



FNI MPL-504-105-M

IO Link Master Module User Manual





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1 Notes

1.1. Manual structure 1.1 This manual is organized by organization, so the chapters are interconnected.

Section 2: Basic Security Information.

Chapter 3: Getting Started Guide

Chapter 4: Technical Data

.....

1.2. Typography The following typographic conventions are used in this manual.

Enumerate The enumeration is displayed as a list with bullets.

- Headword 1

- Headword 2

Action

Action descriptions are represented by a front triangle.

The result of the action is represented by an arrow.

Action description 1

Action result

Action description 2

Step programs can also be displayed numerically in parentheses.

(1) Step1

(2) Step2

Grammar number:

Decimal numbers are displayed without additional indicators (eg 123)

Hexadecimal numbers are displayed with an additional indicator hex (eg: 00hex) or with the prefix "0X" (eg: 0x00)

Cross reference

Cross-references indicate where to find additional information on this topic.

1.3. Symbol

Notes

This symbol indicates a general comment.

Notice!!

This symbol indicates the most important safety notice.



1.3. Acronym	FNI	FAS network interface
	I	Standard input port
	PN	Profinet
	ECT	EtherCAT
	CCIEBS	CC-Link IE Field Basic Slave
	EIP	Ethernet/IP
	EMC	Electromagnetic Compatibility
	FE	Functional ground
	O	Standard output port
1.5. Viewing angle deviation		Product views and explanations in this manual may deviate from the actual product. They are only used left and right to explain the material.

2 Safety

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

2.2. Install and start Precautions!
Installation and start-up should only be carried out by trained and specialized personnel. A qualified individual is one who is familiar with the installation and operation of the product and has the necessary qualifications to do so. Any damage caused by unauthorized operation or illegal and improper use is not covered by the manufacturer's warranty. Equipment operators are responsible for ensuring compliance with appropriate safety and accident prevention regulations.

2.3. General security Debug and check
Notes Before debugging, you should read the contents of the user manual carefully.
The system cannot be used in applications where the safety of personnel depends on the functionality of the equipment.
intended use
The manufacturer's warranty coverage and limited liability statement do not cover damage caused by:
• Unauthorized tampering
• Improper use
• Handling, installation and operation that do not conform to the instructions provided in the user manual
Owner/Operator Obligations
This device is an EMC Class A compliant product. This device gen



erates RF noise.

The owner/operator must take proper precautions when using this equipment. This device can only use

Use a power supply compatible with this equipment, and connect only approved cables.

Fault

If the defect or equipment failure cannot be corrected, the operation of the equipment must be stopped in order to protected from possible damage caused by unauthorized use.

Intended use can only be ensured when the enclosure is fully installed.

2.4. Corrosion resistance Precautions!

FNI modules generally have good chemical and oil resistance characteristics. When used in aggressive media (e.g. high concentrations of chemicals, oils, lubricants and coolants (i.e. very low water content)), these media must be checked before the corresponding application material compatibility confirm. If the module fails or is damaged due to this corrosive medium, no claim for defects can be claimed.

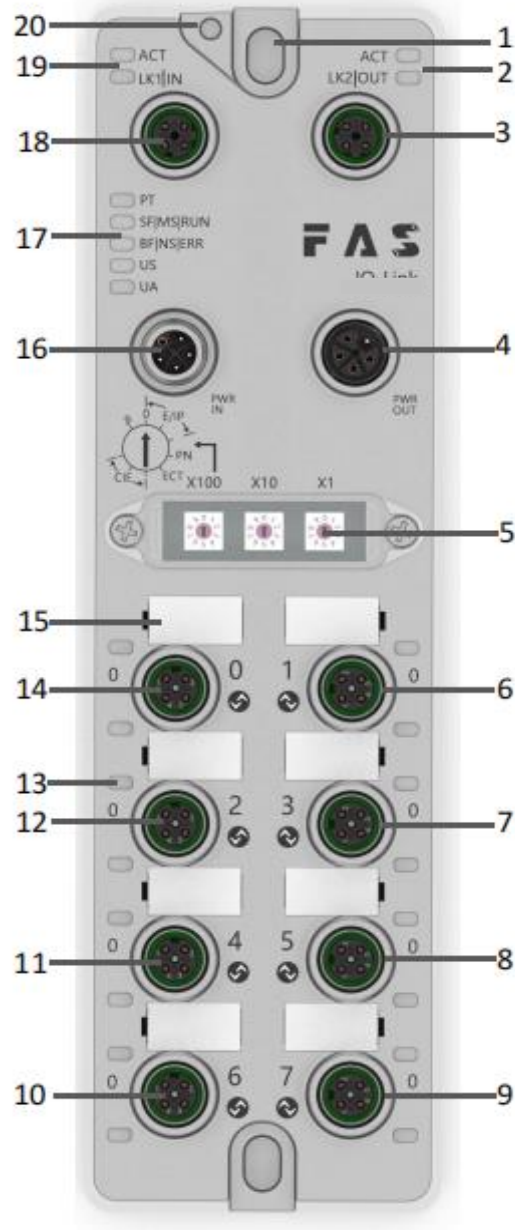
Dangerous voltage

Precautions!

Disconnect all power sources before using the equipment!

3 Getting Started Guide

3.1. Module overview



- | | | |
|-----------------------------------|---------------------------|------------------------------------|
| 1 Mounting holes | 8 Port 5 | 15 Port Identification Board |
| 2 Network port 2 status indicator | 9 Port 7 | 16 Power input port |
| 3 Network port 2 | 10 Port 6 | 17 Module indicator |
| 4 Power outlet | 11 Port 4 | 18 Network port 1 |
| 5 DIP switch | 12 Port 2 | 19 Network port 1 status indicator |
| 6 Port 1 | 13 Port Status Indicators | 20 Ground connection |
| 7 Port 3 | 14 Port 0 | |

3 Getting Started Guide

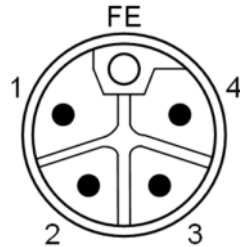
3.2. Mechanical connection

The modules are attached using 2 M6 bolts and 2 washers. Isolation pads are available as accessories.

