



User Manual 用户手册



JP Fence Screw Type Distributed I/O

ETHERCAT protocol
Remote IO Module
Distributed IO Module

CATALOGUE

1.Preface	3
1.1 Document Usage Instructions	4
1.2 Safety Precautions	4
1.3 Document History	4
1.4 Reference document	4
2.Product Overview	5
2.1 Model List.....	6
2.2 JP-EA Specification Parameters	7
2.2.1 DI specification	7
2.2.2 DQ Specification	7
2.2.3 ETHERCAT Communication specification	8
2.2.4 Power Specifications	8
3. Structure description	9
3.1 Shell	10
3.2 Installation method	10
4.Hardware description	11
4.1 JP-EA Structure diagram 16 points	12
4.2 JP-EA Structure diagram 32 points	13
4.3 Communication interface	14
4.4 LED Instruction	14
4.4.1 System status indicates the working condition of the system as shown in the table.	14
4.4.2 I/O Status Indication	15
4.4.3 RJ45 indicator light	15
4.5 Communication power supply	15
4.6 Module terminal wiring diagram	16
5.Ethernet protocol	28
5.1What is ETHERCAT IO ?	29
5.2 Network Topology	29
5.3 JP-EA Address Mapping	29
5.4 Module parameters	30



1.Preface

1.1 Document Usage Instructions

This document describes the product's functional specifications, installation, operation, and settings, as well as related network protocol content. This document is only intended for use by trained electrical automation engineers.

(1) Disclaimer

The author has conducted necessary checks on the document. However, as the product evolves and upgrades, the document may contain technical parameter or editing errors. We reserve the right to make adjustments and modifications without prior notice to users.

(2) Trademark

EtherCAT, the industrial Ethernet protocol, is a deterministic industrial Ethernet that was first developed by Beckhoff, a German company.

(3) Patent Notice

The designer of this product has applied for patent protection for the product's appearance and technical implementation methods. Any attempt to copy, imitate, or reverse engineer may violate the law.

(4) Copyright

Reproduction, distribution, and use of this document are prohibited without the author's authorization.

1.2 Safety Precautions

This product is a professional device for industrial use and should only be operated by personnel with electrical operation experience. Please read this manual carefully before use and follow the instructions to avoid personal injury or product damage.

This product is designed to meet the IP20 protection level. When in use, it must be installed in a distribution cabinet with dust-proof and moisture-proof functions.

1.3 Document History

Version	Date	Explanation
V1.0	2023.02.10	First release
V1.1		Add two new models of relays

1.4 Reference document

《IEC11631-22007 Programmable controllers –Part 2:Equipment requirements and tests》；

《IEC/TR 61158 Industrial Communication Network - Fieldbus Specification》；

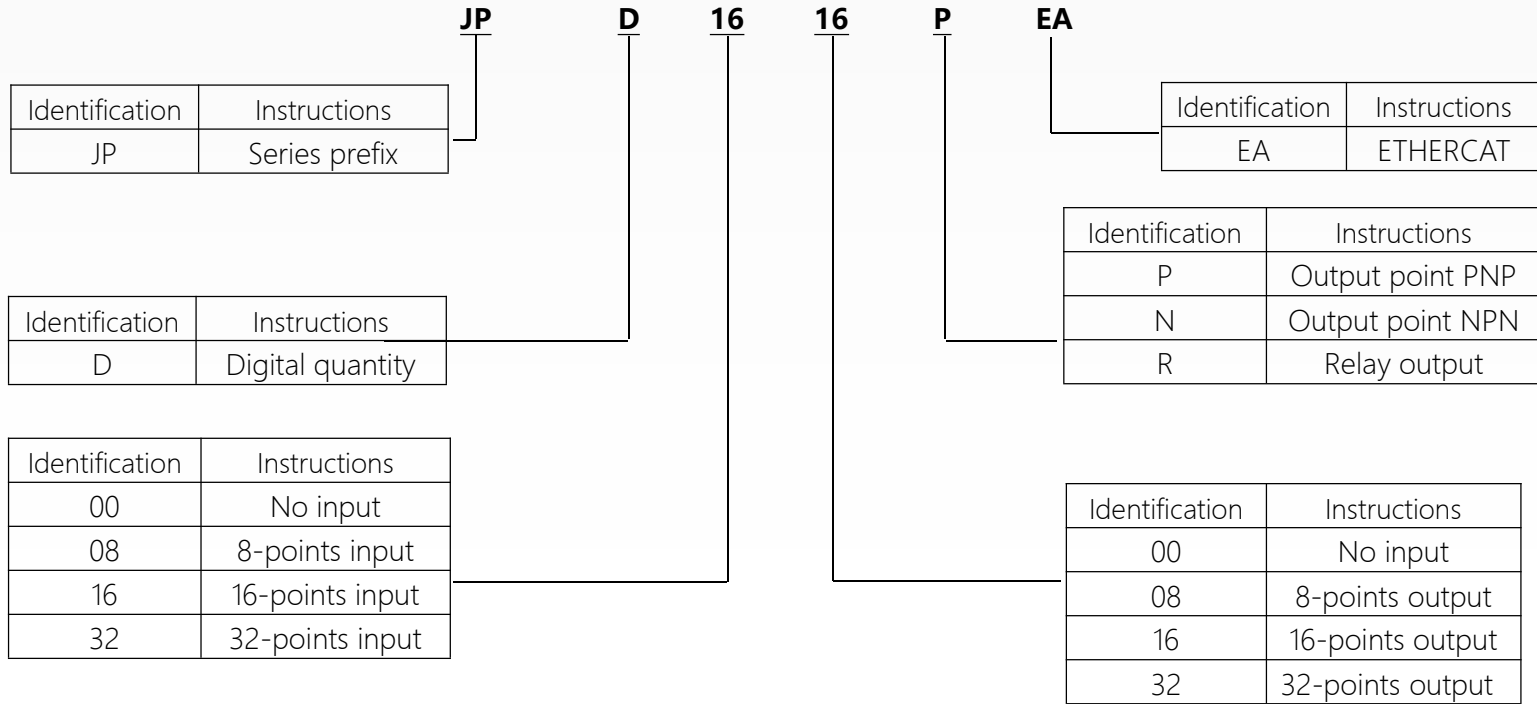
《IEC61784-1Industrial Communication Network - Industry Standards Part 1: Fieldbus Standards》；



2.Product Overview

2.1 Model List

The JP-EA series of remote I/O products support the standard EtherCAT industrial Ethernet communication protocol. Through the digital integration within the module body, they can directly provide high-performance input and output functions without the need for other EtherCAT bus couplers.



Note: The input and output types of the 8-in-8-out module are consistent. For the other models, both PNP and NPN input points are supported.

Number	Model number	Explanation
1	JP-D0808P-EA	Digital quantity 8 input and 8 output, PNP, Ethercat slave station interface 2×RJ45
2	JP-D0808N-EA	Digital quantity 8 input and 8 output, NPN, Ethercat slave station interface 2×RJ45
3	JP-D1600-EA	Digital quantity 16 points input, PNP & NPN, Ethercat slave station interface 2×RJ45
4	JP-D0016P-EA	Digital quantity 16 points output, PNP, Ethercat slave station interface 2×RJ45
5	JP-D0016N-EA	Digital quantity 16 points output, NPN, Ethercat slave station interface 2×RJ45
6	JP-D3200-EA	Digital quantity 32 points input, PNP & NPN, Ethercat slave station interface 2×RJ45
7	JP-D0032P-EA	Digital quantity 32 points output, PNP, Ethercat slave station interface 2×RJ45
8	JP-D0032N-EA	Digital quantity 32 points output, NPN, Ethercat slave station interface 2×RJ45
9	JP-D1616P-EA	Digital quantity 16 input and 16 output, PNP, Ethercat slave station interface 2×RJ45
10	JP-D1616N-EA	Digital quantity 16 input and 16 output, NPN, Ethercat slave station interface 2×RJ45
11	JP-D0008R-EA	Relay 8 points output, 5A 250VAC/30VDC, Ethercat slave station interface 2×RJ45
12	JP-D0016R-EA	Relay 16-point output, 5A 250VAC/30VDC, Ethercat slave station interface 2×RJ45

Table 1 Ethercat Remote I/O Module

2.2 JP-EA Specification Parameters

This article only provides explanations regarding the product specification parameters of JP-EA. For the specification parameters of other models, please contact your supplier for information.

