



PRODUCT

USE INSTRUCTIONS



Ordering code: 004B01

Part number: FNI EIP-500-105-M

IO-Link Master Module User Manual



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■ Expected use

This manual describes the module as a decentralized input and output for connection to an industrial network.

■ Installation and start-up

Things to note!

Installation and start-up may only be performed by trained personnel. A qualified individual is one who is familiar with the installation and operation of the product and has the necessary qualifications to perform such operations. Any damage caused by unauthorized operation or illegal and improper use is not covered by the manufacturer's warranty. The equipment operator is responsible for ensuring that appropriate safety and accident prevention regulations are observed.

■ Corrosion resistance

Things to note!

FNI modules generally have good chemical and oil resistance characteristics. When used in corrosive media (such as high concentrations of chemicals, oils, lubricants and coolants (that is, very low water content)), the above media must be checked and confirmed before the compatibility of the corresponding application materials. If a module fails or is damaged due to such corrosive media, a defect claim cannot be made.

■ Dangerous voltage

Things to note!

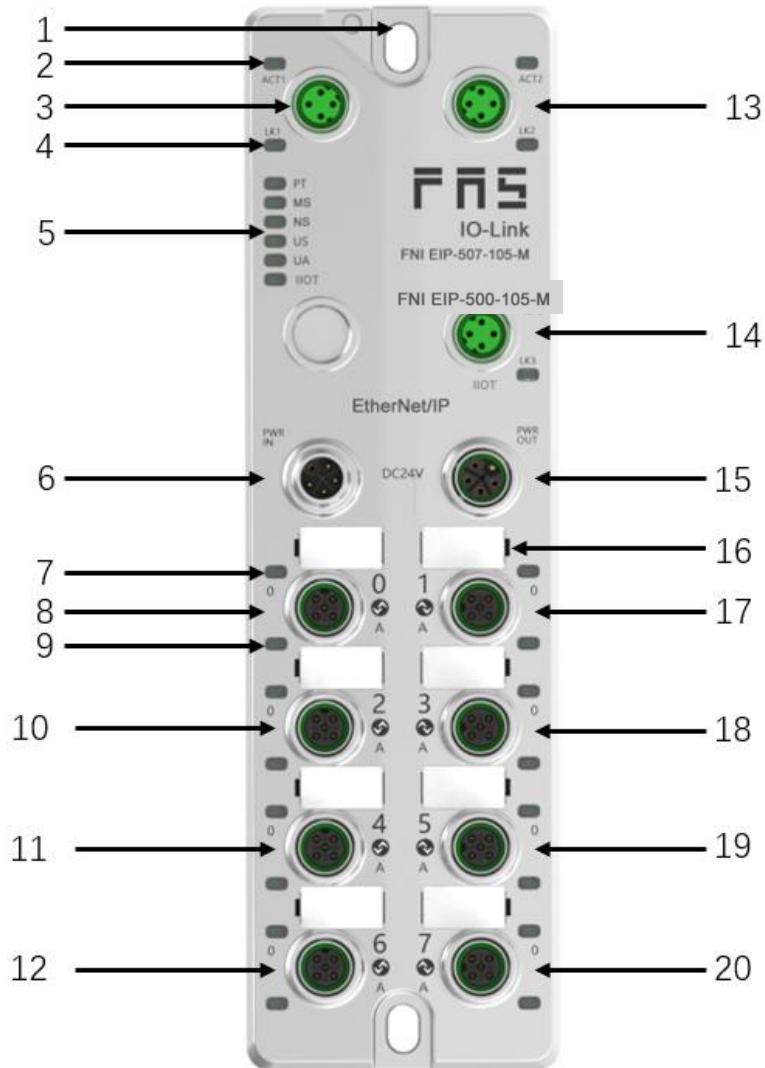
Before using the device, disconnect all power sources!

■ General security

Debugging and inspection	Fault	Owner/Operator Obligations	Intended use
Before debugging, the contents of the user manual should be read carefully.	If a defect or equipment failure cannot be corrected, operation of the equipment must be stopped to avoid possible damage caused by unauthorized use.	This device is an EMC Class A product. This device generates RF noise	The manufacturer's warranty and limited liability statement do not cover damage caused by: ·Unauthorized tampering operations ·Improper use and operation ·Usage, installation and operation that are inconsistent with the instructions and explanations provided in the user manual
This system is not intended to be used in environments where the safety of personnel depends on the functionality of the equipment.	Intended use can only be ensured after the housing is fully installed.	The owner/operator must take appropriate precautions when using this equipment. This device may only be operated from a power source that is suitable for this device and may only be connected to cables approved for the purpose	

1 Getting Started Guide

1.1 Module overview



- | | | |
|---|------------------------------|------------------------------|
| 1 Mounting hole (ground hole) | 8 Port 0 | 15 Power output port |
| 2 Industrial network port 1 communication light | 9 Port PIN2 indicator light | 16 port identification board |
| 3 Industrial network port 1 | 10 Port 2 | 17 port 1 |
| 4 Industrial network port 1 connection light | 11 Port 4 | 18 port 3 |
| 5 Module status indicator | 12 Port 6 | 19 Port 5 |
| 6 Power input port | 13 Industrial network port 2 | 20 Port 7 |
| 7 Port PIN4 status indicator | 14 IIOT network port | |

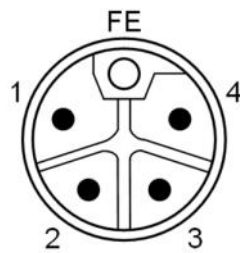
1.2 Mechanical connection

The modules are connected using 2 M6 bolts and 2 washers.

