2	24 V DC field power supply positive	6	24 V DC field power supply positive
3	24 V DC field power supply negative	7	24 V DC field power supply negative
4	Protective ground	8	Protective ground

5.6.6 Battery

The module dedicated button battery is LXA-BC001,supports standard CR1225 button batteries and the batteries are replaceable.

- Note: In the controller system side power supply normal state, then the battery replacement.

5.6.6.1 Models and specifications

The model and specifications of the LXA-BC001 button battery for LX controller are shown in the table below. Other models or specifications are not recommended.

Model	Specifications
CR1225 button battery	Replace once a year

5.6.6.2 Purpose

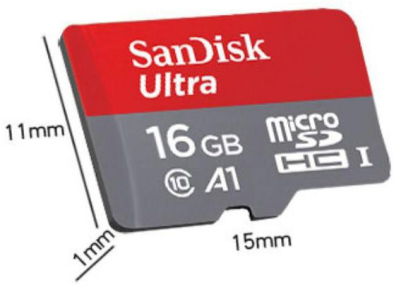
There is a battery slot on the front panel of the controller, which supports standard CR1225 button batteries with a minimum capacity of 40 mAh. The batteries are replaceable. The backup battery provides a power failure protection function for the real-time clock data. Even in the event of a power failure, the real-time clock data can still be maintained.

When the battery power is low, the BAT indicator will display an alarm. Please check regularly and replace the battery in time.

5.6.7 SD Memory Card

5.6.7.1 Models and specifications

- Capacity: 16 GB-32GB
- Specifications: 16-32 GB microSD HC memory card
- Performance speed: The reading speed is up to 98 MB/second, but the writing speed is slightly lower.
- Memory card size: 15 mm×11 mm×1.0 mm
- Operating temperature: -25°C~85°C
- Storage temperature: -40°C~+85°C
- After-sales: 10 years warranty service



5.6.7.2 Purpose

The SD card is the internal memory card of the controller and is used to store files or data. The controller firmware can be upgraded through this medium. The SD card is installed in the Micro SD card slot, supporting an maximum capacity of 32 GB, and allows hot-swapping.

5.6.7.3 SD card button

Waiting for the SD card indicator to go off card holder before inserting or removing the SD card.

5.6.8 Engineering configuration

See LX-CU500.

5.6.9 Diagnostic Information

The LX-CU511 module can perform module diagnosis. The diagnostic information is shown in the following table:

Type	Parameters	Fault Name	Diagnostic Information
Device Diagnosis	AT_CPURun	Running status	0: Unknown status 1: Running 2: Stopped
	AT_CPUKey	Toggle switch status	0: Unknown status 1: RUN 2: STOP
	AT_BatteryAlarm	Battery power alarm status	0: No battery 1: Normal battery power 2: Insufficient battery power
	AT_SDState	SD card status	0: Inserted 1: Not Inserted
	AT_CPUTemp	Controller CPU temperature	It indicates the actual temperature of the current controller
	AT_CPUMemUsage	Usage rate of user data area (M, I, Q, R, G, S)	Usage rate = used (M + I + Q + R + G + S) *100 / max((M + I + Q + R + G + S))
	AT_CPUNtpStatus	NTP colibration result	0: Fault 1: Success
	AT_CPUFatalErr	Controller critical fault	bit0: Toggle switch fault, TRUE: Fault, FALSE: Normal bit1: Dual-network fault, TRUE: Fault, FALSE: Normal bit2: System power failure, TRUE: Fault,

			FALSE: Normal bit2: System power failure, TRUE: Fault, FALSE: Normal
	AT_CPUErr	General controller fault	bit0: RTC initialization fault, TRUE: Fault, FALSE: Normal bit1: zero fault, TRUE: fault, FALSE: normal bit2: Local Ethernet 1 fault, TRUE: Fault, FALSE: Normal When setting 1, it means that the network card 0 fails. The specific failure conditions are as follows: 1 System Startup Phase: Indicates that network card 0 is initializing and is not ready to complete. 2 System Operation Phase: Indicates a network card 0 failure. bit3: local Ethernet 2 fault, TRUE: fault, FALSE: normal When setting 1, it means that the network card 1 fails. The specific failure conditions are as follows: 1 System Startup Phase: Indicates that network card 1 is initializing and is not ready to complete. 2 System Operation Phase: Indicates a network card 1 failure. bit4: field power fault, TRUE: fault, FALSE: normal
	AT_CPUTimePulse	Clock pulse	Provide square wave signals with a 1:1 duty ratio at different cycle times of 1 minute, 1 second, 0.2 seconds, 0.1 seconds, 0.02 seconds, and 0.01 seconds.
	AT_TimeOfLastSystemPowerFault	Time of the last system power failure	-
EtherNet Diagnosis	NetWorkStatus1/2	EtherNet1/2 Status	0:normal, 1: fault
	BandWidth1/2	EtherNet1/2 Bandwidth	Unit: PPS
	TxRxTotalPackets1/2	Total number of TX and RX packets on EtherNet1/2	-
	TxRxPackets1/2	Total number of TX and RX packets on EtherNet1/2 in real time	-
	TxRxPacketsMax1/2	Maximum number of TX and RX packets on EtherNet1/2	-

	TxRxPacketsAverage1/2	Average number of TX and RX packets on EtherNet1/2	-
	TxRxMulticastPackets1/2	Total number of TX and RX multicast packets on EtherNet1/2	-
	TxRxBroadcastPackets1/2	Total number of TX and RX broadcast packets on EtherNet1/2	-
	RxTotalPackets1/2	Total number of RX packets on EtherNet1/2	-
	RxPackets1/2	Total number of RX packets on EtherNet1/2 in real time	-
	RxPacketsMax1/2	Maximum number of RX packets on EtherNet1/2	-
	RxPacketsAverage1/2	Average number of RX packets on EtherNet1/2	-
	RxMulticastPackets1/2	Total number of RX multicast oackets on EtherNet1/2	-
	RxBroadcastPackets1/2	Total number of RX broadcast packets on EtherNet1/2	-
	TxTotalPackets1/2	Total number of TX packets on EtherNet1/2	-
	TxPackets1/2	Total number of TX packets on EtherNet1/2 in real time	-
	TxPacketsMax1/2	Maximum number of TX packets on EtherNet1/2	-
	TxPacketsAverage1/2	Average number of TX packets on EtherNet1/2	-
	TxMulticastPackets1/2	Totalnumber of TX multicast packets on EtherNet1/2	-
	TxBroadcastPackets1/2	Totalnumber of TX broadcast packets on EtherNet1/2	-

5.7 LX-CU430 Basic type high-performance controller module

5.7.1 Product Overview

LX-CU430 is the CPU module of LX series PLC products, which is the core of PLC operation and control to complete original data input, data operation and new data output. It achieves human-computer interaction with the master control room through Ethernet, and data interaction with the communication module and high-speed module through the internal bus.

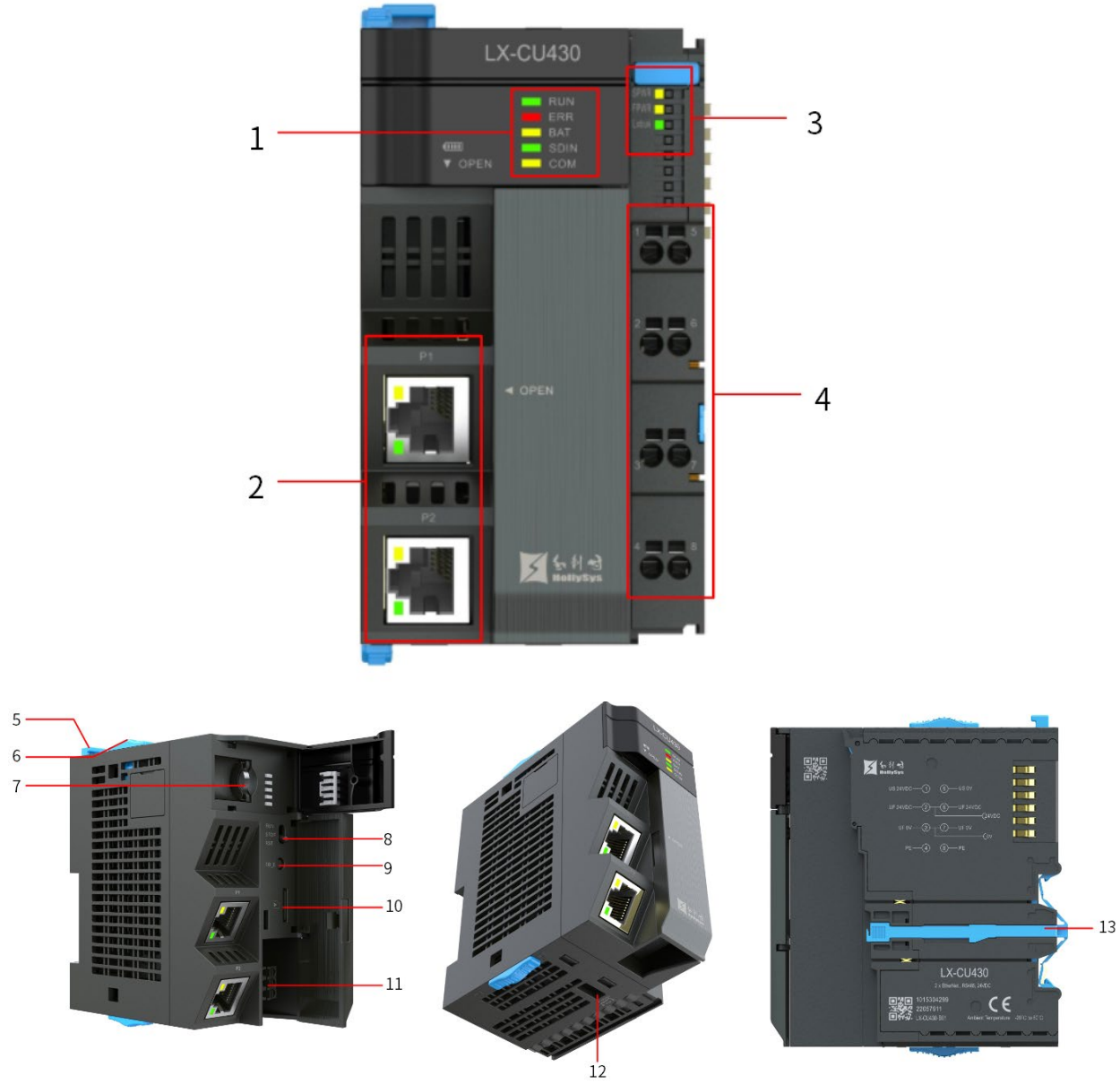
1. Basic Features

   LX-CU430 completes the input-computation-output control process with the following main functions:

   - The CPU and its constituent minimum system, provides the high speed computation resources;
   - Exchange data with other extended communication modules through internal bus;
   - Support Flash, SD card storage;
   - Support dual Ethernet interface;
   - The basic human-computer interaction is accomplished through the indicator light and switch.

2. Module components

   The module picture is shown below:



Block diagram

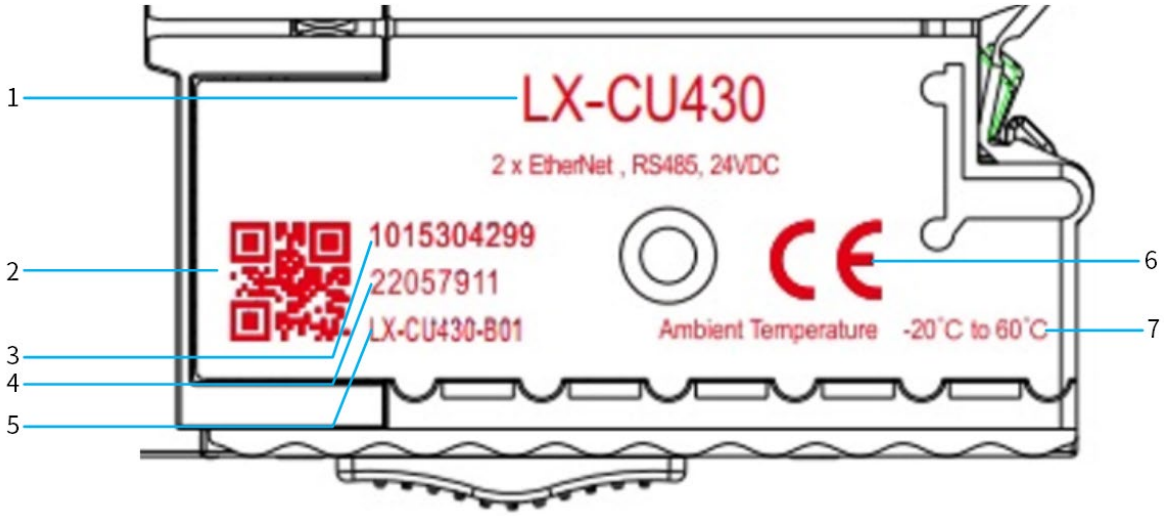
Module part description table

S/N	Component Name	Instructions
1	Module working status indicator	It indicates the operating status of the controller, including the running indicator (RUN), fault indicator (ERR), battery status indicator (BAT), SD card status indicator (SDIN), and communication status indicator (COM).
2	Ethernet interface	The module supports two northbound Ethernet interfaces (P1 and P2), the segment settings for two Ethernet interfaces are inconsistent, and the interface uses a standard RJ45 connector (with indicator). It supports ModbusTCP master-slave protocol, TCP/IP free port protocol, EtherNet/IP slave protocol, and Hlink protocol. The controller IP can be modified by referring to the *<LX Programming Manual for LX Programmable Logic Controllers>*
3	Power status indicator	It contains system power status indicator, field power indicator and backboard bus operating status indicator.
4	Power wiring	It establishes the connection between the power supply of the system and the power supply

	terminal	in the field.
5	DIN rail left side mounting hook top	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to unlock the hook. To lock the module, push the handle inward to the bottom to set the hook to the locked position.
6	Side lock	Reserved components, one at the top and one at the bottom of the module, are used to lock the connection with the expansion module when the expansion module is installed on the left side of the controller.
7	RTC battery	The CR1225 button battery, which is recommended to be replaced once a year,should be inserted with attention to the positive and negative marks
8	Working mode switch	Three modes: running mode (RUN), programming mode (STOP), and reset mode (RST) See Operating Mode Switch
9	SD card button	Before inserting or removing the SD card, this button shall be pressed, otherwise, it may cause file loss or data errors in the SD card.
10	SD card slot	Controller firmware upgrade via SD card
11	RS-485 wiring terminal	It connects one RS-485 and supports ModbusRTU master-slave protocol, and free port protocol.
12	RS-485 matching resistance dial switch	It is a two-position dial switch, which is set with the matching resistance by factory default and set to ON.
13	DIN rail right side mounting hook handle	This component is the handle operating end of the mounting hook on the right side of the DIN rail. When the module is installed on or removed from the DIN rail,pull or press the top of the top of the hook to unlock or lock it. This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status.

3. Nameplate

The nameplate is as shown below:



LX-CU430 nameplate sketch

The nameplate information described

S/N	Name	Description
1	Module model	Basic type high-performance controller module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	

6	Certification standard	
7	Operating Temperature	-20°C ~ 60°C

5.7.2 Technical Indicators

1. General indicators

Item	Specifications
DDR	512 MB
MRAM	512KB
SD card	Up to 32 GB
Program memory area (user)	3MB
Data storage area (M)	4MB
Data storage area (I)	128KB
Data storage area (Q)	128KB
Power failure protection area (R)	256KB
Bit operation	3ns
Extended IO Quantity	128
Hot plug	Module does not support hotplug ,the Micro SD card supports hot swap
System clock accuracy	≤±60 seconds/month, timing supported
Real-time clock data format	Month: Day: Hour: Minutes: Seconds, BCD Code
Power-down duration	1 year
Continuous Maintenance of Power-off Protection Data	Supported
Level of protection	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	56mm *109mm *90mm(W*H*D)

2. Power indicators

Item	Specifications
System power anti-reverse connection	Supported
System power input/output voltage	24 V DC (19.2 V~28.8 V)
System power output current	Max 1.5A
Module power consumption (system side)	Max 7W
Field power anti-reverse connection	Supported
Field power input voltage	24 V DC (19.2 V~28.8 V)
Field power Loading current	Max 10A

3. Communication indicators

Item	Specifications
EtherCAT Communication	
The number of communication ports	1
Communication interface	Via LX-IM002 extension
Maximum number of supported axes	Virtual axis bus axis ≤ 64 axis

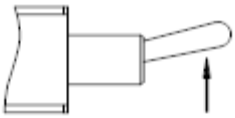
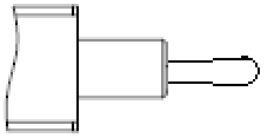
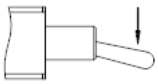
Support Services	FoE,CoE(PDO、SDO)
Maximum synchronization jitter	100us
Synchronous mode	FreeRUN、SM、DC
Physical layer	100BASE-TX
Baud rate	100Mbit/s(100Base-TX)
Duplex mode	Full duplex
Topological structure	Linear topology
Transmission medium	Super Class 5 shielded cable
Transmission distance	Less than 100M between two nodes
Slave station number	128
EtherCAT frame length	44 bytes to 1498 bytes
Process data	Maximum single Ethernet frame size of 1486 bytes
Synchro jitter of two slave stations	< 1us
Refresh time	1000 switch I/O, about 1ms 16 servo axes about 1 ms
Ring network function	No support
Automatic scanning function	Supported
Ethernet Bus 1 (P1\ P2 northbound network)	
Number of Ethernet bus communication ports	2-channel(P1/P2)
Communication interface	RJ45
Communication cable	Super Class 5 shielded cable
Communication rate (bps)	10/100/1000 Mbps auto-negotiation
Serial Communication	
Number of serial communication interfaces	1
Type of interface	Pluggable terminal
Level standard	RS-485
Communication rate	1200bps、2400bps、4800bps、9600bps（Default）、19200bps、38400bps、57600bps、115200bps
Cable impedance	120 Ω
Isolation	Field side and system side isolation

4. Motion indicators

Item	Specifications
Pulse function	Precision requirement (under 25 ℃ environment): not more than one millisecond
Motion control instruction	PLCopen
Servo period	Minimum support of 1ms
Motion control instruction	See Motion Control Instruction Manual
Maximum number of shafts supported	EtherCAT bus has a maximum of 16 axes, virtual axes: virtual axes+bus axes ≤ 64 axes
Motion control method	EtherCAT bus motion control and pulse control supported

5.7.3 Operating Mode Switch

Name	Meaning	Operating Instruction

<table>
<tr><td>  </td><td>Running mode</td><td>The POU and IEC tasks associated with MotionTask can be executed, but the specific status of the IEC task is determined by the IEC task itself;
In this state, the task can be controlled to start or stop through the AutoThink interface running menu;</td></tr>
<tr><td>  </td><td>Stop mode</td><td>The IEC operation stops. In this state, the POU and IEC tasks associated with the IEC task MotionTask are stopped and cannot be triggered to execute; the task cannot be controlled to start or stop through the AutoThink interface running menu;</td></tr>
<tr><td>  </td><td>Reset</td><td>To reset the controller:
Press STOP -> RST (hold for 3 seconds)-> STOP to perform a cold reset, reload and run the user project, clear the power failure protection data, and force the variable list to be released.
To reset factory settings:
Set the toggle switch to RST and press SD_E at the same time, and then the CPU enters the factory reset operation. During this process, the BAT light and SD light flash with a periodic frequency of 4 HZ. After the factory reset operation is completed, the SD light and BAT light stop flashing.
The impact of resetting factory settings on the controller is shown in the following table:
<table>
<tr><th></th><th>Factory Defaults</th></tr>
<tr><td>Controller lock</td><td>Clear</td></tr>
<tr><td>IP address</td><td>Network card 1: 192.168.0.250
Network card 2: 192.168.1.250</td></tr>
<tr><td>Subnet mask</td><td>255.255.255.0</td></tr>
<tr><td>Static routing table</td><td>Clear</td></tr>
<tr><td>User logic source project</td><td>Clear</td></tr>
<tr><td>User file</td><td>Clear</td></tr>
<tr><td>User data area</td><td>Initialize</td></tr>
<tr><td>Mandatory</td><td>Release all</td></tr>
</table>
• Note: Only after the power is off, can the IP address and subnet mask be restored to the default values and the static routing table be cleared.</td></tr>
</table>

5.7.4 Status Indicator

The indicators on the front panel of the controller display different statuses of the controller such as the working status, communication status, and power status. The indicator statuses are described as follows:

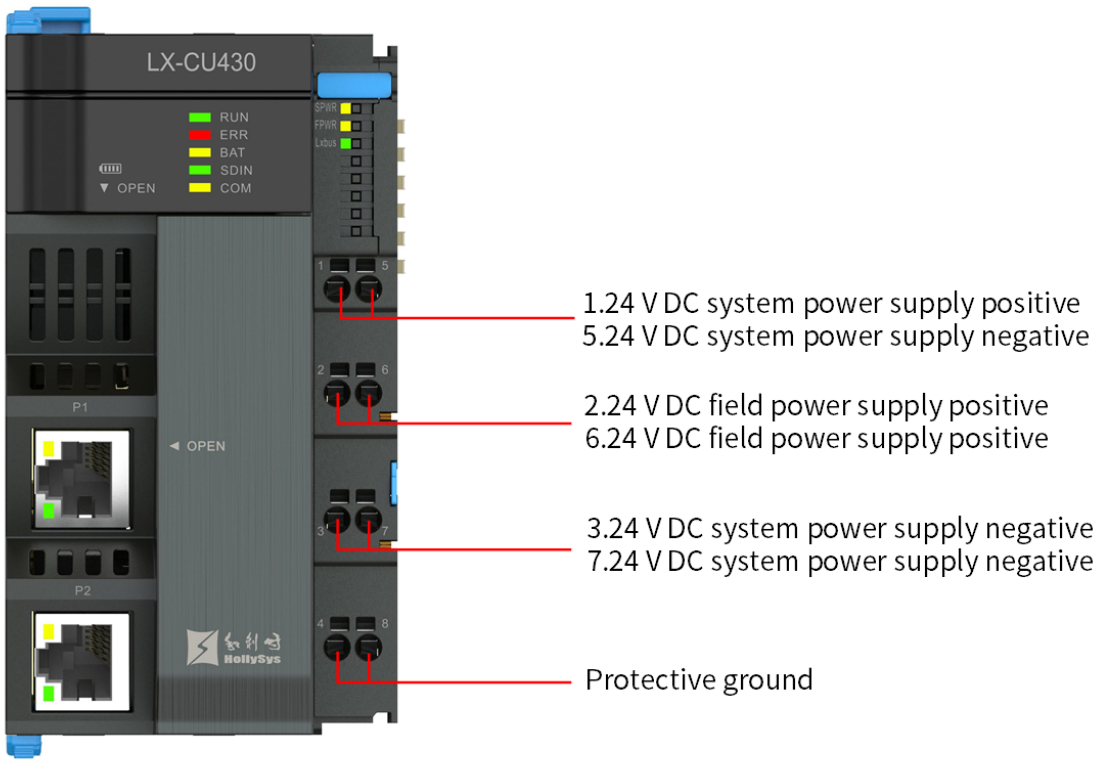
Name		Color	Meaning
RUN	Running status indicator	Green	Always on: The user project has been loaded but is not running Flashing: The user project is running Always off: The user project is not loaded
ERR	Module fault indicator	Red	Always on: It indicates that a fault has occurred Always off: It indicates no fault
BAT	Battery status indicator	Yellow	Always on: It indicates low battery power Always off: It indicates the battery power is normal
SDIN	SD card status indicator	Green	Always on: It indicates that the SD card has been inserted Always off: It indicates that the SD card is not inserted
COM	Communication status indicator	Yellow	Flashing: It indicates data transmission

			Always off: It indicates no data
SPWR	System power indicator	Yellow	Always on: The system side power supply is normal Always off: It indicates a system power fault
FPWR	Field power indicator	Yellow	Always on: The field side power supply is normal Always off: It indicates a field power fault
LXBUS	XBUS bus status indicator	Green	Always on: The XBUS connection has been established Flashing: There is data transmission on XBUS Always off: The XBUS bus is not connected

5.7.5 Description of Wiring Terminal

5.7.5.1 Power Wiring

The power wiring is shown in the figure below:



The definition of power terminals

Left Terminal Pin	Description of Signals	Right Terminal Pin	Description of Signals
1	24 V DC system power supply positive	5	24 V DC system power supply negative
2	24 V DC field power supply positive	6	24 V DC field power supply positive
3	24 V DC field power supply negative	7	24 V DC field power supply negative
4	Protective ground	8	Protective ground

- Terminal interface uses unshielded cable or shielded cable, cable length < 10m, wire diameter 0.3 to 1.0mm².

5.7.5.2 RS-485 wiring

The RS-485 wiring is shown in the figure below:

The definition of RS-485 terminals

Terminal Identification	Description of Signals	Description
+	RS-485 signal positive terminal	Bidirectional, RS-485 port A signal
-	RS-485 signal negative terminal	Bidirectional, RS-485 port B signal
G	Signal ground	Provide reliable grounding for signals

- Terminal type, material code see the module accessories chapter.

5.7.6 Battery

The module dedicated button battery is LXA-BC001,supports standard CR1225 button batteries and the batteries are replaceable.

- Note: In the controller system side power supply normal state, then the battery replacement.

5.7.6.1 Models and specifications

The model and specifications of the LXA-BC001 button battery for LX controller are shown in the table below. Other models or specifications are not recommended.

Model	Specifications
CR1225 button battery	Replace once a year

5.7.6.2 Purpose

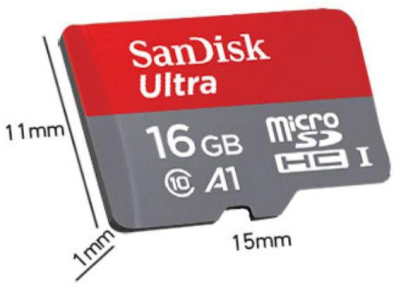
There is a battery slot on the front panel of the controller, which supports standard CR1225 button batteries with a minimum capacity of 40 mAh. The batteries are replaceable. The backup battery provides a power failure protection function for the real-time clock data. Even in the event of a power failure, the real-time clock data can still be maintained.

When the battery power is low, the BAT indicator will display an alarm. Please check regularly and replace the battery in time.

5.7.7 SD Memory Card

5.7.7.1 Models and specifications

- Capacity: 16 GB-32GB
- Specifications: 16-32 GB microSD HC memory card
- Performance speed: The reading speed is up to 98 MB/second, but the writing speed is slightly lower.
- Memory card size: 15 mm×11 mm×1.0 mm
- Operating temperature: -25°C~85°C
- Storage temperature: -40°C~+85°C
- After-sales: 10 years warranty service



5.7.7.2 Purpose

The SD card is the internal memory card of the controller and is used to store files or data. The controller firmware can be upgraded through this medium. The SD card is installed in the Micro SD card slot, supporting an maximum capacity of 32 GB, and allows hot-swapping.

5.7.7.3 SD card button

Waiting for the SD card indicator to go off card holder before inserting or removing the SD card.

5.7.8 Engineering configuration

See LX-CU500.

5.7.9 Diagnostic Information

The LX-CU430 module can perform module diagnosis. The diagnostic information is shown in the following table:

Type	Parameters	Fault Name	Diagnostic Information
Device Diagnosis	AT_CPURun	Running status	0: Unknown status 1: Running 2: Stopped
	AT_CPUKey	Toggle switch status	0: Unknown status 1: RUN 2: STOP
	AT_BatteryAlarm	Battery power alarm status	0: No battery 1: Normal battery power 2: Insufficient battery power
	AT_SDState	SD card status	0: Inserted 1: Not Inserted
	AT_CPUTemp	Controller CPU temperature	It indicates the actual temperature of the current controller
	AT_CPUMemUsage	Usage rate of user data area (M, I, Q, R, G, S)	Usage rate = used (M + I + Q + R + G + S) *100 / max((M + I + Q + R + G + S))
	AT_CPUNtpStatus	NTP colibration result	0: Fault 1: Success
	AT_CPUFatalErr	Controller critical fault	bit0: Toggle switch fault, TRUE: Fault, FALSE: Normal bit1: Dual-network fault, TRUE: Fault, FALSE: Normal bit2: System power failure, TRUE: Fault,

			FALSE: Normal
	AT_CPUErr	General controller fault	bit0: RTC initialization fault, TRUE: Fault, FALSE: Normal bit1: zero fault, TRUE: fault, FALSE: normal bit2: Local Ethernet 1 fault, TRUE: Fault, FALSE: Normal When setting 1, it means that the network card 0 fails. The specific failure conditions are as follows: 1 System Startup Phase: Indicates that network card 0 is initializing and is not ready to complete. 2 System Operation Phase: Indicates a network card 0 failure. bit3: local Ethernet 2 fault, TRUE: fault, FALSE: normal When setting 1, it means that the network card 1 fails. The specific failure conditions are as follows: 3 System Startup Phase: Indicates that network card 1 is initializing and is not ready to complete. 4 System Operation Phase: Indicates a network card 1 failure. bit4: field power fault, TRUE: fault, FALSE: normal
	AT_CPUTimePulse	Clock pulse	Provide square wave signals with a 1:1 duty ratio at different cycle times of 1 minute, 1 second, 0.2 seconds, 0.1 seconds, 0.02 seconds, and 0.01 seconds.
	AT_TimeOfLastSystemPowerFault	Time of the last system power failure	-
EtherNet Diagnosis	NetWorkStatus1/2	EtherNet1/2 Status	0:normal, 1: fault
	BandWidth1/2	EtherNet1/2 Bandwidth	Unit: PPS
	TxRxTotalPackets1/2	Total number of TX and RX packets on EtherNet1/2	-
	TxRxPackets1/2	Total number of TX and RX packets on EtherNet1/2 in real time	-
	TxRxPacketsMax1/2	Maximum number of TX and RX packets on EtherNet1/2	-
	TxRxPacketsAverage1/2	Average number of TX	-

		and RX packets on EtherNet1/2	
	TxRxMulticastPackets1/2	Total number of TX and RX multicast packets on EtherNet1/2	-
	TxRxBroadcastPackets1/2	Total number of TX and RX broadcast packets on EtherNet1/2	-
	RxTotalPackets1/2	Total number of RX packets on EtherNet1/2	-
	RxPackets1/2	Total number of RX packets on EtherNet1/2 in real time	-
	RxPacketsMax1/2	Maximum number of RX packets on EtherNet1/2	-
	RxPacketsAverage1/2	Average number of RX packets on EtherNet1/2	-
	RxMulticastPackets1/2	Total number of RX multicast oackets on EtherNet1/2	-
	RxBroadcastPackets1/2	Total number of RX broadcast packets on EtherNet1/2	-
	TxTotalPackets1/2	Total number of TX packets on EtherNet1/2	-
	TxPackets1/2	Total number of TX packets on EtherNet1/2 in real time	-
	TxPacketsMax1/2	Maximum number of TX packets on EtherNet1/2	-
	TxPacketsAverage1/2	Average number of TX packets on EtherNet1/2	-
	TxMulticastPackets1/2	Totalnumber of TX multicast packets on EtherNet1/2	-
	TxBroadcastPackets1/2	Totalnumber of TX broadcast packets on EtherNet1/2	-

5.8 LX-CM010 Co-processor Module

5.8.1 Product Overview

LX-CM010 is the CPU co-processor module of the LX series PLC products. It is a special function module of the LX system. It is adapted to the LX-CU501 CPU module, completes data exchange with the CPU module, and completes special algorithms. The CPU co-processor module runs an independently embedded operating system and supports C/C++ language programming. It provides users with a graphical compilation interface, a graphical commissioning interface, and a data interaction channel with the controller.

The CPU module allocates an data area for the CPU co-processor module to read-write operations(similar to shared memory). The frequency at which the CPU co-processor is 2 times per second while reading from it module writes to the CPU module occurs every 50 times/second.

(1) The amount of communication data is about 250 words (the maximum shared memory size is 1000 words);

(2) Backboard communication requires a cycle time of 10 ms;

(3) The CPU co-processor control module and connects to the main controller module (LX-CU500) via high-speed Gigabit Ethernet communication.

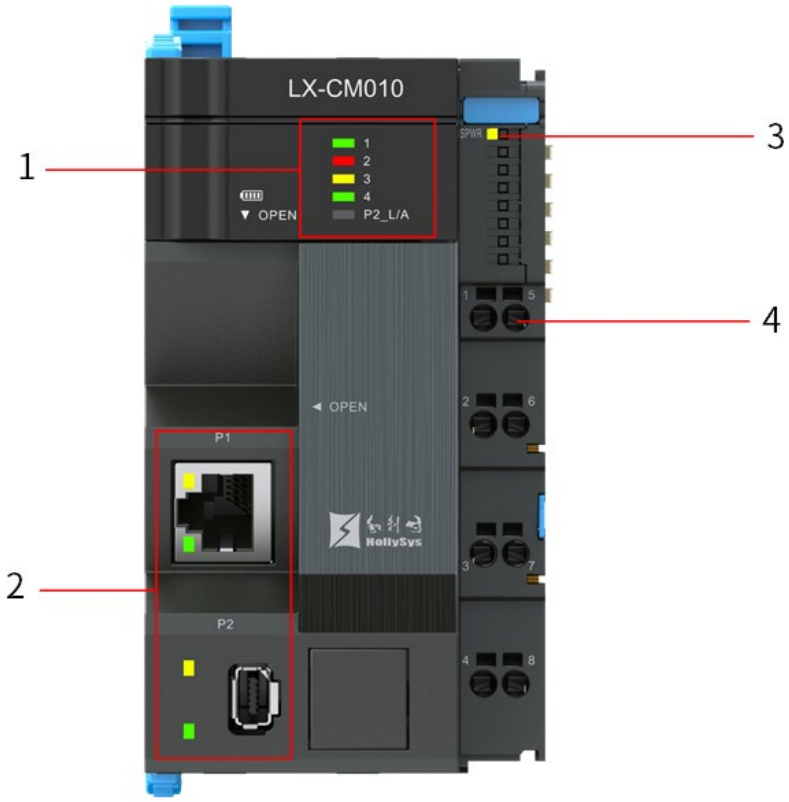
1. Basic Features

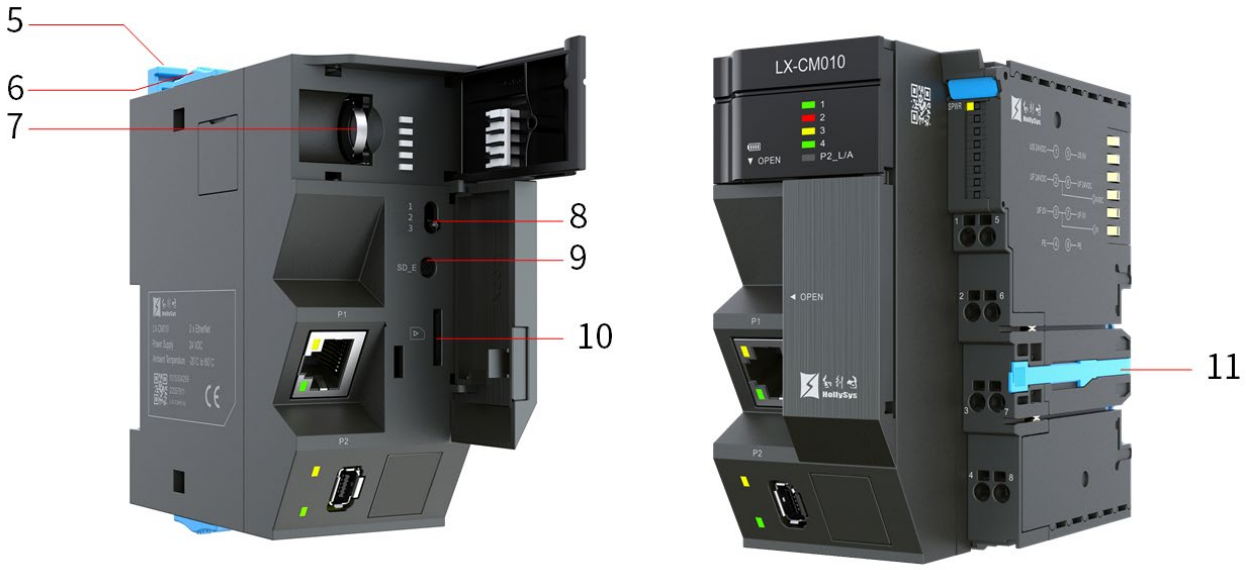
   LX-CM010 completes the interactive functions with the CPU module:

   - The CPU co-processor module and the CPU module share the memory data consistency requirements;
   - The CPU module can obtain the online status of the CPU co-processor in real time;
   - The CPU co-processor module can obtain the online status of the main CPU module in real time;
   - The CPU co-processor module has access to the main CPU module, with a Flag register.

2. Module components

   The module picture is shown below:





Block diagram

Module part description table

S/N	Component Name	Instructions
1	Module working status indicator	It indicates the running status of the controller. The 1/2/3/4 indicator can be customized and can be defined as a running indicator (RUN), fault indicator (ERR), battery status indicator

		(BAT), and SD card status indicator (SDIN). P2_L/A is P2 Net port status indicator.
2	Ethernet interface	P1:The module supports two northbound Ethernet interfaces, and the interface uses a standard RJ45 connector (with indicator). P2: Adopts an enhanced network port connector.
3	Power status indicator	It includes a system power status indicator (SPWR).
4	Power wiring terminal	It establishes the connection between the power supply of the system and the power supply in the field.
5	DIN rail left side mounting hook top	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to unlock the hook. To lock the module, push the handle inward to the bottom to set the hook to the locked position.
6	Side lock	Reserved components, one at the top and one at the bottom of the module, are used to lock the connection with the expansion module when the expansion module is installed on the left side of the controller.
7	RTC battery	The CR1225 button battery, which needs to be replaced once a year,should be inserted with attention to the positive and negative marks
8	Working mode switch	Three modes: running mode (RUN), programming mode (STOP), and reset mode (RST) RUN: In running mode, the controller performs its task, which can be controlled to run or stop through the AutoThink software. Programs can be modified and commissioned. STOP: In programming mode, the controller stops its task. In this case, only user programs can be edited, but controller projects cannot be commissioned and run. RST: In this mode, controller reset and restart with controller.
9	SD card button	Before inserting or removing the SD card, this button shall be pressed, otherwise, it may cause file loss or data errors in the SD card.
10	SD card slot	Controller firmware upgrade via SD card
11	DIN rail right side mounting hook handle	This component is the handle operating end of the mounting hook on the right side of the DIN rail. When the module is installed on or removed from the DIN rail, the hook top shall be pulled or pressed to set the hook to the unlocked or locked status. This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status.

3. Nameplate

The nameplate is as shown below:

LX-CM010 nameplate sketch

The nameplate information described

S/N	Name	Meaning
1	Module model	CPU Module

2	Power voltage level	24V DC
3	Operating Temperature	-20°C ~ 60°C
4	SN identification code	Scan the QR code to get the SN plain code
5	SN plain code	
6	Order number	
7	Version number	
8	Certification standard	

5.8.2 Technical Indicators

1. General indicators

Item	Specifications
DDR	512 MB
MRAM	512KB
SD card	Up to 32 GB
Data Format	Year:Month:Day:Hour:Minute:Second, BCD code
Clock Accuracy	≤±60 seconds/month, timing supported
Power Failure Maintenance Time	1 year
Hot Plug	It does not support module hot-swap, but supports SD card hot-swap
Continuous Maintenance of Power-off Protection Data	Supported
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	56mm *109mm *90mm(W*H*D)

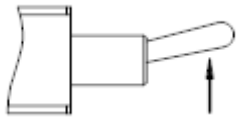
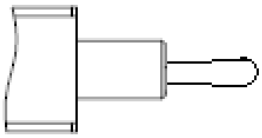
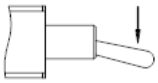
2. Power indicators

Item	Specifications
System Power Anti-Reverse connection	Supported
System Power Input Current	24 V DC (19.2 V~28.8 V)
Module Power Consumption (system side)	Max 6W

3. Communication indicators

Item	Specifications
Number of Communication Ports	2-channel (P1\P2)
Communication Interface	P1: RJ45; P2: Enhanced network port connector
Communication Cable	P1: Super Class 5 shielded cable; P2: Customized cable
Communication Rate (bps)	10/100/1000 Mbps auto-negotiation

5.8.3 Operating Mode Switch

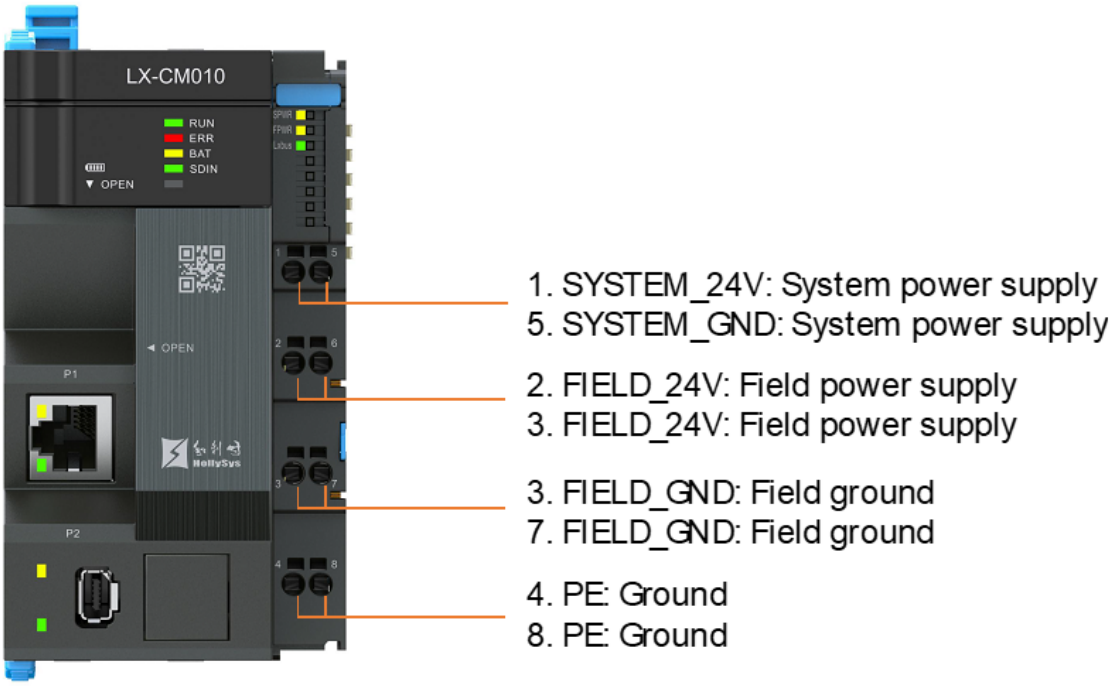
Switch Status	Name	Operating Instruction
	1	Customization
	2	Customization
	3	Customization

5.8.4 Status Indicator

Status indicator description

Color	Name	Meaning
Green	1	Customization
Red	2	Customization
Yellow	3	Customization
Green	4	Customization
Yellow	P2_L/A	Always on: P2 network port is connected normally Flashing: There is data transmission on the P2 network port Always off: There is no connection to the P2 network port
Yellow	SPWR	Always on: The system side power supply is normal Always off: There is a fault in the sysytem power

5.8.5 Description of Wiring Terminal



Pin No.	Symbol	Meaning	Pin No.	Symbol	Meaning
1	SYSTEM_24V	System power supply	5	SYSTEM_GND	System power supply
2	FIELD_24V	Field power supply	6	FIELD_24V	Field power supply
3	FIELD_GND	Field ground	7	FIELD_GND	Field ground
4	PE	Ground	8	PE	Ground

5.8.6 Battery

The module dedicated button battery is LXA-BC001,supports standard CR1225 button batteries and the batteries are replaceable.

- Note: In the controller system side power supply normal state, then the battery replacement.

5.8.6.1 Models and specifications

The model and specifications of the LXA-BC001 button battery for LX controller are shown in the table below. Other models or specifications are not recommended.

Model	Specifications
CR1225 button battery	Replace once a year

5.8.6.2 Purpose

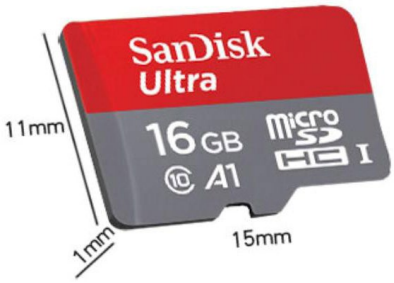
There is a battery slot on the front panel of the controller, which supports standard CR1225 button batteries with a minimum capacity of 40 mAh. The batteries are replaceable. The backup battery provides a power failure protection function for the real-time clock data. Even in the event of a power failure, the real-time clock data can still be maintained.

When the battery power is low, the BAT indicator will display an alarm. Please check regularly and replace the battery in time.

5.8.7 SD Memory Card

5.8.7.1 Models and specifications

- Capacity: 16 GB-32GB
- Specifications: 16-32 GB microSD HC memory card
- Performance speed: The reading speed is up to 98 MB/second, but the writing speed is slightly lower.
- Memory card size: 15 mm×11 mm×1.0 mm
- Operating temperature: -25°C~85°C
- Storage temperature: -40°C~+85°C
- After-sales: 10 years warranty service



5.8.7.2 Purpose

The SD card is the internal memory card of the controller and is used to store files or data. The controller firmware can be upgraded through this medium. The SD card is installed in the Micro SD card slot, supporting an maximum capacity of 32 GB, and allows hot-swapping.

5.8.7.3 SD card button

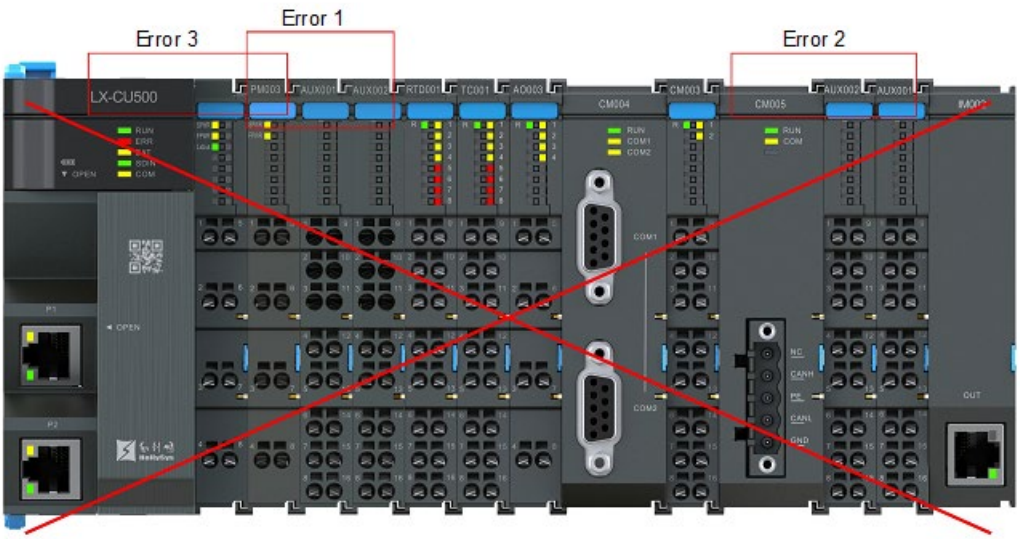
Waiting for the SD card indicator to go off card holder before inserting or removing the SD card.

Chapter 6 Power module

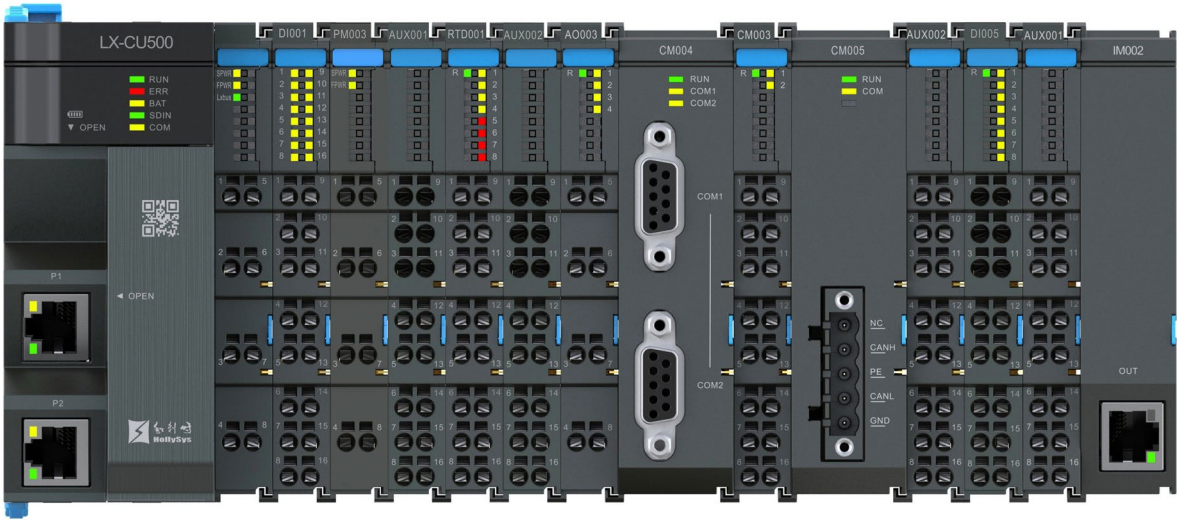
6.1 Principles for Using Power Modules

The following principles shall be observed to use the LX series power relay modules and potential distribution modules:

1. For LX series 12 mm modules, avoid having more than two power distribution modules or power relay modules in close proximity. If more than two potential distribution or power relay modules must be used, they should be separated from other modules.
2. When the potential distribution module is used close to the IM002, CM002, CM004, CM005, CM006, ECI001, PO001, SSI001, and PM003 modules, there shall be only one potential distribution module used. If more than one potential distribution module or power relay module must be used, they shall be separated from other modules.
3. The potential distribution module and power relay module should not be used close to CU500 and IM001 (because the CU500 and IM001 modules come with their power relay module). If the potential distribution module or power relay module must be used, it should be separated from other modules.



Error demonstration



Correct demonstration

6.2 LX-PM003 Power Relay Module

6.2.1 Product Overview

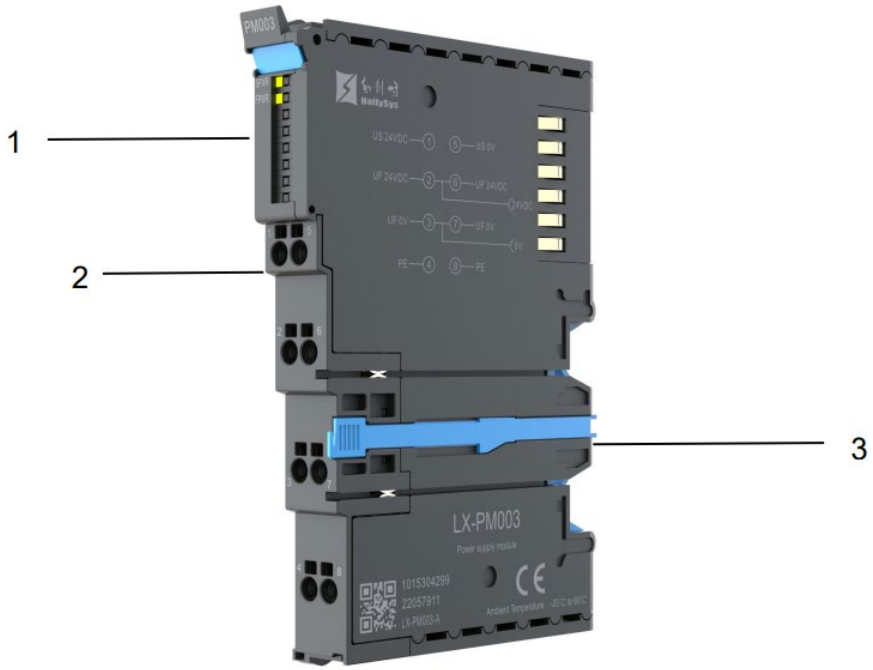
The LX-PM003 power relay module provides system and field power supply functions to the corresponding IO module. At the same time, the module indicator displays the system power and field power status.

1. Basic Features

   LX-PM003 completes system and field power supply:

   - Provide system power to the corresponding IO module;
   - Provide field power to the corresponding IO module;
   - Complete basic HMI through indicators.

2. Module components

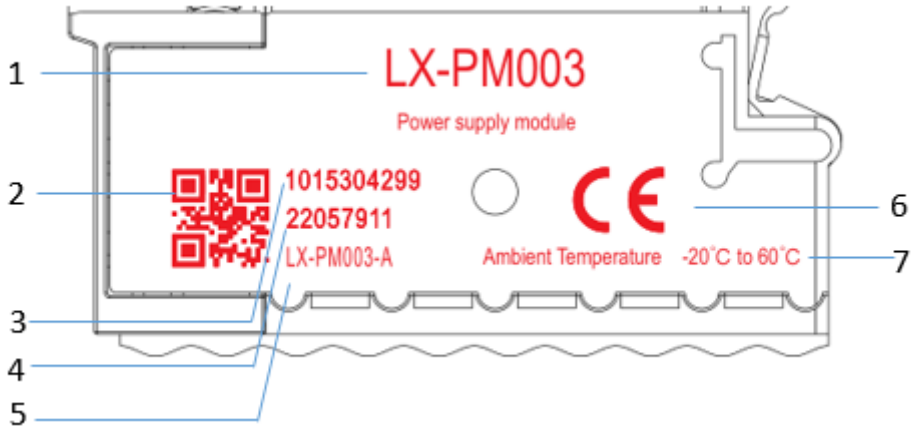


Module component schematic

Module component description table

S/N	Component Name	Instructions
1	Power Indicator Light	Two channels, indicating the power supply status of the system side and the field side respectively.
2	Wiring Terminal	Connect the power of the system side and the field side.
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	LX-PM003 Power Relay Module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

6.2.2 Technical Indicators

1. General indicators

Item	Specifications
Diagnosis	It supports under-voltage, and the light goes out when there is a fault
Isolation of system side and field side	Channels and systems: 1000VAC for 1 minute, leakage current < 5mA
Module hot-swap	No support
Number of ground channels	16
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm *100mm *71mm(W*H*D)

2. Power indicators

Item	Specifications
System power anti-reverse connection	Supported
System supply voltage	Input voltage 24V DC (19.2 ~ 28.8V DC) Output voltage 24V DC (19.2 ~ 28.8V DC)
System Power Output Current	Max 1.5A
Field power anti-reverse connection	Supported
Field power input voltage	Input voltage 24 V DC (19.2 ~ 28.8 V DC)
Field power loading current	Output Current Max 10A

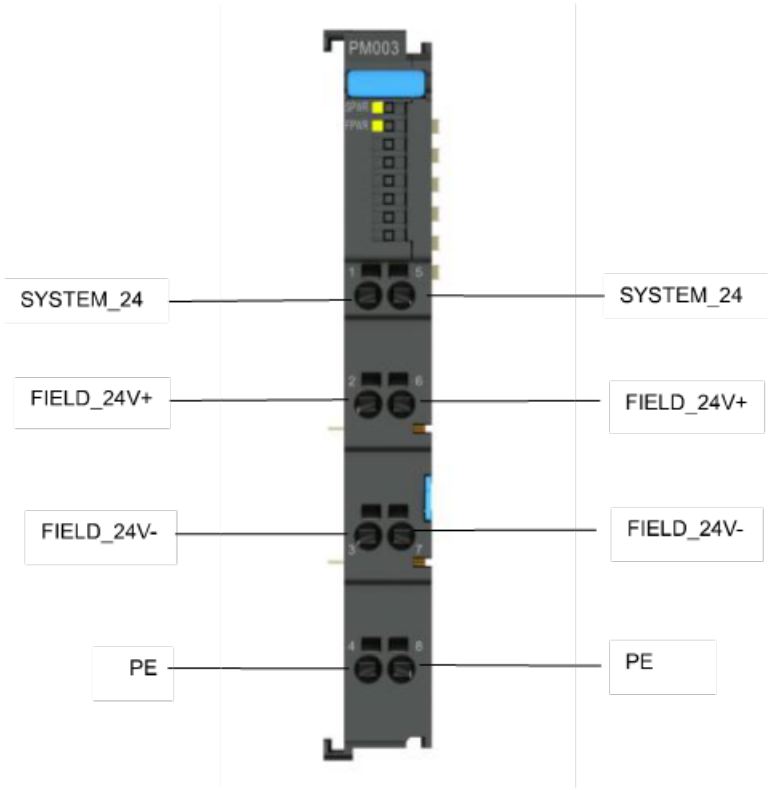
6.2.3 Definition of Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
SPWR	System power indicator	Yellow	On: The system side power supply is normal Off: It indicates a system power fault
FPWR	Field power indicator	Yellow	On: The field side power supply is normal Off: It indicates a field power fault

6.2.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal Identification	Signals	Description
1	SYSTEM_24V+	System side power supply 24 V+
2	FIELD_24V+	Field side power supply 24 V+
3	FIELD_24V-	Field side power supply 24 V-
4	PE	Protective grounding
5	SYSTEM_24V-	System side power supply 24 V-
6	FIELD_24V+	Field side power supply 24 V+
7	FIELD_24V-	Field side power supply 24 V-
8	PE	Protective grounding

- The protective grounding must be reliably grounded. It is recommended to use multi-core copper wires, with an outer diameter not less than 2.5 mm² and a grounding impedance less than 4 Ω.

6.3 LX-AUX001 16-channel GND Power Potential Distribution Module

6.3.1 Product Overview

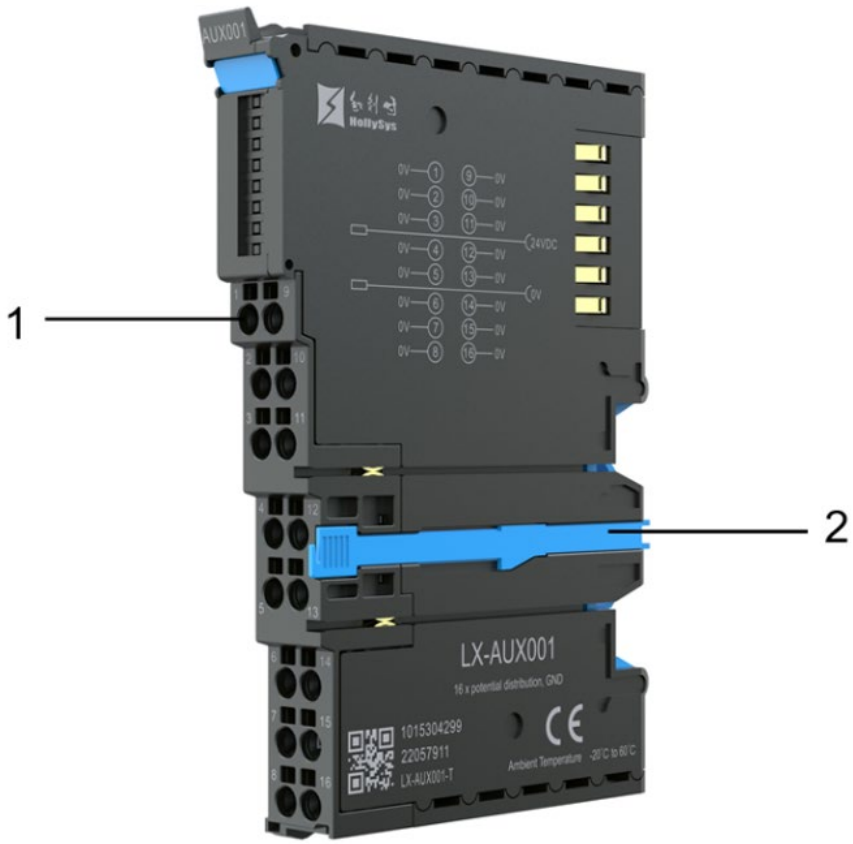
This module completes the 16-channel GND power potential distribution function.

1. Basic Features

   It is used to complete the LX series field power potential distribution function.

