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1. Introduction

2

1.1 Agreement

The following terms/abbreviations are used synonymously in this document:

IOL: IO-Link.

FE: Grounding.

This device: equivalent to "this product", refers to the product model or series described in this manual.

1.2 Purpose

This manual contains all the information required to use the device correctly, including information on necessary functions, performance, usage, etc. It is suitable both for programmers and test/debugging personnel who debug the system themselves and interface it with other units (automation systems, other programming devices), as well as for service and maintenance personnel who install extensions or perform fault/error analysis.

Please read this manual carefully before installing this equipment and putting it into operation.

This manual contains instructions and notes to help you step-by-step through installation and commissioning. This ensures trouble-free use of the product. By familiarizing yourself with this manual, you will gain.

The following benefits:

- ❖ ensuring safe operation of this device.
- ❖ take advantage of the full capabilities of this device.
- ❖ avoid errors and related failures.
- ❖ reduce maintenance and avoid cost waste.

1.3 Valid Scope

The descriptions in this document apply to the IO-Link device module products of the ULK-EIP series.

1.4 Declaration of Conformity

This product has been developed and manufactured in compliance with applicable European standards and guidelines (CE, ROHS). You can obtain these certificates of conformity from the manufacturer or your local sales representative.

2. Safety Instructions

2.1 Safety Symbols

Read these instructions carefully and inspect the equipment before attempting to install, operate, repair, or maintain it. The following special messages may appear throughout this document or on the equipment to indicate status information or to warn of potential hazards.

We divide the safety prompt information into four levels: "Danger", "Warning", "Attention", and "Notice".

DANGER	indicates a severely hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	indicates a hazardous situation which, if not avoided, could result in death or serious injury.
ATTENTION	indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	used to prompt information not related to personal injury



DANGER

This is the DANGER symbol, which indicates an electrical hazard exists which, if instructions are not followed, will result in personal injury.



WARNING

This is a WARNING symbol, which indicates an electrical hazard exists which, if instructions are not followed, could result in personal injury.

Attention

This is the "Attention" symbol. Used to warn you of a potential personal injury hazard. Observe all safety instructions following this symbol to avoid injury or death.

Notice

This is the "Notice" symbol, which is used to warn the user of possible risks. Failure to observe this regulation may result in faulty of device.

2.2 General Safety

⁴ This equipment should only be installed, operated, serviced and maintained by qualified personnel. Qualified person is a person who has skills and knowledge concerning the construction and operation of electrical equipment, and its installation, and has received safety training to recognize and avoid the hazards involved.

There shall be a statement in the instructions that if the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Notice

User modifications and/or repairs are dangerous and will void the warranty and release the manufacturer from any liability.

Attention

Product maintenance can only be carried out by our personnel. Unauthorized opening and improper servicing of the product can result in extensive equipment damage or possibly personal injury to the user.

In the event of a serious malfunction, discontinue use of the equipment. Prevent accidental operation of the device. If repairs are required, please return the device to your local representative or sales office.

It is the operating company's responsibility to comply with locally applicable safety regulations.

Store unused equipment in its original packaging. This provides the best protection against impact and moisture for the device. Please ensure that the ambient conditions comply with this relevant regulation.

2.3 Special Safety

**WARNING**

A process started in an uncontrolled manner may endanger or be exposed to other equipment, therefore, before commissioning, make sure that the use of the equipment does not involve risks that may endanger other equipment or be endangered by other equipment risks of.

Power Supply

This device can only be operated with a current source of limited power, that is, the power supply must have overvoltage and overcurrent protection functions. In order to prevent the power failure of this equipment, affecting the safety of other equipment; or the failure of external equipment, affecting the safety of this equipment.

3. Product Overview

5 The IO-Link master establishes the connection between the IO-Link device and the automation system. As an integral part of the I/O system, the IO-Link master station is either installed in the control cabinet, or directly installed on site as a remote I/O, and its encapsulation level is IP65/67.

- ❖ Designed for industrial environments, it is a system applied to automated lines.
- ❖ Compact structure, suitable for usage scenarios with limited installation conditions.
- ❖ IP67 high protection level, anti-interference design, suitable for demanding application environments.

As a special reminder, IP rating is not part of UL certification.