2.2.1 DI specification

The specifications for digital input (DI) are shown in Table 2.

Number	Project	Specification
1	Number of channels	16
2	Access type	2 bytes
3	Ton	Type. 18uS / Max. 35uS
4	Toff	Type. 135uS / Max. 250uS
5	Input type	Source type or leakage type
6	Input connector	E-CON connector
7	Rated input voltage	24 V DC (-15 %/+20 %), (IEC 61131-2, type 2)
8	"0" signal level	-3...+5 V (IEC 61131-2, type 2)
9	"1" signal level	15...30 V (IEC 61131-2, type 2)
10	Input current	Typ. 10mA/Ch (IEC 61131-2, type 2)
11	Electrical isolation	Input/Control Area:500V DC

Table2 Specifications for Digital Input Quantity

2.2.2 DQ Specification

The specifications and parameters of the MOSFET digital output (DQ) are shown in Table 3.

Number	Project	Specification
1	Number of channels	16
2	Access type Ton	2 bytes
3	Toff	Type. 12uS / Max. 25uS
4	Output type	Type. 10mS / Max. 20mS (空载)
5	Output connector	Source type or leakage type
6	Load type	Barbed screw connector
7	Rated output voltage	Pure resistive, inductive, bulb 24 V DC (-15 %/+20 %), (IEC 61131-2, type 2)
8	Maximum output current	Max. 0.5 A /Ch, independent short-circuit protection for each channel
9	Rated total output current	Source type or leakage type
10	Number of channels	8A

Table 3 Output Specifications of MOSFET

2.2.3 ETHERCAT Communication specification

The parameters of the EtherCAT communication specification are shown in Table 4.

Number	Project	Specification
1	Agreement	ETHERCAT
2	Transmission rate	10/100 Mbaud, automatically detects transmission speed RJ45
3	Bus interface	CAT5e shielded cable COE
4	Transmission cable	Transformer isolation, 1500V DC (IEC 61000-4-2)
5	ETHERCAT characteristics	10/100 Mbaud, automatically detects transmission speed RJ45
6	Port protection	CAT5e shielded cable COE

Table 4 ETHERCAT Communication Specifications

2.2.4 Power Specifications

The power supply for the module is divided into three independent parts: the control part, the digital input part, and the MOSFET digital output part, which are isolated from each other. Therefore, three separate power supplies need to be provided for each part of the circuit or they can be directly connected in parallel.

- ① The control voltage uses 24V DC (-15% / +20%), with a maximum current consumption of 0.5A, and has polarity reverse protection; the electrical isolation withstand voltage between it and other I/O parts is 500V DC.
- ② The digital input voltage uses 24V DC (-15% / +20%), with a maximum current consumption of 16*10mA; the electrical isolation withstand voltage between it and other I/O parts is 500V DC.
- ③ The MOSFET digital output part uses 24V DC (-15% / +20%), with a maximum current consumption of 16*0.5A, and has channel-independent overcurrent protection; the electrical isolation withstand voltage between it and other I/O parts is 500V DC.



3. Structure description

3.1 Shell

The module adopts the standard shell design of the JP series remote I/O module. The dimensions of 16 points are: 111 * 50 * 40 (W/H/D, mm); for 32 points, they are: (180 * 50 * 40 (W/H/D, mm), the height of the lower guide rail clip is h = 5.5 mm, and it supports the IP20 protection level.

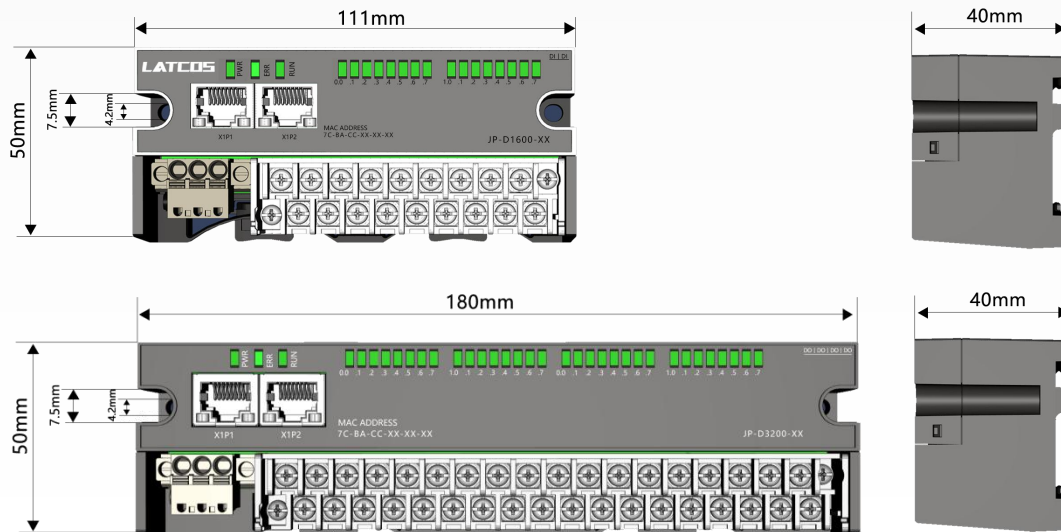


Figure 1 Module Dimension Diagram

3.2 Installation method

The design of the module adopts natural convection cooling method. At least 25 mm of space must be left above and below the device to facilitate normal heat dissipation. The distance between the front panel and the back panel should also be maintained at least 75 mm.

The module can be easily installed on a standard DIN rail or the back panel of a control cabinet. The rail specification is TS35/7.5, as shown in Figure 2.

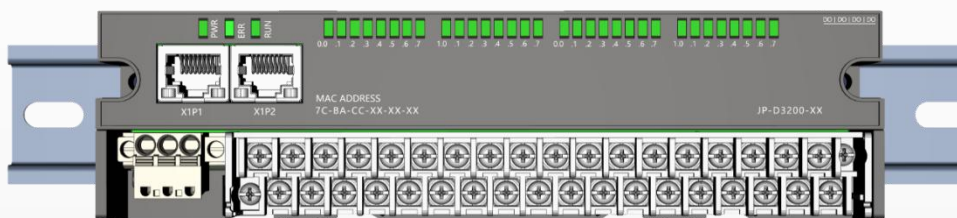


Figure 2 Installation Diagram of DIN Rails



4.Hardware description

4.1 JP-EA Structure diagram 16 points

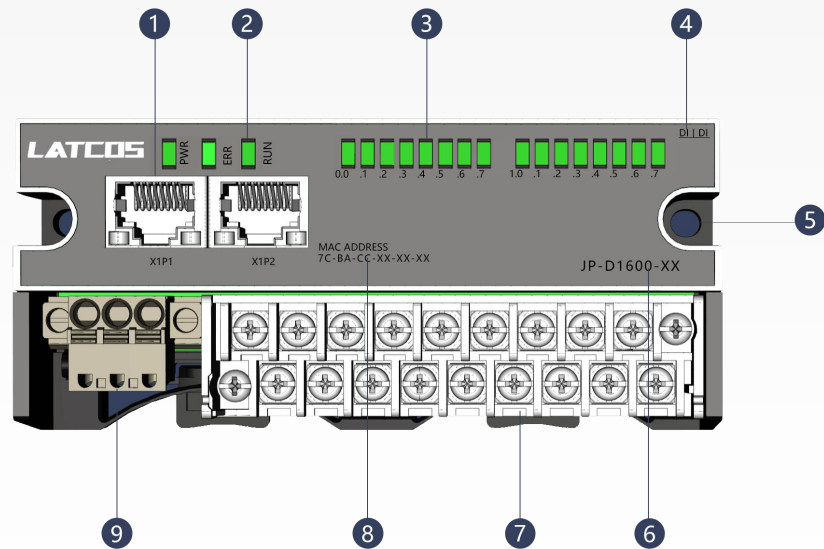


Figure 3 Module Wiring Diagram

Number	Interface Name	Function Definition
①	2 RJ45 ports Indicator light	Ethernet interface, connecting to PLC or PC end
②	Indicator light	Power supply, communication status indicator light
③	Indicator light	IO status indicator light
④	Module type	Grouped every 8 points, indicating input/output type
⑤	Installation hole	-
⑥	Module model	-
⑦	IO terminal block	Receive input and output signals, provide IO power supply
⑧	Communication power terminal block	Communications power supply

