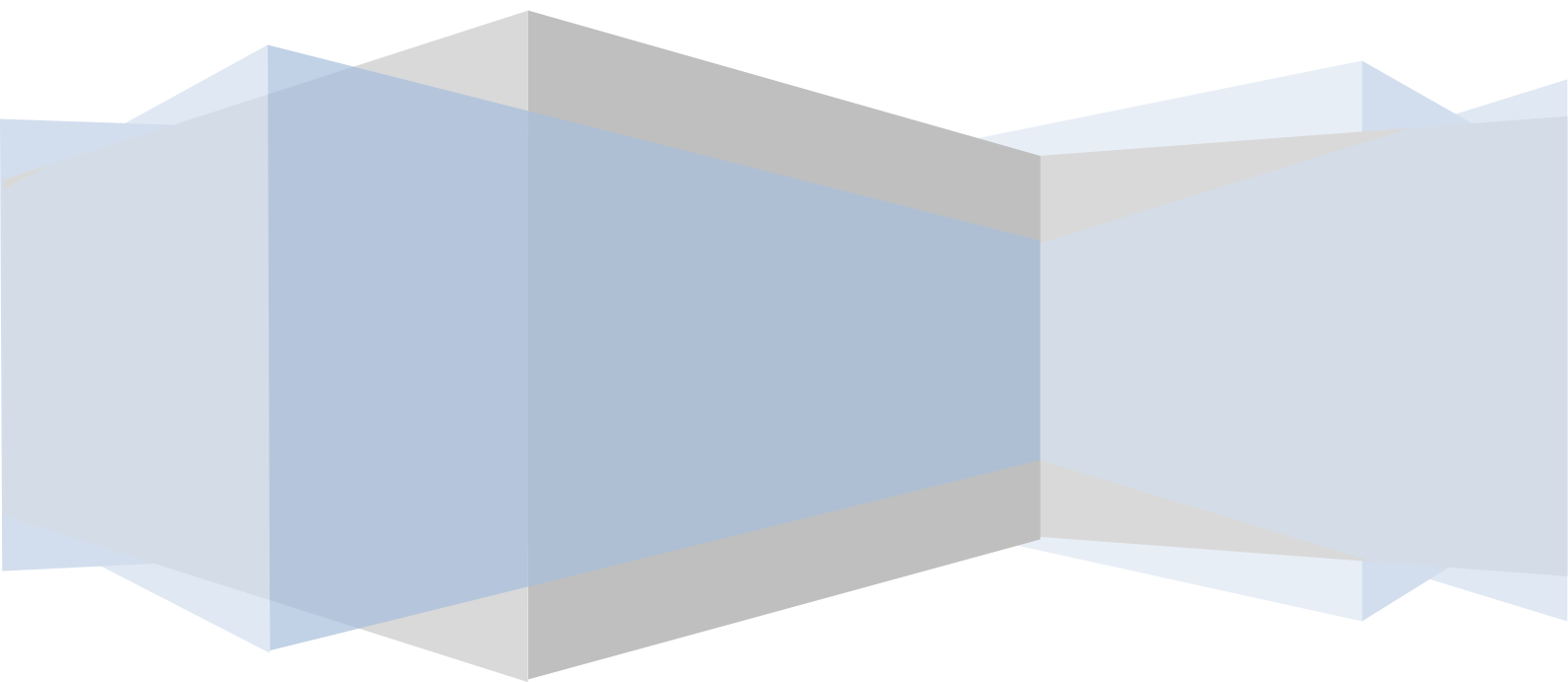


**AirTAC**

# Product Manual

**C-6DLK**



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## Safety Instructions

① The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the conditions of use of this product are diverse, the designer of the system or the developer of the specification should judge the suitability of the system. If necessary, please make a judgment through analysis and experimentation.

The expected performance and safety of this system are guaranteed by the person who judges the suitability of the system.

Review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

② Only personnel with appropriate training should operate machinery and equipment.

Misuse of the products described here can compromise their safety.

Assemble, operate, maintain machinery/equipment by persons with sufficient knowledge and experience.

③ Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

④ Contact AirTAC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application that could have negative effects on people, property, or in situations where safety is required.



4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

⑤ The product is provided for use in manufacturing industries.

1. The product herein described is basically provided for peaceful use in manufacturing industries.

2. If considering using the product in other industries, consult AirTAC beforehand and exchange specifications or a contract if necessary.

3. If anything is unclear, contact your nearest sales branch.

## Product handling

### Installation

· Do not drop, hit or apply excessive shock to the fieldbus system. Otherwise damage to the product can result, causing malfunction.