6. Technical Parameters


4.1 ULK-EIP-4AP6



4.1.1 ULK-EIP-4AP6_Specification

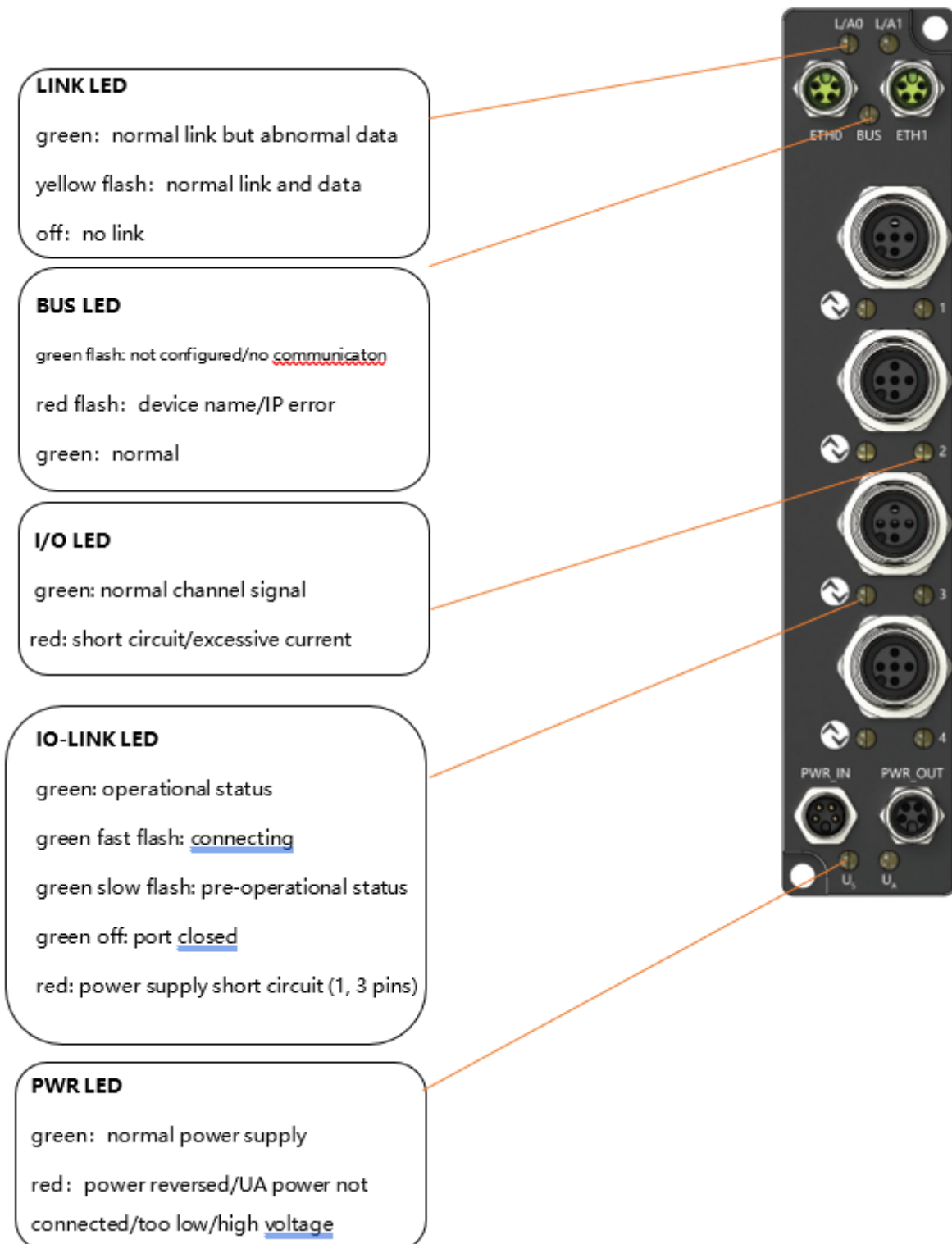
The technical specifications of ULK-EIP-4AP6 are as follows:

IO-Link Master IP67		
ULK-EIP-4AP6		
4*CLASS A		
Basic Parameters		
Housing Material	Aluminum Alloy	
Housing Color	Anodized Black	
Protection Level	IP67, epoxy full potting	
Dimensions (W x H x D)	155mm*30mm*31.9mm	
Weight	208g	
Operating Temperature	-25°C..70°C	
Storage Temperature	-40°C..85°C	
Operating Humidity	5%..95%	
Storage Humidity	5%..95%	
Operating Atmospheric Pressure	80KPa...106KPa	
Storage Atmospheric Pressure	80KPa...106KPa	
Altitude	0...2000m	
Pollution Degree	3	
Tightening Torque(I/O)	M12:0.5Nm	
Application Environment	conforms to EN-61131	
Vibration Test	conforms to IEC60068-2	
Impact Test	conforms to IEC60068-27	
Free Drop Test	conforms to IEC60068-32	
EMC	conforms to IEC61000-4-2,-3,-4	
Certification	CE,RoHS	
Mounting Hole Size	φ4.5mm × 2	
Data Transfer		
Connection Type	2 ×M8 A-code; 4-pin, Female	
Physical Layer	Ethernet	
Transfer Rate	10/100 Mbps, Full Duplex	
Characteristic	conforms to protocol features	
Alarm Function	diagnosis alarm, process alarm	
Min. Cycle Time	1ms	
Tightening Torque(data port)	M8:0.5Nm	
Power Supply		
Connection Type	M8, 4 pin, A-code, Male/Female	
System voltage Us	18...30 VDC(type 24VDC)	
Auxiliary voltage Ua	18...30 VDC(type 24VDC)	
Total Current S/IA	4A	
Static Working CurrentIc	≤150mA	
Overvoltage Protection	yes	
Power Reverse Polarity Protection	yes	
Tightening Torque(power supply port)	M8:0.5Nm	

<p>7 IO-Link Master IP67 ULK-EIP-4AP6</p> <p>4×CLASS A</p>	
<p>IO-LINK Parameters</p>	
<p>Port Number</p>	<p>4×IO-LINK</p>
<p>IO-LINK Connection Type</p>	<p>M12,5 pins,A-code,Female</p>
<p>IO-LINK Version</p>	<p>1.1</p>
<p>Communication Rate</p>	<p>COM1(4.8KBps),COM2(38.4KBps),COM1(230.4KBps)</p>
<p>Port Voltage</p>	<p>type.24VDC (follow US)</p>
<p>Port Current</p>	<p>2A (follow US)</p>
<p>Port Class</p>	<p>4 × CLASS A</p>
<p>Port Maximum Data Length</p>	<p>32byte</p>
<p>Max. Data Transfer Distance</p>	<p>≤100 m</p>
<p>IO-LINK Max. Distance</p>	<p>≤20 m</p>
<p>Digital Input/Output</p>	<p>4×PNP (self-adaptive)</p>
<p>Port Parameters (Input)</p>	
<p>Input Number</p>	<p>up to 4</p>
<p>Input Port Position</p>	<p>X1...X4</p>
<p>Input Polarity</p>	<p>PNP</p>
<p>Input Signal "0"</p>	<p>low level 0.3~5V DC</p>
<p>Input Signal "1"</p>	<p>high level 12~30V DC</p>
<p>Port Parameters (Output)</p>	
<p>Output Number</p>	<p>up to 4</p>
<p>Output Port Position</p>	<p>X1...X4</p>
<p>Output Polarity</p>	<p>PNP</p>
<p>Output Current</p>	<p>single channel maximum 2A</p>
<p>Port Protection</p>	<p>port power short circuit protection (PIN1, PIN3) / port overload protection</p>
<p>Load Type</p>	
<p>Load Type</p>	<p>Resistive, Pilot Duty, Tungsten</p>
<p></p>	<p></p>
<p></p>	<p></p>
<p></p>	<p></p>

4.1.2 ULK-EIP-4AP6 LED Definition

⁸ ULK-EIP-4AP6 is shown in the below figure.