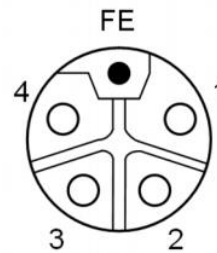
1.3 Electrical connection

1.3.1 Power interface(L-code)

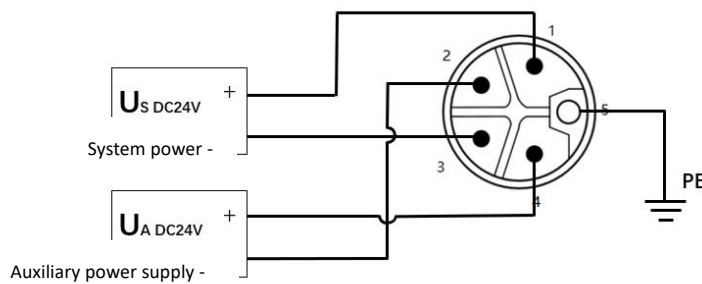
Power input port definition



Power output port definition



Power port



Pin	Function	Describe
1	Us+	+24V(Brown)
2	Ua-*	0V(White)
3	Us-	0V(Blue)
4	Ua+*	+24V(Black)
FE	Functional ground*	FE(Yellow green)

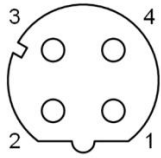
Note:

1. If possible, provide sensor/system power and auxiliary power separately.

The total current of all modules is <16A, even if the auxiliary power supply is daisy chained.

2. The FE connection from the casing to the machine must have low impedance <4Ω and be kept as short as possible.

1.3.2 Network interface(D-code)

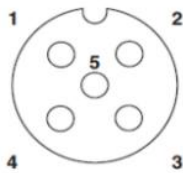


Pin	Function	
1	Tx+	Send data+
2	Rx+	Receive data+
3	Tx-	Send data-
4	Rx-	Receive data-

Communication port	
Data transport layer	Ethernet II, IEEE 802.3
Interface type	100BASE-TX
Transmission rate	100 MBit/second
Integrated switch	Support

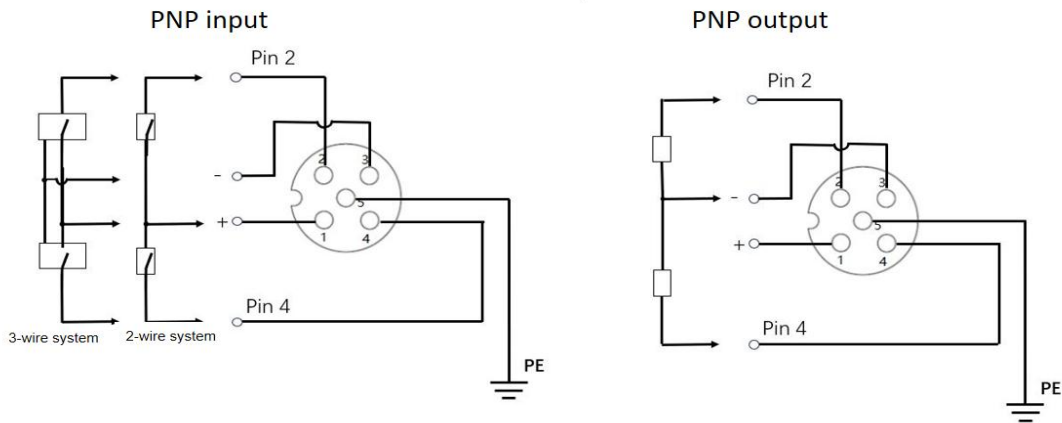
Note:
Unused I/O port sockets must be covered with end caps to meet IP67 protection rating

1.3.3 I/O-port(A-code)



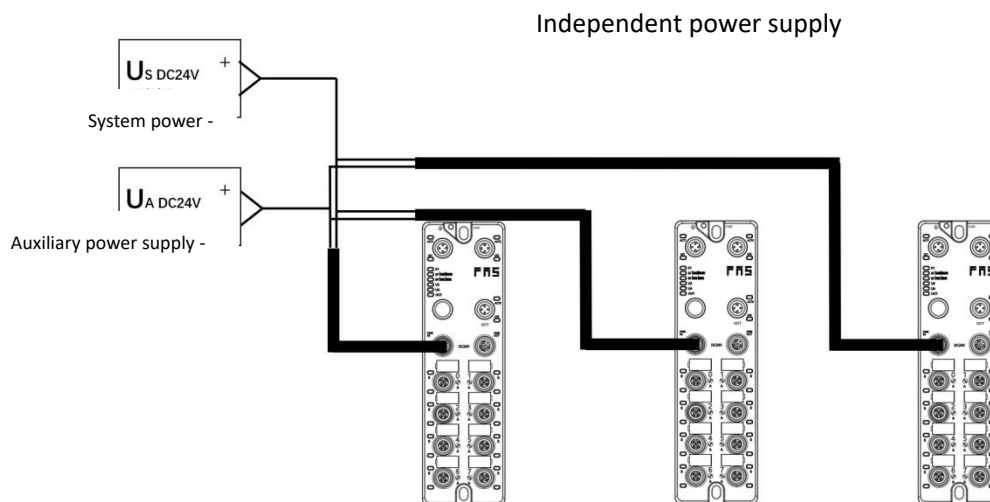
Pin	Function
1	+24V (brown) maximum current 1A
2	Input/output (white)
3	0V(Blue)
4	Input/output/IOLINK (black)

