

## FX20 Series Modular I/O System IO-Link Master Modules User Manual



## Content

1.	Product overview .....	2
2.	Version change records .....	2
3.	About obtaining manuals.....	2
4.	Warranty statement .....	2
5.	FX20 IO-Link masters module introduction .....	3
5.1.	Appearance and function.....	3
5.2.	IO-Link Master Modules Technical Data .....	4
5.3.	Dimension drawing .....	7
6.	Mechanical installation and disassembly .....	8
6.1.	Installation location and minimum installation distance.....	8
6.2.	FX20 adapter installation .....	9
6.3.	FX20 submodules installation .....	9
6.4.	Modules disassembly.....	9
7.	Modules wiring .....	11
7.1.	FX20 power supply system wiring schematic .....	11
7.2.	FX20 IO-Link master modules wiring diagram .....	12
7.3.	Wiring method .....	12
8.	Input/output data structure .....	14
8.1.	Input data.....	14
8.2.	Output data.....	15
8.3.	Configuration Data Descriptions.....	15
9.	Configuration and testing .....	16
9.1.	Configuration in Siemens TIA Portal .....	16
9.1.1.	FX20 GSD file.....	16
9.1.2.	IO-Link master module configuration steps .....	18
9.2.	Configure IO-Link master and slaves through a web server.....	27
10.	Fault Diagnosis .....	34

### 1. Product overview

The FX20 series IO-Link master module adopts IO-Link V1.1.2 version, which is divided into two models: 2-channel 32 bytes and 4-channel 8-bytes. It supports IO-Link slave devices of different data lengths, Class A or Class B wiring methods, and supports three communication speeds: COM1 (4.8kbps), COM2 (38.4kbps), and COM3 (230.4kbps); It can easily connect IO-Link sensors from various brands and other IO-Link slave devices, as well as sensors and actuators with ordinary switch signals.

The FX20 IO Link master module, combined with FX20 bus adapter modules of different bus protocols, can be compatible with multiple PLC control systems and is suitable for application scenarios such as process sensor data acquisition, IP67 hubs expansion, valve terminals control, etc. It provides a cost-effective I/O comprehensive solution for industries such as automotive parts, photovoltaics, and lithium batteries.

### 2. Version change records

Revision date	Version	Content changed
2025-07	V1.0	1st version
2025-12	V2.0	Update fonts and layouts

### 3. About obtaining manuals

This manual is not shipped with the product. You can obtain its PDF file through the following methods:

- Log in to Elco's official website ([www.elcoautomation.com](http://www.elcoautomation.com)), search for keywords, and download.
- Use WeChat to search and subscribe the official account of "Elco Automation" to obtain the product manual.
- Contact Elco sales engineers in your area to obtain the latest manual materials.

### 4. Warranty statement

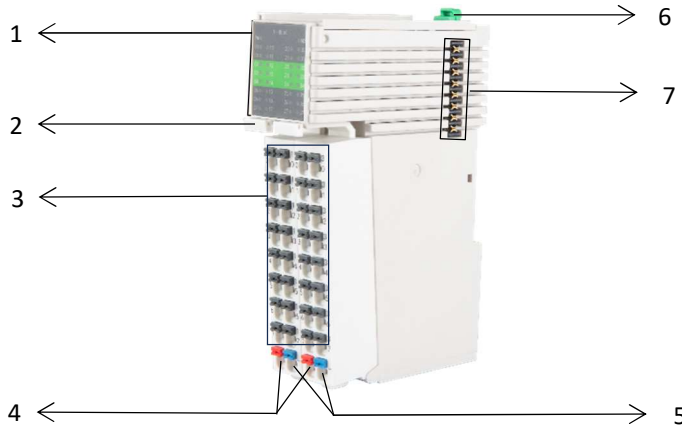
Under normal use, if the product malfunctions or is damaged, Elco will be responsible for an 18 months warranty (from and subject to the delivery date; executed according to the agreement, if there is a contract). When it's over 18 months, maintenance fees will be charged.

- Within 18 months, repair fees will be charged for product damaged by the following circumstances.
- Failure to operate according to the manual
- Fires, floods, and abnormal voltage
- Used for abnormal functions
- Beyond the application scope
- Force majeure (natural disasters, earthquakes, lightning strikes).

The service fees shall be calculated according to Elco's unified standards. Subject to the contract, if there is.

## 5. FX20 IO-Link masters module introduction

### 5.1. Appearance and function



Item	Name	Function	Status
<b>1</b>	<b>Module running indicator LEDs</b>		
	PW	Power supply status	Green on: OK; Red on: Overvoltage or undervoltage Off: No power supply or module damaged
	MD	Module status	Green on: OK; Red on: Module channels have short circuit fault
	Us	Input supply	Green on: Input supply OK; Red on: System power supply overvoltage or undervoltage.
	Ua	Auxiliary supply	Green on: Auxiliary supply OK; Red on: Auxiliary supply overvoltage or undervoltage
	C	IO-Link communication	Green on: IO-Link OK; Green flashing: IO-Link communication interruption
	Q	I/O indicator	Green on: DI/DO high level
	ER	Channel error	Red on: Channel configuration error
<b>2</b>	<b>Terminal disassembly buckle</b>	Used for disassembling terminals	-
<b>3</b>	<b>Terminal blocks for IO-Link</b>	Wiring for IO-Link slave devices	-
	Terminal No.: 00,10,20,30	L+	System power supply 24V+ for Channel 1 ... 4
	Terminal No.: 01,11,21,31	CQ1, CQ2, CQ3, CQ4	IO-Link/DIO interfaces for Channel 1 ... 4 (FX20-LKM-BB00 only terminal 01 and 11 available)

	Terminal No.: 02,12,22,32	L-	System power supply GND for Channel 1 ... 4	
	Terminal No.: 03,13,23,33	P24	Auxiliary supply 24V+ for Channel 1 ... 4	
	Terminal No.: 04,14,24,34	N24	Auxiliary supply GND for Channel 1 ... 4	
	Terminal No.: 05,15,25,35	n.c	-	
	Terminal No.: 06,16,26,36	n.c	-	
	Terminal No.: 07,17,27,37	n.c	-	
4	<b>Auxiliary power supply access terminals</b>		Red: 24V+, Blue: GND	-
5	<b>System power supply access terminals</b>		Red: 24V+, Blue: GND	-
6	<b>Module fixed buckle</b>		Used to fix the module onto a DIN 35 mm rail	Pull up: installation position; Press down: locking position
7	<b>Backplane bus interface</b>		Used for backplane bus communication between gateway and I/O modules	-

## 5.2. IO-Link Master Modules Technical Data

### 5.2.1. Datasheet for FX20-LKM-BB00

#### ARTICLE PROPERTIES

<b>PRODUCT TYPE</b>	FX20 series modular I/O system IO-Link master modules	<b>PRODUCT GROUP</b>	IP20 modular I/O system
<b>DESCRIPTION</b>	FX20-submodul 2-channel IO-Link master module, 2 x 32 Bytes, Class A / Class B compatible, 24 V DC, IP20, DIN rail installation	<b>PU</b>	1 pcs
		<b>COUNTRY OF ORIGIN</b>	CN

#### TECHNICAL DATA

<b>NUMBER OF CHANNEL</b>	2	<b>NUMBER OF DI CHANNELS</b>	Max. 2
<b>INTERFACE TYPE</b>	Terminal type	<b>INPUT CURRENT</b>	Max. 200 mA (SIO mode)
<b>OPERATING VOLTAGE</b>	24 V DC	<b>INPUT SIGNAL TYPE</b>	PNP type sensors, travel switches, dry contacts, etc. (SIO mode)
<b>SYSTEM POWER SUPPLY US CURRENT</b>	Max. 4 A	<b>INPUT FILTERING DELAY</b>	1.6 ms

<b>AUXILIARY POWER SUPPLY</b>	Max. 4 A	<b>NUMBER OF DO CHANNELS</b>	Max. 2
<b>UA CURRENT</b>			
<b>IO-LINK TYPE</b>	IO-Link master, compatible with Class A and Class B	<b>OUTPUT CURRENT</b>	Max. 100 mA (SIO mode)
<b>IO-LINK VERSION</b>	IO-Link V 1.1.2	<b>OUTPUT TYPE</b>	Resistive, pilot duty (SIO mode)
<b>IO-LINK TRANSFER RATE</b>	COM1 (4.8 kbps) COM2 (38.4k bps) COM3 (230.4 kbps)	<b>CURRENT CONSUMPTION (5 V)</b>	60 mA
<b>PROCESS DATA BYTE LENGTH</b>	32 Bytes per channel	<b>FAULT DIAGNOSIS METHOD</b>	LED, communication message

**CONNECTION DATA**

<b>WIRE CONNECTION</b>	Plug-in terminal block	<b>STRIPPED LENGTHS</b>	8 ... 10 mm 0.315 ... 0.394 in
<b>CROSS SECTION</b>	0.08 mm <sup>2</sup> ... 2.5 mm <sup>2</sup> AWG 28 ... 14		

**ENVIRONMENTAL REQUIREMENTS**

<b>PROTECTION CLASS</b>	IP20	<b>ELECTRICAL FAST TRANSIENT (EFT)</b>	Level A, per IEC 61000-4-4
<b>MOUNTING TYPE</b>	DIN-35 mm rail	<b>ELECTRO-STATIC DISCHARGE (ESD)</b>	Level A, per IEC 61000-4-2
<b>AMBIENT TEMPERATURE</b>	-5 ... +60 °C	<b>SURGE TEST</b>	Level A, per IEC 61000-4-5
<b>STORAGE TEMPERATURE</b>	-25 ... +70 °C	<b>VIBRATION RESISTANCE</b>	4 g, per IEC 60068-2-6
<b>RELATIVE HUMIDITY</b>	95%, non-condensing	<b>SHOCK RESISTANCE</b>	15 g, per IEC 60068-2-27
<b>OPERATING ALTITUDE</b>	0 ... 2000 m / 0 ... 6562 ft	<b>EU ROHS COMPLIANCE STATUS</b>	Yes
<b>POLLUTION DEGREE</b>	2, per IEC 61131-2	<b>MATERIAL COMPLIANCE</b>	Compliant with REACH

**GENERAL DATA**

<b>HOUSING MATERIAL</b>	PPE	<b>DIMENSIONS (H X W X D)</b>	110.6 x 28 x 78.4 mm
<b>WEIGHT</b>	63 g	<b>APPROVALS</b>	CE
<b>COLOR</b>	Light gray		

**5.2.2. Datasheet for FX20-LKM-BD00**
**ARTICLE PROPERTIES**

<b>PRODUCT TYPE</b>	FX20 series modular I/O system IO-Link master Modules	<b>PRODUCT GROUP</b>	IP20 modular I/O system
<b>DESCRIPTION</b>	FX20-submodul 4-channel	<b>PU</b>	1 pcs

IO-Link master module, 4 x 8 Bytes, Class A / Class B compatible, 24 V DC, IP20, DIN rail installation	<b>COUNTRY OF ORIGIN</b>	CN
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**TECHNICAL DATA**

<b>NUMBER OF CHANNEL</b>	4	<b>NUMBER OF DI CHANNELS</b>	Max. 4
<b>INTERFACE TYPE</b>	Terminal type	<b>INPUT CURRENT</b>	Max. 200 mA (SIO mode)
<b>OPERATING VOLTAGE</b>	24 V DC	<b>INPUT SIGNAL TYPE</b>	PNP type sensors, travel switches, dry contacts, etc. (SIO mode)
<b>SYSTEM POWER SUPPLY US CURRENT</b>	Max. 4 A	<b>INPUT FILTERING DELAY</b>	1.6 ms
<b>AUXILIARY POWER SUPPLY UA CURRENT</b>	Max. 4 A	<b>NUMBER OF DO CHANNELS</b>	Max. 4
<b>IO-LINK TYPE</b>	IO-Link master, compatible with Class A and Class B	<b>OUTPUT CURRENT</b>	Max. 100 mA (SIO mode)
<b>IO-LINK VERSION</b>	IO-Link V 1.1.2	<b>OUTPUT TYPE</b>	Resistive, pilot duty (SIO mode)
<b>IO-LINK TRANSFER RATE</b>	COM1 (4.8 kbps) COM2 (38.4 kbps) COM3 (230.4 kbps)	<b>CURRENT CONSUMPTION (5 V)</b>	60 mA
<b>PROCESS DATA BYTE LENGTH</b>	8 Bytes per channel	<b>FAULT DIAGNOSIS METHOD</b>	LED, communication message

**CONNECTION DATA**

<b>WIRE CONNECTION</b>	Plug-in terminal block	<b>STRIPPED LENGTHS</b>	8 ... 10 mm 0.315 ... 0.394 in
<b>CROSS SECTION</b>	0.08 mm <sup>2</sup> ... 2.5 mm <sup>2</sup> AWG 28 ... 14		