2. Module components

   The schematic diagram of the module components is as follows:



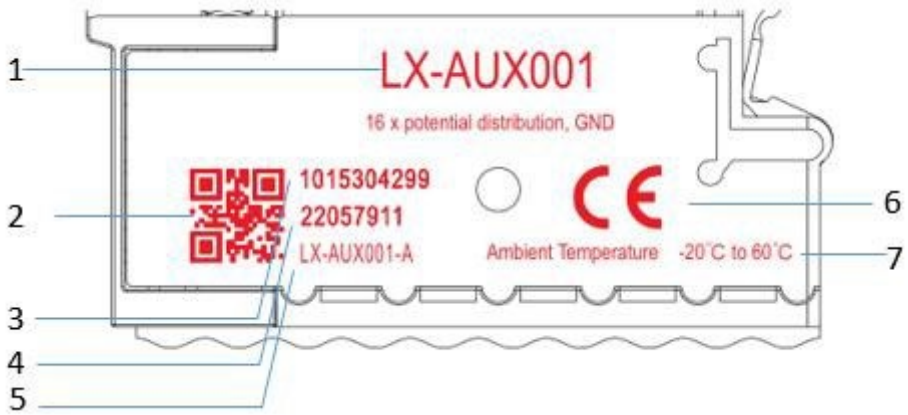
Module component schematic

Module component description table

S/N	Component Name	Instructions
1	Wiring Terminal	Connect 16 channels of 0 V DC power output
2	DIN rail right side	This component is used to control the hook on the right side of the DIN mounting rail of the

	mounting hook handle	module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	16-channel GND power potential distribution module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

6.3.2 Technical Indicators

1. General indicators

Item	Specifications
Number of ground channels	16
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm *100mm *71mm(W*H*D)

2. Power indicators

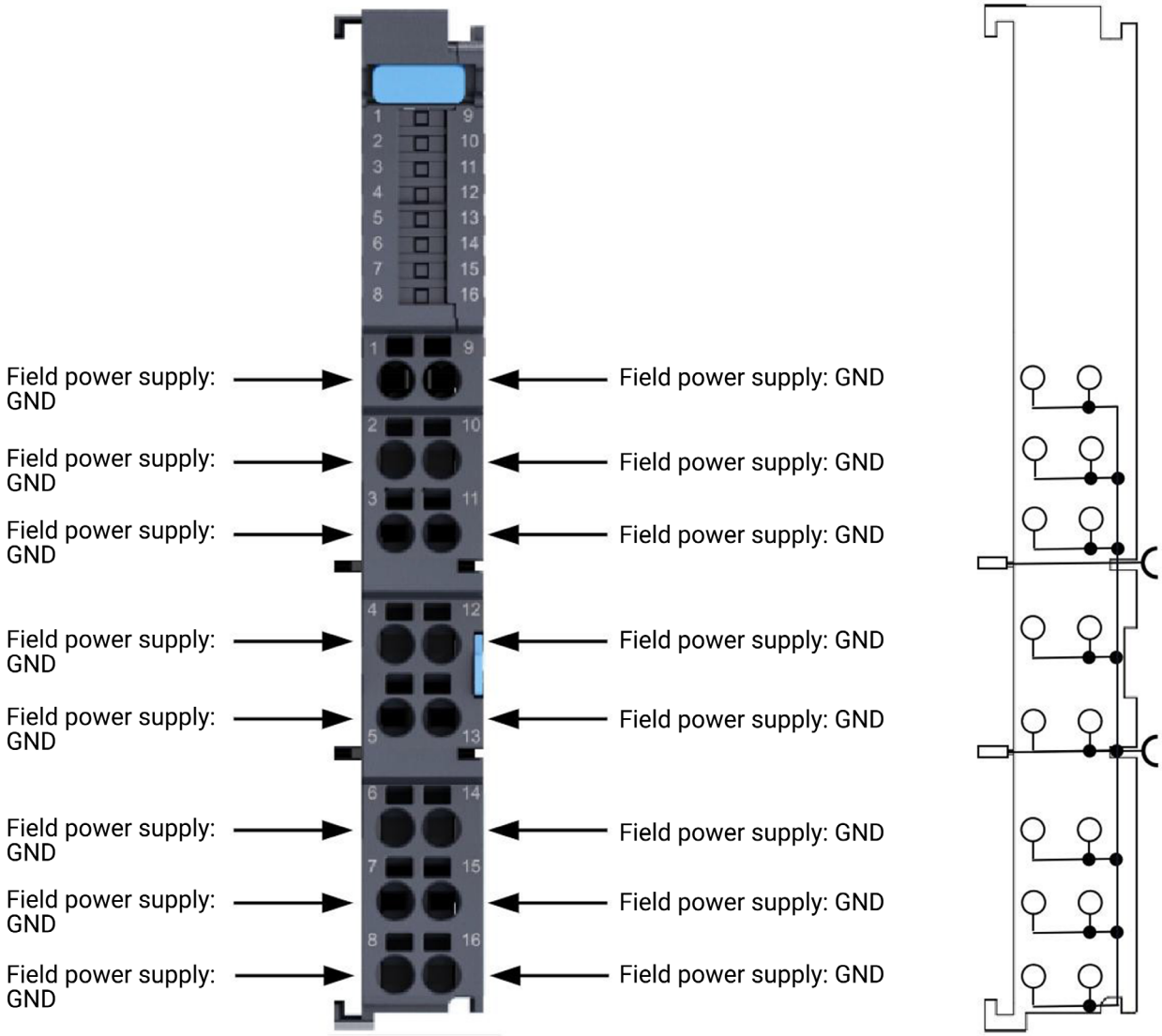
Item	Specifications
Voltage	0V
Current load capacity	Single channel: Max 10 A; whole module: Max 10 A

6.3.3 Definition of Indicators

The module has no indicator.

6.3.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal Identification	Description of Signals	Description
1~16	Field power supply (FIELD) GND	Complete GND power potential distribution

6.4 LX-AUX101 16-channel GND potentiometric assignment enhanced module

6.4.1 Product Overview

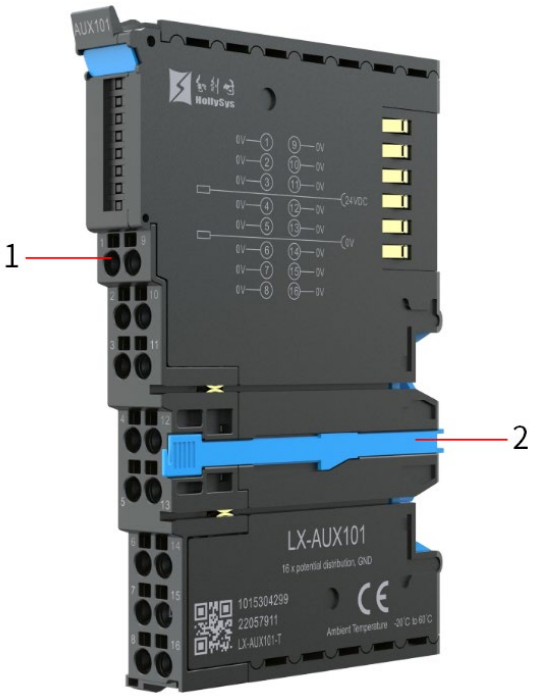
The LX-AUX101 is a 16-channel GND potentiometric distribution module that provides 16 contacts for potential distribution without the need for other terminals or wiring. Power contacts connect directly to the right power contacts, not to terminals, to provide available auxiliary potentials for the system, or to power the connected sensors directly from the remote I/O system.

1. Basic Features

   It is used to complete the LX series field power potential distribution function.

2. Module components

   The schematic diagram of the module components is as follows:



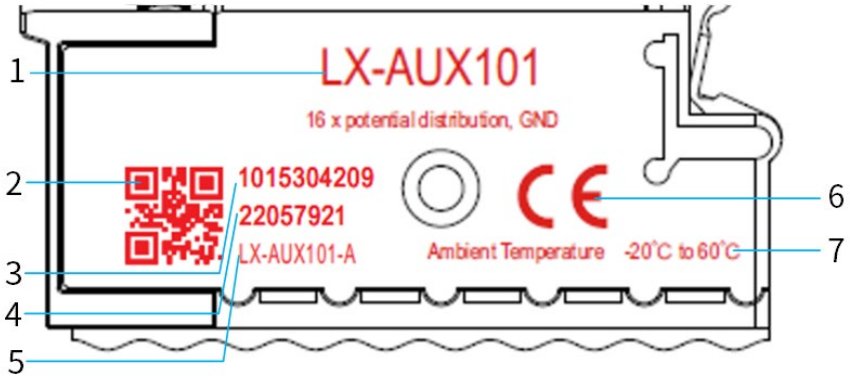
Module component schematic

Module component description table

S/N	Component Name	Instructions
1	Wiring Terminal	Connect 16 channels of 0 V DC power output
2	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the

		locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	16-channel GND potentiometric assignment enhanced module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

6.4.2 Technical Indicators

4. General indicators

Item	Specifications
Number of ground channels	16
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm *100mm *71mm(W*H*D)

5. Power indicators

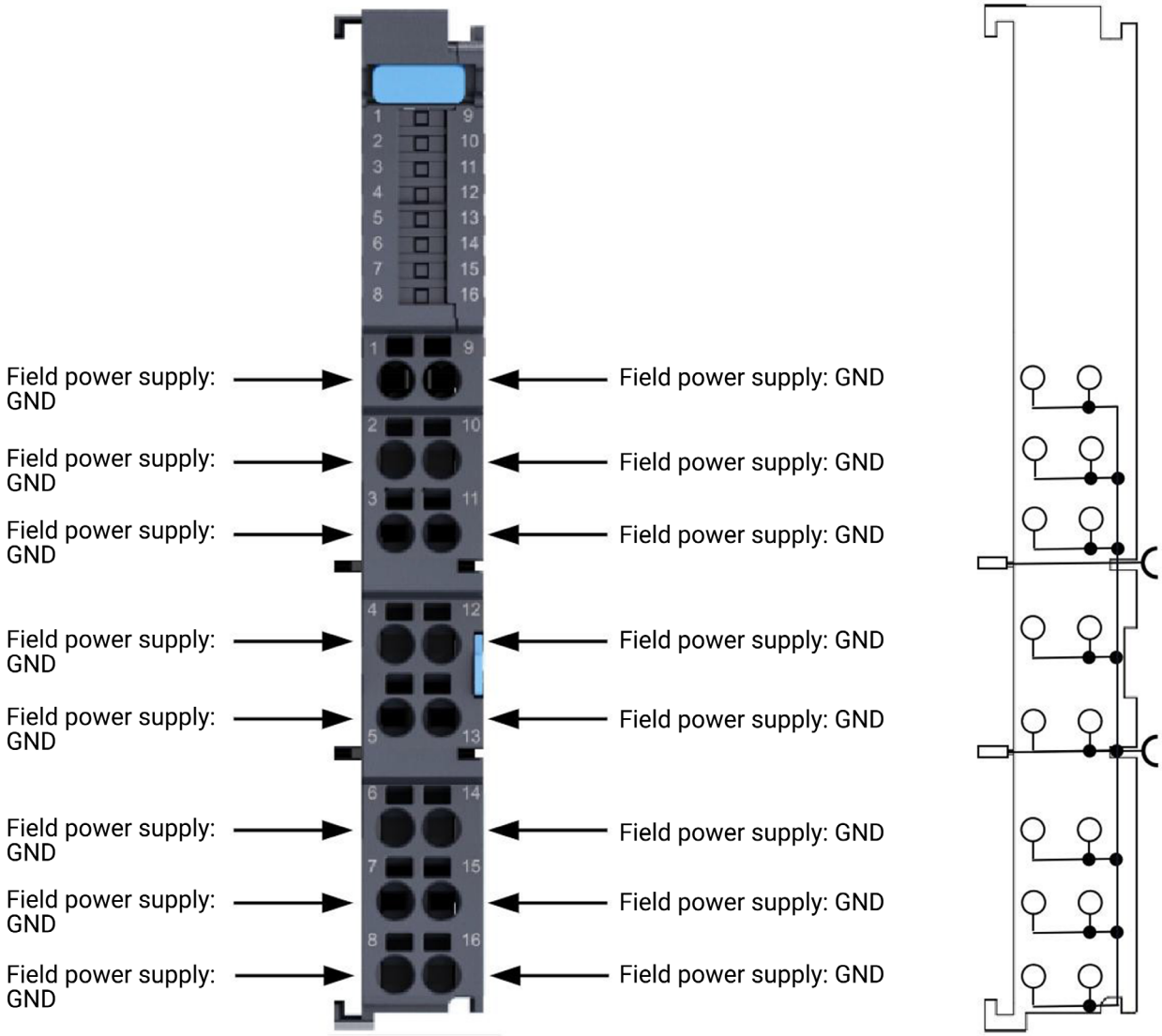
Item	Specifications
Voltage	0V
Current load capacity	Single channel: Max 10 A; whole module: Max 10 A

6.4.3 Definition of Indicators

The module has no indicator.

6.4.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal Identification	Description of Signals	Description
1~16	Field power supply (FIELD) GND	Complete GND power potential distribution

6.5 LX-AUX002 16-Channel 24 V Power Potential Distribution Module

6.5.1 Product Overview

This module is used to complete the LX series field power potential distribution function.

1. Basic Features

   It is used to complete the LX series field power potential distribution function.

2. Module components

   The schematic diagram of the module components is as shown in the figure below:

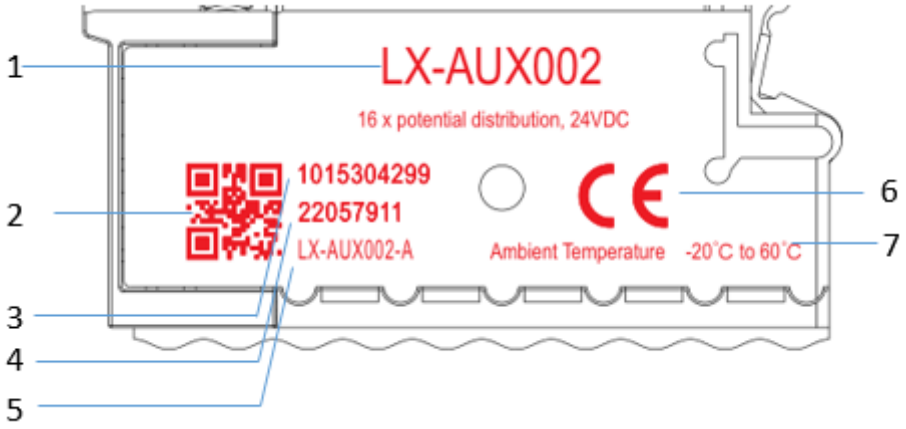
Module component schematic

Module component description table

S/N	Component Name	Instructions

1	Wiring Terminal	It is used to connect 16 channels of 24 VDC power output
2	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	16-channel 24 V power potential distribution module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

6.5.2 Technical Indicators

1. General indicators

Item	Specifications
Number of power channels	16
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm *100mm *71mm(W*H*D)

2. Power indicators

Item	Specifications

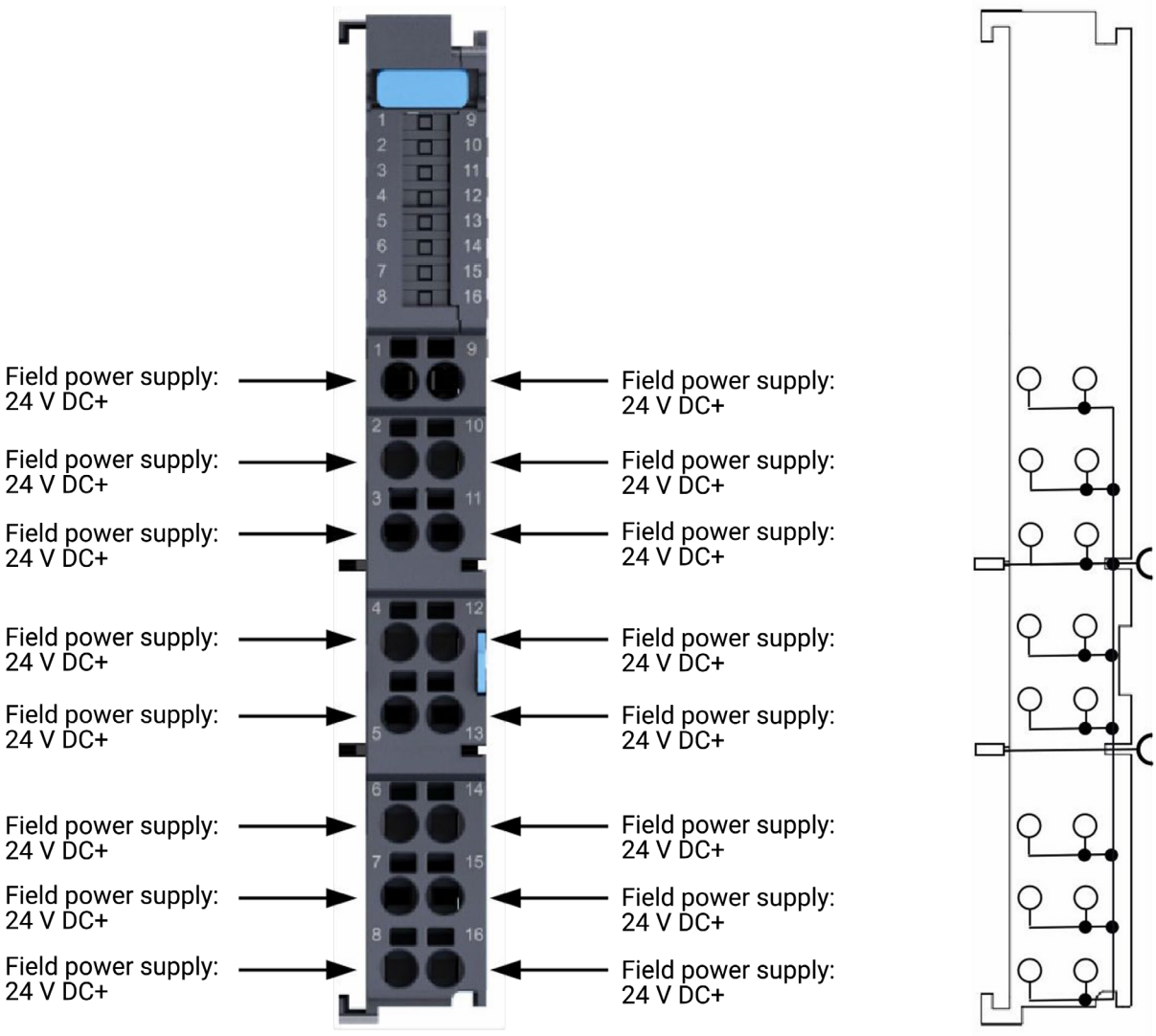
Voltage	24 V DC (19.2 V~28.8 V)
Current load capacity	Single channel: Max 10 A; whole module: Max 10 A

6.5.3 Definition of Indicators

The module has no indicator.

6.5.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal Identification	Description of Signals	Description
1~16	Field power supply (FIELD) 24 V DC+	Complete 24 V field power potential distribution

6.6 LX-AUX102 16-Channel 24 V Power Potential Distribution Module

6.6.1 Product Overview

LX-AUX102 is a 16-channel 24V positive potential allocation module that provides 16 contacts for potential distribution without the need for other terminals or wiring. Power contacts connect directly to the right power contacts, not to terminals, to provide available auxiliary potentials for the system, or to power the connected sensors directly from the remote I/O system.

1. Basic Features

   It is used to complete the LX series field power potential distribution function.

2. Module components

   The schematic diagram of the module components is as shown in the figure below:

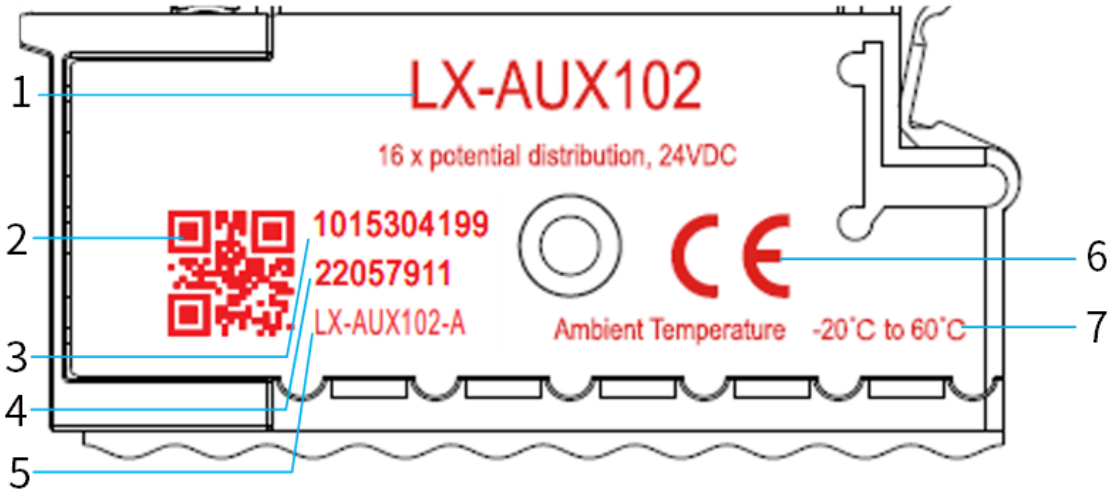
Module component schematic

Module component description table

S/N	Component Name	Instructions
1	Wiring Terminal	It is used to connect 16 channels of 24 VDC power output
2	DIN rail right side	This component is used to control the hook on the right side of the DIN mounting rail of the

	mounting hook handle	module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	16-channel 24 V power potential distribution module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

6.6.2 Technical Indicators

1. General indicators

Item	Specifications
Number of power channels	16
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm *100mm *71mm(W*H*D)

2. Power indicators

Item	Specifications

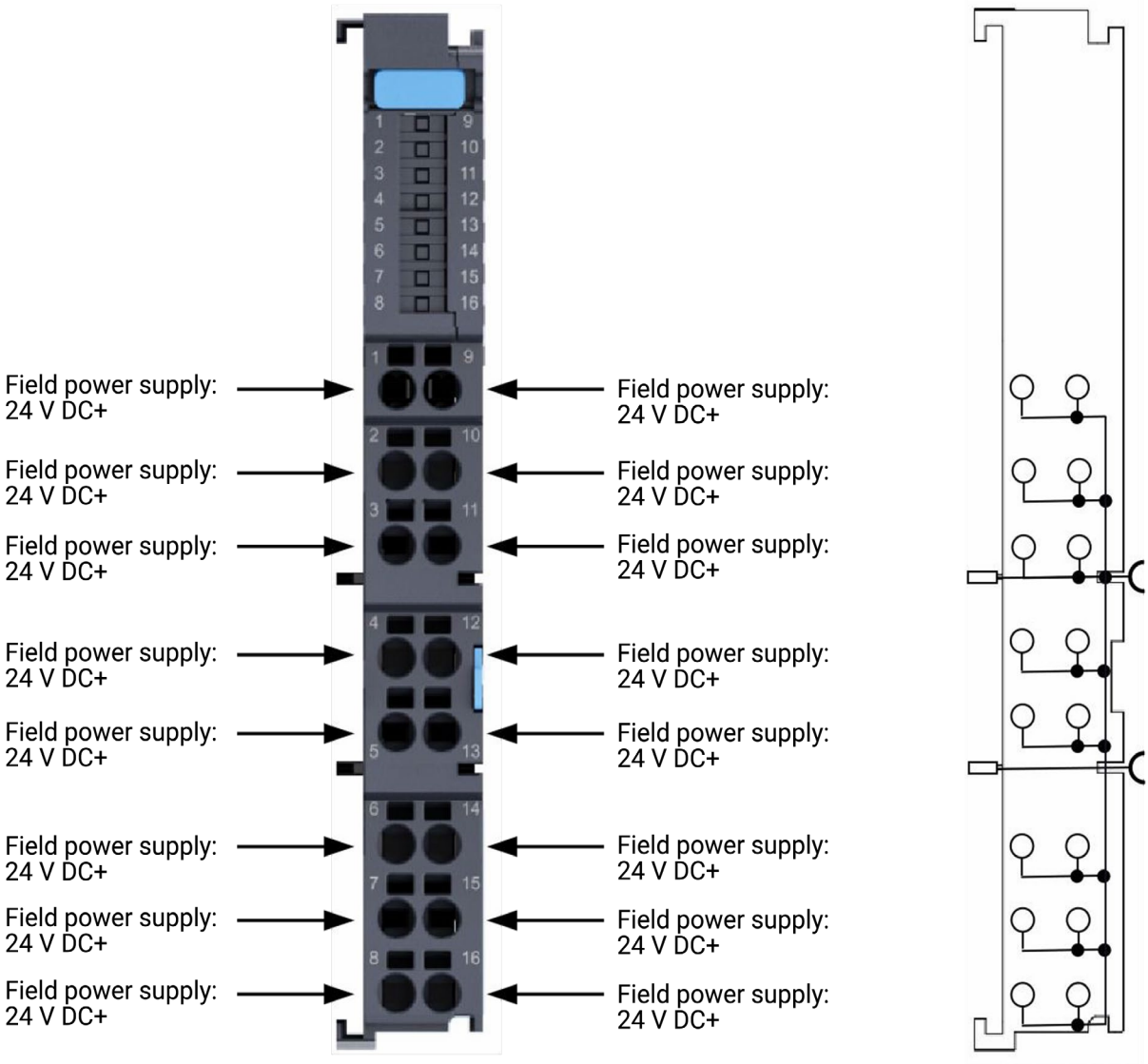
Voltage	24 V DC (19.2 V~28.8 V)
Current load capacity	Single channel: Max 10 A; whole module: Max 10 A

6.6.3 Definition of Indicators

The module has no indicator.

6.6.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal Identification	Description of Signals	Description

1~16	Field power supply (FIELD) 24 V DC+	Complete 24 V field power potential distribution

Chapter 7 Interface Module

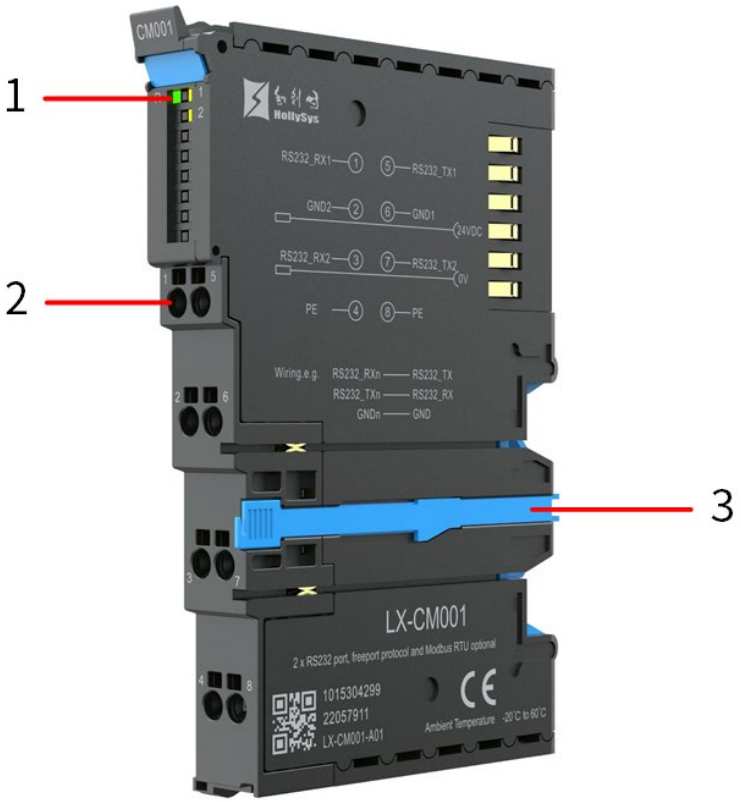
The configuration of the serial module and the explanation of the relevant parameters are detailed in the chapter of *LX Series Programmable Controller Communication Manual*.

7.1 LX-CM001 2-Channel RS-232 Serial Communication Terminal Interface Module

7.1.1 Product Overview

LX-CM001 is the ModbusRTU serial module for LX series PLC products, which is used to communicate with field meters or sensors.

1. Basic Features
   - The smallest system consists of MPU, providing data processing, channel control and other functions;
   - Two channels of PHY provide EtherCAT slave station data transmission;
   - Two isolated RS-232 channels support Modbus RTU\ free port protocol\ ASCII protocol;
   - Complete basic HMI through indicators and switches.
2. Module components

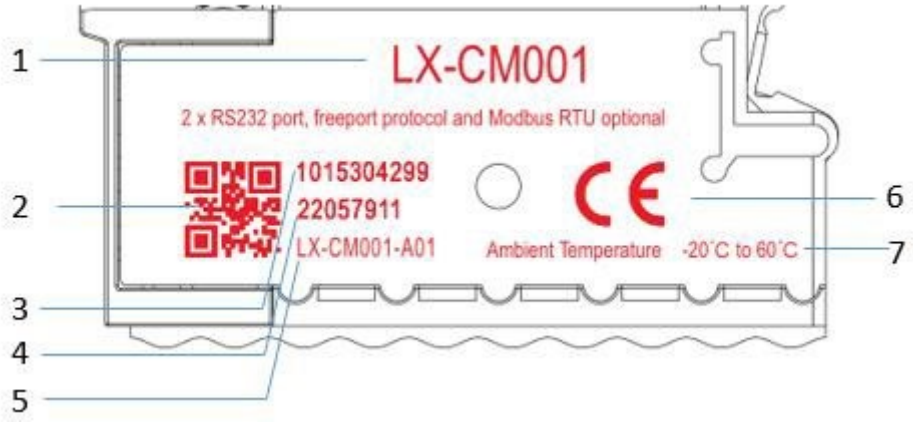


Module component schematic

Module component description table

S/N	Component Name	Instructions
1	Module running	3 channels, indicating module running status, COM1 port communication status and COM2 port communication status respectively
2	Wiring Terminal	It connects 2 channels of RS-232 signal
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	2-channel RS-232 serial communication terminal interface module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

7.1.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm *100mm *71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
System rated voltage	24 V DC
System side Power Consumption	Max 1.5W

3. Communication indicators

Item	Specifications
LX-bus bus interface	

LX-bus interface connection type	Double-sided gold finger connector (backboard interface)
Quantity	1 channel
Rate	100Mbps
Protocol supported	EtherCAT slave protocol
Communication interface	
Communication interface level	RS-232
Quantity	2
Communication interface connection type	8-bit terminal wiring
Protocol type	Support Modbus RTU Master\Slave\Free Port\ASCII
Transfer mode and frame format	RTU, Free Port
Supported function code	01, 02, 03, 04, 05, 06, 0F, 10h (hexadecimal)
Communication rate	Support 1200, 2400, 4800, 9600(default), 19200, 38400, 57600, 115200 bps configurable.
Checking mode	Odd check, even check, no check bit (configurable)
Diagnostic function	Diagnostic reporting function (including off-site diagnosis)
Channel isolation	Supported
Isolated voltage	≥1000VAC@1min@5mA, channel-to-system

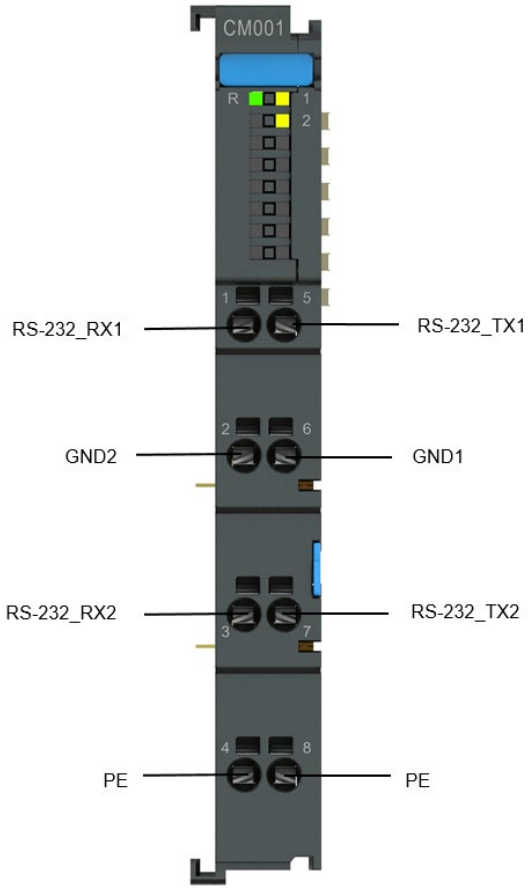
7.1.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
COM1	COM1 port enable status indicator	Yellow	On: Enabled Off: Not enabled
COM2	COM2 port enable status indicator	Yellow	On: Enabled Off: Not enabled

7.1.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal Identification	Description of Signals	Description	Terminal Identification	Description of Signals	Description
1	RS-232_RX1	1-channel RS-485 Receive	5	RS-232_B1	1-channel RS-485 Send
2	GND2	2-channel signal grounding	6	GND1	1-channel signal grounding
3	RS-232_RX2	2-channel RS-485 Receive	7	RS-232_RX2	2-channel RS-485 Send
4	PE	Protective grounding	8	PE	Protective grounding

7.1.5 Parameter specification

Channel parameter information description

Configuration Parameters	Function Description	Parameter Range	Configuration Description
Channel State	Channel enabling	Enable Disable	Enable: Channel enabled Disable: Channel disabled
Baudrate	Baud Rate	1200Baud 2400Baud 4800Baud 9600Baud	1,200Baud: baud rate selection 2400 Baud: baud rate selection 4800 Baud: baud rate selection 9600 Baud: baud rate selection

		19.2KBaud 38.4KBaud 57.6KBaud 115.2KBaud	19.2KBaud: baud rate selection 38.4K Baud: baud rate selection 57.6K Baud: baud rate selection 115.2K Baud: baud rate selection
Databits	Data format	8	Data bits:fixed 8 bit
Parity	Parity bit	NONE ODD EVEN	NONE: No parity ODD: Odd parity EVEN: Even parity
Stopbits	Stop bit	1 2	1: stop bit 1 2: stop bit 2
SendContinuous State	Continuous sending	Enable Disable	Enable: Continuous sending is enabled. The bus transmits data to the module buffer first. After all data is buffered, it is sent continuously at one time. The MODBUS protocol must be enabled. Disable: Continuous sending is not enabled, and the module sends it immediately after receiving the bus data.
Frame Interval	Received frame interval bits	0-255	When the frame interval is greater than 10, and the serial module detects that the number of bits between two bytes is greater than the set value, it considers that one frame has been received and starts transmitting it to the bus. Otherwise, it will transmit to the bus immediately after receiving the data.

7.2 LX-CM002 2-channel RS-232 Serial Communication DB9 Interface Module

7.2.1 Product Overview

LX-CM002 is the ModbusRTU serial module for LX series PLC products, which is used to communicate with field meters or sensors.

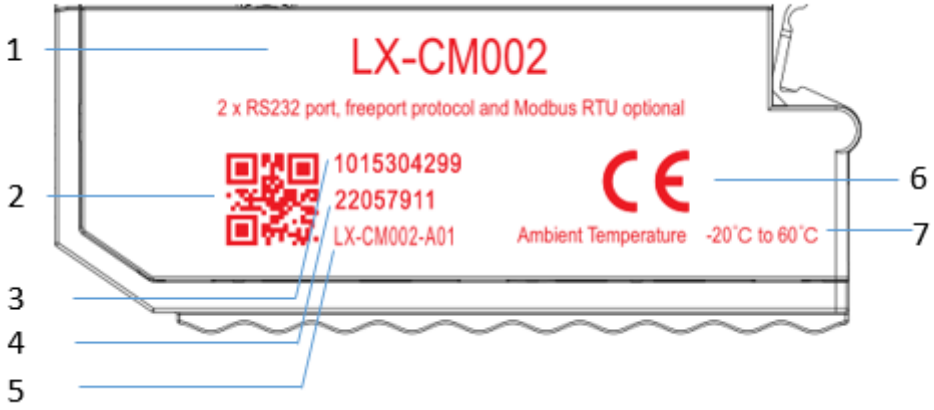
1. Basic Features
   - The smallest system consists of MPU, providing data processing, channel control and other functions;
   - Two channels of PHY provide EtherCAT slave station data transmission;
   - Two isolated RS-232 channels support Modbus RTU\ free port protocol\ ASCII protocol;
   - Complete basic HMI through indicators and switches.
2. Module components

Module component schematic

Module component description table

S/N	Component Name	Instructions
1	Module running indicator	3 channels, indicating module running status(RUN), COM1 port communication status (COM1) and COM2 port communication status respectively (COM2)
2	DB9 interface	2 channels in total, connected to RS-232 signal
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	2-channel RS-232 serial communication DB9 interface module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

7.2.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	24mm *100mm *71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
System rated voltage	24 V DC
System side Power Consumption	Max 1.5W

3. Communication indicators

Item	Specifications
LX-bus bus interface	
LX-bus interface connection type	Double-sided gold finger connector (backboard interface)
Quantity	1 channel
Rate	100Mbps
Protocol supported	EtherCAT slave protocol
Communication interface	
Protocol type	Support Modbus RTU Master\Slave\Free Port\ASCII
Communication interface level	RS-232
Quantity	2 channel
Connection type	2 DB9 seats
Supported function code	01, 02, 03, 04, 05, 06, 0F, 10 (hexadecimal)
Communication rate	Support 1200, 2400, 4800, 9600(default), 19200, 38400, 57600, 115200 bps configurable.
Checking mode	Odd check, even check, no check bit (configurable)
Diagnostic function	Diagnostic reporting function (including off-site diagnosis)

Channel isolation	Supported
Isolated voltage	≥1000VAC@1min@5mA, channel-to-system

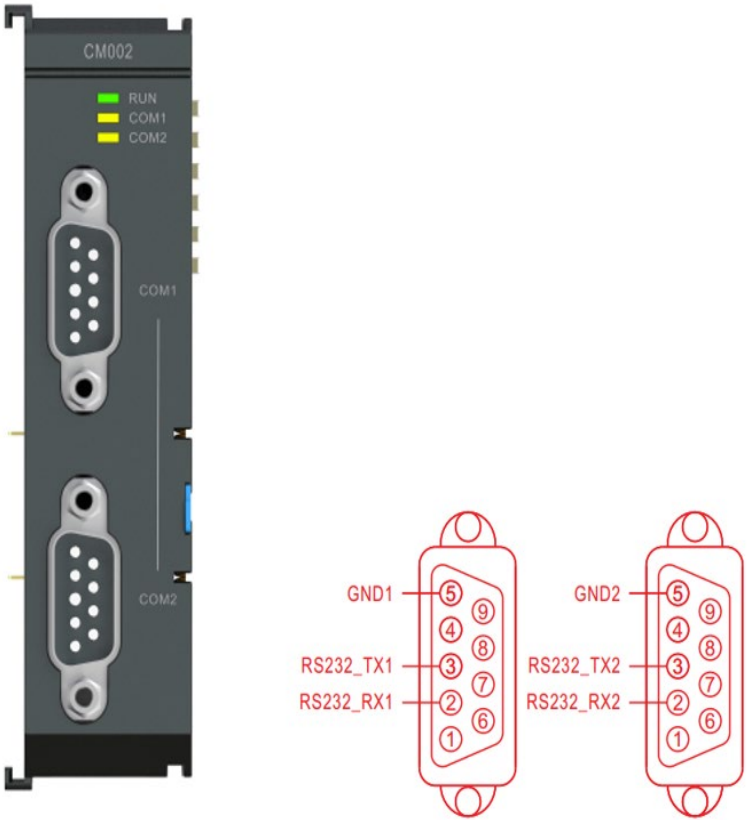
7.2.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
COM1	COM1 port enable status indicator	Yellow	On: Enabled Off: Not enabled
COM2	COM2 port enable status indicator	Yellow	On: Enabled Off: Not enabled

7.2.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal	Description of	Description	Terminal	Description of	Description

Identification	Signals		Identification	Signals	
1	/		6	/	/
2	RS-232_RX	RS-232 Rx signal	7	/	/
3	RS-232_TX	RS-232 Tx signal	8	/	/
4	/	/	9	/	/
5	GND	Signal grounding			

7.2.5 Parameter specification

Channel parameter information description

Configuration Parameters	Function Description	Parameter Range	Configuration Description
Channel State	Channel enabling	Enable Disable	Enable: Channel enabled Disable: Channel disabled
Baudrate	Baud Rate	1200Baud 2400Baud 4800Baud 9600Baud 19.2KBaud 38.4KBaud 57.6KBaud 115.2KBaud	1,200Baud: baud rate selection 2400 Baud: baud rate selection 4800 Baud: baud rate selection 9600 Baud: baud rate selection 19.2KBaud: baud rate selection 38.4K Baud: baud rate selection 57.6K Baud: baud rate selection 115.2K Baud: baud rate selection
Databits	Data format	8	Data bits:fixed 8 bit
Parity	Parity bit	NONE ODD EVEN	NONE: No parity ODD: Odd parity EVEN: Even parity
Stopbits	Stop bit	1 2	1: stop bit 1 2: stop bit 2
SendContinuous State	Continuous sending	Enable Disable	Enable: Continuous sending is enabled. The bus transmits data to the module buffer first. After all data is buffered, it is sent continuously at one time. The MODBUS protocol must be enabled. Disable: Continuous sending is not enabled, and the module sends it immediately after receiving the bus data.
Frame Interval	Received frame interval bits	0-255	When the frame interval is greater than 10, and the serial module detects that the number of bits between two bytes is greater than the set value, it considers that one frame has been received and starts transmitting it to the bus. Otherwise, it will transmit to the bus immediately after receiving the data.

7.3 LX-CM003 2-channel RS-485 Serial Communication Terminal Interface Module

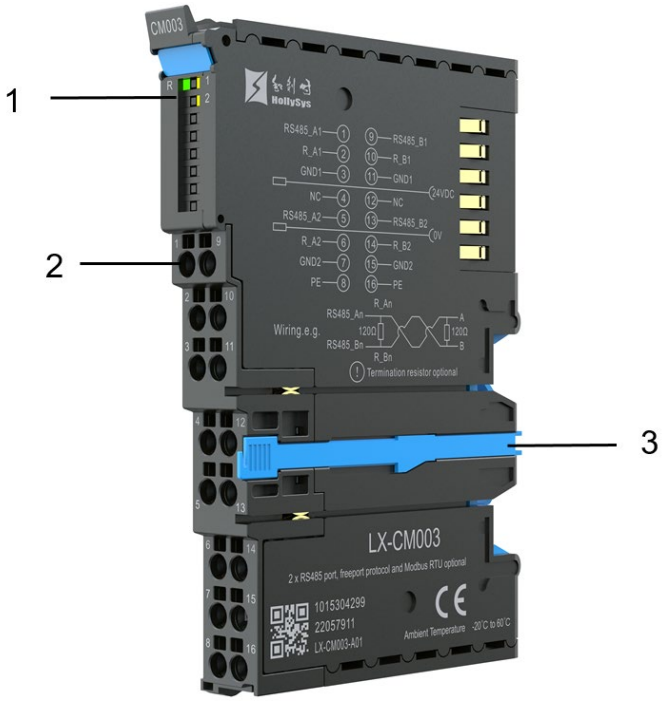
7.3.1 Product Overview

LX-CM003 is the ModbusRTU serial module for LX series PLC products, which is used to communicate with field meters or sensors.

1. Basic Features

   - The smallest system composed of MPU, providing data processing, channel control and other functions;
   - Two channels of PHY provide EtherCAT slave station data transmission path;
   - Two isolated RS-485 channels support Modbus RTU\ free port protocol\ ASCII protocol;
   - Complete basic HMI through indicators and switches.

2. Module components



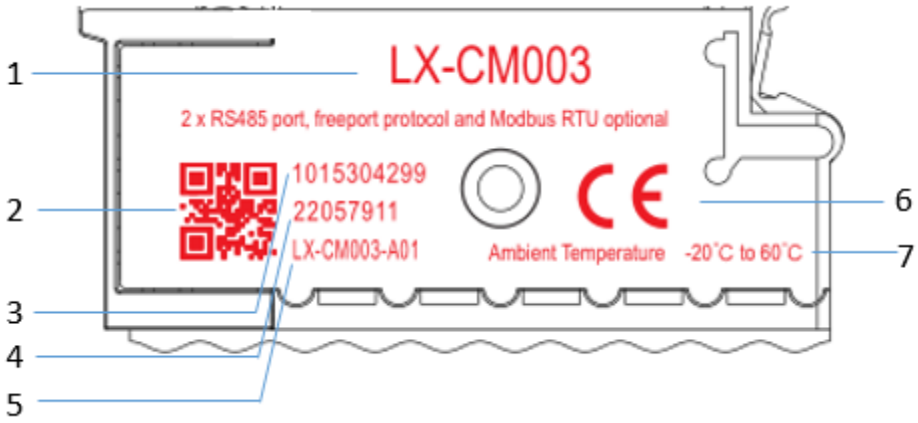
Module component schematic

Module component description table

S/N	Component Name	Instructions
1	Module running indicator	3 channels, indicating module running status, COM1 port communication status and COM2 port communication status respectively

2	Wiring Terminal	It connects 2 channels of RS-485 signal
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	2-channel RS-485 serial communication terminal interface module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

7.3.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	24mm *100mm *71mm(W*H*D)

2. Power indicators

Item	Specifications

System power supply mode	Power supply via LX-bus interface
System rated voltage	24 V DC
System side Power Consumption	Max 1.5W

3. Communication indicators

Item	Specifications
LX-bus bus interface	
LX-bus interface connection type	Double-sided gold finger connector (backboard interface)
Quantity	1 channel
Rate	100Mbps
Protocol supported	EtherCAT slave protocol
Communication interface	
Communication interface level	RS-485
Quantity	2 channel
Communication interface connection type	16-bit terminal wiring
Protocol type	Support Modbus RTU Master\Slave\Free Port\ASCII
Transfer mode and frame format	RTU, Free Port,ASCII
Supported function code	01, 02, 03, 04, 05, 06, 0F, 10 (hexadecimal)
Number of slave stations supported as a master station	Up to 31 field Modbus instruments can be connected per channel
Cable impedance	120Ω
Communication rate	Support 1200, 2400, 4800, 9600(default), 19200, 38400, 57600, 115200 bps configurable.
Checking mode	Odd check, even check, no check bit (configurable)
Diagnostic function	Diagnostic reporting function (including off-site diagnosis)
Channel isolation	Supported
Isolated voltage	≥1000VAC@1min@5mA, channel-to-system

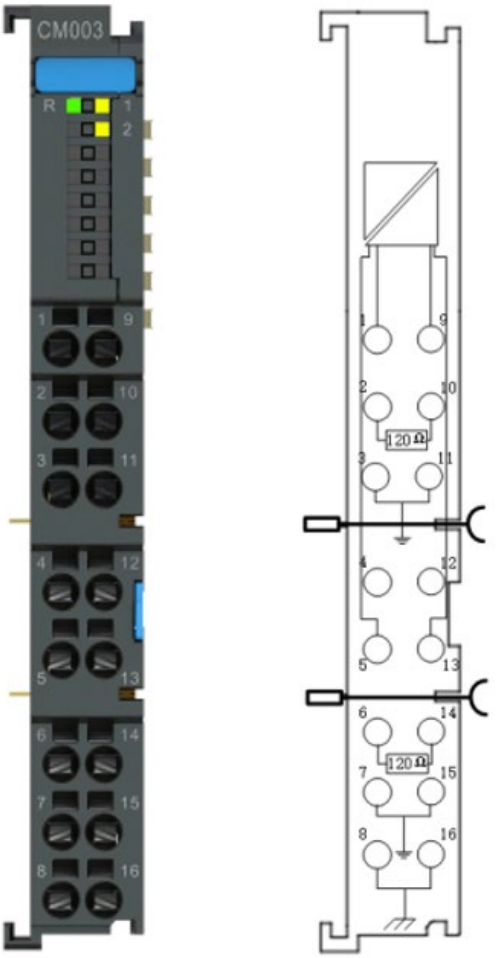
7.3.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
COM1	COM1 port enable status indicator	Yellow	On: Enabled Off: Not enabled
COM2	COM2 port enable status indicator	Yellow	On: Enabled Off: Not enabled

7.3.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal Identification	Description of Signals	Description	Terminal Identification	Description of Signals	Description
1	RS-485_A1	1-channel RS-485 A	9	RS-485_B1	1-channel RS-485 B
2	R_A1	1-channel terminal resistor A	10	R_B1	1-channel terminal resistor B
3	GND1	1-channel signal grounding	11	GND1	1-channel signal grounding
4	NC	Null	12	NC	Null
5	RS-485_A2	2-channel RS-485 A	13	RS-485_B2	2-channelRS-485 B
6	R_A2	2-channel terminal resistor A	14	R_B2	2-channel terminal resistor B
7	GND2	2-channel signal grounding	15	GND2	2-channel signal grounding
8	PE	Protective grounding	16	PE	Protective grounding

7.3.5 Parameter specification

Channel parameter information description

Configuration Parameters	Function Description	Parameter Range	Configuration Description
Channel State	Channel enabling	Enable Disable	Enable: Channel enabled Disable: Channel disabled
Baudrate	Baud Rate	1200Baud 2400Baud 4800Baud 9600Baud 19.2KBaud 38.4KBaud 57.6KBaud 115.2KBaud	1,200Baud: baud rate selection 2400 Baud: baud rate selection 4800 Baud: baud rate selection 9600 Baud: baud rate selection 19.2KBaud: baud rate selection 38.4K Baud: baud rate selection 57.6K Baud: baud rate selection 115.2K Baud: baud rate selection
Databits	Data format	8	Data bits:fixed 8 bit
Parity	Parity bit	NONE ODD EVEN	NONE: No parity ODD: Odd parity EVEN: Even parity
Stopbits	Stop bit	1 2	1: stop bit 1 2: stop bit 2
SendContinuous State	Continuous sending	Enable Disable	Enable: Continuous sending is enabled. The bus transmits data to the module buffer first. After all data is buffered, it is sent continuously at one time. The MODBUS protocol must be enabled. Disable: Continuous sending is not enabled, and the module sends it immediately after receiving the bus data.
Frame Interval	Received frame interval bits	0-255	When the frame interval is greater than 10, and the serial module detects that the number of bits between two bytes is greater than the set value, it considers that one frame has been received and starts transmitting it to the bus. Otherwise, it will transmit to the bus immediately after receiving the data.

7.4 LX-CM004 2-Channel RS-485 Serial Communication DB9 Interface Module

7.4.1 Product Overview

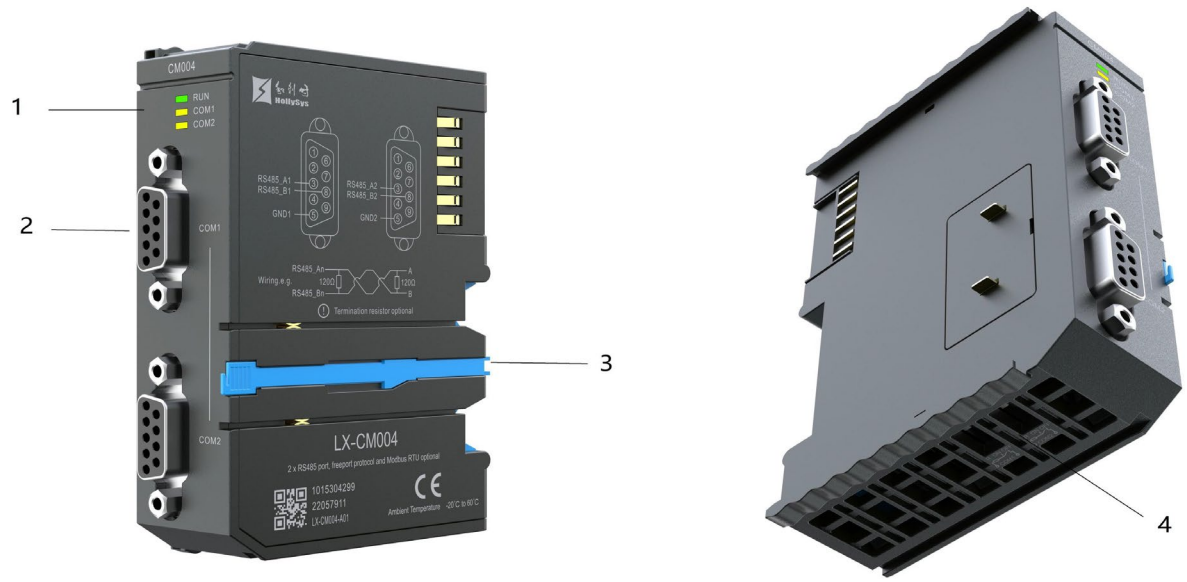
LX-CM004 is the ModbusRTU serial module for LX series PLC products, which is used to communicate with field meters or sensors.

1. Basic Features

- The smallest system composed of MPU, providing data processing, channel control and other functions;
- Two channels of PHY provide EtherCAT slave station data transmission path;

- Two isolated RS-485 channels support ModbusRTU protocol;
- Complete basic HMI through indicators and switches.

2. Module components

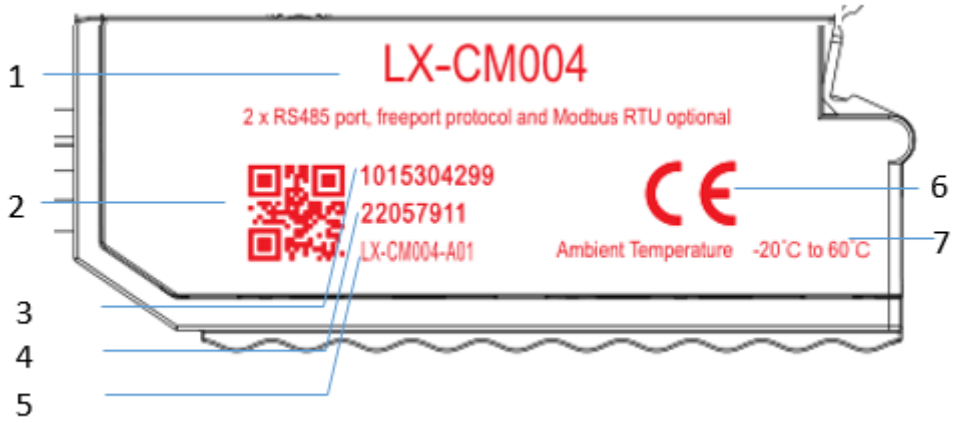


Module component schematic

Module component description table

S/N	Component Name	Instructions
1	Module running indicator	3 channels, indicating module running status, COM1 port communication status and COM2 port communication status respectively
2	DB9 interface	2 channels in total, connected to RS-485 signal
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.
4	Dial switch	There are two groups in total, respectively controlling the switching of 2 groups of channel matching resistors. Each group has two dial switches. To set the matching resistor, please turn the two dial switches to ON at the same time.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	2-channel RS-485 serial communication DB9 interface module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

7.4.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	24mm *100mm *71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
System rated voltage	24 V DC
System side Power Consumption	Max 1.5W

3. Communication indicators

Item	Specifications
LX-bus bus interface	
LX-bus interface connection type	Double-sided gold finger connector (backboard interface)
Quantity	1 channel
Rate	100Mbps
Protocol supported	EtherCAT slave protocol
Communication interface	
Communication interface level	RS-485
Quantity	2
Communication interface connection type	Two DB9 females
Protocol type	Support Modbus RTU Master\Slave\Free Port
Transfer mode and frame format	RTU, Free Port
Supported function code	01, 02, 03, 04, 05, 06, 0F, 10 (hexadecimal)
Number of slave stations supported as a master station	Up to 31 field Modbus instruments can be connected per channel
Cable impedance	120Ω
Communication rate	Support 1200, 2400, 4800, 9600(default), 19200, 38400, 57600, 115200 bps configurable.
Checking mode	Odd check, even check, no check bit (configurable)
Diagnostic function	Diagnostic reporting function (including off-site diagnosis)
Channel isolation	Supported
Isolated voltage	≥1000VAC@1min@5mA, channel-to-system

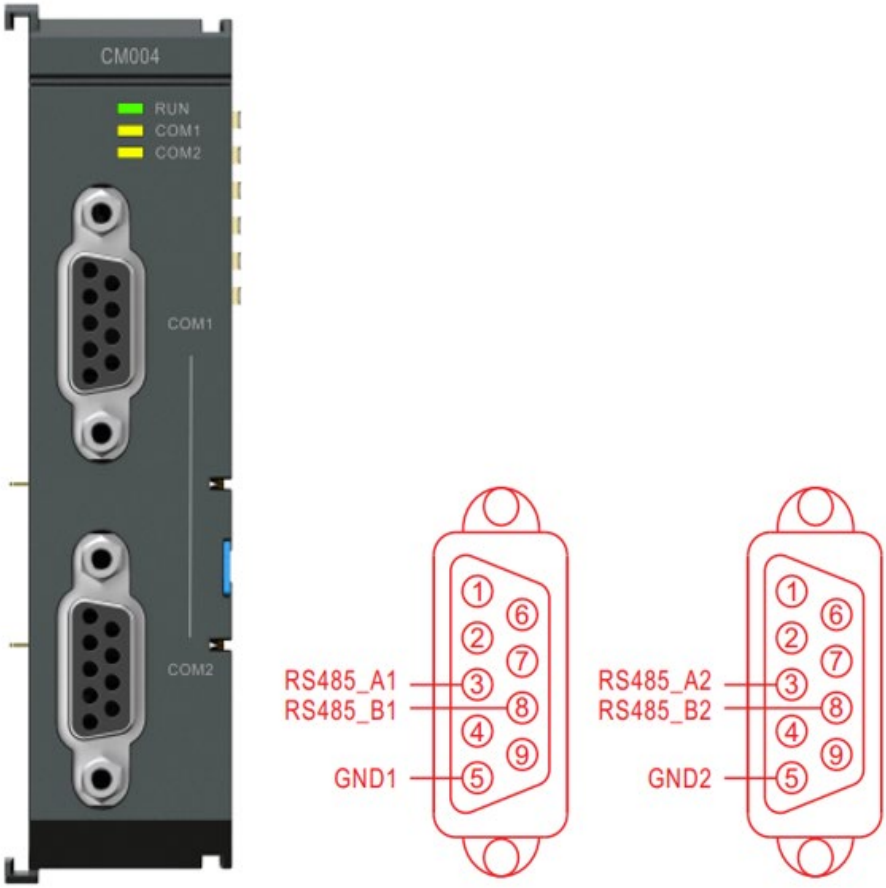
7.4.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
COM1	COM1 port enable status indicator	Yellow	On: Enabled Off: Not enabled
COM2	COM2 port enable status indicator	Yellow	On: Enabled Off: Not enabled

7.4.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal Identification	Description of Signals	Description
1	/	/
2	/	/
3	RS-485_A	RS-485 A signal
4	/	/
5	GND	Signal ground
6	/	/
7	/	/
8	RS-485_B	RS-485 B signal
9	/	/

7.4.5 Parameter specification

Channel parameter information description

Configuration Parameters	Function Description	Parameter Range	Configuration Description
Channel State	Channel enabling	Enable Disable	Enable: Channel enabled Disable: Channel disabled
Baudrate	Baud Rate	1200Baud 2400Baud	1,200Baud: baud rate selection 2400 Baud: baud rate selection

		4800Baud 9600Baud 19.2KBaud 38.4KBaud 57.6KBaud 115.2KBaud	4800 Baud: baud rate selection 9600 Baud: baud rate selection 19.2KBaud: baud rate selection 38.4K Baud: baud rate selection 57.6K Baud: baud rate selection 115.2K Baud: baud rate selection
Databits	Data format	8	Data bits:fixed 8 bit
Parity	Parity bit	NONE ODD EVEN	NONE: No parity ODD: Odd parity EVEN: Even parity
Stopbits	Stop bit	1 2	1: stop bit 1 2: stop bit 2
SendContinuous State	Continuous sending	Enable Disable	Enable: Continuous sending is enabled. The bus transmits data to the module buffer first. After all data is buffered, it is sent continuously at one time. The MODBUS protocol must be enabled. Disable: Continuous sending is not enabled, and the module sends it immediately after receiving the bus data.
Frame Interval	Received frame interval bits	0-255	When the frame interval is greater than 10, and the serial module detects that the number of bits between two bytes is greater than the set value, it considers that one frame has been received and starts transmitting it to the bus. Otherwise, it will transmit to the bus immediately after receiving the data.

Chapter 8 Communication Module

8.1 LX-CM005 DeviceNet Slave Station Protocol Module

8.1.1 Product Overview

The LX-CM005 is a DeviceNet protocol slave module that communicates data operations with live meters or sensors.

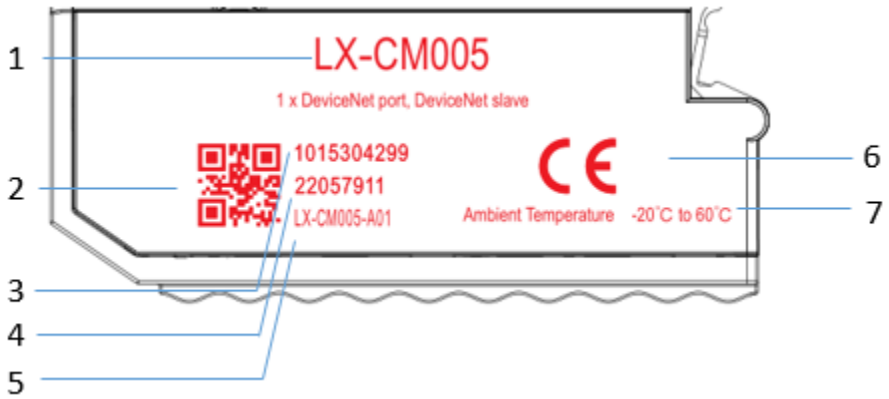
1. Basic Features
   - The smallest system composed of MPU, providing data processing, channel control and other functions;
   - Two channels of PHY provide EtherCAT slave station data transmission path;
   - One isolated CAN channels support DeviceNet protocol;
   - Complete basic HMI through indicators and switches.
2. Module components

Module component schematic

Module component description table

S/N	Component Name	Instructions
1	Module running indicator	2 channels, indicating module running status and communication status respectively
2	CAN communication port	Connect CAN signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.
4	Dial switch	There is 1 group in total, with two dial switches. To set the matching resistor, please turn the two dial switches to ON at the same time.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	DeviceNet slave station protocol module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

8.1.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	24mm*100mm*69mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
Rated voltage	24 V DC
System side Power Consumption	Max 1.5W

3. Communication indicators

Item	Specifications
LX-bus bus interface	
LX-bus interface connection type	Double-sided gold finger connector (backboard interface)
Quantity	1 channel
Rate	100Mbps
Protocol supported	EtherCAT slave protocol
Communication interface	
Communication interface level	CAN
Number of communication interfaces	1
Interface type	5-pin pluggable terminal
Protocol type	DeviceNet Slave Station Protocol
Cable	Shielded twisted pair (rate depends on cable length)
Communication rate	500 Kbps, 250 Kbps, or 125 Kbps
Diagnostic function	Diagnostic reporting function (including off-site diagnosis)
Isolated voltage	≥1000VAC@1min@5mA, channel-to-system

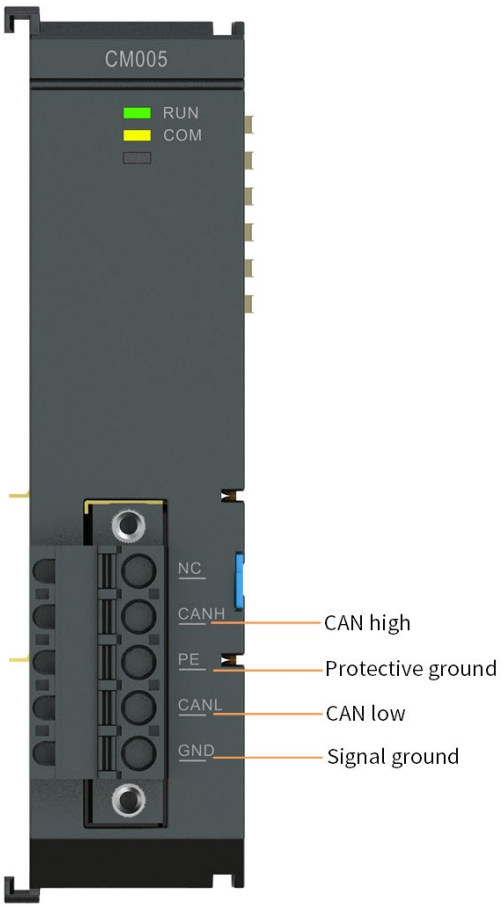
8.1.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
COM	COM port communication status indicator	Yellow	On: The slave station is online and communicating with the master station normally. Flashing(200 ms high, 200 ms low): The slave station has completed the MAC-ID conflict check, but failed to communicate with the master station. Off: The slave station is offline.