Normal I/O

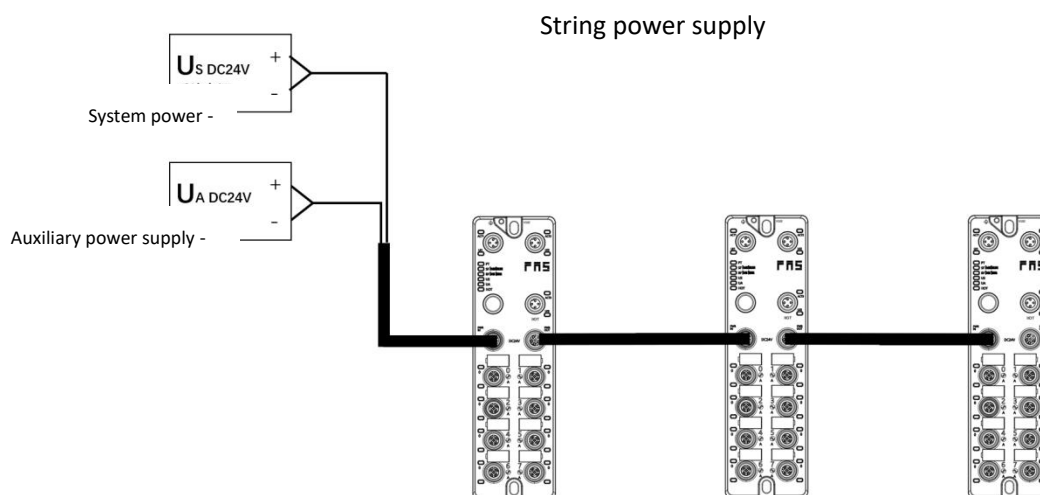


- Note:
1. Regarding digital sensor input, please follow the input guidance of EN61131-2, Type 2.
 2. The single-channel output current of pins 2 and 4 is <2A, and the entire module allows up to 8 channels to be fully loaded with 2A output at the same time.
 3. Unused I/O port sockets must be covered with end caps (tightening torque 0.6Nm) to meet the IP67 protection level.

1.3.4 Main station module wiring method



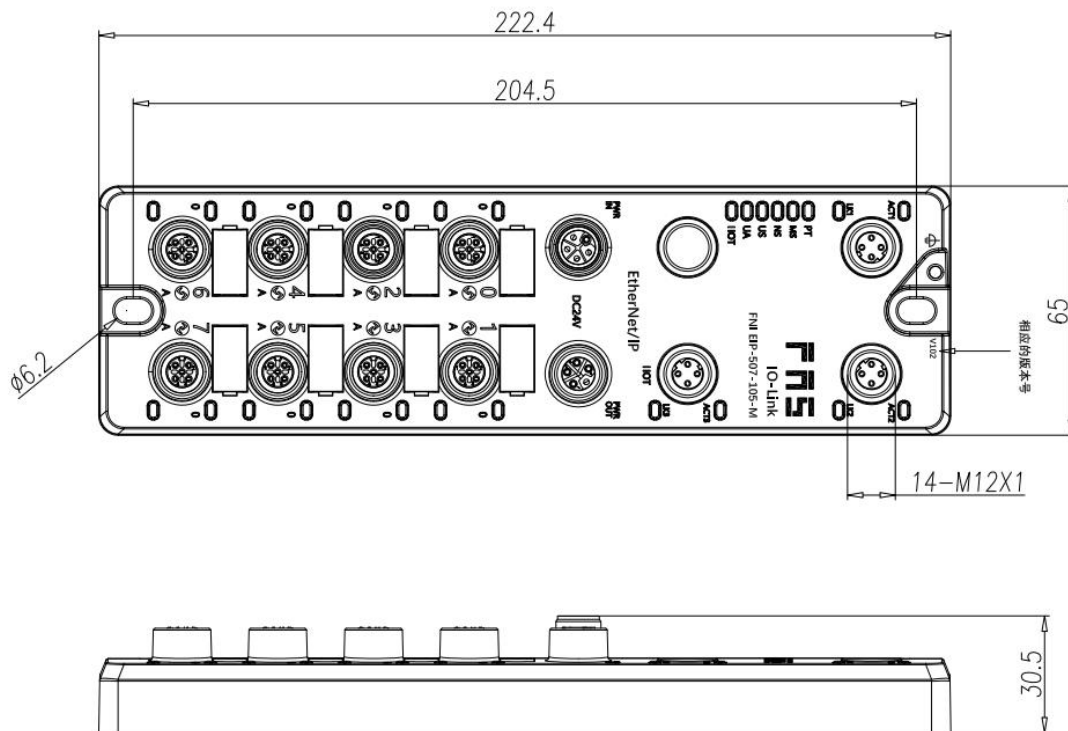
In independent power supply mode, the maximum current of each master station can reach 16A.