· Tighten to the specified tightening torque. If the tightening torque is exceeded, the mounting screws may be broken.

IP65 protection cannot be guaranteed if the screws are not tightened to the specified torque.

· Do not stress the connection part during handling when mounting large size integrated solenoid valve. Otherwise may result in damage to the connection parts of the unit.

In addition, the combination of units may become very heavy, so multiple operators shall work together to carry out the handling/installation.

· Never mount a product in a location that will be used as a foothold.

The product may be damaged if excessive force is applied by stepping or climbing onto it.

### Wiring( Including plugging and unplugging of connectors)

· Avoid repeatedly bending or stretching the cables, or placing heavy load on them. Repetitive bending stress or tensile stress can cause breakage of the cable.

· Wire correctly, incorrect wiring can break the product.

· Do not perform wiring while the power is on. Otherwise damage to the fieldbus system and/or I/O device can result, causing malfunction.



·Do not route wires and cables together with power or high voltage cables. Otherwise the fieldbus system and/or I/O device can malfunction due to interference of noise and surge voltage from power and high voltage cables to the signal line.

Route the wires (piping) of the fieldbus system and/or I/O device separately from power or high voltage cables.

·Confirm proper insulation of wiring.

Poor insulation (interference from another circuit, poor insulation between terminals, etc.) can lead to excess voltage or current being applied to the product, causing damage.

·Take appropriate measures against noise, such as using a noise filter, when the fieldbus system is incorporated into equipment. Otherwise noise can cause malfunction. Separate the power line for output devices from the power line for control. Otherwise noise or induced surge voltage can cause malfunction.

### **Environment**

·Select the proper type of protection according to the environment of operation.

IP65 protection is achieved when the following conditions are met:

- ①The units are connected properly with power cable, fieldbus cable and M12 connector.
- ②Suitable mounting of each unit and manifold valve.
- ③For unused connectors, be sure to install a waterproof cover.

If using in an environment that is exposed to water splashes, please take measures such as using a cover.

Do not use in environments filled with or adhering to water or water vapor. There is a possibility of malfunction, misactivation, etc.

·If the product is to be used in an environment containing oils or chemicals such as coolant or cleaning solvent, even for a short time, it may be adversely affected (damage, malfunction etc.).

·Do not use the product in an environment where corrosive gases or fluids could be splashed. Otherwise damage to the product and malfunction can result.

·Do not use in an area where surges are generated. If there is equipment which generates a large amount of surge (solenoid type lifter, high frequency induction furnace, motor, etc.) close to the fieldbus system, this may cause deterioration or breakage of the internal circuit of the fieldbus system.

·When a surge-generating load such as a relay or solenoid is driven directly, use a fieldbus system with a built-in surge absorbing element. Direct drive of a load generating surge voltage can damage the fieldbus system.



- The product is CE marked, but not immune to lightning strikes. Take measures against lightning strikes in the system.
- Prevent foreign matter such as remnants of wires from entering the fieldbus system to avoid failure and malfunction.
- Mount the product in a place that is not exposed to excessive vibration or impact. Otherwise failure or malfunction can result.
- Do not use the product in an environment that is exposed to temperature cycles. Heat cycles other than ordinary changes in temperature can adversely affect the inside of the product.
- Do not expose the product to direct sunlight.

If using in a location directly exposed to sunlight, shade the product from the sunlight. Otherwise failure or malfunction can result.

- Keep within the specified ambient temperature range. Otherwise malfunction can result.
- Do not operate close to a heat source, or in a location exposed to radiant heat. Otherwise malfunction can result.

### **Adjustment and Operation**

- Perform settings suitable for the operating conditions. Incorrect settings can cause operation failure.
- Please refer to the PLC manufacturer's manual etc. for details of programming and addresses. For the PLC protocol and programming refer to the relevant manufacturer's documentation.

### **Maintenance**

- Turn off the power supply, stop the supplied air, exhaust the residual pressure and verify the release of air before performing maintenance. There is a risk of unexpected malfunction.
- Perform regular maintenance and inspections. There is a risk of unexpected malfunction.
- After maintenance is complete, perform appropriate functional inspections. Stop operation if the equipment does not function properly. Otherwise safety is not assured due to an unexpected malfunction or incorrect operation.
- Do not use solvents such as benzene, thinner etc. to clean the each unit. They could damage the surface of the body and erase the markings on the body.
- Use a soft cloth to remove stains. For heavy stains, use a cloth soaked with diluted neutral detergent and fully squeezed, then wipe up the stains again with a dry cloth.