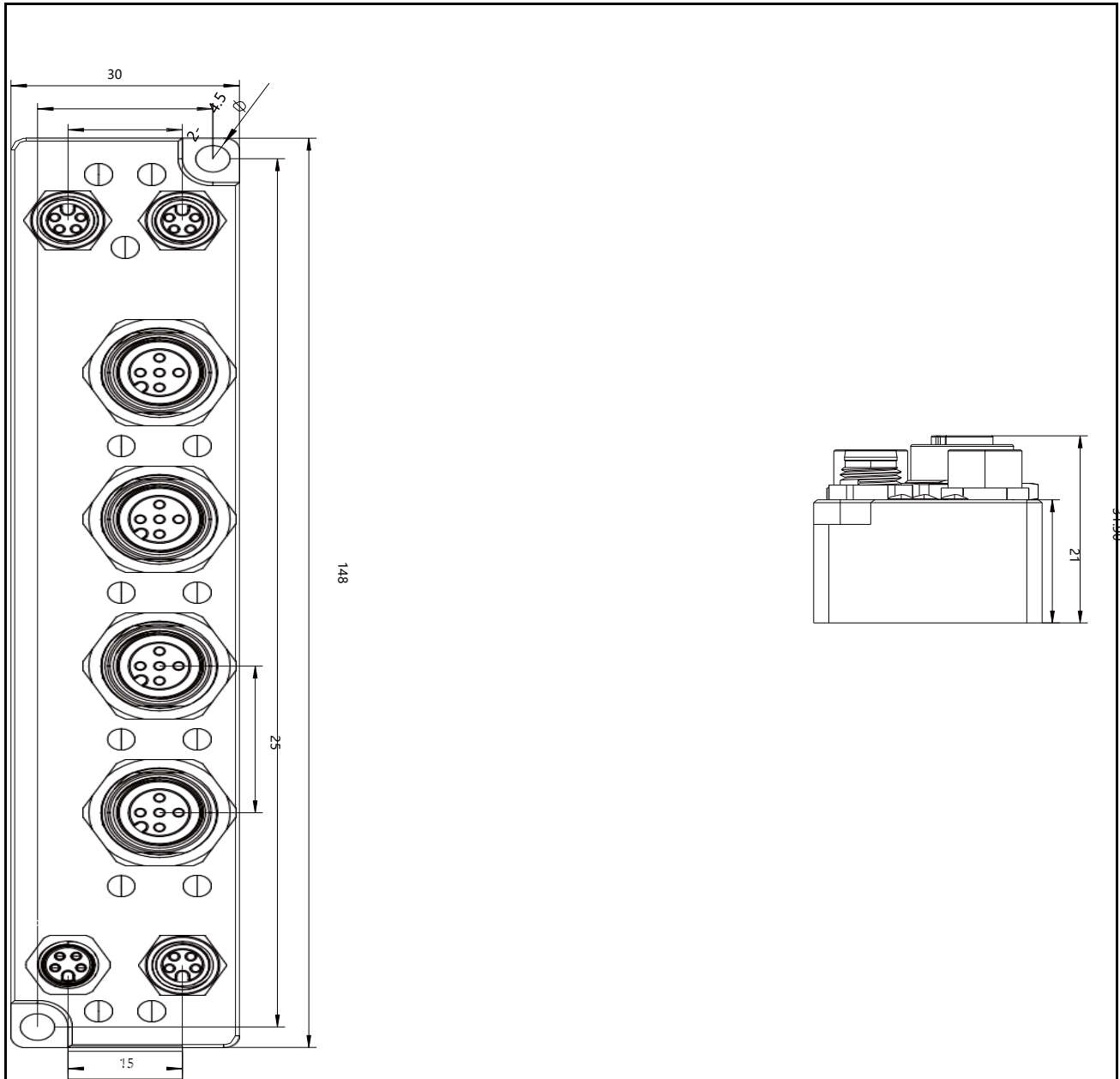


Module Indicator		
	Status	Solution
PWR	green: normal power supply	
	red: power reversed/UA power not connected/too low/high voltage	check power wiring
IO	green: normal channel signal	
	red: port power supply short circuit (2, 3 pins)	check pin 2 and pin 3
LINK	green: normal link but abnormal data	check the network configuration
	yellow flash: normal link and data	
	off: no link	check cable/network configuration
MS	red: module failure	check damage/IO-Link device connected or not
	green flash: module not configured	check configuration in the program and PLC download status
NS	red flash: data interruption	check network cable status
	green flash: data not connected	
MS/NS	green: normal status	
IO-LINK	green: port running status	
	green fast flash: port connecting	
	green slow flash: port pre-operation status	pre-operational / port configured but no device connected
	green off: port closed	port not configured
	red: power supply short circuit (1, 3 pins)	check whether the 1 and 3 pins are short circuited

Note: When the Link indicator is always off, if there is no abnormality in the cable inspection and replacement of other modules, it indicates that the product is working abnormally. Please contact the manufacturer for technical consultation.

4.1.3 ULK-EIP-4AP6 Dimension

The size of the ULK-EIP-4AP6 is 155mm×30mm×31.9mm, including two $\phi 4.5$ mm mounting holes, and the depth of the mounting holes is 20mm, as shown in the figure below:



5. Product Installation

5.1 Installation Precautions

To prevent product malfunction, malfunction, or negative impact on performance and equipment, please observe the following items.