In the serial power supply wiring mode, if the rear module needs to be connected to the front module, the cumulative current shall not exceed 16A.

2

2.1. Size



2.2 Mechanical data

Shell material	Nickel plated Gd-Zn alloy
Housing rating according to IEC 60529	IP67(only in plug-in or plug type)
Power interface	L-Code(male and female)
Input port/output port	M12, A-Code(8*female)
Size(W*H*D)	223 x 65 x 30.5 mm
Installation type	2-Through hole mounting
Ground bus accessories	M4

2.3 Operating conditions

Project	Actual parameters
Ambient temperature (operation)	-25°C...+70°C
Ambient temperature (storage)	-40°C...+80°C
Maximum temperature change	3K/min
Relative humidity	5%...95%
Altitude range	0...2000m
Overvoltage category	II(EN 60664-1)
Protection type	IP67 (EN 60529)
Protection level	III (EN 61140)
Vibration resistance	5g (IEC 60068-2-6)
Impact resistance	50g (IEC 60068-2-27)

2.4 IO connection port (Class A)

IO-LINK protocol version	V1.1.3
Port mode	Pin 1: 24V+
	Pin 2: DI\DO、automatic output
	Pin 3: 0V-
	Pin 4: IO-Link: Auto-configuration, manual, tool-based; DI, DO
Transmission method	COM 1, COM 2, COM 3
Minimum period	6.4ms
Input port type	Type 3 (IEC 61131-2)
Input voltage range	18V-30V DC
Input signal change frequency	Input signal changes up to 0.5KHz
Input signal recording period	1ms
Output voltage range	24 VDC, -25 %/+25 % (18 VDC ...30 VDC), 1L power supply
Normal output current	Maximum 2A per channel
Short circuit current	4A
Circuit type	PNP
Output protection	Overcurrent, overload, overtemperature
Maximum capacitive load	100 μ F in parallel with 12 Ω ; 10 Hz
Maximum inductive load	1.15 H / 2 A; 0.2 Hz; 1.15 H/2A 1Hz DC13
Diagnostic parameters	Events: overload (short circuit), overvoltage

2.5 Power parameters

Supply voltage UA, US	UA: 24 VDC, -25 %/+25 % (18 VDC ...30 VDC)
	US: 24 VDC, -25 %/+25 % (18 VDC ...30 VDC)
	Voltages above 34 V can permanently damage the device.
	Voltage below approximately 6 V causes the device to reset
Under voltage alarm	18.0 V (±5% at 25°C)
Overvoltage alarm	30.0 V (± 5 % at 25°C)
Module current consumption	US: 130ma (24VDC)
Reverse voltage protection	Yes
Power usage	24 VDC PELV or SELV power supply

2.6 Communication parameters

Data transport layer	Ethernet II, IEEE 802.3
Interface type	100BASE-TX
Transmission rate	100 MBit/second
Integrated switch	Support

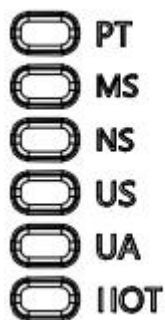
2.7 EtherNet/IP communication parameters

I/O connection type	Exclusive Owner
	Input Only
	Listen Only
Fixed IP address	Support
ACD (Address Conflict Detection)	Support
Reset service	CIP Reset Services: Identity Object, Class 0 and Class 1 Reset Services

2.8 MQTT client

Client service	Publish, subscribe
Service quality	QoS 0、 QoS 1 and QoS 2
IP standards	IPv4
Port	1883 (default), MQTT is not encrypted
MQTT standard	V3.1.1

2.9 Function indicator



PT	Green	EtherNet/IP communication protocol
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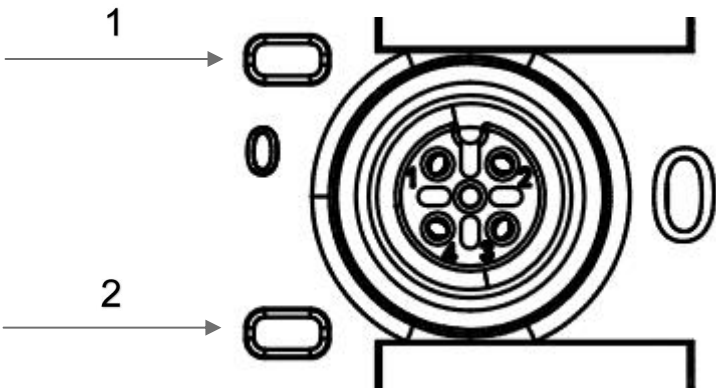
EtherNet/IP communication protocol module status