## 1. Appearance



No.	Description
1	IO-Link Connector (Class B) (M12 x 1, Plug, 5-pin, A-coded )
2	Indicator
3	Ground
4	D-Sub Output

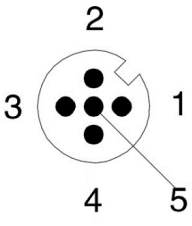
## 2. Specifications

Item	Specification
Nominal power supply	24 VDC ( 18VDC~30VDC )
Nominal power output	24 VDC ( 21.6VDC~26.4VDC )
Output polarity	PNP
Sudden power cut	>10ms
IP grade	IP65
Withstand voltage	Refer to GBT24344 500 VAC for 1 min. between external terminals and FE
Insulation resistance	Refer to GBT24343 500 VDC, 10 MΩ or more between external terminals and FE
Ambient temperature	-10~60 °C
Ambient humidity	35%~85% RH
Impact resistance	EN 60068-2-6 5G, 10~150Hz, for non-stop 2 hours
EMI	CLASS A
Sole power supply for controlling component	Yes
Voltage inspection	Support
Reverse connection and over voltage protection	Support





### 3. Power Supply / Connection

Port	Definition												
IO-Link Connector (Class B)	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p><u>M12x1 , 5pin , Male , A-coded , Class B</u></p> <table border="1" data-bbox="730 528 1422 824"> <thead> <tr> <th>Pin No.</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>L+ (V2 +) 24V electronics power supply</td> </tr> <tr> <td>2</td> <td>2L+ (V1 +) 24V valves power supply</td> </tr> <tr> <td>3</td> <td>L- (V2 -) 0V electronics power supply</td> </tr> <tr> <td>4</td> <td>C/Q (COM) IO-Link communication</td> </tr> <tr> <td>5</td> <td>2M (V1 -) 0V valves power supply</td> </tr> </tbody> </table> </div> </div>	Pin No.	Function	1	L+ (V2 +) 24V electronics power supply	2	2L+ (V1 +) 24V valves power supply	3	L- (V2 -) 0V electronics power supply	4	C/Q (COM) IO-Link communication	5	2M (V1 -) 0V valves power supply
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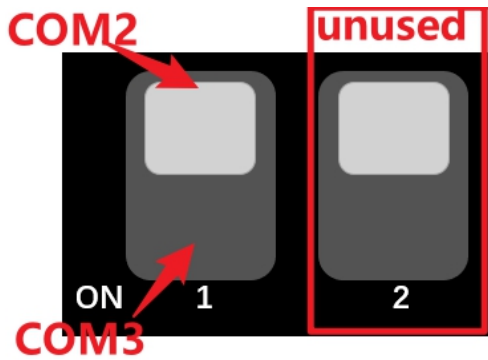


#### 4. Label, Indicator and Status

<b>Appearance</b>		
<b>Indicator</b>	<b>Status</b>	<b>Description</b>
COM	Lights off	IO-Link is not connected
	Green light keeps on	No Activity
	Green light twinkling	Activity
V1 Manifold-power supply	Green light keeps on	Normal power supply
	Red light twinkling	Insufficient power supply
	Red light keeps on	Over power supply
V2 Fieldbus-power supply	Green light keeps on	Normal power supply
	Red light twinkling	Insufficient power supply
	<b>Red light keeps on</b>	<b>Over power supply</b>

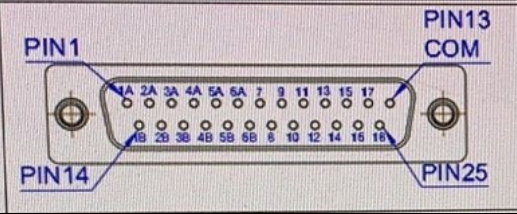


### 5. Dial Instructions



Definition	Baud rate settings
1	ON: COM3 Note: Factory setting is COM3 (DIP dial to “ON” ).
0	OFF: COM2 Note: Remove the LED display window after power off and adjust DIP switch 1. Put the display window back before powering on.