**ENVIRONMENTAL REQUIREMENTS**

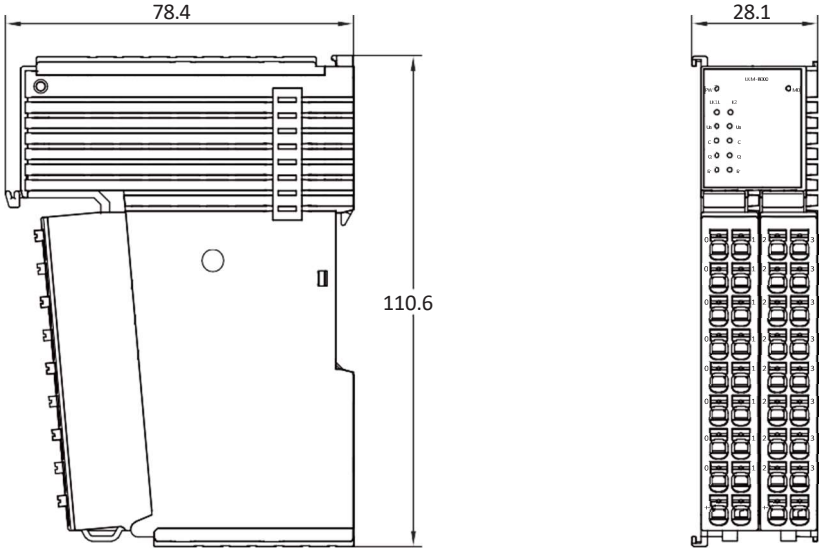
<b>PROTECTION CLASS</b>	IP20	<b>ELECTRICAL FAST TRANSIENT (EFT)</b>	Level A, per IEC 61000-4-4
<b>MOUNTING TYPE</b>	DIN-35 mm rail	<b>ELECTRO-STATIC DISCHARGE (ESD)</b>	Level A, per IEC 61000-4-2
<b>AMBIENT TEMPERATURE</b>	-5 ... +60 °C	<b>SURGE TEST</b>	Level A, per IEC 61000-4-5
<b>STORAGE TEMPERATURE</b>	-25 ... +70 °C	<b>VIBRATION RESISTANCE</b>	4 g, per IEC 60068-2-6
<b>RELATIVE HUMIDITY</b>	95%, non-condensing	<b>SHOCK RESISTANCE</b>	15 g, per IEC 60068-2-27
<b>OPERATING ALTITUDE</b>	0 ... 2000 m / 0 ... 6562 ft	<b>EU ROHS COMPLIANCE STATUS</b>	Yes
<b>POLLUTION DEGREE</b>	2, per IEC 61131-2	<b>MATERIAL COMPLIANCE</b>	Compliant with REACH

**GENERAL DATA**

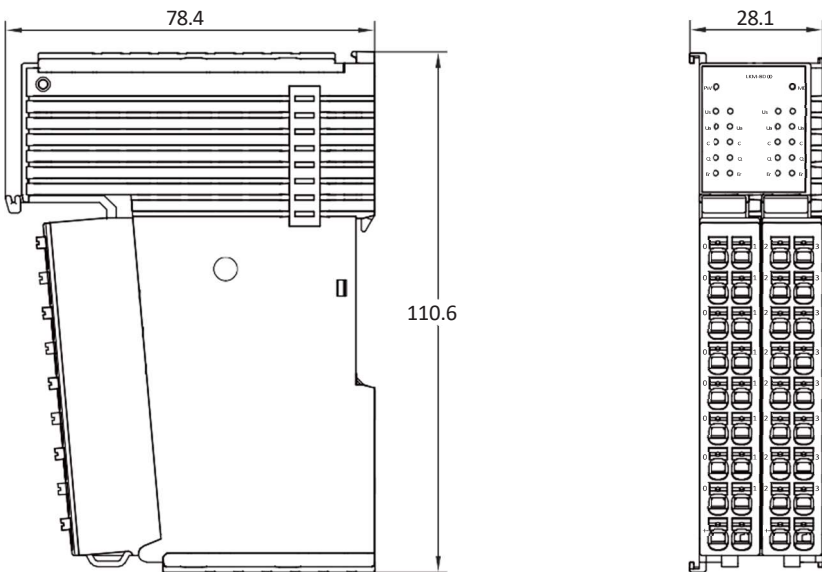
HOUSING MATERIAL	PPE	DIMENSIONS (H X W X D)	110.6 x 28 x 78.4 mm
WEIGHT	63 g	APPROVALS	CE
COLOR	Light gray		

**5.3. Dimension drawing**

**5.3.1. Dimensional drawing for FX20-LKM-BB00**



**5.3.2. Dimensional drawing for FX20-LKM-BD00**



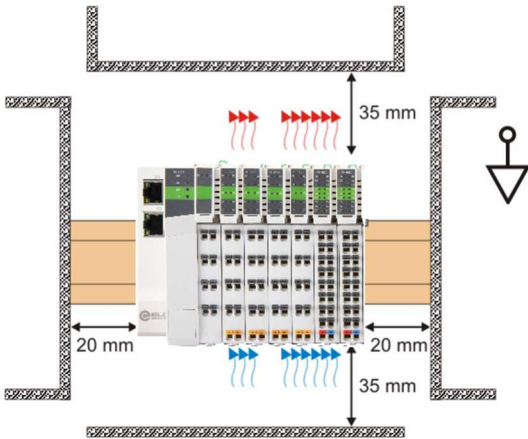
## 6. Mechanical installation and disassembly

### 6.1. Installation location and minimum installation distance

The installation position and reserved space are shown in the following figure. Install the installation guide rail horizontally to the designated installation position, and the connection surface of the connector and I/O modules must face forward.

The installation position should maintain a certain distance from adjacent electrical components or cabinets to facilitate heat dissipation. The recommended minimum installation clearance can refer to the markings in the above figure.

Ensure that FX20 is ventilated from bottom to top and achieve optimal cooling through convective ventilation.



### 6.2. FX20 adapter installation

The installation is carried out according to the following steps:

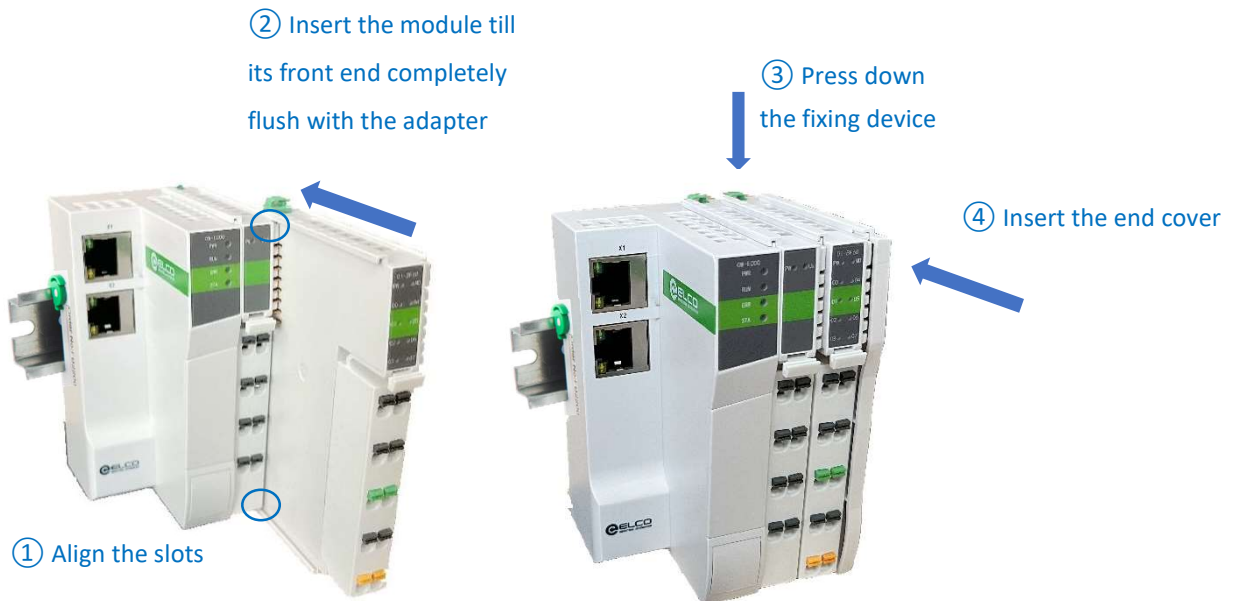


**! Attention!**

During installation, align the module with the DIN rail and press the fixing device in the direction indicated by the arrow. After installation, there will be a noticeable clicking sound; change the position of the locking device slightly; after installing the module properly, make the locking device clamp the upper edge of the rail; to avoid damaging the product, do not apply excessive force.

### 6.3. FX20 submodules installation

After the installation of the adapter, the function modules can be sequentially inserted from the right side of the adapter. Before the insertion, ensure to pull out the fixing device and aligned with the two slots on the module.



**i Caution!**

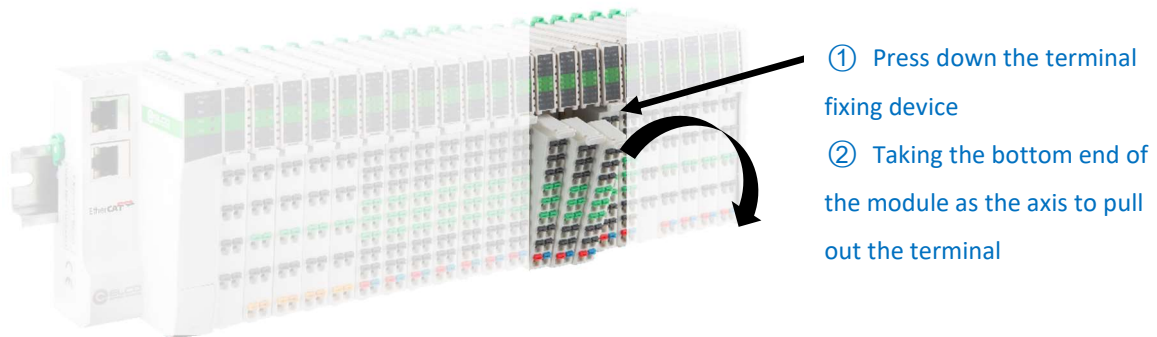
The end cover is only to protect the backplane bus interface of the end module, and it is packaged and shipped together with the adapter.

### 6.4. Modules disassembly

Use a flat screwdriver or similar tool to pry up the locking device on the rail, and then pull the module away from the DIN rail.



The wiring terminals of all modules can be removed separately to facilitate module replacement, as follows:



**⚠ Warning!**

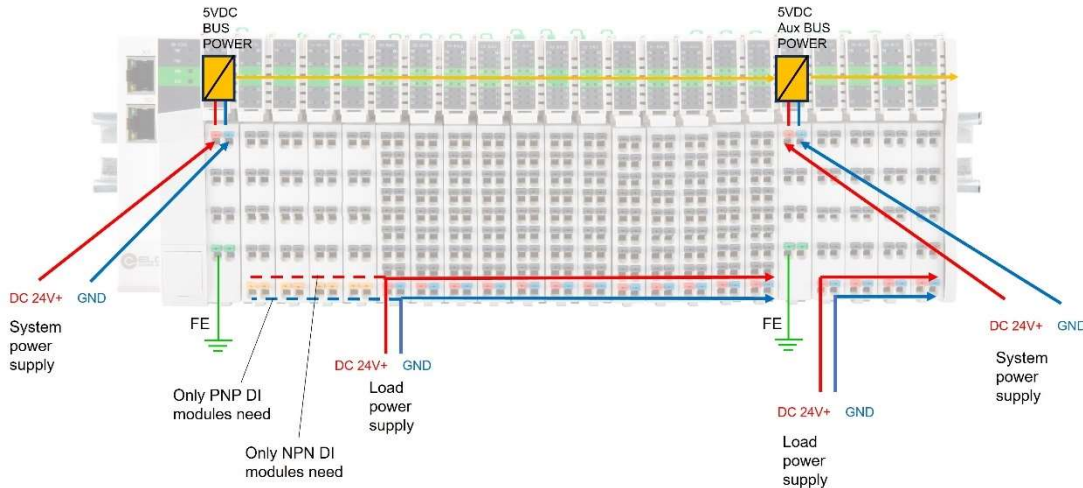
The mechanical installation and disassembly of modules require qualified professional mechanical personnel to operate and pay attention to the correct wearing and use of labor protection equipment.

## 7. Modules wiring

### 7.1. FX20 power supply system wiring schematic

The FX20 series backplane 5 V DC power supply is provided by the adapter, and the load power supply for modules need to be provided separately. Additionally, an auxiliary power supply module can provide a larger backplane power supply current. Usually, when the number of modules exceeds 16 in FX20, the auxiliary power supply module should be considered.