System power LED (US)	Green light is always on	Power supply is normal
	Red light always on	Undervoltage/overvoltage
Auxiliary power LED (UA)	Green light is always on	Power supply is normal
	Red light always on	Loss of pressure
	Red light flashing	Undervoltage/overvoltage
MS indicator light	Green light is always on	Physical connection is connected
	Flashing green	Physical connection broken
	Red light flashing	IP conflict
NS indicator light	Green light is always on	The connection is normal
	Flashing green	Lost connection
	Red light always on	IP conflict
	lights out	Physical connection broken

IIOT indicator light

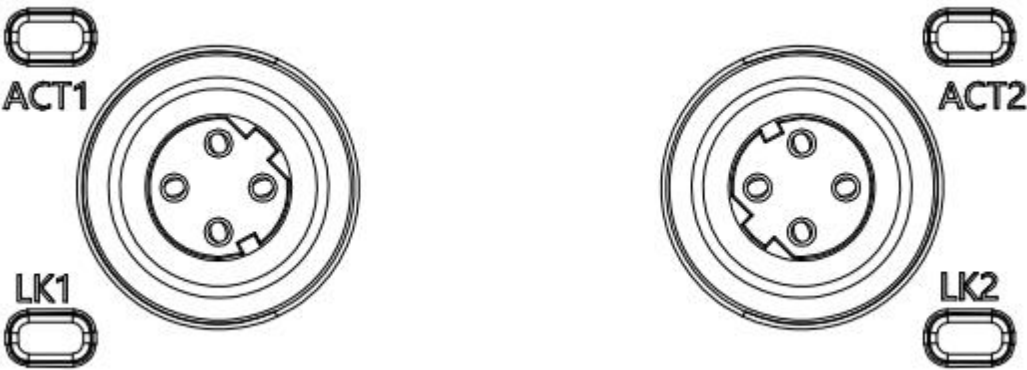
IIOT indicator light	Go out	MQTT function is not enabled
	Blue light flashes slowly	Not connected to MQTT server
	Blue light always on	Connected to MQTT server

2.10 I/O port status



1(PIN4 pin indicator light)	Green light is always on	IO-LINK connection is normal
	Flashing green	IO-LINK is not connected
	Yellow light always on	Output mode Output is on
	Yellow light always on	Input mode with input signal
	Red light always on	IO Link module: Communication error Output mode: output short circuit
	Go out	Output mode: output off, Input mode: No input signal
2(PIN2 pin indicator light)	Green light is always on	None
	Yellow light always on	Output mode Output is on Input mode with input signal
	Red light always on	Output mode: output short circuit
	Go out	Output mode: output off, Input mode: No input signal

2.11 Network port status

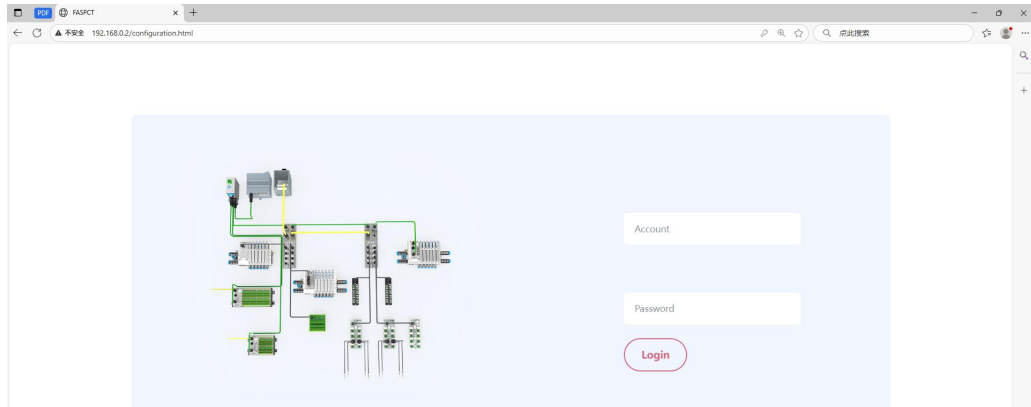


LED	State	Function
ACT	Yellow light flashes	When data is received
LK1	Flashing green	Normal LINK
LK2	Flashing green	Normal LINK