8.1.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal Identification	Description of Signals	Description
1	GND	Signal ground
2	CAN_L	CAN low
3	PE	Protective ground
4	CAN_H	CAN high
5	NC	Null

8.1.5 Parameter specification

For configuration configuration of the LX-CM005 and specification of relevant parameters, please refer to the section on DeviceNet communication in the ***Communication Manual for LX Programmable Logic Controllers***.

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Configuration Description
MAC ID	Module address	0~63	Each slave station is assigned a unique ID to the master station, that cannot be duplicated with the slave ID when configured
Baudrate	Baud Rate	125K 250K 500K	Configure baud rate based on end-to-end network distance 500 m, baud rate 125 Kbp/s 250 m, baud rate 250 Kbp/s 100 m, baud rate 500 Kbp/s

8.1.6 Diagnostic Alarm

Diagnostic information description

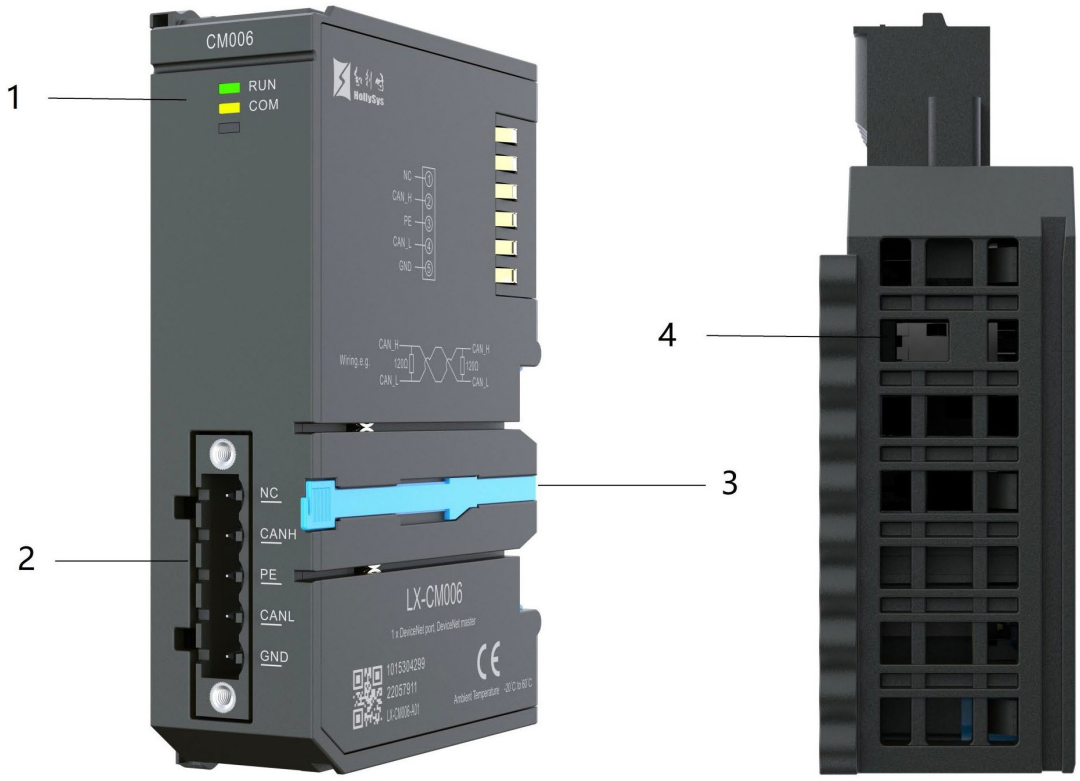
Diagnosis	Diagnostic Description	Diagnostic Value
NO_ERROR	No error occurred in the protocol stack	0
STATION_DEACTIVATED	Errors occurred in the protocol stack	1
STATION_READY	Set after the protocol stack initialization is completed and reset after normal operation	18
VENDOR_ID_ERR	Vendor ID does not match	42
DEVICE_TYPE_ERR	Device Type does not match	43
PRODUCT_CODE_ERR	Product Code does not match	44
REVISION_ERR	Revision does not match	45
PRODUCED_IO_SIZE_ERR	The output data length exceeds 255	47
CONSUMED_IO_SIZE_ERR	The input data length exceeds 255	48
CAN_CONNECT_ERR	Disconnected from the master station	50

8.2 LX-CM006 DeviceNet Master Station Protocol Module

8.2.1 Product Overview

The LX-CM006 is a DeviceNet protocol master module that communicates data operations with live meters or sensors.

1. Basic Features
   - The smallest system composed of MPU, providing data processing, channel control and other functions;
   - Two channels of PHY provide EtherCAT slave station data transmission path;
   - One isolated CAN channels support DeviceNet protocol;
   - Complete basic HMI through indicators and switches.
2. Module components

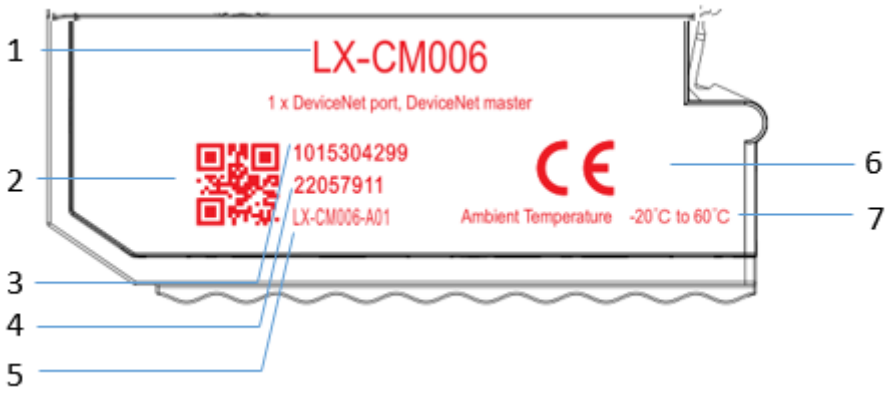


Module component schematic

Module component description table

S/N	Component Name	Instructions
1	Module running indicator	2 channels, indicating module running status(RUN) and communication status respectively(COM)
2	CAN communication port	Connect CAN signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.
4	Dial switch	There is 1 group in total, with two dial switches. To set the matching resistor, please turn the two dial switches to ON at the same time.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	DeviceNet master station protocol module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

8.2.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation

Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	24mm *100mm *69mm(W*H*D)

2. Power indicators

Item	Specifications
Power supply mode	Power supply via LX-bus interface
Rated voltage	24 V DC
System side Power Consumption	Max 1.5W

3. Communication indicators

Item	Specifications
LX-bus bus interface	
LX-bus interface connection type	Double-sided gold finger connector (backboard interface)
Quantity	1 channel
Rate	100Mbps
Protocol supported	EtherCAT slave protocol
Communication interface	
Communication interface level	CAN
Number of communication interfaces	1
Interface type	5-pin pluggable terminal
Protocol type	DeviceNet Slave Station
Cable	Shielded twisted pair (rate depends on cable length)
Communication rate	500 Kbps, 250 Kbps, or 125 Kbps
Diagnostic function	Diagnostic reporting function (including off-site diagnosis)
Isolated voltage	≥1000VAC@1min@5mA, channel-to-system

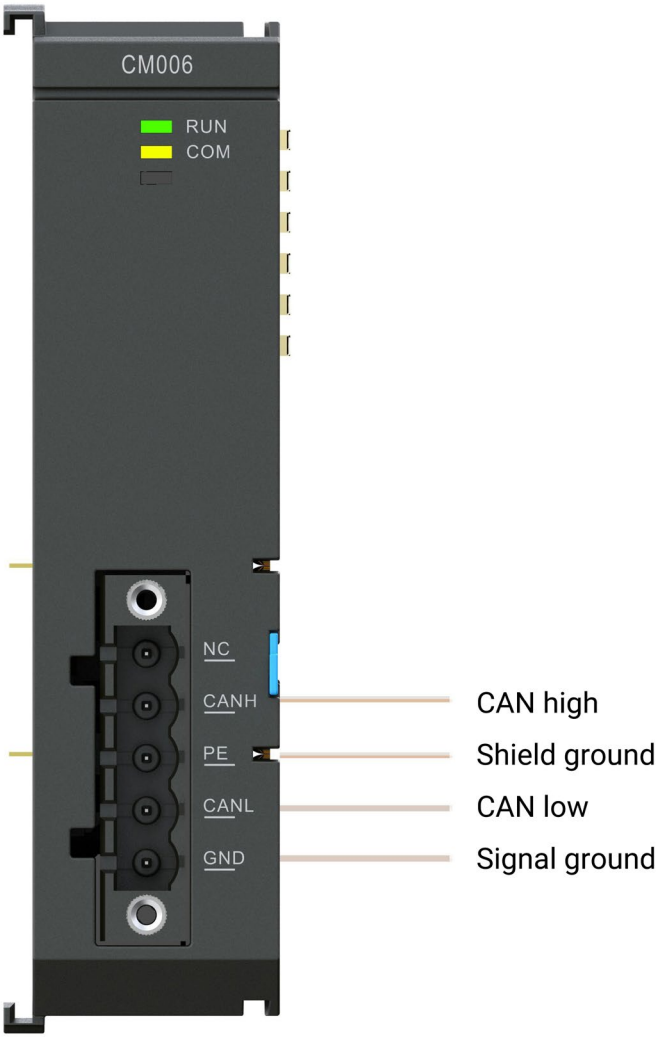
8.2.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state （Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
COM	COM port communication status indicator	Yellow	On: The master station is online and communicating with the slave station normally. Flashing: The master station is performing MAC-ID conflict check Off: The master station is offline.

8.2.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal Identification	Description of Signals	Description
1	GND	Signal ground
2	CAN_L	CAN low
3	PE	Protective ground
4	CAN_H	CAN high
5	NC	Null

8.2.5 Parameter specification

For configuration configuration of the LX-CM006 and specification of relevant parameters, please refer to the section on DeviceNet communication in the ***Communication Manual for LX Programmable Logic Controllers***.

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Configuration Description
MAC ID	Module address	0~63	Each slave station is assigned a unique ID to the master station that cannot be duplicated with the slave ID when configured
Baudrate	Baud Rate	125K 250K 500K	Configure baud rate based on end-to-end network distance 500 m, baud rate 125 Kbp/s 250 m, baud rate 250 Kbp/s 100 m, baud rate 500 Kbp/s
IO cycle time (ms)	Expected packet rate	1~65535	Default value when adding slave stations
Watchdog time		0~100000	Not used, no configuration required

8.2.6 Diagnostic Alarm

Diagnostic information description

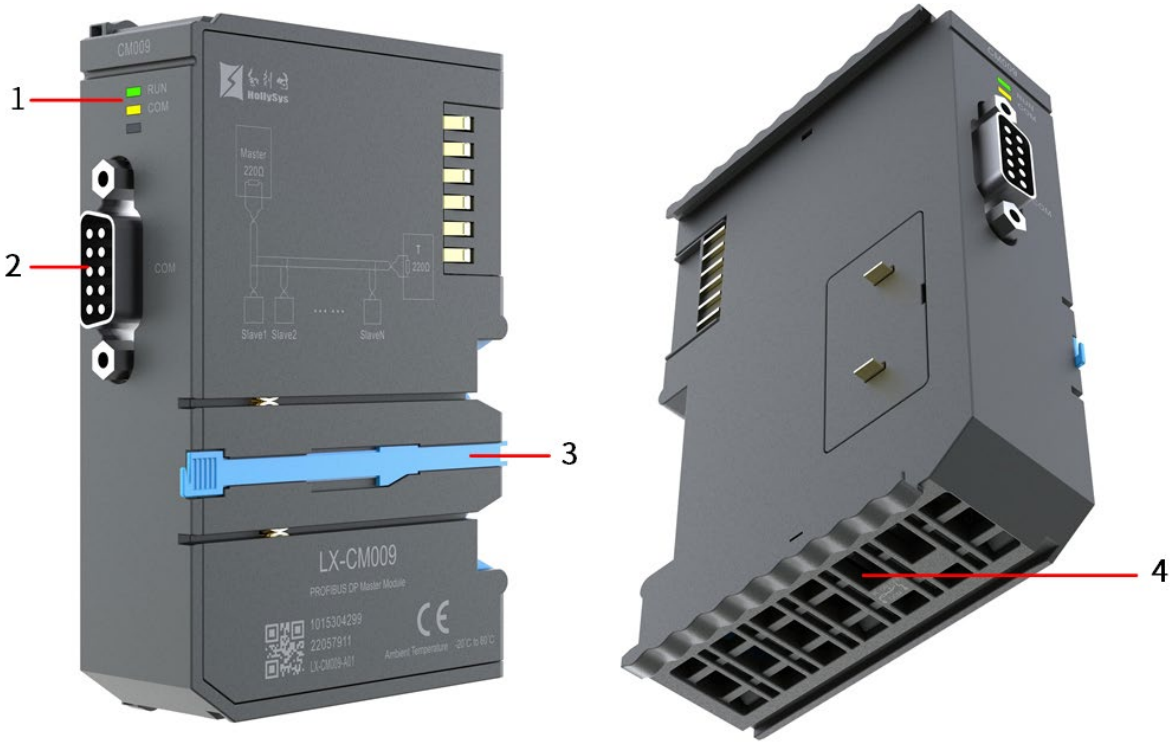
Diagnosis	Diagnostic Description	Diagnostic Value
Error	The number of offline slave stations, indicating the number of slave stations that have been configured but are not online. If it is 0, it means that all slave stations are online.	0

8.3 LX-CM009 Profibus DP Master Communication Module

8.3.1 Product Overview

The LX-CM009 EtherCAT Master Module supports all functions of DP-V0 and DP-V1, which are mainly used for fast data exchange with distributed field devices (slave devices such as I/O devices, valves, transmitters and other types of instrumentation); the DP Master Module supports DP-V0 and DP-V1 protocol slave devices for normal use in mixed mode.

1. Basic Features
   - The smallest system composed of MPU, providing data processing, channel control and other functions;
   - Two channels of PHY provide EtherCAT slave station data transmission path;
   - One isolated RS-485 channels support DP-V0 and DP-V1 protocol;
   - Complete basic HMI through indicators and switches.
2. Module components



Module component schematic

Module component description table

S/N	Component Name	Instructions
1	Module running indicator	2 channels, indicating module running status(RUN) and communication status respectively(COM)
2	DB9 interface	1 channels, connected to RS-485 signal
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.
4	Dial switch	There is 1 group in total, with two dial switches. To set the matching resistor, please turn the two dial switches to ON at the same time.

8.3.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
DP Master Diagnostics	DP bus looping count is supported, looping up when there are slave stations configured and the master station is normal.
DP slave diagnostics	Support for off-site online diagnostics, diagnostics packets are limited to a maximum of 244 bytes
Module protection grade	IP20
Operating Temperature	-20℃～60℃
Operating relative humidity	10%~95% no condensation

Temperature of storage environment	-40℃～70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	24mm *100mm *69mm(W*H*D)
Altitude above sea level	< 2000m

2. Power indicators

Item	Specifications
Power supply mode	Power supply via LX-bus interface
Rated voltage	24 VDC (19.2~28.8VDC)
Consumption	Max 1.5W

3. Communication indicators

Item	Specifications
LX-bus bus interface	
LX-bus interface connection type	Double-sided gold finger connector (backboard interface)
Quantity	1 channel
Rate	100Mbps
Protocol supported	EtherCAT slave protocol
Communication interface	
Communication interface level	RS-485
Number of communication interfaces	1
Interface type	One DB9 female, not support gateway slave
Protocol type	Support DP-V0 and DP-V1 protocol
Number of stations supported as master	32（No relay）
Slave address range	2-125
Cable impedance	220Ω（Terminal matching resistance can be set by dialing switch）
Baud rate	9.6k,19.2k,31.25k,45.45k,93.75k,187.5k,500k,1.5M,3M
Diagnostic function	Support for standard and extended diagnostics
Isolated voltage	1000VAC,1min,Leakage current < 5mA, channel pair system

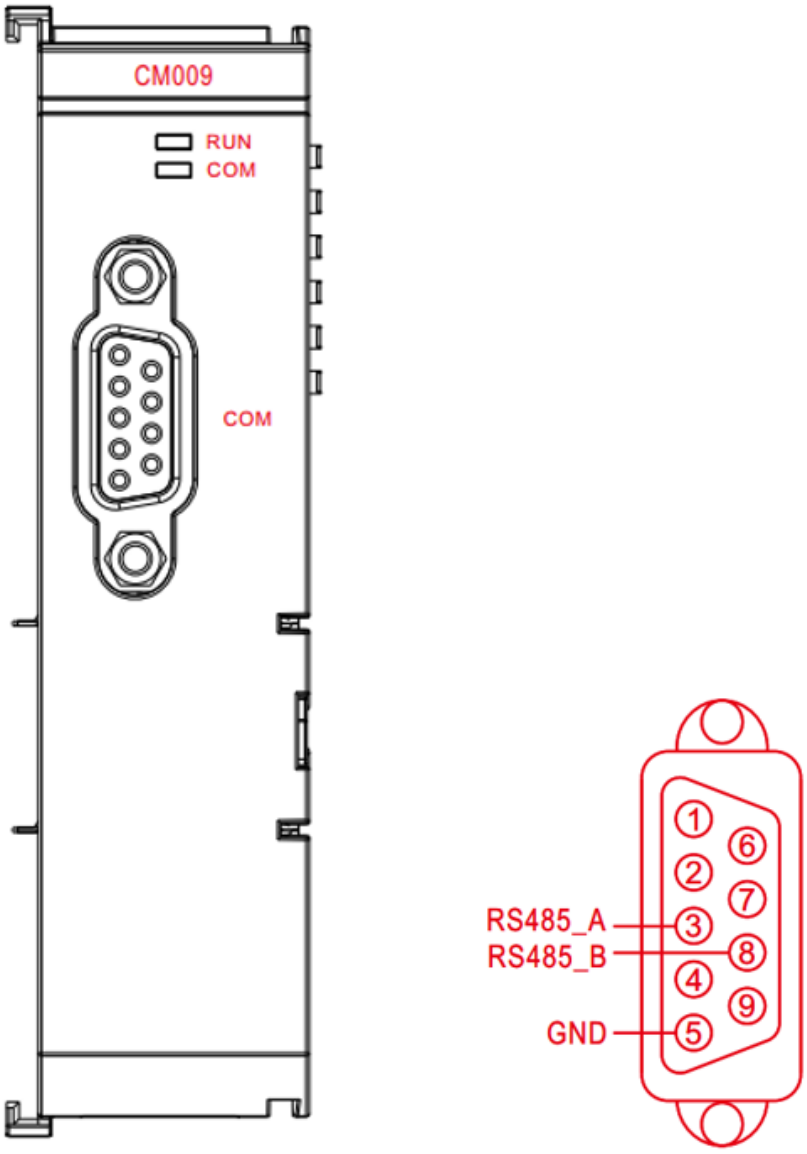
8.3.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
RUN	Running status indicator	Green	On: Connected to the EtherCAT master module, this module is online Off: Master module is in a connected state
COM	COM port communication status indicator	Yellow	On: DP slave configured all online Flashing(200 ms high, 200 ms low): DP off site Off: All DP slave is offline or not configured for DP slave

8.3.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal Identification	Description of Signals	Description	Terminal Identification	Description of Signals	Description
1	/	/	6	/	/
2	/	/	7	/	/
3	RS-485_A	RS-485 A signal	8	RS-485_B	RS-485 A signal
4	/	/	9	/	/
5	PE	Protective grounding			

8.3.5 Parameter Configuration

1. Module configuration

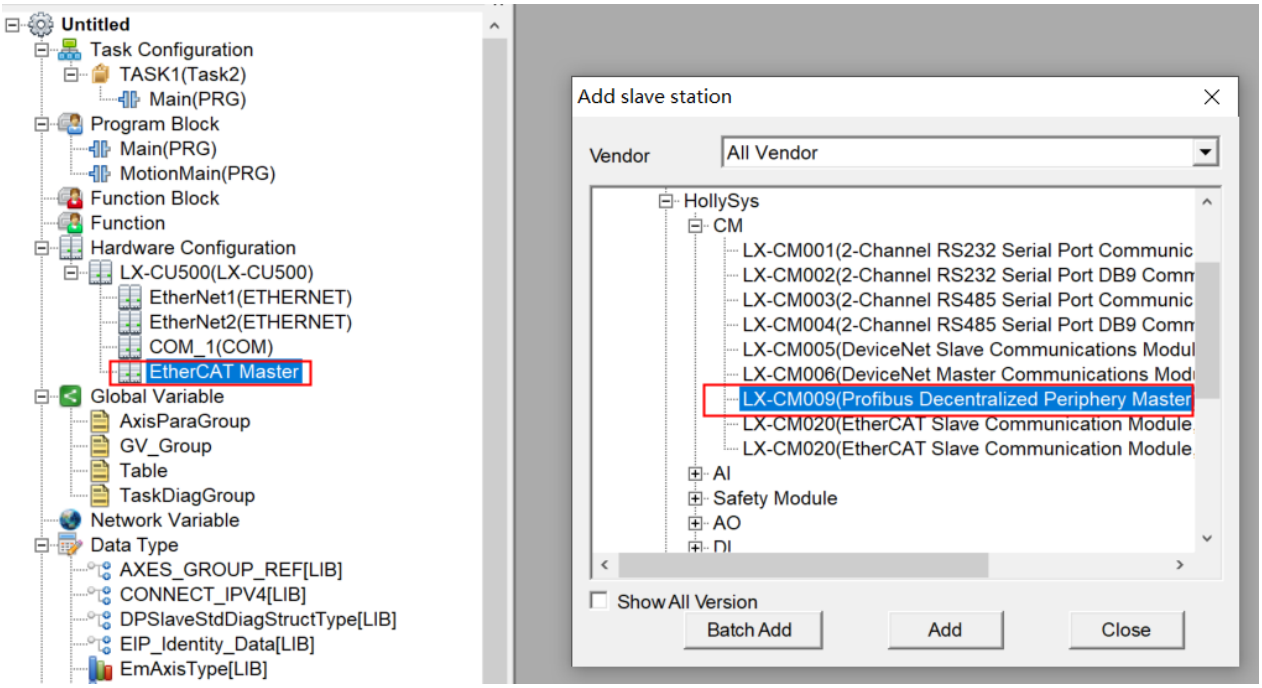
The module configuration steps are as follows:

■ Add slave station

Secondary addition Add by:

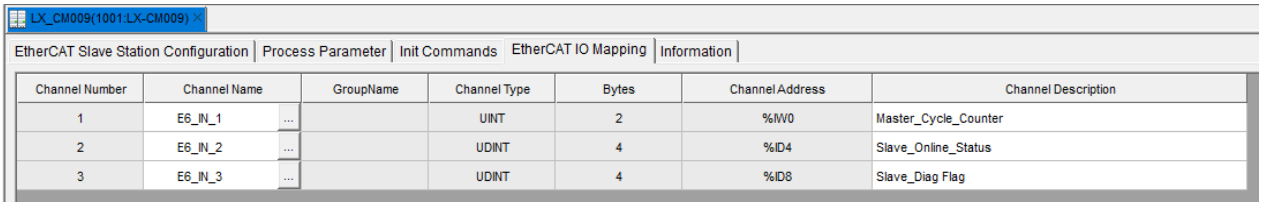
(1) Right-click EtherCAT Master under the Hardware Configuration node, and click Add Slave;

(2) After you click Add Slave, click LX-CM009 on the HollySys column.The master station parameters are configured as follows:



2. LX-CM009 slave configuration

By default, the parameters in "EtherCAT Slave Station Configuration", "Process Parameter", "Init CommandS" and "Information" in the module need not be changed. Module channel information can be viewed in the "Ether CAT IO Mapping", as shown in the following figure.



LX-CM009 EtherCAT IO Mapping

Parameter specification

Configuration Parameters	Configuration Description
Master_Cycle_Counter	DP Master Diagnostics: The DP bus loops the count, and if the master station is healthy, the loop accumulates.
Slave_Online_Status	Slave Online Status (32bit): Bit0-bit31 corresponds to slave station 0-31, online is 1, offline is 0.
Slave_Diag Flag	Diagnostic identification (32bit):

	Bit0-bit31 corresponds to slave stations with numbers 0-31 (1 indicates that diagnostic data is valid and readable; 0 indicates that diagnostic data has not been refreshed. Diagnostic data include basic diagnosis (6 bytes) + extended diagnosis with a maximum limit of 244 bytes. Detailed diagnostic data corresponds to the sub-index of dictionary F103. For example: 1 index for # 0 slave station (F103: 1). And so on.

- Note: The slave station number here is AT configuration order, not the slave address.

3. DP Master Configuration

   Double-click "DP _ MASTER" on the tree node to open the DP master device configuration page, as shown in the following figure.

Device Configuration | Information

Project	Content
Protocol name	DP_MASTER
Alias	DP_MASTER
Port	COM
Baud rate	1500.00kBits/s
TSL(0~65535)	400
Min TSDR(0~65535)	11
Max TSDR(0~65535)	150
TQUI failure/Repeater switching time(0~255)	0
TSET(0~255)	1
TTR	4449
Gap	10
Retry limit(0~255)	2
Slave interval(0~65535)	50
Poll timeout	500
Data control time	1200
Protocol	PROFIBUS-DP
Address range of slave station	2~125
Position of master/slave station	Profibus-DP master station

DP Master device configuration page

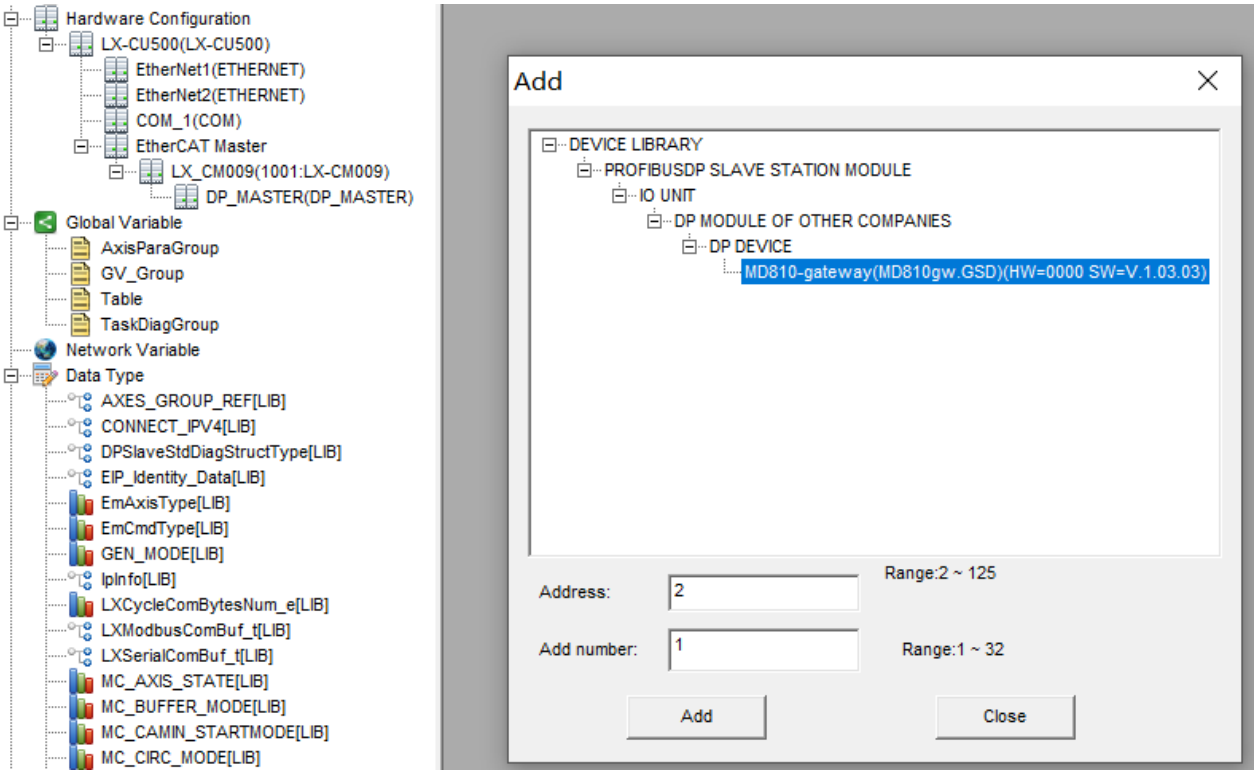
- Alias:DP_MASTER.
- Baud rate: Support 9.6k,19.2k,31.25k,45.45k,93.75k,187.5k,500k,1.5M,3M.
- TSL (0 ~ 65535): The DP polling time of a slave station; that is, retry or poll the next station if no response is received after this period of time.
- Min TSDR (0 ~ 65535):Minimum slave latency; The minimum delay from master request to the slave reply.
- Max TSDR (0 ~ 65535):Maximum slave latency; The maximum delay from the master request to the slave reply.
- TQUI failure/Repeater switching time(0~255):The switch time of DP send failed to next resend.
- TSET(0~255):DP connection establishment time.
- TTR:Maximum time available for token delivery.

- Gap:Number of token turns.
- Retry limit(0~255):Maximum number of retries after DP reply timeout.
- Slave interval(0 ~ 65535):The time interval of polling the same slave twice cannot be less than this parameter, otherwise the slave may not be processed in time.
- Poll timeout:Maximum polling time for a token between master stations.
- Data control time:The maximum time for a master station to update all its slave stations, typically set to 1200ms.
- Protocol:PROFIBUS-DP.
- Address range of slave station:2~125.
- Position of master/slave station: Profibus-DP master station.

4. DP Slave Configuration

(1) Add DP Slave Device

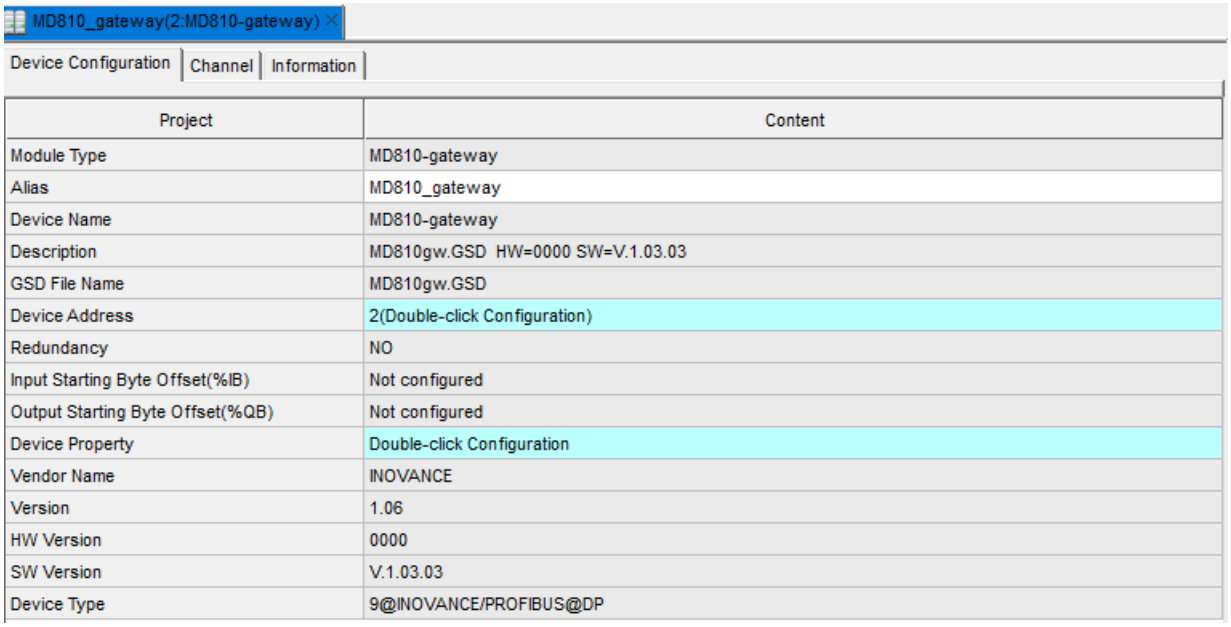
(a) Right-click on the node tree "DP_MASTER", select Add Device Options, and the Add Device dialog box will pop up. Select the DP device you want to add, as shown below.



Add DP Device

- Before adding a DP device, ensure that a DP slave device is added to the project.

(b) Double-click the DP slave device node to open the device information window, as shown in the figure.


MD810_gateway(2:MD810-gateway)

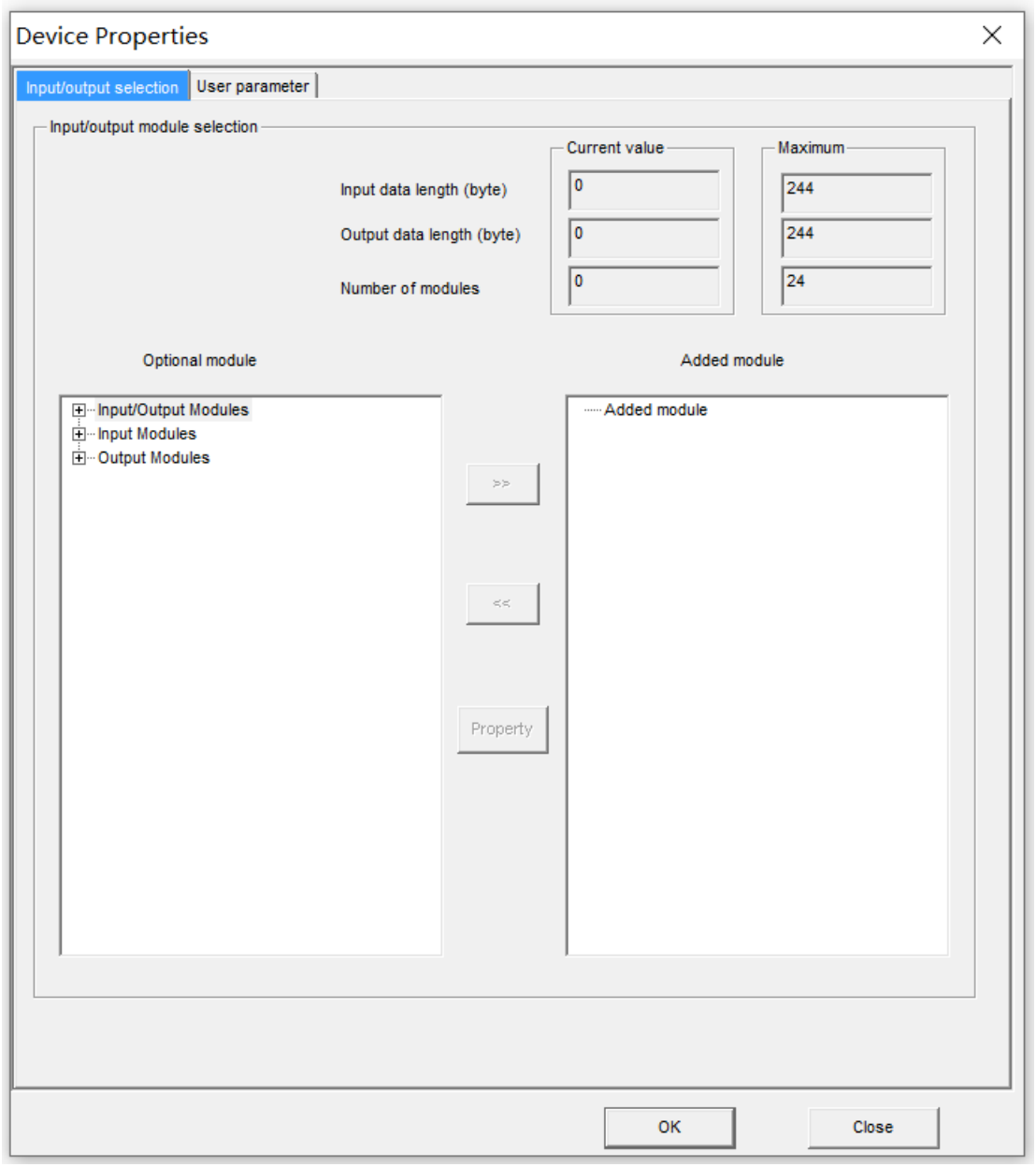
Device Configuration | Channel | Information

Project	Content
Module Type	MD810-gateway
Alias	MD810_gateway
Device Name	MD810-gateway
Description	MD810gw.GSD HW=0000 SW=V.1.03.03
GSD File Name	MD810gw.GSD
Device Address	2(Double-click Configuration)
Redundancy	NO
Input Starting Byte Offset(%IB)	Not configured
Output Starting Byte Offset(%QB)	Not configured
Device Property	Double-click Configuration
Vendor Name	INOVANCE
Version	1.06
HW Version	0000
SW Version	V.1.03.03
Device Type	9@INOVANCE/PROFIBUS@DP

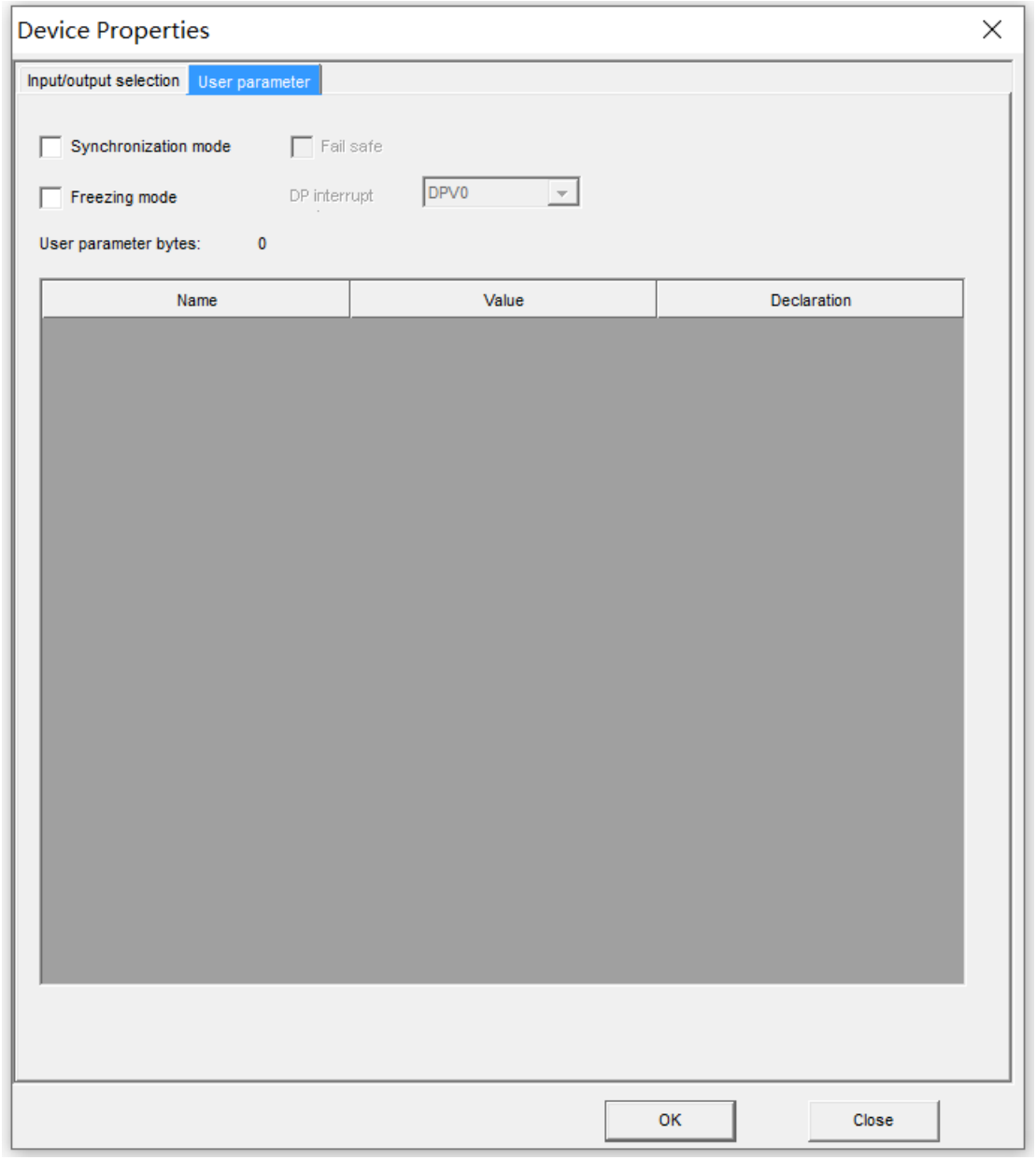
The DP slave supports up to 32 slave stations (no relay).

Can configure Alias, Device Address, Device Properties.

- Device Address: Range 2-125.
- Device Properties: input data configuration, output data configuration, synchronous mode, or frozen mode.


Device Properties
Input/output selection
User parameter
Input/output module selection
Current value
Maximum
Input data length (byte)
0
244
Output data length (byte)
0
244
Number of modules
0
24
Optional module
Added module
Input/Output Modules
Input Modules
Output Modules
Added module
>>
<<
Property
OK
Close

(a)



(b)

DP Slave Device Properties

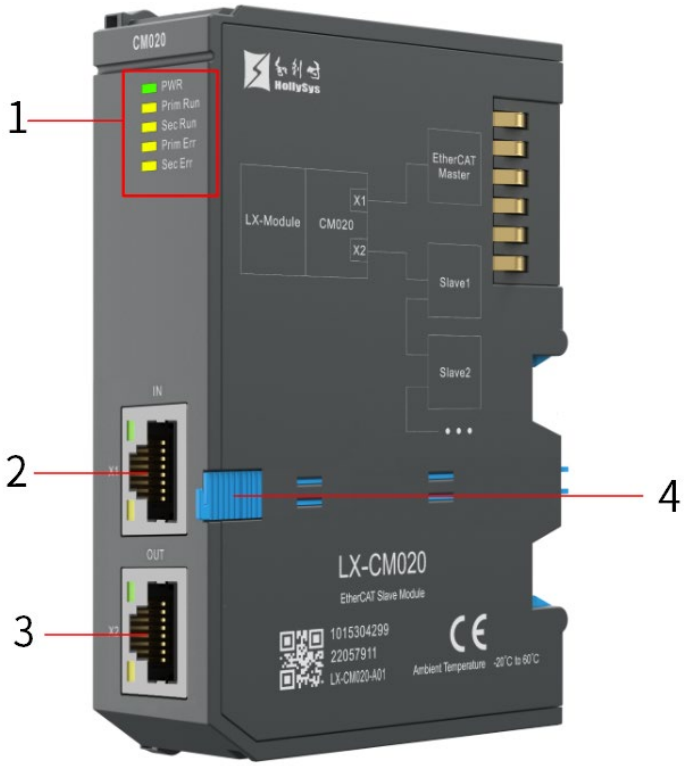
- Input data, output data, parameter configuration or diagnostic data, each slave station has a maximum of 244 byte data;
- The total input data for all slave stations does not exceed: 1.4Kbyte;
- The total output data of all slave stations shall not exceed: 1.4Kbyte;
- The total number of input variables or output variables shall not exceed 1000 (the input variables contain the data of three cycles of the module itself).

8.4 LX-CM020 EtherCAT slave module

8.4.1 Product Overview

LX-CM020 EtherCAT slave communication module, supporting EtherCAT slave protocol, can realize real-time data exchange between two different EtherCAT master stations.

1. Basic Features
   - RJ45 interface communication extension module;
   - Support EtherCAT slave communication protocol;
   - Support third party EtherCAT master station.
2. Module components



Module component schematic

Module component description table

S/N	Component Name	Instructions
1	Module running indicator	5 channels, indicating power state (PWR), Prim Run, Sec Run, Primary side failure (Prim Err), Secondary side failure (Sec Err)
2	EtherCAT IN	RJ45 EtherCAT Entry
3	EtherCAT OUT	RJ45 EtherCAT Export
4	DIN rail right side mounting hook	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked

	handle	status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

8.4.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Diagnostic function	Support diagnostic reporting Ethernet Interface Diagnosis
Diagnostic reporting method	Support cycle data reporting
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	24mm *100mm *69mm(W*H*D)
Altitude above sea level	< 2000m

2. Power indicators

Item	Specifications
Power supply mode	Power supply via LX-bus interface
Rated voltage	LXBUS:24 VDC (19.2~28.8VDC) • The module only needs to supply power along the way, when both voltages are in position, the module will give priority to 24V terminal.
Consumption	Max 2.1W

3. Communication indicators

Item	Specifications
Primary side bus	
Number of communication interfaces	2 channels
Communication interface level	Lxbus
Protocol type	EtherCAT slave protocol
Rate(bps)	100Mbps
PDO data size	Input data: 1024 Byte Output data: 1024 Byte
Period time	Minimum 125us
Mailbox data size (aperiodic data)	256Byte
Secondary ethernet bus (X1\X2)	
Level standard	IEEE 802.3
Quantity	2 channels
Communication interface	RJ45 with indicator
Communication cable	shielded twisted-pair cable
Communication rate(bps)	100M
Allowable cable length	≤100m

Protocol	EtherCAT slave station
Protocol type	CoE、FoE
PDO data size	Input data: 1024 Byte Output data: 1024 Byte
Period time	Minimum 125us
Mailbox data size (aperiodic data)	256Byte

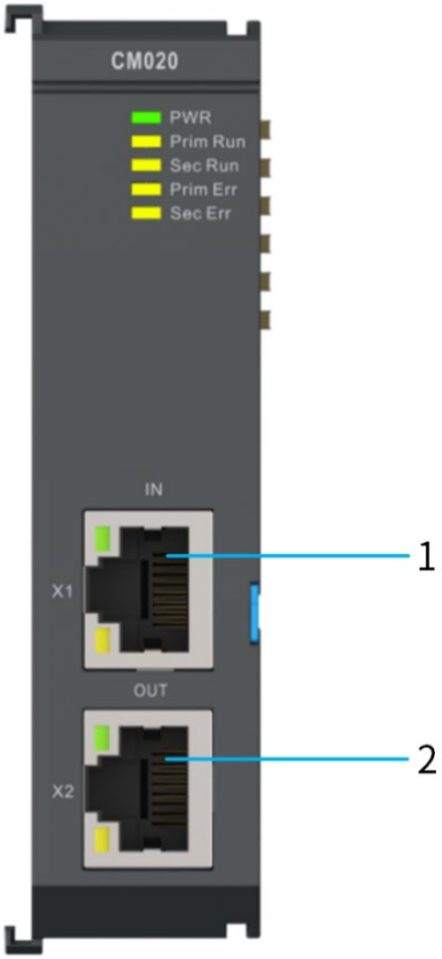
8.4.3 Status Indicators

The indicator statuses are described as follows:

Color	Name	Status Description
Yellow	PWR	Constant Bright: Module power supply is normal Off: Abnormal power supply to module
Green	Prim RUN	RUN lamp: Determined by the Primary side state machine Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
Green	Sec RUN	RUN lamp: Determined by the Secondary side state machine Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
Red	Prim ERR	ERR lamp Determined by the Primary side state machine Always on: indicating failure Off: indicating no fault
Red	Sec ERR	ERR lamp Determined by the Secondary side state machine Always on: indicating failure Off: indicating no fault
Green	IN(RJ45)	Always on: IN (RJ45) interface connection established Flashing: Data transfer on IN (RJ45) interface Off: IN (RJ45) interface bus not connected
Green	OUT(RJ45)	Always on: OUT (RJ45) connection established Flashing: data transfer on OUT (RJ45) Off: OUT (RJ45) bus not connected

8.4.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal Identification	Description of Signals	Description
1	X1	RJ45 EtherCAT IN
2	X2	RJ45 EtherCAT OUT

8.4.5 Parameter Configuration

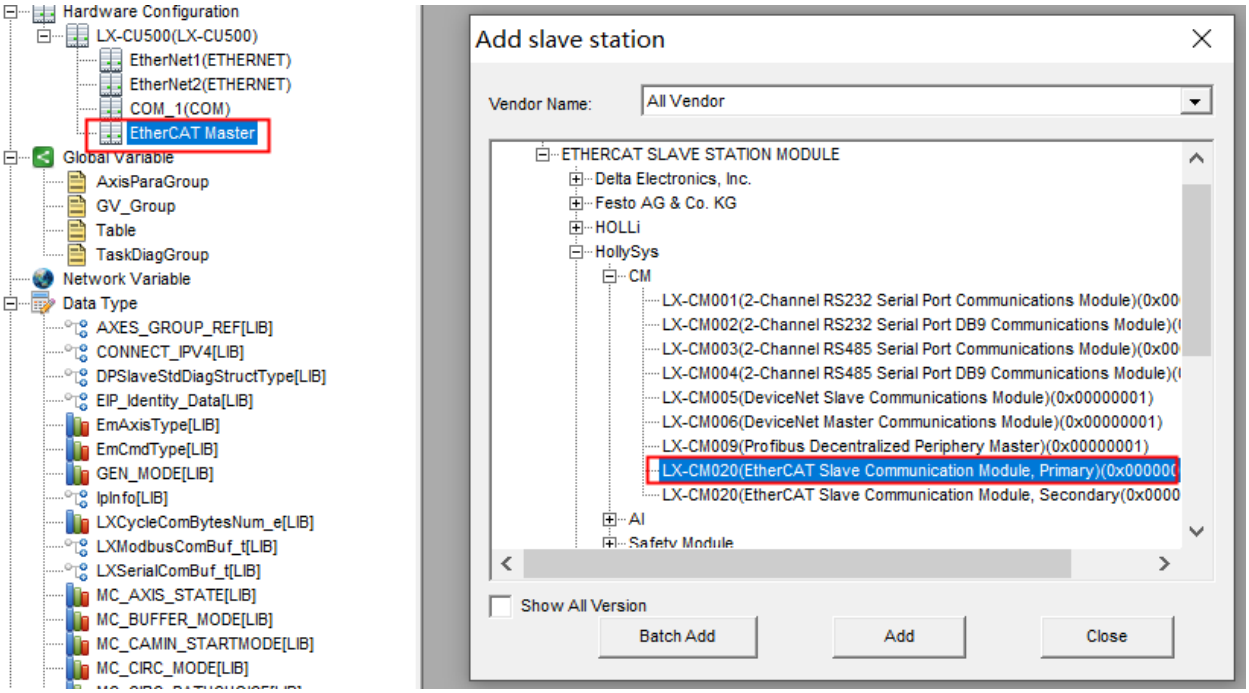
The module configuration steps are as follows:

1. Secondary addition

   Add by:

   (1) Project management tree: Right-click "Ether CAT Master" under the "Hardware Configuration" node, but click "Add Slave";

   (2) After you click Add Slave, click LX-CM020 in the HollySys column to add.



Add LX-CM020

- Note:
- For the LX system connected to LX-CM020 via a "golden finger," click on LX-CM020 with the suffix "Primary" to add it;
- For the LX system connected to LX-CM020 via an Ethernet cable, click on LX-CM020 with the suffix "Secondary" to add it.

2. Slave Station Configuration

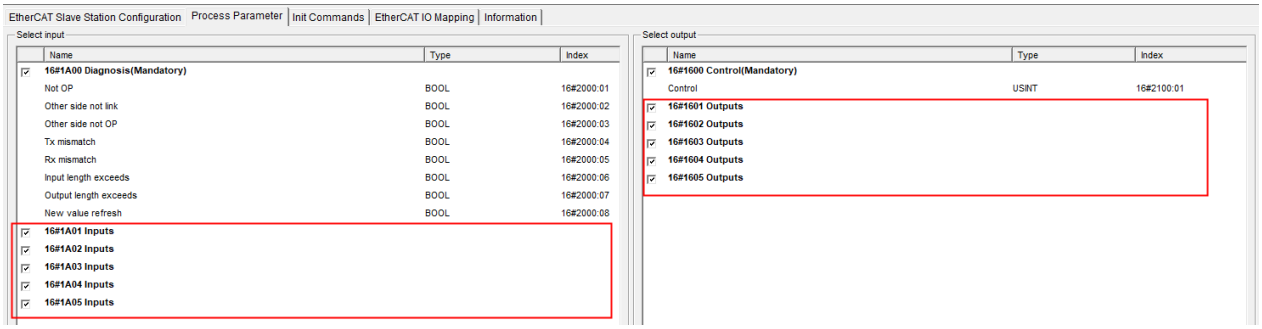
Double-click on the "EtherCAT Master" node's "LX-CM020" slave station to open the slave station's "Parameter Configuration Interface" on the right, as shown in the figure. This interface includes five tabs: "EtherCAT Slave Configuration", "Process Parameters", "Initialization Commands", "EtherCAT IO Mapping", and "Information". Relevant parameters can be set through each tab.

■ EtherCAT Slave Configuration

The default parameters are fine, no changes are needed.

■ Process Parameter

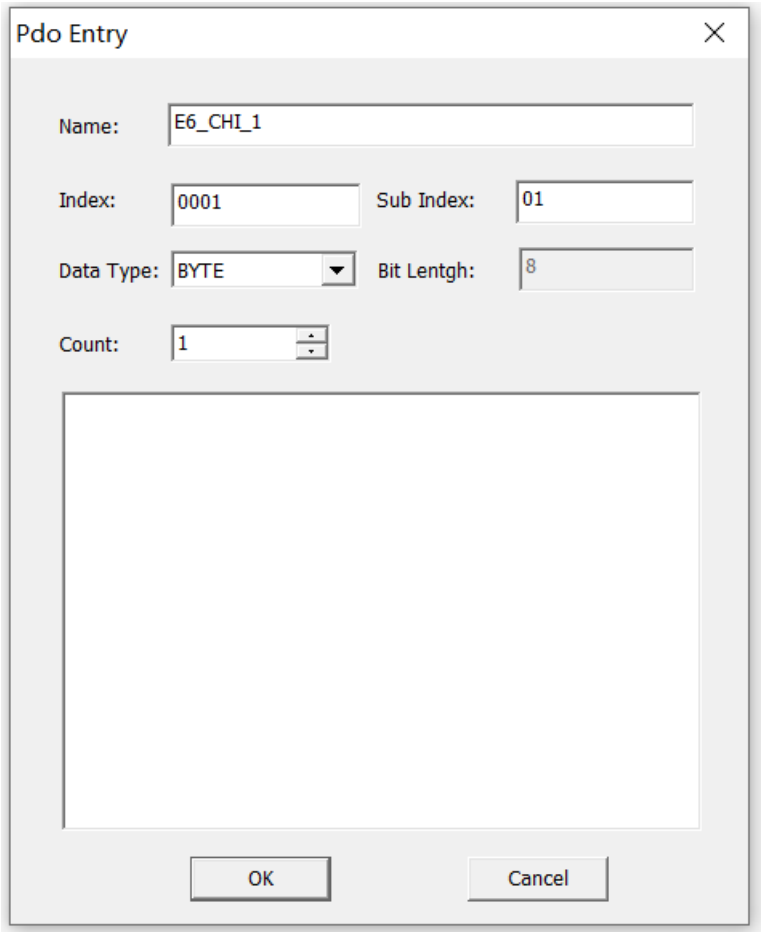
(1) When you click on process parameters, the following page will appear:



Process parameter setting

As shown in the figure, the process parameters are divided into two columns: "Select Input" and "Select Output". The part highlighted in red can be set, and the "Select Input" of one system corresponds to the "Select Output" of another system.

(2) Right-click on "16#1A01 Inputs", click on "Add", and the following page will appear:



Add the Pdo parameter

For the name, it can be set freely; generally, it is set as "Input". The "Index", "Subindex", "Data Type", and "Count" should be consistent with the Pdo parameters set in the "16#1601 Output" of the "Select Output" section of another LX system; otherwise, connection cannot be established. (The steps to set the Pdo parameters in the "Select Output" section are the same as those in the "Select Input" section, but the name of the Pdo parameters is generally set as "Output");

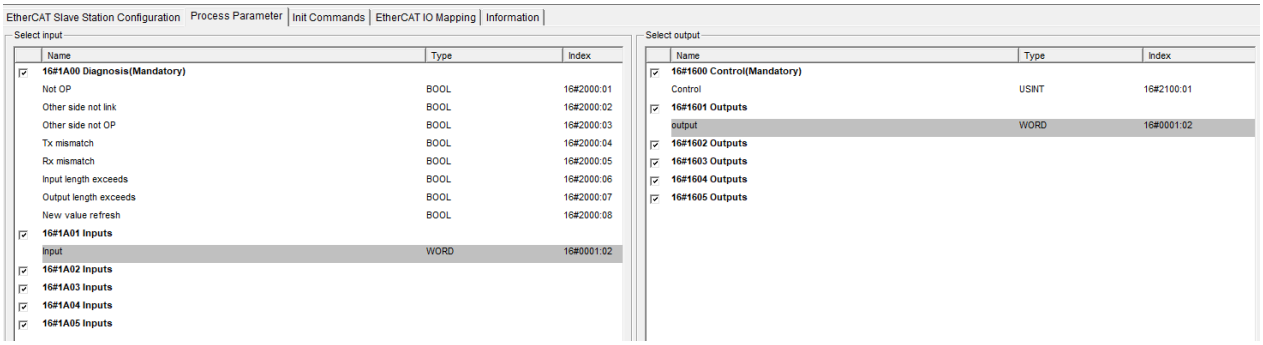
The BOOL type variable has a length of 1 bit, but in the AutoThink software, it will be padded internally to 1 byte. Therefore, when adding variables to a single PDO, if there are BOOL type variables, the total number of variables in that PDO will be less than 255 due to the internal padding variables. For example, if all variables added to a single PDO are BOOL type, the maximum number of variables that can be added is 248.

- Note: In actual use, if no more variables can be added to one PDO, you can continue adding variables to the next PDO.

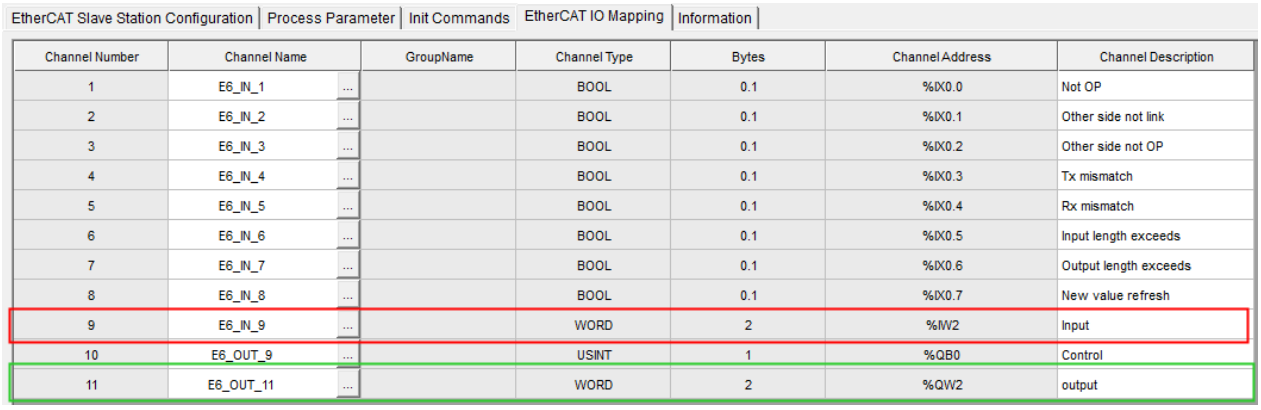
The total number of variables added across all PDOs in a single direction channel (input or output) must be less than 1024 and occupy less than 1024 bytes. For example, if PDOs 1A01 to 1A04 each add 248 BOOL type variables, then PDO 1A05 can only add 32 BOOL type variables.

Whether diagnosis information for Rx mismatch and Tx mismatch is reported depends on whether the lengths of corresponding variables on the Primary side and Secondary side match. Since BOOL type variables occupy 1 byte in the AutoThink software, if the corresponding variables are 1-byte types such as BYTE or USINT, the diagnosis information will not report an error, even though the actual variable data types do not match. Therefore, ensure strict matching of corresponding variable types on both the Primary side and Secondary side during use.

(3) After setting the "Select Input" and "Select Output", the page will look as follows:



(4) At this point, click on "EtherCAT IO Mapping," and you can find that the configured address has been displayed.



- Note: The steps for adding another system are the same, but be sure to click on the suffix

"Secondary" of LX-CM020 to add the slave station.