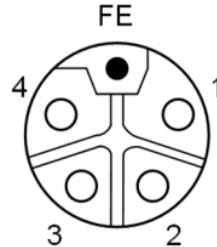
3.3. Electrical connections

3.3.1 Power interface(L-code)

Definition of power input port



Definition of power outlet

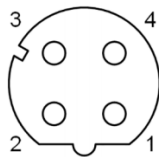


Pin	Features	Describe
1	Us+	+24V(Brown)
2	Ua-*	0V(White)
3	Us-	0V(Blue)
4	Ua+*	+24V(Black)
FE	Functional ground	FE(Yellow-green)

Notes:

1. It is recommended to provide sensor/module power supply and actuator power supply separately
2. The FE connection from the housing to the machine must be low impedance and kept as short as possible.

3.3.2 Network Interface(D-code)

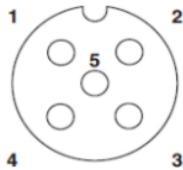


pin	Features	
1	Tx+	Send data+
2	Rx+	Receive data+
3	Tx-	Send data-
4	Rx-	Receive data-

Notes:

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

3.3.3 I/O-port(A-code)



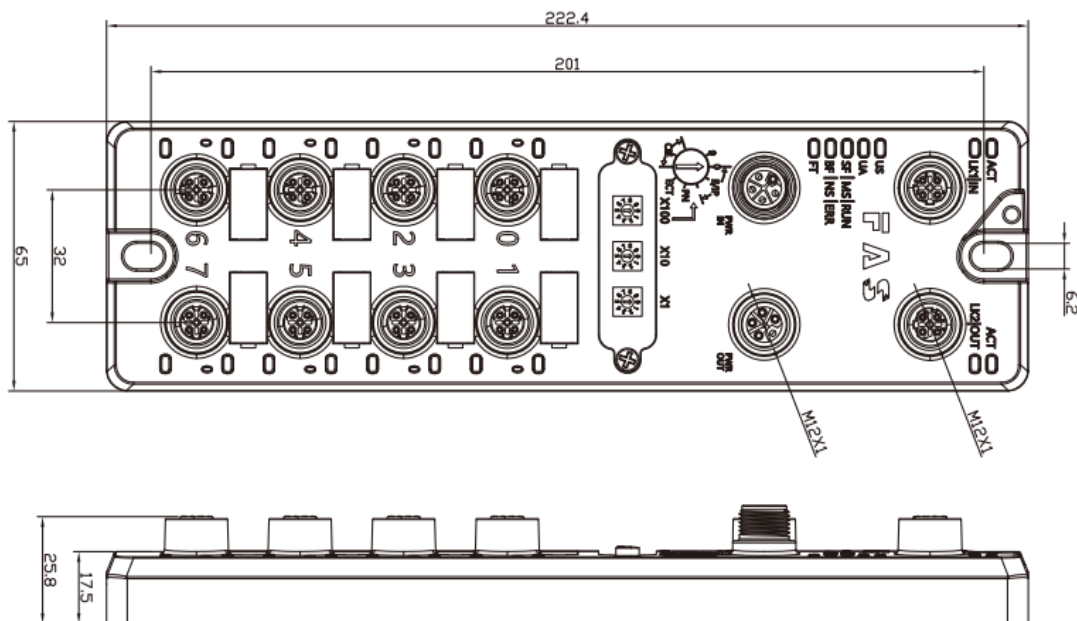
pin	Features
1	+24V,(Brown)
2	reserved, not connected
3	0V(Blue)
4	Input /IOLINK(Black)
5	reserved, not connected

Notes:

1. For digital sensor input, please follow the input guidelines of EN61131-2, Type 2.
2. The maximum output current of pins 2 and 4 is 2A. The total current of the module is <9A.
3. Unused I/O port sockets must be covered with end caps to meet IP67 protection level.

4 Technical data

4.1. Size



4.2 Mechanical data

Shell material	Die-cast aluminum case, pearl nickel plated
Enclosure rating according to IEC 60529	IP67(Only in plug-in or plug-in style)
Power interface	L-Code(male and female)
Input port/output port	M12, A-Code(8* female)



Size(W*H*D)	65mm*222mm*25.8mm
Installation type	2-Through hole mounting
Ground Bus Accessories	M4
weight	Make an appointment670g

4.3. Operating conditions

Operating temperature	-5° C ~ 70° C
Storage temperature	-25° C ~ 70° C

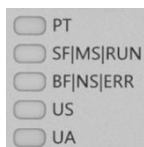
4.4. Electrical data

voltage	18~30V DC, symbol EN61131-2
voltage fluctuation	<1%
Input current when supply voltage is 24V	<130mA

4.5 Network port

port	2 x 10Base-/100Base-Tx
port connection	M12, D-Code
IEEE 802.3 Compliant Cable Types	Shielded twisted pair, minimum STP CAT 5/STP CAT 5e
Data transfer rate	10/100 M bit/s
Maximum cable length	100m
Flow control	Half condition/full condition (IEEE 802.3-PAUSE)

4.6 Function indicator



PT	Green	EtherNet/IP letter of agreement
	Yellow	ProfiNet letter of agreement
	Blue	EtherCat letter of agreement (reserved)
	White	CC-Link IE Field basic letter of agreement

EIP Communication Protocol Module Status

LED	Show	Features
SF/MS/RUN	Green light is always on	Working status: The device is running normally
	Green light flashes 1 HZ	Standby: Device not configured
	Green, red and green	Self-test: The device is undergoing a power



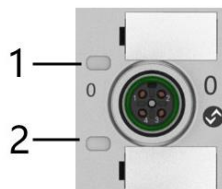
	flashing alternately	er-on test.
	Red flashing 1HZ	Recoverable failures:
	Steady red light	Unrecoverable failure
	closure	US no input voltage
BF/NS/ER R	Green light is always on	Connected
	Green light flashing 1HZ	Not connected:
	Green and red off flashing alternately	Self-test: The device is undergoing a power-on test.
	Red light flashing 1HZ	Connection timed out
	Steady red light	IP repeat:
	closure	US No input voltage or no IP address
US	Green	Input voltage is normal
	Flashing red	low input voltage (< 18 V)
UA	Green	The output voltage is normal
	Flashing red	low output voltage (< 18 V)
	Red always on	No output voltage (< 11 V)