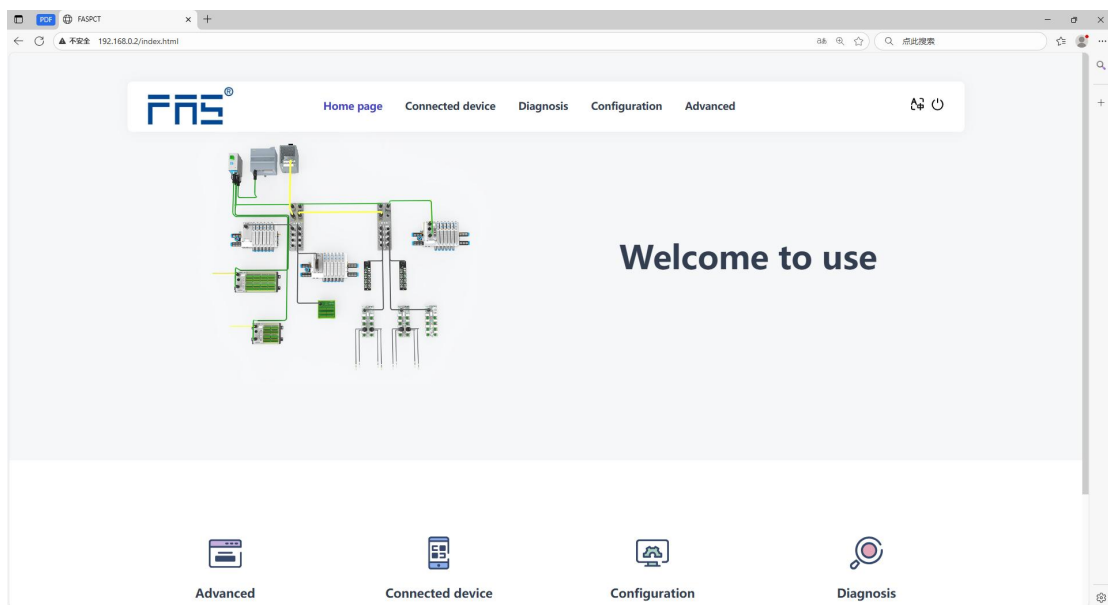
3 Integrated

3.1 Change network segment

Open the browser and enter the module default IP: 192.168.0.2 to enter the WEB interface:



Enter the account admin and password admin to log in to the interface:



Click the configuration tab above to enter the configuration interface and click Network to enter network configuration:



Network
 Configure the master device network



Port Configuration
 Configure the master device port



MQTT Configuration
 Configure the MQTT



Opcua configuration
 Configure the OPCUA



Industrial protocol parameterization
 Industrial protocol parameterization

Fill in the IP, subnet mask and gateway in the interface. All three are indispensable. Click Save after completion. The modified network segment will take effect after the module is restarted.

Network configuration

Save

IoT network parameters	
IP	192.168.0.2
Subnet mask	255.255.255.0
Gateway	192.168.0.1
DHCP enabled	☐
Save modified data	

Save

Industrial network parameters	
IP	192.168.0.3
Subnet mask	255.255.255.0
Gateway	192.168.0.1
Save modified data	

3.2 Data mapping

EtherNet/IP Communication Protocol Process Output Data									
Byte	Function description								
	Function description	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Standard IO output 0=off 1=on	Port7 Pin4	Port6 Pin4	Port5 Pin4	Port4 Pin4	Port3 Pin4	Port2 Pin4	Port1 Pin4	Port0 Pin4
1		Port7 Pin2	Port6 Pin2	Port5 Pin2	Port4 Pin2	Port3 Pin2	Port2 Pin2	Port1 Pin2	Port0 Pin2
2 ~ 5	Reserve								
6 ~ 37	Port 0 process output data								
38 ~ 69	Port 1 process output data								
70 ~ 101	Port 2 process output data								
102 ~ 133	Port 3 process output data								
134 ~ 165	Port 4 process output data								
166 ~ 197	Port 5 process output data								
198 ~ 229	Port 6 process output data								
230 ~ 261	Port 7 process output data								

EtherNet/IP Communication Protocol Process Input Data									
Byte	Function description								
	Function description	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Standard IO input 0=no signal 1=There is signal	Port7 Pin4	Port6 Pin4	Port5 Pin4	Port4 Pin4	Port3 Pin4	Port2 Pin4	Port1 Pin4	Port0 Pin4
1	Standard IO input 0=no signal 1=There is signal	Port7 Pin2	Port6 Pin2	Port5 Pin2	Port4 Pin2	Port3 Pin2	Port2 Pin2	Port1 Pin2	Port0 Pin2
2	Pin4 short circuit 0=no short circuit 1=There is a short circuit	Port7 Pin4	Port6 Pin4	Port5 Pin4	Port4 Pin4	Port3 Pin4	Port2 Pin4	Port1 Pin4	Port0 Pin4
3	Pin2 short circuit 0=no short circuit 1=There is a short circuit	Port7 Pin2	Port6 Pin2	Port5 Pin2	Port4 Pin2	Port3 Pin2	Port2 Pin2	Port1 Pin2	Port0 Pin2
4	Pin1 short circuit 0=no signal 1=There is signal	Port7 Pin1	Port6 Pin1	Port5 Pin1	Port4 Pin1	Port3 Pin1	Port2 Pin1	Port1 Pin1	Port0 Pin1
5	IOLink communication status 0=not connected 1=Connected	Port7	Port6	Port5	Port4	Port3	Port2	Port1	Port0
6	IOLink PD valid 0=disabled 1=enable	Port7	Port6	Port5	Port4	Port3	Port2	Port1	Port0
7	Module status	-	-	-	Us overvo ltage	Ua overvo ltage	Overhe at	Us Underv oltage	Ua Underv oltage
8 ~ 9	Reserve								
10 ~ 41	Port 0 process input data								
42 ~ 73	Port 1 process input data								
74 ~ 105	Port 2 process input data								
106 ~ 137	Port 3 process input data								
138 ~ 169	Port 4 process input data								
170 ~ 201	Port50 process input data								
202 ~ 233	Port 6 process input data								
234 ~ 265	Port 7 process input data								