## 6. D-Sub Configuration

<p>D-sub configuration</p>	
<p>Output type</p>	<p>Source/PNP (-Common)</p>
<p>Number of outputs</p>	<p>24 outputs</p>
<p>Load</p>	<p>24V per valve 1.5W</p>
<p>V1 Voltage and current supply</p>	<p>24VDC, Max. 2A (24 points)</p>



## 7. Parameter Setting

### 7.1. Parameters definition and setting

	Item	Description	Type	Definition
Channel Parameters Setting	Open circuit diagnostic setting	Open circuit detection for each coil can be set individually	0	Disable diagnostics (Default)
			1	Enable diagnostics
	Fail Safe setting	When the communication fails, the output status of the coil	0	off (Default)
			1	Hold last value
	Valve terminal switch counting threshold setting	Switch counts alarm threshold. When the numbers of coil switches reach the threshold, the slave alarms. (The slave counts the switches of each coil and stores them every hour)	UINT 32	Range: 0 ~ 0xFFFF FFFF 0xFFFFFFFF(Default)

### 7.2. Diagnostic

Type	Description	Display mode		Note (Input Bytes)
	(The valve terminal module status is displayed in real time)	Input Byte, displayed in hexadecimal (Bit=0 indicates normal, 1 means failure error)	LED Status	
General status diagnostics	Manifold power supply, Over power OV-V1	16#01 (bit0)	"V1" LED, Red light on	Input Byte 0
	Manifold power supply, Insufficient power UV-V1	16#02 (bit1)	"V1" LED, Red light twinkling	



	Module power supply, Over power OV-V2	16#04 (bit2)	"V2" LED, Red light on	
	Module power supply, Insufficient power UV-V2	16#08 (bit3)	"V2" LED, Red light twinkling	
	Count overflow diagnostics(Count threshold exceeded)COR	16#10 (bit4)	---	
	Short-circuit diagnostics SC	16#20 (bit5)	---	
	Open-circuit diagnostics(Ex: Coil broken)OC	16#40 (bit6)	---	
		--- (bit7)	---	
Channel short-circuit diagnostics	Whether a short-circuit fault has occurred on each channel (short- circuit diagnostics always enabled)	Common failure error codes:  Each diagnosis accounts for 3 Input Bytes, a total of 24 bits from low byte to high byte, each bit corresponds to coil SOL.01-SOL.24 in turn, and when a channel fails, it corresponds to Bit set to 1		Input Byte 1  Input Byte 2  Input Byte 3
Channel open-circuit diagnostics	Whether a open-circuit fault has occurred on each channel (Open- circuit diagnostics need to be configured to be enabled)			Input Byte 4  Input Byte 5  Input Byte 6
Channel count overflow diagnostics	Whether count overflow has occurred on each channel (counting thresholds need to be set correctly for this diagnostic function to work)			Input Byte 7  Input Byte 8  Input Byte 9



### 7.3. Error codes

Error Code (Hexadecimal)	Description	LED Light
0×00	OK, no errors	None
0×8C10	Solenoid cycles beyond setting limit	
0×5000	Hardware fault	None
0×5011	Non-volatile memory loss	None
0×5100	Under voltage V2 electronic supply	“V2” LED, flashing red
0×5100	Over voltage V2 electronic supply	“V2” LED, red
0×5100	Under voltage V1 valve supply	“V1” LED, flashing red
0×5100	Over voltage V1 valve supply	“V1” LED, red
0×7700	Solenoid, open circuit	
0×7710	Solenoid, short circuit	

### 7.4. IODD Files

“AirTAC-C-6DLK-COM2-JJJJMMDD-IODDy.z.xml”

“AirTAC-C-6DLK-COM3-JJJJMMDD-IODDy.z.xml”

Note:

1.”JJJJMMDD” (JJJJ-year, MM-month, DD-day) indicates release date, ”y.z” indicates version.

2.COM2 and COM3 are Baud rate, COM2=38.4kbps, COM3=230.4kbps. Default setting is COM3.

3.The configuration software of the IO-Link master manufacturer shall support the reading of IODD files and graphical display of all relevant parameters of the valve terminal.

4.It is recommended to install two IODD files, IO linked devices will be automatically found whatever COM2 or COM3.



## 8. Environment Setting

Note:

1. The way IO-Link devices are installed is highly dependent on the configuration software. Refer to your IO-Link Master's configuration software manual.
2. The PLC used in this manual is made by Siemens PLC S7-1500 and TIA Portal V15.1. The Master is IFM AL1100.