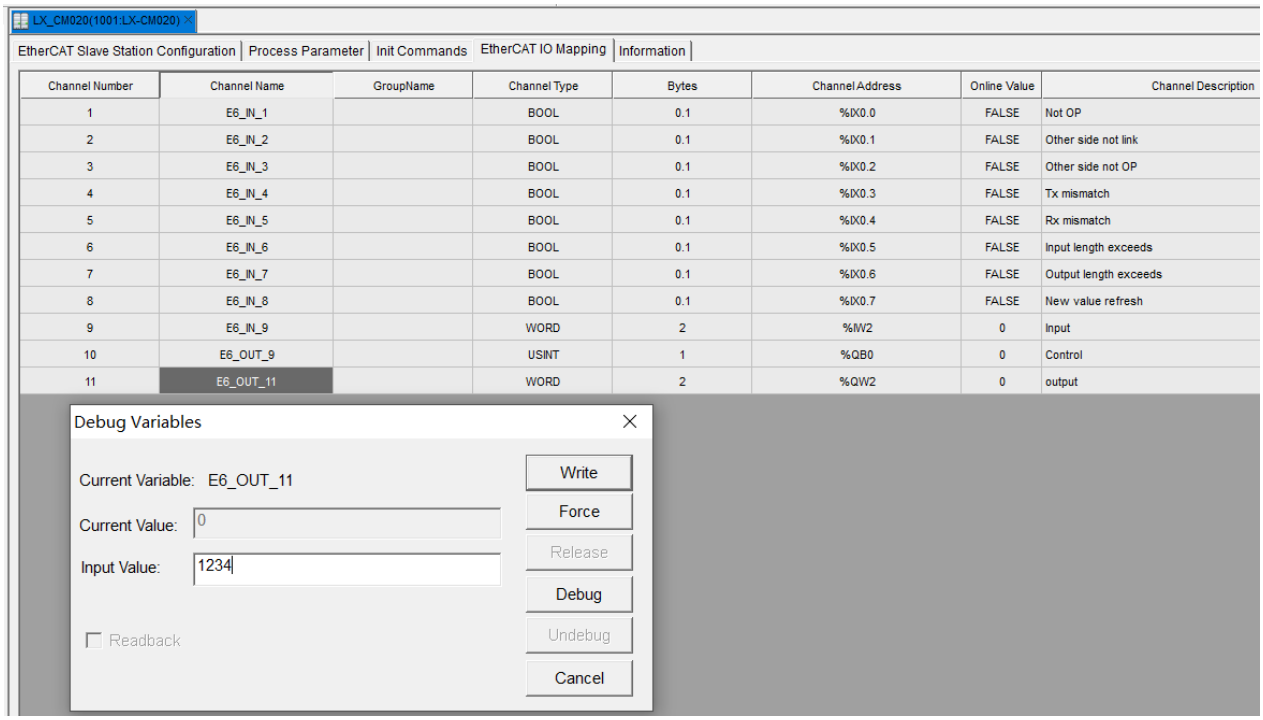
- Init commands

  Default parameters are fine, no modifications are needed.

- Module verification

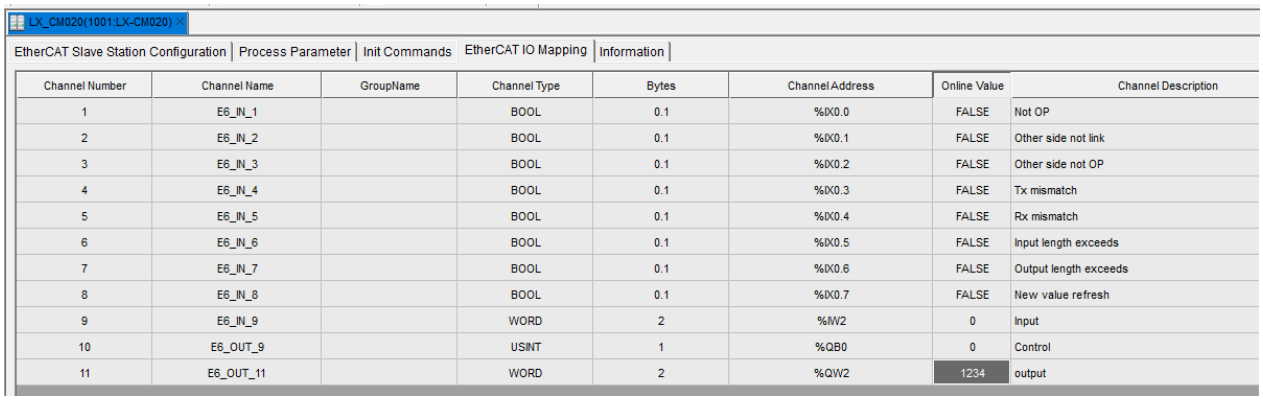
  If the slave station has been added and configured, it needs to be verified whether normal communication is established.

(1) As shown in the figure, double-clicking any channel address within the " EtherCAT IO Mapping " under "Output" in online mode will pop up the following page:



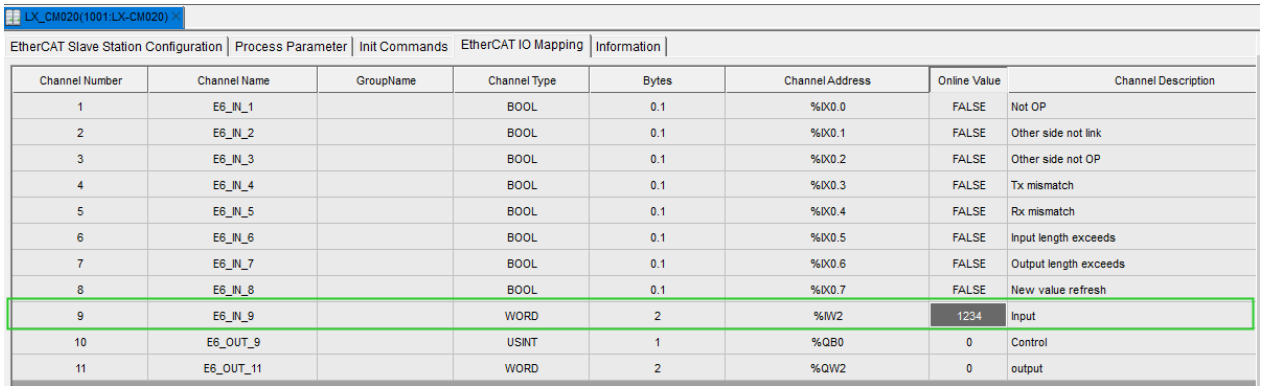
Channel Number	Channel Name	GroupName	Channel Type	Bytes	Channel Address	Online Value	Channel Description
1	E6_IN_1		BOOL	0.1	%IX0.0	FALSE	Not OP
2	E6_IN_2		BOOL	0.1	%IX0.1	FALSE	Other side not link
3	E6_IN_3		BOOL	0.1	%IX0.2	FALSE	Other side not OP
4	E6_IN_4		BOOL	0.1	%IX0.3	FALSE	Tx mismatch
5	E6_IN_5		BOOL	0.1	%IX0.4	FALSE	Rx mismatch
6	E6_IN_6		BOOL	0.1	%IX0.5	FALSE	Input length exceeds
7	E6_IN_7		BOOL	0.1	%IX0.6	FALSE	Output length exceeds
8	E6_IN_8		BOOL	0.1	%IX0.7	FALSE	New value refresh
9	E6_IN_9		WORD	2	%IW2	0	Input
10	E6_OUT_9		USINT	1	%QB0	0	Control
11	E6_OUT_11		WORD	2	%QW2	0	output

(2) Set the input variable values at this point, and after clicking "Write," it will appear as shown in the following figure:



Channel Number	Channel Name	GroupName	Channel Type	Bytes	Channel Address	Online Value	Channel Description
1	E6_IN_1		BOOL	0.1	%IX0.0	FALSE	Not OP
2	E6_IN_2		BOOL	0.1	%IX0.1	FALSE	Other side not link
3	E6_IN_3		BOOL	0.1	%IX0.2	FALSE	Other side not OP
4	E6_IN_4		BOOL	0.1	%IX0.3	FALSE	Tx mismatch
5	E6_IN_5		BOOL	0.1	%IX0.4	FALSE	Rx mismatch
6	E6_IN_6		BOOL	0.1	%IX0.5	FALSE	Input length exceeds
7	E6_IN_7		BOOL	0.1	%IX0.6	FALSE	Output length exceeds
8	E6_IN_8		BOOL	0.1	%IX0.7	FALSE	New value refresh
9	E6_IN_9		WORD	2	%IW2	0	Input
10	E6_OUT_9		USINT	1	%QB0	0	Control
11	E6_OUT_11		WORD	2	%QW2	1234	output

(3) At this point, check the "EtherCAT IO Mapping" page of another system within the other AT software to see if the data address of the "Input" channel is as shown in the following figure:



Channel Number	Channel Name	GroupName	Channel Type	Bytes	Channel Address	Online Value	Channel Description
1	E6_IN_1		BOOL	0.1	%IX0.0	FALSE	Not OP
2	E6_IN_2		BOOL	0.1	%IX0.1	FALSE	Other side not link
3	E6_IN_3		BOOL	0.1	%IX0.2	FALSE	Other side not OP
4	E6_IN_4		BOOL	0.1	%IX0.3	FALSE	Tx mismatch
5	E6_IN_5		BOOL	0.1	%IX0.4	FALSE	Rx mismatch
6	E6_IN_6		BOOL	0.1	%IX0.5	FALSE	Input length exceeds
7	E6_IN_7		BOOL	0.1	%IX0.6	FALSE	Output length exceeds
8	E6_IN_8		BOOL	0.1	%IX0.7	FALSE	New value refresh
9	E6_IN_9		WORD	2	%IW2	1234	Input
10	E6_OUT_9		USINT	1	%QB0	0	Control
11	E6_OUT_11		WORD	2	%QW2	0	output

If the received data and the output data are consistent, it indicates that the output channel of this system is normal; additionally, set the parameters using the "Output" channel address of another system, and check the "Input" channel parameters of this system. If the data is consistent, it indicates that the input and output of both systems are operating normally, and the module verification is complete.

EtherCAT IO mapping channel system parameters description

Channel parameters	Description
Not OP	This end has not been launched,
Other side not link	The other end is not connected,
Other side not OP	The other party is not online
Tx mismatch	The output from this end does not match the input from the other end
Rx mismatch	The input on this end does not match the output on the other end
Input length exceeds	Input length exceeds specifications
Output length exceeds	Output length exceeds specifications
New value refresh	New interaction data is refreshing
Control	Reserve control characters

Chapter 9 HUB Module

For the configuration of the HUB module and related parameter explanations, please refer to the EtherCAT communication section in the *LX Series Programmable Controller Communication Manual*.

9.1 Notes for Use

- When using multiple HUBs, they must be cascaded from the HUB X6 port (the sixth network port);
- The HUB does not support hot-plugging on the IN port.

9.2 LX-HUB106 6-channel EtherCAT HUB module

9.2.1 Product Overview

LX-HUB106 is the HUB module for the LX series PLC products, with 6 EtherCAT ports (1 in and 5 out), and the module can carry no more than 16 IO.

1. Basic Features
   - 1 in, 5 out EtherCAT Ethernet port expansion;
   - IO module with functions;
   - RUN indicator light, ERR indicator light, system power light, field power light, LXBUS light;
   - Field power diagnosis.
2. Module components

Schematic diagram of the LX-HUB106 module

Module component description table

S/N	Component Name	Instructions
1	Module running indicator	2 channels, indicating the module online status (RUN) and module fault status (ERR),
2	Ethernet interface	Supports 1 input and 5 output EtherCAT Ethernet port expansion
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

- Note:
- When used with the LX-CU50X series controller, the quantity should not exceed 5;
- When used with the LX-CU501 controller, under the ring network wiring method, the loopback network cable needs to be connected from port X6, and must not be connected from other ports.

9.2.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support

Module protection grade	IP20
Operating Temperature	-20℃～60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃～70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	56mm*109mm*90mm(W*H*D)

2. Power indicators

Item	Specifications
Power supply mode	24V terminal
Rated voltage	24 VDC(19.2~28.8VDC)
Power Consumption	Max 4.5W

3. Communication indicators

Item	**Specifications**
LX-bus bus interface	
Connection type	Right-sided gold finger connector (backboard interface)
Quantity	1 channel
Rate	100Mbps
Protocol supported	EtherCAT slave protocol
EtherCAT network port	
Number of communication interfaces	6 (1 in, 5 out)
Interface type	RJ45
Cable	Ethernet category 5, 5e or above shielded twisted-pair cable
Communication rate	100Mbps(default)
Isolated voltage	≥1000VAC@1min@5mA, channel-to-system

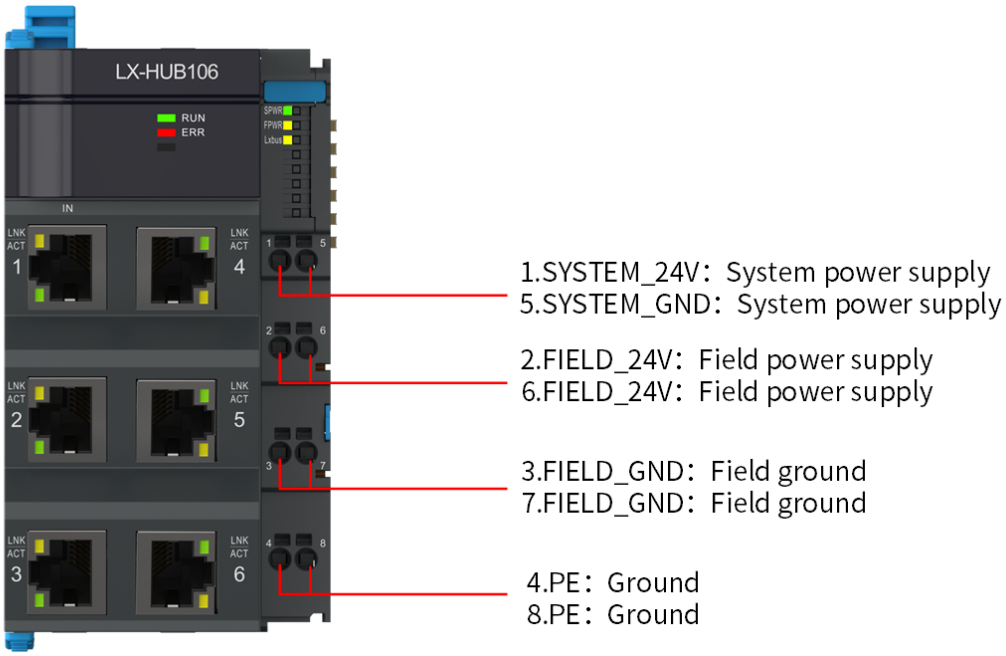
9.2.3 Status Indicators

Definition of indicator lights

Color	**Name**	**Status Description**
Green	RUN	Always on: module online Flashing: communicating
Red	ERR	Always on: module exception Always off: module normal
Yellow	SPWR	Always on: system power supply is normal Always off: system power supply is fault
Yellow	FPWR	Always on: power supply at the site is normal Always off: power supply at the site is abnormal
Green	LXBUS	Always on: XBUS connection established Flashing: XBUS data transmission in progress Always off: XBUS bus not connected,
Green	LIN\ACT 1	Always on: Solid on - Port 1 bus connection established Flashing: Data transmission on Port 1 Always off: Port 1 bus not connected
Yellow	/	Reserve

Green	LIN\ACT 2	Always on: Port 2 bus connection established Flashing: Data transmission on Port 2 Always off: Port 2 bus not connected
Yellow	/	Reserve
Green	LIN\ACT 3	Always on: Port 3 bus connection established Flashing: Data transmission on Port 3 Always off: Port 3 bus not connected
Yellow	/	Reserve
Green	LIN\ACT 4	Always on: Port 4 bus connection established Flashing: Data transmission on Port 4 Always off: Port 4 bus not connected
Yellow	/	Reserve
Green	LIN\ACT 5	Always on: Port 5 bus connection established Flashing: Data transmission on Port 5 Always off: Port 5 bus not connected
Yellow	/	Reserve
Green	LIN\ACT 6	Always on: Port 6 bus connection established Flashing: Data transmission on Port 6 Always off: Port 6 bus not connected
Yellow	/	Reserve

9.2.4 Description of Wiring Terminal



Schematic diagram of LX-HUB106 terminal component

Terminal definition explanation module terminal definition

Pin No.	Symbol	Meaning	Pin No.	Symbol	Meaning
1	SYSTEM_24V	System power supply	5	SYSTEM_GND	System power supply

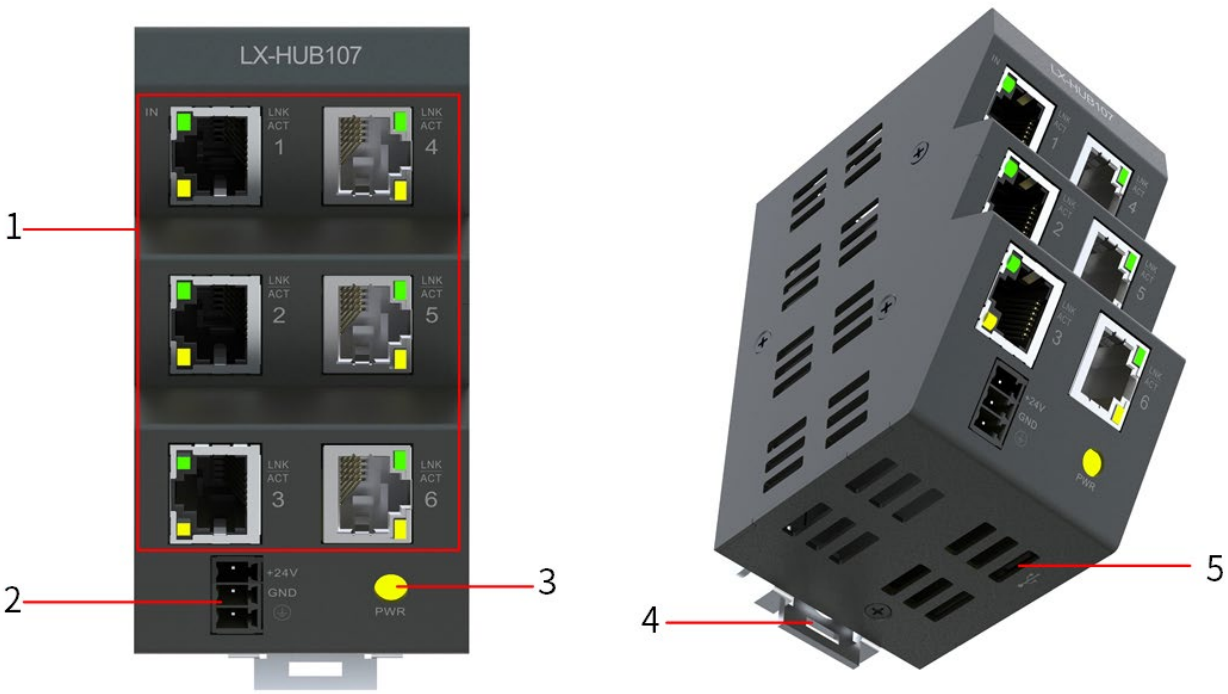
2	FIELD_24V	Field power supply	6	FIELD_24V	Field power supply
3	FIELD_GND	Field ground	7	FIELD_GND	Field ground
4	PE	Ground	8	PE	Ground

9.3 LX-HUB107 6-channel EtherCAT HUB module

9.3.1 Product Overview

LX-HUB107 is the HUB module of the LX series PLC products, with 6 EtherCAT ports (1 in and 5 out), supporting hot connection. More EtherCAT slave devices can be connected through this module.

1. Basic Features
   - 1 in 5 out EtherCAT Ethernet port expansion;
   - PWR indicator light, port LIN/ACT light.
2. Module components



Schematic diagram of the LX-HUB107 module

Module component description table

S/N	Component Name	Instructions
1	Ethernet interface	1 RJ45 input, 5 RJ45 outputs It is recommended to use the default values for the network port parameters of each module without making any changes.
2	Power supply interface	DC power positive (+24V), DC power ground (GND), earth ground, DC

3	Module running indicator	Power status indicator light
4	DIN rail mounting hook handle	The installation method meets the requirements for vertical, horizontal, and lateral installation.
5	USB port	Serial port debugging interface, configuration commands or query commands in the custom protocol can be used to set or query the delay parameters of the module's five ports respectively

9.3.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	56mm*109mm*90mm(W*H*D)

2. Power indicators

Item	Specifications
Power supply mode	24V terminal
Rated voltage	24 VDC(19.2~28.8VDC)
Power Consumption	Max 2W

3. Communication indicators

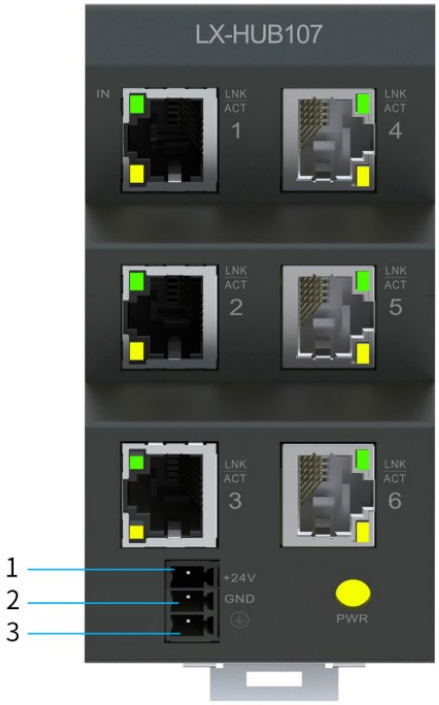
Item	Specifications
EtherCAT network port	
Number of communication interfaces	6 (1 in, 5 out)
Interface type	RJ45
Cable	Ethernet category 5, 5e or above shielded twisted-pair cable
Communication rate	100Mbps(default)
Isolated voltage	≥1000VAC@1min@5mA, channel-to-system

9.3.3 Status Indicators

Definition of indicator lights

Color	Name	Status Description
Yellow	PWR	Light off: Power OFF Light on: Power ON
Green	LNK/ACT	Light off: no connection, or connection not established Light on: connection established, no data communication Flashing: connection established, data communication in progress

9.3.4 Description of Wiring Terminal



Schematic diagram of LX-HUB107 terminal component

Terminal definition explanation module terminal definition

Pin No.	Symbol	Meaning
1	+24V	DC power positive pole
2	GND	DC power ground
3	PGND	Ground

Chapter 10 Coupler Module

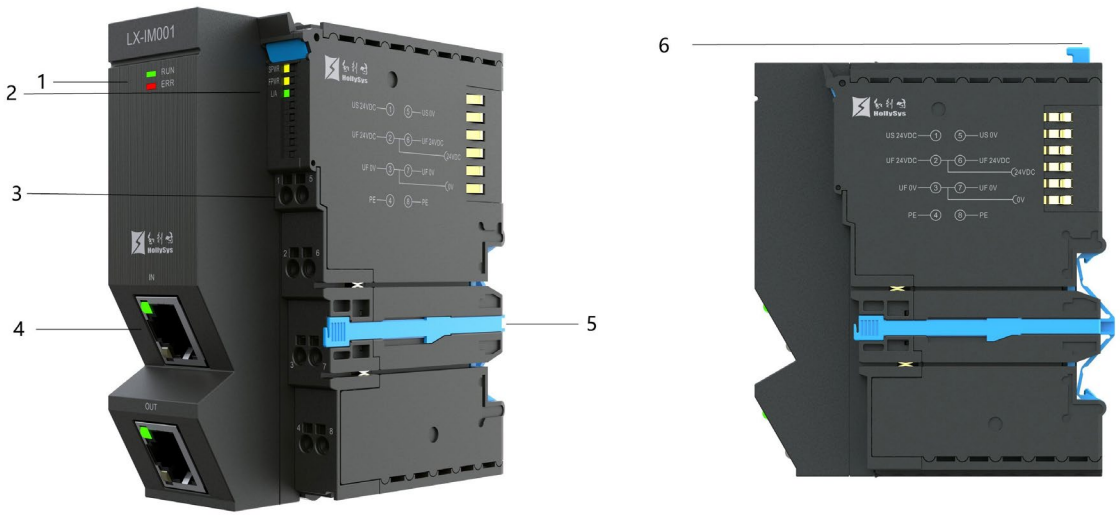
For the configuration of the coupler module and related parameter explanations, please refer to the EtherCAT communication section in the *LX Series Programmable Controller Communication Manual*.

10.1 LX-IM001 EtherCAT Coupler Module

10.1.1 Product Overview

LX-CM001 is the Modbus RTU serial port module for the LX series PLC products, used for communication with instruments or sensors in the field.

1. Basic Features
   - The minimum system composed of MPU provides data processing, channel control, and other functions;
   - Two PHYs provide data transmission channels for EtherCAT slave stations;
   - Two isolated RS-232 channels support Modbus RTU/free port/ASCII protocol;
   - Basic human-machine interaction is achieved through indicator lights, switches, etc.
2. Module components

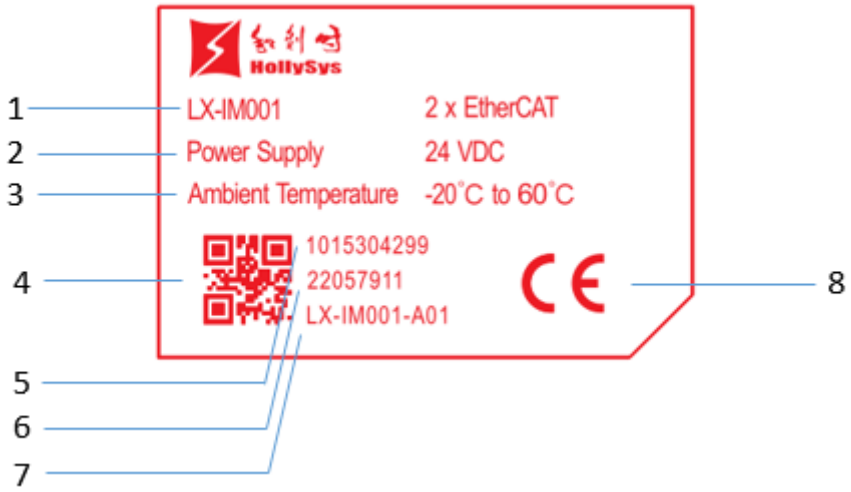


Schematic diagram of the LX-IM001 module

Module component description table

S/N	Component Name	Instructions
1	Left panel indicator	Indicate the module running status, including running indicator (RUN) and fault indicator (ERR).
2	Right panel indicator	Include system power status indicator, field power indicator and backboard bus operating status indicator.
3	Power wiring terminal	Connect the system power to the field power.
4	Ethernet interface	Support 2 Ethernet interfaces (with network port status indicator), with one in and one out, and support EtherCAT protocol.
5	DIN-rail rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.
6	DIN rail left side mounting hook top	Used to control the left hook of the module DIN mounting rail. Pull up the top of the hook to set the hook to the unlocked status. Press the top of the hook to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	LX-IM001 EtherCAT Coupler Module
2	Power voltage	24 V DC
3	Operating ambient temperature range	-20°C ~ 60°C
4	SN identification code	Scan the QR code to get the SN plain code
5	SN plain code	
6	Order number	
7	Version number	
8	Certification standard	

10.1.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	40mm*107mm*84mm(W*H*D)

2. Power indicators

Item	Specifications
Power supply mode	Power supply via LX-bus interface
Rated voltage	24 V DC
Power consumption	Max 1.5W

3. Communication indicators

Item	Specifications
LX-bus bus interface	
LX-bus interface connection type	Double-sided gold finger connector (backboard interface)
Quantity	1 channel
Rate	100Mbps
Protocol supported	EtherCAT slave protocol
Control the network bus	
Interface type	Ethernet RJ45
Number of communication interfaces	2 channels
Communication cable	Category 5 or higher twisted pair cable (foil + braided shielded direct connect cable)
Communication rate	100Mbps
Allowed cable length	≤100m
Protocol type	EtherCAT Slave Protocol
EtherCAT ring network functionality	Support
Isolated voltage	1Channel pair system,≥1000VAC@1min@5mA

10.1.3 Status Indicators

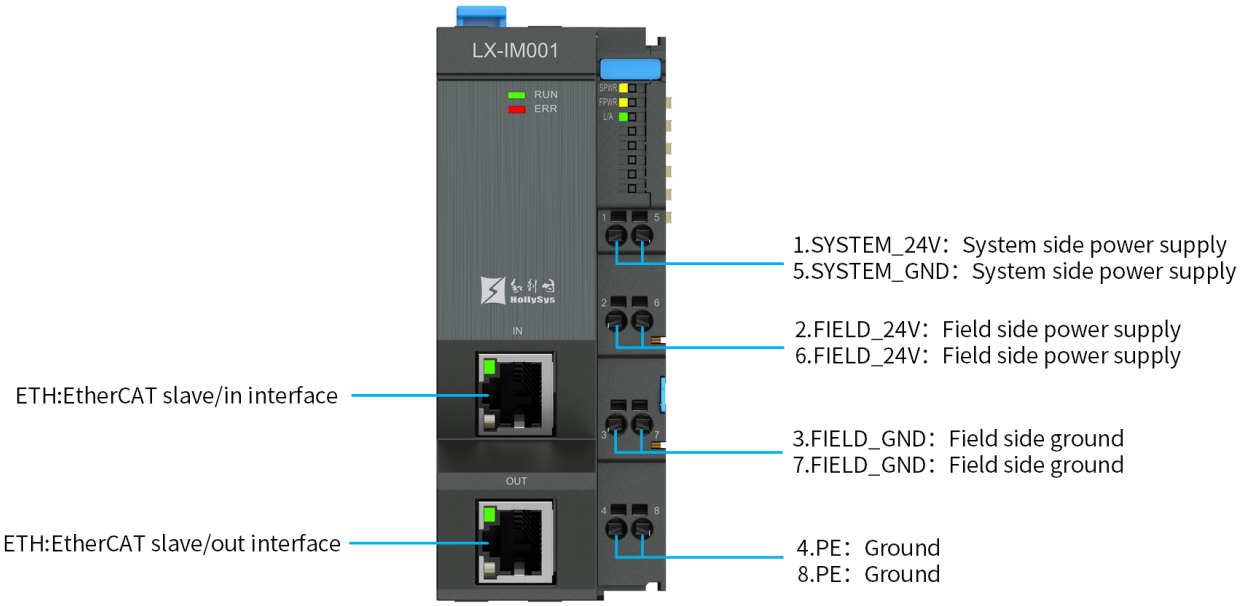
Definition of indicator lights

Position	Name		Color	Status Description
Left panel indicator	RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)

	ERR	Module fault indicator	Red	On: The field power supply is faulty Off: The field power supply is normal
Right panel indicator	SPWR	System power status indicator	Yellow	On: The system power supply is normal Off: It indicates a power fault
	FPWR	Field power indicator	Yellow	On: The field power supply is normal Off: The field power supply is faulty
	L/A	Backboard bus operating status indicator	Green	On: The communication connection is normal Flashing: There is data interaction Off: The communication connection is disconnected
Network port indicator	IN (RJ45)	Input network port status indicator	Green	On: The communication connection is normal Flashing: There is data interaction Off: The communication connection is disconnected
	OU (RJ45)	Output network port status indicator	Green	On: The communication connection is normal Flashing: There is data interaction Off: The communication connection is disconnected

10.1.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



Terminal definition explanation module terminal definition

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	SYSTEM_24V	System side power supply	5	SYSTEM_GND	System side power supply
2	FIELD_24V	Field side power supply	6	FIELD_24V	Field side power supply
3	FIELD_GND	Field side ground	7	FIELD_GND	Field side ground
4	PE	Ground	8	PE	Ground

10.1.5 Parameter specification

EtherCAT IO mapping channel system parameters description

Type	Parameters	Fault Name	Diagnostic Information
Device diagnosis	Field Power Status	Module field power failure detection fault	The module detects the following situations through the power monitoring circuit: When the field power supply fails or is not connected, the **ERR** light of the module is always on, and the periodic data field diagnosis position is 1; When the field power supply is restored or connected, the **ERR** light of the module is always off, and the periodic data field power diagnosis position is 0.

10.2 LX-IM002 EtherCAT End Coupler Module

10.2.1 Product Overview

LX-IM002 is the EtherCAT bus end coupler module of the LX series PLC products.

1. Basic Features

   The LX-IM002 module completes the extraction function of the EtherCAT bus.

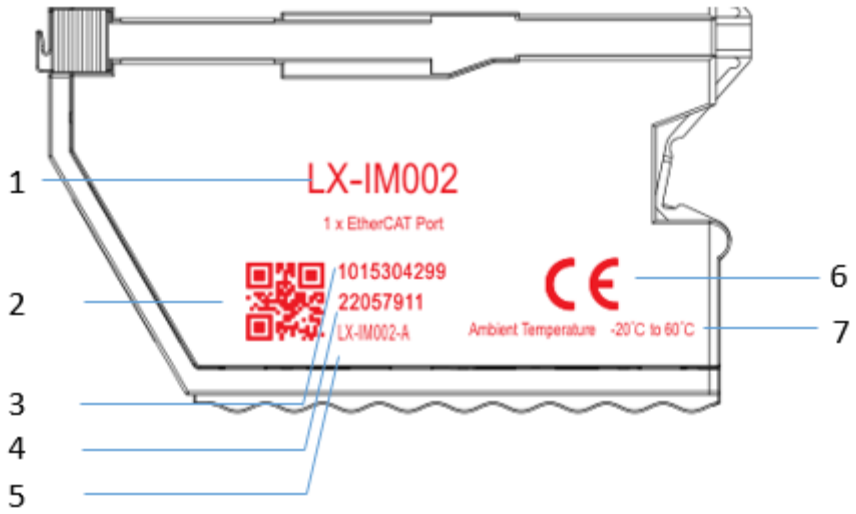
2. Module components

Schematic diagram of the LX-IM001 module

Module component description table

S/N	Component Name	Instructions
1	Ethernet interface	Support 1 Ethernet interface, with output only, and support EtherCAT protocol
2	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	EtherCAT end coupler module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

10.2.2 Technical Indicators

1. General indicators

Item	Specifications
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	40mm*107mm*84mm(W*H*D)

2. Power indicators

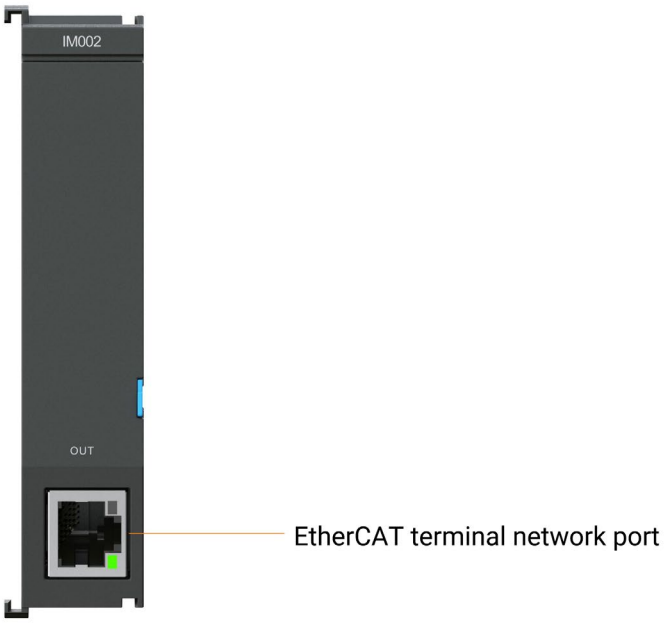
Item	Specifications
Power supply mode	Gold finger connection for power supply
Rated voltage	24 V DC (19.2 V~28.8 V)
Module power consumption	Max 1W

3. Communication indicators

Item	Specifications
Field bus	
Number of communication ports	1 Channel
Bus topology	Daisy chain
Communication interface	Back panel interface
Quarantine requirements	Not involved
Rate	100Mbps
Ethernet field bus	
Standard	IEEE 802.3
Interface Type	RJ45
Communication cable	Category 5 or higher twisted pair cable (foil + braided shielded direct connect cable)
Communication rate	100Mbps
Allowed cable length	≤100m

10.2.3 Description of Terminal Components

The terminal signal schematic diagram is as follows:



Chapter 11 IO Module

For the configuration of the IO module and related parameter explanations, please refer to the EtherCAT communication section in the *LX Series Programmable Controller Communication Manual*.

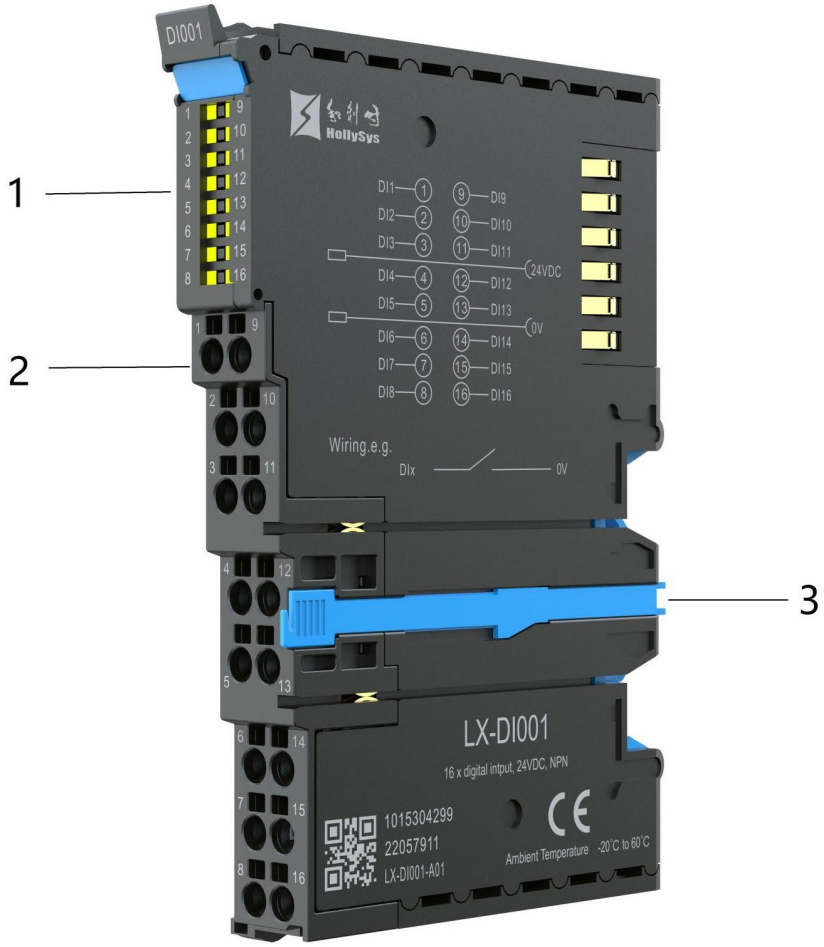
11.1 DI Module

11.1.1 LX-DI001 16-Channel NPN Type 24 V DC Digital Input Module

11.1.1.1 Product Overview

LX-DI001 is a LX series 16-channel Sink 24 V DC digital input module that supports channel filtering and configurable filtering parameters. The digital signals and diagnostic signals collected by the module are uploaded to the main control module through the EtherCAT bus.

1. Basic Features
   - The minimum system composed of MPU provides data processing, channel control, and other functions;
   - 2-channel Lxbus slave station data transfer path;
   - 16-channel isolated 24VDC digital input channels;
   - 16-channel indicator lights.
2. Module components

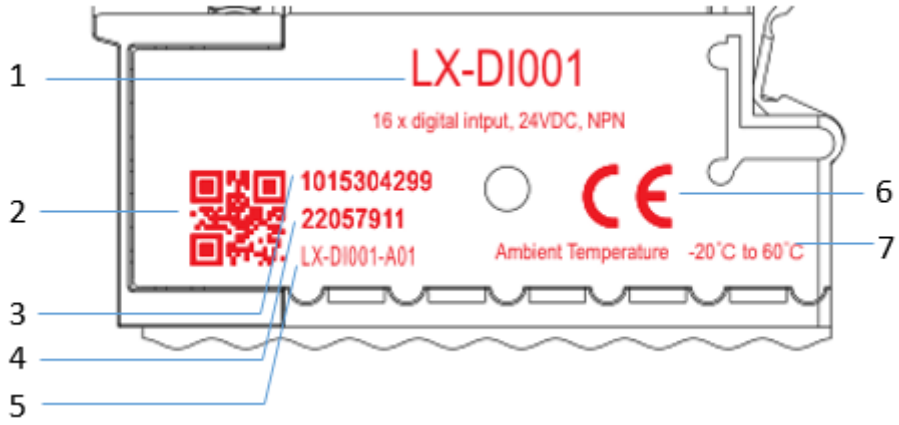


Schematic diagram of the LX-DI001 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	1~16, indicating the channel working status
2	Wiring Terminal	Connect 16 digital input signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	16-channel source type 24 V DC digital input module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.1.1.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
Rated voltage	24 V DC
System side Power Consumption	Max 1.8W

3. Channel indicators

Item	Specifications
Number of channels	16
Input channel type	Source type

Logic 1 signal (minimum)	5 V DC at 1 mA
Logic 0 signal (minimum)	11 V DC at 3 mA
Response time	Logic 0 to logic 1: 0.5 ms; logic 1 to logic 0: 0.5 ms
Channel filtering parameters	No filtering, 0.2 ms, 0.5 ms, 1 ms (default), 5 ms, 10 ms, 50 ms, 100 ms, 500 ms
Channel cable	Unshielded cable or shielded cable
Channel isolation	Not support
Isolated voltage	Channel to system: 1000 VAC, continuous for 1 minute, leakage current < 5mA

4. Communication indicators

Item	Specifications
LX-bus interface connection type	Double-sided gold finger connector (backboard interface)
LX-bus interface quantity	1 channel
LX-bus interface rate	100Mbps
LX-bus interface protocol supported	EtherCAT slave protocol

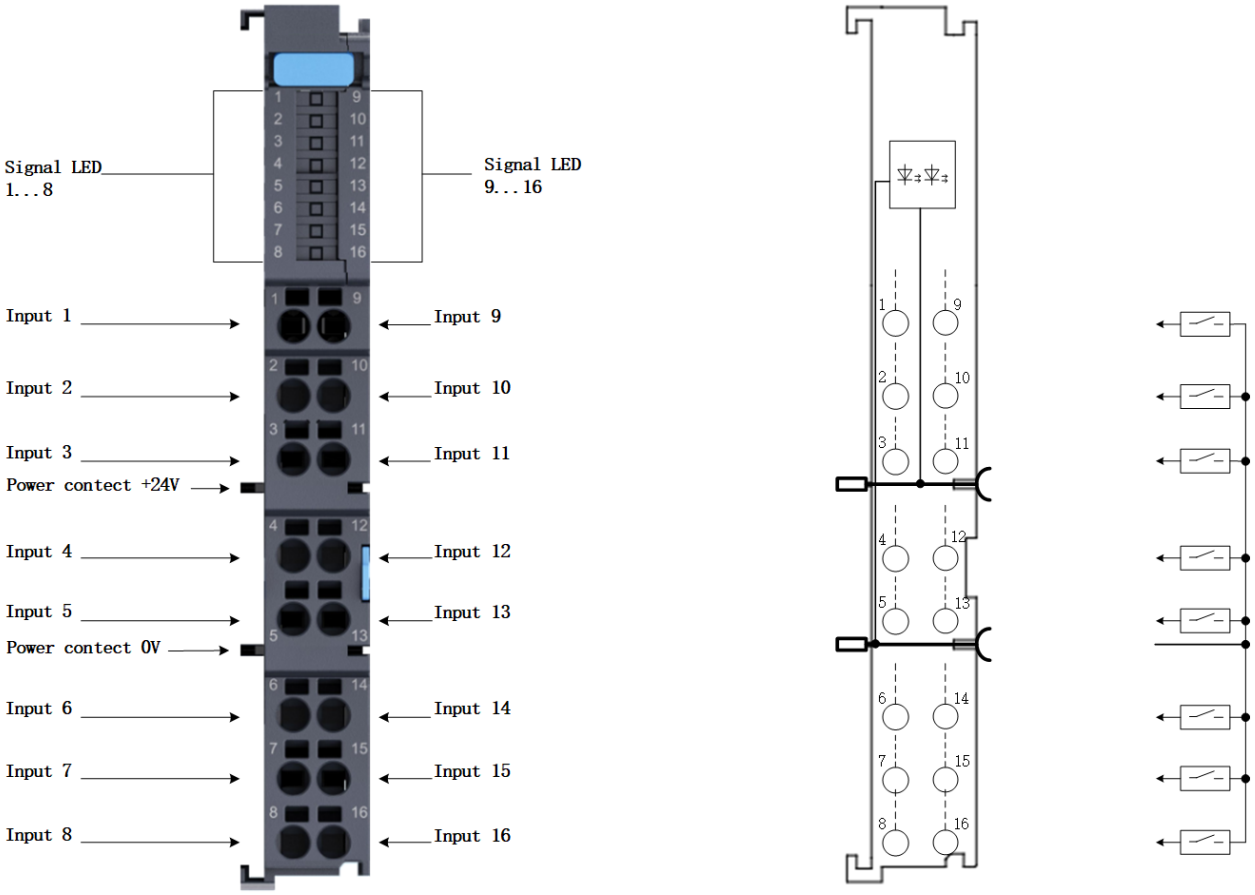
11.1.1.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
CH1~CH16	Channel status indicator	Yellow	Channel status indication: On: channel input enabled, set to 1 Off: channel input disabled, set to 0

11.1.1.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	DI0	Digital input 1	9	DI10	Digital input 9
2	DI1	Digital input 2	10	DI11	Digital input 10
3	DI2	Digital input 3	11	DI12	Digital input 11
4	DI3	Digital input 4	12	DI13	Digital input 12
5	DI4	Digital input 5	13	DI14	Digital input 13
6	DI5	Digital input 6	14	DI15	Digital input 14
7	DI6	Digital input 7	15	DI16	Digital input 15
8	DI7	Digital input 8	16	DI17	Digital input 16

11.1.1.5 Parameter specification

Parameter description for DeviceNet slave

Channel Parameter Name	Parameter Meaning	Parameter Value	Default values
Channel Filter	Channel filtering time	No filtering, 0.2 ms, 0.5 ms, 1 ms (default), 5 ms, 10 ms, 50 ms, 100 ms, 500 ms	1 ms

11.1.1.6 Diagnostic Alarm

The diagnostic information of the 16-channel Sink 24 V DC digital input module includes module diagnosis, which encompasses software/hardware version numbers that can be acquired through reading SDO data.

Module diagnostic instructions

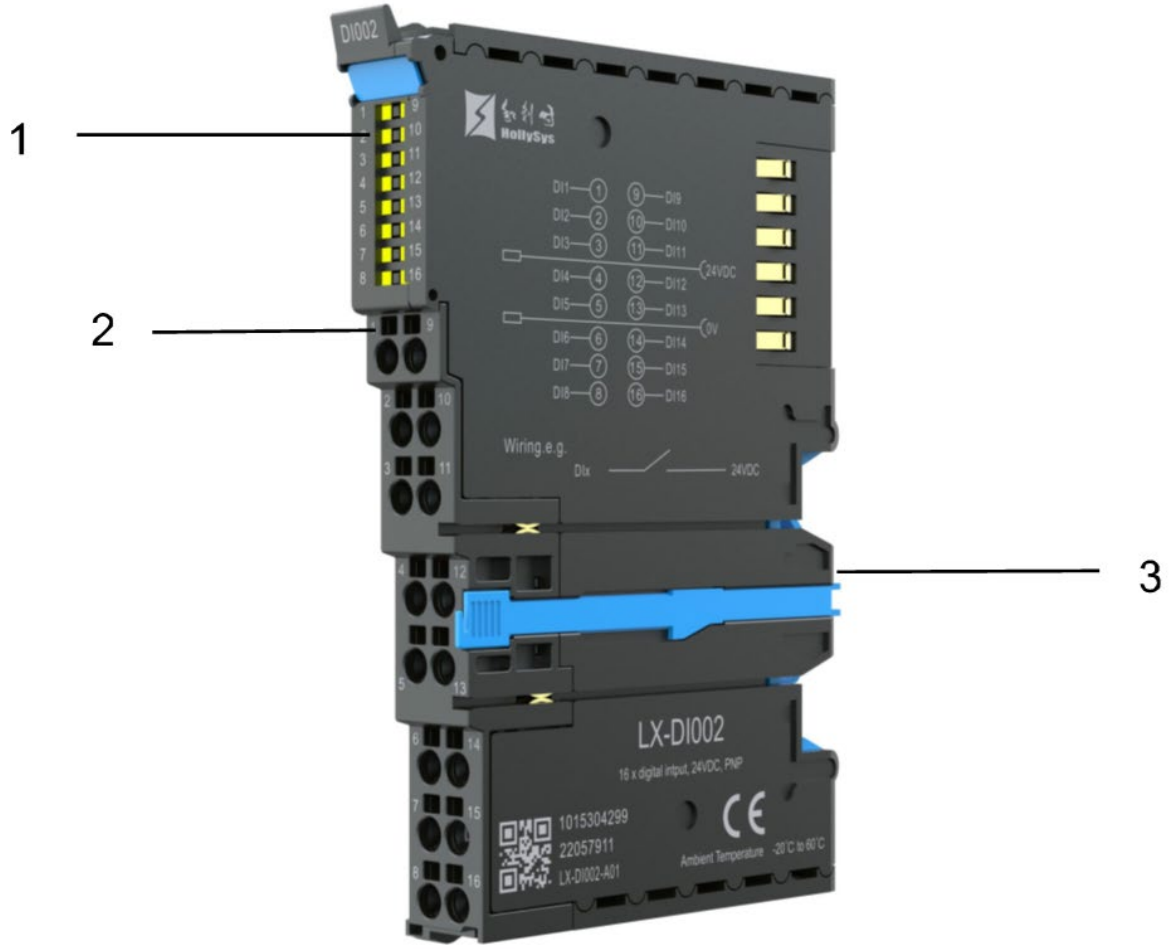
S/N	Module Diagnosis	Object Dictionary	Instructions
1	Device name	0x1008	Read through the parameter commissioning interface.
2	Hardware version number	0x1009	Read through the parameter commissioning interface.
3	Software version number	0x100A	Read through the parameter commissioning interface.

11.1.2 LX-DI002 16-channel PNP Type 24 V DC Digital Input Module

11.1.2.1 Product Overview

LX-DI002 is an LX series 16-channel source type 24 V DC digital input module that is used for field 24 V DC digital input collection. It supports channel filtering and configurable filtering parameters. The digital signals and diagnostic signals collected by the module are uploaded to the main control module through the ECat bus.

1. Basic Features
   - MPU minimal system, providing data processing, channel control, and other functions;
   - Lxbus bus;
   - 16 channels of isolated 24VDC digital input channels;
   - 16 channel indicator lights.
2. Module components

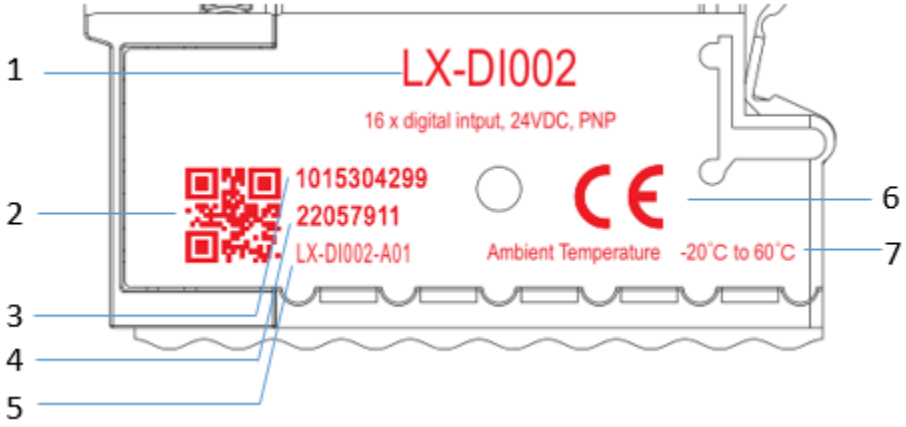


Schematic diagram of the LX-DI002 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	1~16, indicating the channel working status
2	Wiring Terminal	Connect 16 digital input signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	16-channel sink type 24 V DC digital input module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.1.2.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
Rated voltage	24 V DC(19.2~28.8VDC)
Power Consumption	Max 1.8W(measured at 24V DC)

3. Channel indicators

Item	Specifications

Number of channels	16
Input channel type	Sink type
Input voltage level	24V DC±20%（19.2V DC ~ 28.8V DC）
Input current	1.26mA(measured at 24V DC)
Logic 1 signal	≥19.2V DC
Logic 0 signal	≤5V DC
Response time	Logic 0 to logic 1: 0.5 ms Logic 1 to logic 0: 0.5 ms
Channel filtering parameters	No filtering, 0.2 ms, 0.5 ms, 1 ms (default), 5 ms, 10 ms, 50 ms, 100 ms, 500 ms
Channel cable	Unshielded cable or shielded cable
Channel isolation	Not support
Isolated voltage	Channel to system: 1000 VAC, continuous for 1 minute, leakage current < 5mA

4. Communication indicators

Item	Specifications
LX-bus interface connection type	Double-sided gold finger connector (backboard interface)
LX-bus interface quantity	1 channel
LX-bus interface rate	100Mbps
LX-bus interface protocol supported	EtherCAT slave protocol

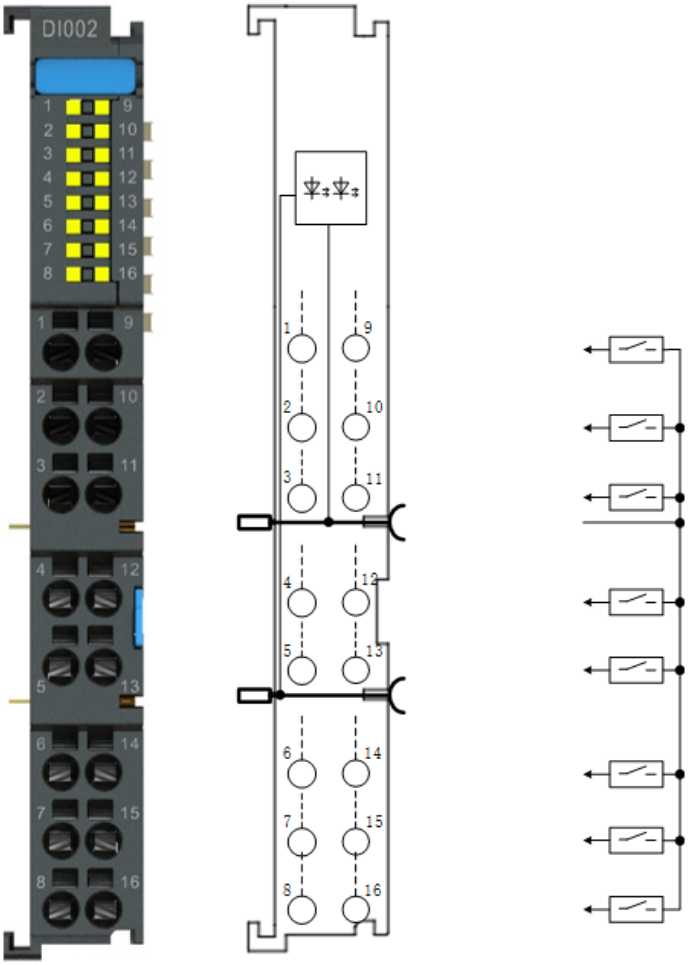
11.1.2.3 Status Indicators

LX-DI002 Indicator light status description table

Name		Color	Status Description
CH1~CH16	Channel status indicator	Yellow	Channel status indication: On: channel input enabled, set to 1 Off: channel input disabled, set to 0

11.1.2.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	DI0	Digital input 1	9	DI10	Digital input 9
2	DI1	Digital input 2	10	DI11	Digital input 10
3	DI2	Digital input 3	11	DI12	Digital input 11
4	DI3	Digital input 4	12	DI13	Digital input 12
5	DI4	Digital input 5	13	DI14	Digital input 13
6	DI5	Digital input 6	14	DI15	Digital input 14
7	DI6	Digital input 7	15	DI16	Digital input 15
8	DI7	Digital input 8	16	DI17	Digital input 16

11.1.2.5 Parameter specification

Parameter description for DeviceNet slave

Channel Parameter Name	Parameter Meaning	Parameter Value	Default values
Channel Filter	Channel filtering time	No filtering, 0.2 ms, 0.5 ms, 1 ms (default), 5 ms, 10 ms, 50 ms, 100 ms, 500 ms	1 ms

11.1.2.6 Diagnostic Alarm

The diagnostic information of the 16-channel source type 24 V DC digital input module includes module diagnosis. The module diagnosis includes software/hardware version numbers, which can be obtained by reading SDO data.

Module diagnostic description table

S/N	Module Diagnosis	Object Dictionary	Instructions
1	Device name	0x1008	Read through the parameter commissioning interface.
2	Hardware version number	0x1009	Read through the parameter commissioning interface.
3	Software version number	0x100A	Read through the parameter commissioning interface.

11.1.3 LX-DI005 8-Channel 5 V DC Digital Input Module

11.1.3.1 Product Overview

LX-DI005 is the DI module of LX series PLC products that is used for field 5 V DC digital input collection. It supports channel filtering and configurable filtering parameters.The collected digital signals and diagnostic signals are transmitted to the main control module through the ECat bus

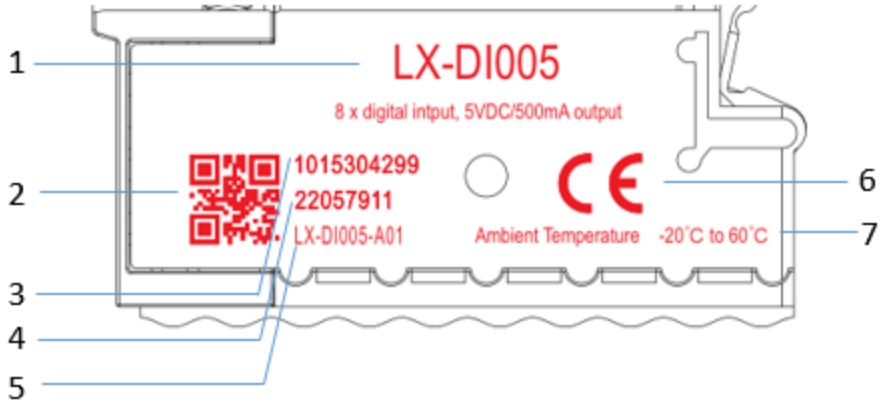
1. Basic Features
   - The minimum system composed of MPU provides data processing, channel control, and other functions;
   - 2-channel Lxbus slave station data transfer path;
   - 8-channel 5VDC digital signal acquisition channels;
   - 8-channel indicator lights, 1 operational indicator light.
2. Module components

Schematic diagram of the LX-DI005 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	Channels 1~8, indicating the channel working status
2	Wiring Terminal	Connect 8 digital input signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	8-channel 5 V DC digital input module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.1.3.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply	
Supply mode	Power supply via LX-bus interface
Rated voltage	24 VDC（19.2~28.8VDC）
Power Consumption	Max 1.8W
On-site power output	
Output Voltage	5V（4.5~5.5V）
Maximum load current	0.5A

3. Channel indicators

Item	Specifications
Number of channels	8
Input channel type	Sink type
Input voltage level	24V DC±20% （19.2V DC ~ 28.8V DC）
Logic 1 signal	≥19.2V DC
Logic 0 signal	≤5V DC
Response time	Logic 0 to logic 1: 0.5 ms Logic 1 to logic 0: 0.5 ms
Channel filtering parameters	No filtering, 0.2 ms, 0.5 ms, 1 ms (default), 5 ms, 10 ms, 50 ms, 100 ms, 500 ms
Channel cable	Unshielded cable or shielded cable
Channel isolation	Not support
Isolated voltage	Channel to system: 1000 VAC, continuous for 1 minute, leakage current < 5mA

4. Communication indicators

Item	Specifications
LX-bus interface connection type	Double-sided gold finger connector (backboard interface)
LX-bus interface quantity	1 channel
LX-bus interface rate	100Mbps
LX-bus interface protocol supported	EtherCAT slave protocol

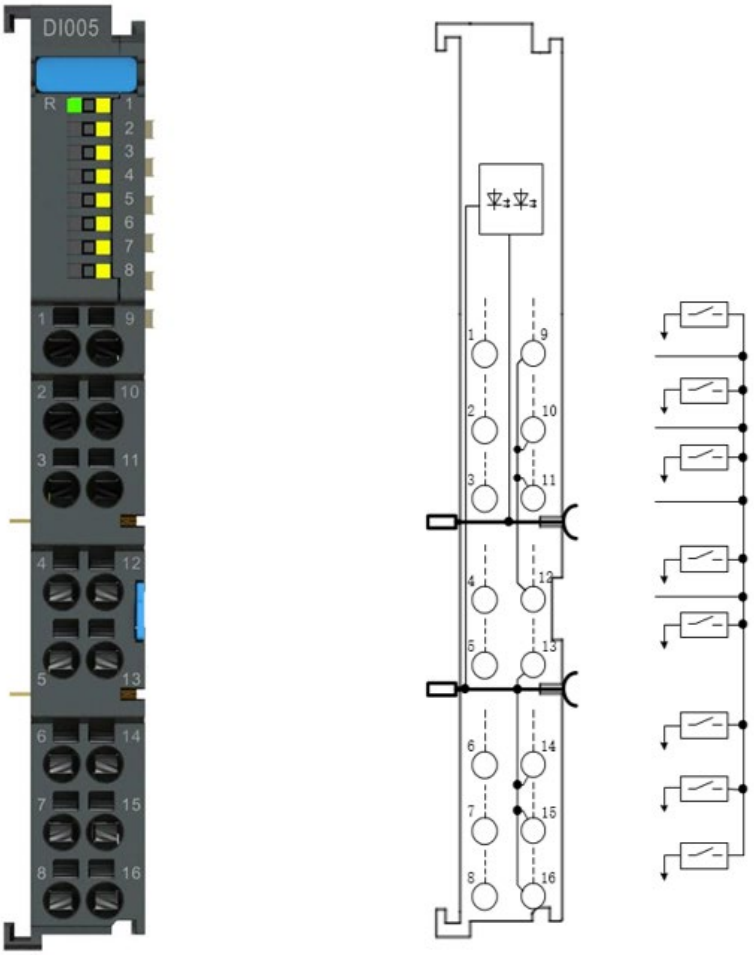
11.1.3.3 Status Indicators

LX-DI005 Indicator light status description table

Name		Color	Status Description
CH1~CH8	Channel status indicator	Yellow	Channel status indication: On: channel input enabled, set to 1 Off: channel input disabled, set to 0
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state （Init） , module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)

11.1.3.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	DI0	Digital input 1	9	+5V	Output +5 V
2	DI1	Digital input 2	10	+5V	Output +5 V
3	DI2	Digital input 3	11	+5V	Output +5 V
4	DI3	Digital input 4	12	+5V	Output +5 V
5	DI4	Digital input 5	13	0V	Field GND
6	DI5	Digital input 6	14	0V	Field GND
7	DI6	Digital input 7	15	0V	Field GND
8	DI7	Digital input 8	16	0V	Field GND

11.1.3.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Default values
Channel Filter	Channel digital filtering	No filtering, 0.2 ms, 0.5 ms, 1 ms (default), 5 ms, 10 ms, 50 ms, 100 ms, 500 ms	1ms

11.1.3.6 Diagnostic Alarm

The diagnostic information of the LX-DI005 module includes module diagnosis. The module diagnosis includes software/hardware version number and 5 V field power diagnosis. The software/hardware version number can be obtained by reading SDO data.

