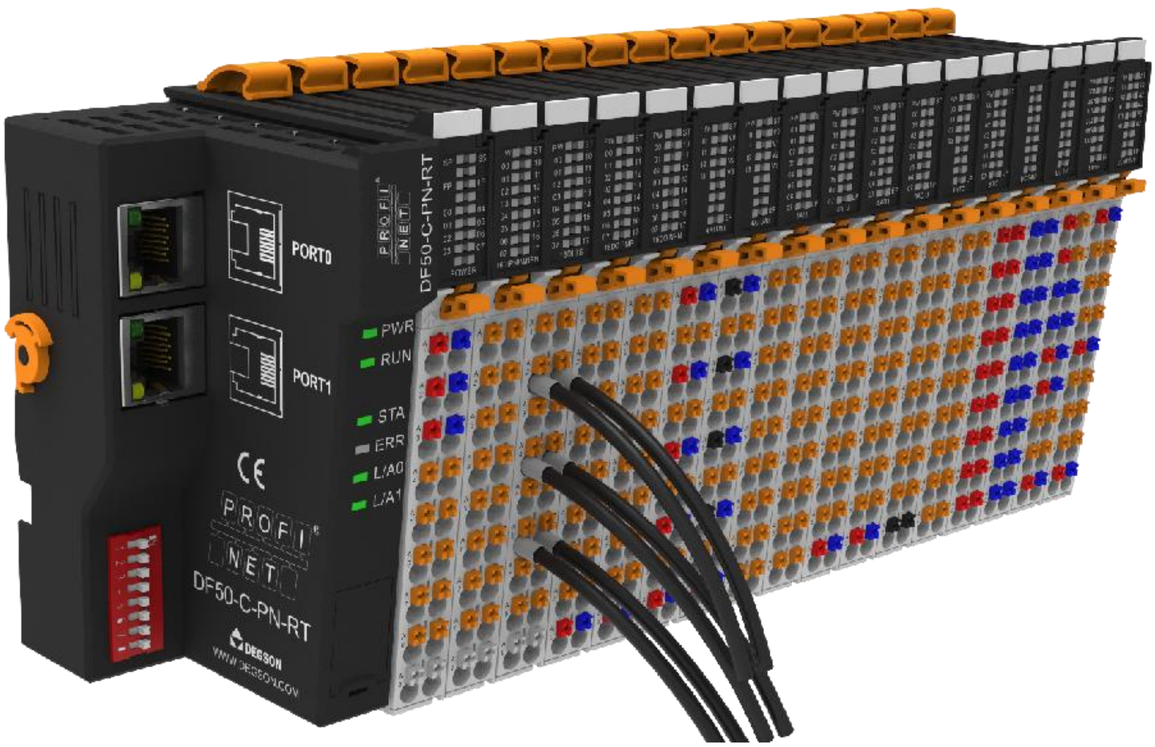
DF50-C-PN-RT
Adapter
User Manual



Version History

date	Version	describe
2024/9/20	V1.0.3	Added DF50-M-32DO-N, DF50-M-32DO-P, DF50-M-32DI-P/N, DF50-M-16DI-16DO-N, DF50-M-16DI-16DO-P module parameters and configuration instructions
2024/4/26	V1.0.2	AddedDF50-M-4IOL, DF50-M-4DOR, DF50-M-4DO-P module parameters; new diagnostic module0xE4 Fault Code;IncreaseDFDF50-M-4IOL, DF50-M-4DOR, DF50-M-4DO-P configuration routines; supplement the missing figures in the DF50-M-4AO-UI-6 voltage/current output module configuration routines; modify the DF50-M-16DI-P/N-TS parameters and modify the routines synchronously; replace the Chinese pictures in the TIA Portal V16 and STEP 7-MicroWIN SMART software configuration routines with English
2024/3/6	v1.0.1	Added STEP 7-MicroWIN SMART, SIMATIC ManagerTwo software operation instructions
2024/2/27	v1.0.0	Release version

Table of contents

Preface

Scope of this document

This document is applicable toDF50Series RemoteIOsystem

Introduction

This manual mainly introducesDF50Series RemoteI/OTechnical specifications, installation, and debugging of the module.

The main contents include:

- System Overview: Mainly introduces the product ordering information, product composition, system architecture, product transportation, storage environment, etc. of the DF50 series remote I/O modules;
- Product Description: Introduces the technical parameters of the DF50 series remote I/O modules;
- Installation and removal guide: Introduces the installation and removal of DF50 series remote I/O modules;
- Mechanical and electrical drawings: DF50 remote IO module dimension drawing and electrical wiring diagram;
- User Guide: Introduces the communication between DF50 series remote I/O modules and mainstream PLCs through examples.

Precautions

This document describes in detailDF50Series RemoteI/OThe usage of the module is for people with certain engineering experience. DEGSONNo responsibility.

Before attempting to use the device, please read the relevant precautions of the device carefully and be sure to comply with the installation and commissioning safety precautions and operating procedures. For the possible hazards and damages caused by incorrect use of the device, please refer to the following symbols.

DANGER

Imminent risk to life!

Notes with the signal word Danger warnyou of situations which will result in seriousnjury or death if you do not follow the instructions given in this manual.

WARNING

Possible danger to life!

Notes with the signal word " Warning " warnyou of situations which may result in seriousinjury or death if you do not follow the instructions given in this manua

ATTENTION

Material damageNotes

With the signal word " Attention " warn you of hazardswhich may result in material damage

Target customers

This manual provides information aboutDF50Series RemoteI/OInformation on installation and commissioning of modules, designed for engineers, installers, maintenance personnel, and electricians with general automation knowledge.

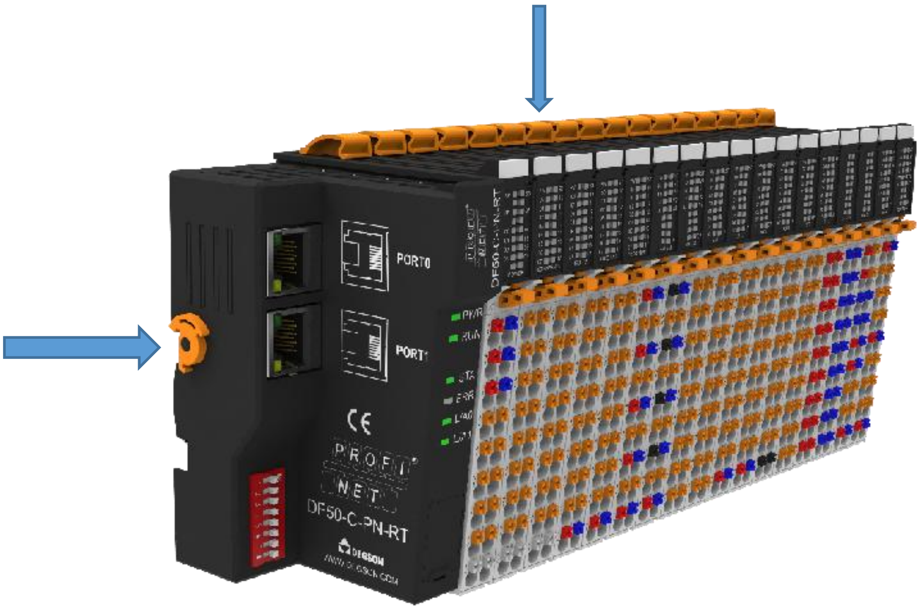
Recycling and Disposal

To ensure environmentally friendly recycling of your old device, please contact a certified electronic waste disposal agency.

1.Product installation and removal

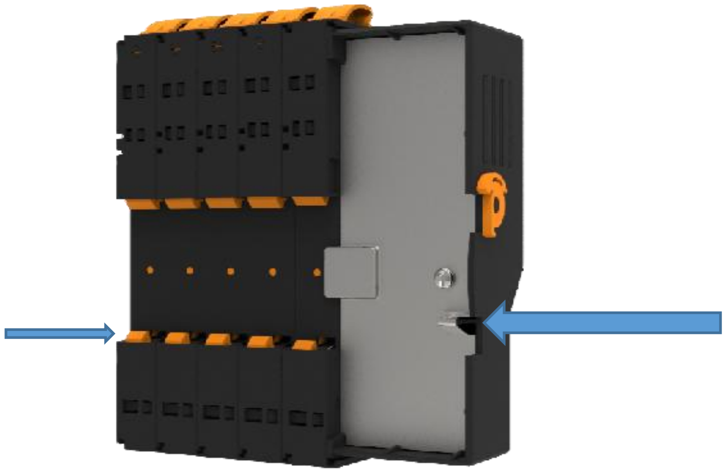
1.1. Installation

- When installing the module, the DIN rail lock at the bottom of the module can be safely and reliably installed on the 35 mm DIN rail. When installing the module, you need to align the notch, push the module toward the DIN latch, and place the module on the DIN rail.
- InstalladapterhourThere is a manual buckle on the upper and left side for locking the guide rail.



1.2. Grounding protection

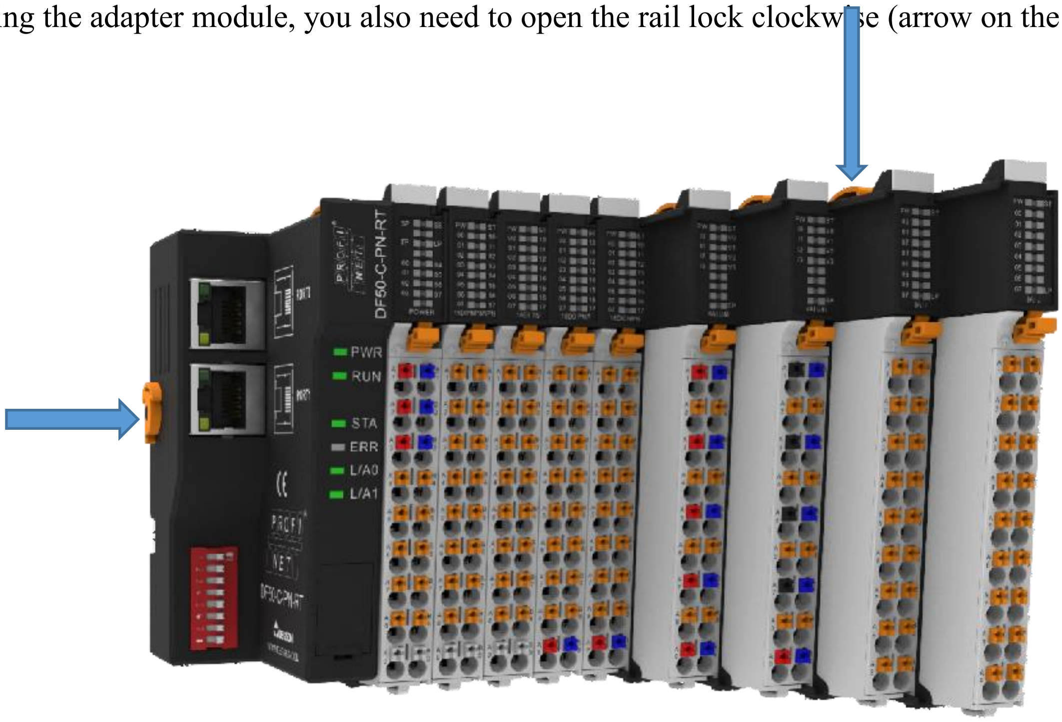
- There is a metal spring on the back of the module, which is used to effectively ground the guide rail. The metal spring is connected to the grounding PE of the adapter module.