PN Communication Protocol Module Status

LED	show	Features
SF/MS/R UN	Closure	Works fine
	Flashing red 3s 1HZ	Bus start
	Red always on	System error
BF/NS/ER R	Closure	Works fine
	Flashing red 2HZ	No data exchange
	Red always on	No configuration; or slow physical link; or no physical link
US	Green	Input voltage is normal
	Flashing red	low input voltage (< 18 V)
UA	Green	The output voltage is normal
	Flashing red	low output voltage (< 18 V)
	Red always on	No output voltage (< 11 V)

CCIEBS Communication Protocol Module Status

LED	Show	Features
SF/MS/RUN	Green light off	Module not connected
	Green light flashing 2.5HZ	Module not communicating
	Green light flashing 1HZ	Module is not configured
	Green light is always on	Running: The device is running
BF/NS/ERR	Closure	Module works fine
	Red always on	Communication error
US	Green	Input voltage is normal
	Flashing red	low input voltage (< 18 V)
UA	Green	The output voltage is normal
	Flashing red	low output voltage (< 18 V)
	Red always on	No output voltage (< 11 V)



I/Oport status LED	State	Features
1	Closure	The status of Pin4 input or output is 0
1	Yellow	The status of Pin4 input or output is 1
1	Red	Port is configured as input: Pin1 overcurrent
1	Green	IO Link connected
1	Flashing green	IO Link not connected



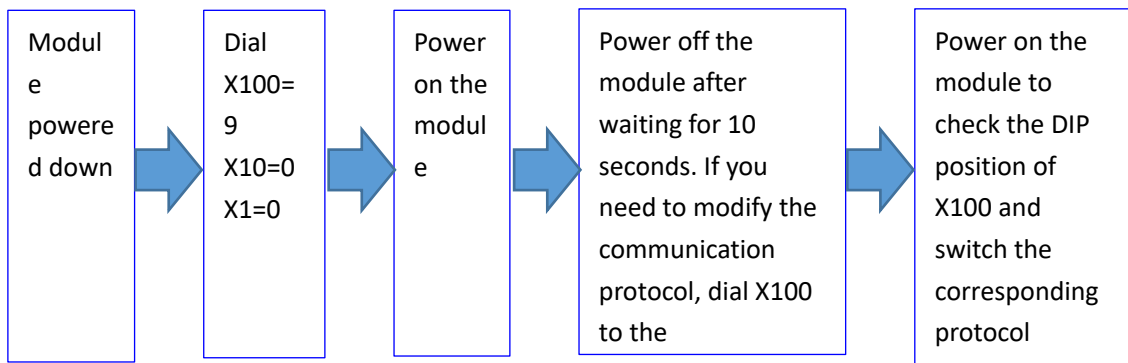
Network port status

LED	State	Features
ACT	Closure	Bus speed: 10Mbit/s
	Yellow	Bus speed: 100Mbit/s
LK1 IN (ECT IN)	Flashing green	Data transmission
LK2 IN (ECT OUT)	Flashing green	Data transmission

5 integrated

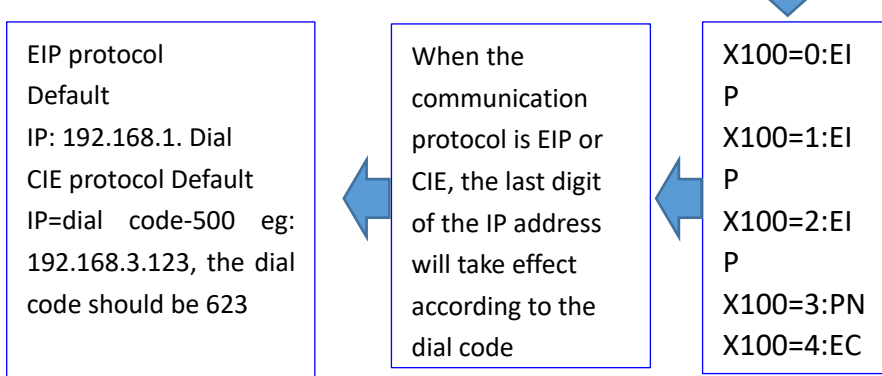
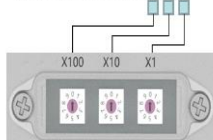
5.1 Module configuration

5.1.1 Factory reset and communication protocol switching

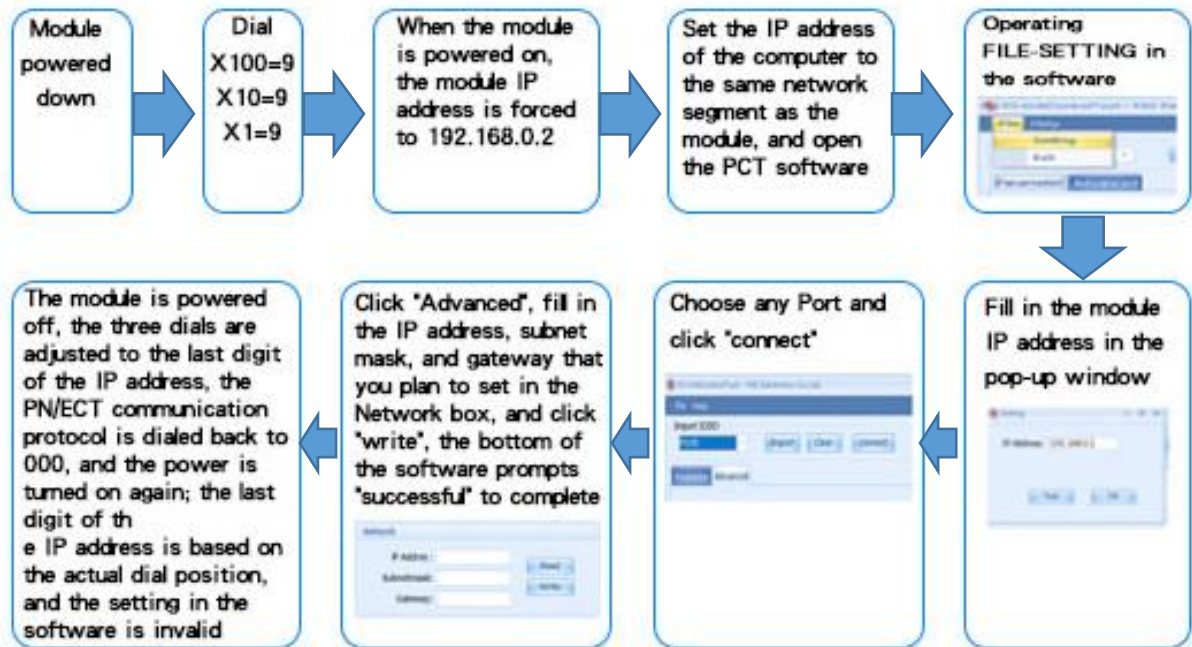


IP地址说明:

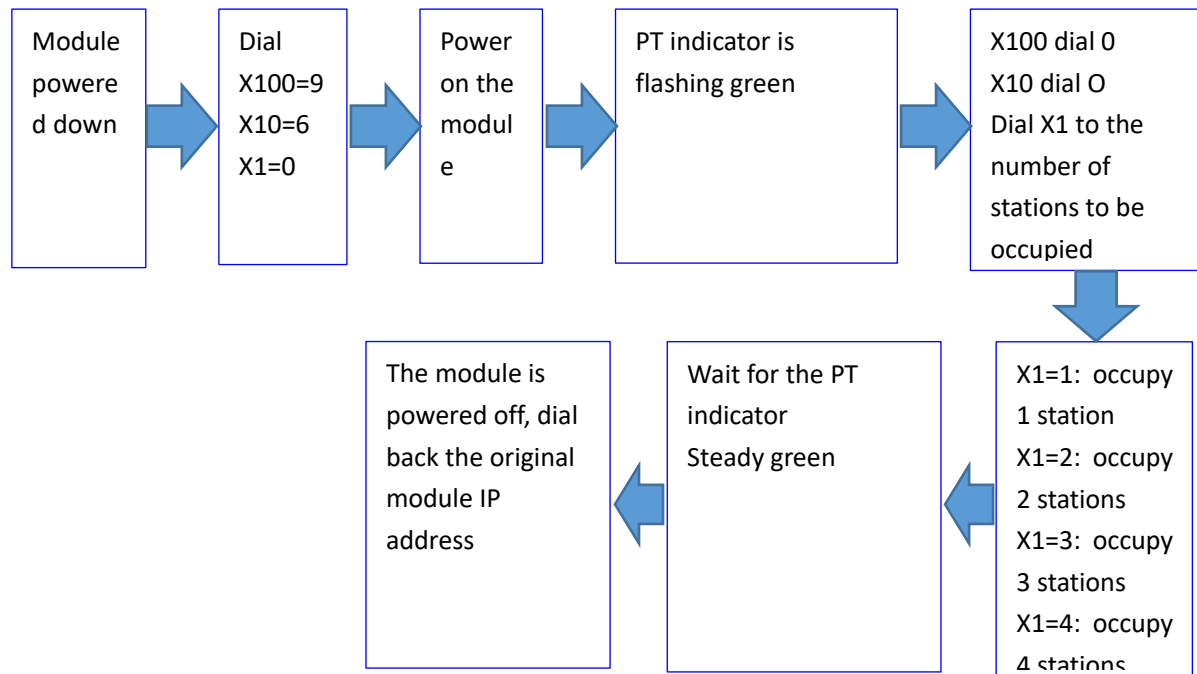
192.168.1.123



5.1.2 Network segment modification



5.1.3 CCIEBS Occupied station quantity setting



5.2 Data mapping

EIP 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								

EIP 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=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=Signal	Port7 Pin2	Port6 Pin2	Port5 Pin2	Port4 Pin2	Port3 Pin2	Port2 Pin2	Port1 Pin2	Port0 Pin2
2	Short circuit detection (Pin4 overcurrent) 0=No overcurrent 1=Overcurrent	Port7 Pin4	Port6 Pin4	Port5 Pin4	Port4 Pin4	Port3 Pin4	Port2 Pin4	Port1 Pin4	Port0 Pin4
3	Short circuit detection (Pin2 overcurrent) 0=No overcurrent 1=Overcurrent	Port7 Pin2	Port6 Pin2	Port5 Pin2	Port4 Pin2	Port3 Pin2	Port2 Pin2	Port1 Pin2	Port0 Pin2
4	Short circuit detection (Pin1 overcurrent) 0=no signal 1=Signal	Port7 Pin1	Port6 Pin1	Port5 Pin1	Port4 Pin1	Port3 Pin1	Port2 Pin1	Port1 Pin1	Port0 Pin1
5	IO Link communication status 0=Not connected 1=Connected	Port7	Port6	Port5	Port4	Port3	Port2	Port1	Port0
6	IO Link PD is valid 0=disabled 1=enable	Port7	Port6	Port5	Port4	Port3	Port2	Port1	Port0
7	module status	-	-	-	Us overvoltage	Ua overvoltage	overheat	Us undervoltage	Ua undervoltage
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	Port 5 process input data
202 ~ 233	Port 6 process input data
234 ~ 265	Port 7 process input data

EIP Protocol Configuration Data									
Byte	Function description								
	Function Description	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Pin4 function settings 00=Normally open input 01=normally closed input 10=output 11=IOLink	Port3		Port2		Port1		Port0	
1		Port7		Port6		Port5		Port4	
2	Pin2 function settings 00=Normally open input 01=normally closed input 10=output	Port3		Port2		Port1		Port0	
3		Port7		Port6		Port5		Port4	
4	Pin4 Security Status Settings 00 = keep at 0 01 = keep at 1 10 = keep last value	Port3		Port2		Port1		Port0	
5		Port7		Port6		Port5		Port4	
6	Pin2 Security Status Settings 00 = keep at 0 01 = keep at 1 10 = keep last value	Port3	Port2	Port1				Port0	
7		Port7	Port6	Port5				Port4	
8 ~ 31	Port0 configuration	(1byte) IOLink CycleTime (1byte) Validation Type (2bytes) Vendor ID1~ID2 (3bytes) Device ID1~ID3 (16bytes) Serial Number1~16 (1byte) Parameter Server							
32 ~ 55	Port1 configuration	(Ditto)							
56 ~ 79	Port2 configuration	(Ditto)							



	gure	
80 ~ 103	Port3 confi gure	(Ditto)
104 ~ 127	Port4 confi gure	(Ditto)
128 ~ 151	Port5 confi gure	(Ditto)
152 ~ 175	Port6 confi gure	(Ditto)
176 ~ 199	Port7 confi gure	(Ditto)

Note:

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

Port configuration parameter description:

A. (1byte) IOLink CycleTime cycle time setting:

IO-Link communication speed is available for this parameter. 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 MinCycleTime.