The diagnostic information

Type	Parameters	Fault Name	Diagnostic Information
Device diagnosis	5 V field power diagnosis	Module field power failure detection fault	The module performs power failure diagnosis by reading the status of a pin of the hardware. If any fault, the fault status is reported to the controller module in the form of periodic data. The 5 V field power supply ranges from 4.5 to 5.5 V DC. If the power supply is greater than 4 V, it can be judged to be normal, and the online value of the diagnostic channel corresponding to AT is 0. If it is lower than 4 V, it can be judged to be a power failure, and the online value corresponding to AT is 1.

The description of module diagnos

S/N	Type	Object Dictionary	Instructions
1	Device name	0x1008	Read through the parameter commissioning interface.
2	Hardware version number	0x1009	Read through the parameter commissioning interface.
3	Software version number	0x100A	Read through the parameter commissioning interface.

11.2 DO Module

11.2.1 LX-DO004 4-channel Relay Type Digital Output Module

11.2.1.1 Product Overview

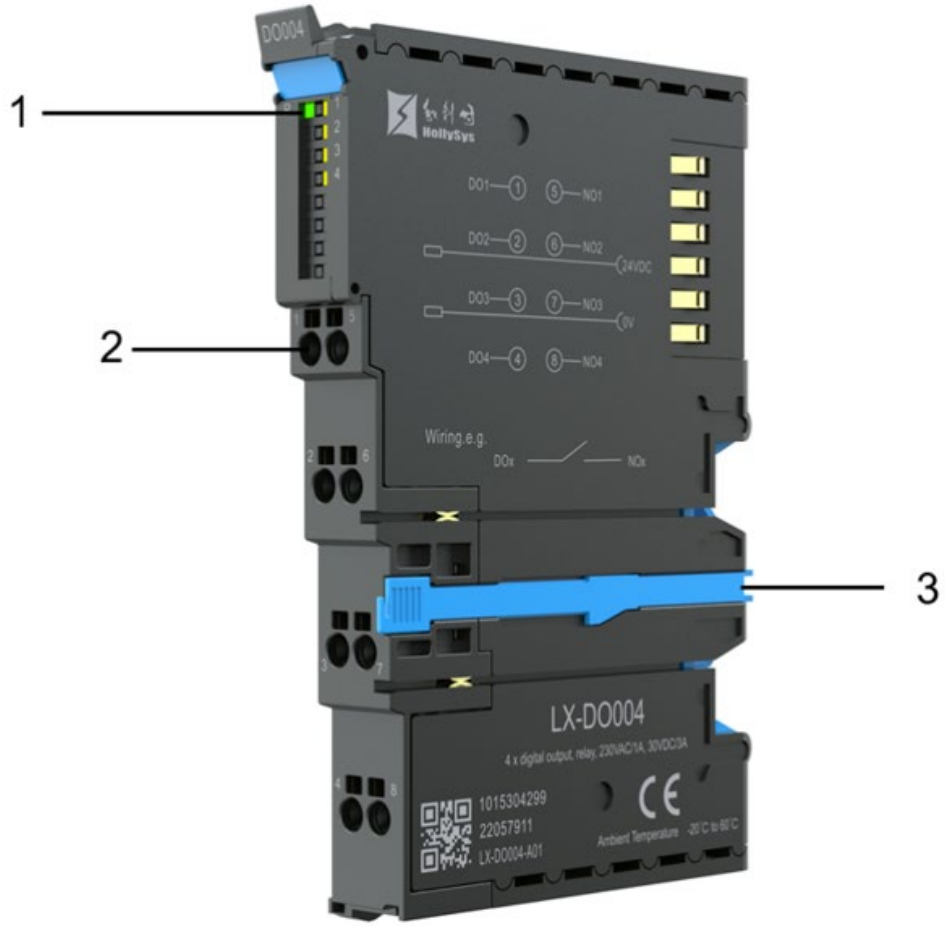
LX-DO004 is the digital output module of LX series PLC products, which is used in field relay-type digital output control modules. Each channel of the 4-channel relay-type digital output module is independently configured with a preset safety value. The module periodically reads periodic output data from the ECat bus and refreshes the channel output. The diagnostic signal is uploaded to the main control module through the EtherCAT bus.

1. Basic Features

- Support independent configuration of preset safety values for each channel in the minimum system composed of MPU, providing data processing, channel control, and other functions;
- 2-channel Lxbus slave station data transfer paths;

- 4-channel relay-type digital output channels;
- 4-channel indicator lights, 1 operational indicator light.

2. Module components

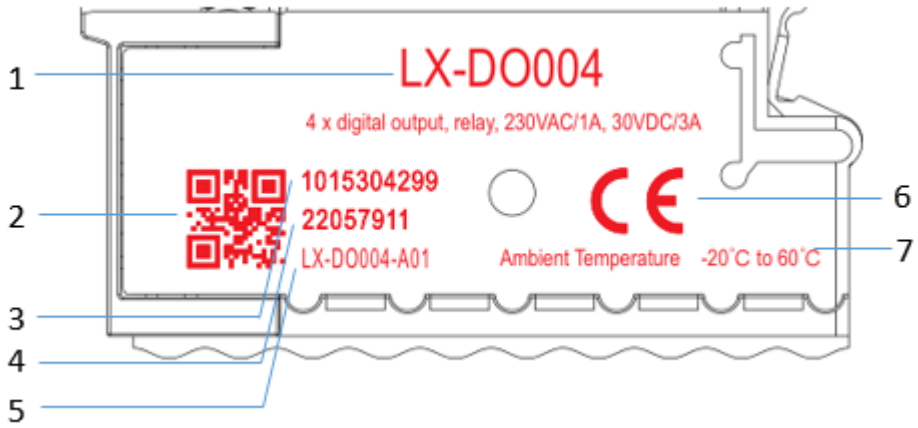


Schematic diagram of the LX-DO004 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	Module operation status indicator lights, channels 1~4 indicate the working status of the channels
2	Wiring Terminal	Connect 4 digital output signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	4-channel relay type digital output module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.2.1.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
Rated voltage	24 V DC(19.2~28.8VDC)
System power consumption	Max 2W

3. Channel indicators

Item	Specifications

Number of channels	4
Signal type	Normally open contact without power source
Load voltage	230 VAC/ 30 VDC
Maximum load current (resistive)	1A@ 230VAC 3A @30VDC
Channel cable	Unshielded cable or shielded cable
Channel isolation	Not support
Isolated voltage	Channel to system: 1000 VAC, continuous for 1 minute, leakage current < 5mA

4. Communication indicators

Item	Specifications
LX-bus interface connection type	Double-sided gold finger connector (backboard interface)
LX-bus interface quantity	1 channel
LX-bus interface rate	100Mbps
LX-bus interface protocol supported	EtherCAT slave protocol

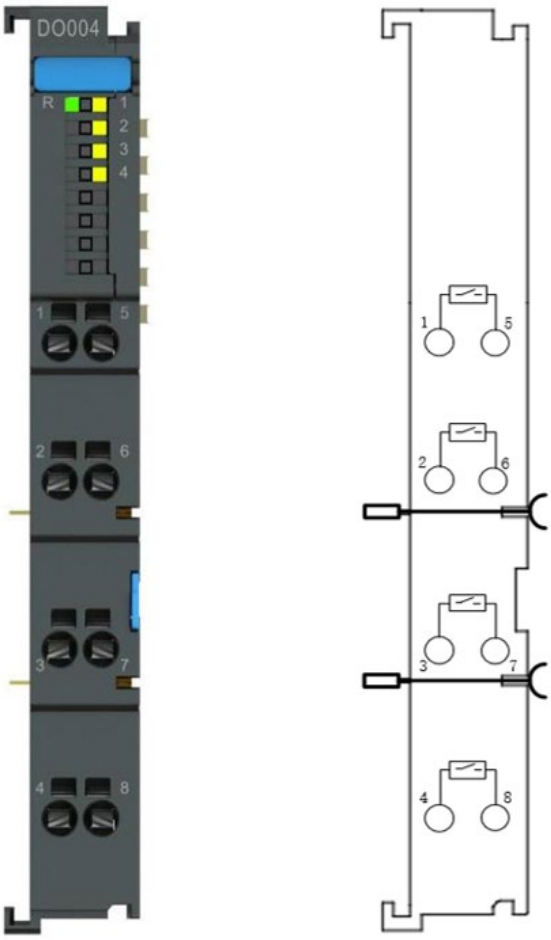
11.2.1.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
CH1~CH4	Channel status indicator	Yellow	Channel status indication: On: channel input enabled, set to 1 Off: channel input disabled, set to 0
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)

11.2.1.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Pin No.	Symbol	Meaning	Pin No.	Symbol	Meaning
1	DO0	Channel contact relay output 1	5	COM0	Channel contact relay output 1
2	DO1	Channel contact relay output 2	6	COM1	Channel contact relay output 2
3	DO2	Channel contact relay output 3	7	COM2	Channel contact relay output 3
4	DO3	Channel contact relay output 4	8	COM3	Channel contact relay output 4

11.2.1.5 Parameter specification

Parameter description for DeviceNet slave

Channel Parameter Name	Parameter Meaning	Parameter Value	Default value
Fault Mode Output Value(n=1~4)	Preset channel safety value	Hold Last State, OFF, ON	Hold Last State

EtherCAT IO mapping channel data

Channel Parameter Name	Parameter Meaning	Parameter Value
Channel value	0: low level output 1: high level output	0: OFF 1: ON

11.2.1.6 Diagnostic Alarm

The diagnostic information of the 4-channel relay type digital output module includes module diagnosis. The module diagnosis includes software/hardware version numbers, which can be obtained by reading SDO data.

The diagnostic information is shown as follows:

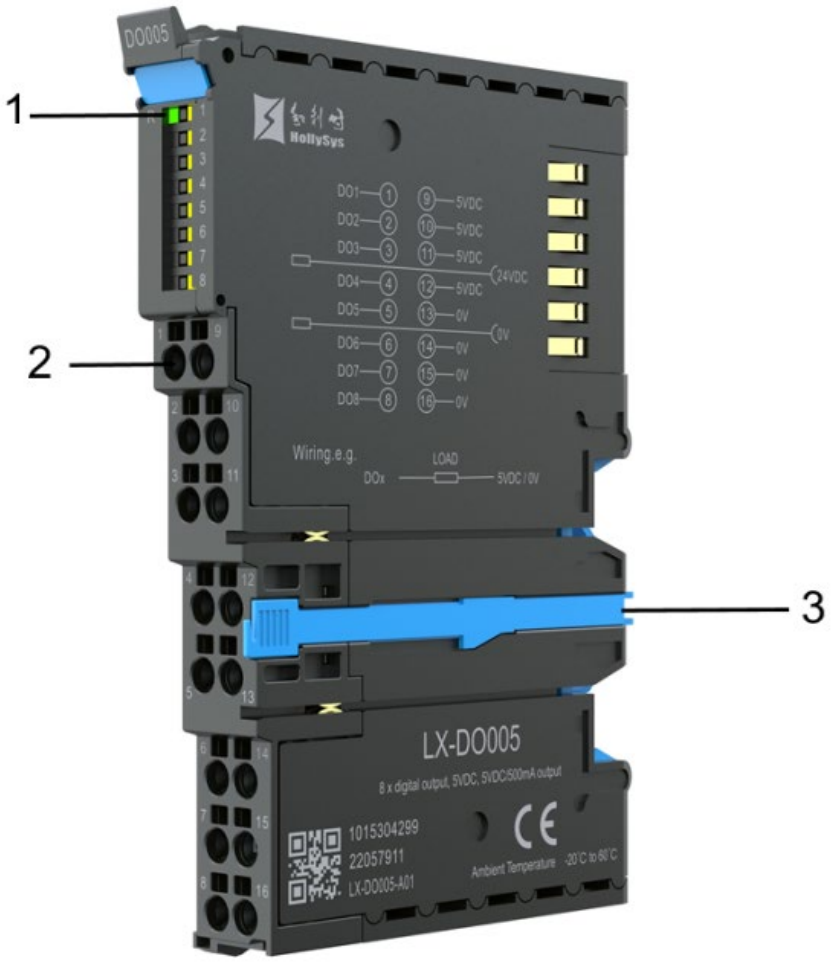
S/N	Module Diagnosis	Object Dictionary	Instructions
1	Device name	0x1008	Read through the parameter commissioning interface.
2	Hardware version number	0x1009	Read through the parameter commissioning interface.
3	Software version number	0x100A	Read through the parameter commissioning interface.

11.2.2 LX-DO005 8-channel 5 V DC Digital Output Module

11.2.2.1 Product Overview

LX-DO005 is the digital output module of LX series PLC products, which is used in field 5 V DC digital output control modules. Each channel of the 8-channel 5 V DC digital output module is independently configured with a preset safety value. The module periodically reads periodic output data from the ECat bus and refreshes the channel output. The diagnostic signal is uploaded to the main control module through the EtherCAT bus.

1. Basic Features
   - The minimum system composed of MPU provides data processing, channel control, and other functions;
   - 2-channel Lxbus slave station data transfer path;
   - 8-channel 5VDC digital output channels;
   - 8-channel indicator lights, 1-channel operation indicator light.
2. Module components

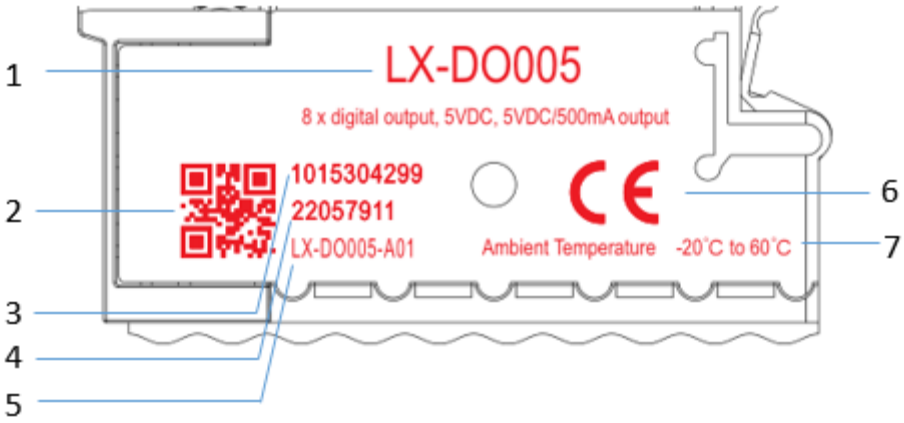


Schematic diagram of the LX-DO005 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	Channels 1~8, indicating the channel working status
2	Wiring Terminal	Connect 8 digital output signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	8-channel 5 V DC digital output module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.2.2.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply	
Supply mode	Power supply via LX-bus interface
Rated voltage	24 VDC（19.2~28.8VDC）
Power Consumption	Max 1.8W
Field power output	
Output Voltage	5V（4.5~5.5V）

Maximum load current	0.5A

3. Channel indicators

Item	Specifications
Number of channels	8
Channel type	High side output
Load voltage	±5VDC
Maximum load (current)	8 mA/channel 64 mA/common terminal
Response time	Logic 0 to logic 1: 0.15 ms Logic 1 to logic 0: 0.15 ms
Channel short circuit protection	Support short circuit transient protection (<1 h)
Module diagnosis	On-site diagnosis of 5V power drop (< 4V)
Channel cable	Unshielded cable or shielded cable
Channel isolation	Not support
Isolated voltage	Channel to system: 1000 VAC, continuous for 1 minute, leakage current < 5mA

4. Communication indicators

Item	Specifications
Bus interface connection type	Double-sided gold finger connector (backboard interface)
Bus interface quantity	1 channel
Bus interface rate	100Mbps
Bus interface protocol supported	EtherCAT slave protocol

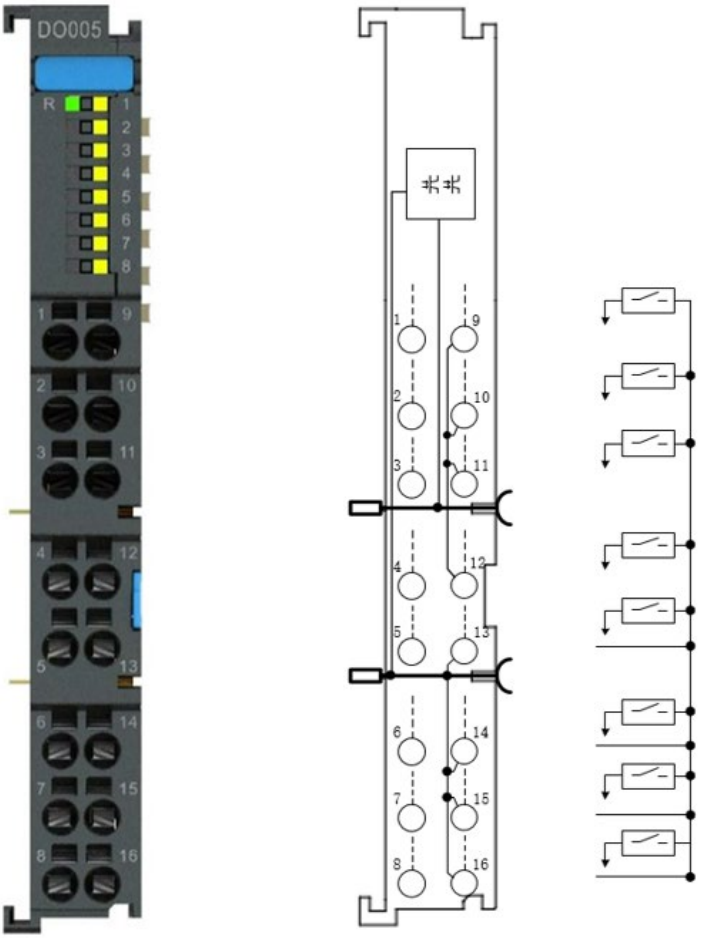
11.2.2.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
CH1~CH8	Channel status indicator	Yellow	Channel status indication: Bright: Channel ON Off: Channel OFF
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state （Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)

11.2.2.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	DO0	Digital Output 1	9	+5V	Output +5 V
2	DO1	Digital Output 2	10	+5V	Output +5 V
3	DO2	Digital Output 3	11	+5V	Output +5 V
4	DO3	Digital Output 4	12	+5V	Output +5 V
5	DO4	Digital Output 5	13	0V	Field GND
6	DO5	Digital Output 6	14	0V	Field GND
7	DO6	Digital Output 7	15	0V	Field GND
8	DO7	Digital Output 8	16	0V	Field GND

11.2.2.5 Parameter specification

Parameter description for DeviceNet slave

Channel Parameter Name	Parameter Meaning	Parameter Value	Default value
Fault Mode Output Value(n=1~8)	Preset channel safety value	Hold Last State, OFF, ON	Hold Last State

EtherCAT IO mapping channel data

Channel Parameter Name	Parameter Meaning	Parameter Value
Channel value	0: low level output 1: high level output	0: OFF 1: ON

11.2.2.6 Diagnostic Alarm

The diagnostic information of the 8-channel 5 V DC digital output module includes module diagnosis. The module diagnosis includes software/hardware version numbers, which can be obtained by reading SDO data.

The description of module diagnosis is shown in the following table:

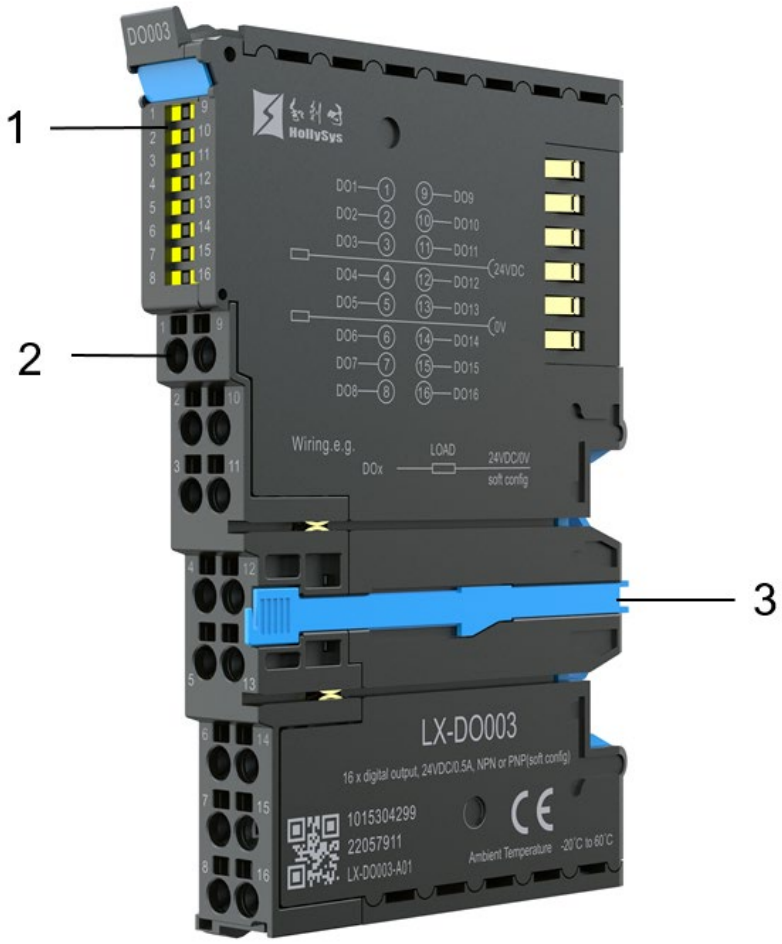
S/N	Module Diagnosis	Object Dictionary	Instructions
1	Device name	0x1008	Read through the parameter commissioning interface.
2	Hardware version number	0x1009	Read through the parameter commissioning interface.
3	Software version number	0x100A	Read through the parameter commissioning interface.

11.2.3 LX-DO003 16-Channel 24 V DC Digital Output Module

11.2.3.1 Product Overview

LX-DO003 is the digital output module of LX series PLC products, which mainly completes the output execution of switching values. It consists of a function template and an LX series IO universal housing. It has 16 indicators to indicate the true or false status of each channel. The module supports the EtherCAT protocol and function as an EtherCAT slave station to complete data exchange with the main controller block. It can be configured through the configuration software to support high-side and low-side working modes.

1. Basic Features
   - The minimal system composed of MPU provides data processing, channel control, and other functions;
   - 2-channel Lxbus slave data transfer pathways;
   - 16-channel PNP/NPN digital output channels, supporting high-side and low-side switching in groups of 8;
   - 16-channel indicator lights.
2. Module components

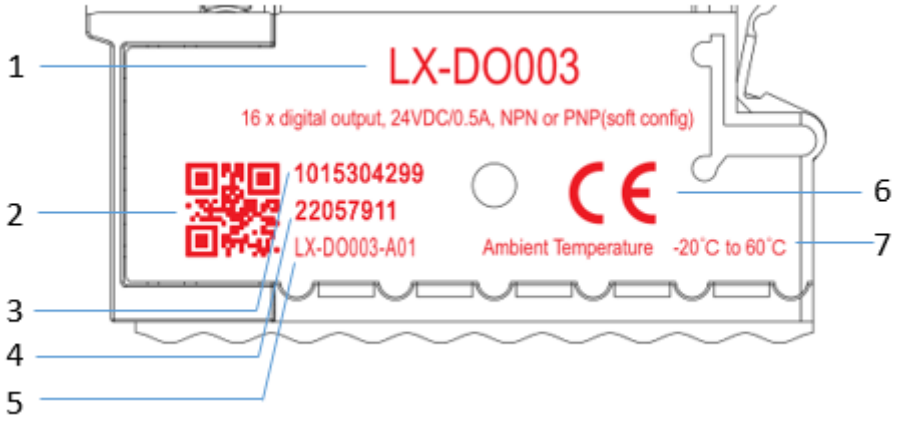


Schematic diagram of the LX-DO003 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	Channels 1~16, indicating the channel working status
2	Wiring Terminal	Connect 16 digital output signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	16-channel 24 V DC digital output module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.2.3.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply	
Supply mode	Power supply via LX-bus interface
Rated voltage	24 VDC（19.2~28.8VDC）
Power consumption	Max 0.96W
Field power output	
Rated voltage	24 VDC
Input voltage range	19.2~28.8VDC

3. Channel indicators

Item	Specifications
Number of channels	16
Channel type	High side/Low side (configurable)
Load voltage	24VDC
Maximum load (current)	0.5A/1 point 4A/common terminal
Switching time	TON: 120 μs (typ) TOFF: 300 μs
Leakage current in the off state	0.5 mA single channel
Channel conduction voltage drop	<0.75V single channel
Protection function	Support short circuit protection
Channel cable	Unshielded cable
Channel isolation	Not support
Isolated voltage	Channel to system: 1000 VAC, continuous for 1 minute, leakage current < 5mA
Configuration method	1 bit represents one channel
Preset safety value output	The channel can output a preset safety value when any of the following faults occur: 1. System power fault 2. Backboard communication interruption
Configuration is configurable	Maintain the previous state (default), ON, OFF High side/low side channel, 8 channels per group, configurable

11.2.3.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
CH1~CH16)	Channel status indicator	Yellow	Channel status indication On: activity of port Off: activity of port

11.2.3.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:

The definition of terminals

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	DO0	Digital Output 1	9	DO10	Digital Output 9
2	DO1	Digital Output 2	10	DO11	Digital Output 10
3	DO2	Digital Output 3	11	DO12	Digital Output 11
4	DO3	Digital Output 4	12	DO13	Digital Output 12
5	DO4	Digital Output 5	13	DO14	Digital Output 13
6	DO5	Digital Output 6	14	DO15	Digital Output 14
7	DO6	Digital Output 7	15	DO16	Digital Output 15
8	DO7	Digital Output 8	16	DO17	Digital Output 16

- Note:

- The maximum load current of the module is 4A, and the load wiring needs to be evenly distributed. The first 8 channels should not exceed 2A; the last 8 channels should not exceed 2A.
- The channel does not support parallel output, meaning multiple channels cannot simultaneously output to the same load.
- The channel is configured for low-side output; ensure that the module's power supply is energized no later than the load power supply.

11.2.3.5 Parameter specification

Parameter description for DeviceNet slave

Channel Parameter Name	Parameter Meaning	Parameter Value	Default value
Output Type	Output Type	High Side or Low Side configurable; Each group of 8 channels has one configuration option; Channels 1~8 form one group, channels 9~16 form another group.	High Side
Fault Mode Output Value(n=1~16)	Preset channel safety value	Hold Last State, OFF, ON	Hold Last State

11.2.3.6 Diagnostic Alarm

The diagnostic information of the 16-channel 24 V DC digital output module includes module diagnosis. Encompassing module diagnosis includes software/hardware version numbers, which can be obtained by reading SDO data.

S/N	Module Diagnosis	Object Dictionary	Instructions
1	Device name	0x1008	Read through the parameter commissioning interface.
2	Hardware version number	0x1009	Read through the parameter commissioning interface.
3	Software version number	0x100A	Read through the parameter commissioning interface.

11.3 Counting Module

11.3.1 LX-ECI001 2-channel Incremental Encoder Input Module

11.3.1.1 Product Overview

LX-ECI001 is the incremental encoder input module of LX series PLC products, including 2 incremental encoder input interfaces and 6 digital input interfaces and 1 5VDC power output interface. It consists of a function template and an LX series IO universal housing. It indicates the operating status of the module and the working status of each channel through panel indicators. The module supports the EtherCAT protocol and serves as an EtherCAT slave station to complete data exchange with the main controller.

1. Basic Features
   - Provides 2 incremental encoder input interfaces, 6 digital input interfaces, and 1 +5VDC power output interface;
   - RS422 level standard A, B, Z three-phase input;

- Offers communication isolation between the field side and the system side;
- Completes basic human-machine interaction through indicator lights.

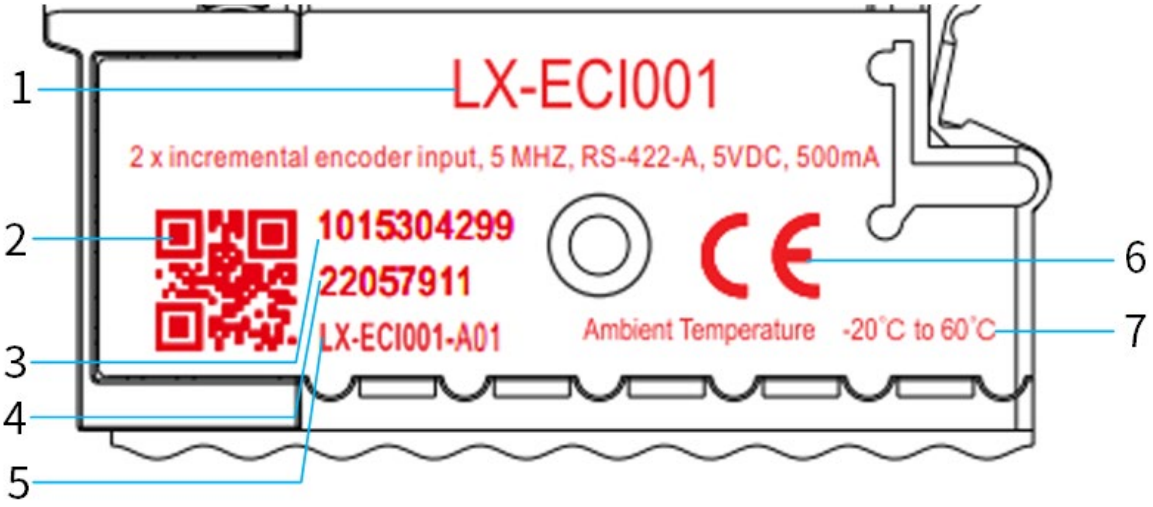
2. Module components

Schematic diagram of the LX-ECI001 module

Module component description table

S/N	Component Name	Instructions
1	Channel and operating status indicators	On the right side are the field power supply and channel lights, and on the left side are the RUN lights and DI channel lights.
2	Wiring Terminal	Connect the 2-channel encoder input signal, 6 digital input interfaces and 1 +5V power output port
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	Incremental encoder input module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.3.1.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	24mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
Power supply	
Power supply mode	Power supply via LX-bus interface
Rated voltage	24VDC (19.2~28.8VDC)
Power consumption	80mA@24VDC
Power output	

Output voltage	4.5~5.5VDC
Maximum output power	Max 0.5A@5V±10%
On-site power supply	
Voltage range	24VDC (19.2~28.8VDC)

3. Channel indicators

Item	Specifications
Channel	
Quantity	High-speed counting channel (A/B): 2 pcs
Counting mode	AB phase 1x frequency AB phase 2x frequency AB phase 4x frequency (default) PLS+DIR CW/CCW
Wire system	Differential
Level standard	RS-422
Input impedance	120Ω typ
High level input voltage	VIT+: 0.1 V min
Low level input voltage	VIT-: -0.1 V min
Counting range	-2147483648~2147483647 （32 bits ）
Counting error	±1 count code value
Maximum input frequency	5M Hz
Channel filtering	No filter, 0.05 us, 0.1 us, 0.2 us, 0.4 us (default), 1 us, 2 us, 4 us, 10 us, 20 us, 40 us, 100 us; Each channel can be set independently.
Digital input channel	
Number of channels	6
Logic 0 to logic 1	15~30V/min 3mA (sink type)
	0~4V/min 2mA (source type)
Logic 1 to logic 0	0~4V/max 1mA (sink type)
	17~30V/max 2mA (source type)
Input type	Type 1
ON/OFF response time	From OFF to ON, 100us (no filtering) From ON to OFF, 100us (no filtering)
Channel Type	Sink/source
Isolation Withstand Voltage	1000 V AC, 1 min, leakage current <5 mA (channel side and system side)

- Note:
- The typical input impedance is 120Ω, and values within the range of 100 ~ 140Ω are normal.
- For sink type DI input, the common terminal is grounded; for source type DI input, the common terminal is connected to the field DC24V.

- Motion control performance indicators are reflected in the main controller.

11.3.1.3 Status Indicators

The indicator statuses are described as follows:

Color	Name	Meaning
Green	RUN	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
Yellow	DI1	On: Port1 is currently receiving input Off: Port1 is not receiving any input
Yellow	DI2	On: Port2 is currently receiving input Off: Port2 is not receiving any input
Yellow	DI3	On: Port3 is currently receiving input Off: Port3 is not receiving any input
Yellow	DI4	On: Port4 is currently receiving input Off: Port4 is not receiving any input
Yellow	DI5	On: Port5 is currently receiving input Off: Port5 is not receiving any input
Yellow	DI6	On: Port6 is currently receiving input Off: Port6 is not receiving any input

Color	Name	Meaning
Yellow	PWR2	On: The field power input is normal Off: The field power input is abnormal or there is no input
Yellow	PWR1	On: The 5 V output is normal Off: There is no 5 V output or the output is abnormal
Yellow	A1	On: Channel phase A is enabled Off: Channel phase A is disenabled
Yellow	B1	On: Channel phase B is running Off: Channel phase B is not running
Yellow	A2	On: Channel phase A is running Off: Channel phase A is not running
Yellow	B2	On: Channel phase B is running Off: Channel phase B is not running

11.3.1.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:

The definition of terminals

Pin No.	Symbol	Meaning	Pin No.	Symbol	Meaning
1	DI0	Digital input 1	9	COM0	Digital (1) input common terminal
2	DI1	Digital input 2	10	COM1	Digital (2) input common terminal
3	DI2	Digital input 3	11	COM2	Digital (3) input common terminal
4	DI3	Digital input 4	12	COM3	Digital (4) input common terminal
5	DI4	Digital input 5	13	COM4	Digital (5) input common terminal
6	DI5	Digital input 6	14	COM5	Digital (6) input common terminal
7	NC	-	15	NC	-
8	NC	-	16	NC	-
Pin No.	**Symbol**	**Meaning**	**Pin No.**	**Symbol**	**Meaning**
1	A1+	Input 1 phase A+	9	A1-	Input 1 phase A-
2	B1+	Input 1 phase B+	10	B1-	Input 1 phase B-
3	NC	-	11	NC	-
4	A2+	Input 2 phase A+	12	A2-	Input 2 phase A-
5	B2+	Input 2 phase B+	13	B2-	Input 2 phase B-
6	NC	-	14	NC	-
7	NC	-	15	NC	-
8	Ue	Power supply 5 V output+	16	U0	Power 5V output-

11.3.1.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Description
Channel1/ Channel2 Encoder Type	Channel count mode	AB phase 1x frequency AB phase 2x frequency AB phase 4x frequency PLS+DIR CW/CCW	AB phase 4x frequency

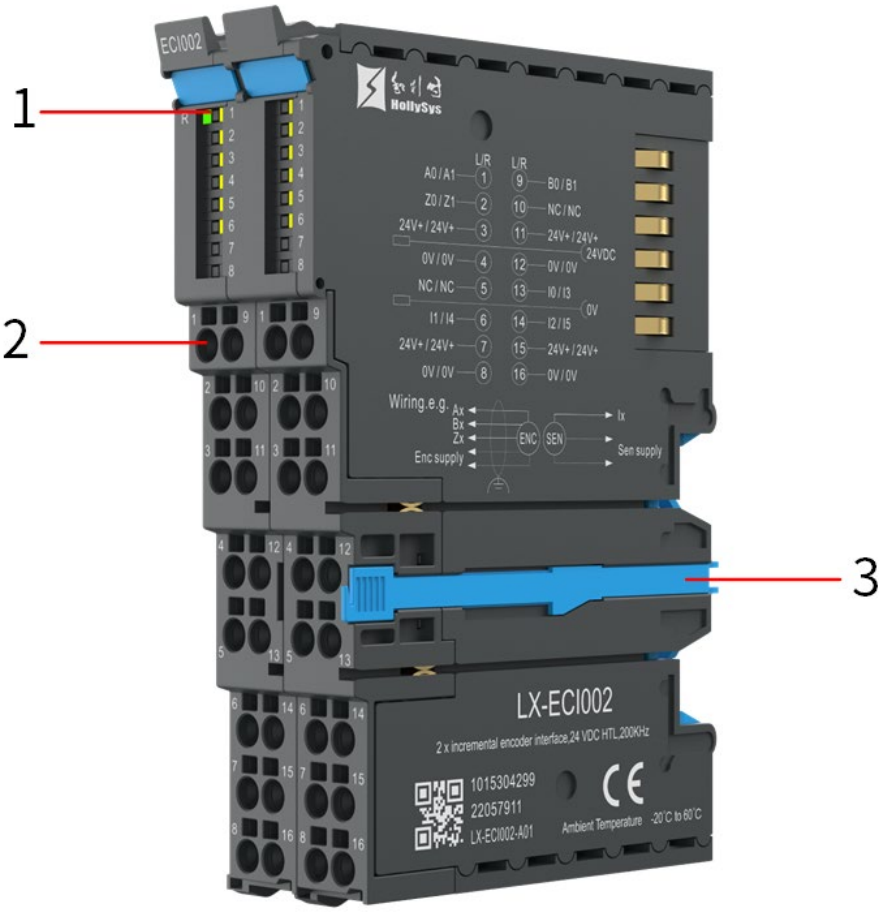
Channel1/ Channel2 FilterType	Counting channel filtering	No filtering, 0.05 us, 0.1 us, 0.2 us, 0.4 us (default), 1 us, 2 us, 4 us, 10 us, 20 us, 40 us, 100 us. Each channel can be set independently	0.4us
Digital Input Filter Type	DI channel filtering	Each channel is set independently Configurable options No filtering, 0.1 ms, 0.5 ms, 1 ms (default), 5 ms, 10 ms, 50 ms, 100 ms, 500 ms	1ms

11.3.2 LX-ECI002 2-channel 24V incremental encoder input module

11.3.2.1 Product Overview

The LX-ECI002 is a 24V incremental encoder input module for the LX series of PLC products, featuring 2 incremental encoder interfaces and 6 digital input interfaces. It consists of a functional template and a universal IO housing for the LX series. The module's operation status and the status of each channel are indicated by panel lights. The module supports the EtherCAT protocol, enabling data exchange as an EtherCAT slave with the master controller.

1. Basic Features
   - Provide six digital input channels;
   - 24V level standard, A, B, Z three-phase input;
   - Provide four 24VDC outputs;
   - Provide communication isolation between field side and system side;
   - Complete basic human-machine interaction through indicator lights.
2. Module components



Schematic diagram of the LX-ECI002 module

Module component description table

S/N	Component Name	Instructions
1	Channel and operating status indicators	On the right side are the field power supply and channel lights, and on the left side are the RUN lights and DI channel lights.
2	Wiring Terminal	Connect the 2-channel encoder input signal, 6 digital input interfaces
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

11.3.2.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation

Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	24mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
Power supply	
Power supply mode	Power supply via LX-bus interface
Rated voltage	24VDC (19.2~28.8VDC)
Power consumption	80mA@24VDC
8-channel output voltage	
Output voltage	24VDC±20%
Maximum output power	Max 0.5A@5V±10%
Field power supply	
Voltage range	24VDC (19.2~28.8VDC)

3. Channel indicators

Item	Specifications
Encoder channel acquisition	
Quantity	2 channels (A, B, Z three phases),
Counting pattern	A/B(1/2/4 octave), CW/CCW, PLS/DIR
Enable the channel	Fixed enable, supports use in conjunction with the controller's motion control axis
Measurement mode	Hybrid mode (reporting both frequency and location, default)
Signal type	PNP
ON condition	19.2~28.8VDC, current 3.5mA (typical value when input voltage is 24V),
OFF condition	0~5V@1mA
ON/OFF response time	1us
Counting range	-2147483648~2147483647(32-bit, default)
Counting error	±1 pulse
Maximum input frequency	200KHz
Frequency measurement gate width	1~40000ms, Step into, 1ms
Frequency measurement accuracy	1~200Hz (including 200Hz) range, accuracy is 0.1% of the input frequency 200Hz~200KHz (excluding 200Hz) range, accuracy is 0.01% of the input frequency • Note: The above frequencies apply to CW/CCW, PLS/DIR, A/B phase single frequency. A/B phase double frequency and quadruple frequency need to be increased by 2 times and 4 times respectively.
Channel filtering	No filter, 0.5us(1MHz), 1us(500kHz), 2us(250kHz), 5us(100kHz) (default) , 10us(50kHz), 50us(10kHz), 100us(5kHz), 500us(1kHz), 5ms(100Hz), 50ms(10Hz); (Filtering time error ±0.5us)
Latching function	Each encoder acquisition channel corresponds to 3 latch channels including the Z-axis and 2 DI channels Note: Encoder acquisition channel 1 corresponds to any 2 DI channels among I1, I2, I3 as latch channels; Encoder acquisition channel 2 corresponds to any 2 channels among I4, I5, I6 as latch channels,
Isolation voltage	1000VAC, 1min, leakage current < 5mA, channel to system
DI input channel	
Quantity	6 channels (I0, I1, I2, I3, I4, I5)

Signal type	PNP
ON condition	19.2~28.8VDC, current 3.5mA (typical value when input voltage is 24V)
OFF response time	0~5V@1mA
ON/OFF response time	1us
Channel filtering	No filtering, 0.1ms, 0.5ms, 1ms (default), 5ms, 10ms, 50ms, 100ms, 500ms; filtering time error ±0.1ms
Maximum input frequency	200KHz
Channel mode	Normal DI input mode, Latch 1 input mode, Latch 2 input mode
Isolation voltage withstand	1000VAC, 1min, leakage current < 5mA, channel to system

11.3.2.3 Status Indicators

A1, B1, Z1, A2, B2, Z2 lights are always on when counting and ensure that the indicator lights are on for at least 200ms; they are always off when not counting.

DI channel lights (I0, I1, I2, I3, I4, I5) are always on when there is a signal in the channel, and always off when there is no signal in the channel.

- Note: The lighting of the passage light only indicates the presence of a hardware signal, it is not related to the software acquisition results.

The indicator statuses are described as follows:

Definitions of left-side indicators

Color	Name	Meaning
Green	RUN	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
Yellow	A1	On: Phase A of the channel is running Off: Phase A of the channel is not running
Yellow	B1	On: Phase B of the channel is running Off: Phase B of the channel is not running
Yellow	Z1	On: Phase Z of the channel is running Off: Phase Z of the channel is not running
Yellow	I0	On: The channel has input Off: The channel has no input
Yellow	I1	On: The channel has input Off: The channel has no input
Yellow	I2	On: The channel has input Off: The channel has no input

Definitions of right-side indicators

Color	Name	Meaning
Yellow	A2	On: Phase A of the channel is running Off: Phase A of the channel is not running
Yellow	B2	On: Phase B of the channel is running Off: Phase B of the channel is not running
Yellow	Z2	On: Phase Z of the channel is running

		Off: Phase Z of the channel is not running
Yellow	I3	On: The channel has input Off: The channel has no input
Yellow	I4	On: The channel has input Off: The channel has no input
Yellow	I5	On: The channel has input Off: The channel has no input

11.3.2.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:

The definition of terminals

Pin No.	Symbol	Meaning	Pin No.	Symbol	Meaning
1	A1	Encoder 1 input phase A	9	B1	Encoder 1 input phase B
2	Z1	Encoder 1 input phase Z	10	NC	-
3	24V+	24V power output positive	11	24V+	24V power output positive

4	0V	24V power output negative	12	0V	24V power output negative
5	NC	-	13	DI0	Digital input 1
6	DI1	Digital input 2	14	DI2	Digital input 3
7	24V+	power output positive	15	24V+	24V power output positive
8	0V	24V power output negative	16	0V	24V power output negative
Pin No.	**Symbol**	**Meaning**	**Pin No.**	**Symbol**	**Meaning**
1	A2	Encoder 2 input phase A	9	B2	Encoder 21 input phase B
2	Z2	Encoder 2 input phase Z	10	NC	-
3	24V+	24V power output positive	11	24V+	24V power output positive
4	0V	24V power output negative	12	0V	24V power output negative
5	NC	-	13	DI3	Digital input 4
6	DI4	Digital input 5	14	DI5	Digital input 6
7	24V+	24V power output positive	15	24V+	24V power output positive
8	0V	24V power output negative	16	0V	24V power output negative

11.3.2.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Description
Channel1/ Channel2 Encoder Type	Channel count mode	AB phase 1x frequency AB phase 2x frequency AB phase 4x frequency PLS+DIR CW/CCW	AB phase 4x frequency
Channel1/ Channel2 FilterType	Counting channel filtering	No filtering, 0.05 us, 0.1 us, 0.2 us, 0.4 us (default), 1 us, 2 us, 4 us, 10 us, 20 us, 40 us, 100 us. Each channel can be set independently	0.4us
Digital Input Filter Type	DI channel filtering	Each channel is set independently Configurable options: No filtering, 0.1 ms, 0.5 ms, 1 ms (default), 5 ms, 10 ms, 50 ms, 100 ms, 500 ms	1ms
Digital Input Function Selection	DI channel function selection	General Input Latch1 Input Latch2 Input	General Input

Each counting channel corresponds to two latch channels, and the position latch function meets the CiA 402 protocol specifications. The functional modes and related object dictionary definitions are as follows.

Position Latching Explanation

Position latching function (0x60B8)

Bit	Value	Definition
0	0	Switch off touch probe 1
	1	Enable touch probe 1
1	0	Trigger first event
	1	continous
2	0	Trigger with touch probe 1 input
	1	Trigger with zero impulse signal or position encoder
3	0	Reserved
4	0	Switch off sampling at positive edge of touch probe 1
	1	Enable sampling at positive edge of touch probe 1
5	0	Switch off sampling at negative edge of touch probe 1
	1	Enable sampling at negative edge of touch probe 1
6, 7	-	User-defined (e.g. for testing)
8	0	Switch off touch probe 2
	1	Enable touch probe 2
9	0	Trigger first event
	1	Continous
10	0	Trigger with touch probe 2 input
	1	Trigger with zero impulse signal or position encoder
11	0	Reserved

Bit	Value	Definition
12	0	Switch off sampling at positive edge of touch probe 2
	1	Enable sampling at positive edge of touch probe 2
13	0	Switch off sampling at negative edge of touch probe 2
	1	Enable sampling at negative edge of touch probe 2
14, 15	-	User-defined (e.g. for testing)

Position latching status (0x60B9)

Bit	Value	Definition
0	0	Touch probe 1 is switched off
	1	Touch probe 1 is enabled
1	0	Touch probe 1 no positive edge value stored
	1	Touch probe 1 positive edge position stored
2	0	Touch probe 1 no negative edge value stored
	1	Touch probe 1 negative edge position stored
3 to 5	0	Reserved
6, 7	-	User-defined (e.g. for testing)
8	0	Touch probe 2 is Switched off
	1	Touch probe 2 is Enabled
9	0	Touch probe 2 no positive edge value stored
	1	Touch probe 2 positive edge position stored
10	0	Touch probe 2 no negative edge value stored
	1	Touch probe 2 negative edge position stored
11 to 13	0	Reserved
14, 15	-	User-defined (e.g. for testing)

Location latching result

The rising edge latching channel for position latch 1 is defined in object 0x60BA;
The falling edge latching channel for position latch 1 is defined in object 0x60BB;
The rising edge latching channel for position latch 2 is defined in object 0x60BC;
The falling edge latching channel for position latch 2 is defined in object 0x60BD.

- Note: The object dictionary for the second channel is offset by 0x800 sequentially.

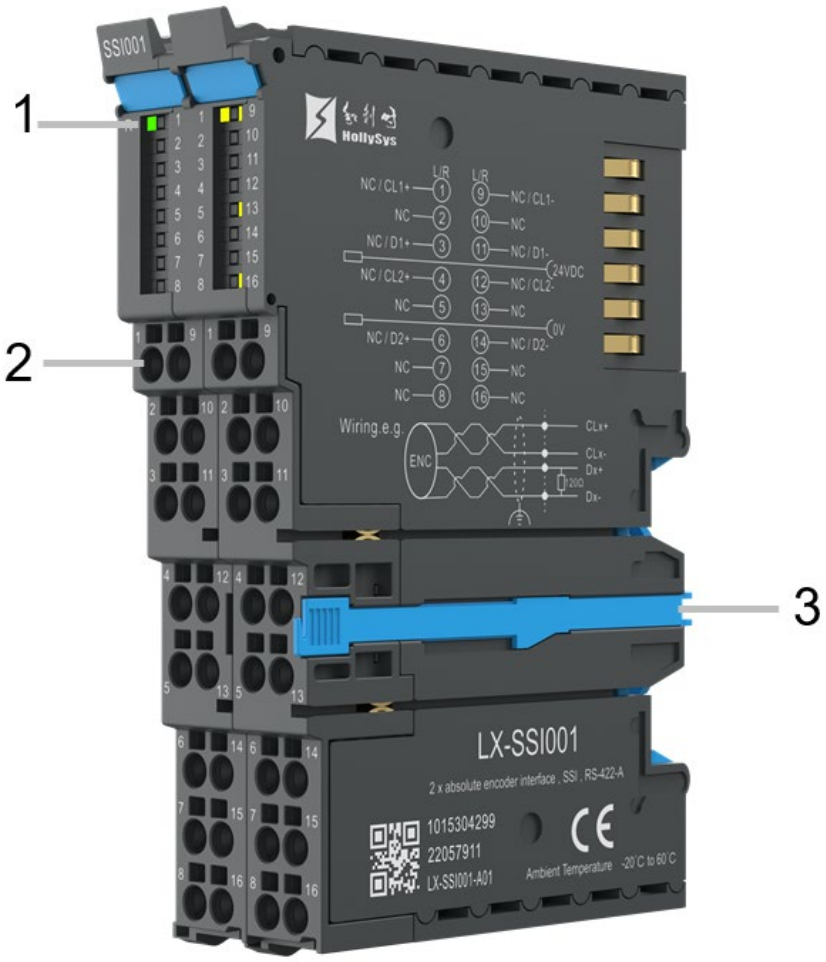
11.4 Encoder Module

11.4.1 LX-SSI001 2-Channel SSI Absolute Encoder Module

11.4.1.1 Product Overview

LX-SSI001 is the absolute encoder module of LX series PLC products, interface for an SSI absolute encoder with 2 channels, supporting the SSI protocol. It consists of a function template and an LX series IO universal housing. Panel indicators used to display the operating status of the modules as well as the working status of each channel. The module supports the EtherCAT protocol and fuction as an EtherCAT slave station to complete data exchange with the main controller.

1. Basic Features
   - RS422 level standard, provides 2 differential signal outputs and 2 differential signal inputs;
   - Provides communication isolation between the field side and the system side;
   - Completes basic human-machine interaction through indicator lights.
2. Module components

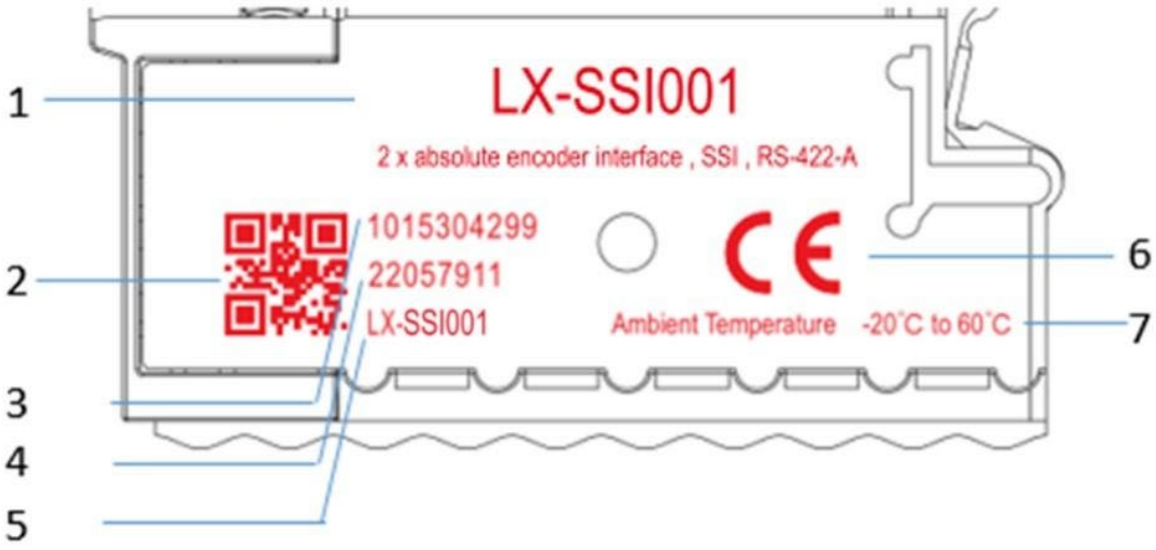


Schematic diagram of the LX-SSI001 module

Module component description table

S/N	Component Name	Instructions
1	Channel and operating status indicators	The right light is the power indicator light for the channel and the channel light, the left light is the module operation status indicator light.
2	Wiring Terminal	Connect the 2-channel encoder input signal
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	2-channel SSI absolute encoder input module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.4.1.2 Technical Indicators

1. General indicators

Item	Specifications
Module hot-swap	Not support
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	24mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
Power supply	
Supply mode	Power supply via LX-bus interface
Rated voltage	24 VDC（19.2~28.8VDC）

Power consumption	Max 0.96W
Field power	
Input voltage range	24 VDC(19.2~28.8VDC)

3. Channel indicators

Item	Specifications
Quantity	2
Level standard	EIA standard RS−422−A
Encoding mode	Single-ring and multi-ring available
Communication protocol	SSI
Communication baud rate	2 Mbps, 1.5 Mbps, 1 Mbps, 500 Kbps, 400 Kbps, 300 Kbps, 250 Kbps (default), 200 Kbps, 100 Kbps, 50 Kbps (Depending on whether the encoder supports it)
Data transfer frequency	Baud Rate / Length 2Mbps / 5m 1.5Mbps / 10m 1Mbps / 25m 500Kbps / 60m 400Kbps / 80m 300Kbps / 120m 250Kbps / 180m 200Kbps / 190m 100Kbps / 400m 50 Kbps / 800m
Supported encoder type	SSI interface Bit width: 8 bits ~ 32 bits, 25 bits by default Code: gray/binaray
Channel data	Input: 1 x 32-bit data, 1 x 8-bit status data
Field power failure detection	Remote alarm by reporting device diagnosis value, and field alarm through channel indicators
Coding compliance	Absolute encoder 24 V model with standard SSI interface (tolerance: 10-30 V DC)
Support preset functions	When the count value is equal to the preset value, the AutoThink displays that the axis position information is reset to zero
Channel cable	Shielded twisted-pair
Isolation Withstand Voltage	1000 V AC, 1 min, leakage current <5 mA (channel side and system side)
Channel isolation	Not supported

11.4.1.3 Status Indicators

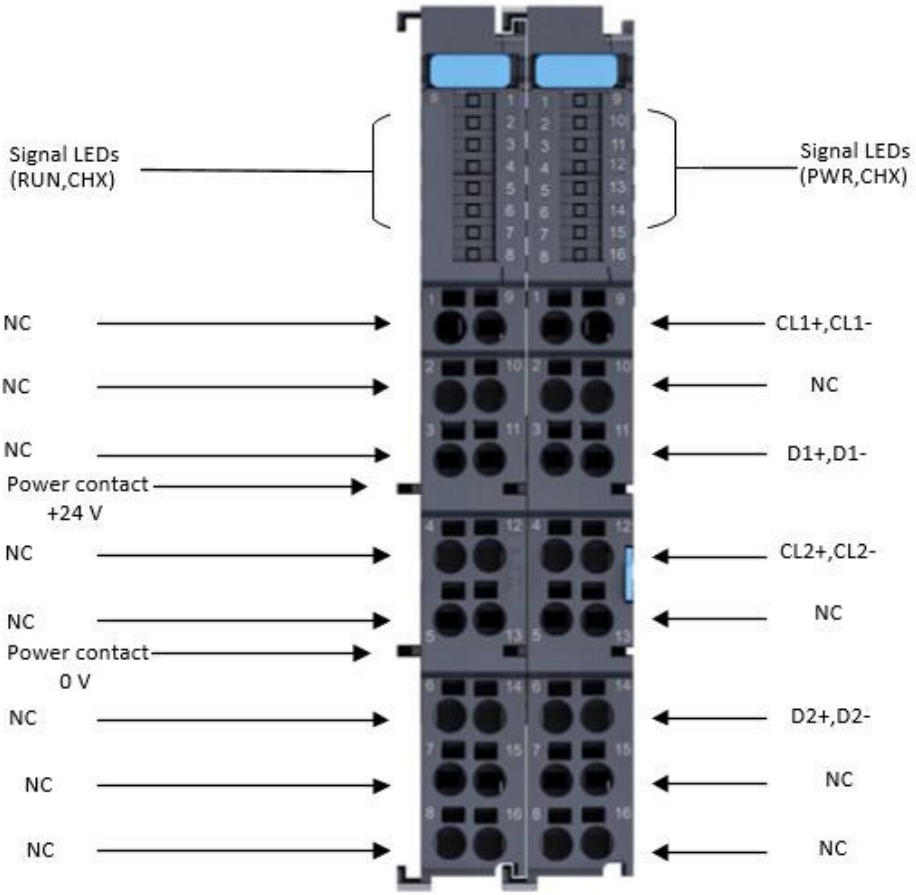
The indicator statuses are described as follows:

Color	Name	Meaning
Green	RUN	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
Yellow	1	On: The channel works normally at 5 VDC Off: The channel works abnormally at 5 VDC
Yellow	9	On: The field power input is normal Off: The field power input is abnormal or there is no input
Yellow	13	On: Channel 1 receives data from the encoder

		Off: Channel 1 does not receive any data from the encoder
Yellow	16	On: Channel 2 receives data from the encoder Off: Channel 2 does not receive any data from the encoder

11.4.1.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Pin No.	Symbol	Meaning	Pin No.	Symbol	Meaning
1	-	NC	9	-	NC
2	-	NC	10	-	NC
3	-	NC	11	-	NC
4	-	NC	12	-	NC
5	-	NC	13	-	NC
6	-	NC	14	-	NC
7	-	NC	15	-	NC
8	-	NC	16	-	NC
Pin No.	**Symbol**	**Meaning**	**Pin No.**	**Symbol**	**Meaning**
1	A0+	Clock signal line CL1+	9	A0-	Clock signal line CL1-

2	-	NC	10	-	NC
3	Z0+	Data signal line D1+	11	Z0+	Clock signal line D1-
4	A1+	Clock signal line CL2+	12	A1-	Clock signal line CL2-
5	-	NC	13	-	NC
6	Z1+	Data signal line CL2+	14	Z1-	Data signal line CL2-
7	-	NC	15	-	NC
8	-	NC	16	-	NC

11.4.1.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Description
Frame type	SSI interface Code	Gray/binaray	binaray
Comm speed	Communication rate (baud rate)	2 Mbps, 1.5 Mbps, 1 Mbps, 500 Kbps, 400 Kbps, 300 Kbps, 250 Kbps, 200 Kbps, 100 Kbps, 50 Kbps (specifically depending on whether the encoder supports it)	250Kbps
Sample interval(10us)	Sampling rate (unit 10us)	1~9999*10us -> 10us~99.99ms	4
Frame length	Frame length	8~32	25
Valid Data length	Data length in frame (excluding status data)	Value range: 0, 8~32 When the length is not 0, the default frame format is, there is no multi-lap data, the single lap data starts at 0bit, the length is the current data length, the remaining part of the frame is status data. When the length is 0, the frame format is configured according to the subsequent (single lap/multi-lap/status) parameters.	25
Single-turn Data Start Bit	Single lap data start bit	0~31	12
Single-turn Data Length	Single lap data length	1~32 There must be valid data in the frame, otherwise the frame is meaningless, so at least 1 bit of data should be retained in a single loop.	13
Multi-turn Data Start Bit	Multibit data start bit	0~31	0
Multi-Single-turn Data Length	Multi-circle data length	0~32	12
Status Data Start Bit	Status data start bit	0~31	0
Status Data Length	Status data length	0~8	0

EtherCAT IO mapping channel data

Channel parameter name	Parameter Description
Channel Status	Channel status: bit0 Channel enable status bit3 Field power abnormality flag bit15 Channel configuration abnormality flag
Encoder Actual Value	The actual position data read by the encoder
Encoder Present Position	The offset position data after calculation, relative to the initial position after configuration.
Channel Status	Status data returned by the encoder.
Field Power Status	The power supply status at the scene is the same as bit 3 of the Channel Status

Encoder Counter Operation Command	Bit0 channel enable control

11.4.1.6 Diagnostic Alarm

When an exception occurs in the module, the device will report the relevant error code. The error code definition is assigned as follows:

Parameter	Value
Error code	0xFF00: field power fault

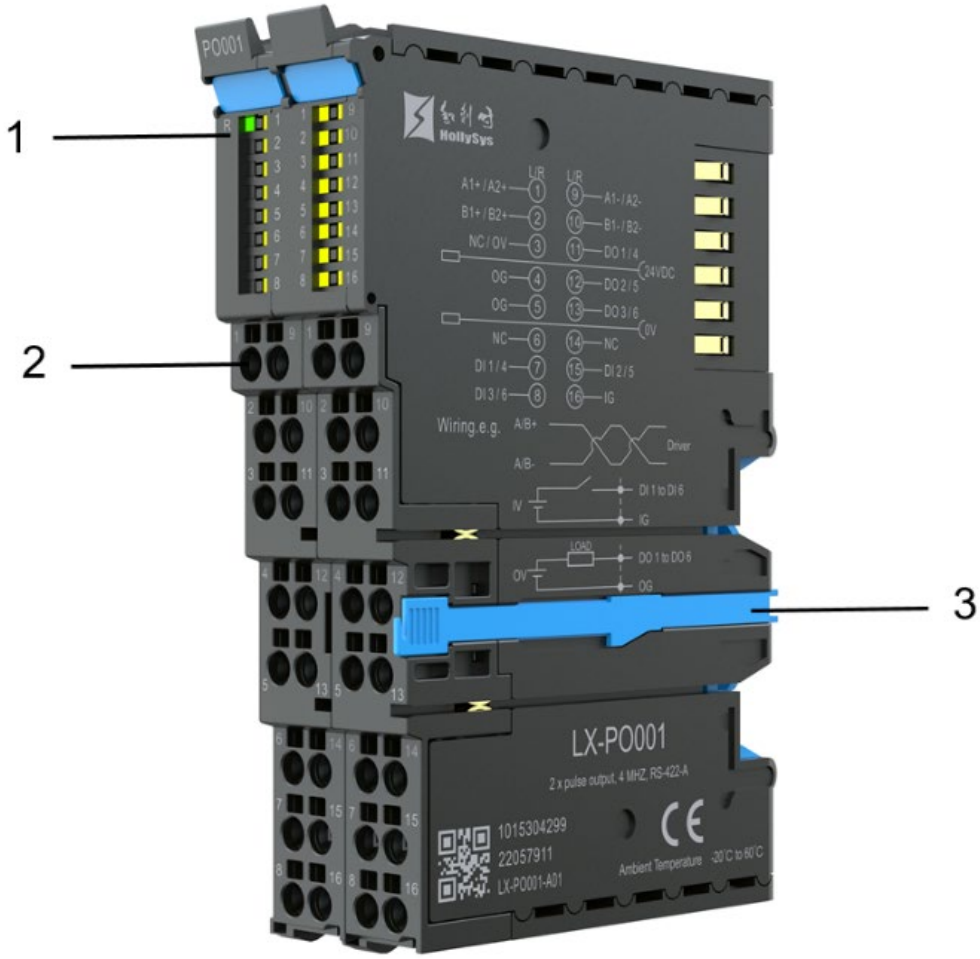
11.5 Pulse Output Module

11.5.1 LX-PO001 2-channel High-speed Pulse Output Module

11.5.1.1 Product Overview

LX-PO001 is the high-speed pulse output module of LX series PLC products, including 2-channel pulse output, 6-channel digital output and 6-channels digital input. It consists of a function template and an LX series IO universal housing. Panel indicators are used to display the operating status of the modules as well as the working status of each channel. The module supports the EtherCAT protocol and functions as an EtherCAT slave station to complete data exchange with the main controller.