1.3. Disassembly method

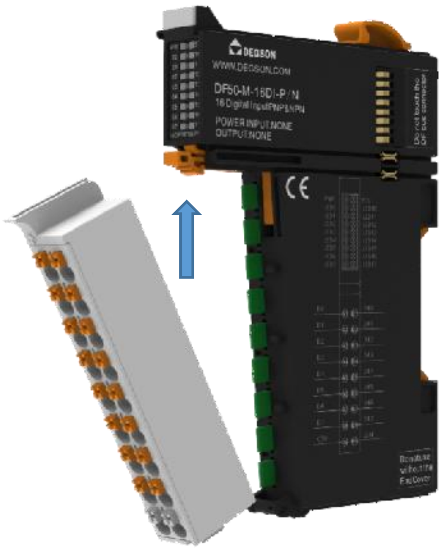
1.3.1. Module disassembly

First, remove all signal cables or power cables from the module, then press the latch (arrow above). When removing the adapter module, you also need to open the rail lock clockwise (arrow on the left).



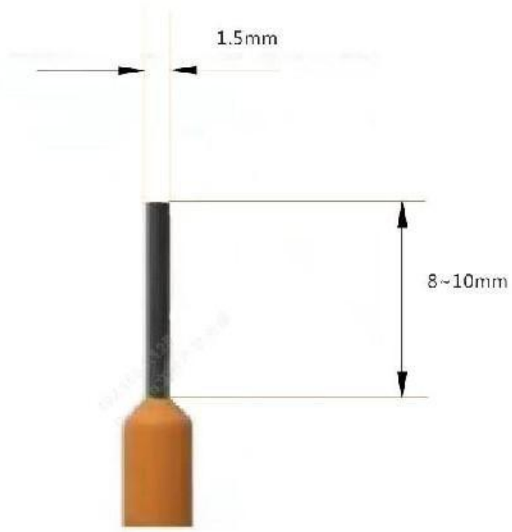
1.3.2. TerminalsDisassembly

The terminals can be removed individually by pressing the snaps.

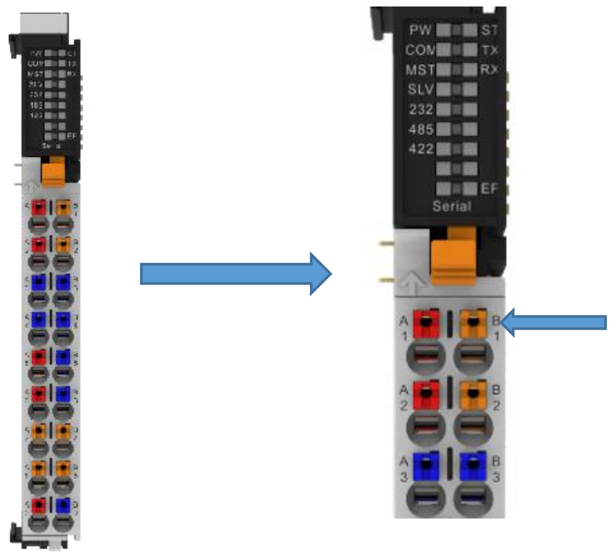


1.3.3. Cold pressed terminal

It is recommended to use cables with a core size less than 1.5 mm^2 . The reference for the cold terminal parameters is as follows



TerminalsButton Recommended Userecommenduse0.4*2.5Screwdriver press down.



1.4. Precautions

ifIf you encounter a module that is difficult to install, do not use brute force to install it.waivedDamage to the current module or other modules; remove the module from the rail and check whether there is any abnormality in the module (Such as foreign body blockagewait),After confirming that there is no problem, plug and unplug.

2.Fieldbus Adapter

Fieldbus systems	describe	model
PROFINET	PROFINET bus, 2 RJ45, expandable to 32 modules, 24VDC	DF50-C-PN-RT

1. PROFINET fieldbus adapter (DF50-C-PN-RT)

- DF50-C-PN-RTThe fieldbus adapter acts as a slave withPROFINET IOConnected,PROFINET IOIt is an open industrial Ethernet standard in the field of automation. It can automatically configure and generate local process images including analog, digital and special function modules. Analog modules and special function modules transmit data in the form of words or bytes.,The data of digital modules are transmitted in bit form.
- The fieldbus adapter can be used asPROFINET IOThe device is integrated into the application.
- It also comes with a dual-port switch,Line structures can be easily created without using any other network components.
- The device name can beDCPAgreement for allocation.

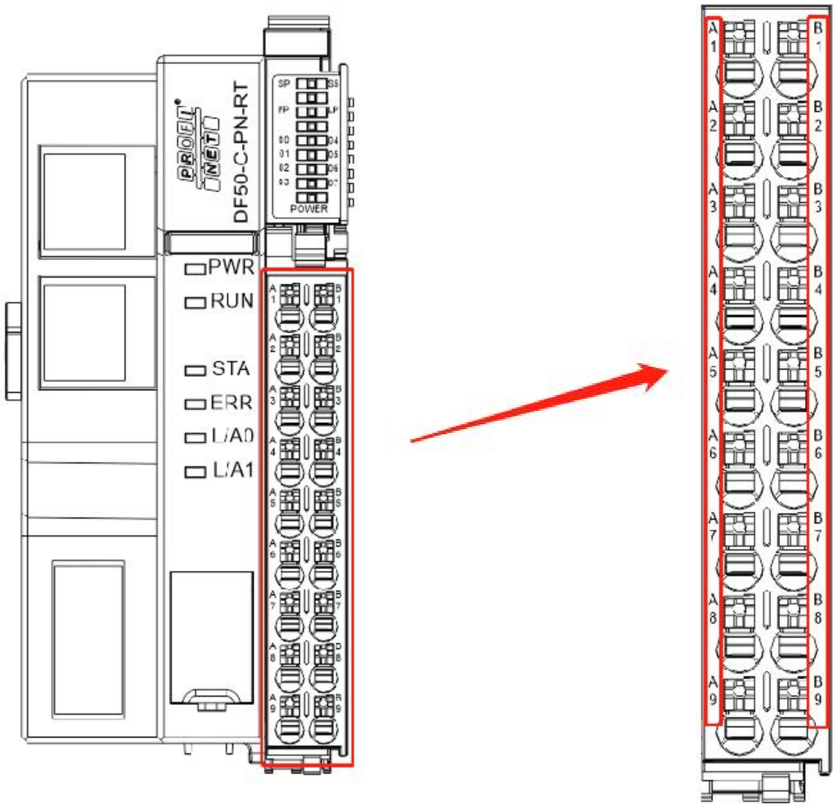
1.1. Specifications

Technical Information		
Specifications		PROFINET bus, 2 RJ45, expandable to 32 modules, 24VDC
Product Description		PROFINET
Connection		2 X RJ45, integrated switch function
Transfer rate		10/100Mbps, full-duplex
Transmission distance		100 meters
PDO Data		1024 bytes
Expandable number of modules		32
Address Mapping		support
Bus address setting		PROFINET Specification
Transmission medium		Category 5 twisted pair
Isolation method		Electrically isolated from the field
characteristic		RT, Class C compliant, MRP, automatic addressing/topology detection
Alarm function		Diagnostic alarm, process alarm, connector plug and unplug alarm
Minimum cycle time		1ms
Connection		PUSH-IN Terminal Blocks
Internal system electrical terminal rated voltage input		24V DC (20.4V DC~ 28.8V DC)
Internal system electrical terminal rated current input		0.75A (typical at 24V)
Internal system rated voltage output		5VDC
Internal system rated current output		2A
Internal load electrical terminal rated voltage input		24V DC (20.4V DC~ 28.8V DC)
Internal load electrical terminal rated current input		0.75A (typical at 24V)
Internal load rated voltage output		24V DC (20.4V DC~ 28.8V DC)
Internal load rated current output		0.75A (typical at 24V)
DIparameter		
Number of channels		8
Signal Type		NPN & PNP
Signal range	"ON" signal voltage	Voltage difference > 11VDC (voltage difference with common input)

	"OFF" signal voltage	Voltage difference <5VDC (voltage difference with common input)
Data size		1 Byte
Connection Type		1-wire, Type 1/Type 3, according to IEC 61131-2
Filter time		0-40ms configurable
Input Impedance		>7.5kΩ
Input Action Display		When the input is in driving state, the input indicator light is on.
IO Mapping		Support bitwise access
wiringparameter		
Connection technology: Communication/fieldbus		PROFINET IO: 2 x RJ-45
Connection technology		PUSH-IN Terminal Blocks
Connection Type		System/Field Power Supply/Input
Wire crimping area		0.14～1.5mm2/26～16AWG
Stripping length		8～10mm
Installation		DIN-35 rail
Materialparameter		
color		black
Housing Material		PC plastic, PA66
Conformance mark		CE
environmentRequire		
Allowable ambient temperature (operating)		-25～60℃
Permissible ambient temperature (storage)		-40～85℃
Protection type		IP20
Pollution degree		2. Comply with IEC 61131-2 standard
Operating altitude		Temperature without derating: 0～2000m
Relative humidity (non-condensing)		5～95%RH
Vibration resistance		1g, in accordance with IEC 60068-2-6
Shock resistance		15g, compliant with IEC 60068-2-27
EMC anti-interference level		Compliant with IEC 61000-4
Corrosion resistance		Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity		10ppm
Permissible SO2 pollutant concentration at 75% relative humidity		25ppm

1.2. Hardware Interface

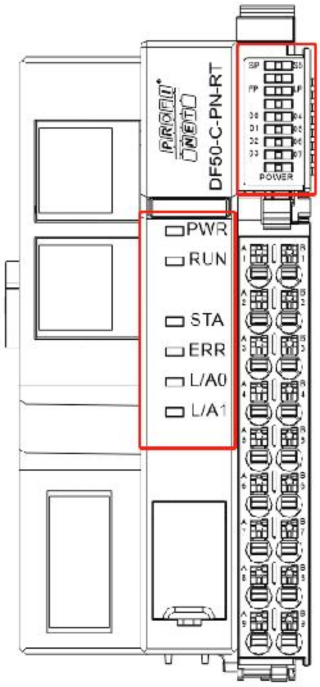
1.2.1. wiringTerminal Definition



Terminal number	Signal	Terminal number	Signal	illustrate
A1	Sys-24V	B1	Sys-0V	System Power
A2	Field-24V	B2	Field-0V	Load power supply
A3	Field-24V	B3	Field-0V	
A4	PE	B4	PE	Safely
A5	DI0	B5	DI4	DI signal input
A6	DI1	B6	DI5	
A7	DI2	B7	DI6	
A8	DI3	B8	DI7	
A9	COM	B9	COM	Public

Note:It is recommended to use two isolatedtwenty fourVpower supplyProvided for couplers2-wayPower supply to achievemostExcellent anti-interference performance.