Possible values for MasterCycleTime and MiniCycleTime

Time base encoding	Time base value	Calculation	Cycle time
00	0.1 ms	Multiplier x time base	0.4 ms to 6.3 ms
01	0.4 ms	6.4 ms + multiplier x time base	6.4 ms to 31.6 ms
10	1.6 ms	32.0 ms + multiplier x time base	32.0 ms to 132.8 ms
11	Reserved	Reserved	Reserved

NOTE: The value 0.4 results from the minimum possible transmission time according to A.3.7.

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

(value=0) No Verification: Verification is disabled, every device will be accepted.

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

(value=2) Identity: Compares manufacturer ID/device ID/serial number with IO-Link device data. IO-Link communication is only started when 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)

CCIEBS Protocol Process output data									
Byte	Function description								
	Function Description	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
RY (maximum 256Bit)	reserved								
RWW (maximum 256Byte)	Port 0 process output data (32Byte)								
	Port 1 process output data (32Byte)								
	Port 2 process output data (32Byte)								
	Port 3 process output data (32Byte)								
	Port 4 process output data (32Byte)								
	Port 5 process output data (32Byte)								
	Port 6 process output data (32Byte)								
	Port 7 process output data (32Byte)								

CCIEBS Protocol Process input data									
Byte	Function description								
	Function Description	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0



RX (maximum 256Bit)	Standard IO input 0=no signal 1=Signal	Port7 Pin4	Port6 Pin4	Port5 Pin4	Port4 Pin4	Port3 Pin4	Port2 Pin4	Port1 Pin4	Port0 Pin4
	Standard IO input 0=no signal 1=Signal	Port7 Pin2	Port6 Pin2	Port5 Pin2	Port4 Pin2	Port3 Pin2	Port2 Pin2	Port1 Pin2	Port0 Pin2
	Short circuit detection (Pin2/4 overcurrent) 0=No overcurrent 1=Overcurrent	Port7 Pin4	Port6 Pin4	Port5 Pin4	Port4 Pin4	Port3 Pin4	Port2 Pin4	Port1 Pin4	Port0 Pin4
	Short circuit detection (Pin2/4 overcurrent) 0=no signal 1=Signal	Port7 Pin2	Port6 Pin2	Port5 Pin2	Port4 Pin2	Port3 Pin2	Port2 Pin2	Port1 Pin2	Port0 Pin2
	Short circuit detection (Pin1 overcurrent) 0=no signal 1=Signal	Port7 Pin1	Port6 Pin1	Port5 Pin1	Port4 Pin1	Port3 Pin1	Port2 Pin1	Port1 Pin1	Port0 Pin1
	IOlink communication status 0=Not connected 1=Connected	Port7	Port6	Port5	Port4	Port3	Port2	Port1	Port0
	IOlink PD active 0=disabled 1=enable	Port7	Port6	Port5	Port4	Port3	Port2	Port1	Port0
	module status	-	-	-	Us overvoltage	Ua overvoltage	overheat	Us undervoltage	Ua undervoltage
	(The rest of the points are reserved)								
RWR (maximum)	Port 0 process input data(32Byte)								
	Port 1 process input data(32Byte)								

256Byte)	Port 2 process input data(32Byte)
	Port 3 process input data(32Byte)
	Port 4 process input data(32Byte)
	Port 5 process input data(32Byte)
	Port 6 process input data(32Byte)
	Port 7 process input data(32Byte)

Note:

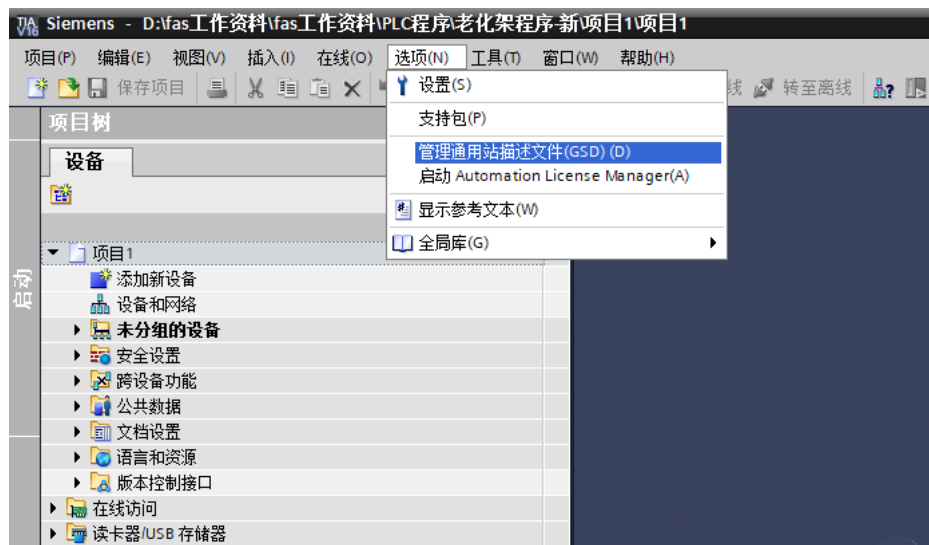
1. Please set the CCIEBS master port function in the FAS IOLink Tool software.
2. The number of points 64 occupies 1 station, and the number of points used by the slave station connected to each port is 4 words
3. The number of points 128 occupies 2 stations, and the number of points used by the slave station connected to each port is 8 words
4. The number of points 192 occupies 3 stations, and the number of points used by the slave station connected to each port is 12 words
5. The number of points 256 occupies 4 stations, and the number of points used by the slave station connected to each port is 16 words
6. Refer to chapter 5.1.3 for the setting of points. The CCIEBS master station occupies 4 stations by default.