The power supply system diagram is as follows:

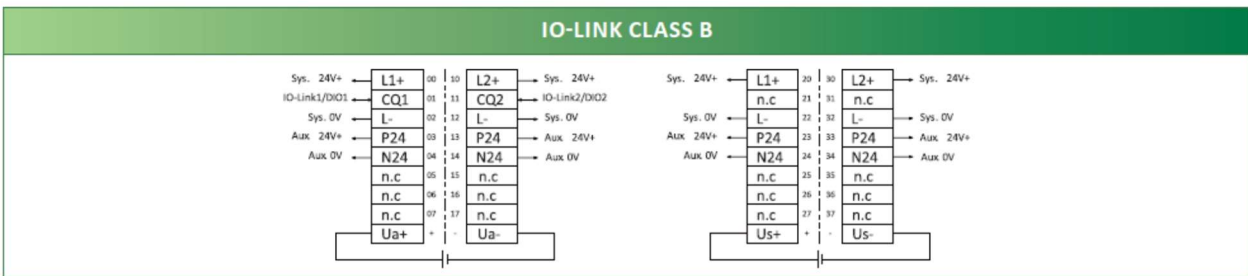
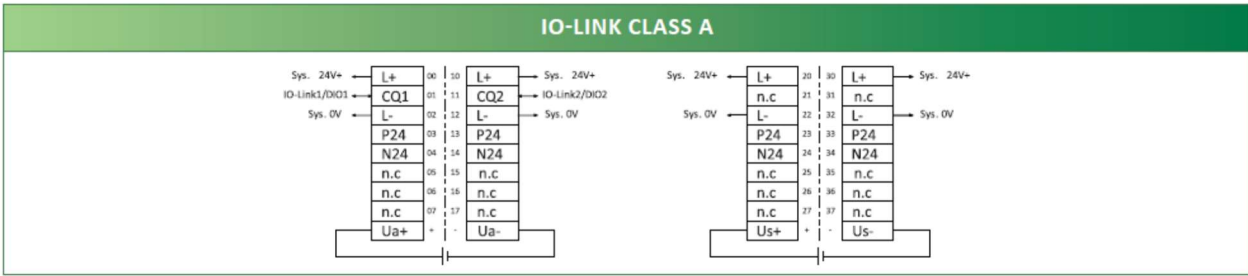


#### **Warning!**

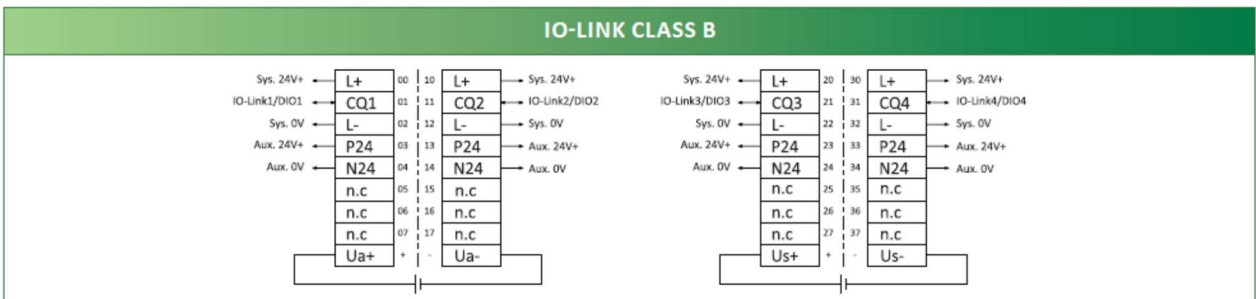
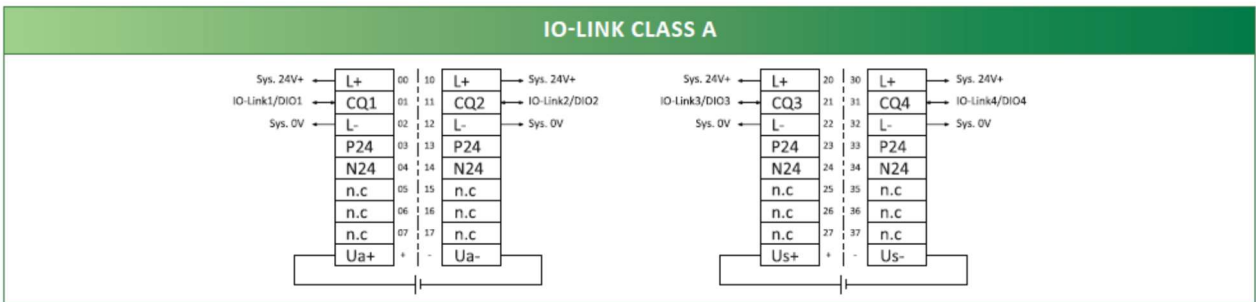
- Be sure to disconnect all power connections before wiring!
- To ensure safety, must reliably connect the module grounding terminal to the ground!
- The wiring work must be operated by authorized electrical personnel to ensure safety!
- Using cables that do not meet the requirements will result in serious equipment damage or personal injury!
- Please refer to this manual or the wiring diagram printed on the side of the module for wiring. Incorrect wiring will cause module damage or personal injury!

## 7.2. FX20 IO-Link master modules wiring diagram

### 7.2.1. FX20-LKM-BB00



### 7.2.2. FX20-LKM-BD00



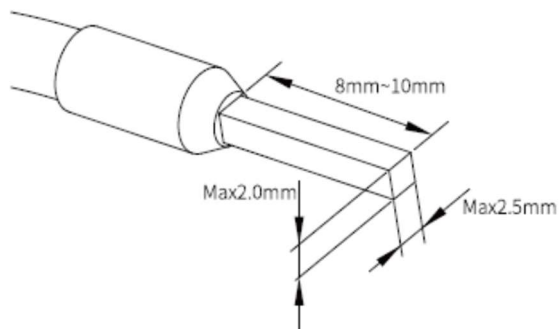
1) Module wiring diagrams are printed on the side of the module for easy reference during wiring and debugging.



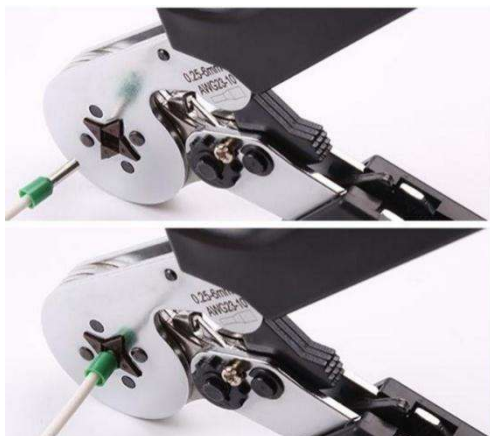
2) Only electrical technicians can carry out wiring and related operations.

### 7.3. Wiring method

The FX20 series adopts tool-free spring wiring terminals, and the wiring needs to be equipped with tube type cold pressing cable lugs. Please refer to the following figure for the stripping length and cable lug specifications:



Standard cable crimper can be used for pressing the wire ear, as shown in the following figure:

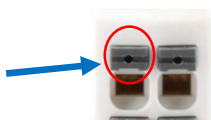


The wire connection does not need tools, and the wiring method is as follows:

- 1) Install the wire ear on the wire;
- 2) Insert the wire installed with the wire ear into the plug-in terminal to its most;
- 3) Pull the cable to ensure its fixed securely.

To release the wire:

- 1) Press the terminal spring button with your hand or a flat screwdriver
- 2) Pull out the wire and release the button.



## 8. Input/output data structure

### 8.1. Input data

#### 8.1.1. 2-Channel IO-Link master input data (FX20-LKM-BB00)

No.	Registers	Descriptions	Format	Length
1	Data of Channel 1	Input Data of IO-Link CH1	Byte	32 Bytes
2	Data of Channel 2	Input Data of IO-Link CH2	Byte	32 Bytes
3	CH 1 Diagnostic	Diagnostic Data of CH 1	Refer to 8.1.3	1 Byte
4	CH 2 Diagnostic	Diagnostic Data of CH 2	Refer to 8.1.3	1 Byte
5	IO-Link Master Diagnostic	Diagnostic Data of Master	Refer to 8.1.4	2 Bytes

#### 8.1.2. 4-Channel IO-Link master input data (FX20-LKM-BD00)

No.	Registers	Descriptions	Format	Length
1	Data of Channel 1	Input Data of IO-Link CH 1	Byte	8 Bytes
2	Data of Channel 2	Input Data of IO-Link CH 2	Byte	8 Bytes
3	Data of Channel 3	Input Data of IO-Link CH 3	Byte	8 Bytes
4	Data of Channel 4	Input Data of IO-Link CH 4	Byte	8 Bytes
5	CH 1 Diagnostic	Diagnostic Data of CH 1	Refer to 8.1.3	1 Byte
6	CH 2 Diagnostic	Diagnostic Data of CH 2	Refer to 8.1.3	1 Byte
7	CH 3 Diagnostic	Diagnostic Data of CH 3	Refer to 8.1.3	1 Byte
8	CH 4 Diagnostic	Diagnostic Data of CH 4	Refer to 8.1.3	1 Byte
9	IO-Link Master Diagnostic	Diagnostic Data of Master	Refer to 8.1.4	2 Bytes

#### 8.1.3. Channel Diagnostic Bytes Descriptions

No.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
CH 1	<p><b>00000000</b>: No Error.</p> <p><b>00000001</b>: Power supply short circuit.</p> <p><b>00000010</b>: Auxiliary power supply Ua overload.</p> <p><b>00000100</b>: Auxiliary power supply Ua abnormal.</p> <p><b>00001000</b>: Reserved.</p> <p><b>00010000</b>: IO-Link configured, but no slave devices connected.</p> <p><b>00100000</b>: IO-Link configured, But the slave device does not match the configuration.</p> <p><b>01000000</b>: There is a short from the device.</p> <p><b>10000000</b>: Abnormal auxiliary power supply of slave device.</p>							
CH 2 ... 4	Refer to CH 1							

#### 8.1.4. Master Diagnostic Bytes Descriptions

No.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	<p><b>10000000</b>: Ua Overvoltage.</p> <p><b>01000000</b>: Ua Undervoltage.</p> <p><b>00100000</b>: Us Overvoltage.</p> <p><b>00010000</b>: Us Undervoltage.</p> <p><b>00001000</b>: Ua Short circuit.</p>							

00000010: Communication connection status is normal.

00000001: The master module is not configured.

## 8.2. Output data

### 8.2.1. 2-Channel IO-Link master output data (FX20-LKM-BB00)

No.	Registers	Descriptions	Format	Length
1	Data of Channel 1	Output Data of IO-Link CH 1	Byte	32 bytes
2	Data of Channel 2	Output Data of IO-Link CH 2	Byte	32 bytes

### 8.2.2. 2-Channel IO-Link master output data (FX20-LKM-BB00)

No.	Registers	Descriptions	Format	Length
1	Data of Channel 1	Output Data of IO-Link CH 1	Byte	8 bytes
2	Data of Channel 2	Output Data of IO-Link CH 2	Byte	8 bytes
3	Data of Channel 1	Output Data of IO-Link CH 3	Byte	8 bytes
4	Data of Channel 2	Output Data of IO-Link CH 4	Byte	8 bytes

## 8.3. Configuration Data Descriptions

No.	Index	Subindex	Parameters	Length	Range	Parameter Descriptions
1	0x3100	0x01	CH 1 model setting	1 Byte		See 8.3.1, default 0x00
		0x02	CH 2 model setting	1 Byte		See 8.3.1, default 0x00
		0x03	CH 3 model setting	1 Byte		See 8.3.1, default 0x00
		0x04	CH 4 model setting	1 Byte		See 8.3.1, default 0x00
2	0x3101 (CH 1)	0x01	Delay setting	1 Byte	Byte 0	See 8.3.2
			Verification setting	2 Bits	Byte 1.1-1.0	1: Not verified, 0: Verified
			Parameters setting	3 Bits	Byte 1.7-1.5	See 8.3.3
			Vendor ID setting	2 Bytes	Byte 2-3	
			Device ID setting	3 Bytes	Byte 4-6	
3	0x3102 (CH 2)	0x01	Delay setting	1 Byte	Byte 0	See 8.3.2
			Verification setting	2 Bits	Byte 1.1-1.0	1: Not verified, 0: Verified
			Parameters setting	3 Bits	Byte 1.7-1.5	See 8.3.3
			Vendor ID setting	2 Bytes	Byte 2-3	
			Device ID setting	3 Bytes	Byte 4-6	
4	0x3103 (CH 3)	0x01	Delay setting	1 Byte	Byte 0	See 8.3.2
			Verification setting	2 Bits	Byte 1.1-1.0	1: Not verified, 0: Verified
			Parameters setting	3 Bits	Byte 1.7-1.5	See 8.3.3
			Vendor ID setting	2 Bytes	Byte 2-3	
			Device ID setting	3 Bytes	Byte 4-6	
5	0x3104 (CH 4)	0x01	Delay setting	1 Byte	Byte 0	See 8.3.2
			Verification setting	2 Bits	Byte 1.1-1.0	1: Not verified, 0: Verified
			Parameters setting	3 Bits	Byte 1.7-1.5	See 8.3.3