### 8.1 IODD file installation

Configuring valve terminals require a device description file IODD. IODD files are XML-based files that contain all the information about the communication characteristics of the valve terminal, equipment parameters, identification data, process data, and diagnostic data. Place the IODD file and icon in the following path:

C:\Program Files\ifm electronic\LR4\LRBackend.LRDevice\Lib\PlugInIodd\iodd

### 8.2 IO-Link host port configuration

IO-Link host port submodule configuration

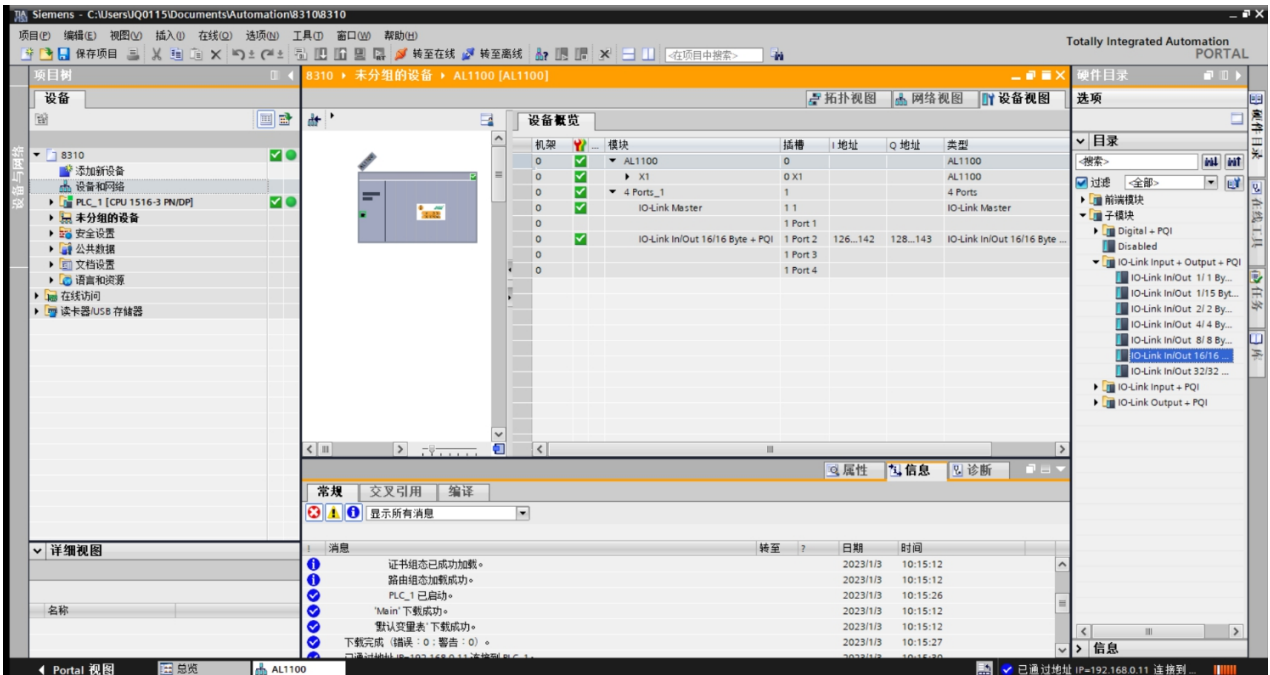
The performance must be allocated to IO-Link host port before turn on the manifold.

After successfully adding the IO link master in the TIA Portal and configuring the network, submodules with at least 10 bytes of IO link input data and at least 3 bytes of IO link output data must be assigned to the relevant ports to which the valve terminal is physically connected.

The first possible submodule in the figure below is "IO-Link 16I/16O+PQI", executed as an example on IO-Link master master port 2.