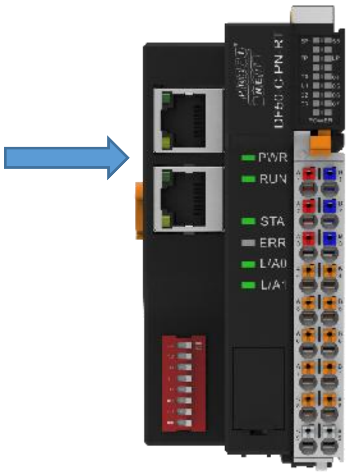
1.2.2. LED Indicatordefinition



Indicator Lights	state	meaning
PWR	Green Bright	Power supply is operating normally
	Green Kill	Abnormal power supply operation
RUN	Green Bright	The coupler network is operating normally
	Green Flash	Coupler network has link connection
	Green Kill	Coupler network has no link connection
STA	Green Flash	The module is running normally
	Green Kill	Module operation abnormality
ERR	Red Bright	Communication abnormality between coupler and module
	Red Extinction	The communication between the coupler and the module is normal
L/A0	Green Bright	Network port 1 is connected successfully
	Green Flash	Network port 1 has data communication
L/A1	Green Bright	Network port 2 is connected successfully
	Green Flash	Network port 2 has data communication
FP	Green light is always on	Load power input is normal
	Green light off	Load power input abnormality

LP	Green light is always on	Load power output is normal
	Green light off	Load power output abnormality
SP	Green light on	System power input is normal
	Green light off	System power input abnormality
S5	Green light on	System power output is normal
	Green light off	System power output abnormality

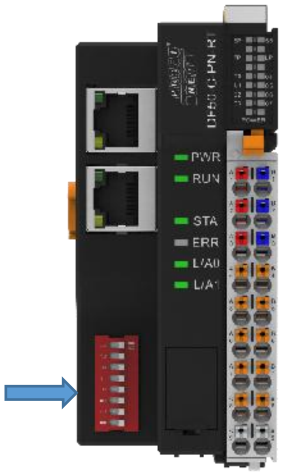
1.2.3. RJ45 interface



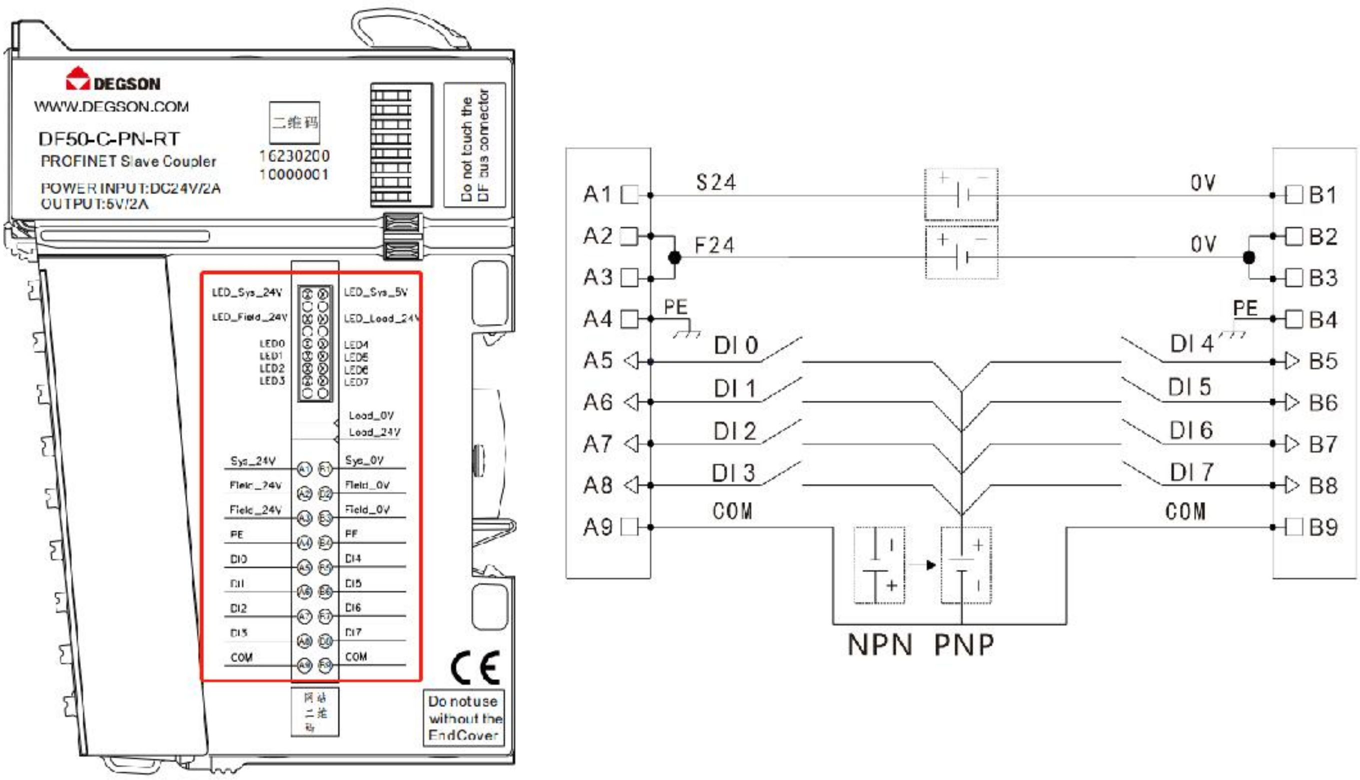
For establishing communication with the host computer, the dual RJ45 ports can easily create a linear structure without using any other network components.

1.2.4. Dip switch

There is function definition, 0: the host computer sets the device name, 1~255: the device name is dgpn1~dgpn255

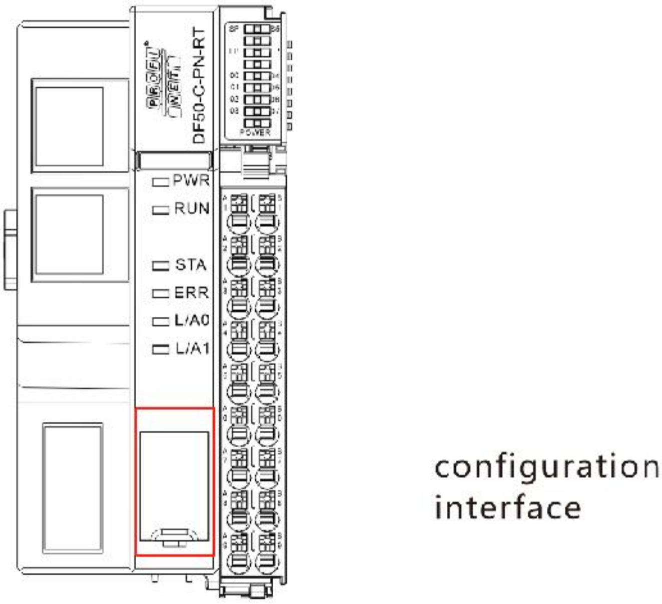


1.2.5. Wiring Diagram



Note: COM is the common terminal, external 24V is used to realize NPN, external 0V is used to realize PNP.

1.2.6. Configurationinterface



The configuration interface is set up and the cover can be opened to facilitate firmware upgrade of the adapter.

Note:Non-professionals and authorized personnel are prohibited from using this interface to avoid firmware problems.

1.3. Process data definition

1.3.1. SystemDiagnostic: Diagnostic module

The diagnostic module contains two bytes of input data and two bytes of output data. The diagnostic module can display the fault information of the IO module. The user can also obtain the software version of the IO module through the output setting command.

1. Display IO module fault information

Input data: 2 Byte		
Byte No.	illustrate	Remark
Byte 0	Location of the faulty module	0x01 represents the first IO module, 0x02 represents the second module, and so on.
Byte 1	Fault Codes	See fault code table 1 for details
Output data: 2 Byte		
Byte No.	illustrate	Remark
Byte 0	No action required	/
Byte 1		/

Table 1: Fault code table		
Fault Codes	Fault Description	Troubleshooting
0xE1	Module power supply abnormality	Check the power cord connection

0xE2	Analog module calibration failure	Contact Supplier
0xE3	Module internal initialization exception	Contact Supplier
0xE4	Overcurrent signal detected	Check peripherals
0xE8	Serial port module communication abnormality	Check signal line wiring

2. Get the software version of the IO module inserted later

Input data: 2 Byte		
Byte No.	illustrate	Remark
Byte 0	IO module software version	0x11 means version V11, and so on.
Byte 1	Reserve	/
Output data: 2 Byte(Need to operate by word)		
WordNo.	illustrate	Remark
Word0	Get module software version command output	Setting 0x100 can obtain the software version of the coupler module, setting 0x101 can obtain the software version of the first IO module, setting 0x102 can obtain the software version of the second IO module, and so on.

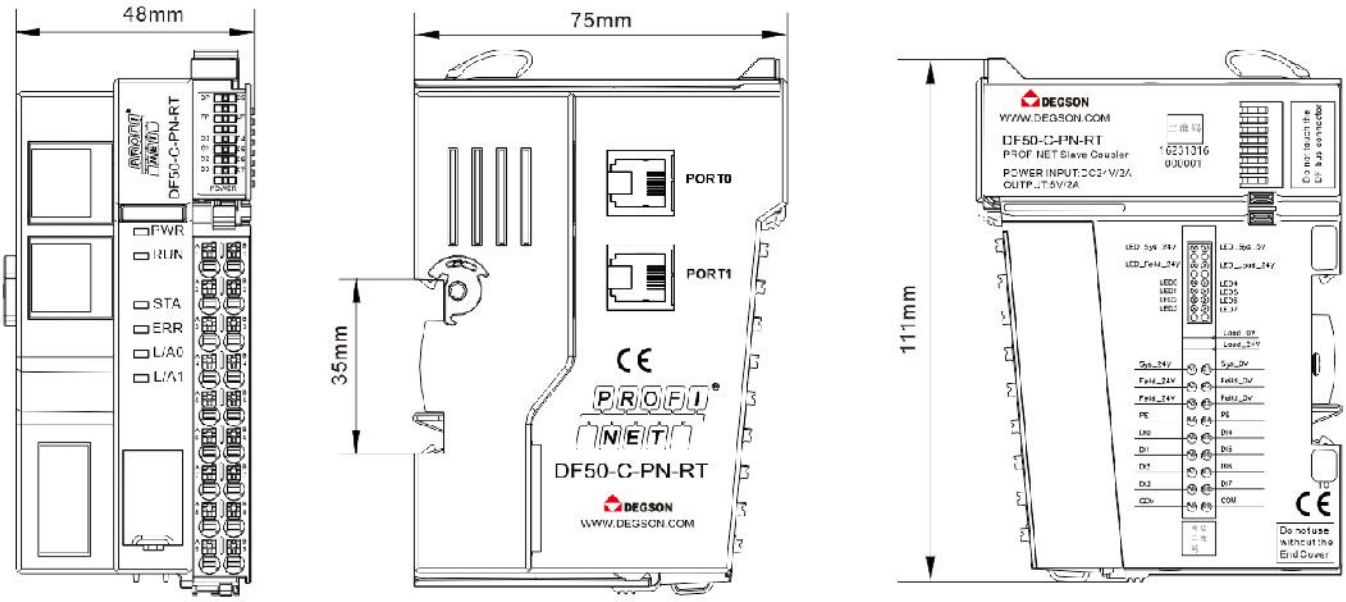
1.3.2. AdapterDigitalInput: Adapter 8-channel digital input display

Input data: 1 Byte								
Byte 0	Bit7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	DI 07	DI 06	DI 05	DI 04	DI 03	DI 02	DI 01	DI 00

1.4. Mechanical Installation

1.4.1. Installsize

InstallSize letterinterestAs shown in the figure below, the unit is (mm）:



3.ExpandexhibitionI/O Module

Function	describe	model
Digital Module	Digital input, 16 inputs, PNP/NPN	DF50-M-16DI-P/N
Digital Module	Digital input, 16 inputs with counting, PNP/NPN	DF50-M-16DI-P/N-TS
Digital Module	Digital output, 16 outputs, PNP	DF50-M-16DO-P
Digital Module	Digital output, 16 outputs, NPN	DF50-M-16DO-N
Digital Module	Digital output,32Input, PNP/NPN	DF50-M-32DI-P/N
Digital Module	Digital output,32Output, NPN	DF50-M-32DO-N
Digital Module	Digital output,32Output,PNP	DF50-M-32DO-P
Digital Module	Digital output,16 inputs and 16 outputs, NPN	DF50-M-16DI-16DO-N
Digital Module	Digital output,16 inputs and 16 outputs, PNP	DF50-M-16DI-16DO-P
Digital Module	Digital output,4 channels, relay	DF50-M-4DO-R
Digital Module	Digital output,4 outputs, PNP, 2A	DF50-M-4DO-P-2A
Analog Modules	Analog input, 4 channels, voltage and current type	DF50-M-4AI-UI-6
Analog Modules	Analog input, 8 channels, voltage type	DF50-M-8AI-U-4
Analog Modules	Analog input, 8 channels, current type	DF50-M-8AI-I-5
Analog Modules	Analog output, 4 channels, voltage and current type	DF50-M-4AO-UI-6
Analog Modules	Analog output, 8 channels, voltage type	DF50-M-8AO-U-4
Analog Modules	Analog output, 8 channels, current type	DF50-M-8AO-I-5
Temperature Module	Thermal resistance measurement, 4 channels	DF50-M-4RTD-PT
Temperature Module	Thermocouple measurement, 8 channels	DF50-M-8TC
Pulse counting module	Encoder input/pulseenter, 2 channels, 24V	DF50-M-2CNT-PIL-24
Pulse counting module	Encoder input/pulseenter, 2 channels, 5V	DF50-M-2CNT-PIL-5
Communication serial port module	232/485/422 serial communication, 1 channel	DF50-M-1COM-232/485/422
IO-Link	IO-Link Master, 4 channels	DF50-M-4IOL

communication module		
Voltage distribution module	24VDC voltage distribution, 16 channels	DF50-M-DC-U-twenty four
Voltage distribution module	0VDC voltage distribution, 16 channels	DF50-M-DC-U-0

1 16-channel digital input/24VDC/PNP&NPN (DF50-M-16DI-P/N)

- The digital input module can receive control signals from field devices (such as sensors, etc.).
- 16-channel digital input, PNP&NPN valid, common terminal conversion.
- Each input module is equipped with an anti-interference filter.
- Each input module has an LED indicator.
- The field level and the system level are isolated by optocouplers.
- Protection grade IP20.

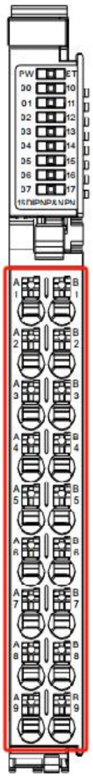
1.1 Specifications

Technical Information		
Product Description		Digital Input Module, 16 Inputs, NPN & PNP, 24VDC
Number of channels		16
Signal Type		NPN & PNP
Signal range	"ON" signal voltage	Voltage difference > 11VDC (voltage difference with common input)
	"OFF" signal voltage	Voltage difference <5VDC (voltage difference with common input)
Hardware response time		200us/200us
Data size		2 Byte
Connection Type		1-wire, Type 1/Type 3, according to IEC 61131-2
Reverse circuit protection		Yes
Isolation method		Photoelectric isolation from the field layer
Error diagnosis		Yes
Filter time		0-40ms configurable
Input Impedance		>7.5kΩ
Input Action Display		When the input is in driving state, the input indicator light is on.
IO Mapping		Support bit-by-bit or word-by-word mapping
Power parameters		
System bus input power rated voltage		5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current		45mA
Terminal power supply (common terminal) input rated voltage	NPN signal type	24V
	PNP signal type	0V
Wiring parameters		
Connection technology: Input		PUSH-IN Terminal Blocks
Wire crimping area		0.2～1.5mm2/26～16AWG
Stripping length		8～10mm²
Installation		DIN-35 rail
Material parameters		
color		black
Housing Material		PC plastic, PA66
Conformance mark		CE
Environmental requirements		
Allowable ambient temperature (operating)		-25～60℃
Permissible ambient temperature (storage)		-40～85℃
Protection type		IP20

Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

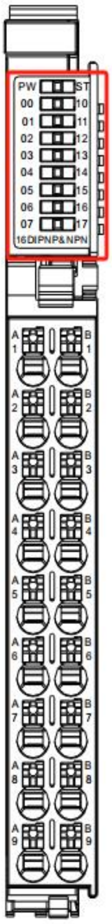
1.2 Hardware Interface

1.2.1 Terminal Block Definition



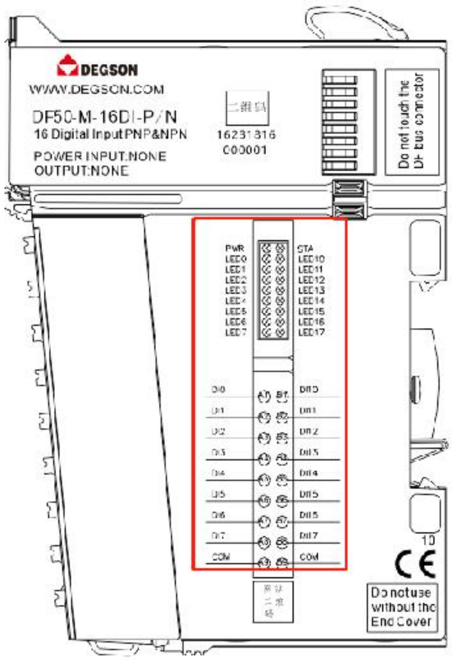
Terminal number	Signal	Terminal number	Signal	illustrate
A1	DI 0	B1	DI 10	DI signal input
A2	DI 1	B2	DI 11	
A3	DI 2	B3	DI 12	
A4	DI 3	B4	DI 13	
A5	DI 4	B5	DI 14	
A6	DI 5	B6	DI 15	
A7	DI 6	B7	DI 16	
A8	DI 7	B8	DI 17	
A9	COM	B9	COM	Public

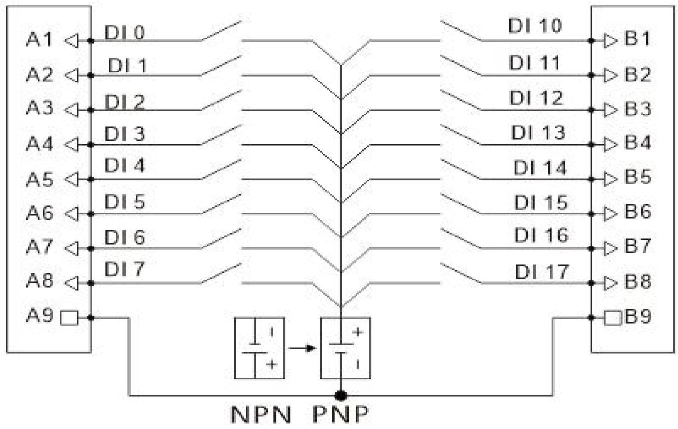
1.2.2 LED indicator definition



Indicator Lights	meaning	
PW	Green:System bus powerSource Inputnormal	
	Green Kill:System bus powerSource Inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally
		Green off: The internal bus of the module is working abnormally
00～07,10～17	Green: Input signal is valid	
	Green off: Input signal is invalid	

1.2.3 Wiring Diagram

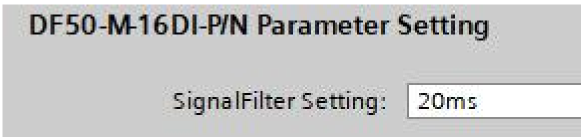




Note: COM is the common terminal, external 24V realizes NPN; external 0V realizes PNP.

1.3 Module configuration data definition

As shown in the figure, users canunifiedConfigurationSignal filtering of the module.



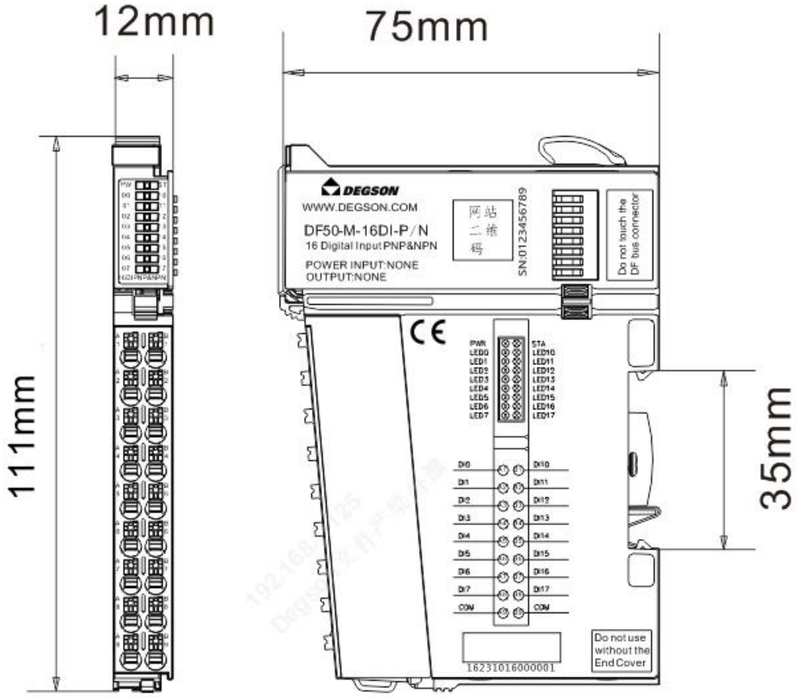
1.4 Module process data definition

DF50-M-16DI-P/NModulesProcess data definition

Input Data								
Bit No	Bit7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
Byte 1	DI17	DI16	DI15	DI14	DI13	DI12	DI11	DI10

1.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



2 16-channel digital input/8-channel counting/24VDC/PNP&NPN(DF50-M-16DI-P/N- TS)

- The digital input module can receive control signals from field devices (such as sensors, etc.).
- 16-channel digital input with 8-channel counting function, PNP&NPN valid, common terminal conversion.
- Each input module is equipped with an anti-interference filter.
- Each input module has an LED indicator.
- The field level and the system level are isolated by optocouplers.
- Protection grade IP20.

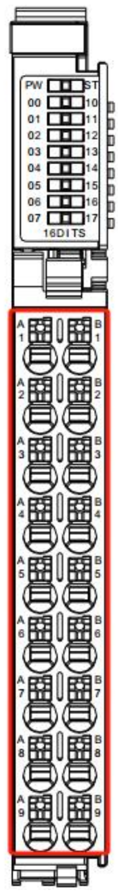
2.1 Specifications

<table>
<tr><th colspan="3">Technical Information</th></tr>
<tr><td colspan="2">Product Description</td><td>Digital input counting module, 16 inputs,8 channels have counting function.NPN & PNP, 24VDC</td></tr>
<tr><td colspan="2">Number of channels</td><td>16</td></tr>
<tr><td colspan="2">Signal Type</td><td>NPN & PNP</td></tr>
<tr><td rowspan="2">Signalscope</td><td>"ON" signal voltage</td><td>Voltage difference > 11VDC (voltage difference with common input)</td></tr>
<tr><td>"OFF" signal voltage</td><td>Voltage difference <5VDC (voltage difference with common input)</td></tr>
<tr><td rowspan="4">Counting function Channel parameter information</td><td>Counting Mode</td><td>Rising edge counting, falling edge counting, double edge counting, configurable</td></tr>
<tr><td>Counting range</td><td>0~4294967296</td></tr>
<tr><td>countMaximum input frequency of several channels</td><td>1KHz</td></tr>
<tr><td>Count value clear function</td><td>support</td></tr>
<tr><td colspan="2">Hardware response time</td><td>200us/200us</td></tr>
<tr><td colspan="2">Input channel without counting functionFilter time</td><td>0~255ms configurable</td></tr>
<tr><td colspan="2">Data size</td><td>Input 34Byte; Output 1 Byte</td></tr>
<tr><td colspan="2">Connection Type</td><td>1-wire, Type 1/Type 3, according to IEC 61131-2</td></tr>
<tr><td colspan="2">Reverse circuit protection</td><td>Yes</td></tr>
<tr><td colspan="2">Isolation method</td><td>Photoelectric isolation from the field layer</td></tr>
<tr><td colspan="2">Error diagnosis</td><td>Yes</td></tr>
<tr><td colspan="2">Input Impedance</td><td>>7.5kΩ</td></tr>
<tr><td colspan="2">Input Action Display</td><td>When the input is in driving state, the input indicator light is on.</td></tr>
<tr><td colspan="2">IO Mapping</td><td>Support bit-by-bit or word-by-word mapping</td></tr>
<tr><th colspan="3">Power parameters</th></tr>
<tr><td colspan="2">System bus input power rated voltage</td><td>5V DC (4.75V DC~ 5.25V DC)</td></tr>
<tr><td colspan="2">System bus input power rated current</td><td>45mA</td></tr>
<tr><td rowspan="2">Terminal power supply (common terminal) input rated voltage</td><td>NPN signal type</td><td>24V</td></tr>
<tr><td>PNP signal type</td><td>0V</td></tr>
<tr><th colspan="3">Wiring parameters</th></tr>
<tr><td colspan="2">Connection technology: Input</td><td>PUSH-IN Terminal Blocks</td></tr>
<tr><td colspan="2">Wire crimping area</td><td>0.2～1.5mm2/26～16AWG</td></tr>
<tr><td colspan="2">Stripping length</td><td>8～10mm²</td></tr>
<tr><td colspan="2">Installation</td><td>DIN-35 rail</td></tr>
<tr><th colspan="3">Material parameters</th></tr>
</table>