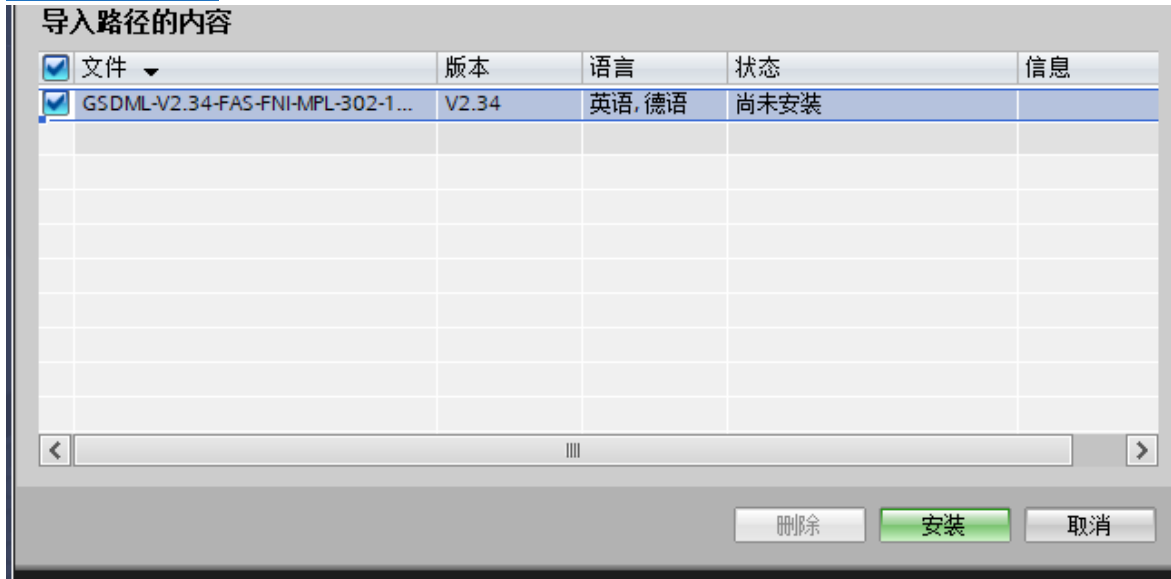
5.3 PLC Integration Tutorial

(The module communication protocol should be set before configuring the module, see 5.1.1 for details)

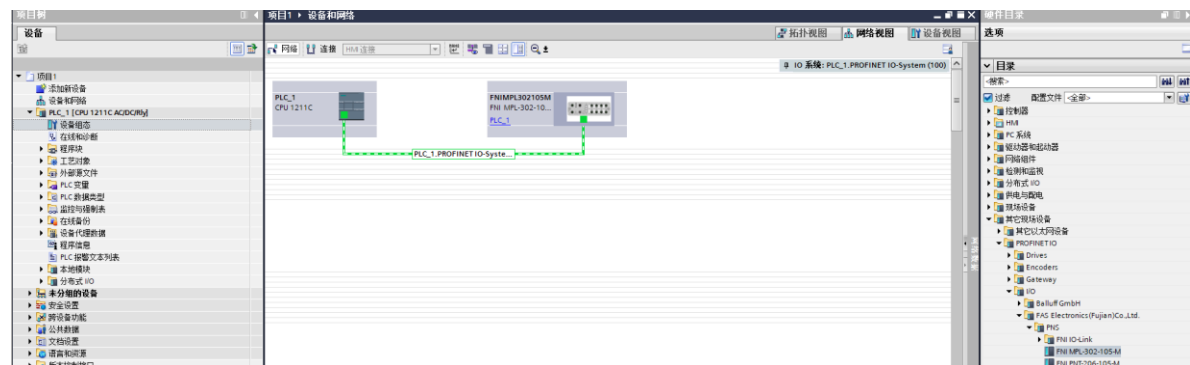
5.3.1 Siemens S7-1200 Portal Integration (PN)

1. Install the GSD file





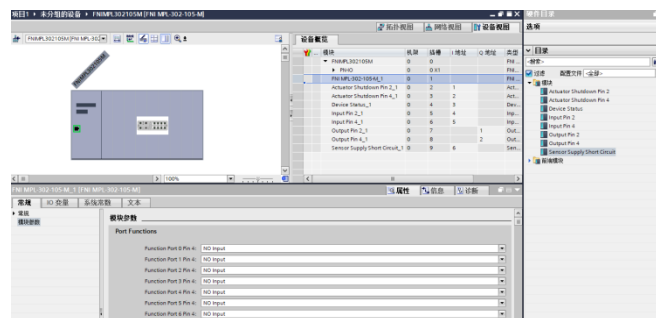
2. In PLC---Device Configuration---Network View---Hardware Catalog, select the module and drag it in, click "Unassigned", and select the PLC to be connected;



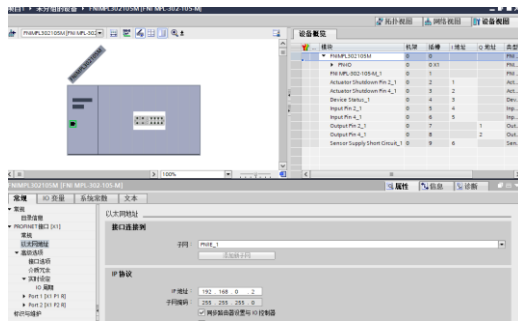
2. Double-click the module to enter the configuration,

(1) Slot function configuration: select the required data in the hardware catalog--module and drag it into the slot in the device overview window;