		Vendor ID setting	2 Bytes	Byte 2-3	
		Device ID setting	3 Bytes	Byte 4-6	

**8.3.1. Model configuration table**

No.	Name	Type	Descriptions
1	NONE	0x00	NONE, default setting as digital input
2	IOL_I/O_01/01 byte	0x01	IO-Link 1 Byte Process Data Input/1 Byte Process Data Output
3	IOL_I/O_02/02 byte	0x02	IO-Link 2 Bytes Process Data Input/2 Bytes Process Data Output
4	IOL_I/O_04/04 byte	0x04	IO-Link 4 Bytes Process Data Input/4 Bytes Process Data Output
5	IOL_I/O_08/08 byte	0x08	IO-Link 8 Bytes Process Data Input/8 Bytes Process Data Output

**8.3.2. Delay parameters table**

Param	Value (ms)	Param	Value (ms)	Param	Value (ms)	Param	Value (ms)	Param	Value (ms)
0	4 ms	11	38.4 ms	21	70.4 ms	31	102.4 ms	41	132.8 ms
1	6.4 ms	12	41.6 ms	22	73.6 ms	32	105.6 ms		
2	9.6 ms	13	44.8 ms	23	76.8 ms	33	108.8 ms		
3	12.8 ms	14	48 ms	24	80 ms	34	112 ms		
4	16 ms	15	51.2 ms	25	83.2 ms	35	115.2 ms		
5	19.2 ms	16	54.4 ms	26	86.4 ms	36	118.4 ms		
6	22.4 ms	17	57.6 ms	27	89.6 ms	37	121.6 ms		
7	25.6 ms	18	60.8 ms	28	92.8 ms	38	124.8 ms		
8	28.8 ms	19	64 ms	29	96 ms	39	128 ms		
9	32 ms	20	67.2 ms	30	99.2 ms	40	131.2 ms		

**8.3.3. Parameters saving setting**

Parameters	Descriptions	Parameters	Descriptions
0	Disable parameter saving	2	Download parameters
1	Clear parameters	3	Upload/ Download parameters

**9. Configuration and testing**

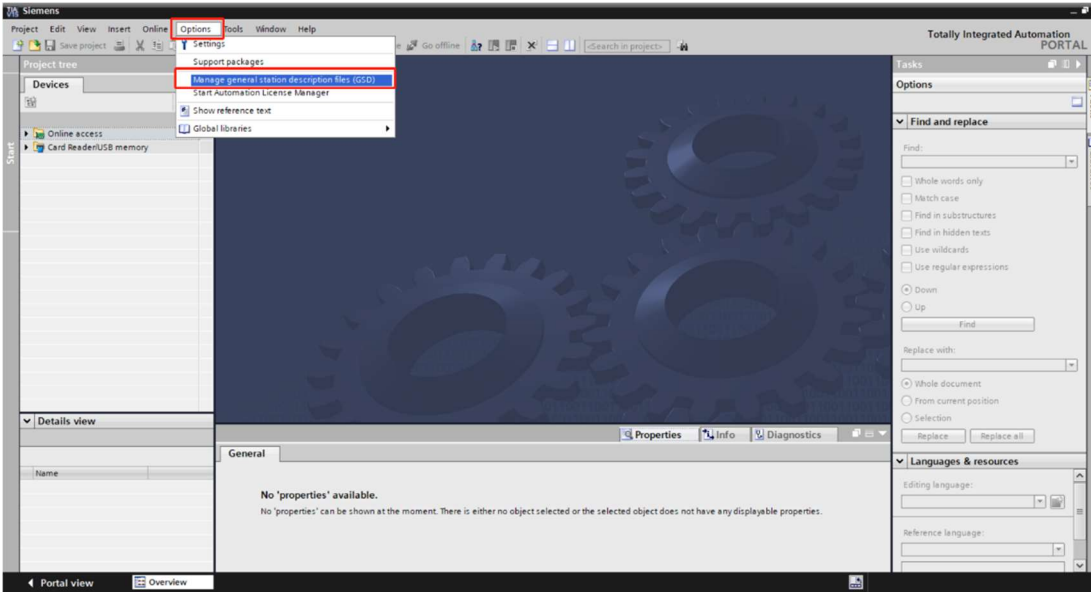
**9.1. Configuration in Siemens TIA Portal**

**9.1.1. FX20 GSD file**

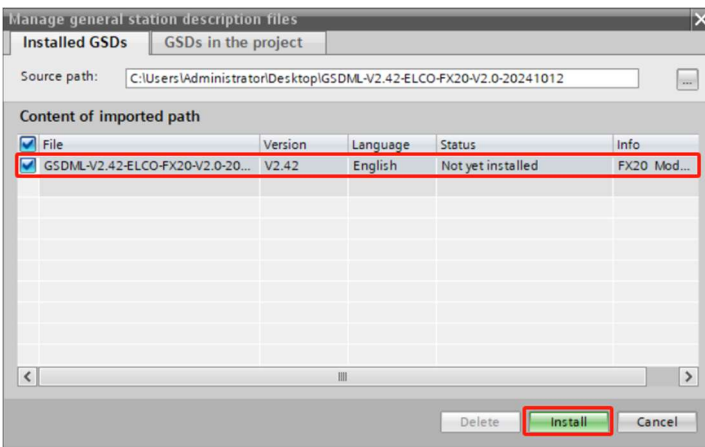
Configure the FX20 IO-Link master modules using the GSD file (in .xml format), which is used to integrate the FX20 series modules into your system as a standard PROFINET IO slave. You can visit Elco website to obtain the latest GSD files or call the customer service hotline to contact technical personnel.

The integration of GSD files into the system depends on the configuration software you are using. Typically, the Siemens Portal programming software used in the PROFINET system integrates GSD files according to the following steps:

- 9.1.1.1. Run the Portal software and select "Options>Manage general station description files\_GSD" in the menu bar.

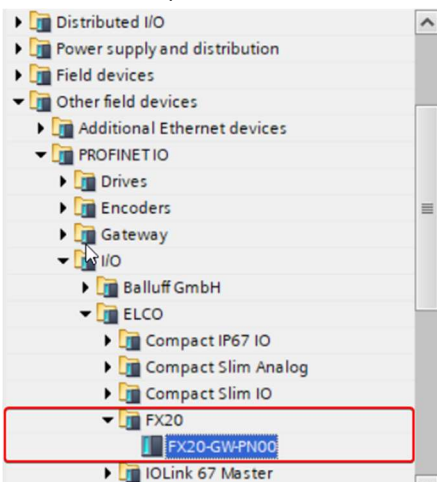


9.1.1.2. In the pop-up dialog box, select the FX20 latest GSD file to install, and then click on "Install" to proceed with the installation operation.



**Attention:** The latest version of GSDML file containing IO-Link master module needs to be installed for configuration.

9.1.1.3. The newly installed FX20 adapter module is displayed in the "Other Field Devices>PROFINET IO>I/O>ELCO>FX20" hardware directory.



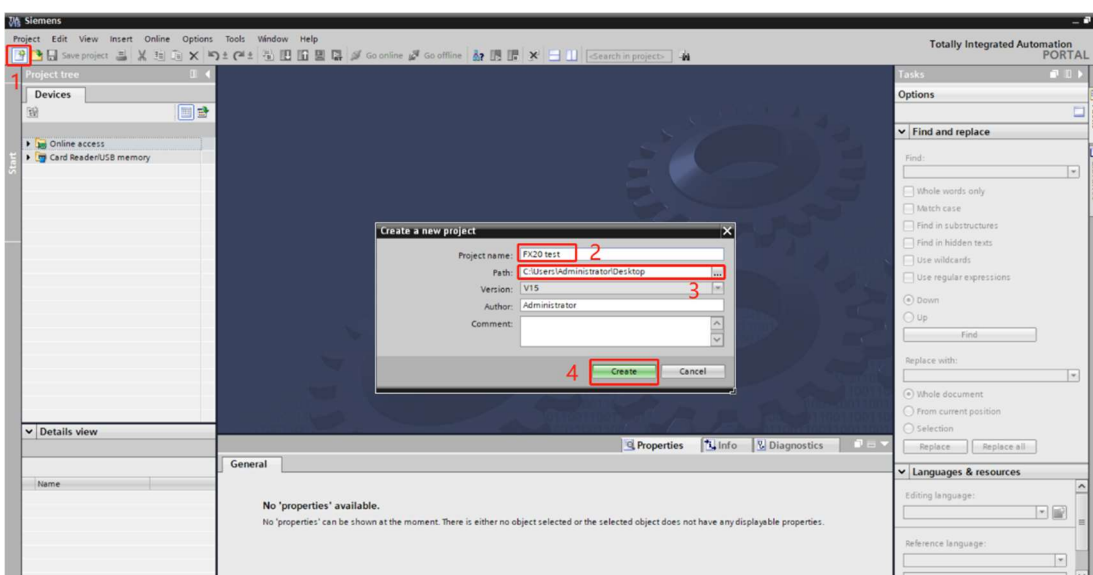
### 9.1.2. IO-Link master module configuration steps

This section provides users with a comprehensive understanding of the actual use of FX20 series IO-Link master modules through a configuration process. This example uses the FX20 from Elco as the PROFINET slave station, and connects to Siemens' PLC - CPU1211C through the PROFINET bus. By default, all power supply and bus connections have been completed, and the device name of the FX20 adapter module is set to "fx gateway". The difference between the 2-channel and the 4-channel IO-Link master module are only the number of channels and the length of configuration bytes, The configuration method is basically the same. For simplicity, only the 4-channel module is taken as an example.

Model	Description	Quantity
FX20-GW-PN00	PROFINET adapter	1
FX20-LKM-BD00	FX20 IO-Link master, 4x8 bytes	1

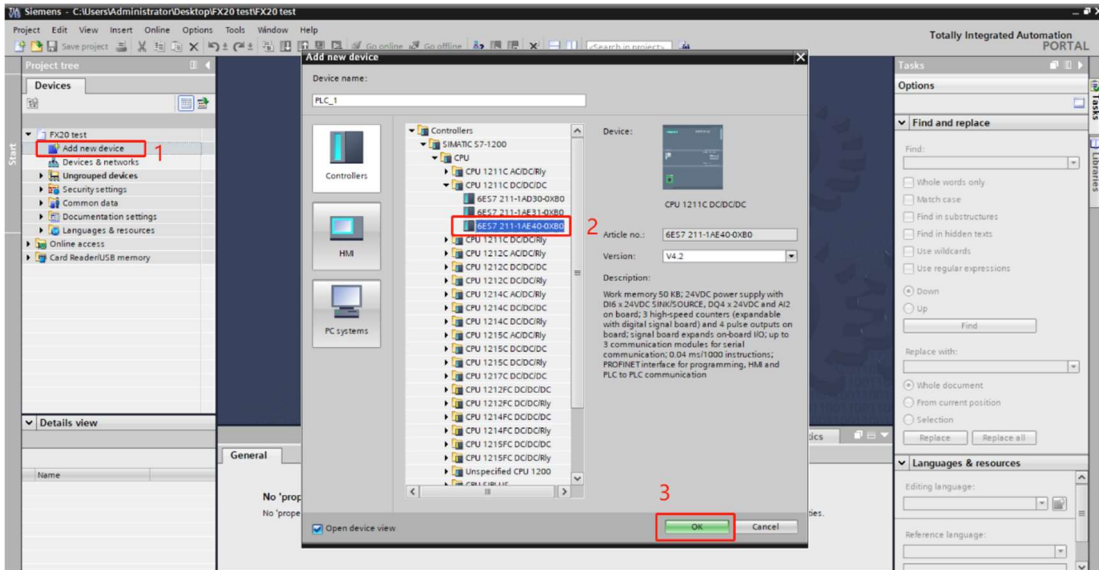
9.1.2.1. Create a new Portal project.

Open TIA portal, Click the "Create New Project" button, enter the project name, storage path, and click "Create".