4.2 JP-EA Structure diagram 32 points

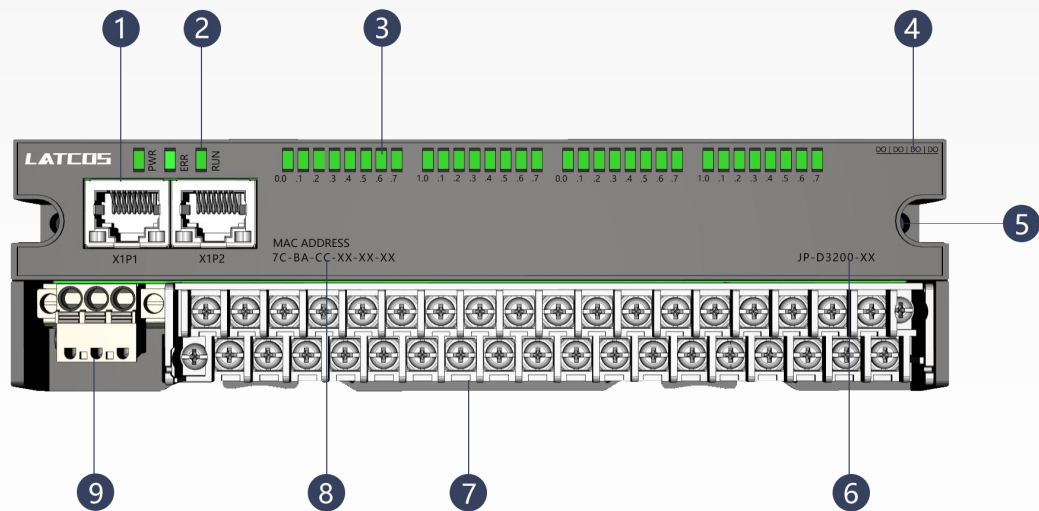


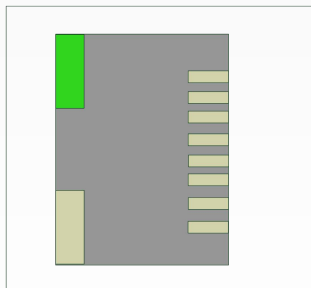
Figure 4 Module Wiring Diagram

Number	Interface Name	Function Definition
①	2 RJ45 ports Indicator light	Ethernet interface, connecting to PLC or PC end
②	Indicator light	Power supply, communication status indicator light
③	Indicator light	IO status indicator light
④	Module type	Grouped every 8 points, indicating input/output type
⑤	Installation hole	-
⑥	Module model	-
⑦	IO terminal block	Receive input and output signals, provide IO power supply
⑧	Communication power terminal block	Communications power supply

4.3 Communication interface

The module uses a physical interface with two RJ45 sockets for communication, which are respectively identified as IN and OUT.

Table 5 ETHERCAT Communication Interface



Pin	Signal	Description
1	TD+	Data transmission positive terminal
2	TD-	Data transmission negative terminal
3	RD+	Data reception positive terminal
4	NC	Unused
5	NC	Unused
6	RX-	Data reception negative terminal
7	NC	Unused
8	NC	Unused

4.4 LED Instruction

The LED indicators of the module are divided into three parts: system status indicator, I/O status indicator, and RJ45 link indicator.

4.4.1 System status indicates the working condition of the system as shown in the table.

ERR(red)	RUN(green)	PWR(green)	Explanation
○	○	○	Power supply abnormality
●	○	●	Communication interface failure
○	●	●	The module has successfully entered the operating (operate) state and successfully established a cyclic data exchange with the main station.

Table 8 System Status Indicators ● Indicates that the green light remains constantly on

● Indicates that the red light remains constantly on ○ Indicates that it is not lit

4.4.2 I/O Status Indication

The digital input/output ports use green LEDs to indicate the status of the corresponding channels. When the light is on, it indicates that the logic state of the input/output port is "1", and when the light is off, it indicates that the logic state of the input/output port is "0".

4.4.3 RJ45 indicator light

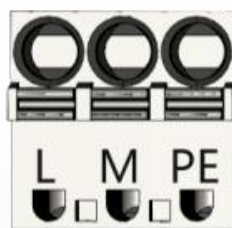
Under normal circumstances, the RJ45 port indicator lights should be the green light constantly on and the yellow light flashing. If this is not the case, it indicates that a fault has occurred. If the green light is not on, it means there is a connection fault with the RJ45 port that is connected to a Hub or switch; if the yellow light is not on, it might be a fault with the module itself.

As shown in Table 7: RJ45 Indicator Light Explanation

LINK1/LINK2	ACT1/ACT2	Explanation
○	Not related	The RJ45 port is not connected to a network cable or the connection is poor.
●	Not related	The RJ45 port has correctly identified the Ethernet network.
Not related	○	There is no data exchange at the RJ45 port.
Not related	●	There is data exchange at the RJ45 port.

Table 7 RJ45 Indicator Light Explanation

4.5 Communication power supply



24V	24V, positive terminal of the DC power supply
0V	0V, negative terminal of the DC power supply
PE	Connect to the ground

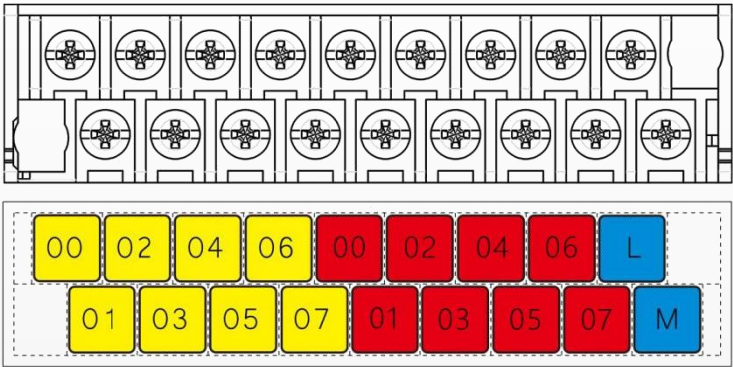
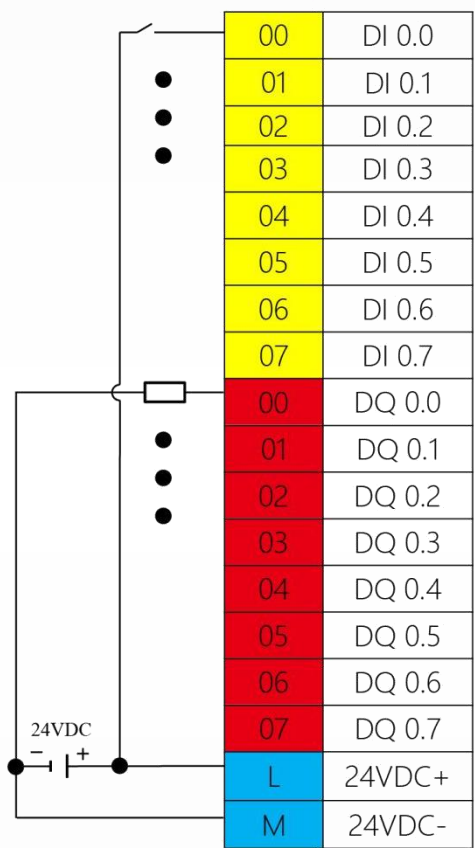
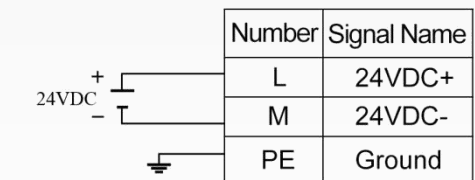
Table 8 Power Connection Terminals

The control voltage uses 24V DC (-15% / +20%), with a maximum current consumption of 0.5A, and has polarity reverse protection; the electrical isolation withstand voltage between it and other I/O components is 500V DC.