color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

2.2 Hardware Interface

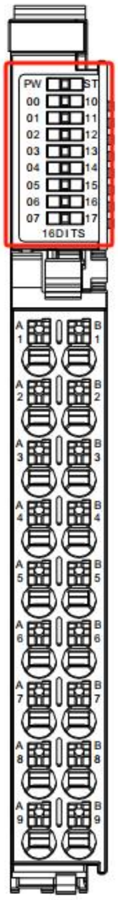
2.2.1 Terminal Block Definition



Terminal number	Signal	Terminal number	Signal	illustrate

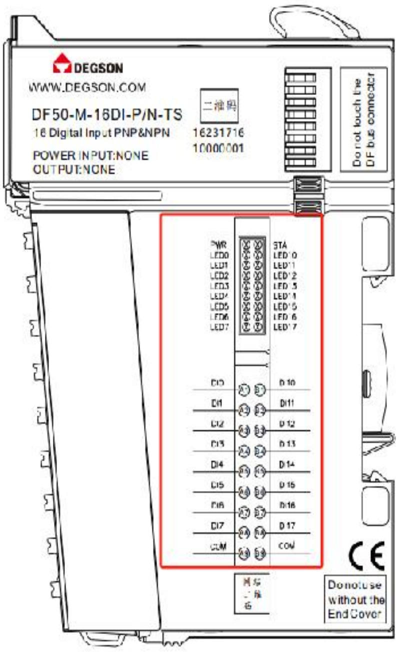
A1	DI 0	B1	DI 10	DI signal input
A2	DI 1	B2	DI 11	
A3	DI 2	B3	DI 12	
A4	DI 3	B4	DI 13	
A5	DI 4	B5	DI 14	
A6	DI 5	B6	DI 15	
A7	DI 6	B7	DI 16	
A8	DI 7	B8	DI 17	
A9	COM	B9	COM	Public

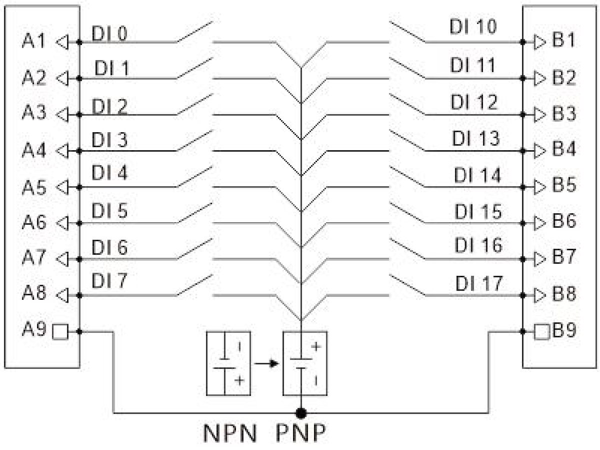
2.2.2 LED indicator definition



Indicator Lights	meaning	
PW	Green:System bus powerSource Inputnormal	
	Green Kill:System bus powerSource Inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally
		Green off: The internal bus of the module is working abnormally
00～07,10～17	Green: Input signal is valid	
	Green off: Input signal is invalid	

2.2.3 Wiring Diagram

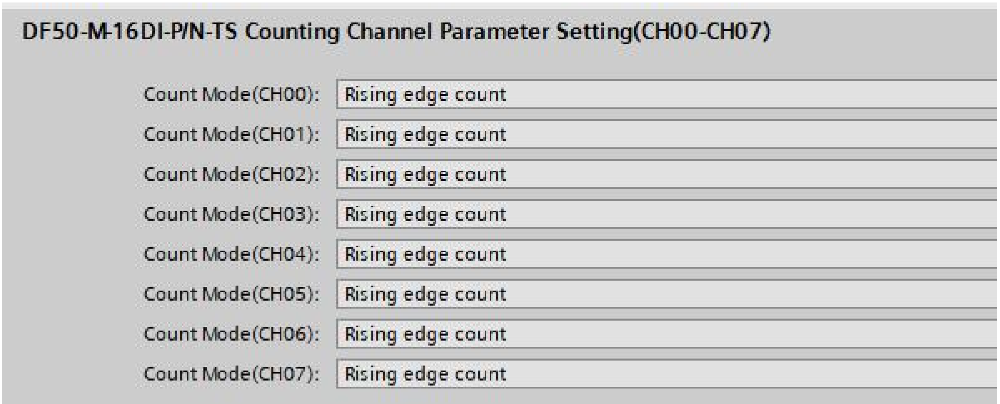




Note: COM is the common terminal, external 24V realizes NPN; external 0V realizes PNP.

2.3 Module configuration data definition

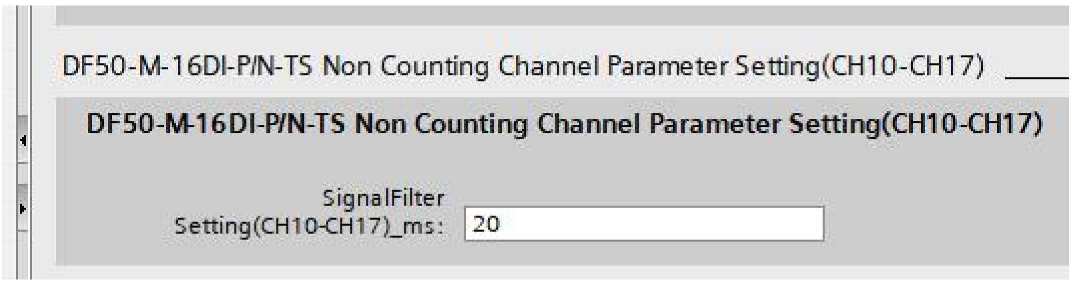
As shown in the figure, users can configureCH00~CH07Input channel count trigger mode.



There are three counting trigger modes for users to choose from, and their specific meanings are shown in the table.

name	meaning
Rising edge count	Rising edge trigger counting
Falling edge count	Falling edge trigger count
Bilateral edge count	Double edge trigger counting

In addition, users can also set the signal filtering for the input channels CH10~CH17 without counting function.

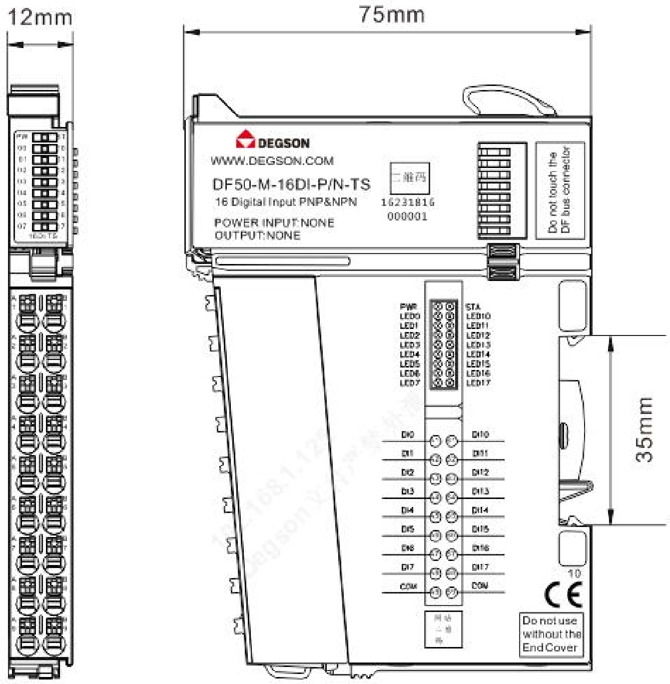


2.4 Module process data definition

Output data:1Byte		
Byte0	Bit0	0: Channel 0 counts normally; 1: Channel 0 count value is cleared
	Bit1	0: Channel 1 counts normally; 1: Channel 1 count value is cleared
	⋮	⋮
	Bit6	0: Channel 6 counts normally; 1: Channel 6 count value is cleared
	Bit7	0: Channel 7 counts normally; 1: Channel 7 count value is cleared
loseenterdata:34Byte		
Byte0	Bit0	Channel 0 signal status
	Bit1	Channel 1 signal status
	⋮	⋮
	Bit6	Channel 6 signal status
	Bit7	Channel 7 signal status
Byte1	Bit0	Channel 10 signal status
	Bit1	Channel 11 signal status
	⋮	⋮
	Bit6	Channel 16 signal status
	Bit7	Channel 17 signal status
Byte2-Byte5	DWord	Channel 0 input count value
Byte6-Byte9	DWord	Channel 1 input count value
⋮	⋮	⋮
Byte26-Byte29	DWord	Channel 6 input count value
Byte30-Byte33	DWord	Channel 7 input count value

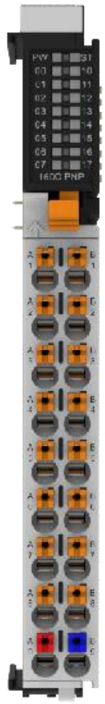
2.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:


12mm
75mm
35mm
DEGSON
WWW.DEGSON.COM
DF50-M-16DI-P/N-TS
16 Digital Input PNP&NPN
POWER INPUT:NONE
OUTPUT:NONE
16231816
000001
Do not touch the DF bus connector
Do not use without the End Cover

3 16-channel digital output/24VDC/PNP (DF50-M-16DO-P)

- 16-channel digital output, PNP high level is valid.
- Each output channel has an LED indicator.
- The field layer and the system layer are isolated by photocouplers.
- Protection grade IP20.