5.1.1 Installation Site

Notice

Please avoid installing near devices with high heat dissipation (heaters, transformers, large-capacity resistors, etc.)

Notice

Please avoid installing it near equipment with serious electromagnetic interference (large motors, transformers, transceivers, frequency converters, switching power supplies, etc.). This product uses PN communication. Radio waves (noise) generated by transceivers, motors, inverters, switching power supplies, etc. may affect the communication between the product and other modules. When these devices are around, it may affect the communication between the product and the module or damage the internal components of the module. When using this product near these devices, please confirm the effects before use.

Notice

When multiple modules are installed close to each other, The service life of the modules may be shortened due to the inability to dissipate heat. Please keep more than 20mm between the modules.

5.1.2 Application



Do not use AC power. Otherwise, there is a risk of rupture, seriously affecting the safety of personal and equipment.

Attention

Please avoid wrong wiring. Otherwise, there is a risk of rupture and burnout. It may affect the safety of personal and equipment.

5.1.3 Usage

Attention

Do not bend the cable within a radius of 40mm. Otherwise there is a risk of disconnection.

Attention

If you feel that the product is abnormal, please stop using it immediately and contact the company after cutting off the power.

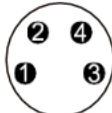
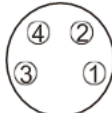
5.2 Hardware Interface

5.2.1 ULK-EIP-4AP6 Interface Definition

Power Port Definition

1. ULK-EIP-4AP6 Port Definition

The power port uses a 4-pin connector, and the pins are defined as follows:

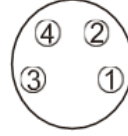
Power Port Pin Definition			
Auxiliary Power Port	Connection Type	M8, 4 pins, A-code, Female/Male	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>PWR_IN</p> </div> <div style="text-align: center;">  <p>PWR_OUT</p> </div> </div>
	System Supply Voltage u_s	18...30 VDC (type.24VDC)	
	Auxiliary Supply Voltage u_a	18...30 VDC (type.24VDC)	
	Total Current I_s	4A	
	Total Current I_a	4A	
M8 A-code	Static Working Current I_c	$\leq 150\text{mA}$	
Female & Male	Power Reverse Polarity Protection	yes	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">Male</div> <div style="text-align: center;">Female</div> </div> <ol style="list-style-type: none"> 1. +24V_Us 2. +24V_Ua 3. GND_Us 4. GND_Ua
	Tightening Torque (power port)	M8:0.5Nm	
Pin Definition			

Note: U_s is the system power and input power, and U_a is the output power.

The power supply must be a limiting power source or class 2 power supply.

Data Port Definition

The data port uses a 4-pin connector, and the pins are defined as follows:

Data Port Pin Definition			
M8 A-code Female	Connection Type	2 × M8 A-code; 4 pins, Female	<div style="text-align: center;"> <p>ETH0 , ETH1</p>  </div>
	Physical Layer	Ethernet	
	Transfer Speed	10/100 Mbps, full duplex	
	Characteristic	conforms to the protocol features	
	Alarm Function	diagnostic alarm, process alarm	
	Min. Cycle Time	1ms	
	Tightening Torque (data port)	M8:0.5Nm	
			<ol style="list-style-type: none"> 1. TX+ 2. RX+ 3. TX- 4. RX-

IO-Link Port Definition

The IO-Link port uses a 5-pin connector, and the pins are defined as follows:



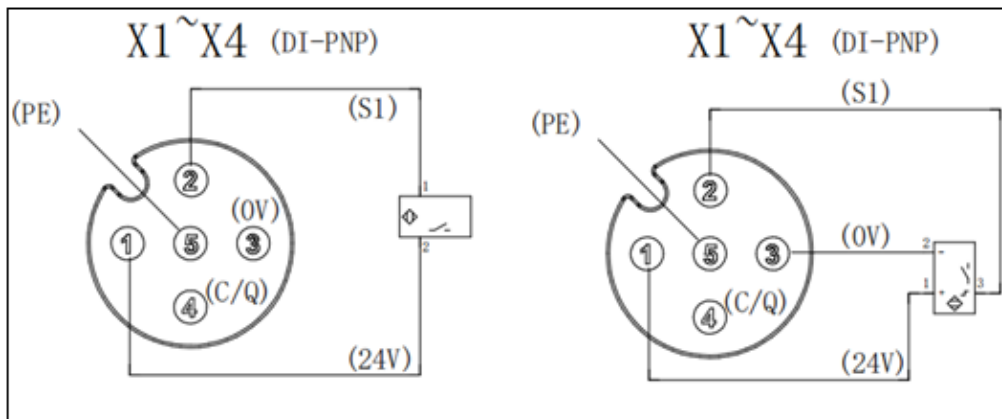
WARNING Use Copper Conductors Only.