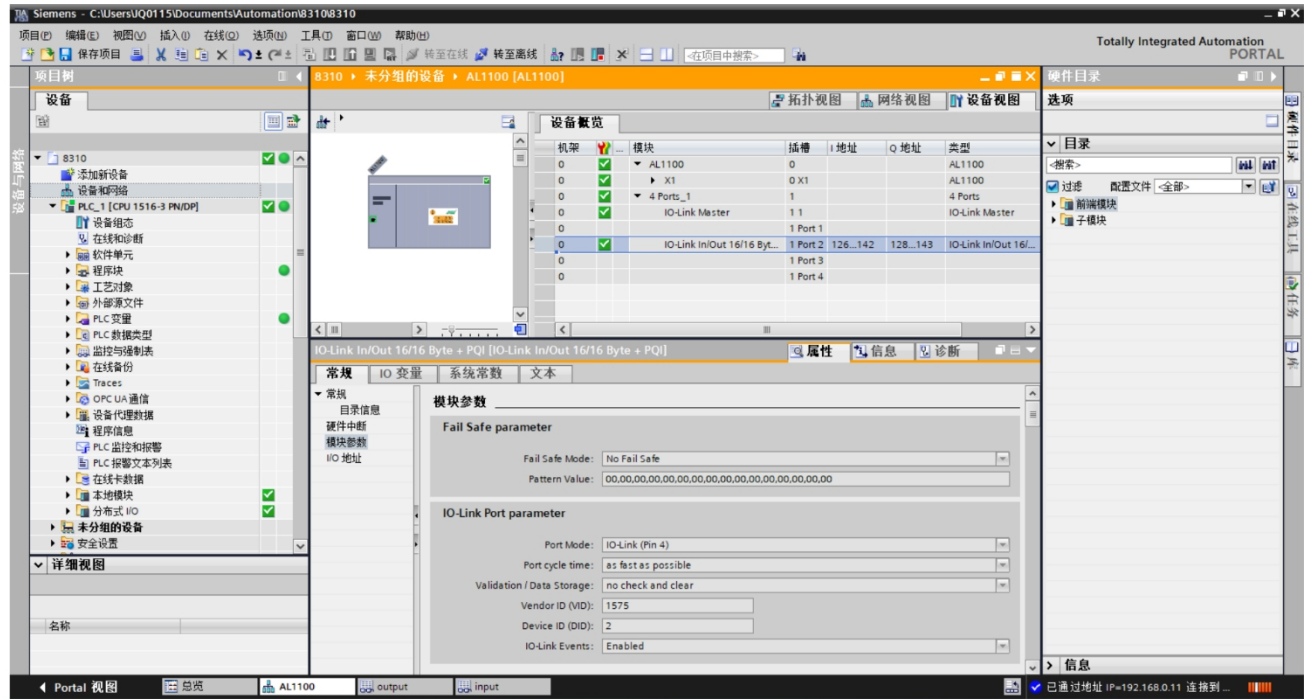






### 8.3 Port parameter configuration

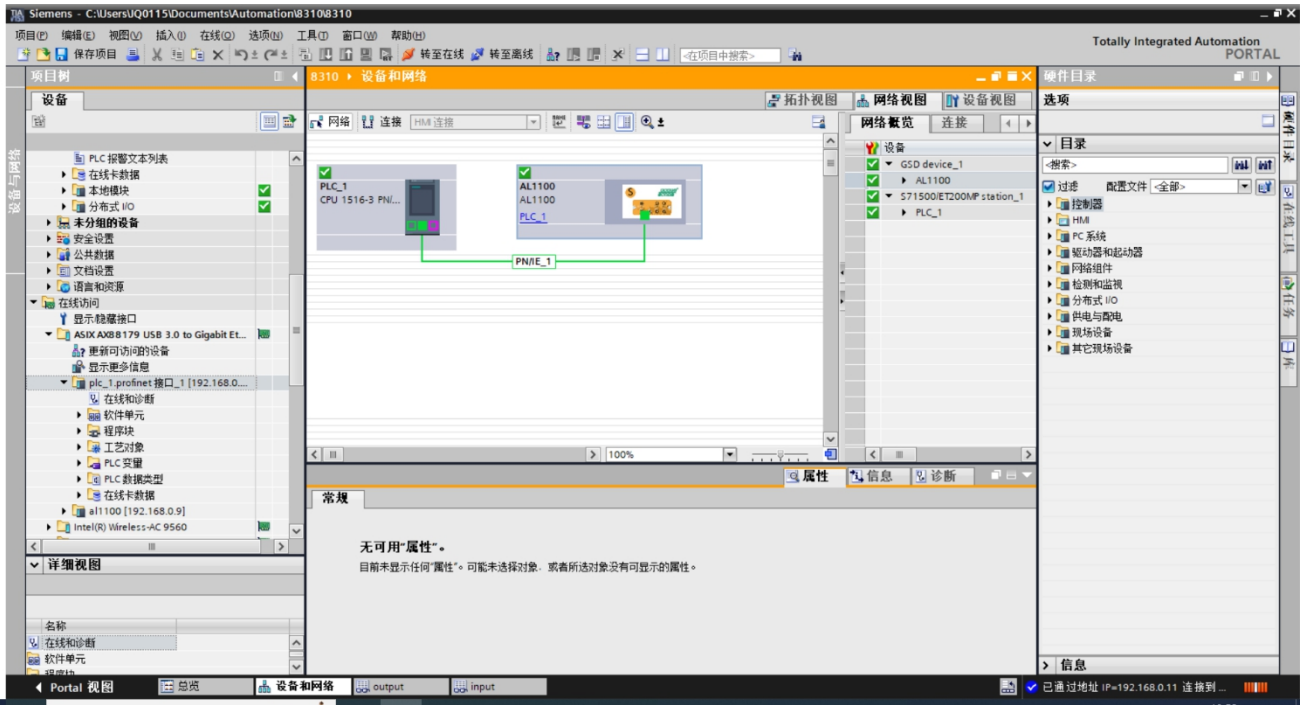
After the submodule is added to the associated port, configure the port parameters as follows.