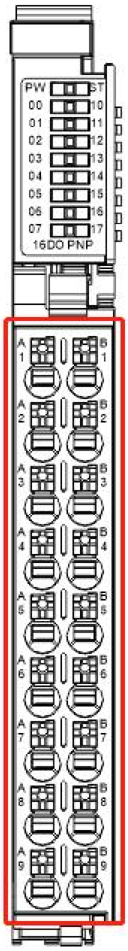
3.1 Specifications

Technical Information	
Product Description	Digital output module, 16 outputs,PNP, 24VDC
Number of channels	16
Signal Type	PNP
"OFF" signal voltage	High impedance
"ON" signal voltage	twenty fourV DC
Data size	2 Byte
Connection Type	1-wire
Reverse circuit protection	Yes
Overcurrent protection	Yes
Short circuit protection	Yes
Isolation method	Photoelectric isolation from the field layer
Error diagnosis	Yes
Switching frequency (resistive)	100Hz
Switching frequency (lamp)	10Hz

Switching frequency (inductive)	0.2Hz
Response time of protection circuit	< 100μs
Maximum output current per channel	500 mA
Leakage Current	Maximum value: 10uA
Hardware response time	100us/100us
Output Impedance	<200mΩ
Output delay	OFF to ON:Max.100us, ON to OFF:Max.150us
Protection function	Over temperature shutdown: typical value 135℃ Overcurrent protection: 1.1A. Typical value 0.5A Support short circuit protection
Load Type	Inductive (7.2W/point, 24W/module), Resistive (0.5A/point, 4A/module), Light (5W/point, 18W/module)
Output action display	When the output is in driving state, the indicator light is on.
Input derating	When working at 55℃, the rating is reduced by 50% (the output current of ON at the same time does not exceed 2A), or the rating is reduced by 10℃ when all output points are ON
IO Mapping	Support bit-by-bit or word-by-word mapping
Fault shutdown output status mode	Clear, keep current value or output according to preset value
In stop mode	In the fault shutdown mode, no more refresh
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	100mA
Terminal power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power input rated current	8A
Wiring parameters	
Connection technology: Output	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

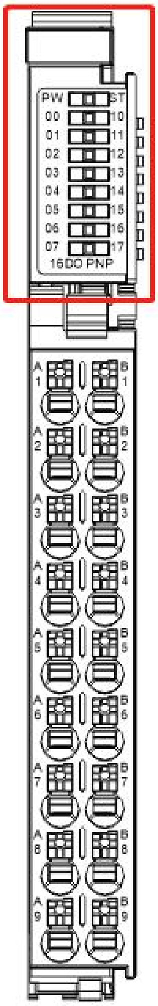
3.2 Hardware Interface

3.2.1 Terminal Block Definition



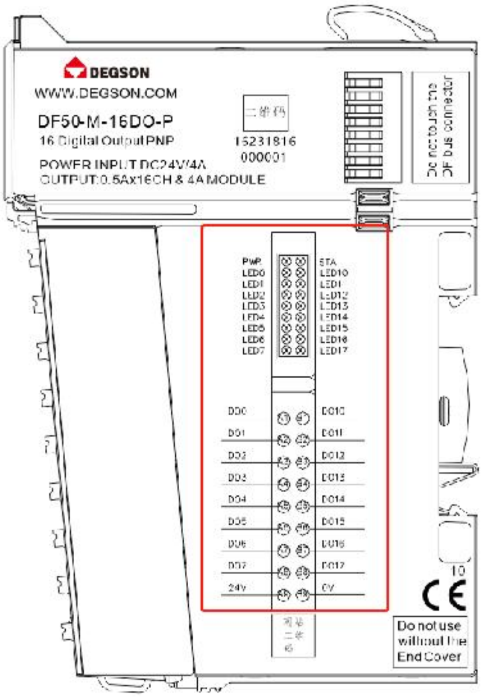
Terminal number	Signal	Terminal number	Signal	illustrate
A1	DO 00	B1	DO 10	DO signal output
A2	DO 01	B2	DO 11	
A3	DO 02	B3	DO 12	
A4	DO 03	B4	DO 13	
A5	DO 04	B5	DO 14	
A6	DO 05	B6	DO 15	
A7	DO 06	B7	DO 16	
A8	DO 07	B8	DO 17	
A9	24V	B9	0V	Terminal power input

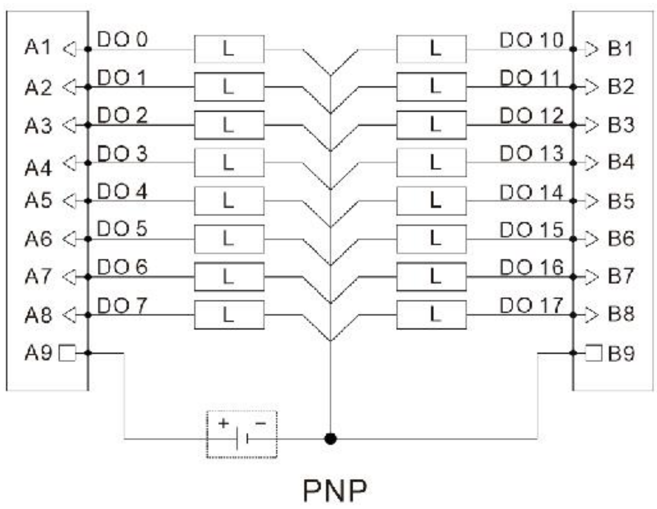
3.2.2 LED Indicatordefinition



<table>
<tr><th>Indicator Lights</th><th colspan="2">meaning</th></tr>
<tr><td rowspan="2">PW</td><td colspan="2">Green:System bus power inputnormal</td></tr>
<tr><td colspan="2">Green Kill:System bus power inputabnormal</td></tr>
<tr><td rowspan="4">ST</td><td rowspan="2">Power-on stage</td><td>Green: Module initialization error</td></tr>
<tr><td>Green off: Module initialization is normal</td></tr>
<tr><td rowspan="2">Operational stage</td><td>Green flash: The internal bus of the module is working normally</td></tr>
<tr><td>Green off/green on: The internal bus of the module is working abnormally or the terminal power input is abnormal</td></tr>
<tr><td rowspan="2">00～07,10～17</td><td colspan="2">Green: Output signal is valid</td></tr>
<tr><td colspan="2">Green off: Output signal is invalid</td></tr>
</table>

3.2.3 Wiring Diagram





Note: A9, B9 The 24V power supply is provided externally.

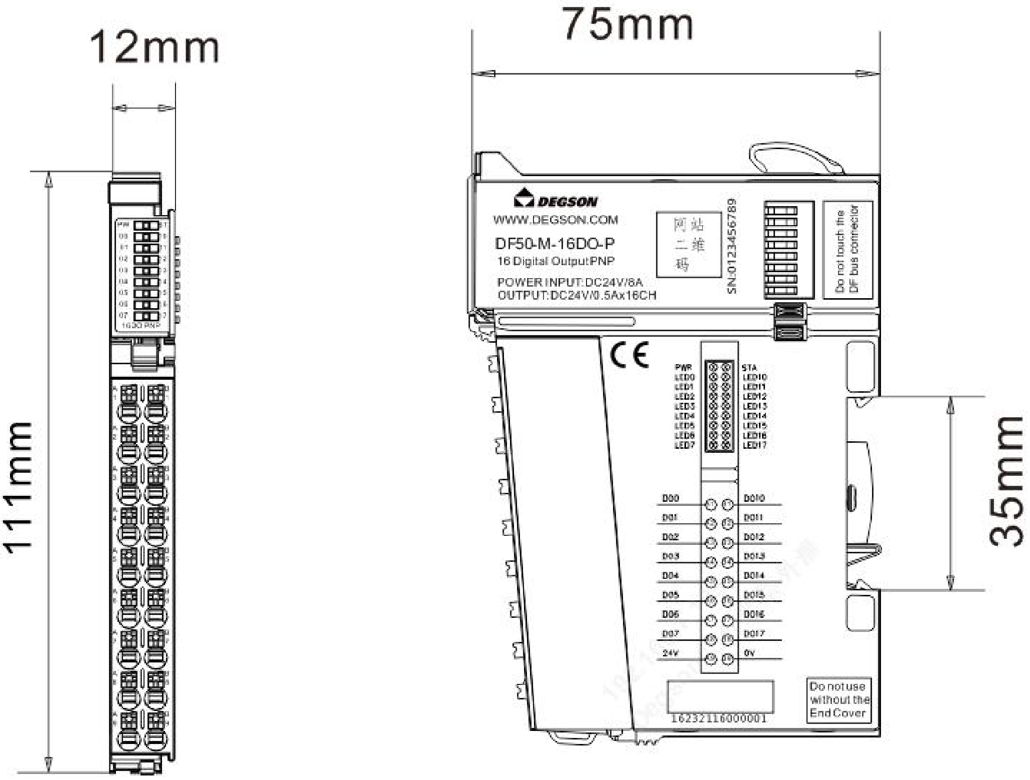
3.4 Process data definition

DF50-M-16DO-PModulesProcess data definition

Output Data								
Bit No	Bit7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DO7	DO6	DO5	DO4	DO3	DO2	DO1	DO0
Byte 1	DO17	DO16	DO15	DO14	DO13	DO12	DO11	DO10

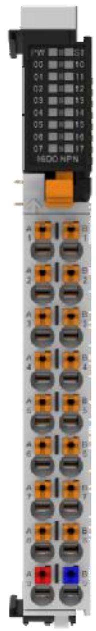
3.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



4 16-channel digital output/24VDC/NPN (DF50-M-16DO-N)

- 16-channel digital output, NPN low level is valid.
- Each output channel has an LED indicator.
- The field layer and the system layer are isolated by photocouplers.
- Protection grade IP20.



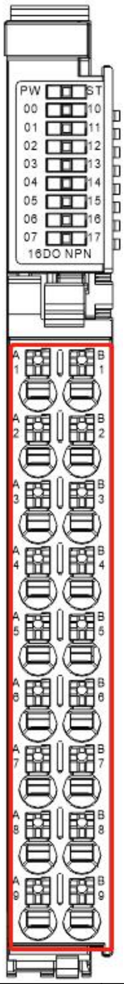
4.1 Specifications

Technical Information	
Product Description	Digital output module, 16 outputs, NPN, 24VDC
Number of channels	16
Signal Type	NPN
"OFF" signal voltage	High impedance
"ON" signal voltage	0V DC
Data size	2 Byte
Connection Type	1-wire
Reverse circuit protection	Yes
Overcurrent protection	Yes
Short circuit protection	Yes
Isolation method	Photoelectric isolation from the field layer
Error diagnosis	Yes
Switching frequency (resistive)	100Hz
Switching frequency (lamp)	10Hz
Switching frequency (inductive)	0.2Hz
Response time of protection circuit	< 100μs
Maximum output current per channel	500 mA

Leakage Current	Maximum value: 10uA
Hardware response time	100us/100us
Output Impedance	<200mΩ
Output delay	OFF to ON:Max.100us, ON to OFF:Max.150us
Protection function	Over temperature shutdown: typical value 135℃ Overcurrent protection: 1.1A. Typical value 0.5A Support short circuit protection
Load Type	Inductive (7.2W/point, 24W/module), Resistive (0.5A/point, 4A/module), Light (5W/point, 18W/module)
Output action display	When the output is in driving state, the indicator light is on.
Input derating	When working at 55℃, the rating is reduced by 50% (the output current of ON at the same time does not exceed 2A), or the rating is reduced by 10℃ when all output points are ON
IO Mapping	Support bit-by-bit or word-by-word mapping
Fault shutdown output status mode	Clear, keep current value or output according to preset value
In stop mode	In the fault shutdown mode, no more refresh
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	100mA
Terminal power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power input rated current	8A
Wiring parameters	
Connection technology: Output	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