1. Basic Features
   - Provide two-channel pulse output with phases A and B, RS422 electrical level standard;
   - Provide six-channel digital input;
   - Provide six-channel digital output;
   - Provide communication isolation between the field side and the system side;
   - Complete basic human-machine interaction through indicator lights.
2. Module components

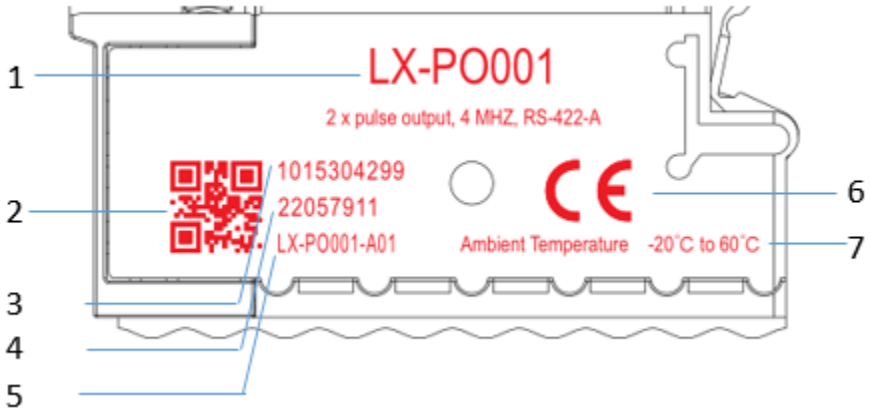


Schematic diagram of the LX-PO001 module

Module component description table

S/N	Component Name	Instructions
1	Channel and operating status indicators	On the left side are the operating status indicator and input indicator. On the right side are the field power indicator and output indicator.
2	Wiring Terminal	Connect the 2-channel encoder input signal, 6-channel digital output, and 6-channel digital input
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	2-channel high-speed pulse output module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.5.1.2 Technical Indicators

1. General indicators

Item	Specifications
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	24mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
Power supply	
Supply mode	Power supply via LX-bus interface
Rated voltage	24 VDC（19.2~28.8VDC）
Power consumption	80mA@24VDC
Field power	
Input voltage range	24 VDC(19.2~28.8VDC)

3. Channel indicators

Item	Specifications

Channel	
Quantity	Pulse output axis (A/B): 2
Level standard	EIA standard RS−422−A
Pulse output mode	PLS+DIR (default), CW/CCW,A/B phase pulse output 1x frequency
Maximum output frequency (single phase)	4 MHz
Channel cable	Shielded twisted-pair
Isolation withstand voltage	1000 V AC, 1 min, leakage current <5 mA (channel side and system side)
Digital input channel	
Number of digital input channels	6
Logic 1 signal	15~30 V/minimum 3 mA (sink type), 0~4 V/minimum 2 mA (source type)
Logic 0 signal	0~4 V/maximum 1 mA (sink), 17~30 V/maximum 2 mA (source)
On/off response time	OFF Tto ON: 100 us ON to OFF: 100 us
Input type	Type 1
Quarantine method	Optocoupler isolation (channel and system side)
Isolation Withstand Voltage	1000 V AC, 1 min, leakage current <5 mA (channel side and system side)
Channel Type	Sink/source
Channel filtering	Each channel can be set independently Configurable options: No filtering, 0.1ms, 0.5ms, 1ms (default), 5ms, 10ms, 50ms, 100ms, 500ms
Digital output channel	
Number of digital input channels	6
Rated voltage	24VDC
Response time (ON/OFF)	OFF to ON, 100 us ON to OFF, 300 us
Output Type	NPN
Load voltage	15～28.8VDC
Maximum output power (resistive)	Max 0.5A@24V
Leakage current	＜0.1mA
On-state resistance	0.5Ω（Typ）
Quarantine method	Optocoupler isolation (channel and system side)
Short circuit protection for channels	Support

- Note:
- The input range of DI is sink with the common end grounded, and source with the common end connected to the field DC24VDC.
- The motion control function indicators are reflected in the main controller.

11.5.1.3 Status Indicators

The indicator statuses are described as follows:

Color	Name	Meaning
Green	RUN	Determined by the EtherCAT slave station status machine;

		Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
Yellow	DI1	On: The channel has input Off: The channel has no input
Yellow	DI2	On: The channel has input Off: The channel has no input
Yellow	DI3	On: The channel has input Off: The channel has no input
Yellow	DI4	On: The channel has input Off: The channel has no input
Yellow	DI5	On: The channel has input Off: The channel has no input
Yellow	DI6	On: The channel has input Off: The channel has no input

Color	Name	Meaning
Yellow	PWR2	On: The field power input is normal Off: The field power input is abnormal or there is no input
Yellow	PWR1	On: The channel works normally at 5 V Off: The channel works abnormally at 5 V
Yellow	A1	On: Channel phase A is running Off: Channel phase A is not running
Yellow	B1	On: Channel phase B is running Off: Channel phase B is not running
Yellow	A2	On: Channel phase A is running Off: Channel phase A is not running
Yellow	B2	On: Channel phase B is running Off: Channel phase B is not running
Yellow	DO1	On: channel output ON Off: channel output OFF
Yellow	DO2	On: channel output ON Off: channel output OFF
Yellow	DO3	On: channel output ON Off: channel output OFF
Yellow	DO4	On: channel output ON Off: channel output OFF
Yellow	DO5	On: channel output ON Off: channel output OFF
Yellow	DO6	On: channel output ON Off: channel output OFF

11.5.1.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:

The definition of terminals

Pin No.	Symbol	Meaning	Pin No.	Symbol	Meaning
1	DI0	Digital input 1	9	COM0	Digital (1~6) input common terminal
2	DI1	Digital input 2	10	COM1	Digital (1~6) input common terminal
3	DI2	Digital input 3	11	COM2	Digital (1~6) input common terminal
4	DI3	Digital input 4	12	COM3	Digital (1~6) input common terminal
5	DI4	Digital input 5	13	COM4	Digital (1~6) input common terminal
6	DI5	Digital input 6	14	COM5	Digital (1~6) input common terminal
7	DO0	Digital output 1	15	DO1	Digital output 2
8	DO2	Digital output 3	16	DO3	Digital output 4
Pin No.	**Symbol**	**Meaning**	**Pin No.**	**Symbol**	**Meaning**
1	A1+	Output 1 phase A+	9	A1-	Output 1 phase A-
2	B1+	Output 1 phase B+	10	B1-	Output 1 phase B-
3	NC	-	11	NC	-
4	A2+	Output 2 phase A+	12	A2-	Output 2 phase A-

5	B2+	Output 2 phase B+	13	B2-	Output 2 phase B-
6	NC	-	14	NC	-
7	DO5	Digital output 5	15	DO6	Digital output 6
8	NC	-	16	NC	-

11.5.1.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Description
Channel1/ Channel2 Output Type	Channel count mode	A/B phase pulse output 1x frequency PLS+DIR CW/CCW	PLS+DIR
Digital Input Filter Type	Counting channel filtering	Each channel i s set independently Configurable options No filtering, 0.1 ms, 0.5 ms, 1 ms, 5 ms, 10 ms, 50 ms, 100 ms, 500 ms Filtering time error ±0.1ms	1 ms
Digital Output Fault Mode Output Type	Channel safety value	Each channel can be independently configured Configurable options: Hold Last State, OFF, ON	Hold Last State

11.5.1.6 Diagnostic Alarm

When an exception occurs in the module, the device will report the relevant error code. The error code definition is assigned as follows:

Parameter	Value
Error code	0xFF00: field power fault;

11.6 AI Module

11.6.1 LX-AI001 4-channel Voltage Type Analog Input Module

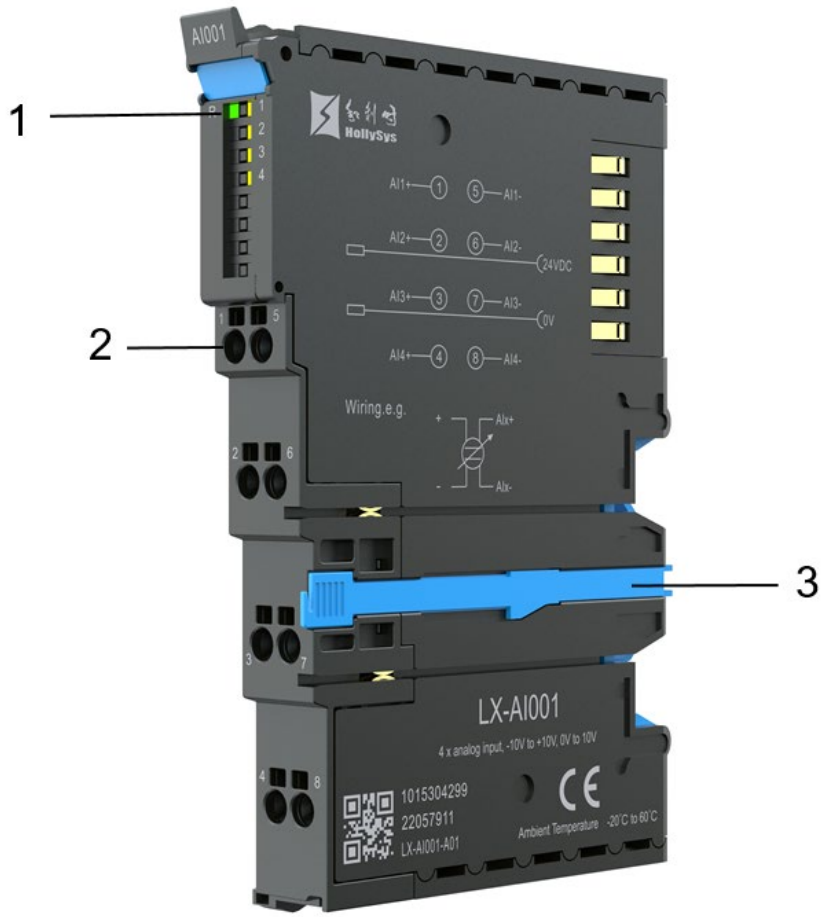
11.6.1.1 Product Overview

LX-AI001 is the AI module of LX series PLC products. It is a voltage-type analog input module that converts field side electrical signals into digital signals and reports them to the CPU module through the backboard bus.

1. Basic Features

- Support current range 0~10 V and ±10 V;
- Support upper and lower range diagnosis;
- Support users to set channel upper and lower limit settings and diagnosis;
- Support data collection filtering;
- Support power frequency filtering mode;
- Support independent channel enable/disable.

2. Module components



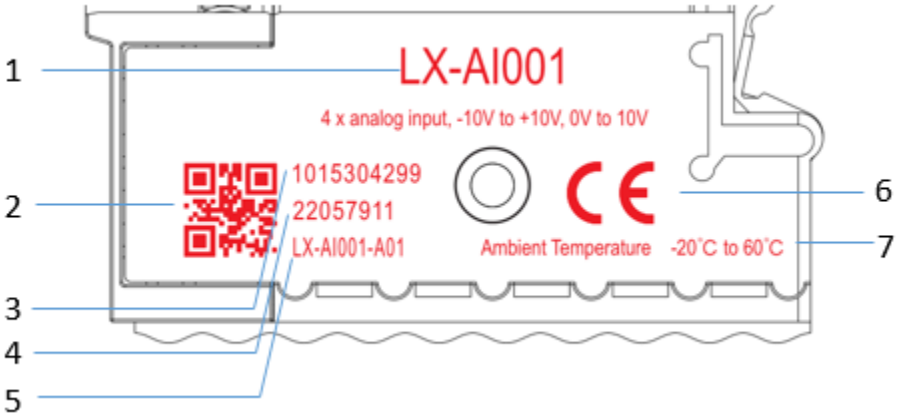
Schematic diagram of the LX-AI001 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	4 channels, indicating channel enable status
2	Wiring Terminal	Connect 4-channel voltage input signals
3	DIN rail right side mounting hook	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked

	handle	status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	4-channel voltage type analog input module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.6.1.2 Technical Indicators

1. General indicators

Item	Specifications
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
System power supply voltage range	19.2~28.8VDC
System side power consumption	Max 1.5W

3. Channel indicators

Item	Specifications	
Number of channels	4	
Signal type	Single-ended/differential	
Input method	Voltage	
Range	0~10 V	±10 V
Range code value range	0 ~ 32767	-32768 ~ 32767
Resolution	24-bit	
Maximum input signal	±15V	
Convert time	330μs/channel	
Full channel scan time	1.6ms	
Step response time	2.0ms	
Measurement accuracy (full temperature range)	0.3% F.S.	
Channel filtering	No filtering, 4 points (default), 8 points, 16 points, 32 points Each channel is configured independently	
50Hz/60Hz power frequency filtering	Support	
Input impedance	> 1MΩ	
Common mode rejection ratio	90dB	
Common mode rejection ratio	60dB	
Channel diagnosis function	Line break detection	Not supported
	Exceeding limits (upper and lower)	Support
	Over-range (over-range, under-range) diagnosis	Support
Channel cable	Shielding line	
Channel isolation	Not supported	
Field and system isolation withstand voltage	1000 VAC	

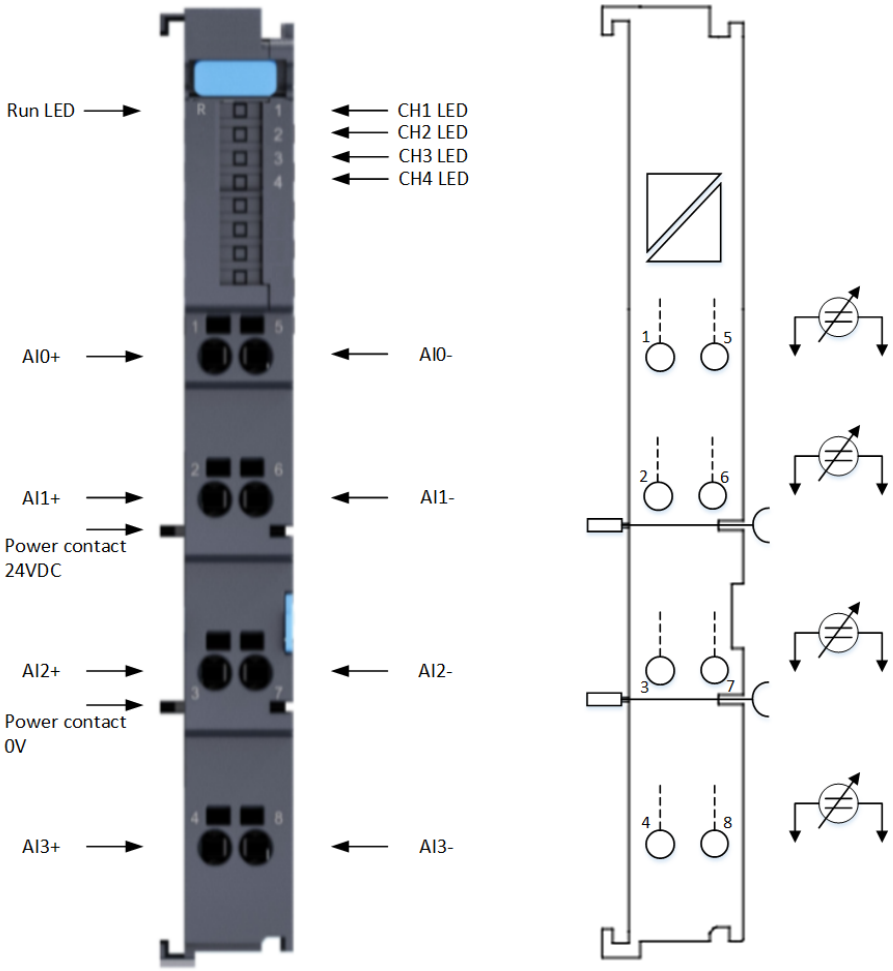
11.6.1.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
CH1~CH4)	Channel status indicator	Yellow	Channel status indication On: channel ON Off: channel OFF
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)

11.6.1.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	AI0+	Channel 1 positive	5	AI0-	Channel 1 negative
2	AI1+	Channel 2 positive	6	AI1-	Channel 2 negative
3	AI2+	Channel 3 positive	10	AI2-	Channel 3 negative
4	AI3+	Channel 4 positive	12	AI3-	Channel 4 negative

11.6.1.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Configuration Description (Default)
Device Filter Mode	Full channel power frequency filtering	No filtering 50Hz/60Hz	No filtering
Channel State	Channel enabling	Enable/disable	Enable
Channel Filter	Channel digital filtering	No filtering, 4 points (default), 8 points, 16 points, 32 points. Each channel is configured independently.	4 points
Channel Range	Channel range	0~10 V -10 V~10 V	-10 V~10 V

Channel Over Limit Value	Channel upper limit	-32768~32767	32767
Channel Under Limit Value	Channel lower limit	-32768~32767	-32768

EtherCAT IO mapping channel data

Channel Parameter Name	Parameter Meaning	Parameter Value
UnderRange	Under range	FALSE: normal TRUE: under range
OverRange	Over range	FALSE: normal TRUE: over range
Underlimit	Under limit	FALSE: normal TRUE: under limit
Overlimit	Over limit	FALSE: normal TRUE: over limit
Value	Channel code value	16-bit INT type

- The underlimit setting cannot be greater than the overlimit setting, otherwise, both the underlimit and overlimit alarms will be triggered simultaneously.

11.6.1.6 Diagnostic Alarm

The analog voltage signal collection module includes module diagnosis and channel diagnosis. Channel diagnosis supports diagnostic functions such as detecting over-range, under-range, exceeding the upper limit,andfalling below the lower limit.

Description of diagnostic information

Type	Parameters	Fault Name	Diagnostic Information
Channel diagnosis (Range 0~10 V)	Over range diagnosis	Over range	Under range: -15~-0.35 V Dead band: -0.35~0 V Normal: 0~10 V Dead band: 10~10.35 V Over range: 10.35~15 V
	Under-range diagnosis	Under range	
	Over limit diagnosis	Over limit	
	Under limit diagnosis	Under limit	
Channel diagnosis (Range ±10V)	Over range diagnosis	Over range	Under range: -15~-10.35 V Dead band: -10.35~-10 V Normal: -10~10 V Dead band: 10~10.35 V Over range: 10.35~15 V
	Under-range diagnosis	Under range	
	Over limit diagnosis	Over limit	
	Under limit diagnosis	Under limit	

11.6.2 LX-AI002 8-channel Voltage Type Analog Input Module

11.6.2.1 Product Overview

LX-AI002 is the AI module of LX series PLC products. It is a voltage-type analog input module that converts field-side electrical signals into digital signals and reports them to the CPU module through the backboard bus.

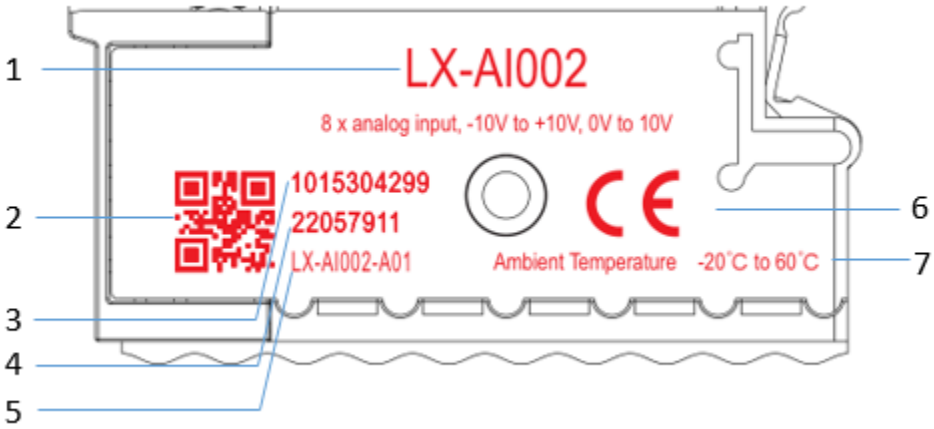
1. Basic Features
   - Support voltage range 0~10 V and ±10 V;
   - Support upper and lower range diagnosis;
   - Support users to set channel upper and lower limit settings and diagnosis;
   - Support data collection filtering;
   - Support power frequency filtering mode;
   - Support independent channel enable/disable.
2. Module components

Schematic diagram of the LX-AI002 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	Module operation status indicator (R), channel enable status indicators (1~8)
2	Wiring Terminal	Connect 8-channel voltage input signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	8-channel voltage type analog input module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.6.2.2 Technical Indicators

1. General indicators

Item	Specifications
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
System power supply voltage range	19.2~28.8VDC
System side power consumption	Max 1.5W

3. Channel indicators

Item	Specifications	
Number of channels	8	
Signal type	Single-ended/differential	
Input method	Voltage	
Range	0~10 V	±10 V

Range code value range	0 ~ 32767	-32768 ~ 32767
Resolution	24-bit	
Maximum input signal	±15V	
Convert time	330μs/channel	
Full channel scan time	3.2ms	
Step response time	4ms	
Measurement accuracy (full temperature range)	0.3% F.S.	
Channel filtering	No filtering, 4 points (default), 8 points, 16 points, 32 points Each channel is configured independently	
50Hz/60Hz power frequency filtering	Support	
Input impedance	> 1MΩ	
Common mode rejection ratio	90dB	
Common mode rejection ratio	60dB	
Channel diagnosis function	Line break detection	Not supported
	Exceeding limits (upper and lower)	Support
	Over-range (over-range, under-range) diagnosis	Support
Channel cable	Shielding line	
Channel isolation	Not supported	
Field and system isolation withstand voltage	1000 VAC	

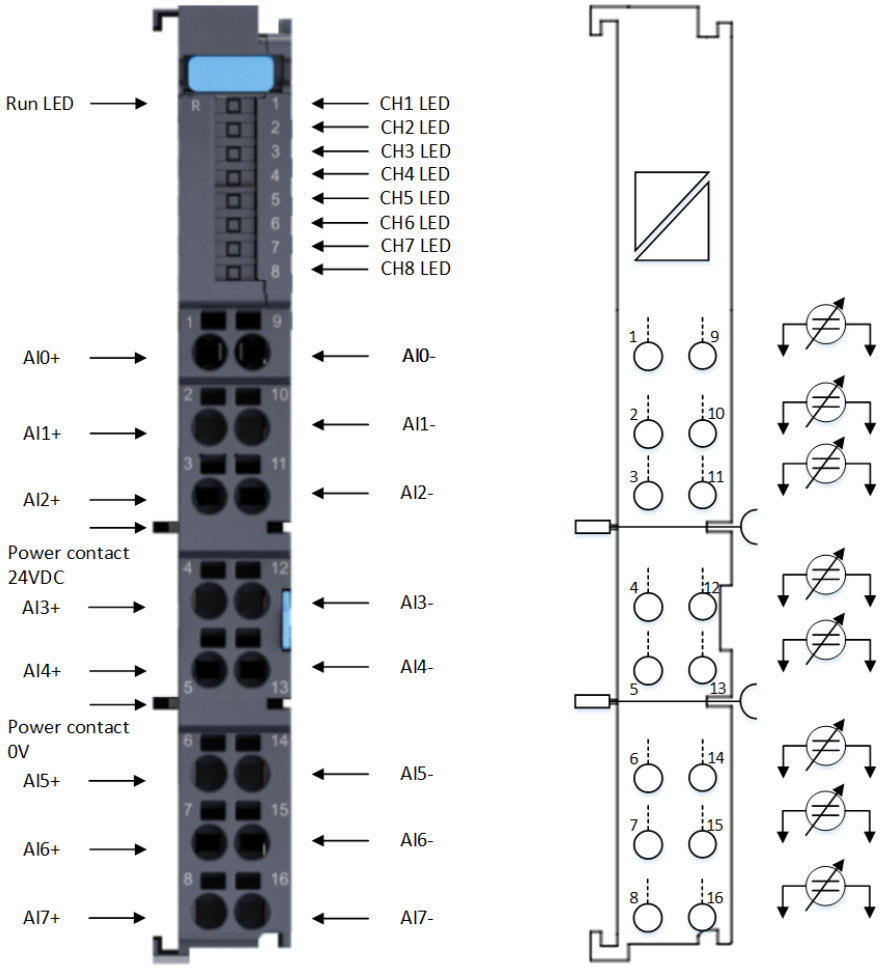
11.6.2.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
CH1~CH8)	Channel status indicator	Yellow	Channel status indication On: channel ON Off: channel OFF
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)

11.6.2.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	AI0+	Channel 1 positive	9	AI0-	Channel 1 negative
2	AI1+	Channel 2 positive	10	AI1-	Channel 2 negative
3	AI2+	Channel 3 positive	11	AI2-	Channel 3 negative
4	AI3+	Channel 4 positive	12	AI3-	Channel 4 negative
5	AI4+	Channel 5 positive	13	AI4-	Channel 5 negative
6	AI5+	Channel 6 positive	14	AI5-	Channel 6 negative
7	AI6+	Channel 7 positive	15	AI6-	Channel 7 negative
8	AI7+	Channel 8 positive	16	AI7-	Channel 8 negative

11.6.2.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Configuration Description (Default)
Device Filter Mode	Full channel power frequency filtering	No filtering 50Hz/60Hz	No filtering
Channel State	Channel enabling	Enable/disable	Enable
Channel Filter	Channel digital	No filtering, 4 points (default), 8 points, 16 points,	4 points

	filtering	32 points. Each channel is configured independently.	
Channel Range	Channel range	0~10 V -10 V~10 V	-10 V~10 V
Channel Over Limit Value	Channel upper limit	-32768~32767	32767
Channel Under Limit Value	Channel lower limit	-32768~32767	-32768

EtherCAT IO mapping channel data

Channel Parameter Name	Parameter Meaning	Parameter Value
UnderRange	Under range	FALSE: normal TRUE: under range
OverRange	Over range	FALSE: normal TRUE: over range
Underlimit	Under limit	FALSE: normal TRUE: under limit
Overlimit	Over limit	FALSE: normal TRUE: over limit
Value	Channel code value	Channel code value

- The underlimit setting cannot be greater than the overlimit setting, otherwise, both the underlimit and overlimit alarms will be triggered simultaneously.

11.6.2.6 Diagnostic Alarm

The analog voltage signal collection module includes module diagnosis and channel diagnosis. Channel diagnosis supports diagnostic functions such as detecting over-range, under-range, exceeding the upper limit,andfalling below the lower limit.

The description of diagnostic information

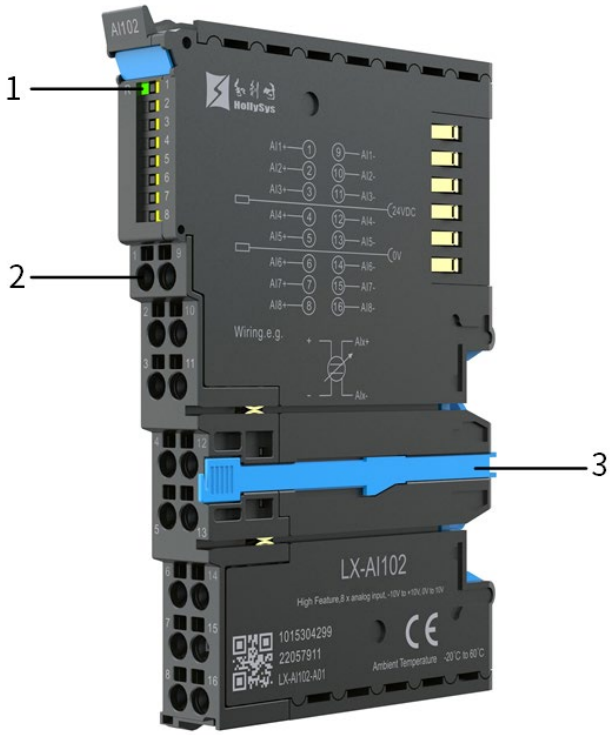
Type	Parameters	Fault Name	Diagnostic Information
Channel diagnosis (Range 0~10 V)	Over range diagnosis	Over range	Under range: -15~-0.35 V Dead band: -0.35~0 V Normal: 0~10 V Dead band: 10~10.35 V Over range: 10.35~15 V
	Under-range diagnosis	Under range	
	Over limit diagnosis	Over limit	
	Under limit diagnosis	Under limit	
Channel diagnosis (Range ±10V)	Over range diagnosis	Over range	Under range: -15~-10.35 V Dead band: -10.35~-10 V Normal: -10~10 V Dead band: 10~10.35 V Over range: 10.35~15 V
	Under-range diagnosis	Under range	
	Over limit diagnosis	Over limit	
	Under limit diagnosis	Under limit	

11.6.3 LX-AI102 8-channel High-performance Voltage-type Analog Input Module

11.6.3.1 Product Overview

LX-AI102 is an AI module of the LX series PLC products. It is a high-performance voltage-type analog input module that converts on-site electrical signals into digital signals and reports them to the CPU module via the backplane bus.

1. Basic Features
   - Supports voltage ranges of 0~10V and ±10V;
   - Supports upper and lower limit diagnostics for ranges;
   - Supports user-defined upper and lower limits setting and diagnostics for channels;
   - Supports data filtering during acquisition;
   - Supports power frequency filtering mode;
   - Supports independent channel enable/disable.
2. Module components

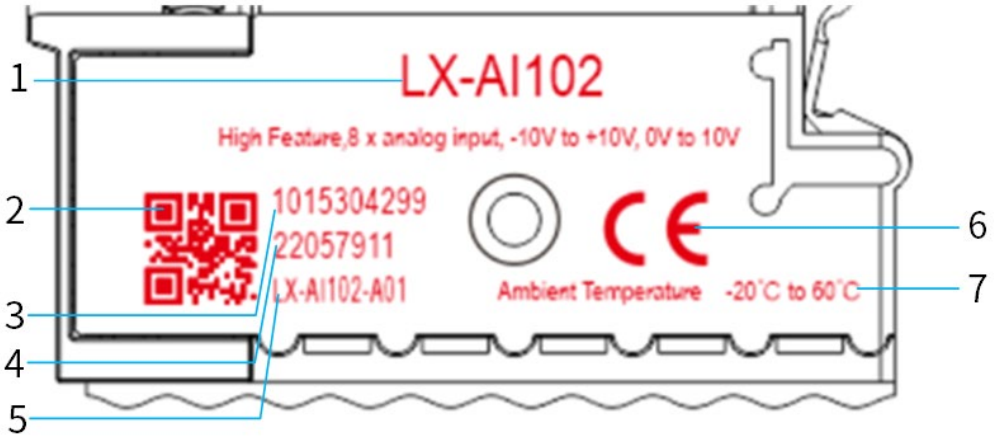


Schematic diagram of the LX-AI102 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	Module operation status indicator (R), channel enable status indicators (1~8)
2	Wiring Terminal	Connect 8-channel voltage input signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	8-channel high-performance voltage-type analog input module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.6.3.2 Technical Indicators

1. General indicators

Item	Specifications
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
System power supply voltage range	19.2~28.8VDC
System side power consumption	Max 1.5W

3. Channel indicators

Item	Specifications	
Number of channels	8	
Signal type	Single-ended/differential	
Input method	Voltage	
Range	0~10 V	±10 V
Range code value range	0 ~ 32767	-32768 ~ 32767
Resolution	16-bit	
Maximum input signal	±15V	
Convert time (No filtering)	≤60μs/channel	
Full channel scan time	(No filtering)3.2ms	
Step response time	450μs	
Measurement accuracy	Accuracy at ambient temperature (25±5°C): 0.1% FS Accuracy over the full temperature range: 0.3% FS	
Channel filtering	No filtering, 4 points (default), 8 points, 16 points, 32 points Each channel is configured independently	
50Hz/60Hz power frequency filtering	Support	
Input impedance	> 1MΩ	
Common mode rejection ratio	90dB	
Common mode rejection ratio	60dB	
Channel diagnosis function	Line break detection	Not supported
	Exceeding limits (upper and lower)	Support
	Over-range (over-range, under-range) diagnosis	Support
Channel cable	Shielding line	
Channel isolation	Not supported	
Field and system isolation withstand voltage	1000 VAC	

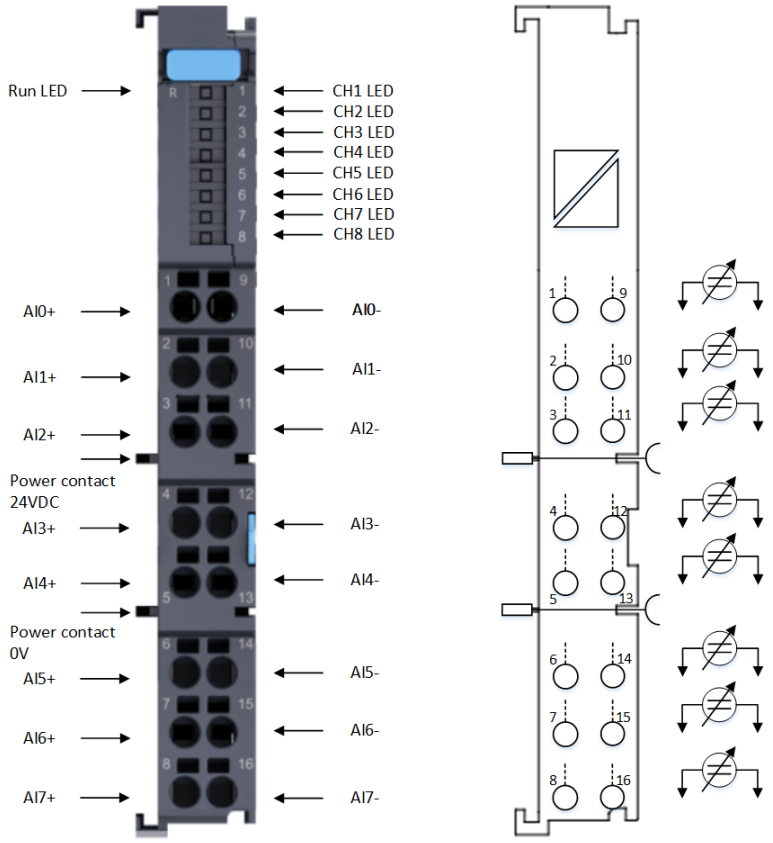
11.6.3.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
CH1~CH8	Channel status indicator	Yellow	Channel status indication On: channel ON Off: channel OFF
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)

11.6.3.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	AI0+	Channel 1 positive	9	AI0-	Channel 1 negative
2	AI1+	Channel 2 positive	10	AI1-	Channel 2 negative
3	AI2+	Channel 3 positive	11	AI2-	Channel 3 negative
4	AI3+	Channel 4 positive	12	AI3-	Channel 4 negative
5	AI4+	Channel 5 positive	13	AI4-	Channel 5 negative
6	AI5+	Channel 6 positive	14	AI5-	Channel 6 negative
7	AI6+	Channel 7 positive	15	AI6-	Channel 7 negative
8	AI7+	Channel 8 positive	16	AI7-	Channel 8 negative

11.6.3.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Configuration Description (Default)
Device Filter Mode	Full channel power frequency filtering	No filtering 50Hz/60Hz	No filtering
Channel State	Channel enabling	Enable/disable	Enable
Channel Filter	Channel digital filtering	No filtering, 4 points (default), 8 points, 16 points, 32 points. Each channel is configured independently.	4 points
Channel Range	Channel range	0~10 V -10 V~10 V	-10 V~10 V
Channel Over Limit	Channel upper limit	-32768~32767	32767

Value			
Channel Under Limit Value	Channel lower limit	-32768~32767	-32768

EtherCAT IO mapping channel data

Channel Parameter Name	Parameter Meaning	Parameter Value
UnderRange	Under range	FALSE: normal TRUE: under range
OverRange	Over range	FALSE: normal TRUE: over range
Underlimit	Under limit	FALSE: normal TRUE: under limit
Overlimit	Over limit	FALSE: normal TRUE: over limit
Value	Channel code value	Channel code value

- The underlimit setting cannot be greater than the overlimit setting, otherwise, both the underlimit and overlimit alarms will be triggered simultaneously.

11.6.3.6 Diagnostic Alarm

The analog voltage signal collection module includes module diagnosis and channel diagnosis. Channel diagnosis supports diagnostic functions such as detecting over-range, under-range, exceeding the upper limit,andfalling below the lower limit.

The description of diagnostic information

Type	Parameters	Fault Name	Diagnostic Information
Channel diagnosis (Range 0~10 V)	Over range diagnosis	Over range	Under range: -15~-0.35 V Dead band: -0.35~0 V Normal: 0~10 V Dead band: 10~10.35 V Over range: 10.35~15 V
	Under-range diagnosis	Under range	
	Over limit diagnosis	Over limit	
	Under limit diagnosis	Under limit	
Channel diagnosis (Range ±10V)	Over range diagnosis	Over range	Under range: -15~-10.35 V Dead band: -10.35~-10 V Normal: -10~10 V Dead band: 10~10.35 V Over range: 10.35~15 V
	Under-range diagnosis	Under range	
	Over limit diagnosis	Over limit	
	Under limit diagnosis	Under limit	

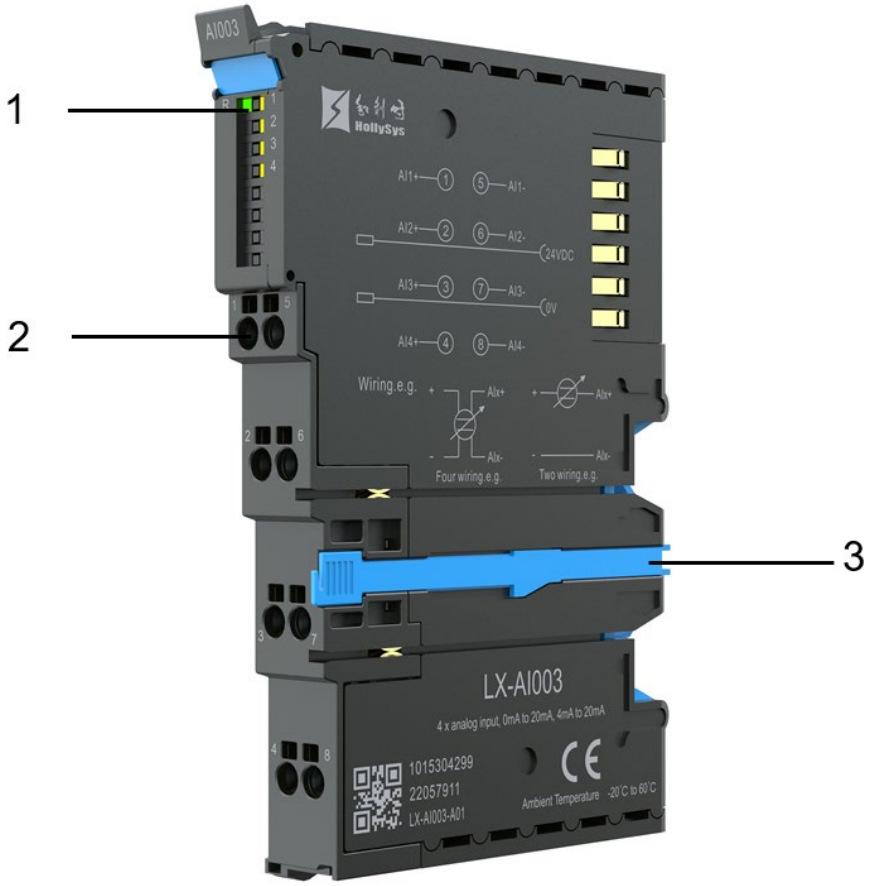
11.6.4 LX-AI003 4-channel Current Type Analog Input Module

LX-AI003 is the AI module of LX series PLC products. It is a current-type analog input module that converts field-side electrical signals into digital signals and reports them to the CPU module through the backboard bus.

1. Basic Features

- Support current ranges 0~20 mA and 4~20 mA;
- Support upper and lower range diagnosis;
- Support users to set channel upper and lower limit settings and diagnosis;
- Supports 4~20 mA disconnection diagnosis;
- Support data collection filtering;
- Support power frequency filtering mode;
- Support independent channel enable/disable.

2. Module components

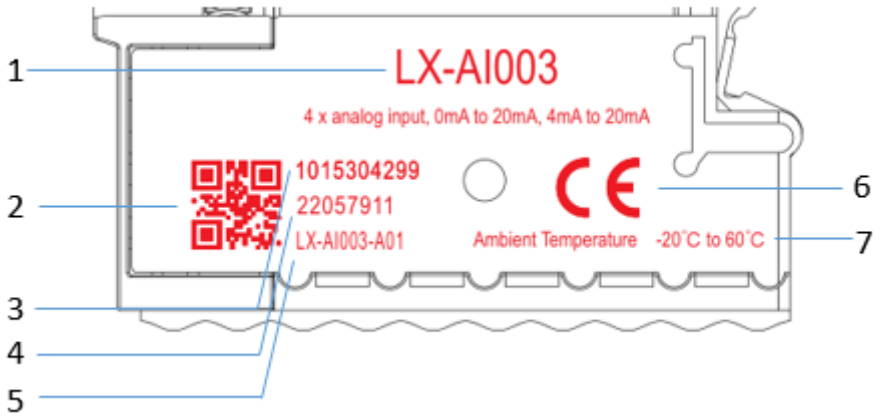


Schematic diagram of the LX-AI003 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	Module operation status indicator (R), channel enable status indicators (1~4)
2	Wiring Terminal	Connect 4-channelcurrent input signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	4-channel current type analog input module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.6.4.1 Technical Indicators

1. General indicators

Item	Specifications
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
System power supply voltage range	19.2~28.8VDC
System side power consumption	Max 1.5W

3. Channel indicators

Item	Specifications
Number of channels	4
Signal type	Single-ended/differential
Input method	Current

Range	0~20 mA	4~20 mA
Range code value range	0 ~ 32767	
Resolution	24-bit	
Maximum input signal	25 mA	
Convert time	330μs/channel	
Full channel scan time	1.6ms	
Step response time	2ms	
Measurement accuracy (full temperature range)	0.3% F.S.	
Channel filtering	No filtering, 4 points (default), 8 points, 16 points, 32 points Each channel is configured independently	
50Hz/60Hz power frequency filtering	Support	
Input impedance	250±1Ω	
Common mode rejection ratio	90dB	
Common mode rejection ratio	60dB	
Channel diagnosis function	Line break detection	0~20mA is not supported; 4~20mA is supported
	Exceeding limits (upper and lower)	Support
	Over-range (over-range) diagnosis	Support
	Over-range (under-range) diagnosis	0~20mA is not supported; 4~20mA is supported
Channel cable	Shielding line	
Channel isolation	Not supported	
Field and system isolation withstand voltage	1000 VAC	

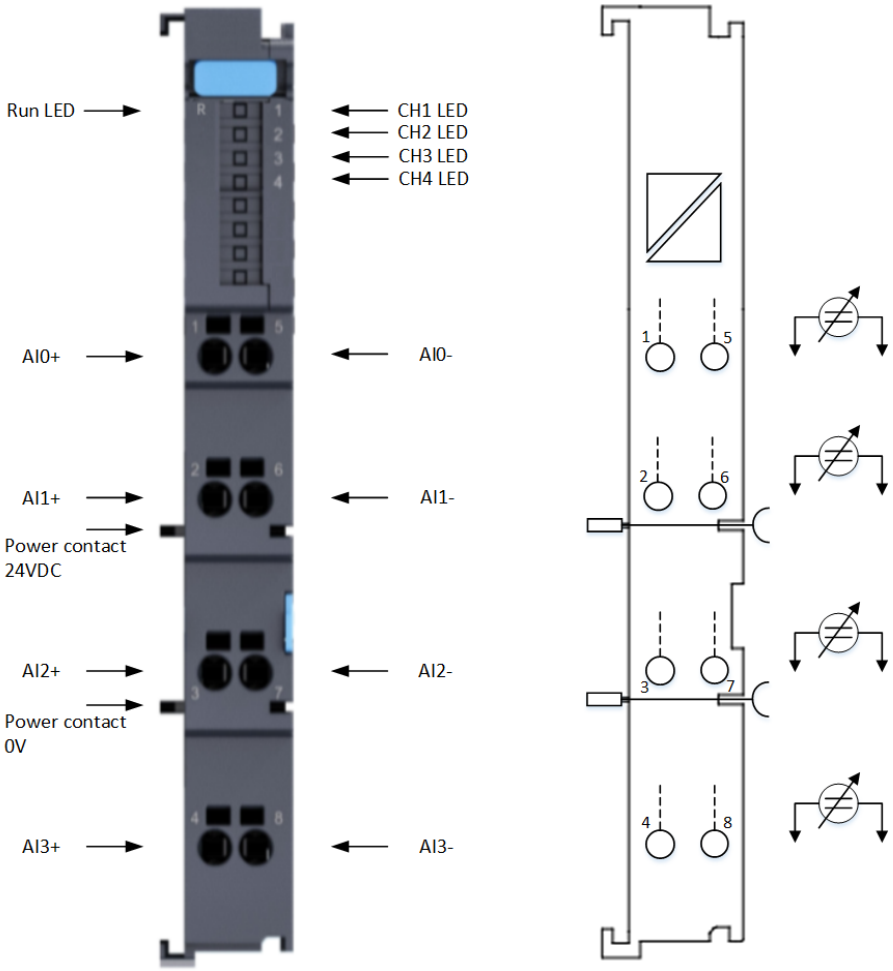
11.6.4.2 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
CH1~CH4)	Channel status indicator	Yellow	Channel status indication On: channel ON Off: channel OFF
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)

11.6.4.3 Description of Terminal Components

The terminal signal schematic diagram is as follows:



he definition of terminals

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	AI0+	Channel 1 positive	5	AI0-	Channel 1 negative
2	AI1+	Channel 2 positive	6	AI1-	Channel 2 negative
3	AI2+	Channel 3 positive	10	AI2-	Channel 3 negative
4	AI3+	Channel 4 positive	12	AI3-	Channel 4 negative

11.6.4.4 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Configuration Description (Default)
Device Filter Mode	Full channel power frequency filtering	No filtering 50Hz/60Hz	No filtering
Channel State	Channel enabling	Enable/disable	Enable
Channel Filter	Channel digital filtering	No filtering, 4 points (default), 8 points, 16 points, 32 points. Each channel is configured independently.	4 points
Channel Range	Channel range	0~20mA 4~20mA	0~20mA
Channel Over Limit	Channel upper limit	-32768~32767	32767

Value			
Channel Under Limit Value	Channel lower limit	-32768~32767	-32768

EtherCAT IO mapping channel data

Channel Parameter Name	Parameter Meaning	Parameter Value
UnderRange	Under range	FALSE: normal TRUE: under range
OverRange	Over range	FALSE: normal TRUE: over range
Underlimit	Under limit	FALSE: normal TRUE: under limit
Overlimit	Over limit	FALSE: normal TRUE: over limit
Value	Channel code value	Channel code value

- The underlimit setting cannot be greater than the overlimit setting, otherwise, both the underlimit and overlimit alarms will be triggered simultaneously.

11.6.4.5 Diagnostic Alarm

The analog current signal collection module supports diagnostic functions including: over-range, under-range, over limit, under limit, and disconnection (for under-range and disconnection, it only supports the range of 4~20 mA).

Description of diagnostic information

Type	Parameters	Fault Name	Diagnostic Information
Channel diagnosis (Range0~20mA)	Under limit diagnosis	Under limit	Normal: 0~20mA Dead band: 20~21mA Over range: 21~22.5mA Short circuit: 22.5~25 mA
	Over limit diagnosis	Over limit	
	Over-range diagnosis	Over range	
Channel diagnosis (Range 4~20mA)	Disconnection detection	Channel disconnected	Circuit breaker: 0~0.75 mA Under range: 0.75~3.6 mA Dead band: 3.6~4 mA Normal: 4~20 mA Dead band: 20~21 mA Over range: 21~22.5mA Short circuit: 22.5~25 mA
	Over limit diagnosis	Over limit	
	Under limit diagnosis	Under limit	
	Under-range diagnosis	Under range	
	Over range diagnosis	Over range	

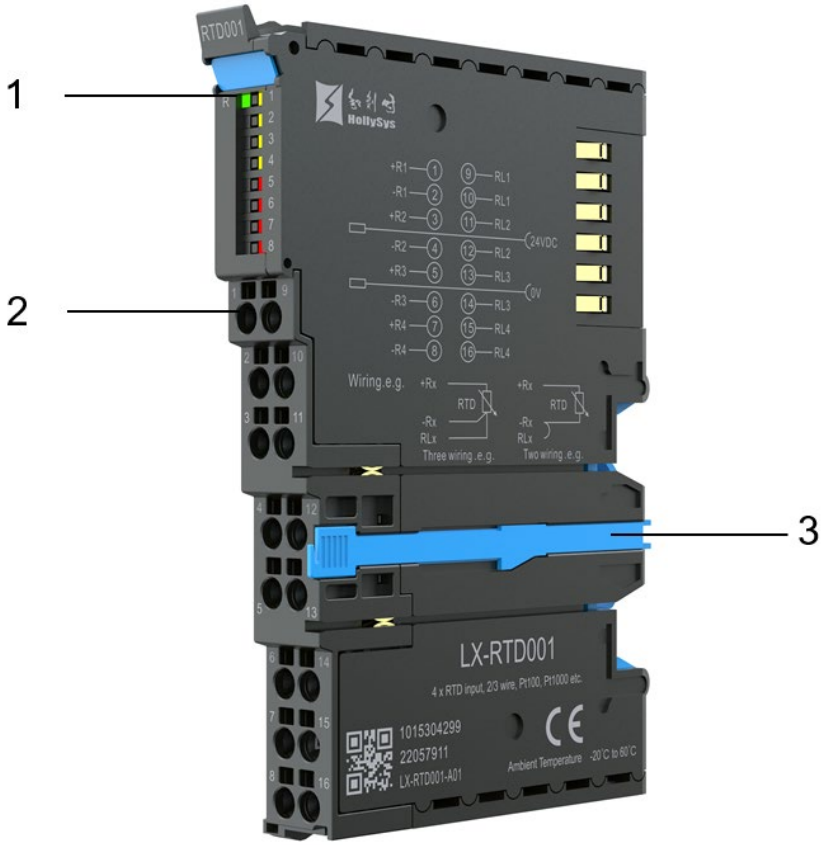
11.7 RTD Module

11.7.1 LX-RTD001 4-channel RTD Analog Input Module

11.7.1.1 Product Overview

LX-RTD001 is the RTD module of LX series PLC products. It is a RTD analog input module that converts field-side temperature signals into digital signals and reports them to the CPU module through the backboard bus.

1. Basic Features
   - Supports resistance range of 10Ω to 4kΩ;
   - Supports upper and lower limit diagnosis of measurement range;
   - Supports user setting of upper and lower limits for channel settings and diagnosis;
   - Supports data filtering during acquisition;
   - Supports power frequency filtering mode;
   - Supports independent channel enable/disable.
2. Module components

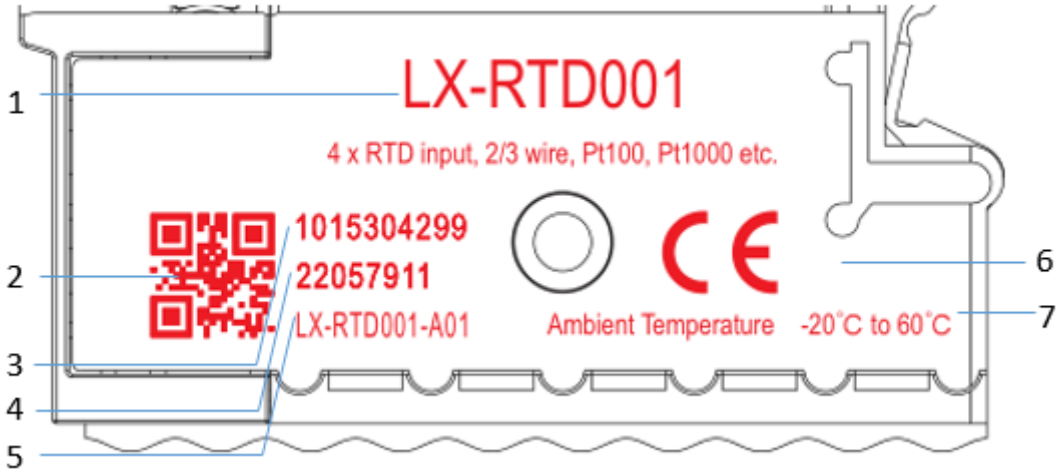


Schematic diagram of the LX-RTD001 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	Module operation status indicator light (R), 4-channel enable status indicator lights
2	Wiring Terminal	Connect 4-channel voltage input signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	4-channel RTD analog input module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.7.1.2 Technical Indicators

1. General indicators

Item	Specifications
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
Power supply mode	Power supply via LX-bus interface
Voltage range	19.2~28.8VDC
System side power consumption	Max 1.2W

3. Channel indicators

Item	Specifications
Number of channels	4
Signal type	2/3 wire resistance input 2/3 wire RTD signal input

Supported RTD type	Pt100-385, Pt200-385, Pt500-385,Pt1000-385 Pt100-3916, Pt200-3916, Pt500-3916,Pt1000-3916 Ni100-618, Ni120-618
Temperature range	-200…+870℃（Pt385） -200…+630℃（Pt3916） -60…+250°C（Ni）
Resistance range	10Ω～4kΩ
Temperature measurement error	< ±0.5 °C （Pt sensors, 3-wire） < ±0.9°C （Ni sensors） < ±1 °C （Pt sensors, 2-wire）
Maximum error in resistance measurement	0.1% F.S.@ (full temperature range)
Maximum range of the scale code value	-2147483648～2147483647
Temperature measurement resolution	0.01℃(Thermal resistor)
Resistance measurement resolution	0.01Ω
Convert time	Single channel 200ms, full channel 500ms
Channel filtering	Support, configurable selection
Input impedance	≥10MΩ
Common mode rejection ratio	100dB
Differential mode rejection ratio	60dB
Channel diagnosis function	Supports disconnection diagnosis, over-limit diagnosis, and over-range diagnosis
Channel cable	Shielding line
Cable length	Max 100m
Channel isolation	Not supported
Isolation withstand voltage	1000VAC
Configuration method	4 bytes represent one channel

11.7.1.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
CH1~CH4)	Channel status indicator	Yellow	Channel status indication On: channel ON Off: channel OFF
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
ERRx	Channel status indicator	Red	On: The corresponding channel fault status is enabled and a fault is detected Off: The corresponding channel fault status is not enabled, or enabled but no fault is detected

11.7.1.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:

The definition of terminals

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	+R0	Channel 1 positive	9	RL0	Channel 1 common terminal
2	-R0	Channel 1 negative	10	RL0	Channel 1 common terminal
3	+R1	Channel 2 positive	11	RL1	Channel 2 common terminal
4	-R1	Channel 2 negative	12	RL1	Channel 2 common terminal
5	+R2	Channel 3 positive	13	RL2	Channel 3 common terminal
6	-R2	Channel 3 negative	14	RL2	Channel 3 common terminal
7	+R3	Channel 4 positive	15	RL3	Channel 4 common terminal
8	-R3	Channel 4 negative	16	RL3	Channel 4 common terminal

11.7.1.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Configuration Description (Default)
All Channel filter Type	Full channel power frequency filtering	No filtering 50 Hz 60 Hz	No filtering
All value Type	Full channel value type	Celsius temperature	Celsius temperature

		Resistance	
Channel State	Channel enabling	Enable Disable	Enable
Channel Wire Type	Channel wiring type	2-wire 3-wire	3-wire
Channel Filter	Channel digital filtering	No filtering 4 points 8-point 16 points 32-point	16 points
Channel Range	Channel range	Pt100-385 Pt100-3916 Pt200-385 Pt200-3916 Pt500-385 Pt500-3916 Pt1000-385 Pt1000-3916 Ni100-618 Ni120-618	Pt100-385
Channel Break Wire Diag	Channel disconnection diagnosis enable	Enable Disable	Disable
Channel Break Wire Safety Value	Channel disconnection safety value	Hold Maximum value Minimum value	Hold
Channel Over Range Diag	Channel over-range diagnosis enable	Enable Disable	Disable
Channel Over Limit Value	Channel upper limit	-2147483648 ~2147483647	2147483647
Channel Under Limit Value	Channel lower limit	-2147483648 ~2147483647	-2147483648

EtherCAT IO mapping channel data

Channel Parameter Name	Parameter Meaning	Parameter Value
UnderRange	Under range	FALSE: normal TRUE: under range
OverRange	Over range	FALSE: normal TRUE: over range
Break line	Disconnection	FALSE: normal TRUE: disconnection
Underlimit	Under limit	FALSE: normal TRUE: under limit
Overlimit	Over limit	FALSE: normal TRUE: over limit
Value	Channel code value	Channel code value

- 

- The underlimit setting cannot be greater than the overlimit setting, otherwise, both the underlimit and overlimit alarms will be triggered simultaneously.
- When wiring the module in a 2-wire configuration, the common terminal must be shorted to the channel negative.

11.7.1.6 Diagnostic Alarm

Channel diagnosis includes disconnection diagnosis, over-range diagnosis, under-range diagnosis, over limit diagnosis and under limit diagnosis. The diagnostic information is uploaded to the main control module through PDO data.

Description of diagnostic information

Type	Parameters	Fault Name	Diagnostic Information
Channel diagnosis	Disconnection diagnosis	Disconnected	It takes effect after disconnection diagnosis is enabled. When the channel has no external signal, it is considered to be disconnected. **TRUE** is uploaded for disconnection diagnosis, and **FALSE** is uploaded for normal operation. The disconnection diagnosis has the highest priority in all channel diagnoses. When a disconnection occurs, only the disconnection diagnosis is reported, and other diagnoses are not reported.
	Over range diagnosis	Over range	When the voltage value collectedexceeds the corresponding range for the the thermocouple type of the channel by 3‰, it is consideredover-range, 2‰~3‰ of the range isconsidered as dead band. **TRUE** is for over-range diagnosis and **FALSE** for normal operation.
	Under-range diagnosis	Under range	When the collected voltage value is less than the voltage value range corresponding to the channel thermocouple type and exceeds by 3‰, it is considered to be under-range, and if by 2‰~3‰, it is considered to be a dead band. **TRUE** is uploaded for under-range diagnosis, and **FALSE** is uploaded for normal operation.
	Over limit diagnosis	Over limit	The module allows for the configuration of the upper limit of code values through parameters. If the uploaded code value exceeds this upper limit setting, it will be considered as exceeding the limit.**TRUE** indicates an over-limit situation, while **FALSE** indicates normal operation.
	Under limit diagnosis	Under limit	The module can configure the lower limit of the code value through parameters. When the uploaded code value is less than the set lower limit, it is considered to have exceeded the lower limit. **TRUE** is uploaded for under limit, and **FALSE** is uploaded for normal operation.