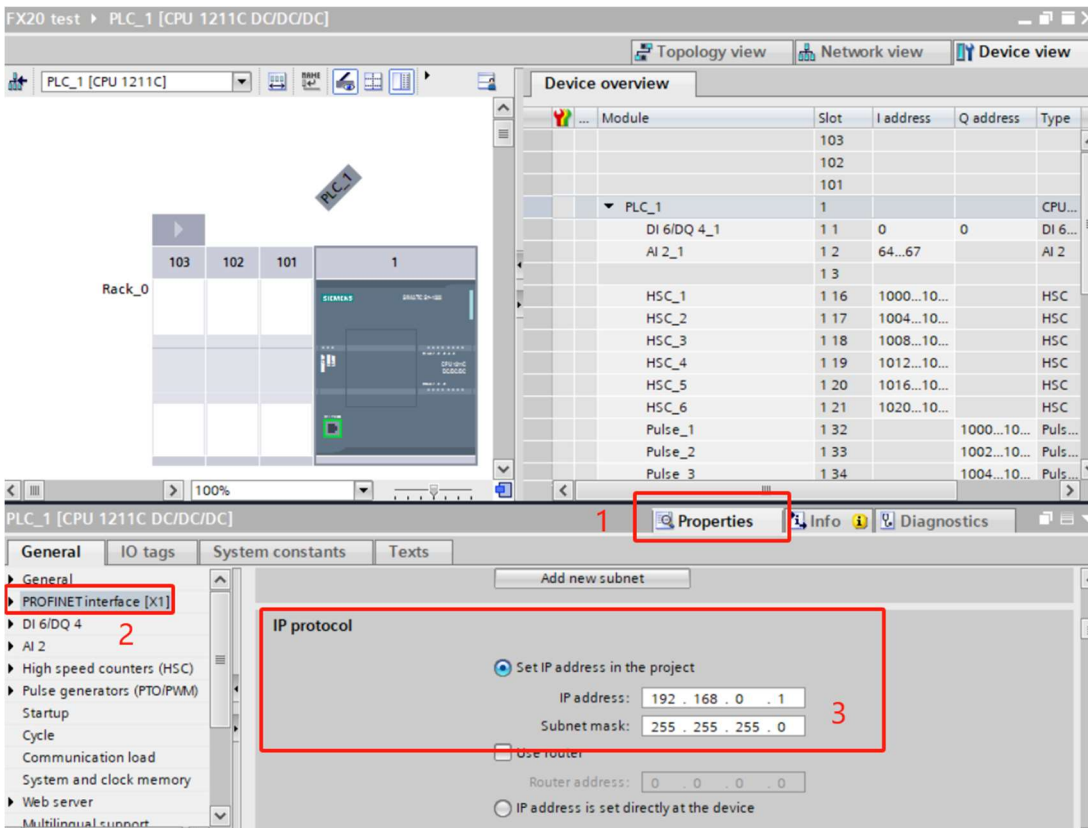


9.1.2.2. Install the GSD files for the Elco FX20 series modular I/O system. For specific methods, refer to "9.1.1 GSD files".

9.1.2.3. Double clicks on "Add New Device" on the left side and select the PLC model used in the "Controller" window.

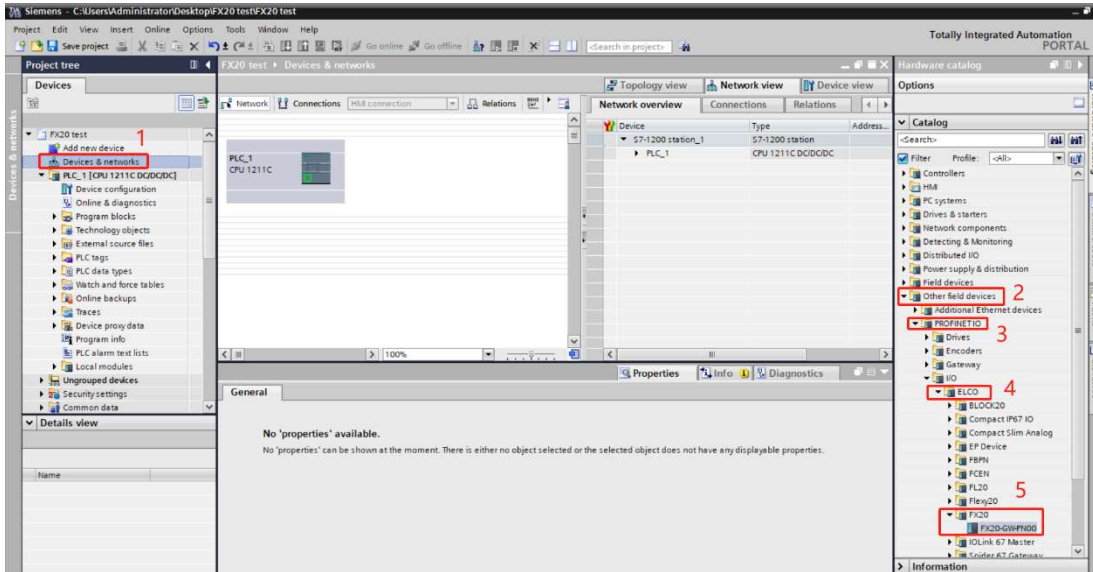


9.1.2.4. Double clicks on the "Device Configuration" window on the left, and in the "Device View" window, select "Properties" ->"PROFINET Interface [X1]" ->"Ethernet Address" to set the IP address of the PLC.

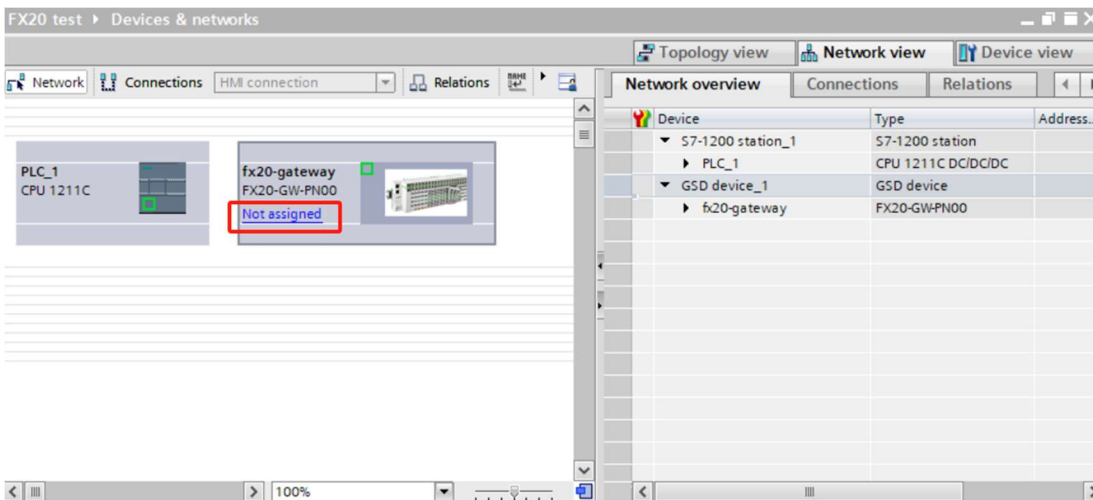


9.1.2.5. Add FX20 adapter module and communicate with PLC.

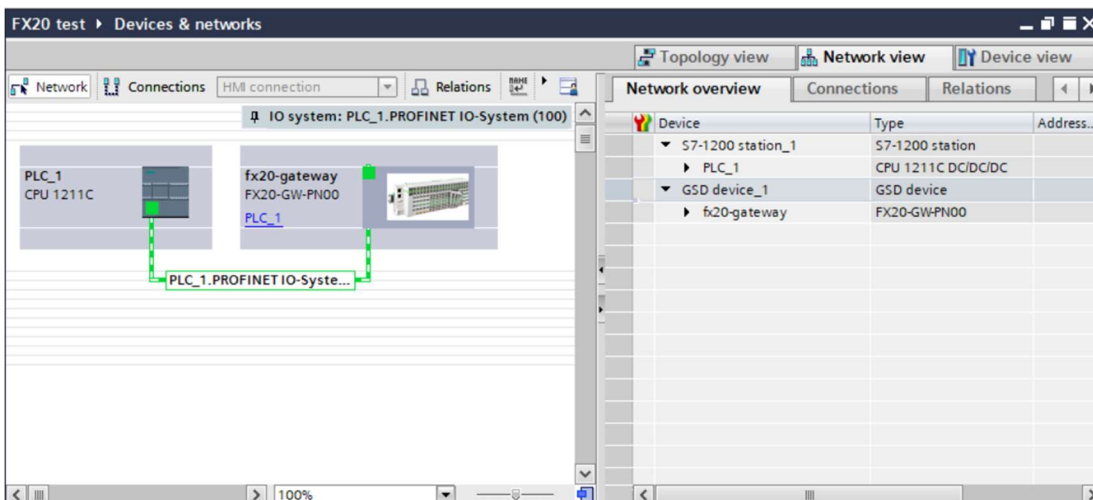
- a) Double clicks on "Devices and Networks" on the left to enter the "Network View" interface. In the "Hardware Directory", select FX20-GW-PN00 adapter through "Other Field Devices ->PROFINET IO ->I/O ->ELCO ->FX20 ", and double-click or drag to add it to the network.



b) Click on 'Not assigned' and select 'PLC\_1. PROFINET interface\_1'.

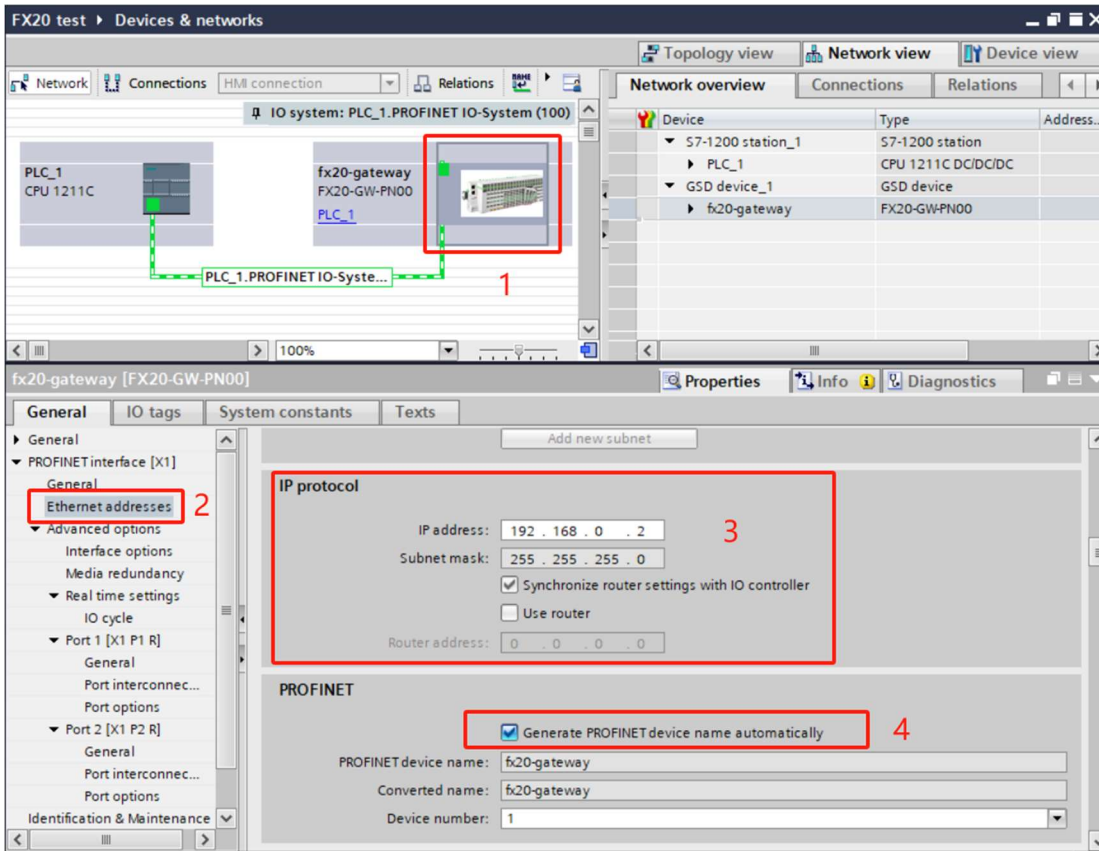


c) The FX20 adapter module is connected to the PLC for communication.