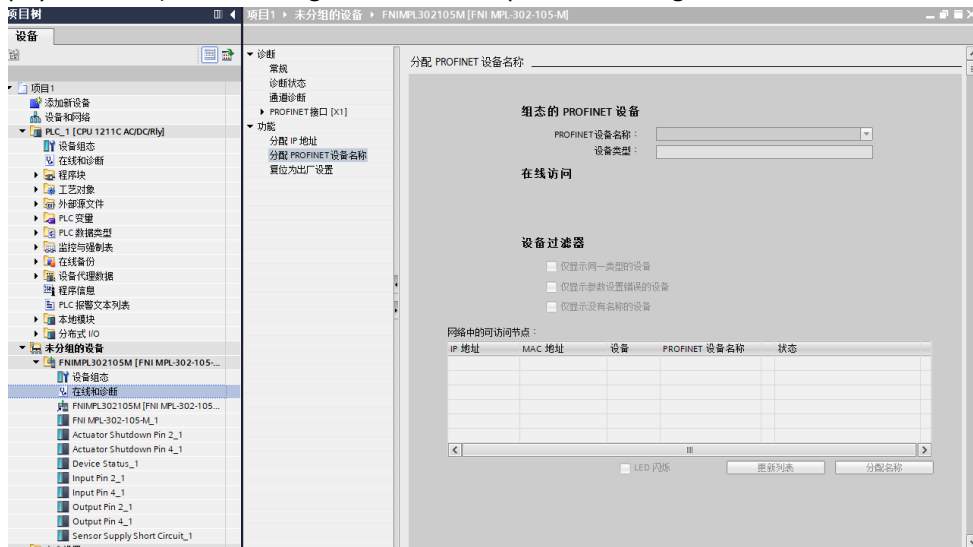
(2) Module port function configuration: click the module icon, select "General", and then click slot 1 to configure the port function



(1) Module function configuration: Click the module icon, select "General", and then click slot 0 to configure the module function

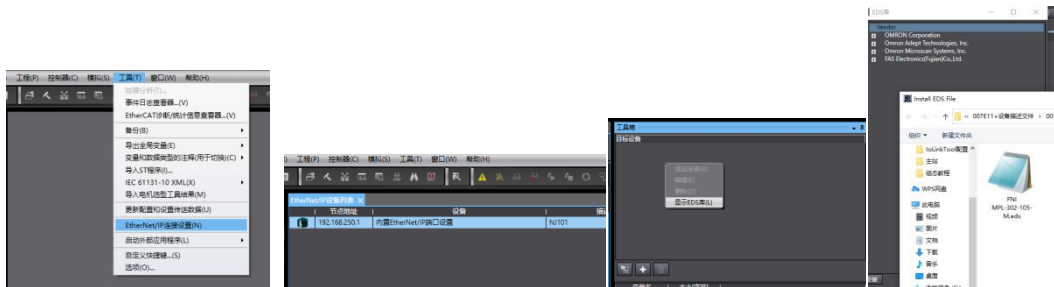


- (1) After the configuration is complete, in the configuration view, click Download.
3. Assign the module PN name: PLC switches to the online state, select "ungrouped device"---click the module name---select online and diagnosis---function---assign PROFINET device name--- --Select the module to be allocated in the list (should be selected according to the physical MAC)---Click "Assign Name" to complete the configuration! .



5.3.2 OMRON NX1P2 Sysmac Studio Integration (EIP)

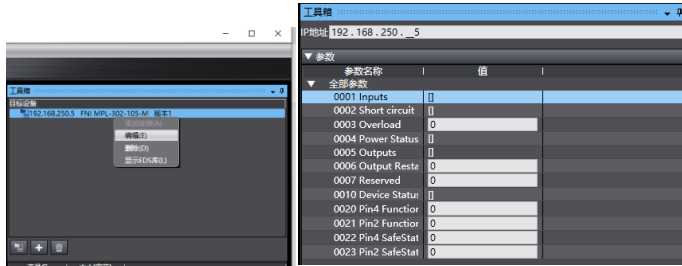
1. Install the EDS file: Tools---ETHERNET/IP Connection Settings---Double-click PLC in the window---right-click on the blank of the toolbox on the right and select "Show EDS Library", click "Install" in the pop-up window, and select EDS file installation



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

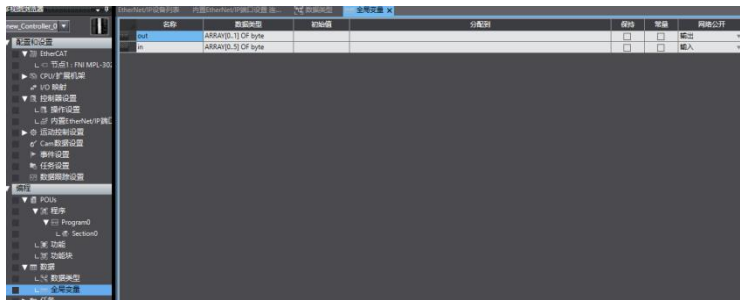


2. Configuration module: right-click the module - select "Edit" - configure the corresponding values in the parameters according to actual needs and click OK after completion

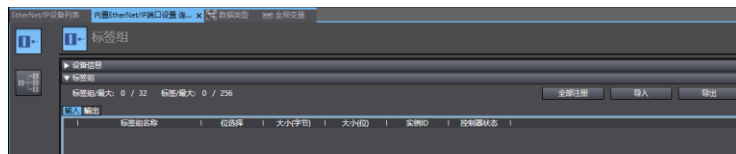


2. Create a variable association:

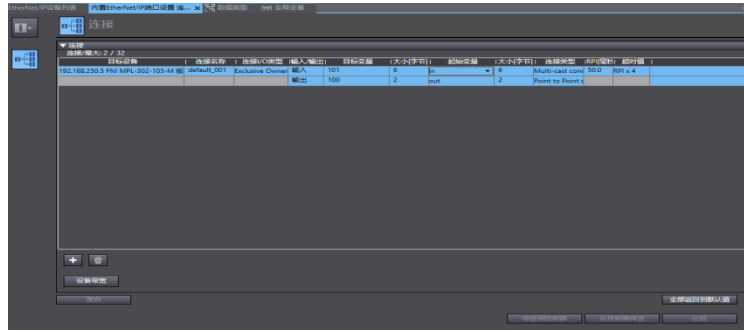
(1) Programming--Data--Global variables create two arrays, output 262 bytes, input 266 bytes, the corresponding input and output should be configured in the network disclosure;



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

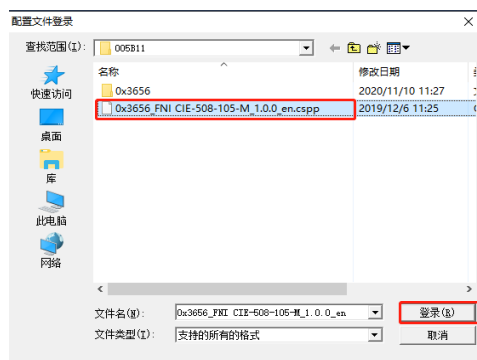


(3) In the built-in ETHERNET/IP port setting window - select the second icon on the left (connection) - click "+", the target device selects the previously configured module, the IO type selects EXCLUSIVE Owner, and the corresponding For input and output, the target variable must be filled with 101,100;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