4.6 Module terminal wiring diagram

JP-D0808P-EA

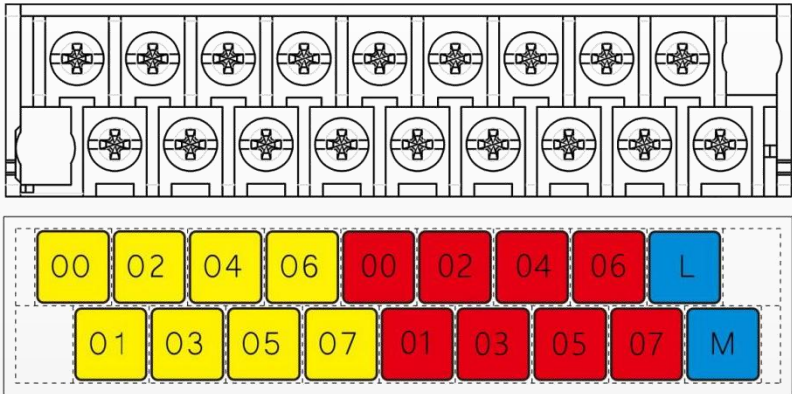
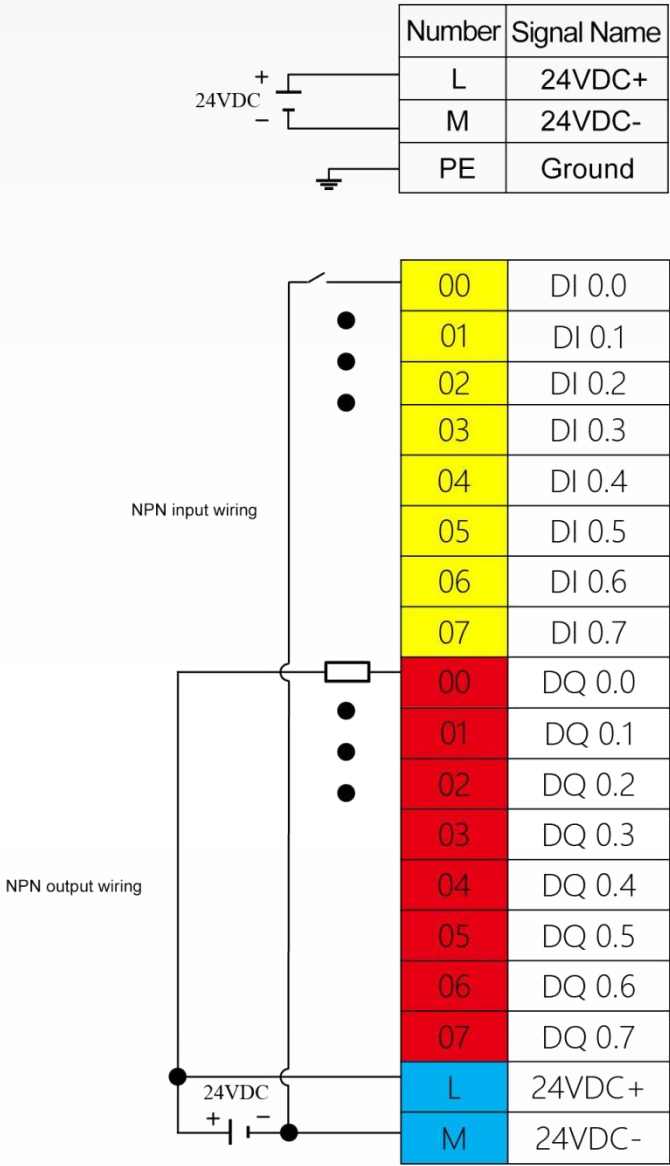
8-point digital input (PNP)
8-point digital output (PNP)



JP-D0808N-EA

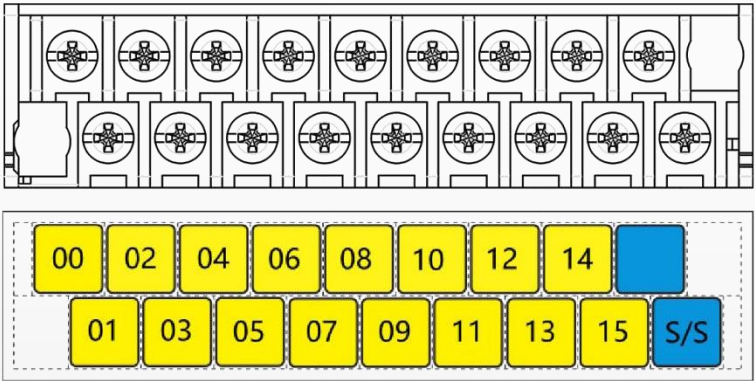
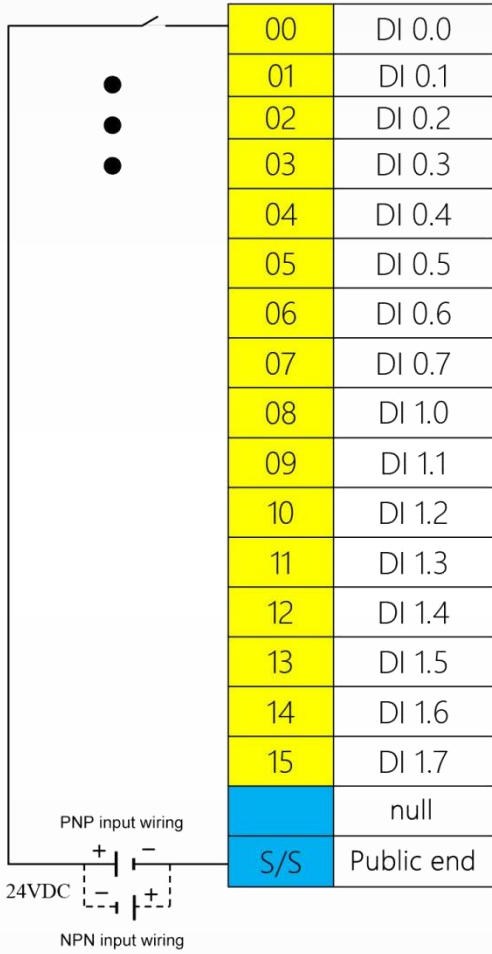
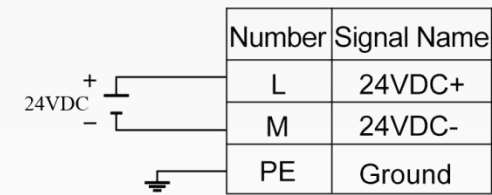
8-point digital input (NPN)

8-point digital output (NPN)



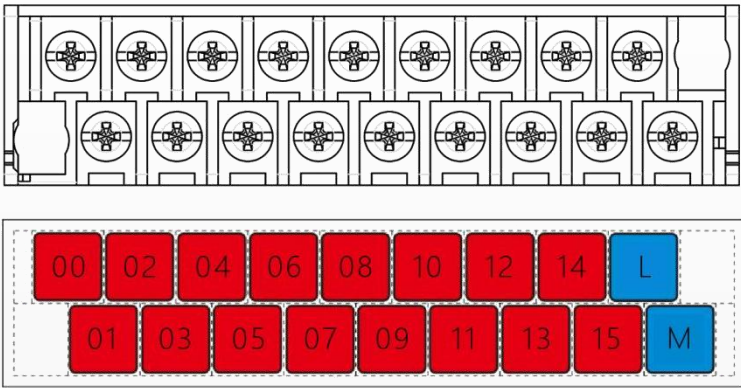
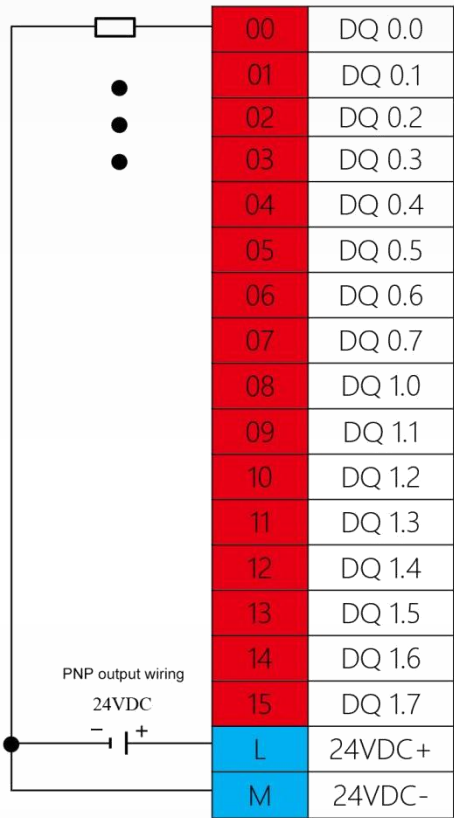
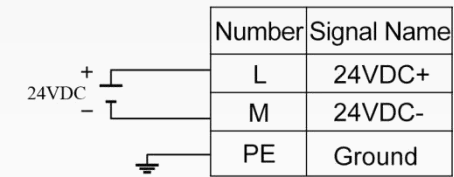
JP-D1600-EA