11.8 TC Module

11.8.1 LX-TC001 4-channel Thermocouple Analog Input Module

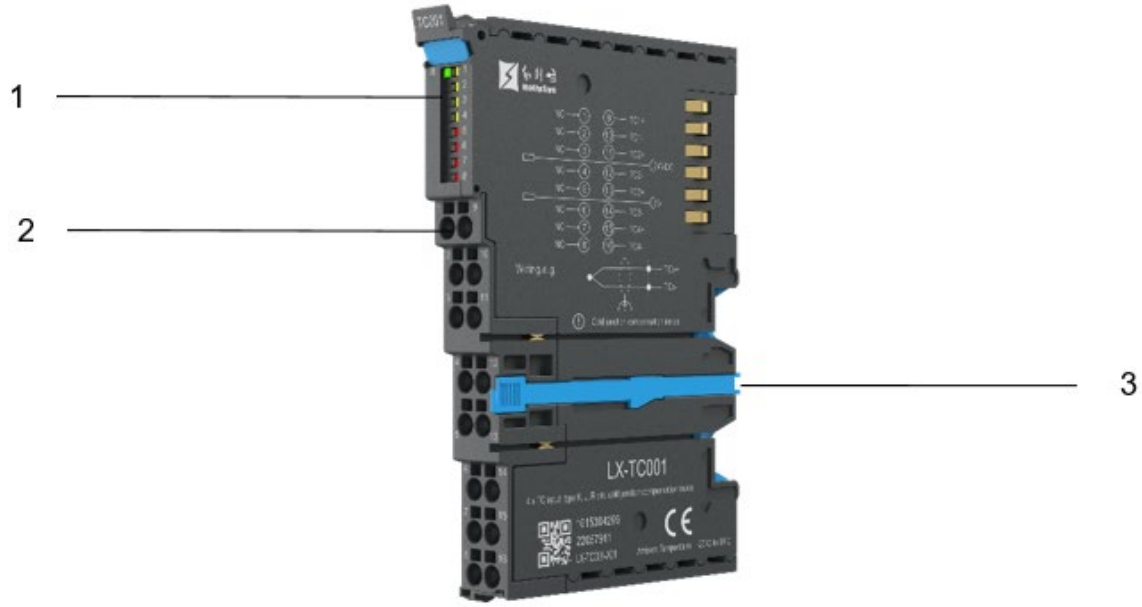
11.8.1.1 Product Overview

LX-TC001 is a thermocouple type analog input module that converts the temperature signal on the field side into a digital signal and reports it to the CPU module through the backboard bus.

1. Basic Features
   - Support upper and lower range diagnosis;
   - Support users to set channel upper and lower limit settings and diagnosis;

- Support disconnection diagnosis;
- Support data collection filtering;
- Support power frequency filtering mode;
- Support independent channel enable/disable;
- Support channel internal cold junction compensation.

2. Module components

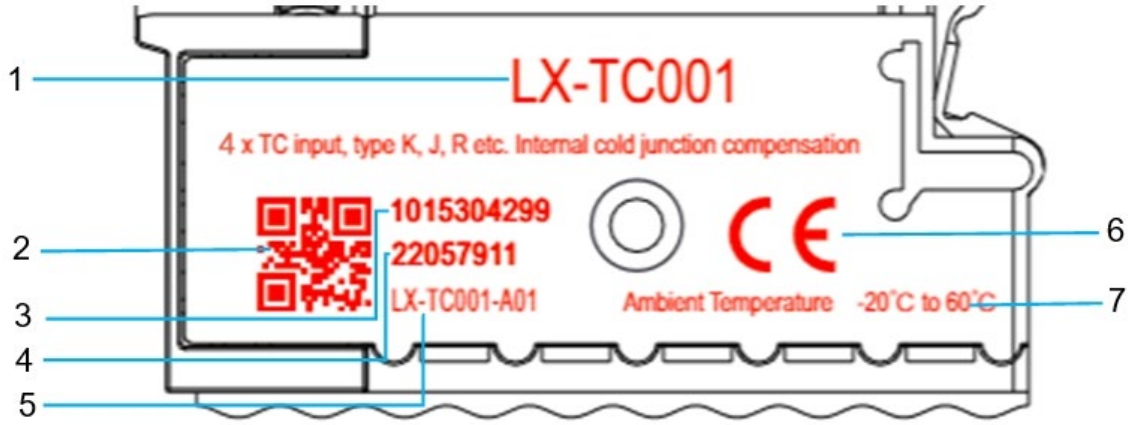


Schematic diagram of the LX-TC001 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	Module operation status indicator (R), 4-channel enable status indicators 1~4, indicating the enable status of the channels
2	Wiring Terminal	Connect 4 channels of thermocouple input signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	4-channel thermocouple analog input module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.8.1.2 Technical Indicators

1. General indicators

Item	Specifications
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
System power voltage range	19.2~28.8VDC
System side power consumption	Max 1.2W

3. Channel indicators

Item	Specifications
Number of channels	4
Signal type	Small signal mV voltage input Thermocouple signal input

Temperature range	mV voltage: ±75 mV Type B: +200...+1820℃ Type C: 0...+2320℃ Type E: -100...+1000℃ Type J: -100...+1200℃ Type K: -270…+1370℃ (default) Type N: -100…+1300℃ Type R: -50...+1767℃ Type S: -50...+1760℃ Type T: -200…+400℃
Maximum range of the scale code value	-2147483648 ~ 2147483647
Resolution	0.02℃ (thermocouple) 0.001 mV (voltage)
Maximum temperature error	mV voltage: ±0.1%FS Room temperature (25℃±2℃), measurement error when using internal cold junction compensation Type B: ±8.5℃, test range 0~300℃, which does not guarantee accuracy; Type C: ±6.2℃; Type E: ±2.5℃; Type J: ±2.7℃; Type K: ±3℃, test range -270~-200℃, which does not guarantee accuracy; Type N: ±3℃, test range -270~-200℃, which does not guarantee accuracy; Type R: ±6.7℃; Type S: ±7.1℃; Type T: ±2.9℃;
Switching time	Channel 4: 200 ms; channel 2: 100 ms
Channel filtering	Support, configurable selection
Input impedance	≥10MΩ
Common mode rejection ratio	100dB
Differential mode rejection ratio	60dB
Channel diagnosis function	Supports disconnection diagnosis, over-limit diagnosis, and over-range diagnosis
Channel cable	Shielding line
Cable length	Max 30m
Channel isolation	Fault isolation
Cold end compensation temperature range	-20 ~ 60℃
Cold end compensation method	Supports internal cold end compensation
Isolation withstand voltage	Channel to system, ≥1000VAC@1min@5mA

11.8.1.3 Status Indicators

The indicator statuses are described as follows:

Color	Name	Meaning
Green	RUN	Determined by the EtherCAT slave station status machine;

		Flashing(200 ms high, 200 ms low): Initialization state （Init） , module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)
Yellow	CHx	On: The corresponding channel is enabled Off: The corresponding channel is not enabled
Red	ERRx	On: The corresponding channel fault status is enabled and a fault is detected Off: The corresponding channel fault status is not enabled, or enabled but no fault is detected

11.8.1.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:

The definition of terminals

Terminal Identification	Description of Signals	Description	Terminal Identification	Description of Signals	Description
1	NC	Not connected	9	TC0+	Channel 1 positive
2	NC	Not connected	10	TC0-	Channel 1 negative
3	NC	Not connected	11	TC1+	Channel 2 positive
4	NC	Not	12	TC1-	Channel 2

		connected			negative
5	NC	Not connected	13	TC2+	Channel 3 positive
6	NC	Not connected	14	TC2-	Channel 3 negative
7	NC	Not connected	15	TC3+	Channel 4 positive
8	NC	Not connected	16	TC3-	Channel 4 negative

11.8.1.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Configuration Description (Default)
All Channel filter Type	Full channel power frequency filtering	No filtering 50 Hz 60 Hz	No filtering
Channel State	Channel enabling	Enable Disable	Enable
Channel Filter	Channel digital filtering	No filtering 4 points 8-point 16 points 32-point	16 points
Channel Range	Channel range	Each channel is independently configured -75~75mV, Type B: +200...+1820 °C Type C: 0...+2320 °C Type E: -100...+1000 °C Type J: -100...+1200 °C Type K: -270…+1370°C Type N: -100…+1300 °C Type R: -50...+1767 °C Type S: -50...+1760 °C Type T: -200…+400 °C	Type K: -270…+1370°C
Channel Cold junction compensation	Internal cold end compensation of the channel	Disable Enable For the voltage range, there is no cold junction compensation; ignore this parameter.	Enable
Channel Break Wire Diag	Channel disconnection diagnosis enable	Enable Disable	Disable
Channel Break Wire Safety Value	Channel disconnection safety value	Hold Maximum value Minimum value	Hold
Channel Over Range Diag	Channel over-range diagnosis enable	Enable Disable	Disable
Channel Over Limit Value	Channel upper limit	-2147483648 ~2147483647	2147483647
Channel Under Limit Value	Channel lower limit	-2147483648 ~2147483647	-2147483648

EtherCAT IO mapping channel data

Channel Parameter Name	Parameter Meaning	Parameter Value
UnderRange	Under range	FALSE: normal

		TRUE: under range
OverRange	Over range	FALSE: normal TRUE: over range
Break line	Disconnection	FALSE: normal TRUE: disconnection
Underlimit	Under limit	FALSE: normal TRUE: under limit
Overlimit	Over limit	FALSE: normal TRUE: over limit
Value	Channel code value	Channel code value

- The underlimit setting cannot be greater than the overlimit setting, otherwise, both the underlimit and overlimit alarms will be triggered simultaneously.

11.8.1.6 Diagnostic Alarm

The diagnostic information of the 4-channel thermocouple type analog input module includes module diagnosis and channel diagnosis. The module diagnosis includes software/hardware version numbers, which can be obtained by reading SDO data. Channel diagnosis includes disconnection diagnosis, over-range diagnosis, under-range diagnosis, over limit diagnosis and under limit diagnosis. The diagnostic information is uploaded to the main control module through PDO data.

Description of diagnostic information

Type	Parameters	Fault Name	Diagnostic Information
Channel diagnosis	Disconnection diagnosis	Disconnected	It takes effect after being enabled. Each channel is independently configured to enable or not (not enabled by default). When the channel has no external signal, it is considered to be disconnected. At this time, the online value of **Break Wire** of the corresponding channel in the **EtherCATIO** mapping interface is **TRUE**. The disconnection diagnosis has the highest priority in all channel diagnoses. When a disconnection occurs, only the disconnection diagnosis is reported, and other diagnoses are not reported.
	Over range diagnosis	Over range	It takes effect after being enabled. Each channel is independently configured to enable or not (not enabled by default). When the collected voltage value is greater than the voltage value range corresponding to the channel thermocouple type and exceeds by 3‰, it is considered to be over-range, and if by 2‰~3‰, it is considered to be a dead band. **TRUE** is uploaded for over-range diagnosis, and **FALSE** is uploaded for normal operation.
	Under-range diagnosis	Under range	It takes effect after being enabled. Each channel is independently configured to enable or not (not enabled by default). When the collected voltage value is less than the voltage value range corresponding to the channel thermocouple type and exceeds by 3‰, it is considered to be under-range, and if by 2‰~3‰, it is considered to be a dead band. **TRUE** is uploaded for under-range diagnosis, and **FALSE** is uploaded for normal operation.
	Over limit diagnosis	Over limit	The module can configure the upper limit of the code value through parameters. When the uploaded code value is greater than the set upper limit, it is considered to have exceeded the upper limit. **TRUE** is uploaded for over limit, and **FALSE** is uploaded for normal operation. For example: when the channel range is set to -70~75 mV and the channel over limit value is set to 100, if the channel input is 75 mV (code value 7500), the diagnosis reports a fault: upper limit. At this time, the online value of

			OverLimit of the corresponding channel in the **EtherCATIO** mapping interface is **TRUE**.
	Under limit diagnosis	Under limit	The lower limit of the code value can be configured through parameters. When the uploaded code value is less than the set lower limit, it is considered to be under limit. **TRUE** is uploaded for under limit, and **FALSE** is uploaded for normal operation. For example: when the channel range is set to -70~75 mV and the channel under limit value is set to -100, if the channel input is 75 mV (code value -7500), the diagnosis reports a fault: under limit. At this time, the online value of **UnderLimit** of the corresponding channel in the **EtherCATIO** mapping interface is **TRUE**.

11.8.2 LX-TC601 4-channel High-precision Thermocouple Type Analog Input Module

11.8.2.1 Product Overview

LX-TC601 is a thermocouple type analog input module that converts the temperature signal on the field side into a digital signal and reports it to the CPU module through the backboard bus.

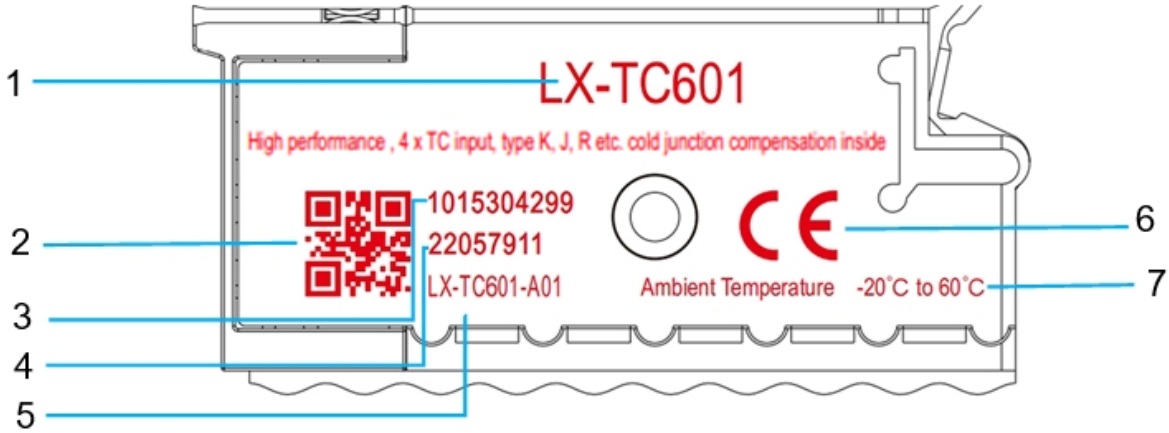
1. Basic Features
   - Support upper and lower range diagnosis;
   - Support users to set channel upper and lower limit settings and diagnosis;
   - Support disconnection diagnosis;
   - Support data collection filtering;
   - Support power frequency filtering mode;
   - Support independent channel enable/disable;
   - Support channel internal cold junction compensation.
2. Module components

Schematic diagram of the LX-TC601 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	Module operation status indicator (R), 4-channel enable status indicators 1~4, indicating the enable status of the channels
2	Wiring Terminal	Connect 4 channels of thermocouple input signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	4-channel high-precision thermocouple type analog input module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.8.2.2 Technical Indicators

1. General indicators

Item	Specifications
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
Power supply mode	Power supply via LX-bus interface
Power voltage range	19.2~28.8VDC
System side power consumption	Max 1.2W

3. Channel indicators

Item	Specifications
Number of channels	4
Signal type	Small signal mV voltage input Thermocouple signal input
Measurement range	mV voltage: ±30/±60/±75mV, three options available Type R: -50…+1768°C

	Type S: -50…+1768°C Type B: 0…+1820°C Type J: -210...+1200°C Type T: -270…+400°C Type E: -270…+1000°C Type K: -270…+1300°C (default) Type N: -270…+1300°C Type C: 0…2315°C
Maximum range of the scale code value	-2147483648 ~ 2147483647
Resolution	0.02℃ (thermocouple) 0.001 mV (voltage)
Maximum temperature error	mV voltage: 0.05% F.S R type: ±1.0℃ S type: ±1.0℃ B type: ±1.5℃ J type: ±0.5℃ T type: ±0.5℃ E type: ±0.4℃ K type: ±0.4℃ N type: ±0.6℃ C type: ±0.5℃
Data stability	Channel default configuration: 0.5°C Enable 50Hz/60Hz power frequency filter: 0.3°C
Switching time	Channel 4: 200 ms; channel 2: 100 ms
Channel filtering	Support, configurable selection
Input impedance	≥10MΩ
Common mode rejection ratio	120dB
Differential mode rejection ratio	60dB
Channel diagnosis function	Supports disconnection diagnosis, over-limit diagnosis, and over-range diagnosis
Channel cable	Shielding line
Cable length	Max 30m
Channel isolation	Fault isolation
Cold end compensation temperature range	-20 ~ 60℃
Cold end compensation temperature measurement accuracy	±1℃
Cold end compensation method	Supports internal cold end compensation
Cold end compensation channel diagnosis	Supports open circuit diagnosis, normal display when data is out of range, but accuracy is not guaranteed. Channel open circuit uses the default temperature value of 30°C as a substitute.
Isolation withstand voltage	Channel to system, ≥1000VAC@1min@5mA

11.8.2.3 Status Indicators

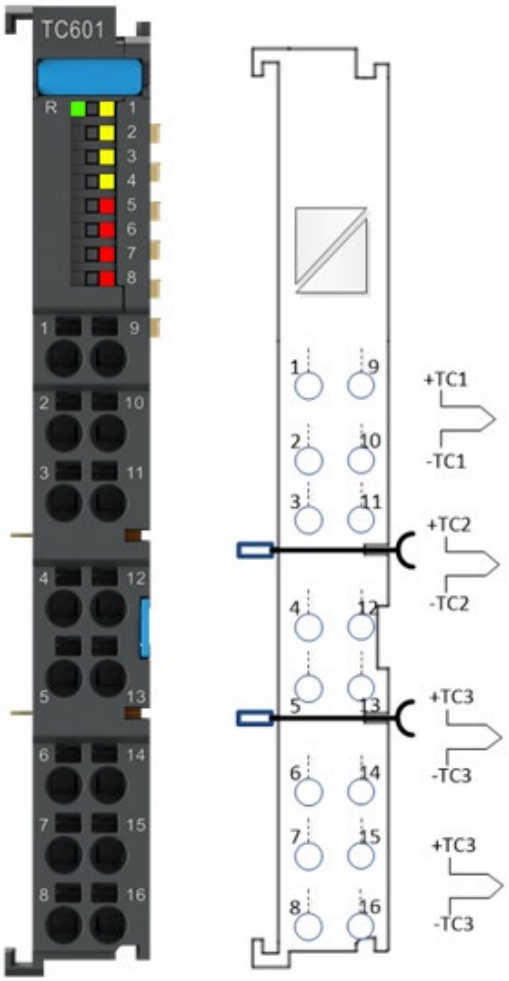
The indicator statuses are described as follows:

Color	Name	Meaning
Green	RUN	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module

		not online (SafeOP) Always on: Module is running (OP)
Yellow	CHx	On: The corresponding channel is enabled Off: The corresponding channel is not enabled
Red	ERRx	On: The corresponding channel fault status is enabled and a fault is detected Off: The corresponding channel fault status is not enabled, or enabled but no fault is detected

11.8.2.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

Terminal Identification	Description of Signals	Description	Terminal Identification	Description of Signals	Description
1	NC	Not connected	9	TC0+	Channel 1 positive
2	NC	Not connected	10	TC0-	Channel 1 negative
3	NC	Not connected	11	TC1+	Channel 2 positive
4	NC	Not connected	12	TC1-	Channel 2 negative

5	NC	Not connected	13	TC2+	Channel 3 positive
6	NC	Not connected	14	TC2-	Channel 3 negative
7	NC	Not connected	15	TC3+	Channel 4 positive
8	NC	Not connected	16	TC3-	Channel 4 negative

11.8.2.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Configuration Description (Default)
All Channel filter Type	Full channel power frequency filtering	No filtering 50 Hz 60 Hz	No filtering
Channel State	Channel enabling	Enable Disable	Enable
Channel Filter	Channel digital filtering	No filtering 4 points 8-point 16 points 32-point	16 points
Channel Range	Channel range	Each channel is independently configured -30~30mV -60~60mV -75~75mV Type B: 0 ~ 1820°C Type C: 0 ~ 2315°C Type E: -270 ~ 1000°C Type J: -210 ~ 1200°C Type K: -270 ~ 1300°C Type N: -270 ~ 1300°C Type R: -50 ~ 1768°C Type S: -50 ~ 1768°C Type T: -270 ~ 400°C	Type K: -270 ~ 1300°C
Channel Cold junction compensation	Internal cold end compensation of the channel	Disable Enable For the voltage range, there is no cold junction compensation; ignore this parameter.	Enable
Channel Break Wire Diag	Channel disconnection diagnosis enable	Enable Disable	Disable
Channel Break Wire Safety Value	Channel disconnection safety value	Hold Maximum value Minimum value	Hold
Channel Over Range Diag	Channel over-range diagnosis enable	Enable Disable	Disable
Channel Over Limit Value	Channel upper limit	-2147483648 ~2147483647	2147483647
Channel Under Limit Value	Channel lower limit	-2147483648 ~2147483647	-2147483648

EtherCAT IO mapping channel data

Channel Parameter Name	Parameter Meaning	Parameter Value

UnderRange	Under range	FALSE: normal TRUE: under range
OverRange	Over range	FALSE: normal TRUE: over range
Break line	Disconnection	FALSE: normal TRUE: disconnection
Underlimit	Under limit	FALSE: normal TRUE: under limit
Overlimit	Over limit	FALSE: normal TRUE: over limit
ColdBreakLine	Cold end compensation wire break diagnosis	FALSE: normal TRUE: disconnection
Value	Channel code value	Channel code value

- The underlimit setting cannot be greater than the overlimit setting, otherwise, both the underlimit and overlimit alarms will be triggered simultaneously.

11.8.2.6 Diagnostic Alarm

The diagnostic information of the 4-channel thermocouple type analog input module includes module diagnosis and channel diagnosis. The module diagnosis includes software/hardware version numbers, which can be obtained by reading SDO data. Channel diagnosis includes disconnection diagnosis, over-range diagnosis, under-range diagnosis, over limit diagnosis and under limit diagnosis. The diagnostic information is uploaded to the main control module through PDO data.

Description of diagnostic information

Type	Parameters	Fault Name	Diagnostic Information
Channel diagnosis	Disconnection diagnosis	Disconnected	It takes effect after being enabled. Each channel is independently configured to enable or not (not enabled by default). When the channel has no external signal, it is considered to be disconnected. At this time, the online value of **Break Wire** of the corresponding channel in the **EtherCATIO** mapping interface is **TRUE**. The disconnection diagnosis has the highest priority in all channel diagnoses. When a disconnection occurs, only the disconnection diagnosis is reported, and other diagnoses are not reported.
	Over range diagnosis	Over range	It takes effect after being enabled. Each channel is independently configured to enable or not (not enabled by default). When the collected voltage value is greater than the voltage value range corresponding to the channel thermocouple type and exceeds by 3‰, it is considered to be over-range, and if by 2‰~3‰, it is considered to be a dead band. **TRUE** is uploaded for over-range diagnosis, and **FALSE** is uploaded for normal operation.
	Under-range diagnosis	Under range	It takes effect after being enabled. Each channel is independently configured to enable or not (not enabled by default). When the collected voltage value is less than the voltage value range corresponding to the channel thermocouple type and exceeds by 3‰, it is considered to be under-range, and if by 2‰~3‰, it is considered to be a dead band. **TRUE** is uploaded for under-range diagnosis, and **FALSE** is uploaded for normal operation.
	Over limit diagnosis	Over limit	The module can configure the upper limit of the code value through parameters. When the uploaded code value is greater than the set upper limit, it is considered to have exceeded the upper limit. **TRUE** is uploaded

			for over limit, and **FALSE** is uploaded for normal operation. For example: when the channel range is set to -70~75 mV and the channel over limit value is set to 100, if the channel input is 75 mV (code value 7500), the diagnosis reports a fault: upper limit. At this time, the online value of **OverLimit** of the corresponding channel in the **EtherCATIO** mapping interface is **TRUE**.
	Under limit diagnosis	Under limit	The lower limit of the code value can be configured through parameters. When the uploaded code value is less than the set lower limit, it is considered to be under limit. **TRUE** is uploaded for under limit, and **FALSE** is uploaded for normal operation. For example: when the channel range is set to -70~75 mV and the channel under limit value is set to -100, if the channel input is 75 mV (code value -7500), the diagnosis reports a fault: under limit. At this time, the online value of **UnderLimit** of the corresponding channel in the **EtherCATIO** mapping interface is **TRUE**.
	Cold end compensation diagnosis	Cold end compensation	Cold end compensation measurement range -20~60°C, accuracy 1°C. Supports open circuit detection, when the channel is open, cold end compensation uses a fixed 30°C instead. For voltage ranges, there is no cold end compensation, ignore this parameter.

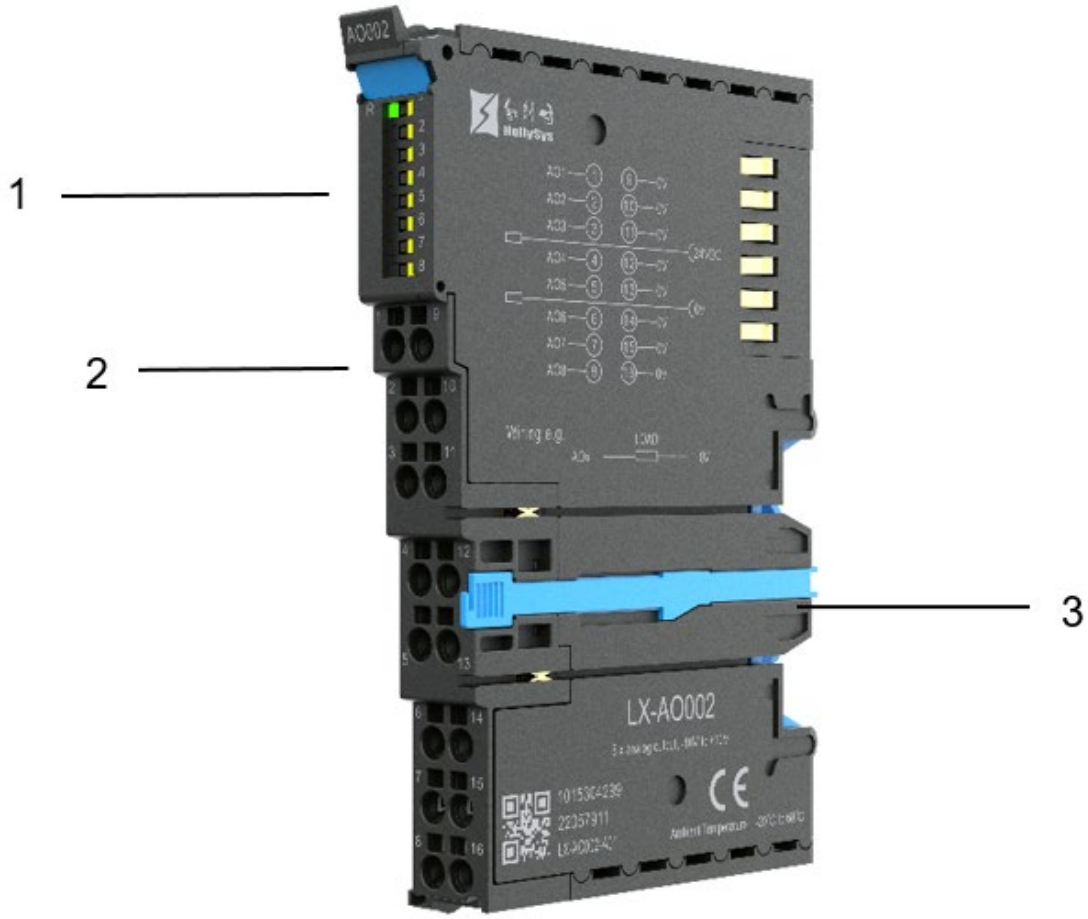
11.9 AO Module

11.9.1 LX-AO002 8-channel Voltage Type Analog Output Module

11.9.1.1 Product Overview

LX-AO002 is the AO module of LX series PLC products. It is a voltage-type analog output module that receives digital signals from the CPU through the backboard bus, converts the digital signals into voltage analog signal output, and drives the field side actuator for action.

1. Basic Features
   - Support range ±10 V;
   - Support channel fault preset;
   - Support independent channel enable/disable.
2. Module components

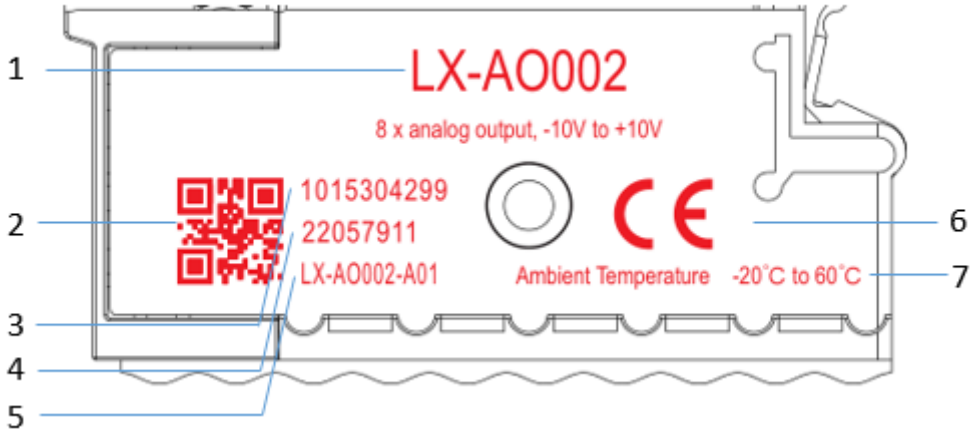


Schematic diagram of the LX-AO002 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	Module operation status indicator (R), 1~8 indicating the enable status of the channels
2	Wiring Terminal	Connect 8-channel voltage output signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	8-channel voltage type analog output module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.9.1.2 Technical Indicators

1. General indicators

Item	Specifications
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
System power voltage range	19.2~28.8VDC
System side power consumption	Max 1.2W
Field power voltage range	19.2~28.8VDC
Field side power consumptio	Max 2.6W (8 channels, each channel with a load of 1kΩ, output 10V; actual power consumption depends on the actual load)

3. Channel indicators

Item	Specifications
Number of channels	8
Output method	Voltage
Range	±10V
Maximum range code value range	-32768～32767
Resolution	16-bit
Output error	±0.3%F.S.
Switching time	250μs/point
Load capacity	>1kΩ
Step response time	100μs
Connection method	Single-ended/Channel for Line 2
Channel diagnosis function range	Not supported
Channel isolation	Not supported
Channel configuration	When there is a system-side power failure or backplane bus fault, the output status can be configured as hold (default), preset value (controller Q area), or reset.
Field and system isolation withstand voltage	1000 VAC

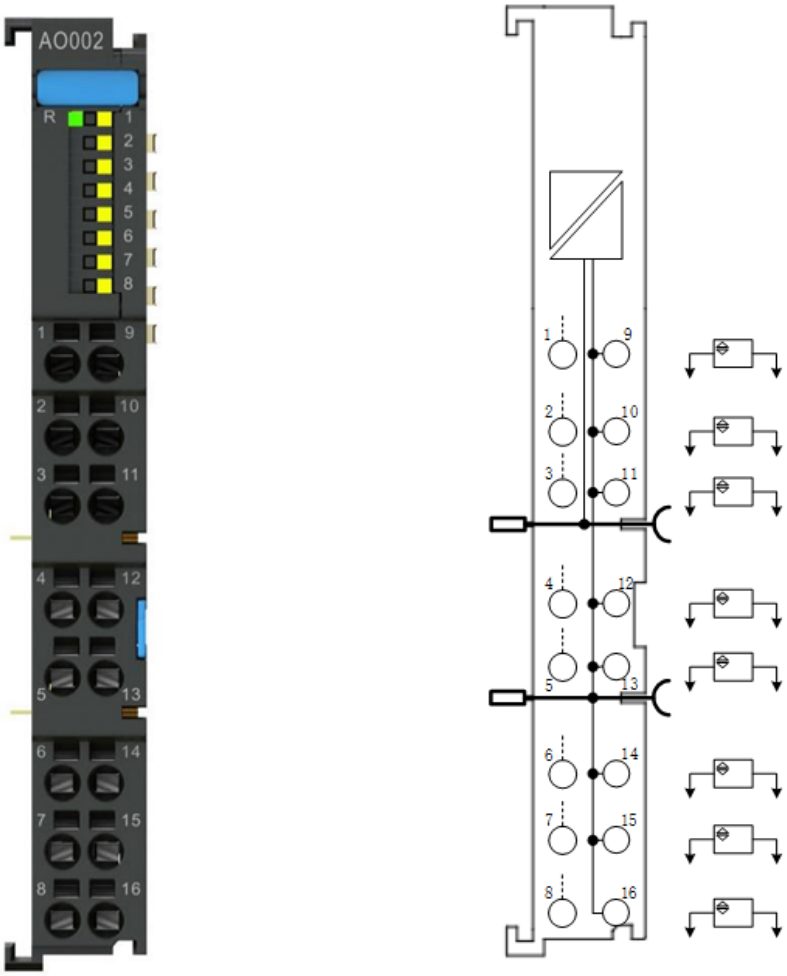
11.9.1.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
CH1~CH8	Channel status indicator	Yellow	Channel status indication On: channel ON Off: channel OFF
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)

11.9.1.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	AO0+	Channel 1 positive	9	AO0-	Channel 1 negative
2	AO1+	Channel 2 positive	10	AO1-	Channel 2 negative
3	AO2+	Channel 3 positive	11	AO2-	Channel 3 negative
4	AO3+	Channel 4 positive	12	AO3-	Channel 4 negative
5	AO4+	Channel 5 positive	13	AO4-	Channel 5 negative
6	AO5+	Channel 6 positive	14	AO5-	Channel 6 negative
7	AO6+	Channel 7 positive	15	AO6-	Channel 7 negative
8	AO7+	Channel 8 positive	16	AO7-	Channel 8 negative

11.9.1.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Configuration Description (Default)
Channel State	Channel enabling	Enable/Disable	Enable
Channel Range	Channel range	-10~10V	-10~10V
Channel Fault Mode Type	Channel safety value	Clear Hold	Hold

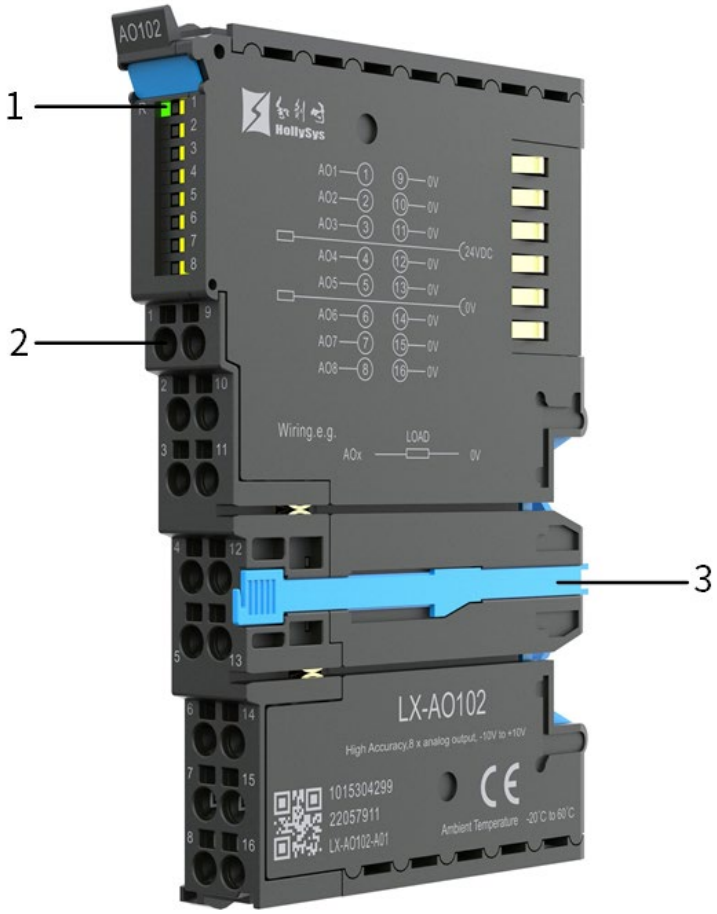
		Preset value	
Channel Fault Mode Value	Preset safety value	-32768~32767	0

11.9.2 LX-AO102 8-channel high-accuracy voltage-type analog output module

11.9.2.1 Product Overview

LX-AO102 is the AO module of LX series PLC products. It is a high-accuracy analog output module that receives digital signals from the CPU through the backboard bus, converts the digital signals into voltage analog signal output, and drives the field side actuator for action.

1. Basic Features
   - Support range ±10 V;
   - Support channel fault preset;
   - Support independent channel enable/disable.
2. Module components

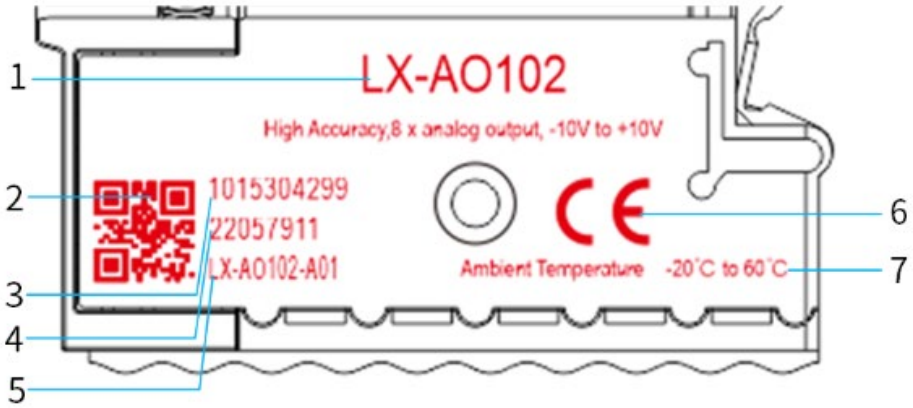


Schematic diagram of the LX-AO102 module

Module component description table

S/N	Component Name	Instructions
1	Channel status indicator	Module operation status indicator (R), 1~8 indicating the enable status of the channels
2	Wiring Terminal	Connect 8-channel voltage output signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	8-channel high-accuracy voltage type analog output module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.9.2.2 Technical Indicators

1. General indicators

Item	Specifications
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

2. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface
System power voltage range	19.2~28.8VDC
System side power consumption	Max 1.2W
Field power voltage range	19.2~28.8VDC
Field side power consumptio	Max 2.6W (8 channels, each channel with a load of 1kΩ, output 10V; actual power consumption depends on the actual load)

3. Channel indicators

Item	Specifications

Number of channels	8
Output method	Voltage
Range	±10V
Maximum range code value range	-32768～32767
Resolution	16-bit, one code value corresponds to one voltage signal resolution
Output error	Precision at ambient temperature (25±5°C): 0.1% FS Precision over full temperature range: 0.3% FS
Switching time	≤ 60us (single channel)
Load capacity	>1kΩ
Step response time	100μs
Connection method	Single-ended/Channel for Line 2
Channel diagnosis function range	Not supported
Channel isolation	Not supported
Channel configuration	When there is a system-side power failure or backplane bus fault, the output status can be configured as hold (default), preset value (controller Q area), or reset.
Field and system isolation withstand voltage	1000 VAC

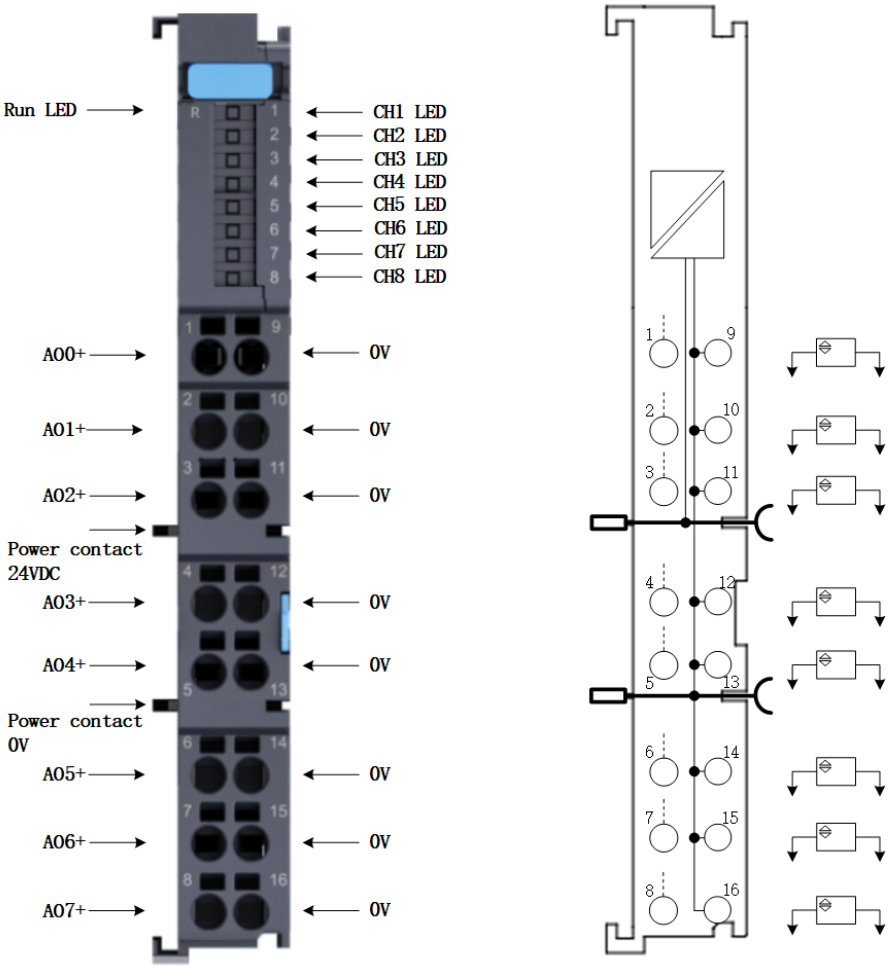
11.9.2.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
CH1~CH8	Channel status indicator	Yellow	Channel status indication On: channel ON Off: channel OFF
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)

11.9.2.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	AO0+	Channel 1 positive	9	0V	Channel 1 negative
2	AO1+	Channel 2 positive	10	0V	Channel 2 negative
3	AO2+	Channel 3 positive	11	0V	Channel 3 negative
4	AO3+	Channel 4 positive	12	0V	Channel 4 negative
5	AO4+	Channel 5 positive	13	0V	Channel 5 negative
6	AO5+	Channel 6 positive	14	0V	Channel 6 negative
7	AO6+	Channel 7 positive	15	0V	Channel 7 negative
8	AO7+	Channel 8 positive	16	0V	Channel 8 negative

11.9.2.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Configuration Description (Default)
Channel State	Channel enabling	Enable/Disable	Enable
Channel Range	Channel range	-10~10V	-10~10V
Channel Fault Mode Type	Channel safety value	Clear(Output 0) Hold Preset value	Hold

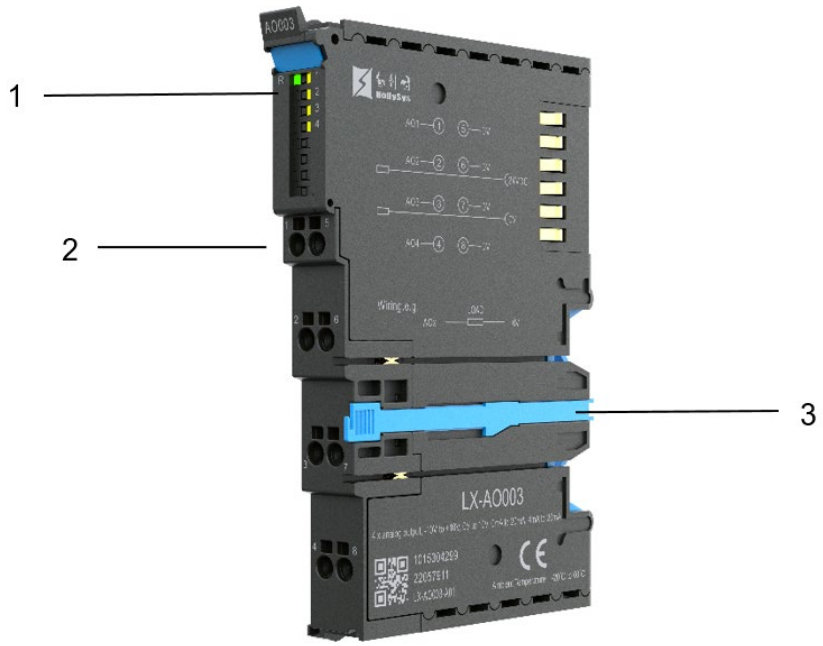
Channel Fault Mode Value	Preset safety value	-32768~32767	0

11.9.3 LX-AO003 4-channel Voltage/Current Type Analog Output Module

11.9.3.1 Product Overview

LX-AO003 is the AO module of LX series PLC products. It is a voltage/current type analog output module that receives digital signals from the CPU through the backboard bus, converts the digital signals into voltage/current analog signal output, and drives the field actuator for action.

1. Basic Features
   - Support ranges 0~10 V, ±10 V, 0~20 mA and 4~20 mA;
   - Support channel fault preset;
   - Support independent channel enable/disable.
2. Module components



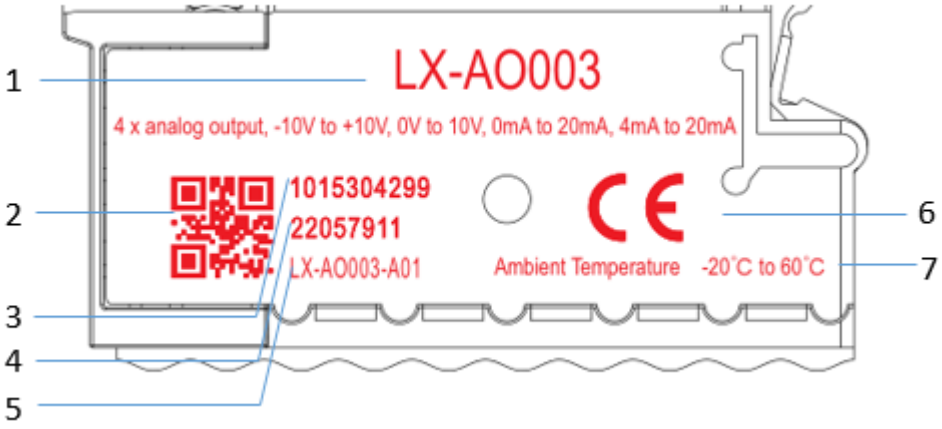
Schematic diagram of the LX-AO003 module

Module component description table

S/N	Component Name	Instructions
1	Channel status	Module operation status indicator (R), 1~4 indicating the enable status of the

	indicator	channels
2	Wiring Terminal	Connect 4-channel voltage and current output signals
3	DIN rail right side mounting hook handle	This component is used to control the hook on the right side of the DIN mounting rail of the module. To remove the module, pull the handle outward to set the hook to the unlocked status. To lock the module, push the handle inward to the bottom to set the hook to the locked status.

3. Nameplate



Nameplate schematic diagram

Nameplate information description table

S/N	Name	Meaning
1	Module model	4-channel voltage/current type analog input module
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	
7	Operating ambient temperature range	-20°C ~ 60°C

11.9.3.2 Technical Indicators

4. General indicators

Item	Specifications
Module protection grade	IP20
Operating Temperature	-20℃ ~ 60℃
Operating relative humidity	10%~95% no condensation
Temperature of storage environment	-40℃ ~ 70℃
Relative humidity of storage environment	10%~95% no condensation
Overall Dimensions	12mm*100mm*71mm(W*H*D)

5. Power indicators

Item	Specifications
System power supply mode	Power supply via LX-bus interface

System power voltage range	19.2~28.8VDC
System side power consumption	Max 1.2W
Field power voltage range	19.2~28.8VDC
Field side power consumptio	Max 2.5W (8 channels, each channel with a load of 1kΩ, output 10V; actual power consumption depends on the actual load)

6. Channel indicators

Item	Specifications			
Number of channels	8			
Output method	Voltage			
Range	0~10 V	±10 V	0~20 mA	4~20 mA
Maximum range code value range	0 ~ 32767	-32768 ~ 32767	0 ~ 32767	0 ~ 32767
Resolution	16-bit			
Output error	±0.1%F.S.			
Switching time	100μs/point			
Load capacity	Voltage			>1kΩ
	Current			<600Ω
Step response time	100μs			
Connection method	Single-ended/Channel for Line 2			
Channel diagnosis function range	Not supported			
Channel isolation	Not supported			
Channel configuration	When there is a system-side power failure or backplane bus fault, the output status can be configured as hold (default), preset value (controller Q area), or reset.			
Field and system isolation withstand voltage	1000 VAC			

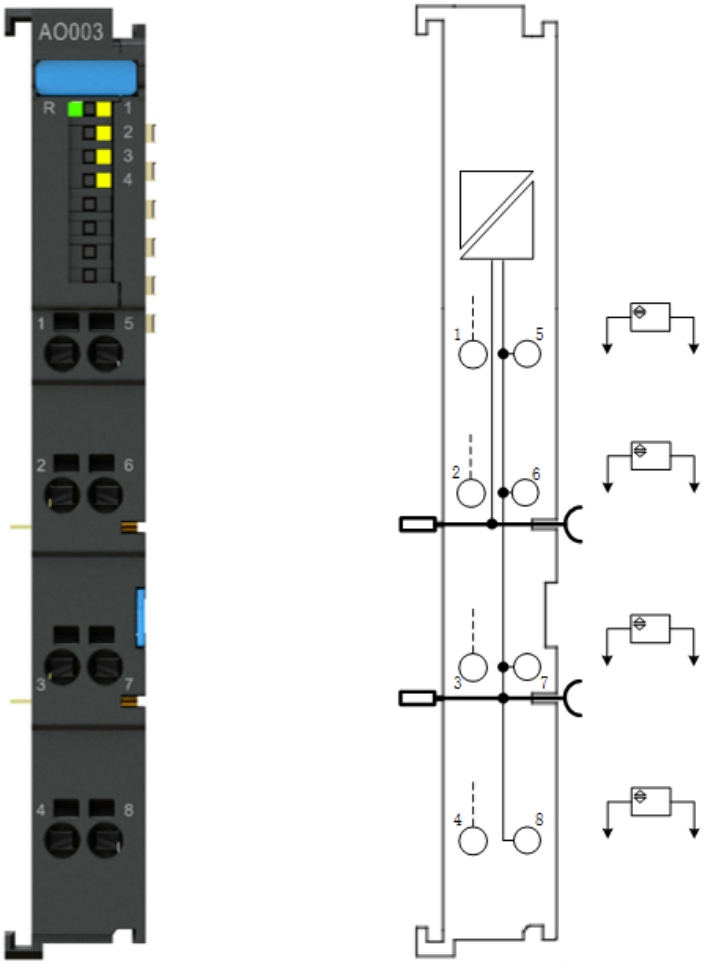
11.9.3.3 Status Indicators

The indicator statuses are described as follows:

Name		Color	Status Description
CH1~CH4	Channel status indicator	Yellow	Channel status indication On: channel ON Off: channel OFF
RUN	Running status indicator	Green	Determined by the EtherCAT slave station status machine; Flashing(200 ms high, 200 ms low): Initialization state（Init）, module in connection (PreOP), module not online (SafeOP) Always on: Module is running (OP)

11.9.3.4 Description of Terminal Components

The terminal signal schematic diagram is as follows:



The definition of terminals

S/N	Description of Signals	Description	S/N	Description of Signals	Description
1	AO0+	Channel 1 positive	5	AO0-	Channel 1 negative
2	AO1+	Channel 2 positive	6	AO1-	Channel 2 negative
3	AO2+	Channel 3 positive	7	AO2-	Channel 3 negative
4	AO3+	Channel 4 positive	8	AO3-	Channel 4 negative

11.9.3.5 Parameter specification

Parameter description for DeviceNet slave

Configuration Parameters	Function Description	Parameter Range	Configuration Description (Default)
Channel State	Channel enabling	Enable/Disable	Enable
Channel Range	Channel range	0~10 V, ±10 V, 0~20 VmA, 4~20 mA	4~20 mA
Channel Fault Mode Type	Channel safety value	Clear, keep last output, output preset value	Keep last output
Channel Fault Mode Value	Preset safety value	-32768~32767	0

Chapter 12 Accessory

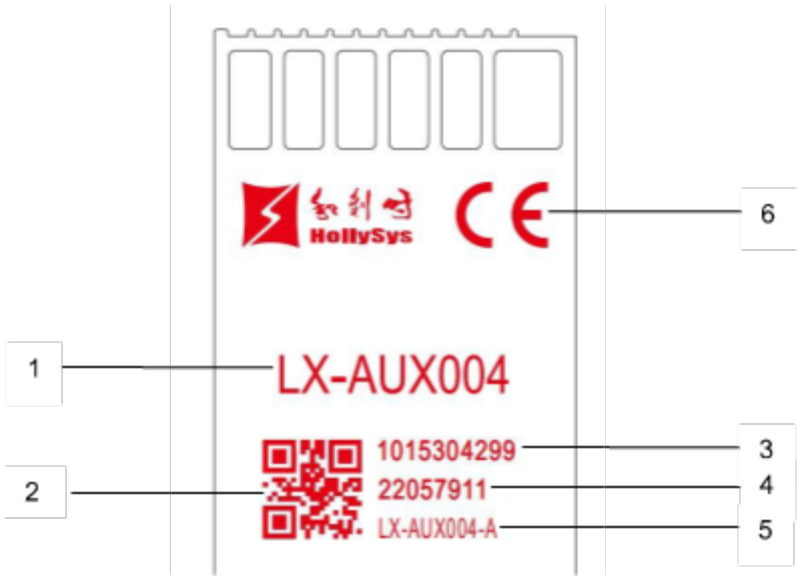
12.1 LX-AUX004 Module

12.1.1 Product Overview

LX-AUX004 is the end cover module of LX series PLC products. It is mainly placed behind the end module to cover the communication and energizing copper sheets to prevent module damage.

1. The diagram of module components is shown below.

2. The nameplate description is as follows.



3. The nameplate information is described as below.

S/N	Name	Meaning
1	Module model	LX-AUX004
2	SN identification code	Scan the QR code to get the SN plain code
3	SN plain code	
4	Order number	
5	Version number	
6	Certification standard	

Chapter 13 Installation Guide

13.1 Installation Principles

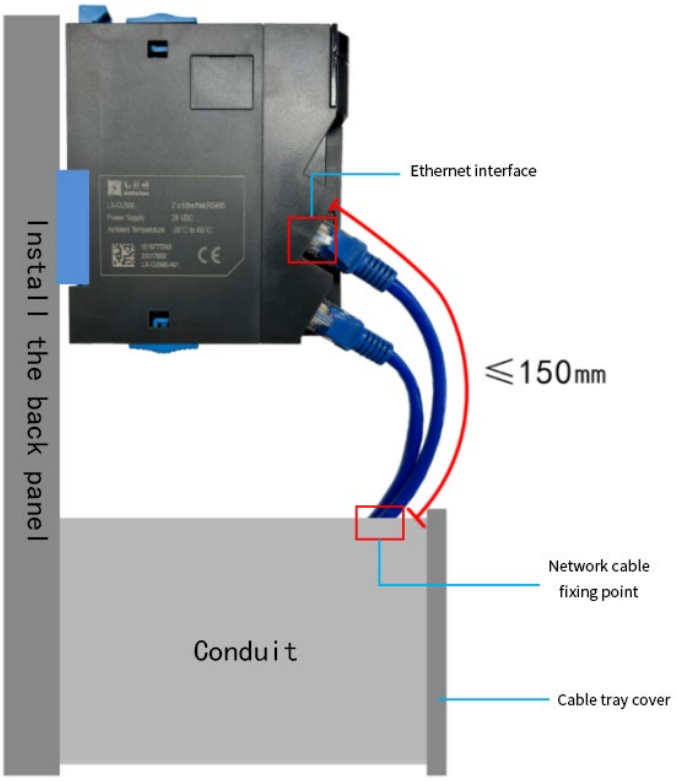
13.1.1 Power Supply

1. Modules with high power (over 1W) are recommended to be placed separately;
2. Pay attention to the load power consumption of the power module.

13.1.2 Network cable routing

The length of the Ethernet cable between the controller module, coupler module, and the fixed point of the network cable should not exceed 150 mm. Excessive length may lead to unstable Ethernet communication in environments with strong vibrations.

The wiring diagram is as follows:



Side view

13.1.3 Module Installation

When installing the module, a certain amount of pressure needs to be applied from the front. After hearing a click, it is also necessary to confirm that there should be no visible gaps between the modules after they are installed on the rail, and the front of the modules should be basically flush with no obvious steps.

13.1.4 Guide rail selection and matching

The locking mechanism of terminal modules and couplers extends to the profile of the mounting rail. During installation, the locking mechanisms of the components must not conflict with the fixing screws of the mounting rail.

It is recommended to use a 15mm high rail. If a 7.5mm high rail is selected, flat mounting connections (such as countersunk screws or blind rivets) should be used.

13.1.5 Module Configuration

- Power relay/potential distribution module:

  Refer to the principles of using power modules.

- Controller and Coupler Modules:

  The right side of the controller and coupler modules cannot be adjacent to 24mm IO modules (LX-ECI001, LX-ECI002, LX-PO001, LX-SSI001) and communication modules (LX-CM002, LX-CM004, LX-CM005, LX-CM006, LX-CM009, LX-CM020).

13.1.6 Selection of the number of system modules

After the LX-PM003 power relay module, it is recommended to install a maximum of 16 LX series IO modules. If the number of modules exceeds 16, an additional LX-PM003 module needs to be added.

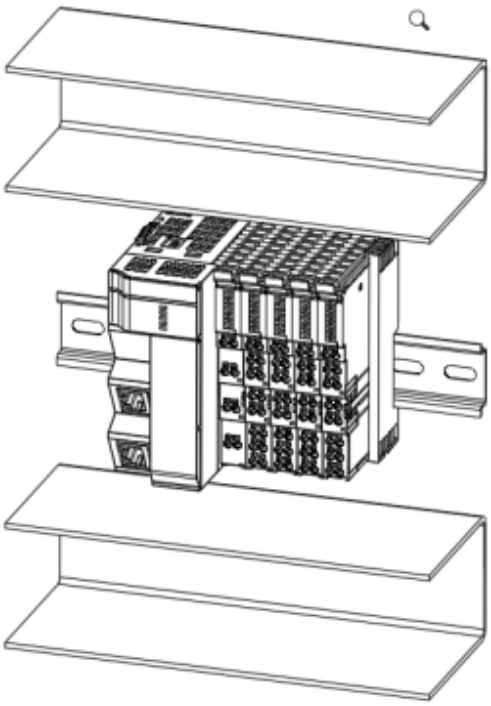
13.2 Installation Environment

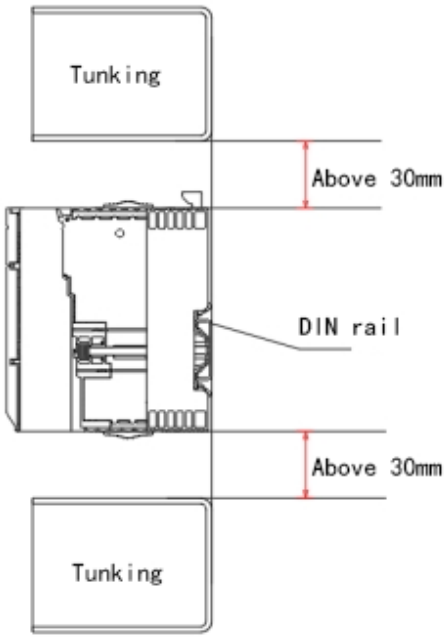
In addition to the following content, the impact of electronic interference and corresponding environmental requirements must be considered.

When using the LX series PLC, consider operability, maintainability, and environmental resistance, and strictly follow the installation requirements below:

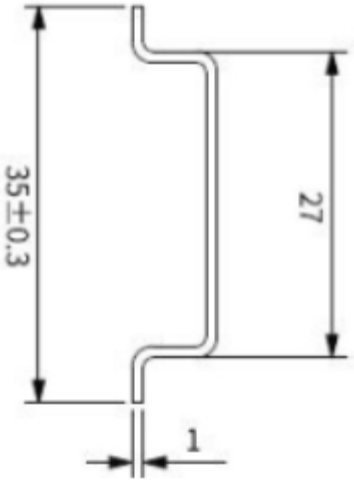
- The operating environment temperature for the LX series PLC is -20°C to 60°C;
- When placing the unit, ensure that no objects block the ventilation ports;

- LX-DO003 and LX-DI002 have high power consumption and are not recommended to be placed continuously. If there are many LX-DO003 and LX-DI002 units, it is suggested to add an AUX cooling module every 2 to 3 units;
- For ventilation and ease of unit replacement, maintain a clearance of more than 30mm between the CPU device and surrounding structures such as wire troughs, other equipment, structures, and components, as shown in the figure below:

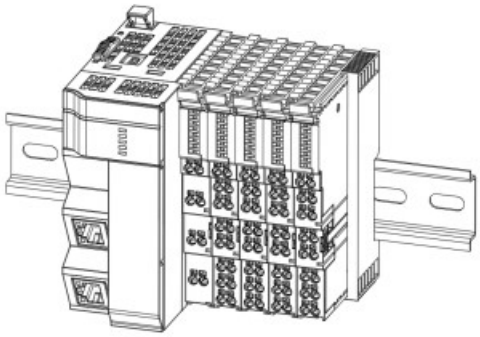




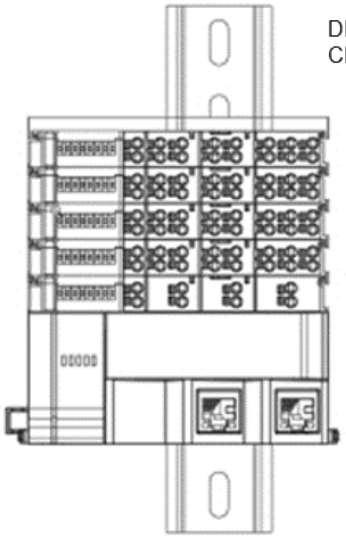
- The LX series PLC uses DIN rail mounting, the DIN rail must comply with EN60715 standards (35mm wide, 1mm thick), the dimensional information is shown in the figure below, unit (mm);



- The instrument needs to dissipate heat, please install it in the direction shown in the figure;

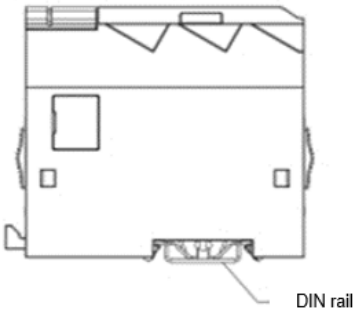


- Consider the installation direction as per special requirements, and it is mandatory to install a fan or air conditioner.