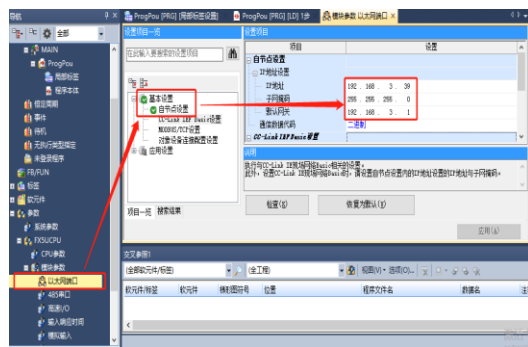


5.3.4 Mitsubishi FX5U Work2 Integration (CIE)

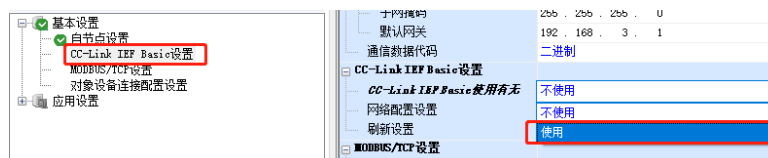
1. Install the CCSP file: first open GX WORKS 3-Tools-Configuration file management-Login-CSPP file (the project must be closed to import the file)



3. Click on the left project-parameters-FX5UCPU-module parameters-Ethernet port, basic settings-self-node settings. Set the self-node IP



2. Click CC-Link IEF Basic Settings - select whether to use CC-Link IEF Basic - click Use



3. Click CC-Link IEF Basic settings - select network configuration settings - detailed settings;

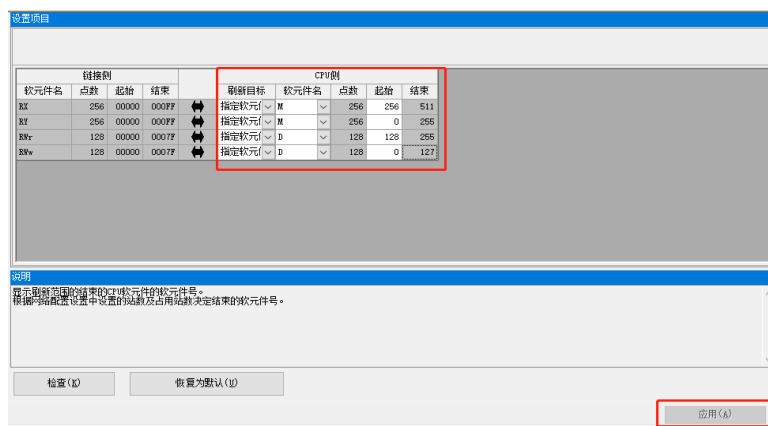




2. Automatic detection of connected devices - occupy 4 stations, IP address is set with DIP switch - reflect the setting and close



2. Select the specified soft element for refresh target - soft element name M - assign soft element address - application, the configuration is complete!



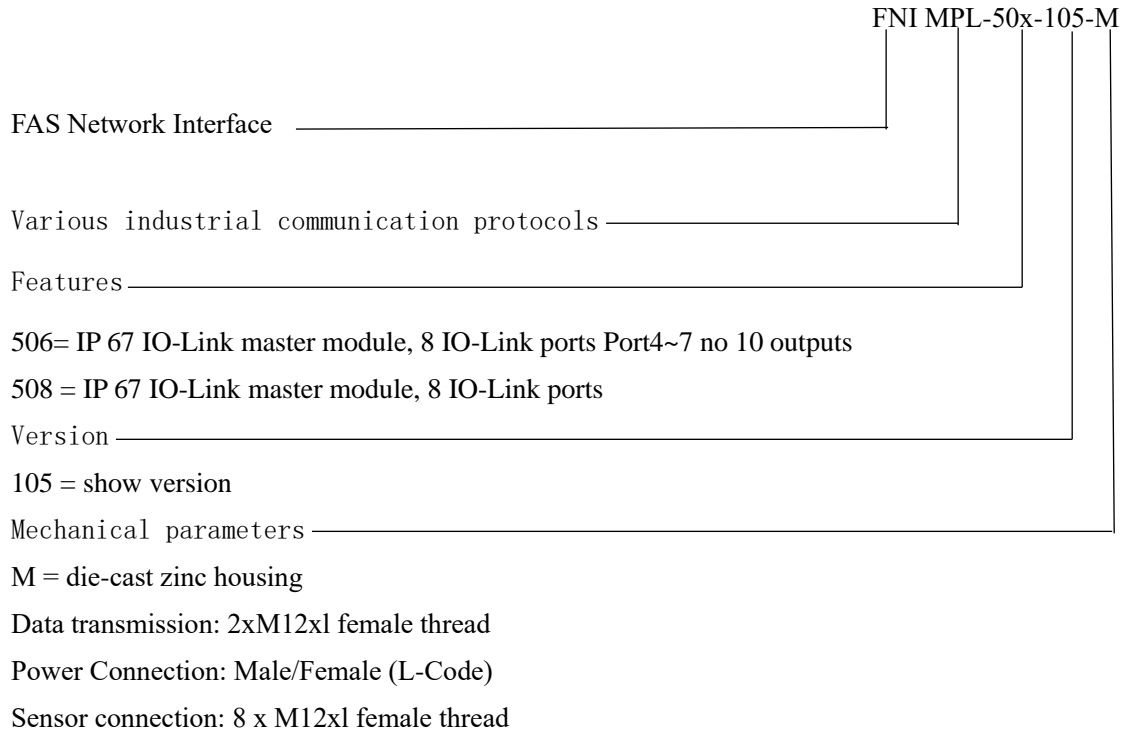
6 Appendix

6.1. Materials included FNI MPL includes the following component

- I/O-block
- 4 blind plugs M12
- Ground bus
- Thread M4x6
- 20 tags



6.2. order code



6.3 Order information

Product order code	order code
FNI MPL-504-105-M	007B51