16-bit digital input PNP/NPN



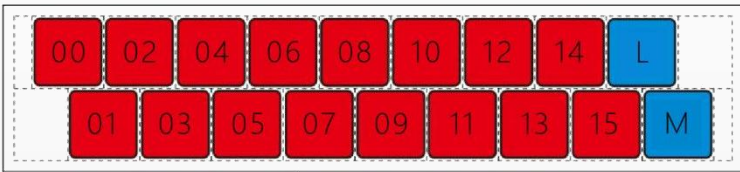
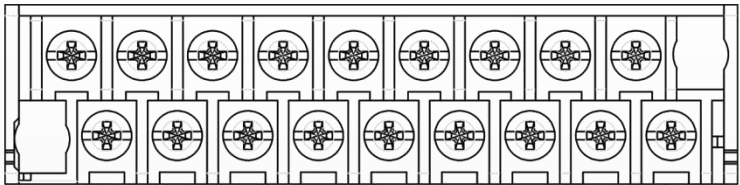
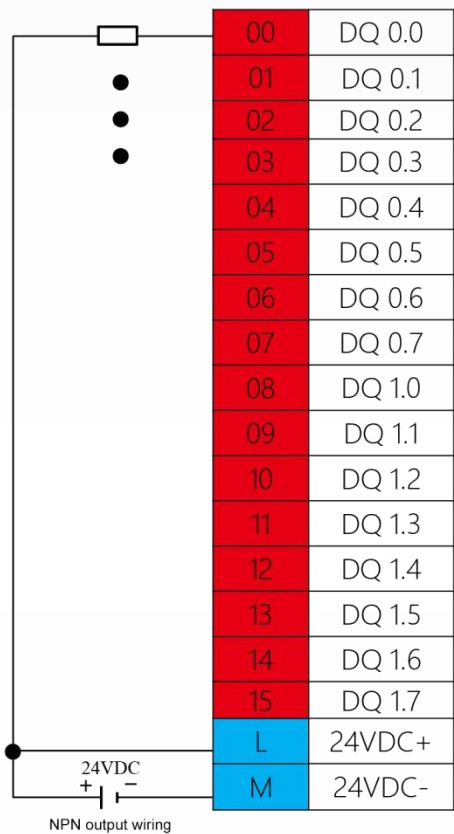
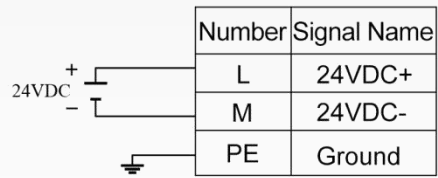
JP-D0016P-RA

16-bit digital output PNP



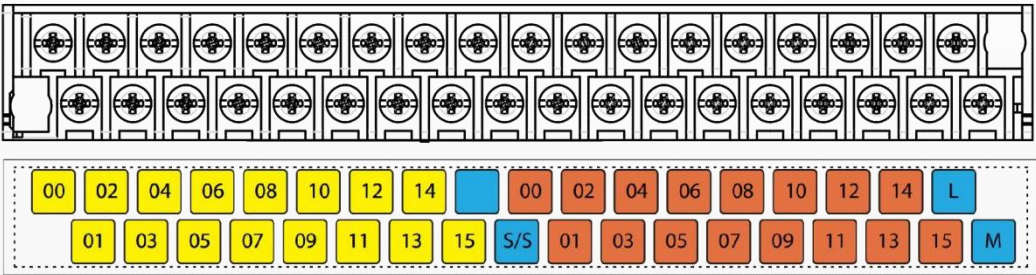
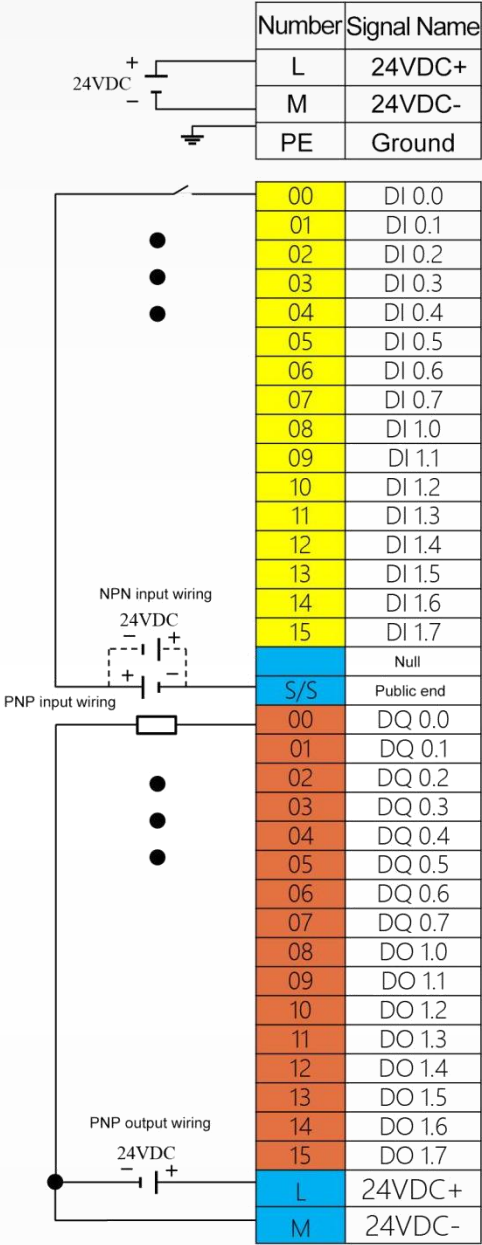
JP-DO016N-EA