The maximum input current per port load is 200mA.

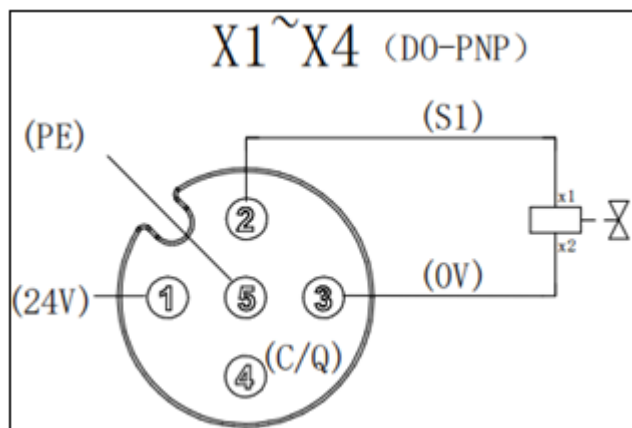
The voltage range of the output signal and U_a has always been 18~30Vdc.

5.2.2 ULK-EIP-4AP6 Wiring Diagram

1. PNP type input signal, that is, the jack is connected to 1 input sensor, which is divided into two-wire sensor and three-wire sensors.

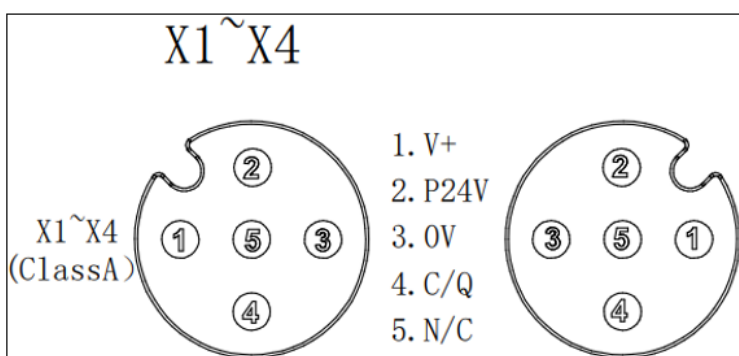


2. PNP type output signal, that is, the jack is connected to the actuator.



3. The IO-Link port is connected to the ULK-EIP-4AP6 substation.

(When the IO-Link device is an input type, the 2 pins allow no wiring.)



5.2.3 ULK-EIP-4AP6 IO Process Image Area Allocation

4-way IO-Link Interface (4 Class-A)

EtherNet/IP Protocol Process Output Data										
Byte	Function Description									
	Description	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0	
0	Standard IO Output 0=off 1=on	N/C				X4P2	X3P2	X2P2	X1P2	
1	no	reserve	reserve	reserve	reserve	reserve	reserve	reserve	reserve	
2-33	port 1 process output data									
34-65	port 2 process output data									
66-97	port 3 process output data									
98-129	port 4 process output data									

EtherNet/IP Protocol Process Input Data										
Byte	Function Description									
	Description	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0	
0	Standard IO Input 0=no signal 1=have signal	N/C				X4P2	X3P2	X2P2	X1P2	
1	no	reserve	reserve	reserve	reserve	reserve	reserve	reserve	reserve	
2	Port 1 process communication status (0x03 connected, 0xa4 not connected, 0x00 not configured)									
3	Port 2 process communication status (0x03 connected, 0xa4 not connected, 0x00 not configured)									
4	Port 3 process communication status (0x03 connected, 0xa4 not connected, 0x00 not configured)									
5	Port 4 process communication status (0x03 connected, 0xa4 not connected, 0x00 not configured)									
6-37	port 1 process input data									
38-69	port 2 process input data									
70-101	port 3 process input data									
102-133	port 4 process input data									

Note: When the IO-Link master port is connected to a slave station with output function, it is necessary to set the Pin2 output point to ON to provide power for the IO-Link device. Otherwise, the output point of the IO-Link device will light up in red when outputting.

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