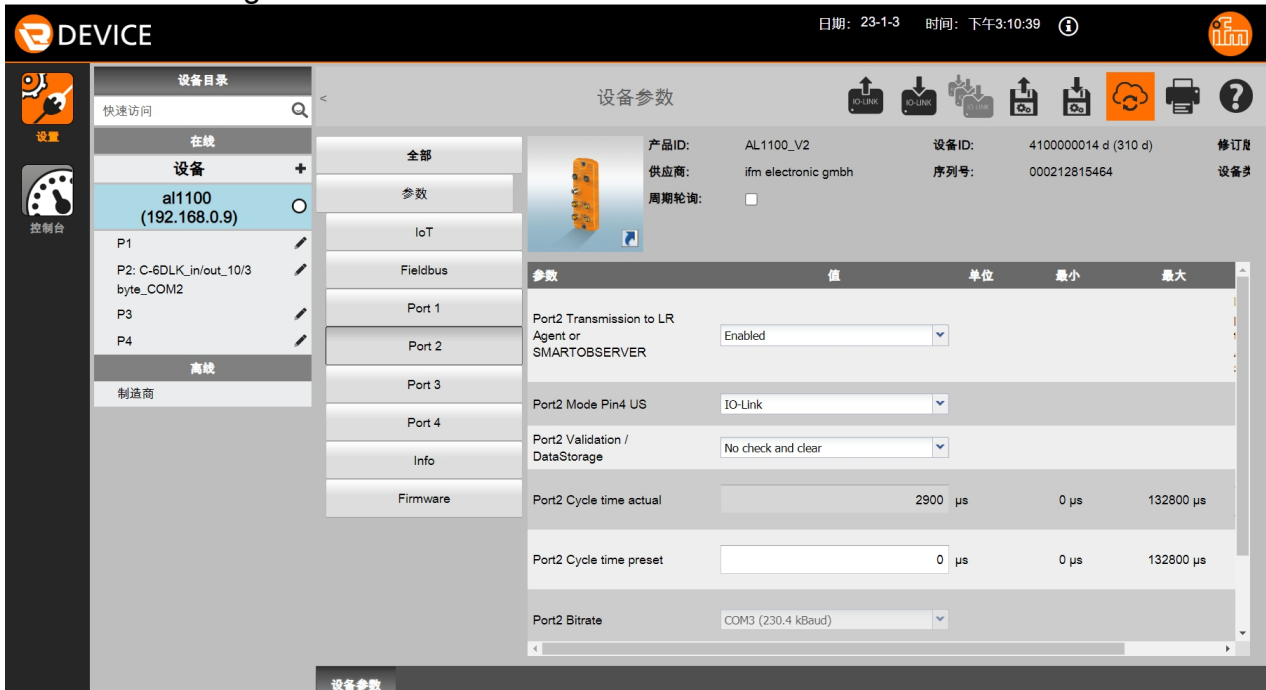
### 8.4 Parameterization

Note: The parameter can be configured through the IO-Link master's configuration tool LR Device.

Add the valve terminal to the configurator to ensure that the valve terminal, IO connection host, and PLC are properly connected and energized.