16-bit digital output NPN



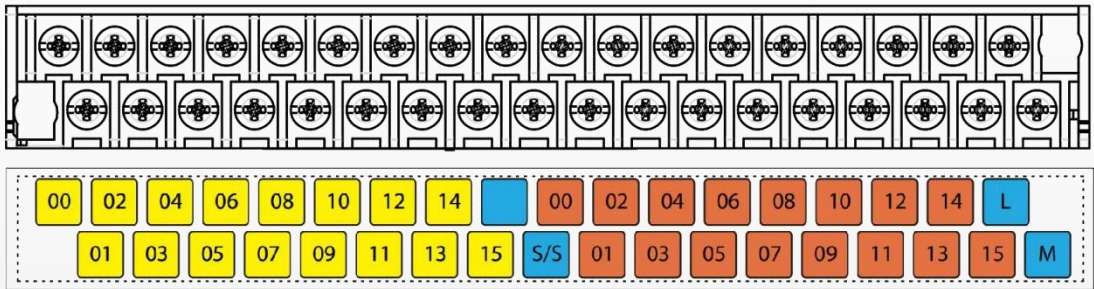
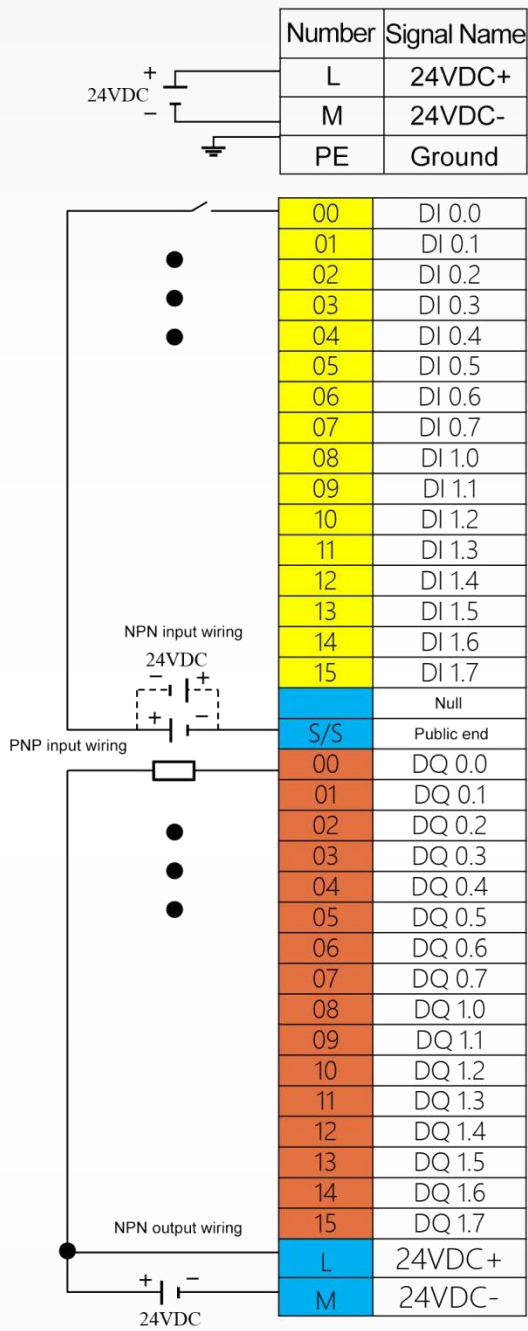
JP-D1616P-EA

16-bit digital input PNP/NPN
16-bit digital output PNP



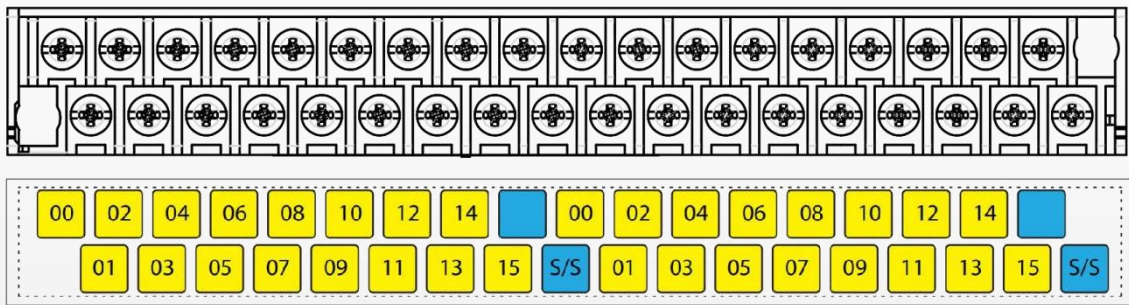
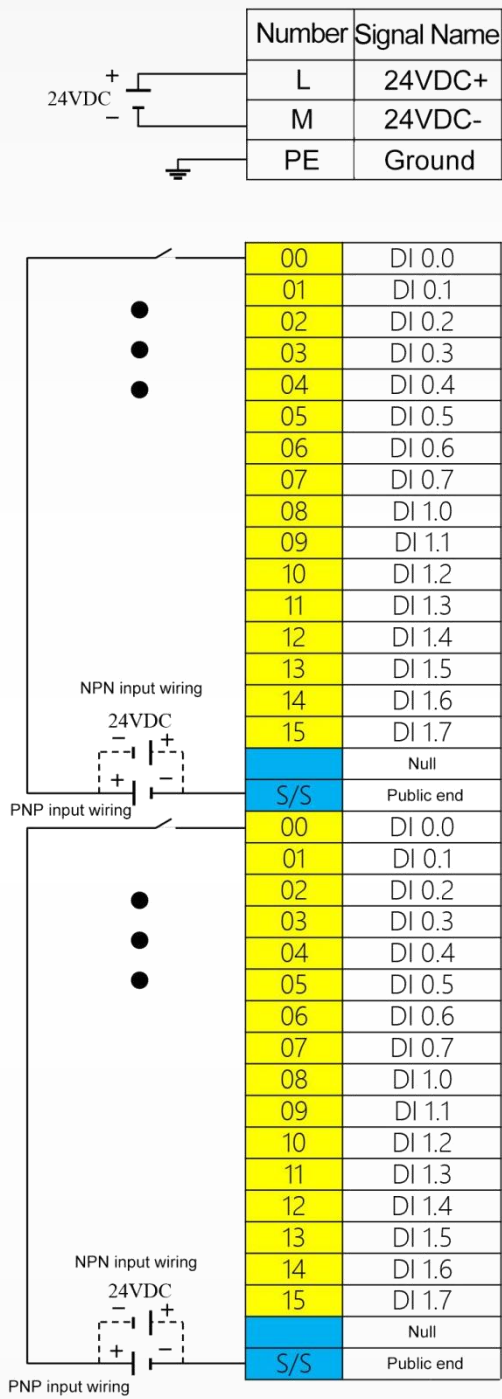
JP-D1616N-EA

16-bit digital input PNP/NPN
16-bit digital output NPN



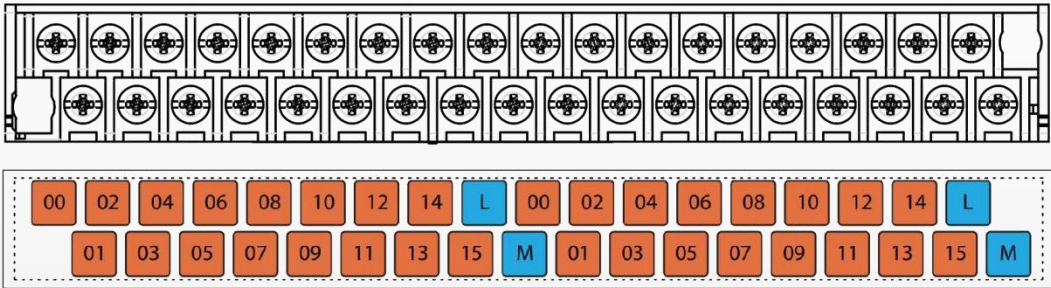
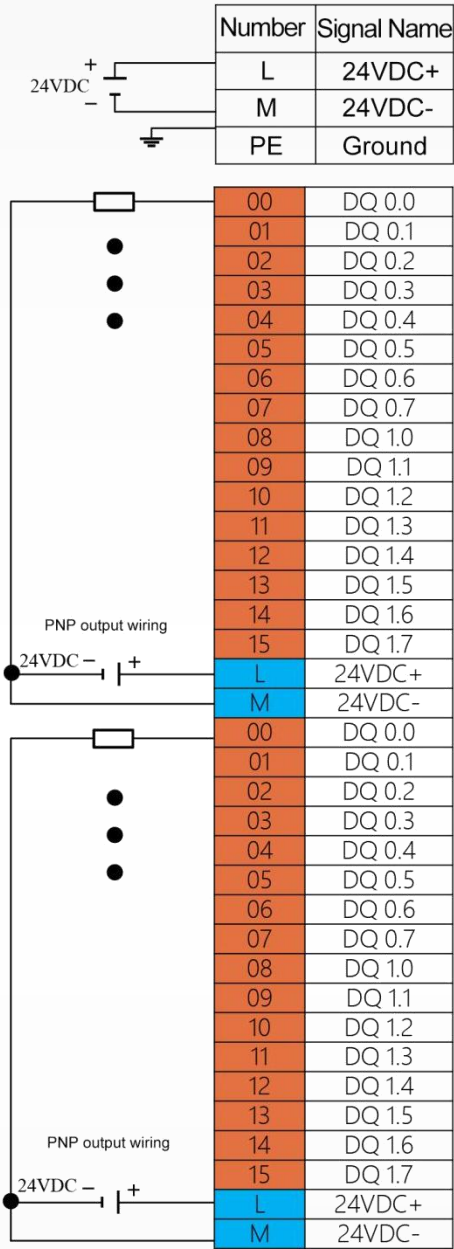
JP-D3200-EA