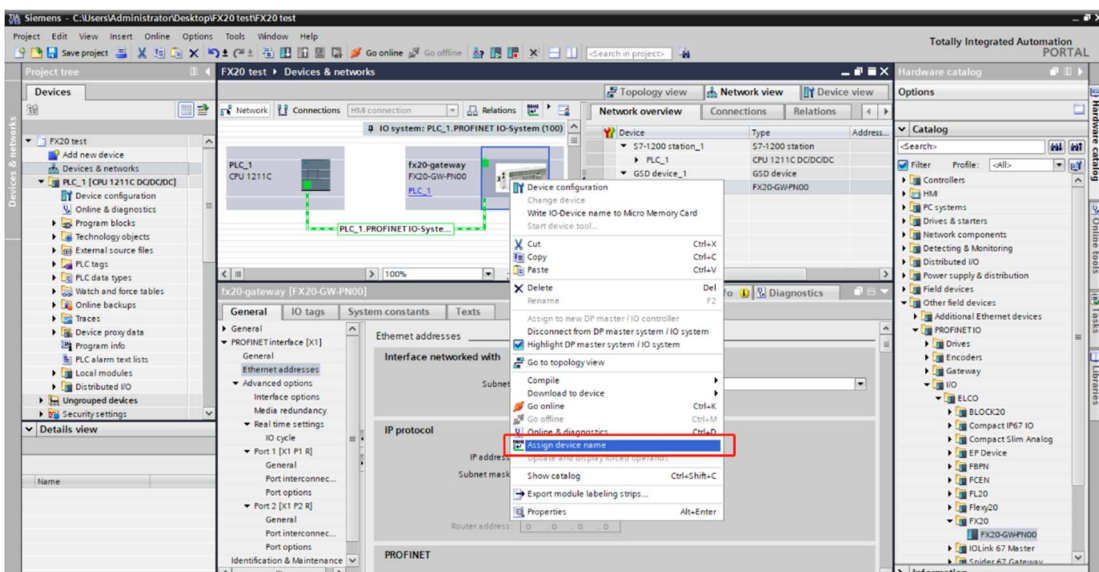


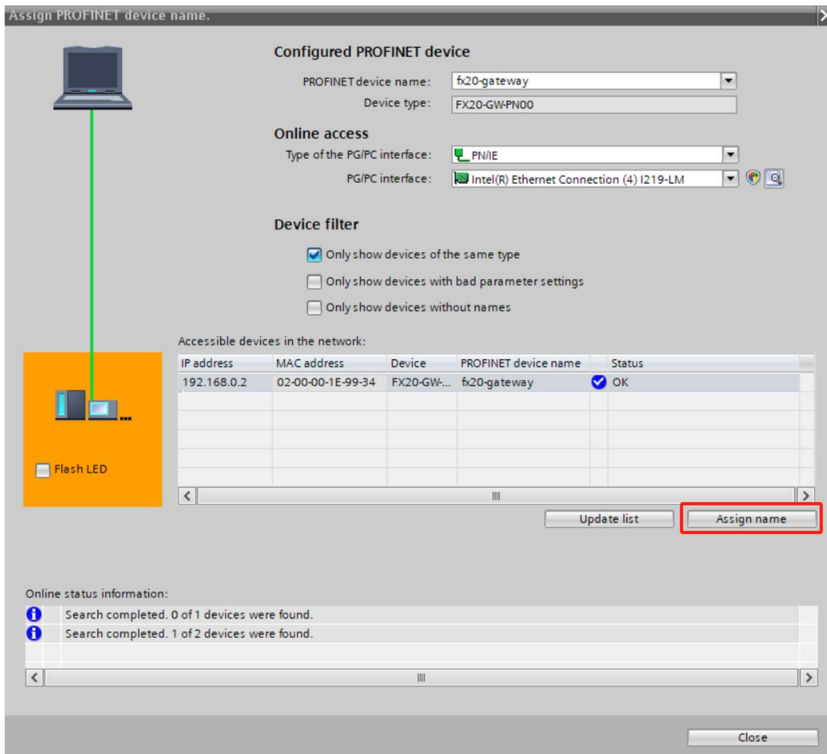
## 9.1.2.6. Modify the device name and IP address settings of the FX20 adapter module.

- a) Click on the FX20 adapter module in the "Network View", select "Properties ->PROFINET Interface ->Ethernet Address", set the FX20 adapter module device Namefx20 gateway in the window, and set the IP address. (It should be in the same network segment as the IP address of the PLC).



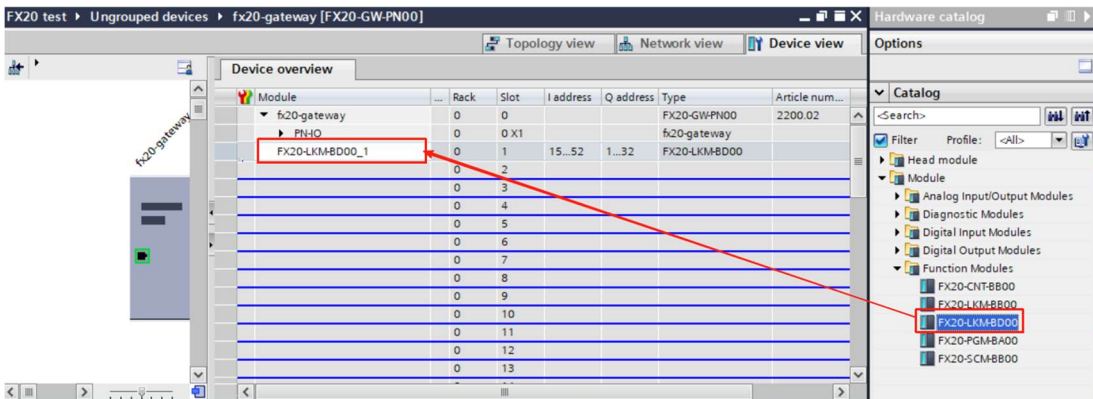
- b) Select FX20-GW-PN00, then select "Assign Device Name" from the right-click menu. In the Assign PROFINET Device Name interface, click "Update List", and the Name and MAC address of the connected FX20 adapter module will be scanned. Select the device that matches the MAC address and click on 'Assign Name'.





9.1.2.7. Add the corresponding model of the FX20 IO-Link master module in the "Device Overview".

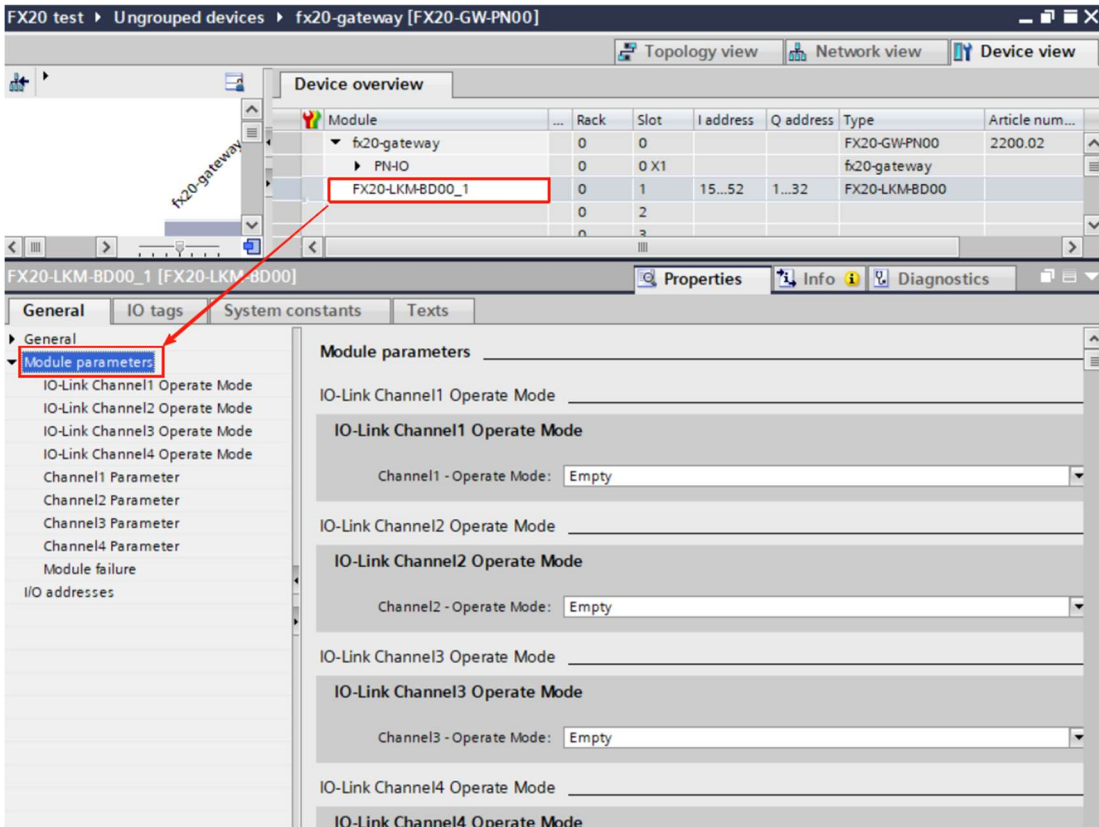
- a) Select the "Module -->Function Modules -->FX20-LKM-BD00" module in the " Hardware Catalog" window and drag it to the corresponding position.



- b) The system automatically assigns I/O addresses based on module attributes. The input address occupies 38 bytes, IO-Link input data occupies 32 bytes, and 6 diagnostic bytes; The output data occupies 32 bytes, and each IO-Link channel occupies 8 bytes. Of course, it can also be manually modified to other unoccupied start addresses.

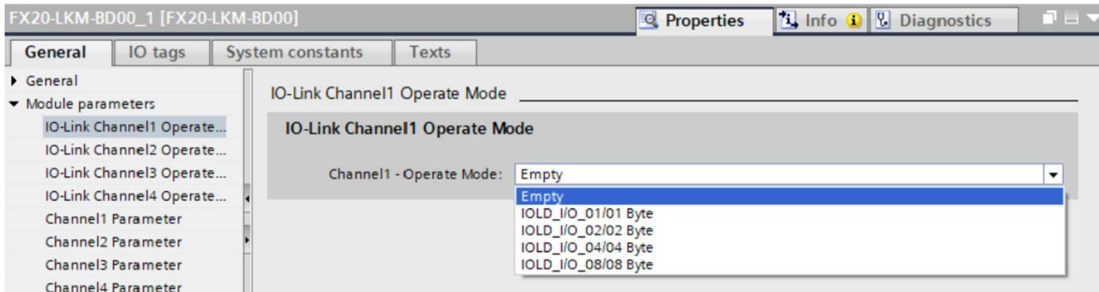
Module	Rack	Slot	I address	Q address	Type
fx20-gateway	0	0			FX20-GW-PN00
PN-IO	0	0 X1			fx20-gateway
FX20-LKM-BD00_1	0	1	15...52	1...32	FX20-LKM-BD00

- c) Select "FX20-LKM-BD00" -->"Properties" -->"Module Parameters" for parameter settings.



We will take channel 1 as an example to illustrate, and the settings and content of other channels are the same as channel 1.

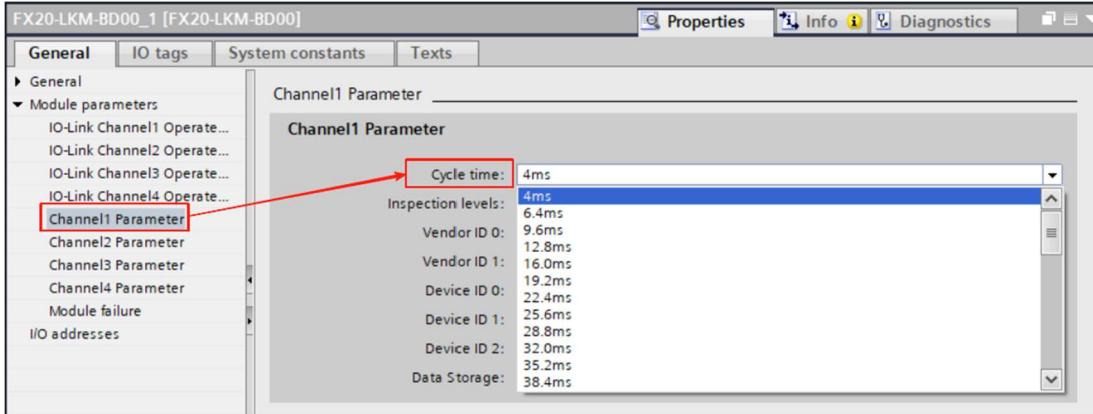
**i. IO-Link Channel 1 Operate Mode:**



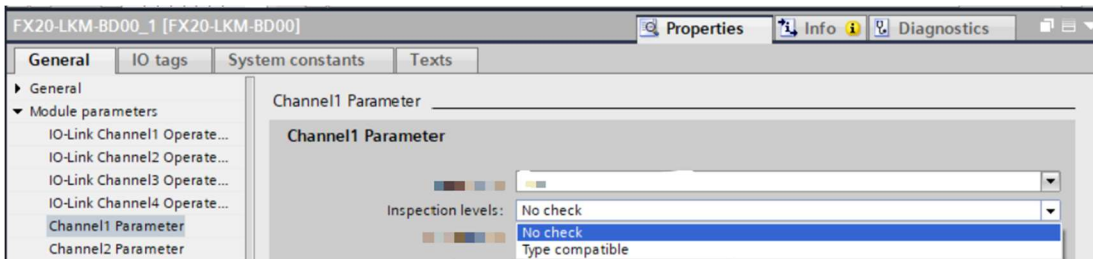
- **Empty:** IO-Link channel 1 closed, this channel is in SIO mode, default is DI, input status corresponds to bit0 of Process Data Byte0. In this example, the bit0 address of channel 1 is "I15.0".
- **IOLD\_I/O\_01/01 Byte:** IO-Link channel 1 opened, the configuration of process data consists of 1 byte input and 1 byte output;
- **IOLD\_I/O\_02/02 Byte:** IO-Link channel 1 opened, the configuration of process data consists of 2 bytes input and 2 bytes output;
- **IOLD\_I/O\_04/04 Byte:** IO-Link channel 1 opened, the configuration of process data consists of 4 bytes input and 4 bytes output;
- **IOLD\_I/O\_08/08 Byte:** IO-Link channel 1 opened, the configuration of process data consists of 8 bytes input and 8 bytes output;

**ii. Channel 1 parameter:**

- Cycle time:** The master cycle time can be configured from 4ms to 132.8ms, with a default of 4ms. Depending on the requirements of the slave devices and actual operating conditions, extending the cycle time appropriately can help improve communication stability between the master and slave.