DIN rail configured longitudinally
CPU unit at the bottom

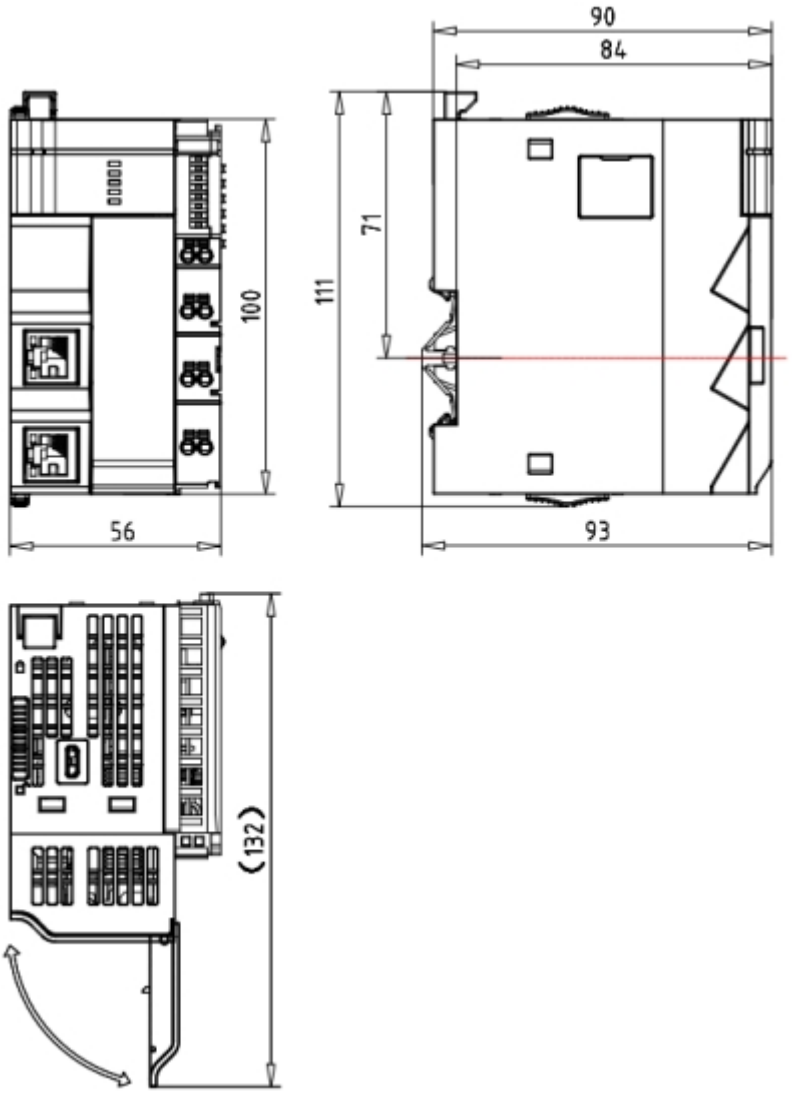
DIN rail configuration at the bottom



13.3 Installation Dimensions

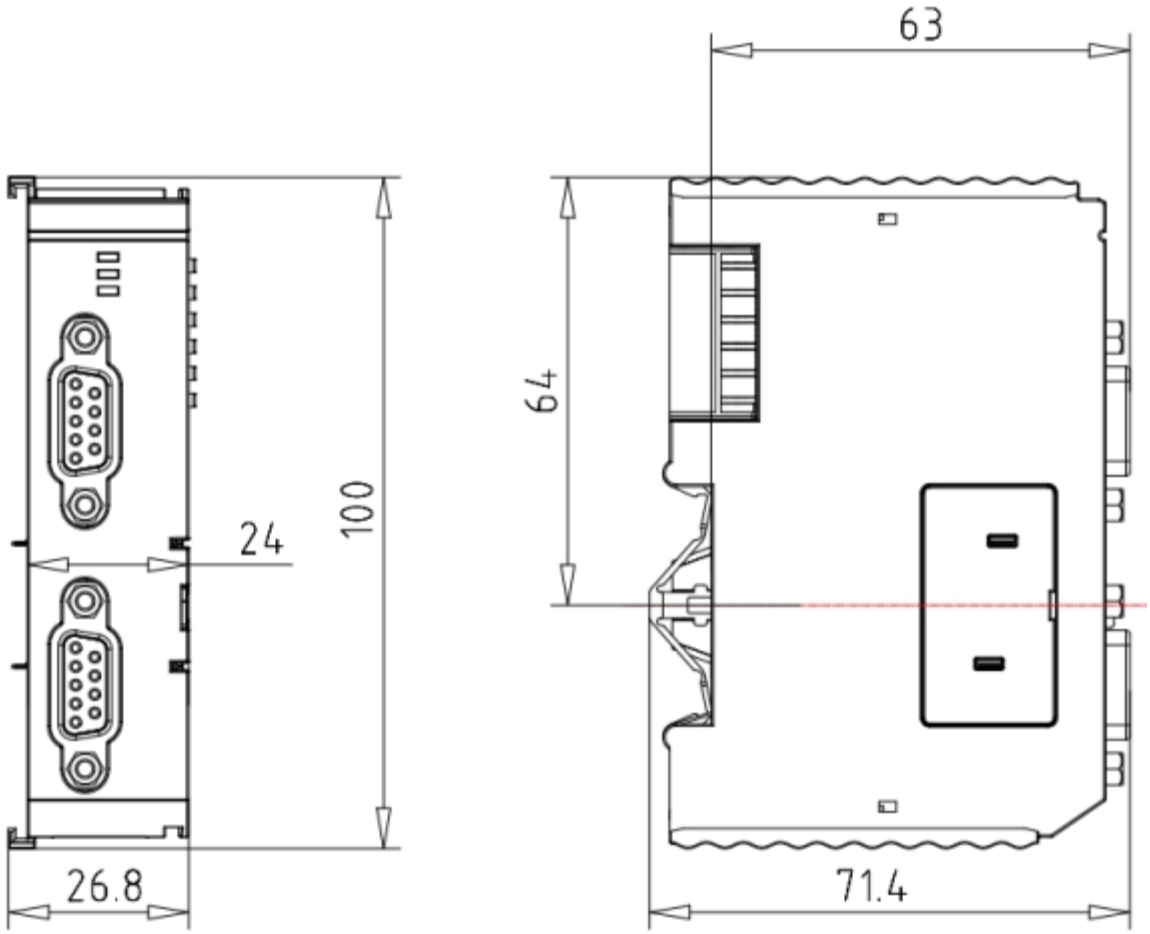
13.3.1 Controller

The installation dimensions of the controller are shown in the figure below, units (mm).



13.3.2 Serial Port Module

The installation dimensions of the LX- CM002/ LX- CM004 serial communication module are shown in the figure below, unit (mm).

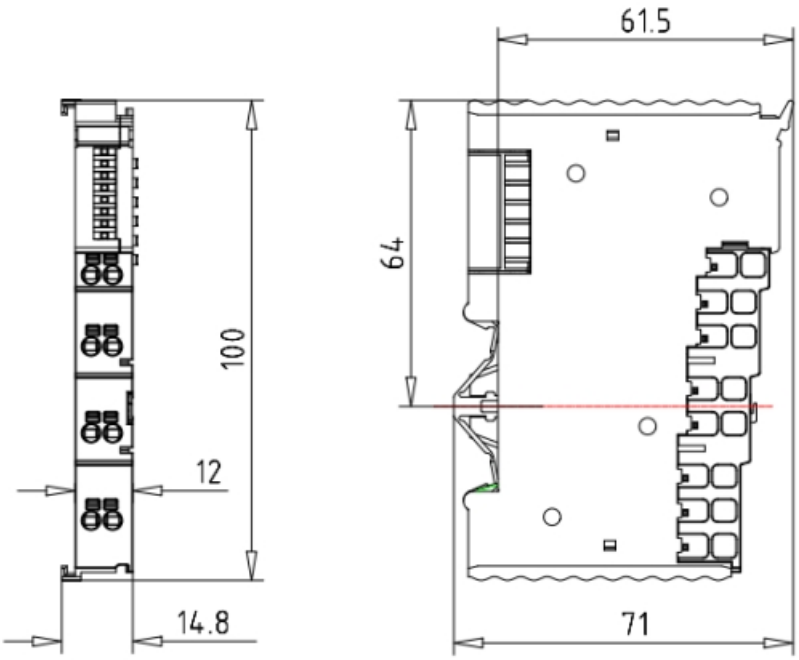


The installation dimensions of the LX-CM001 2-channel RS-232 serial communication terminal interface module are the same as those of the 8-channel IO module.

The installation dimensions of the LX-CM003 2-channel RS-485 serial communication terminal interface module are the same as those of the 16-channel IO module.

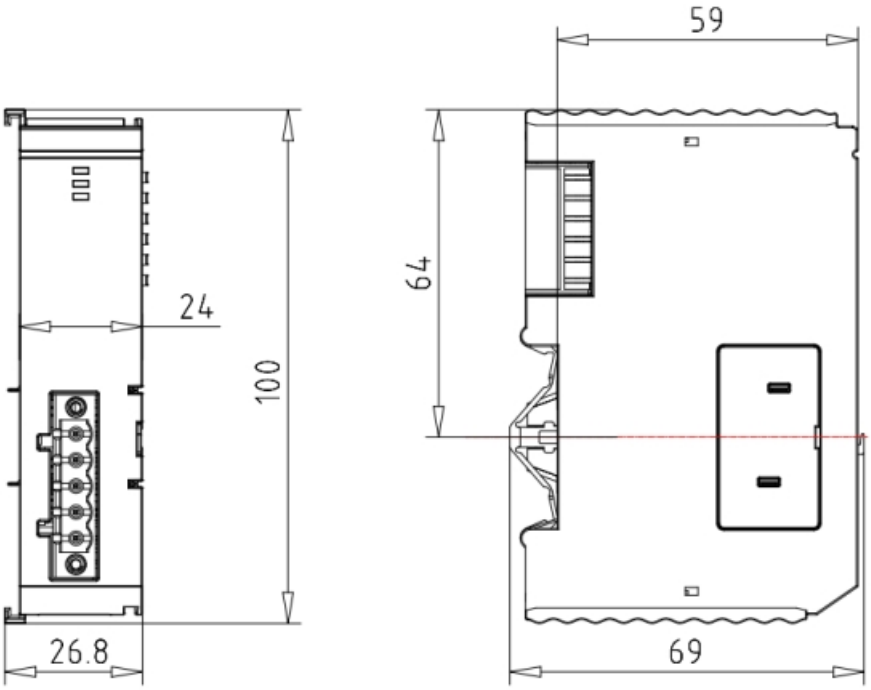
13.3.3 Power Module

The installation dimensions of the power relay module LX-PM003 and the power distribution modules LX-AUX001/LX-AUX002 are shown in the figure below, unit (mm). Here, LX-PM003 is used as an example for explanation.



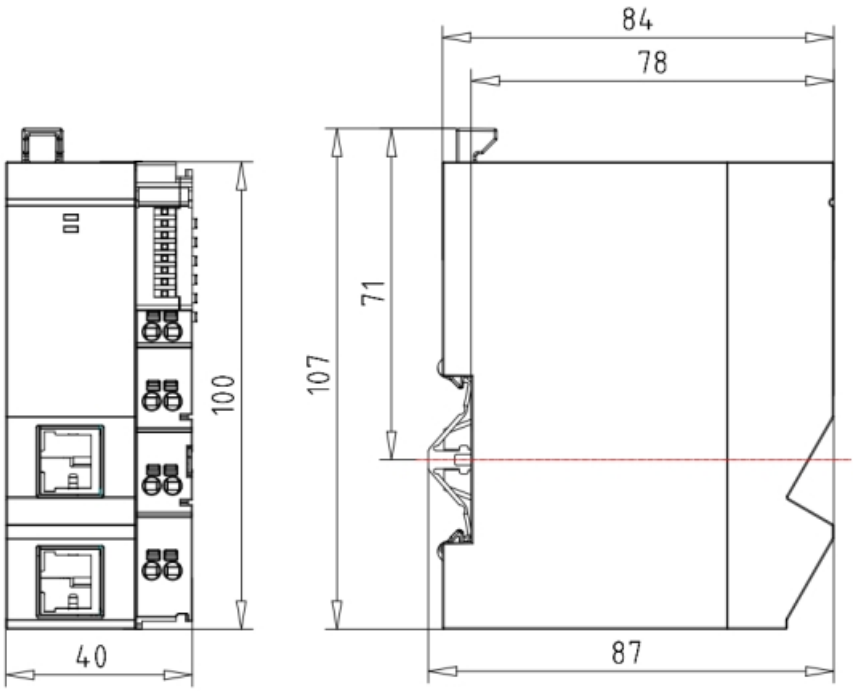
13.3.4 Communication Module

The installation dimensions of the LX-CM005/LX-CM006LX-CM009 module are shown in the figure below, in units (mm).

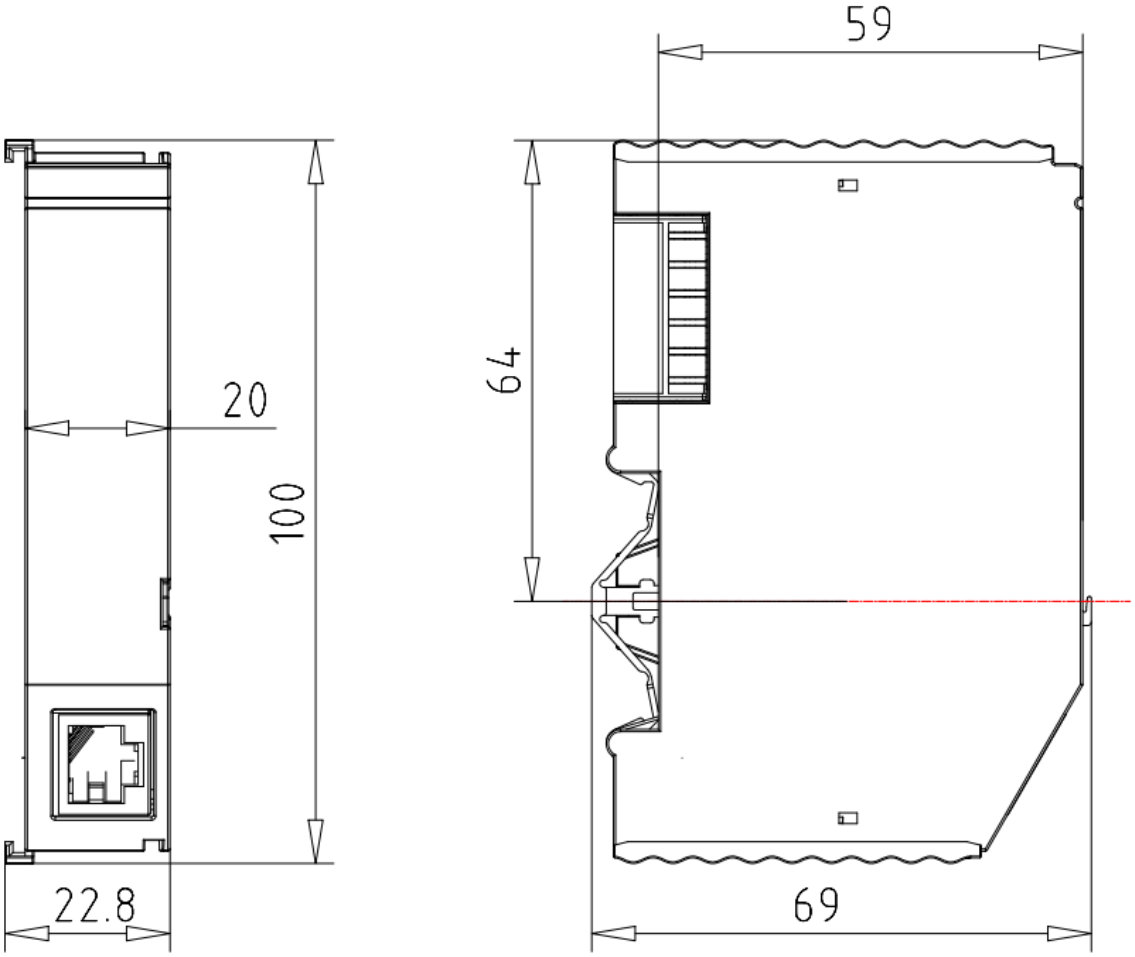


13.3.5 Coupler Module

1. The installation dimensions of the LX-IM001 coupler module are shown in the figure below, unit (mm).

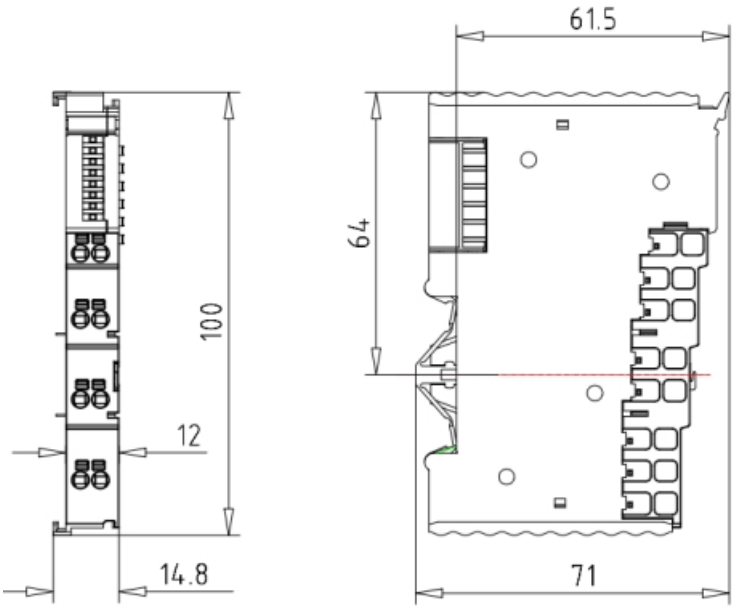


2. The installation dimensions of the LX-IM002 coupler module are shown in the figure below, unit (mm).

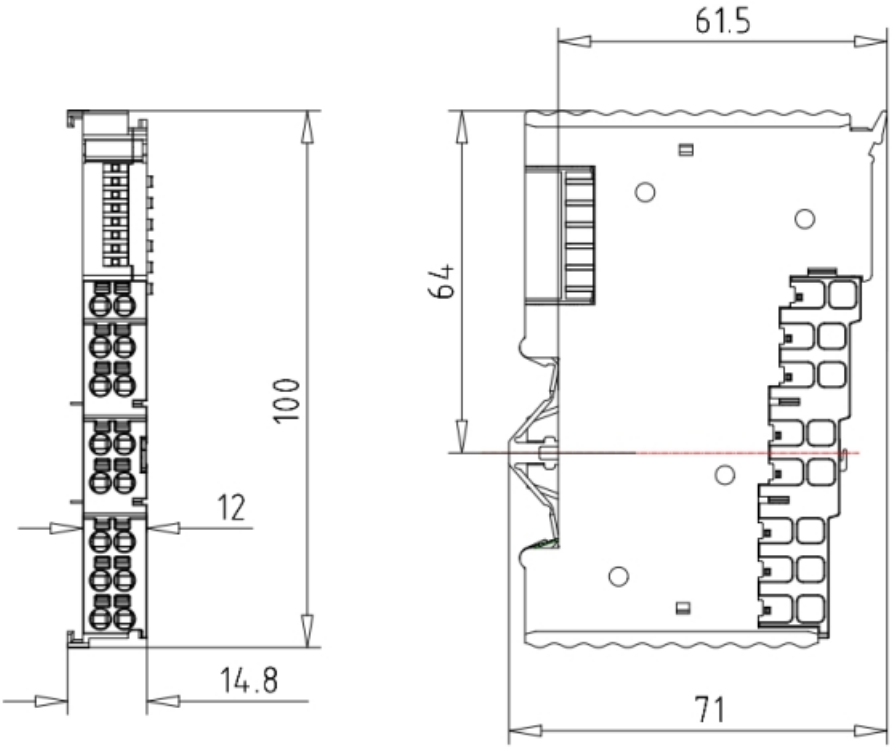


13.3.6 IO Module

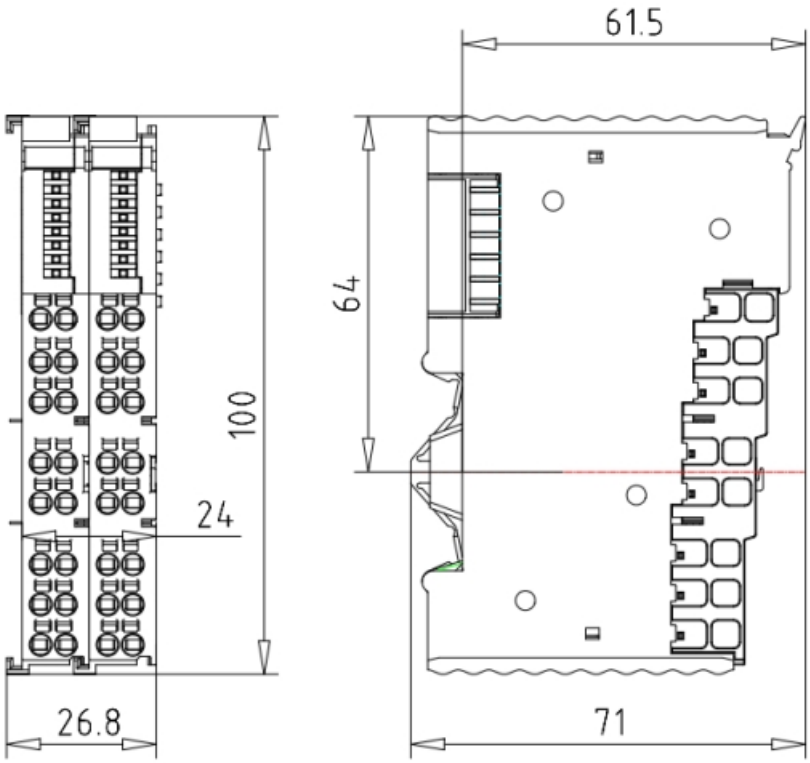
(1) The installation dimensions of the 8-channel IO module are shown in the figure below, unit (mm).



(2) The installation dimensions of the 16-channel IO module are shown in the figure below, unit (mm).

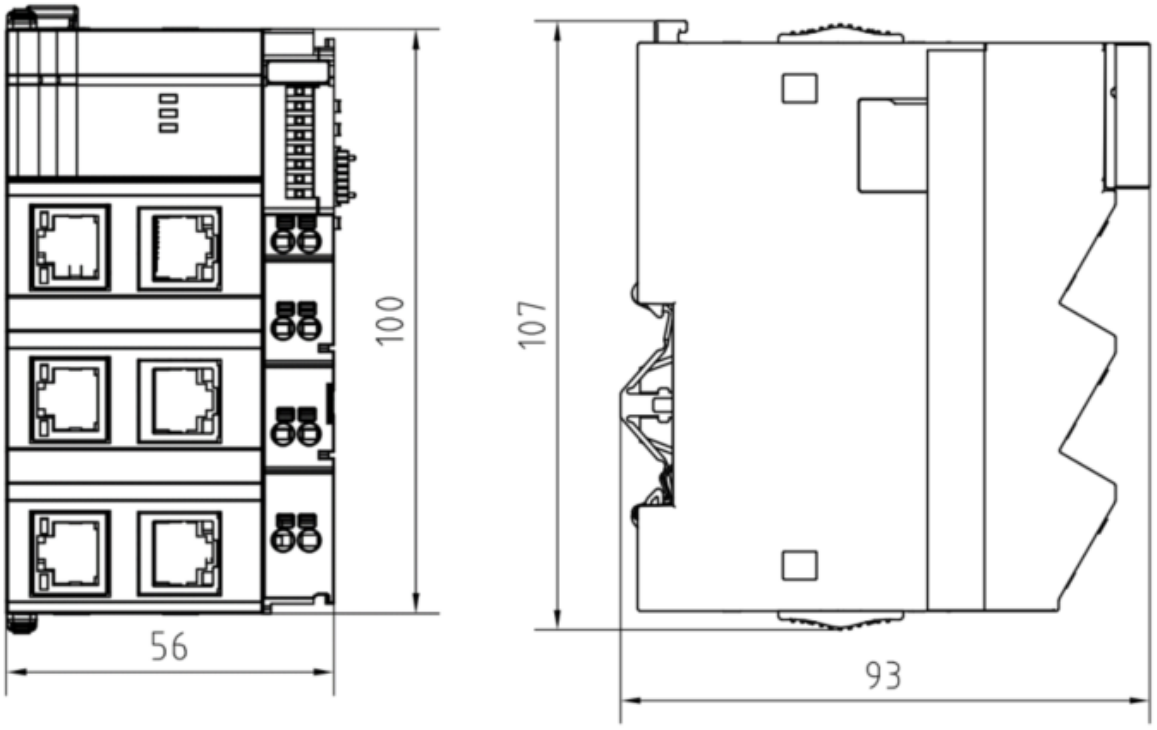


(3) The installation dimensions of the 32-channel IO module are shown in the figure below, with units (mm).

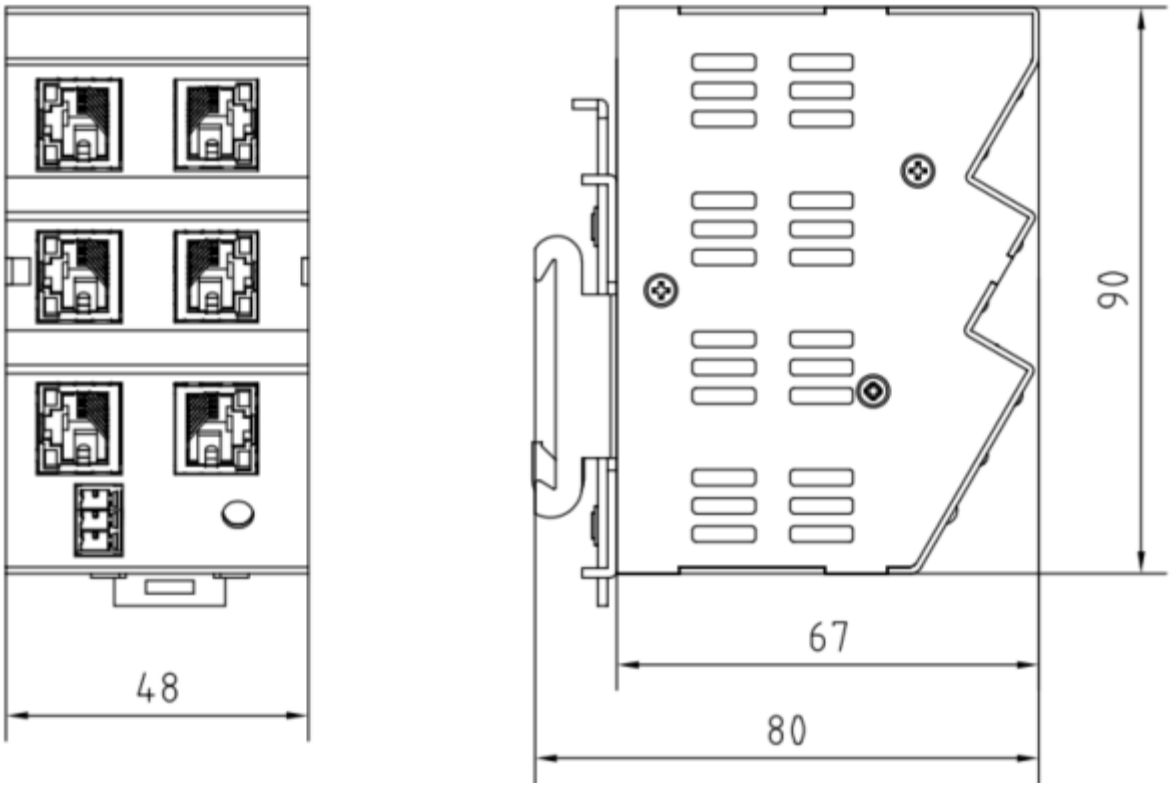


13.3.7 HUB Module

(1) The installation dimensions of the LX-HUB106 HUB module are shown in the figure below, unit (mm).

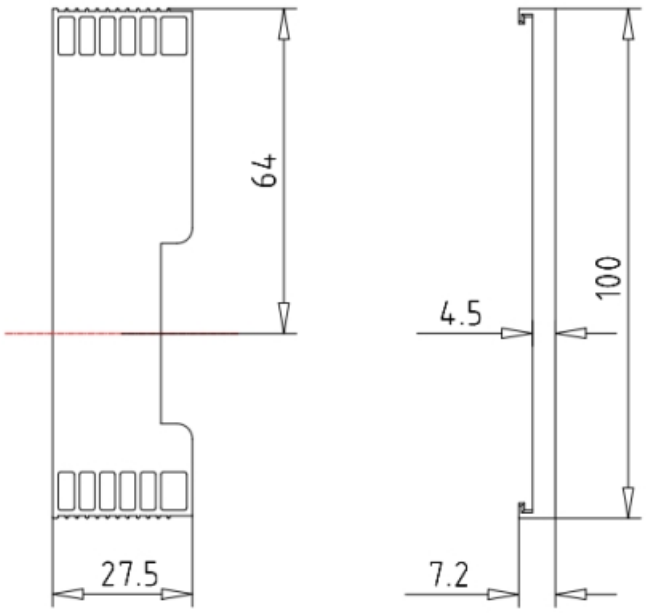


(2) The installation dimensions of the LX-HUB107 HUB module are shown in the figure below, unit (mm).



13.3.8 End cover module

The installation dimensions of the end cover module are shown in the figure below, unit (mm).

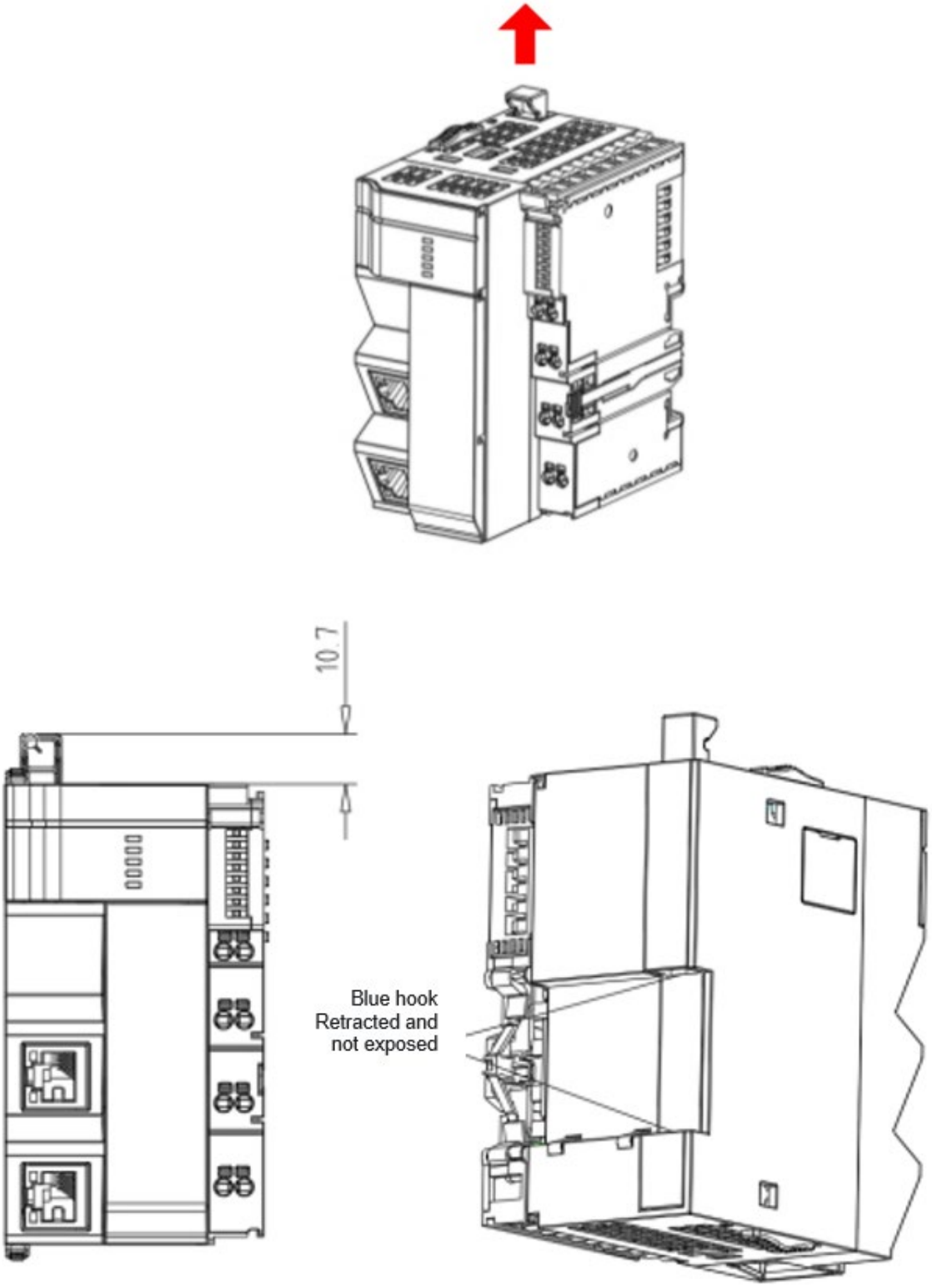


13.4 Installation and Removal

13.4.1 CPU Module Installation

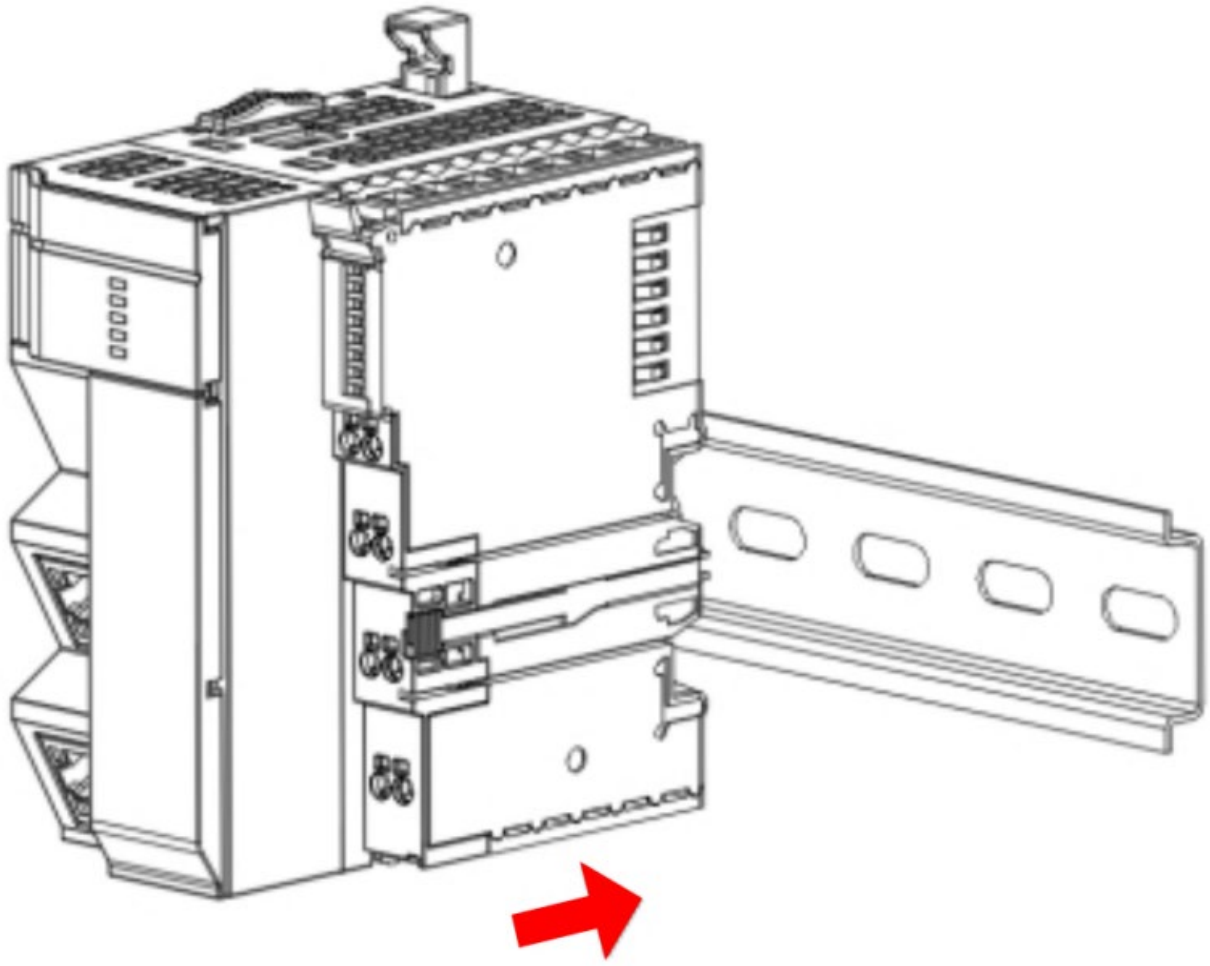
Installation Steps:

(1) Pull the top of the DIN rail mounting hook firmly until you hear a click, which indicates that the left DIN rail mounting hook has been released.



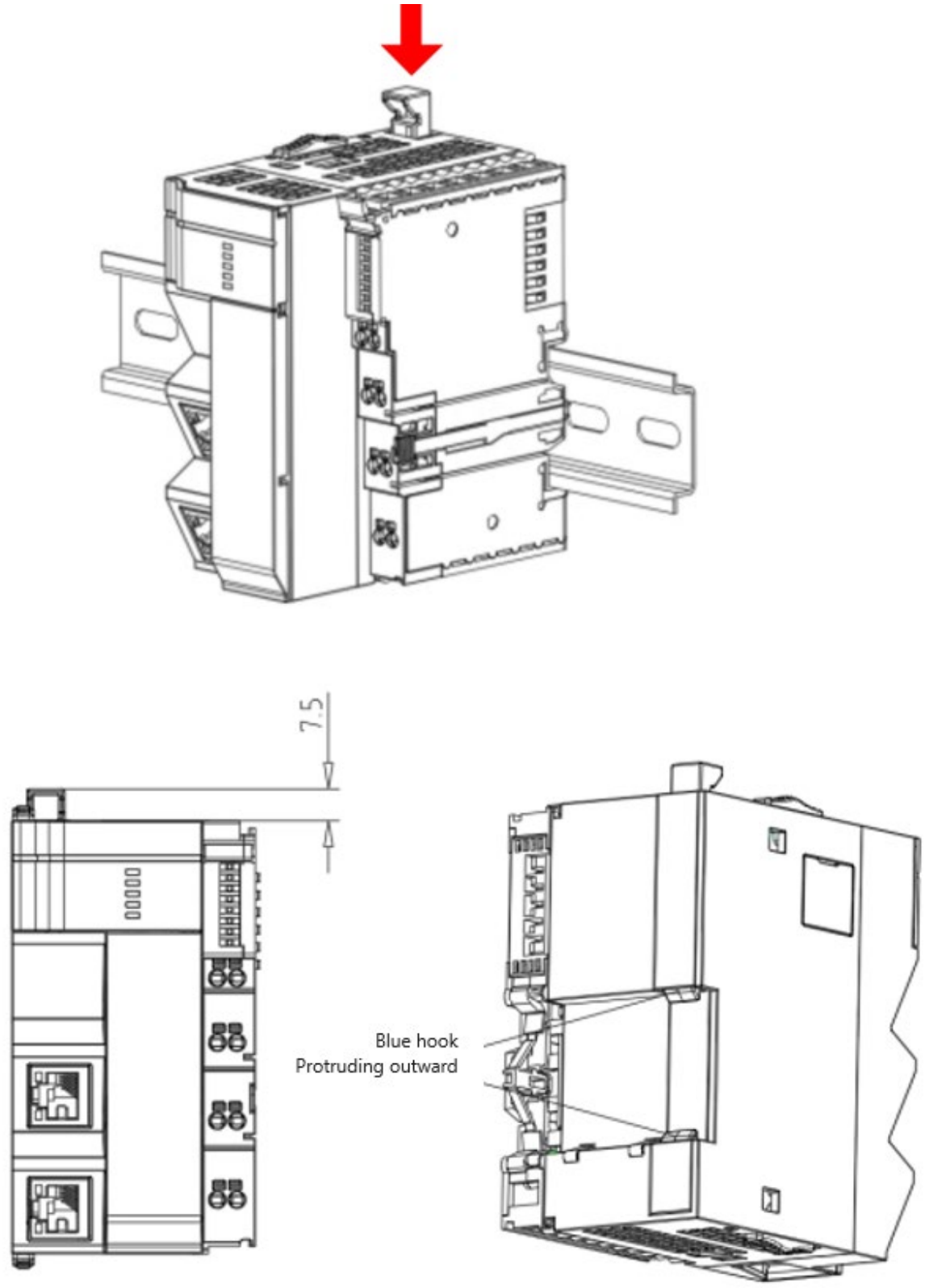
Set the unlock status

(2) Push the CPU module straight onto the DIN rail until you hear a click, at which point the right-side DIN rail mounting clip of the CPU will lock automatically.



Lock the right mounting hook

(3) Press the top of the DIN rail mounting hook firmly until you hear a click, and the left DIN rail mounting hook will be set to the locked position.



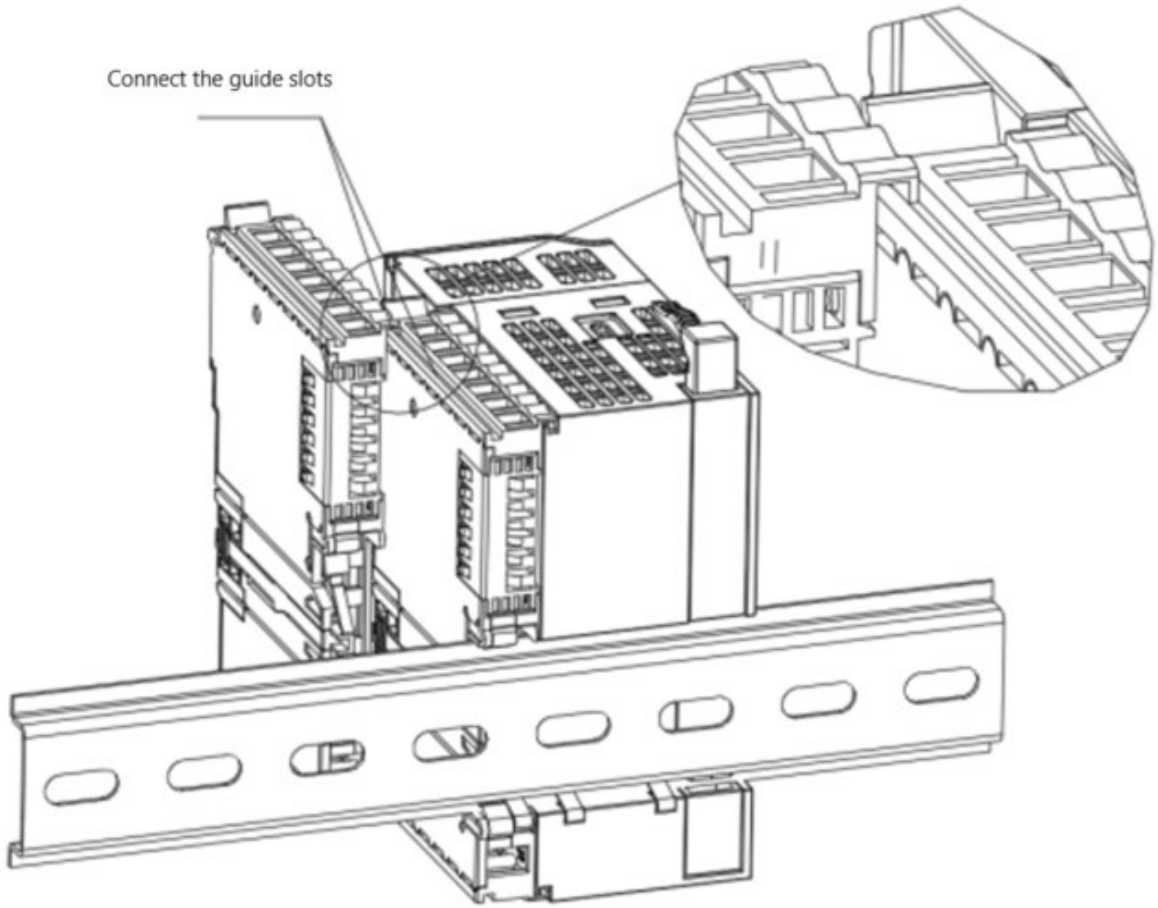
Lock the left mounting hook

13.4.2 Installation between modules

Here, the installation of the IO module onto the CPU module is used as an example.

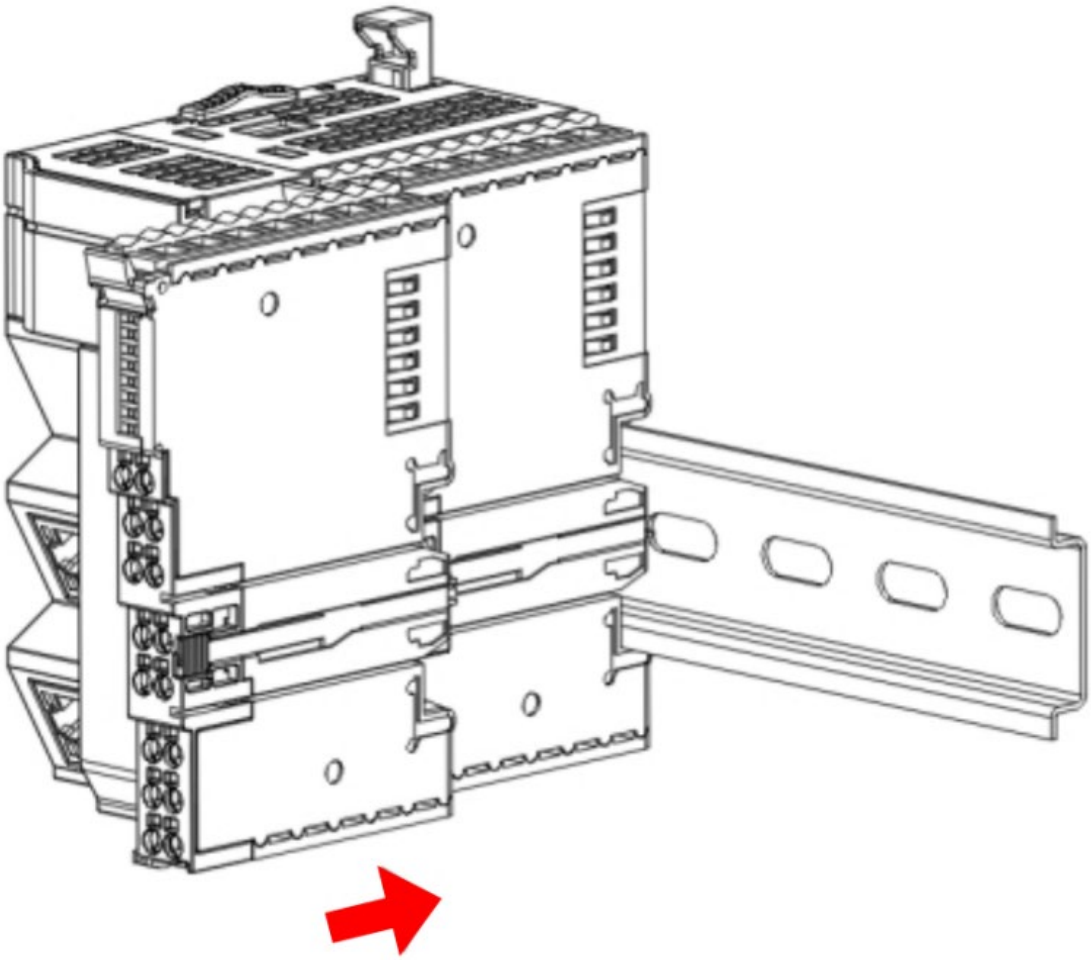
Installation steps:

(1) Align the connection guide slots of the installation module with those on the left side of the connected module from the front and engage them.



Connect the guide slots to fit together

(2) Push the installation module from front to back along the guide slot, push the module straight onto the DIN rail until you hear a click, the right-side DIN rail mounting hook of the module will lock automatically.



Install the module onto the rail

13.4.3 Installation of the LX-HUB107 Module

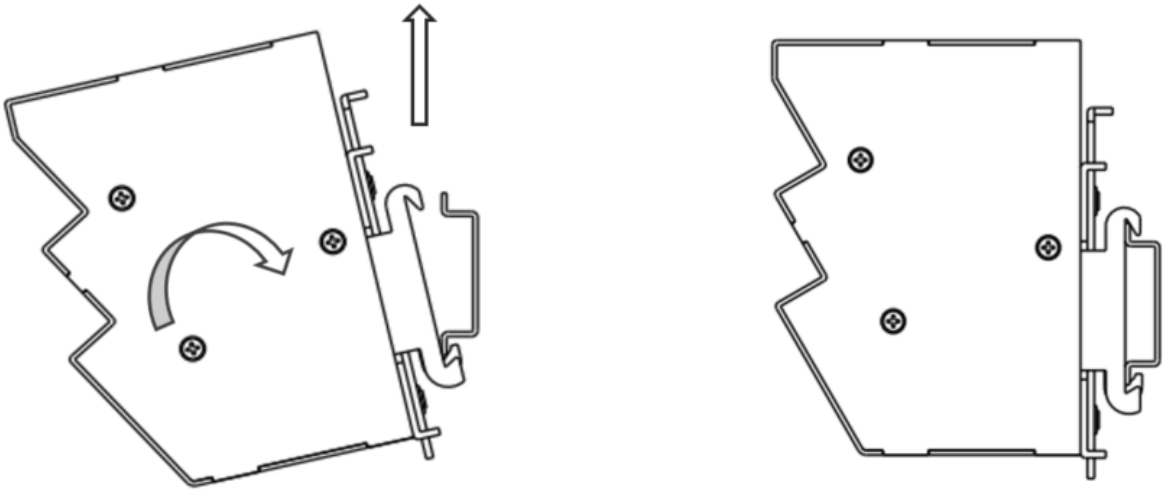
1. Installation Methods

Method 1:

(a) Hook the lower slot of the module clip to the bottom edge of the rail;

(b) Push the module upwards in the direction of the arrow while pushing the top side of the module towards the rail until the upper edge of the rail is fully inserted into the groove of the module clip;

(c) Release the module to allow the clip spring to reset and automatically secure the installation.



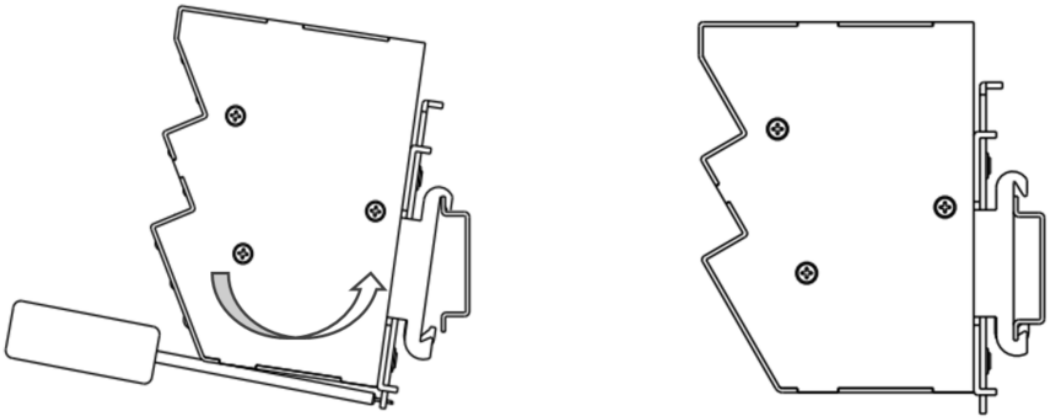
Schematic diagram of LX-HUB107 installation method 1

Method 2:

(a) Hook the upper slot of the module clip to the top edge of the rail;

(b) Use a small flathead screwdriver to pry down the clip lever while pushing the bottom side of the module towards the rail until the lower edge of the rail is fully engaged in the module clip groove;

(c) Release the clip lever to allow the spring to reset and automatically complete the secure installation.

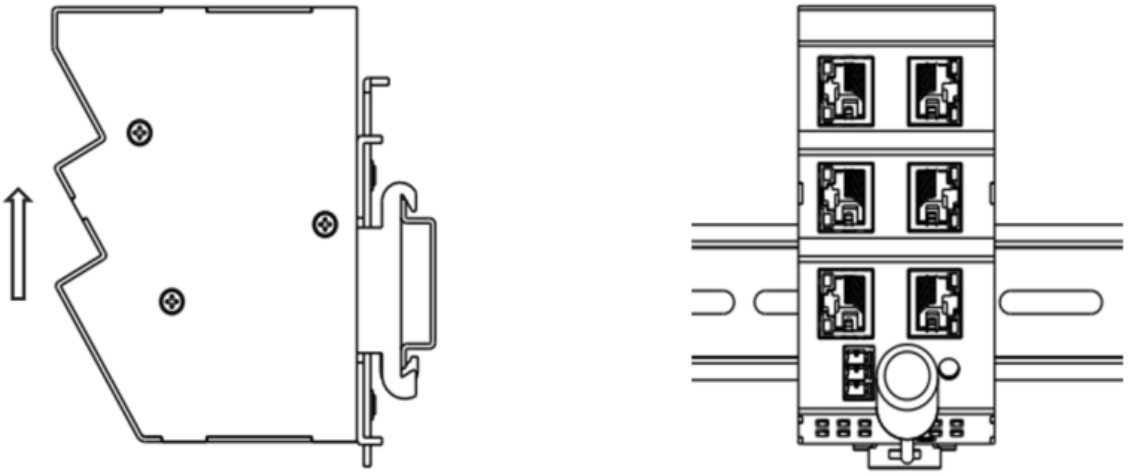


Schematic diagram of LX-HUB107 installation method 2

- This method is suitable for scenarios where the installation area is small and manual operation is difficult.

2. Disassembly

Lift the module vertically or use a small flathead screwdriver to pry down the clip ring to complete the disassembly.



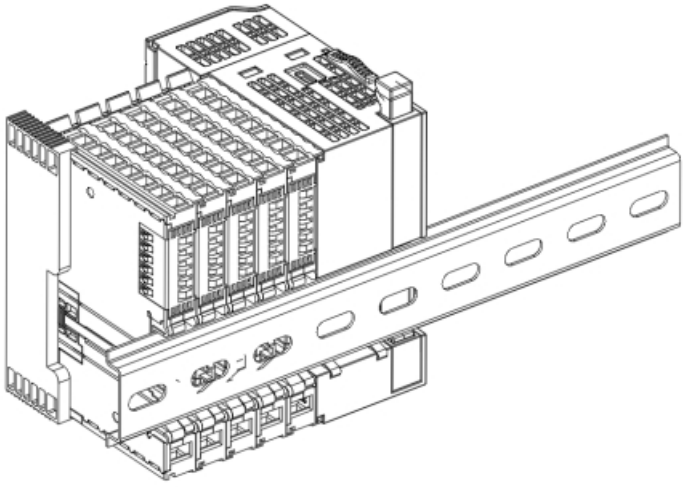
LX-HUB107 disassembly diagram

13.4.4 Installation of the End Cover

If the last installation module is not an end coupler, be sure to install an end cover (LX-AUX004) at the end of the last module.

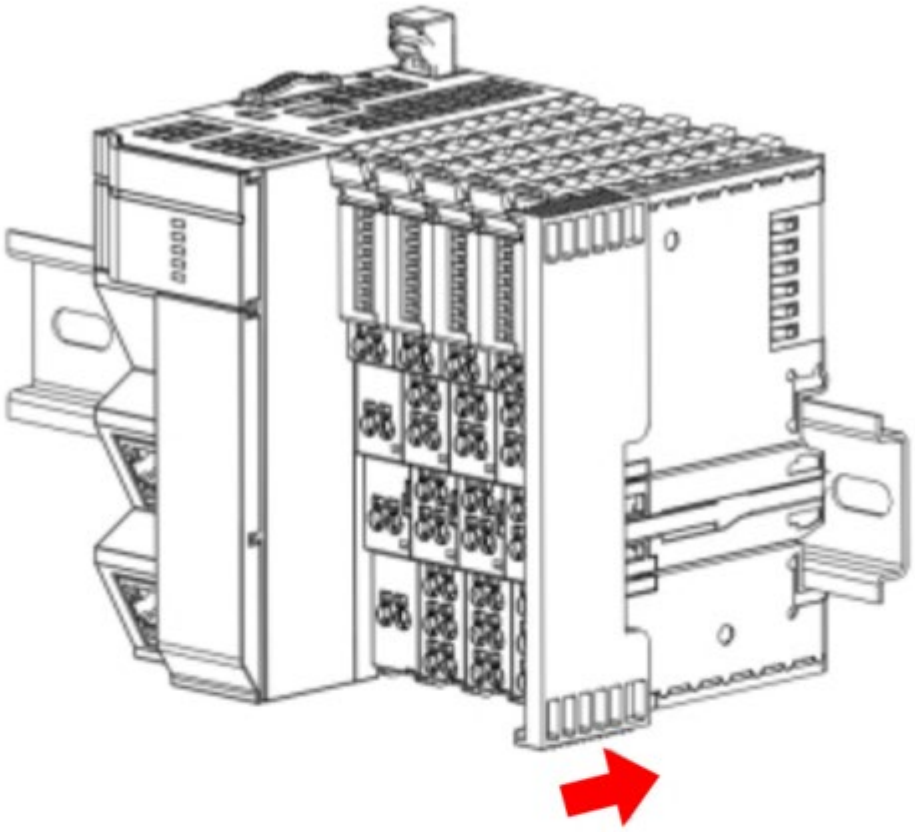
Installation steps:

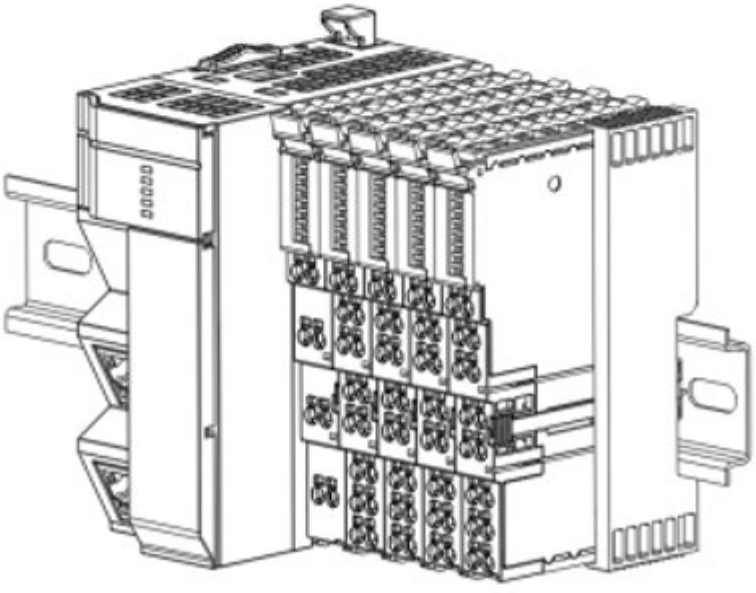
(1) Engage the end cover with the connection guide slot of the left connected module from the front.



Connect the guide slots to fit together

(2) Push the terminal end cover along the guide slot from front to back, push the terminal end cover straight onto the DIN rail until it contacts the rail.

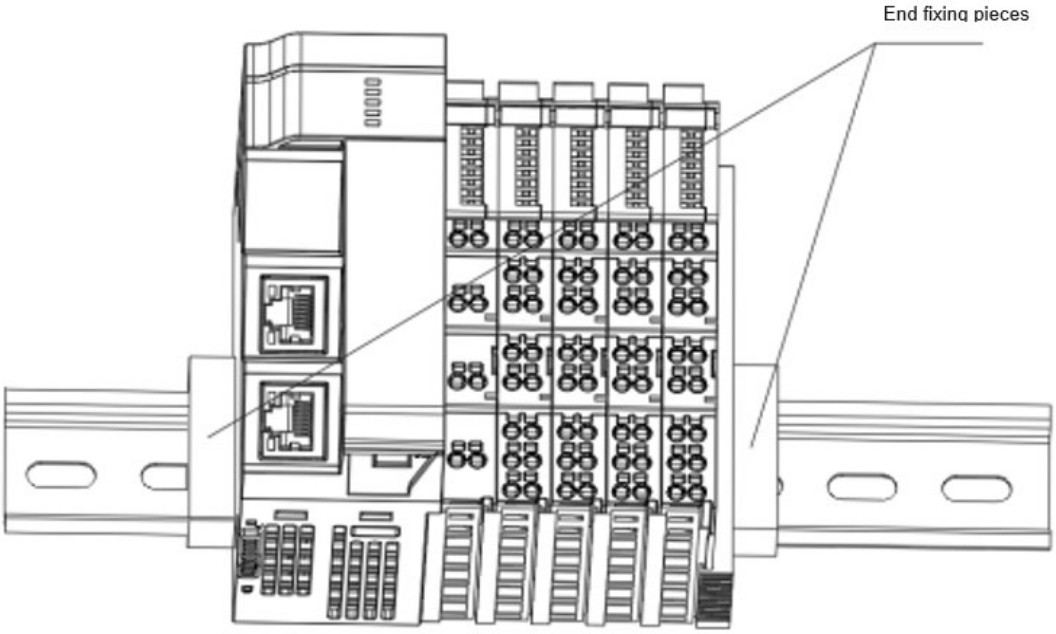




Install the end cover on the guide rail

13.4.5 Installation of End Fixtures

After all modules are installed on the rail, rail positioning clamps need to be installed on both sides to prevent lateral movement.



Installation diagram

Chapter 14 Module accessory

Accessory material code

Material name	Material model number	Material code
Reinforced network port pre-made cable	LXX-EC001	1200456256
16GB memory card	SDSQUNC-016G-ZN3MN/16GB/TF	1200467084
32GB memory card	SDSQUNC-032G-ZN3MN/32GB/TF	1200467085
TF (MicroSD) mobile phone storage card	SDCS2/32GBSPCN	1200476788
LX controller dedicated button battery	LXA-BC001	3200195837
Precision screwdriver	SD-081-S3	4200000652
Spring-connected terminal hole head	TP381P-03-3P-GY28-M8	1200431249

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