EtherNet/IP communication protocol configuration data									
Variable	Function description								
	Function description	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Word	Pin4 Function 00=Normally open input 01=Normally closed input 10=output 11=IOLink	Port3		Port2		Port1		Port0	
		Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
		Port7		Port6		Port5		Port4	
Word	Pin2 Function 00=Normally open input 01=Normally closed input 10=output	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
		Port3		Port2		Port1		Port0	
		Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Word	Pin4 SafeState 00 = remain at 0 01 = remain at 1 10 = keep the last value	Port7		Port6		Port5		Port4	
		Port3		Port2		Port1		Port0	
		Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Word	Pin2 SafeState 00 = remain at 0 01 = remain at 1 10 = keep the last value	Port7		Port6		Port5		Port4	
		Port3		Port2		Port1		Port0	
		Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Byte	Port0 configuration*	(1byte) IOLink CycleTime (1byte) Validation Type (2bytes) Vendor ID1~ID2 (3bytes) Device ID1~ID3 (16bytes) Serial Number1~16 (1byte) Parameter Server							
Byte	Port1 configuration*	(same as above)							
Byte	Port2 configuration*	(same as above)							
Byte	Port3 configuration*	(same as above)							
Byte	Port4 configuration*	(same as above)							
Byte	Port5 configuration*	(same as above)							
Byte	Port6 configuration*	(same as above)							
Byte	Port7 configuration*	(same as above)							

Note:

When using Omron and Delta PLC, the configuration data is set in the module properties, and AB PLC is set in the mapping data.

*Port configuration parameter description:

A. (1byte) IO-Link CycleTime cycle time setting:

This parameter can be used for IO-Link communication speed. Using multipliers and time base calculations, the IO-Link cycle time can be increased.

The time base is described in the table below. The multiplier is entered in decimal form from 0...63.

Bit								Description
7	6	5	4	3	2	1	0	
Time base		Multiplier						Bit 0 to 5: Multiplier These bits contain a 6-bit multiplier for the calculation of MasterCycleTime or MinCycleTime. Permissible values for the multiplier are 0 to 63.
								Bit 6 to 7: Time Base These bits specify the time base for the calculation of MasterCycleTime or WincycleTime.

Possible values for MasterCycleTime and MiniCycleTime

Time base encoding	Time base value	Calculation	Cycle time
00	0.1ms	Multiplier x time base	0.4 ms to 6.3 m
01	0.4ms	6.d ms + multppler x time base	6.4 ms to 31.6 ms
10	1.6ms	32,0 ms + multiplier x time base	32.0 ms to 132.8 ms
11	Resarved	Resarved	Resorved
NOTE: The value 0.4 results from the minimum possible transmission time according to A.3.7			

B. (1byte) Validation Type verification type setting:

(Value=0) No verification: Verification is disabled and every device will be accepted.

(Value = 1) Compatibility: Compare the manufacturer ID/device ID with the IO-Link device data.

(Value=2) Identity: Compares Manufacturer ID/Device ID/Serial Number with IO-Link device data. IO-Link communication only starts if there is a match.

C. (2bytes) Vendor ID1~ID2 manufacturer ID

D. (3bytes) Device ID1~ID3 device ID

E. (16bytes) Serial Number1~16 serial number

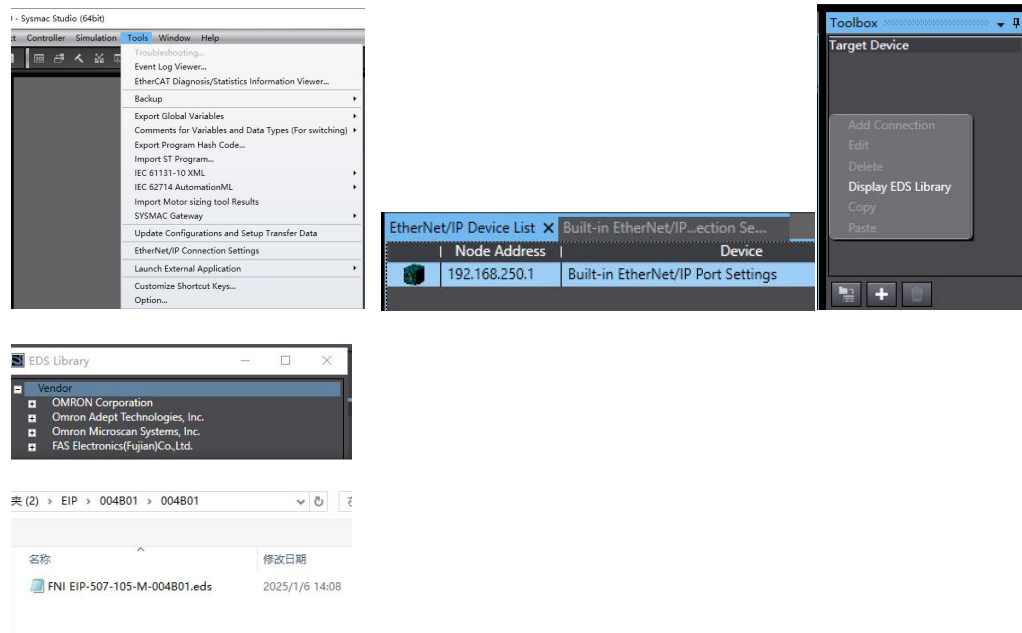
F. (1byte) Parameter Server parameter server (reserved)