- Inspection levels:** Matching verification options for vendor ID and device ID of slave devices.
  - No check:** No verification. The master module can communicate with any slave device whose input and output bytes matched.
  - Type compatible:** Type verification is used to verify the consistency between the device information in the configuration file and the information uploaded to the PLC by the device. If there is any inconsistency, communication between the master and slave will be interrupted, an alarm will be triggered in the diagnostic information.



- Vendor ID and Device ID**

Vendor ID 0:	0
Vendor ID 1:	0
Device ID 0:	0
Device ID 1:	0
Device ID 2:	0

The Vendor ID and Device ID are provided by the slave device supplier and can be obtained from the IODD file of the device or read from the FX20 web server. The values to be compared needs to be filled in here for comparison with the actual value of the slave device. When the "Inspection levels" is set to "Type compatible", only devices with consistent data comparison results are allowed to communicate with the master.

The Vendor ID occupies 2 bytes, and the Device ID occupies 3 bytes.

**Vendor ID 0:** The decimal value, ranging from 0 to 255, is obtained by converting the vendor ID

value to hexadecimal and the high byte value to decimal.

**Vendor ID 1:** The decimal value, ranging from 0 to 255, is obtained by converting the vendor ID value to hexadecimal and the low byte value to decimal.

**Device ID 0:** The decimal value, ranging from 0 to 255, is obtained by converting the Device ID value to hexadecimal and the high byte value to decimal.

**Device ID 1:** The decimal value, ranging from 0 to 255, is obtained by converting the Device ID value to hexadecimal and the middle byte value to decimal.

**Device ID 2:** The decimal value, ranging from 0 to 255, is obtained by converting the Device ID value to hexadecimal and the low byte value to decimal.

For example, the 16-channel digital input and output can be configured with the slave module LKHA-16UP-M12, with vendor ID 1181. Convert 1181 to hexadecimal value of 0 × 49D, 0 × 04 to decimal value of 4, and 0 × 9D to decimal value of 157. From this, it can be concluded that, Vendor ID 0=4, Vendor ID 1=157, Similarly, Device ID is 7, which means Device ID 0=0, Device ID 1=0, and Device ID 2=7.

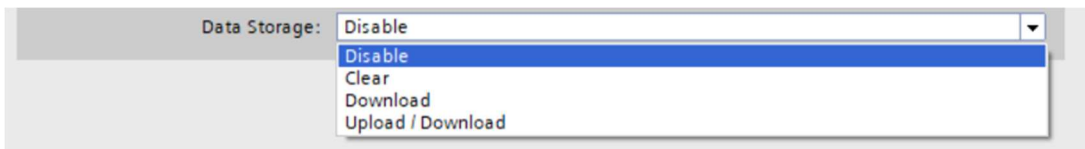
- **Data Storage:** Storing and processing Vendor ID and Device ID of slaves.

**Disable:** No storage for Vendor ID and Device ID.

**Clear:** Clear the Vendor ID and Device ID stored in the master module, then the master can connect to any slave device with the byte lengths that matched.

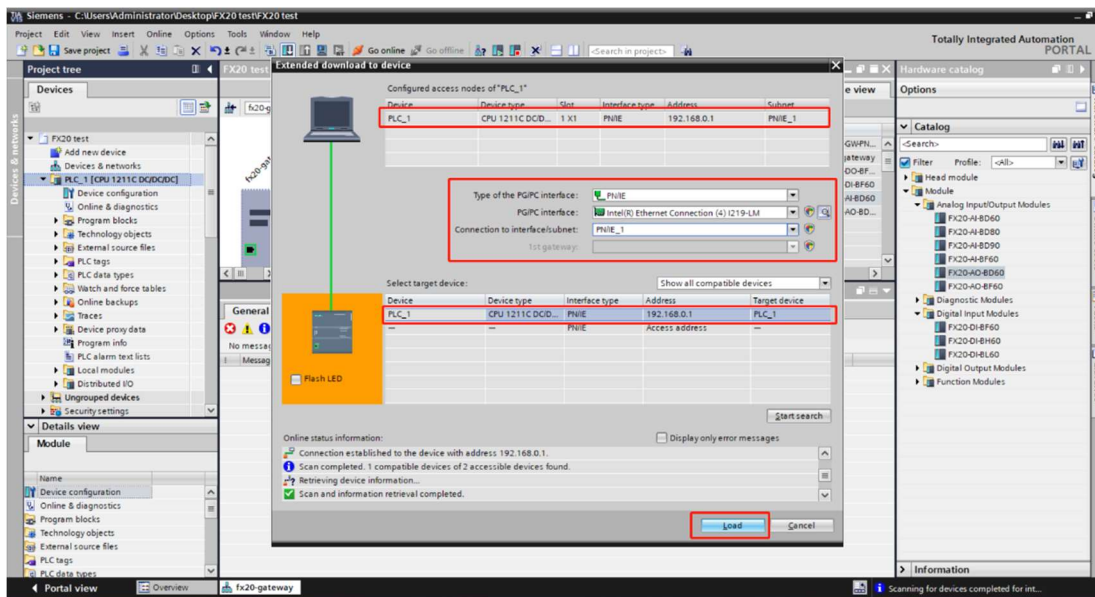
**Download:** Download the Vendor ID and Device ID of the connected slave to master.

**Upload/ Download:** Upload Vendor ID and Device ID from the connected slave and download parameters to master.



**The setting method for channels 2-4 is similar to that of channel 1, and can refer to the setting steps for channel 1, which will not be repeated here.**

9.1.2.8. Parameter settings are complete, save and compile, and download the configured configuration to the PLC to complete the configuration.



9.1.2.9. If everything is configured correctly, the indicators of the FX20 adapter are all in green, and the MD indicator of the I/O module is in green. The basic configuration of IO-Link master is completed.

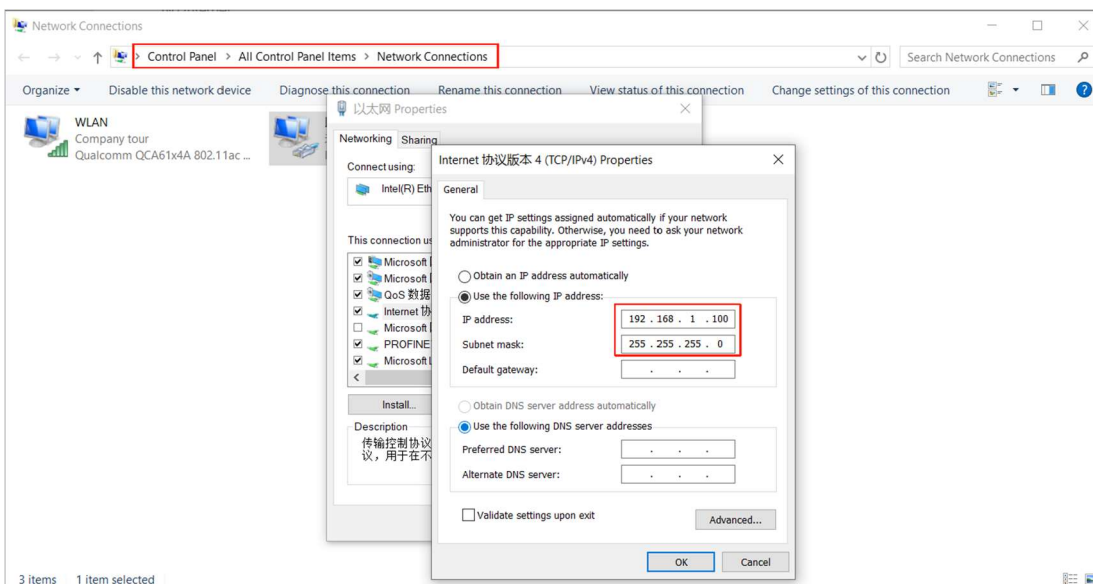
## 9.2. Configure IO-Link master and slaves through a web server

The FX20 bus adapters support built-in web server functionality, except for EtherCAT adapter. By accessing the adapter's IP address through a browser, it is easy to set detailed parameters for I/O and functional modules, upgrade module firmware, and perform other operations.

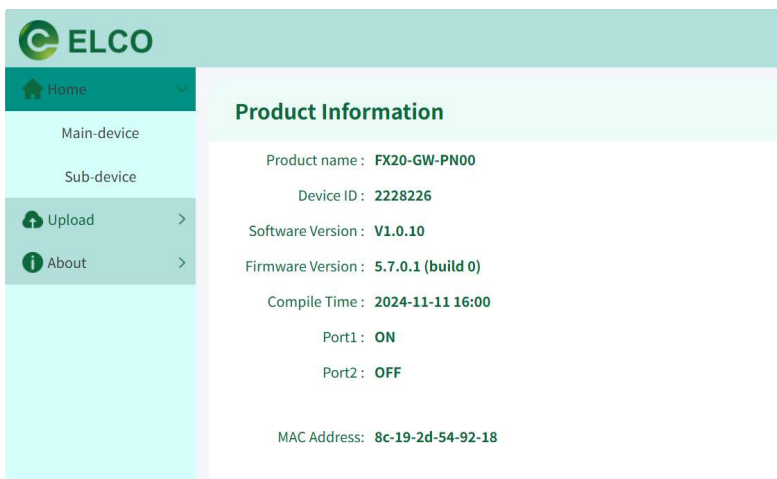
The FX20 IO-Link master module can perform read and write operations on ISDU parameters of slave devices using a web server.

Next, taking the PROFINET adapter web server as an example, we will configure the parameters of the 4-channel FX20 IO-Link master module FX20-LKM-BD00, and use the 16-channel input/output configurable digital IO-Link IP67 slave LKHA-16UP-M12 as an example to explain the method of parameters configuration for slave device.

- 9.2.1. Disconnect the FX20 from the PLC and connect it directly to the computer network port via Ethernet cable. Set the computer IP address to the same network segment as FX20 192.168.1.100, FX20 IP address is configured through TIA Portal software. In the case, the IP address of FX20 has been set to 192.168.1.10.



- 9.2.2. Open the computer browser, enter the IP address of the FX20 PROFINET adapter in the address bar, press enter, and enter the FX20 web server homepage. On the homepage, you can view the product name, device ID, firmware version, MAC address, and other information of the gateway module.

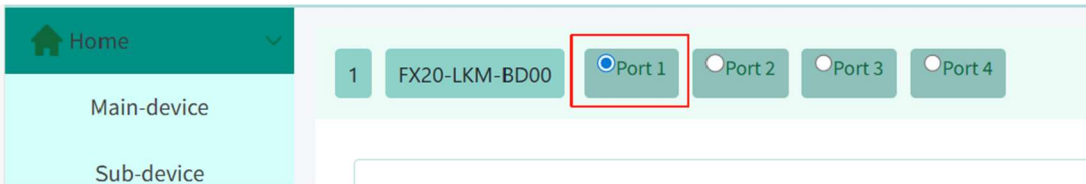


**9.2.3.** Click the "Sub-device" button in the left navigation directory to browse the basic information of the IO-Link master module FX20-LKM-BD00 connected to the FX20 bus adapter. Click the "config" button for further configuration.



**9.2.3.1. Ports Selection**

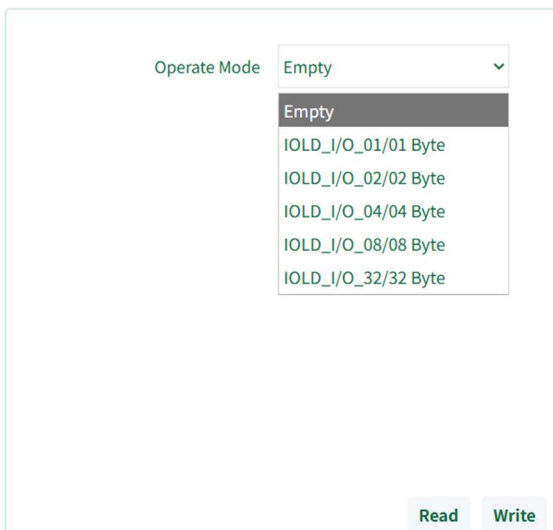
In the configuration interface of module FX20-LKM-BD00, first select the IO- Link port that needs to be configured. In this example, we choose port 1 as the test channel, and the configuration method for other channels is the same. If necessary, you can click on different ports to configure them separately.