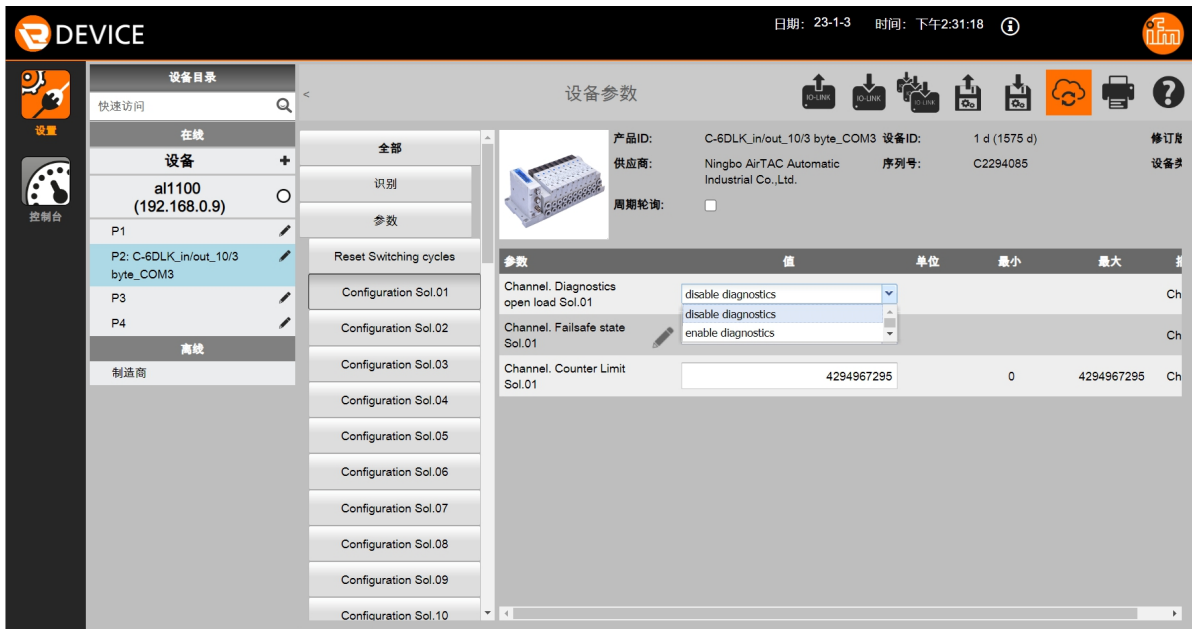


The master configuration is as follow:



### 8.4.1 Open-circuit diagnostic setting

Open-circuit diagnostics for each coil can be enabled/disabled. If disabled, there will be no open diagnostic error. By default, it is disabled.



### 8.4.2 Fail-safe state settings

The fail-safe state of each coil in the parameter catalog can be set, and the behavior of the output can be defined in the event of an interruption of IO link communication between the IO link master and the valve terminal. The output can define the following two states:

- 1) Off
- 2) Hold last value

*Note: If the system and valve terminals are electrically disconnected, the fail-safe function will not work.*



The screenshot shows the 'DEVICE' configuration interface. The left sidebar contains navigation options like '设备目录' (Device Directory) and '在线' (Online). The main area displays '设备参数' (Device Parameters) for a device with Product ID 'C-6DLK' and Supplier 'Ningbo AirTAC Automatic Industrial Co.,Ltd.'. A table lists various parameters for 'Sol.01'.

参数	值	单位	最小	最大
Channel, Diagnostics open load Sol.01	disable diagnostics			Ch
Channel, Failsafe state Sol.01	Off			Ch
Channel, Counter Limit Sol.01	Hold last value		0	4294967295 Ch

### 8.4.3 Voltage and short circuit diagnostics

It supports voltage diagnostics of system power supply for valve terminal power supply and short-circuit diagnostics of each coil.

### 8.4.4 Cycle counter limit

This screenshot is similar to the previous one but highlights the 'Channel, Counter Limit Sol.01' parameter in a red box. The value is set to '4294967295'. The interface also shows the '周期轮询' (Cycle Polling) checkbox is unchecked.

参数	值	单位	最小	最大
Channel, Diagnostics open load Sol.01	disable diagnostics			Ch
Channel, Failsafe state Sol.01	Hold last value			Ch
Channel, Counter Limit Sol.01	4294967295		0	4294967295 Ch

## 8.4.5 Valve terminal device restart &amp; factory reset

The screenshot shows the DEVICE software interface. The top bar displays the date (23-1-6) and time (下午4:04:08). The main area is titled '设备参数' (Device Parameters). On the left, there is a sidebar with '设备目录' (Device Directory) and a list of devices, including 'a1100 (192.168.0.9)'. The main area shows a search bar and a list of configuration solutions (Configuration Sol.01 to Sol.10). The right side displays the device's details, including the product ID (C-6DLK\_in/out\_10/3 byte\_COM3), supplier (Ningbo AirTAC Automatic Industrial Co., Ltd.), and sequence number (C2294086). Below this, there is a table of parameters with columns for '参数' (Parameter), '值' (Value), '单位' (Unit), '最小' (Minimum), and '最大' (Maximum). The table lists three standard commands: '设备重置' (Device Reset), '应用重置' (Apply Reset), and '恢复工厂设置' (Restore Factory Settings).

## 9. I/O Link Characteristic

Item	Description
Protocol	IO-Link Version 1.1
Transfer speed	COM3 (230.4 kBaud)
	COM2 (38.4 kBaud)
Minimum cycle time	COM3: 1 ms
	COM2: 5 ms