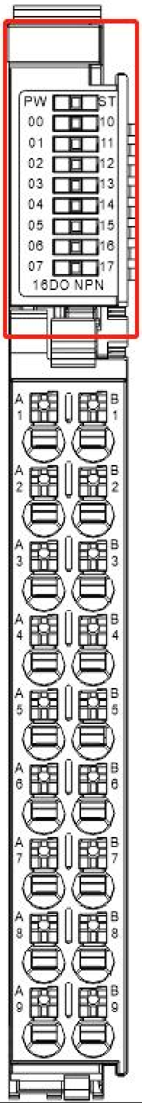
4.2 Hardware Interface

4.2.1 WiringTerminal Definition



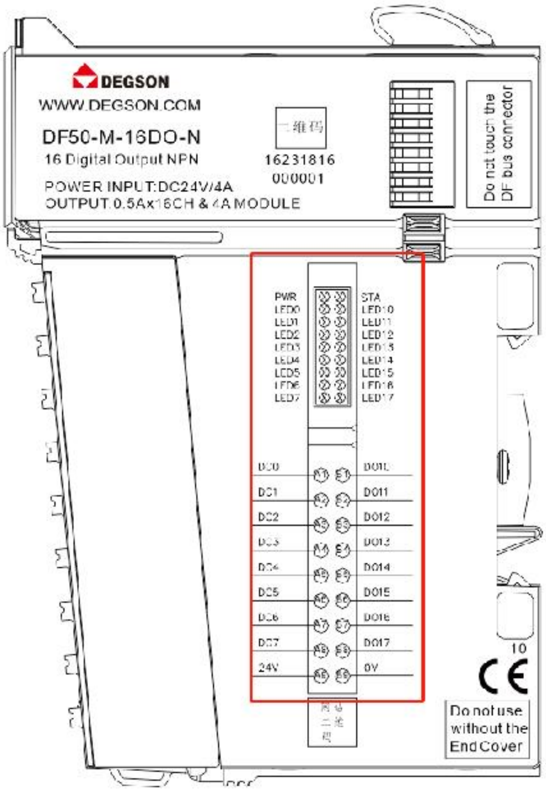
Terminal number	Signal	Terminal number	Signal	illustrate
A1	DO 00	B1	DO 10	
A2	DO 01	B2	DO 11	
A3	DO 02	B3	DO 12	
A4	DO 03	B4	DO 13	
A5	DO 04	B5	DO 14	DO signal output
A6	DO 05	B6	DO 15	
A7	DO 06	B7	DO 16	
A8	DO 07	B8	DO 17	
A9	24V	B9	0V	Terminal power input

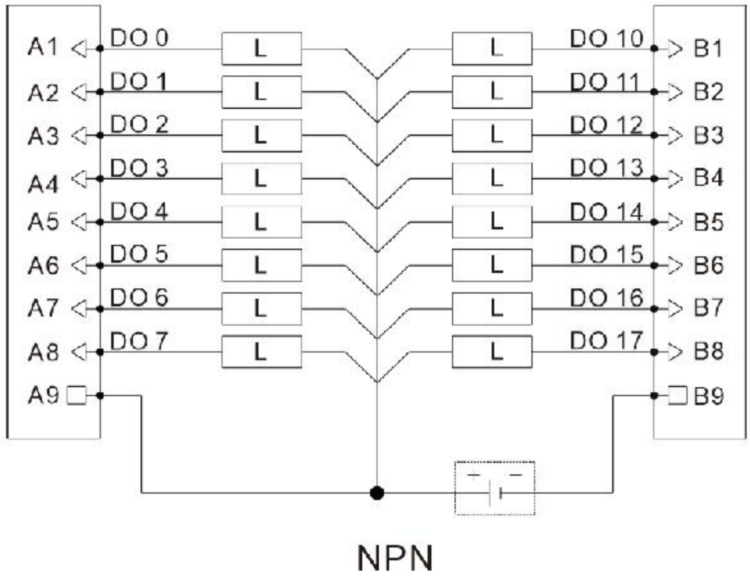
4.2.2 LED Indicatordefinition



Indicator Lights	meaning	
PW	Green:System bus power inputnormal	
	Green Kill:System bus power inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally
		Green off/green on: The internal bus of the module is working abnormally or the terminal power input is abnormal
00～07,10～17	Green: Output signal is valid	
	Green off: Output signal is invalid	

4.2.3 Wiring Diagram





Note: A9, B9 The 24V power supply is provided externally.

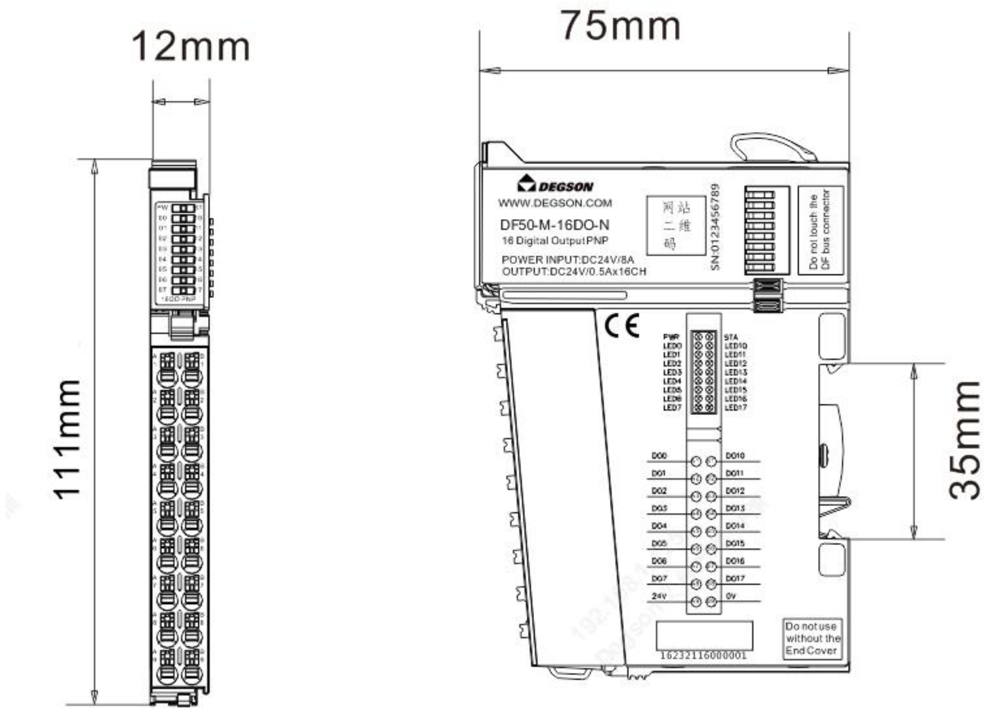
4.3 Process data definition

DF50-M-16DO-NModulesProcess data definition

Output Data								
Bit No	Bit7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DO7	DO6	DO5	DO4	DO3	DO2	DO1	DO0
Byte 1	DO17	DO16	DO15	DO14	DO13	DO12	DO11	DO10

4.4 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:


12mm
75mm
111mm
35mm
DEGSON
WWW.DEGSON.COM
DF50-M-16DO-N
16 Digital Output PNP
POWER INPUT:DC24V/8A
OUTPUT:DC24V/0.5Ax16CH
SN:0123456789
Do not touch the DF bus connector
Do not use without the End Cover

5 4-channel analog input/voltage type/current type (DF50-M-4AI-UI-6)

- The analog input module can receive voltage and current standard signals.
- 4-channel analog input, voltage type, current type.
- The two LED indicators indicate that the module is operating normally and communicating normally.
- Magnetic isolation between the field level and the system level.
- Transmitted in 16-bit resolution.
- Protection grade IP20

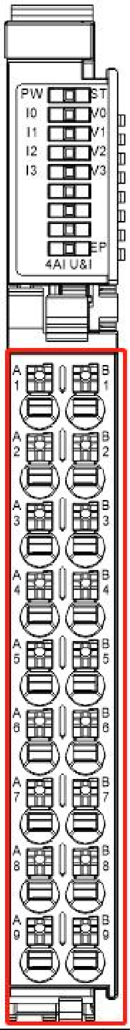
5.1 Specifications

Technical Information	
Product Description	Analog input module, 4 inputs, voltage & current
Number of channels	4
Signal Type	Voltage/current, single-ended signal
Resolution	16 Bit
Voltage measurement range	±10V, 0~10V, 2~-10V, ±5V, 0~5V, 1~5V
Voltage input impedance	>400KΩ
Voltage input accuracy (full temperature range)	0.2%
Voltage input limit	±15V
Voltage input diagnostics	2~10V, 1~5V support disconnection detection
Current measurement range	0~20mA, 4~20mA
Current acquisition impedance	100Ω
Current input accuracy (full temperature range)	0.2%
Current input limit	Instantaneous 30mA, average 24mA

Current input diagnostics	4~20mA supports disconnection detection
Isolation	The interface channels are not isolated, the power supply is isolated from the interface, and the interface is isolated from the bus.
Independent channel enable configuration	support
Diagnosis reporting function configuration	support
Channel Mode Configuration	Disable,±10V, 0~10V, 2~10V, ±5V, 0~5V, 1~5V, 0~20mA, 4~20mA
Filter parameter configuration	1000Hz~50Hz configurable
Input Action Display	When the input signal is valid, the input indicator flashes (software controlled)
IO process data size	4 Word
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	35mA
Terminal power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power input rated current	30mA
Terminal power output rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power output rated current	0.5A/each power output channel
Wiring parameters	
Connection technology: Input	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm²
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

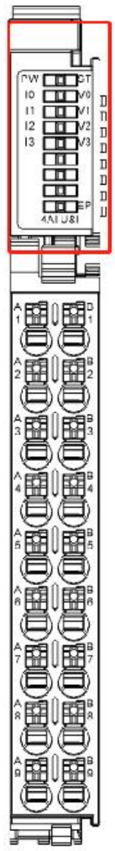
5.2 Hardware Interface

5.2.1 WiringTerminal Definition



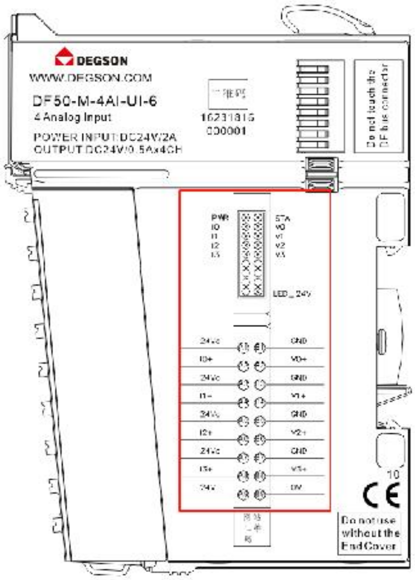
Terminal number	Signal	Terminal number	Signal	illustrate
A1	24Vo	B1	GND	Terminal power output
A2	I0+	B2	V0+	Current/voltage input channels
A3	24Vo	B3	GND	Terminal power output
A4	I1+	B4	V1+	Current/voltage input channels
A5	24Vo	B5	GND	Terminal power output
A6	I2+	B6	V2+	Current/voltage input channels
A7	24Vo	B7	GND	Terminal power output
A8	I3+	B8	V3+	Current/voltage input channels
A9	24V	B9	0V	Terminal power input

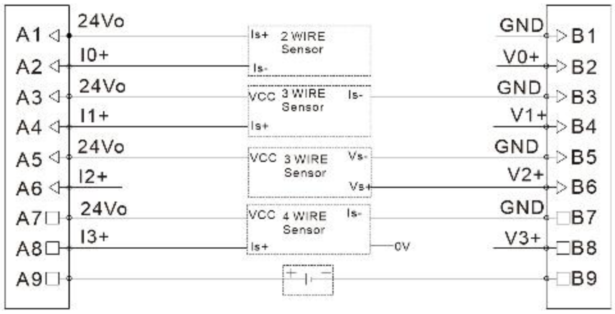
5.2.2 LED Indicatordefinition



<table>
<tr><th>Indicator Lights</th><th colspan="2">meaning</th></tr>
<tr><td rowspan="2">PW</td><td colspan="2">Green:System bus power inputnormal</td></tr>
<tr><td colspan="2">Green Kill:System bus power inputabnormal</td></tr>
<tr><td rowspan="4">ST</td><td rowspan="2">Power-on stage</td><td>Green: Module initialization error</td></tr>
<tr><td>Green off: Module initialization is normal</td></tr>
<tr><td rowspan="2">Operational stage</td><td>Green flash: The internal bus of the module is working normally</td></tr>
<tr><td>Green off/green on: The internal bus of the module is working abnormally or the terminal power input is abnormal</td></tr>
<tr><td rowspan="2">EP</td><td colspan="2">Green: The terminal power input is normal</td></tr>
<tr><td colspan="2">Green off: Terminal power input abnormality</td></tr>
<tr><td rowspan="2">I0～I3,V0～V3</td><td colspan="2">Green flash: input signal is valid</td></tr>
<tr><td colspan="2">Green off: Input signal is invalid</td></tr>
</table>

5.2.3 Wiring Diagram





Note: A9, B9 24V power supply is provided externally.