**9.2.3.2. Operate Mode**

This is a configuration item for the data length of the IO-Link channel process, which needs to be matched with different options based on the data length of the slave device. The configured input and output byte length can be greater than or equal to the actual byte length of the slave device, but cannot be less than, otherwise an error will be reported indicating inconsistent configuration bytes. The default is Empty, which is the SIO mode.

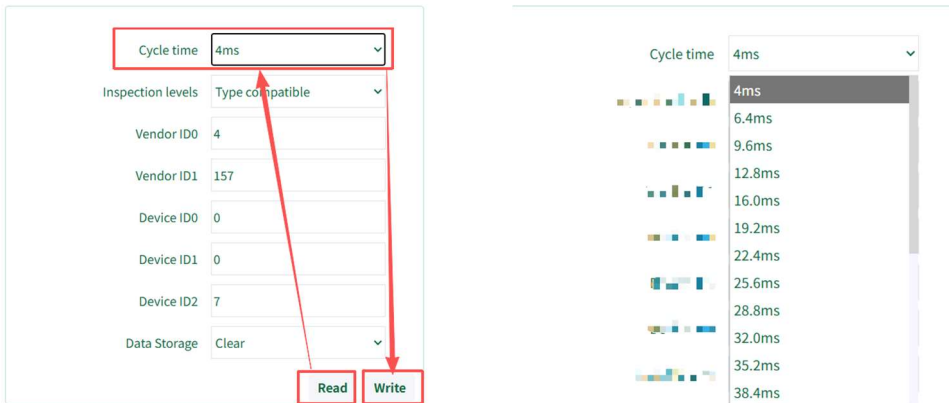
After setting up, click the "Write" button. To view the current configuration status, click the "Read" button.



**Note:** The "IOLD-I/O\_32/32 Byte" option is only applicable to the 2-channel IO-Link master module FX20-LKM-BB00.

9.2.3.3. Cycle time

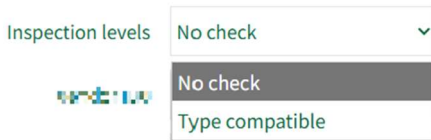
The master cycle time can be configured from 4ms to 132.8ms, by pulling down the scroll bar. Depending on the requirements of the slave devices and actual operating conditions, extending the cycle time appropriately can help improve communication stability between the master and slave.



After selecting, click the "Write" button to confirm the parameters, and click the "Read" button to view the currently selected parameters

9.2.3.4. Slave verification

■ **Inspection levels:** Matching verification options for vendor ID and device ID of slave devices.



**No check:** No verification. The master module can communicate with any slave device whose input and output bytes matched.

**Type compatible:** Type verification is used to verify the consistency between the device information in the configuration file and the information uploaded to the PLC by the device. If there is any inconsistency, communication between the master and slave will be interrupted, an alarm will be triggered in the diagnostic information.

■ **Vendor ID and Device ID**

Vendor ID0

Vendor ID1

Device ID0

Device ID1

Device ID2

The Vendor ID and Device ID are provided by the slave device supplier and can be obtained from the IODD file of the device or read from the FX20 web server. The values to be compared needs to be filled in here for comparison with the actual value of the slave device. When the "Inspection levels" is set to "Type compatible", only devices with consistent data comparison results are allowed to communicate with the master.

The Vendor ID occupies 2 bytes, and the Device ID occupies 3 bytes.

**Vendor ID 0:** The decimal value, ranging from 0 to 255, is obtained by converting the vendor ID value to hexadecimal and the high byte value to decimal.

**Vendor ID 1:** The decimal value, ranging from 0 to 255, is obtained by converting the vendor ID value to hexadecimal and the low byte value to decimal.

**Device ID 0:** The decimal value, ranging from 0 to 255, is obtained by converting the Device ID value to hexadecimal and the high byte value to decimal.

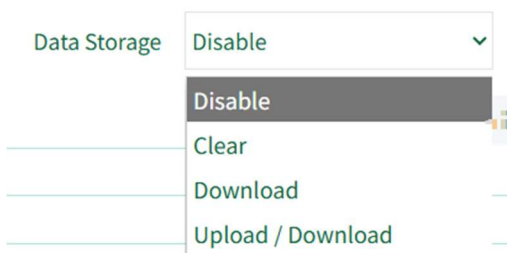
**Device ID 1:** The decimal value, ranging from 0 to 255, is obtained by converting the Device ID value to hexadecimal and the middle byte value to decimal.

**Device ID 2:** The decimal value, ranging from 0 to 255, is obtained by converting the Device ID value to hexadecimal and the low byte value to decimal.

For example, the 16-channel digital input and output can be configured with the slave module LKHA-16UP-M12, with vendor ID 1181. Convert 1181 to hexadecimal value of  $0 \times 49D$ ,  $0 \times 04$  to decimal value of 4, and  $0 \times 9D$  to decimal value of 157. From this, it can be concluded that, Vendor ID 0=4, Vendor ID 1=157, Similarly, Device ID is 7, which means Device ID 0=0, Device ID 1=0, and Device ID 2=7.

- **Data Storage:** Storing and processing Vendor ID and Device ID of slaves.

**Disable:** No storage for Vendor ID and Device ID.



**Clear:** Clear the Vendor ID and Device ID stored in the master module, then the master can connect to any slave device with input and output bytes matched.

**Download:** Download the Vendor ID and Device ID of the connected slave to master.

**Upload/ Download:** Upload Vendor ID and Device ID from the connected slave and download parameters to master.

Inspection levels: Type compatible

Vendor ID0: 4

Vendor ID1: 157

Device ID0: 0

Device ID1: 0

Device ID2: 7

Data Storage: Clear

**Read** **Write**

After setting, click the "Write" button to confirm the parameters, and click the "Read" button to view the currently selected parameters

9.2.3.5. IO-Link device info

**IO-Link Device Info**

Product Name:ELCO

Product ID:FB330007

Vendor ID:1181

Device ID:7

Vendor Name:ELCO

After successful communication between the IO-Link master and slave, the basic information of the slave can be viewed here. This is the information for the IP67 slave station 16- channel digital input/output configurable module.

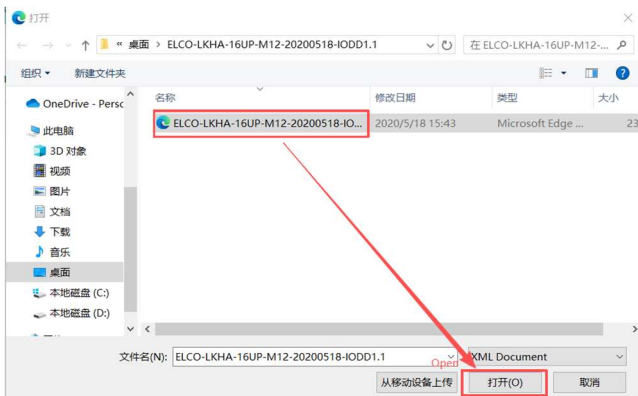
9.2.3.6. Parameters Menu

More parameters of the slave devices can be configured through the "Parameters Menu" by importing IODD files.

- Click the "Select File" button.

ParameterMenu Select IODD file **选择文件** 未选择文件

- Choose the storage path for the IODD file from the slave station.



- Click on the file name, and import the file.

The ISDU parameter list of the slave device is displayed in the "ParameterMenu" directory, as shown in the above figure. In this example, the port pins, DI/DO settings, index and sub index numbers, parameter read and write buttons, etc. of the "LKHA-16UP-M12" 16-channel digital input/output configurable hub are shown.

After importing IODD files from different slave devices, the displayed content may vary based on the actual configurable options.

NAME	INDEX	INPUT/OUTPUT	UNIT	Read All
Direction (rw)	64 (0)	See below childs		
Port1-Pin4	64 (1)	Input(0)		Write Read
Port1-Pin2	64 (2)	Input(0)		Write Read
Port2-Pin4	64 (3)	Input(0)		Write Read
Port2-Pin2	64 (4)	Input(0)		Write Read
Port3-Pin4	64 (5)	Input(0)		Write Read
Port3-Pin2	64 (6)	Input(0)		Write Read

- Parameters reading

By clicking the "Read All" button, all configured parameters of the slave station can be read back and displayed. In this example, the hub defaults to the "I/O Universal" input/output universal state for each channel. The input, output, or input/output universal states can be changed through the drop-down menu of each channel.

After setting, click the "Write" button to confirm the parameters, and click the "Read" button to view the currently selected parameters.

NAME	INDEX	INPUT/OUTPUT	UNIT	Read All
Direction (rw)	64 (0)	See below childs		
Port1-Pin4	64 (1)	I/O Universal(3)		Write Read
Port1-Pin2	64 (2)	Input(0)		Write Read
Port2-Pin4	64 (3)	I/O Universal(3)		Write Read
Port2-Pin2	64 (4)	I/O Universal(3)		Write Read
Port3-Pin4	64 (5)	I/O Universal(3)		Write Read
Port3-Pin2	64 (6)	I/O Universal(3)		Write Read

### 9.2.3.7. ISDU

Users can read the status and modify parameters of configuration items based on the ISDU index and sub index of the slave device.

In this example, we imported the IODD file of the hub from the "Parameters Menu" and found that its ISDU index is 64. We can select the required sub index based on the list, such as reading the input and output settings of port 1, channel 1, which can be configured according to the

parameters in the following figure. If the reading result is "OK", it indicates that the operation is successful.

The screenshot shows the ISDU configuration interface with the following elements:

- Index(dec):** A text input field containing the value "64". A red box highlights the field, and a red instruction "Step1.Fill in the decimal number 64 here" is placed to its right.
- Subindex(dec):** A text input field containing the value "1". A red box highlights the field, and a red instruction "Step2.Fill in the decimal number 1 here" is placed to its right.
- Read/Write:** Two radio buttons are present. The "Read" button is selected and highlighted with a red box. A red instruction "Step3.Select Read" is placed to its right.
- Data(hex):** A text input field containing the value "03". A red box highlights the field. To its right, a grey box contains the text: "The hexadecimal '03' represents that the current configuration item is ' 03 I/O Universal '". Below this, a red instruction "Step4.Click 'Apply'" is placed.
- Buttons:** Two buttons, "Apply" and "Clear", are located below the data field. The "Apply" button is highlighted with a red box.
- Result:** At the bottom left, a red box highlights the text "OK", with the instruction "Operation result OK" placed to its right.

## 10. Fault Diagnosis

Items	Status	Descriptions	Handling suggestions
<b>Module indicator LEDs</b>			
<b>PW</b>	Green on	Power supply normal	None
	Red on	Power supply abnormal	<ol style="list-style-type: none"> <li>1. Check if the auxiliary power supply of the module is overvoltage.</li> <li>2. Check if the auxiliary power supply of the module is under voltage.</li> <li>3. The module is damaged and needs to be replaced.</li> </ol>
<b>MD</b>	Green on	Module normal	None
	Green flashing	Module connected but not configured	<ol style="list-style-type: none"> <li>1. Check if the PLC configuration is complete.</li> <li>2. Check the correctness of PLC configuration.</li> </ol>
	Red and green flashing alternately	Module not connected	<ol style="list-style-type: none"> <li>1. Check if the module is installed properly and if the lock is loose.</li> <li>2. Check if there is any damage or abnormal alarm indication in the adjacent modules on both sides.</li> <li>3. Restart FX20 power supply.</li> </ol>
<b>Us</b>	Green on	The system power supply is normal	None
	Off	No system power supply	<ol style="list-style-type: none"> <li>1. Check if the external power supply module is working properly.</li> <li>2. Check if the polarity of the power cable is reversed.</li> </ol>
<b>Ua</b>	Green on	Auxiliary power supply is normal	None
	Off	No auxiliary power supply	<ol style="list-style-type: none"> <li>1. Check if the external power supply module is working properly.</li> <li>2. Check if the polarity of the power cable is reversed.</li> </ol>
<b>C</b>	Green on	IO-Link communication is normal	None

	Green flashing	IO-Link master and slave communication interruption	<ol style="list-style-type: none"> <li>1. Check the cable connecting the master and slave device.</li> <li>2. Check if the IO-Link configuration bytes match.</li> </ol>
	Off	IO-Link channel closed	If IO-Link connection is required, please change the PLC or configure it through the web server.
Q	Green on	The IO-Link channel is configured in SIO mode, and the input or output is at a high level.	None
	Off	The IO-Link channel is configured in SIO mode, and the input or output is at a low level.	None
ER	Red on	System error	Check if the configuration bytes match the device.
	Off	Normal	None