MQTT topic description		
Topic name	Data format	Function
/client/{cid}/master/0/PD	<pre>{ "InputPin2":[254], "InputPin4":[254], "OutPin2":[254], "OutPin4":[254], "ASPin2":[254], "ASPin4":[254], "SensorSupplyShortCircuit":[254], "DeviceStatus":[254], "IolinkState":[254] }</pre>	Master station PD data
/client/{cid}/master/0/info	<pre>{ "device_ID" : 1233, "HW_version" : "testHWversion", "FW_version": "testFWversion", "IOT_ip": "192.168.1.2", "IOT_subnet_mask": "255.255.255.0", "IOT_gateway": "255.255.255.0" , "master_BUS": "PNET", "iolink_version": "v1.13", "master_uptime": 123456 }</pre>	Main site information
/client/{cid}/port/0/PDO	<pre>{ "errcor_code": 0, "valid": 1, "len": 2, "data": [10 , 12] }</pre>	Output data from the station
/client/{cid}/port/0/PDI	<pre>{ "errcor_code": 0, "len": 2, "valid": 1 , "data": [10 , 12] }</pre>	Input data from station

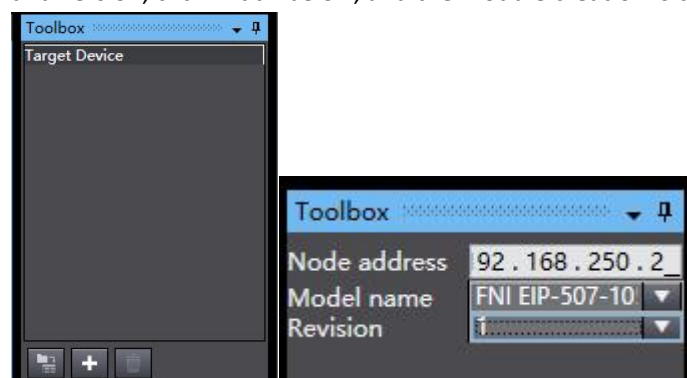
3.3 PLC integration tutorial

3.3.2 Omron NX1P2 Sysmac Studio Integrated (EIP)

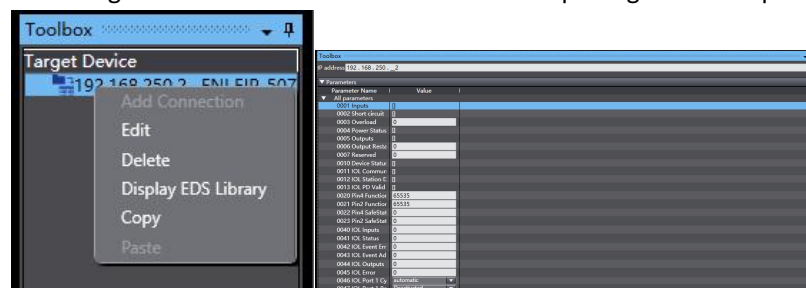
1. Install the EDS file: Tools---ETHERNET/IP Connection Settings---Double-click the PLC in the window---right-click the blank space of the toolbox on the right and select "Show EDS Library", click "Install" in the pop-up window, and select EDS file installation



2. Create a module: Click "+" in the toolbox window, fill in the module IP address, model name, and version, click "Add" below, and the module creation is completed;



3. Configure the module: right-click the module--select "Edit"--configure the parameters according to actual needs and click OK after completing the corresponding values.



4. Create a variable association:

(1)Programming--Data--Global variables create two arrays, output 262 bytes and input 266 bytes. The corresponding input and output should be configured in the network exposure;

EtherNet/IP Device List								
Group Filter (No group)								
Name	Data Type	Initial Value	AT	Retain	Constant	Network Publish	Comment	
IN	ARRAY[0..265] OF BYTE			☐	☐	Input		
OUT	ARRAY[0..261] OF BYTE			☐	☐	Output		

(2) In the built-in ETHERNET/IP port setting window--select the first icon (label) on the left---click "Register All"



(3) In the built-in ETHERNET/IP port setting window--select the second icon on the left (connection)---click "+", select the previously configured module for the target device, select EXCLUSIVE Owner for the IO type, select the corresponding input and output, the target variable must be filled in 101,100; then select the corresponding starting variable, and go online after completion. Select "Transfer to controller" and the configuration is complete!

EtherNet/IP Device List								
Built-in EtherNet/IP...ection Se... Global Variables Data Types								
Connection								
Connection								
Connections/Max: 2 / 32								
Target Device	Connection No	Connection I/O	Input/Output	Target Variable	Size [Byte]	Originator Variable	Size [Byte]	
192.168.250.2 FNI EIP-507-	default_001	Exclusive Owner	Input	101	266	N	266	
			Output	100	262	OUT	262	

4 Appendix

Ordering information

Product ordering code	Order code
FNI EIP-500-105-M	004B01

■ High quality products · Sincere service



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