32-point digital input, PNP/NPN type

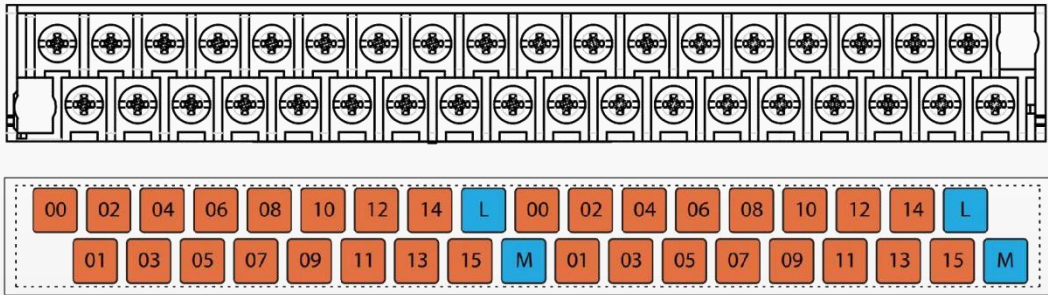
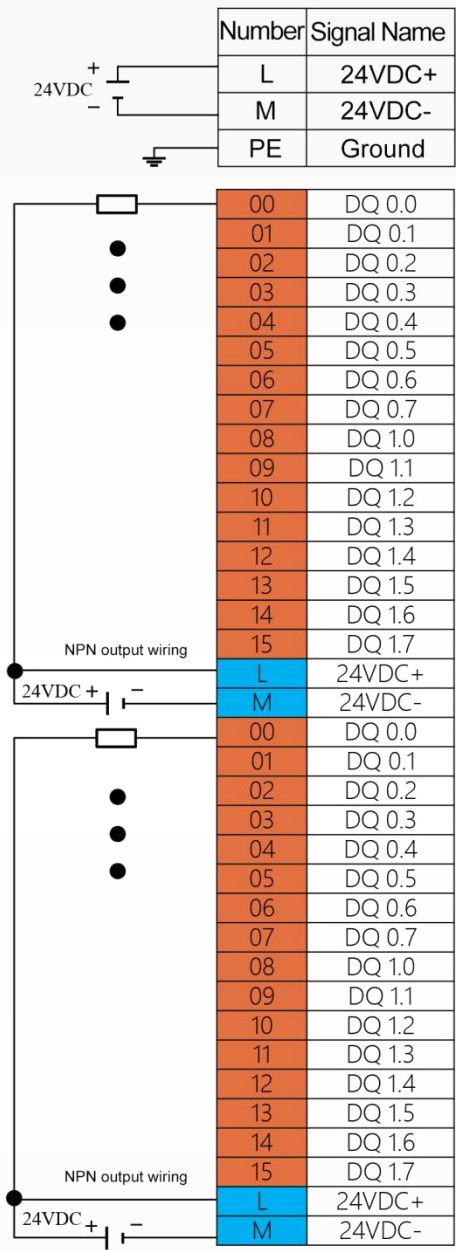


JP-D0032P-EA

32-point digital output PNP

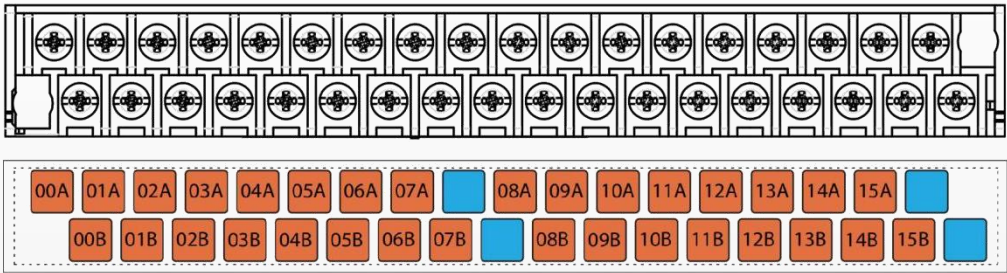
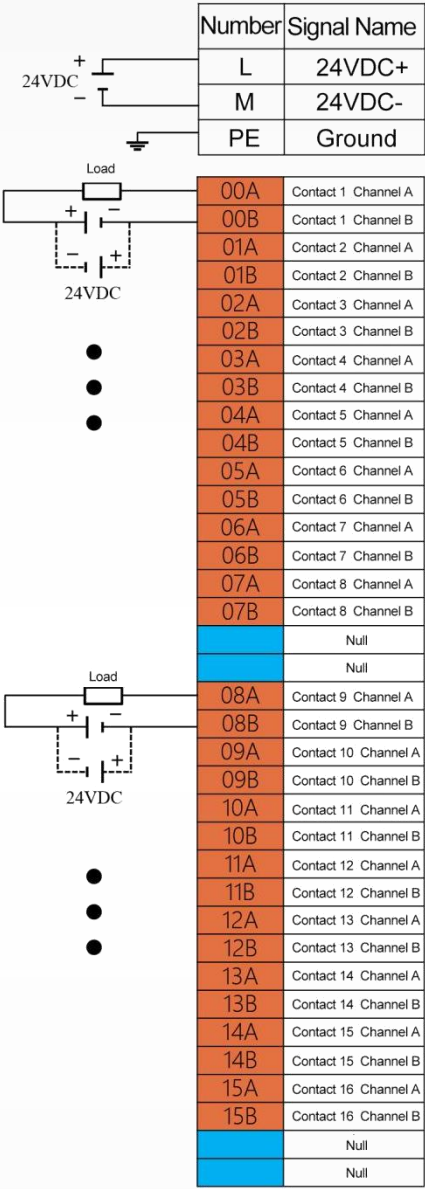


JP-D0032N-EA
32-point digital output NPN



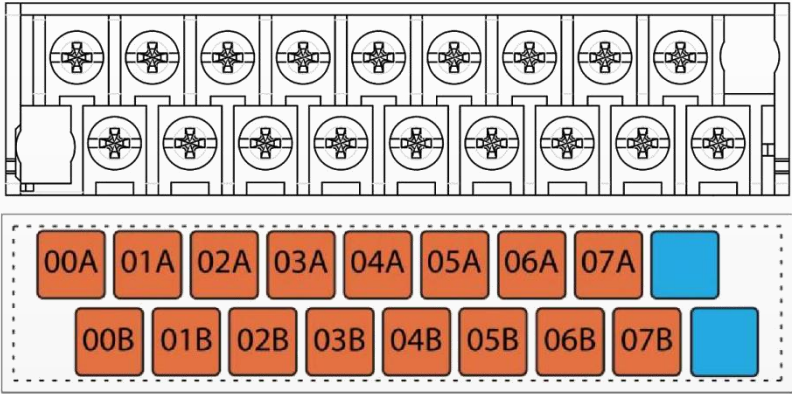
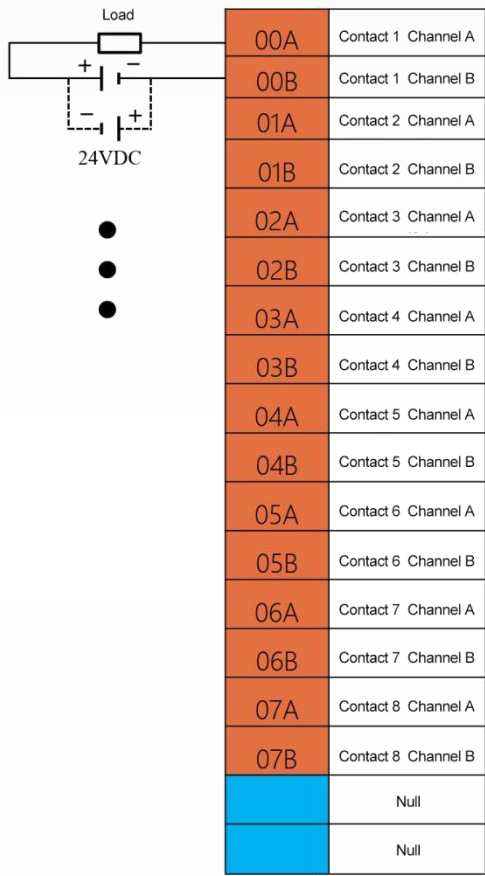
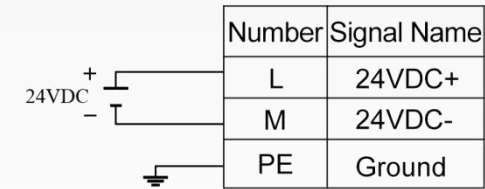
JP-D0016R-EA

Digital 16-point relay output PNP/NPN



JP-D0008R-EA

Digital 8-point relay output PNP/NPN





5.Ethernet protocol

5.1 What is ETHERCAT IO ?

Definition:

EtherCAT (Ethernet Control Automation Technology) is an open architecture fieldbus system based on Ethernet. The "CAT" in the name EtherCAT is an abbreviation of the first letters of "Control Automation Technology". It was initially developed by Beckhoff Automation GmbH, a German company. EtherCAT has set new standards for the real-time performance and topological flexibility of the system, and at the same time, it also reduces the cost of using fieldbuses and complies with even lowers the cost. The features of EtherCAT include high-precision device synchronization, optional cable redundancy, and functional safety protocol (SIL3).

5.2 Network Topology

EtherCAT has a typical network layout - a ring topology structure.

5.3 JP-EA Address Mapping

The JP-EA DI/DQ data is mapped to the main station's memory space through the configuration profile, as shown in the figure.

- 16 digital input signals are mapped to 2-byte In addresses;
- 16 digital output signals are mapped to 2-byte Out addresses;

5.4 Module parameters

JP-D0808X-EA Parameter configuration definition

Output data								
BIT No	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 0	Input filtering time (Filter)							
Data Explanation								
Parameter Name		Organizati on	Format	Input ran ge	Explanation			
Chinese	English							
Input filtering time	Filter	ms	Decimal system	0-255 (Default: 5)				
Output data								
BIT No	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 0	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode
(DO Error_Mode bits 0-7)	For 7	For 6	For 5	For 4	For 3	For 2	For 1	For 0
BYTE 1	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For
(DO Error_Value bits 0-7)	7	6	5	4	3	2	1	0
Data Explanation								
Parameter Name		Organizati on	Format	Input ran ge	Explanation			
Chinese	English							
Fault mode enable Fault value - Safe state value	DO Error_Mode bits	-	Decimal system	0-255 (Default: 0)	The fault safety status value of the DQ0.x port is enabled. The binary bit of this parameter corresponds to the DQ0.x port (Bit 0 corresponds to DQ-0.0, and so on). When the module enters the fault safety state, if the corresponding bit of "Error Mode" is "1", the value of the corresponding bit of "Error Value[7..0]" is output to the respective DQ0.x port.			
Fault mode enable	DO Error_Value bits	-	Decimal system	0-255 (Default: 0)				

JP-D0016X-EA Parameter configuration definition

Output data								
BIT No	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 0	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode
(DO Error_Mode bits 0-7)	For 7	For 6	For 5	For 4	For 3	For 2	For 1	For 0
BYTE 1	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For
(DO Error_Value bits 0-7)	7	6	5	4	3	2	1	0
Data Explanation								
Parameter Name		Organiza tion	Format	Input ra nge	Explanation			
Chinese	English							
Fault mode enable Fault value - Safe state value	DO Error_Mode bits	-	Decimal system	0-255	The fault safety status value of the DQ0.x port is enabled. The binary bit of this parameter corresponds to the DQ0.x port (Bit 0 corresponds to DQ-0.0, and so on). When the module enters the fault safety state, if the corresponding bit of "Error Mode" is "1", the value of the corresponding bit of "Error Value[7..0]" is output to the respective DQ0.x port.			
				(Default : 0)				
Fault mode enable	DO Error_Val ue bits	-	Decimal system	0-255	If the binary bit corresponding to the "Error Mode[7..0]" parameter is set to enable, then when the system enters the fault-safe state, the value of this parameter will be output to the DQ port.			
				(Default : 0)				

JP-D1600-EA Parameter configuration definition

Input data								
BIT No	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 0	Input filtering time (Filter)							
Data Explanation								
Parameter Name		Organizati on	Format	Input ran ge	Explanation			
Chinese	English							
Input filtering time	Filter	ms	Decimal system	0-255				

JP-D3200-EA Parameter configuration definition

Input data								
BIT No	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 0	Input filtering time (Filter)							
Data Explanation								
Parameter Name		Organizati on	Format	Input ran ge	Explanation			
Chinese	English							
Input filtering time	Filter	ms	Decimal system	0-255				
				(Default: 5)				

JP-D0032X-EA Parameter configuration definition

Output data								
BIT No	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 0	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode
(DO Error_Mode bits 0-7)	For 7	For 6	For 5	For 4	For 3	For 2	For 1	For 0
BYTE 1	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For
(DO Error_Value bits 0-7)	7	6	5	4	3	2	1	0
BYTE 2	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode
(DO Error_Mode bits 8-15)	For 15	For 14	For 13	For 12	For 11	For 10	For 9	For 8
BYTE 3	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For
(DO Error_Value bits 8-15)	15	14	13	12	11	10	9	8
.	16-31 Refer to the above configuration							

Data Explanation

Parameter Name		Organiza tion	Format	Input ran ge	Explanation
Chinese	English				
Fault mode enable Fault value - Safe state value	DO Error_Mod e bits	-	Decimal system	0-255 (Default: 0)	The fault safety status value of the DQ0.x port is enabled. The binary bit of this parameter corresponds to the DQ0.x port (Bit 0 corresponds to DQ-0.0, and so on). When the module enters the fault safety state, if the corresponding bit of "Error Mode" is "1", the value of the corresponding bit of "Error Value[7..0]" is output to the respective DQ0.x port.
Fault mode enable	DO Error_Valu e bits	-	Decimal system	0-255 (Default: 0)	If the binary bit corresponding to the "Error Mode[7..0]" parameter is set to enable, when the system enters the fault-safe state, the value of this parameter will be output to the DQ port.

JP-D1616X-EA Parameter configuration definition

Input data								
BIT No	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 0	Input filtering time (Filter)							
Data Explanation								
Parameter Name		Organization	Format	Input range	Explanation			
Chinese	English							
Input filtering time	Filter	ms	Decimal system	0-255				
				(Default: 5)				
Output data								
BIT No	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE 0	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode
(DO Error_Mode bits 0-7)	For 7	For 6	For 5	For 4	For 3	For 2	For 1	For 0
BYTE 1	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For
(DO Error_Value bits 0-7)	7	6	5	4	3	2	1	0
BYTE 2	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode	DO Error_Mode
(DO Error_Mode bits 8-15)	For 15	For 14	For 13	For 12	For11	For 10	For 9	For 8
BYTE 3	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For	DO Error Value For
(DO Error_Value bits8-15)	15	14	13	12	11	10	9	8
Data Explanation								
Parameter Name		Organization	Format	Input range	Explanation			
Chinese	English							
Fault mode enable Fault value - Safe state value	DO Error_Mode bits	-	Decimal system	0-255	The fault safety status value of the DQ0.x port is enabled. The binary bit of this parameter corresponds to the DQ0.x port (Bit 0 corresponds to DQ-0.0, and so on). When the module enters the fault safety state, if the corresponding bit of "Error Mode" is "1", the value of the corresponding bit of "Error Value[7..0]" is output to the respective DQ0.x port.			
				(Default: 0)				
Fault mode enable	DO Error_Value bits	-	Decimal system	0-255	If the binary bit corresponding to the "Error Mode[7..0]" parameter is set to enable, when the system enters the fault-safe state, the value of this parameter will be output to the DQ port.			
				(Default: 0)				

Official website



先进自动化控制及工业网络技术



Copyright © 2023Wuxi Latcos Automation Technology, Inc. All rights reserved.

Wuxi Lingke Automation Technology Co., Ltd. www.latcos.cn

Company Tel: **0510-85888030**