5.3 Module configuration data definition

As shown in the figure, the user can configure each channelSignal range and signal filtering.

DF50-M-4AI-UI-6 Parameter Setting

SignalRange Setting(CH0):	Disabled
SignalRange Setting(CH1):	Disabled
SignalRange Setting(CH2):	Disabled
SignalRange Setting(CH3):	Disabled
SignalFilter Setting(CH0):	100Hz_10ms
SignalFilter Setting(CH1):	100Hz_10ms
SignalFilter Setting(CH2):	100Hz_10ms
SignalFilter Setting(CH3):	100Hz_10ms

5.4 Module process data definition

Input data: 8 Byte

ByteNo.	Word No.	meaning
Byte0-Byte1	Word0	Channel 0 input data
Byte2-Byte3	Word1	aisle1 LoseInput Data
Byte4-Byte5	Word2	aisle2Input Data
Byte6-Byte7	Word3	aisle3Input Data

Process data definition description:

Process data description (voltage type)					
Signal range	Voltage value	Decimal data	Hexadecimal data	Scope	Conversion relationship
±10V	>11.76V	32767	0x7FFF	Overflow	D = 27648 x U / 10 U = D x 10 / 27648
	11.76V	32511	0x7EFF	Upper limit	
	10V	27648	0x6C00	Normal range	
	5V	13824	0x3600		
	0V	0	0x0000		
	-5V	-13824	0xCA00		
	-10V	-27648	0x9400		
	-11.76V	-32511	0x8100	Lower limit	
	<-11.76V	-32768	0x8000	Underflow	
0-10V	>11.76V	32767	0x7FFF	Overflow	D = 27648 x U / 10 U = D x 10 / 27648
	11.76V	32511	0x7EFF	Upper limit	
	10V	27648	0x6C00	Normal range	
	5V	13824	0x3600		
	0V	0	0x0000		
2-10V	>11.41V	32767	0x7FFF	Overflow	D = 27648 x (U – 2) / 8 U = D x 8 / 27648 + 2
	11.41V	32511	0x7EFF	Upper limit	
	10V	27648	0x6C00	Normal range	
	6V	13824	0x3600		

	2V	0	0x0000		
	0.59 V	-4864	0xED00	Lower limit	
	<0.59 V	-32768	0x8000	Underflow	
±5V	>5.88V	32767	0x7FFF	Overflow	D = 27648 x U / 5 U = D x 5 / 27648
	5.88V	32511	0x7EFF	Upper limit	
	5V	27648	0x6C00	Normal range	
	2.5V	13824	0x3600		
	0V	0	0x0000		
	-2.5V	-13824	0xCA00		
	-5V	-27648	0x9400		
	-5.88V	-32511	0x8100	Lower limit	
	<-5.88V	-32768	0x8000	Underflow	
0-5V	>5.88V	32767	0x7FFF	Overflow	D = 27648 x U / 5 U = D x 5 / 27648
	5.88V	32511	0x7EFF	Upper limit	
	5V	27648	0x6C00	Normal range	
	2.5V	13824	0x3600		
	0V	0	0x0000		
1-5V	>5.7V	32767	0x7FFF	Overflow	D = 27648 x (U – 1) / 4 U = D x 4 / 27648 + 1
	5.7V	32511	0x7EFF	Upper limit	
	5V	27648	0x6C00	Normal range	
	3V	13824	0x3600		
	1V	0	0x0000		
	0.3V	-4864	0xED00	Lower limit	
	<0.3V	-32768	0x8000	Underflow	

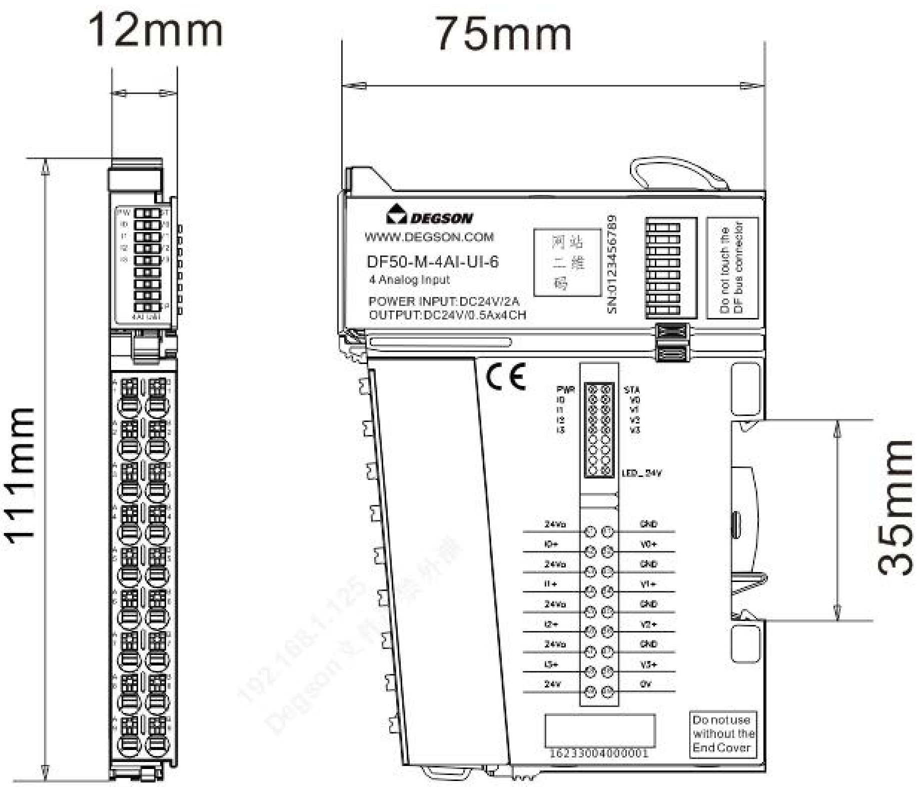
Process data description (current type)

Signal range	Current (I)	Decimal data	Hexadecimal data	scope	Conversion relationship
0 - 20 mA	>23.52 mA	32767	0x7FFF	Overflow	D = 27648 x I / 20 I = D x 20 / 27648
	23.52 mA	32511	0x7EFF	Upper limit	

	20 mA	27648	0x6C00	Normal range	
	10 mA	13824	0x3600		
	0 mA	0	0		
4 – 20 mA	>22.81 mA	32767	0x7FFF	Overflow	D = 27648 x (I – 4) / 16 I = D x 16 / 27648 + 4
	22.81 mA	32511	0x7EFF	Upper limit	
	20 mA	27648	0x6C00	Normal range	
	12 mA	13824	0x3600		
	4 mA	0	0		
	1.19 mA	-4864	0xED00	Lower limit	
	<1.19 mA	-32768	0x8000	Underflow	

5.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



6 8-channel analog input/current type (DF50-M-8AI-I-5)

- The analog input module can receive 0~20mA and 4~20mA standard signals.
- 8-channel analog input, current type.
- The two LED indicators indicate that the module is operating normally and communicating normally.
- Magnetic isolation between the field level and the system level.
- Transmitted in 16-bit resolution.
- Protection grade IP20

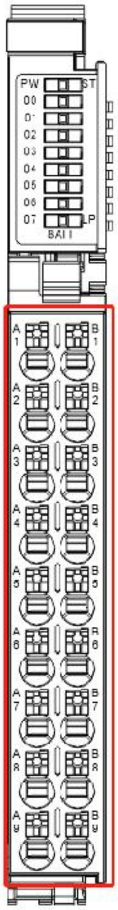
6.1 Specifications

Technical Information	
Product Description	Analog input module, 8 inputs, current type
Number of channels	8
Signal Type	Current, single-ended input
Resolution	16 Bit
Current measurement range	0~20mA, 4~20mA
Current acquisition impedance	100Ω
Current input accuracy (full temperature range)	0.2%
Current input limit	Instantaneous 30mA, average 24mA
Current input diagnostics	4~20mA supports disconnection detection
Isolation	The interface channels are not isolated, the power supply is isolated

	from the interface, and the interface is isolated from the bus.
Independent channel enable configuration	support
Diagnosis reporting function configuration	support
Channel Mode Configuration	Disable, 0~20mA, 4~20mA
Filter parameter configuration	1000Hz~50Hz configurable
Input Action Display	When the input signal is valid, the input indicator flashes (software controlled)
IO process data size	8 Word
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	35mA
Internal load power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Internal load power input rated current	20mA
Wiring parameters	
Connection technology: Input	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm²
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

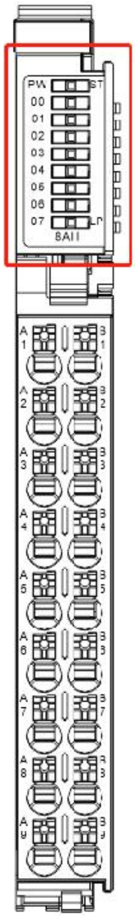
6.2 Hardware Interface

6.2.1 WiringTerminal Definition



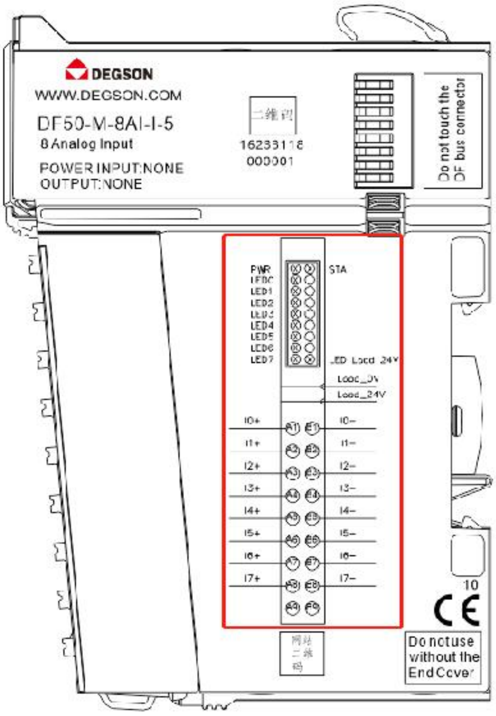
TerminalsSerial number	Signal	TerminalsSerial number	Signal	illustrate
A1	I0+	B1	I0-	Current input channel 1
A2	I1+	B2	I1-	Current input channel2
A3	I2+	B3	I2-	Current input channel3
A4	I3+	B4	I3-	Current input channel4
A5	I4+	B5	I4-	Current input channel5
A6	I5+	B6	I5-	Current input channel6
A7	I6+	B7	I6-	Current input channel7
A8	I7+	B8	I7-	Current input channel8
A9	/	B9	/	/

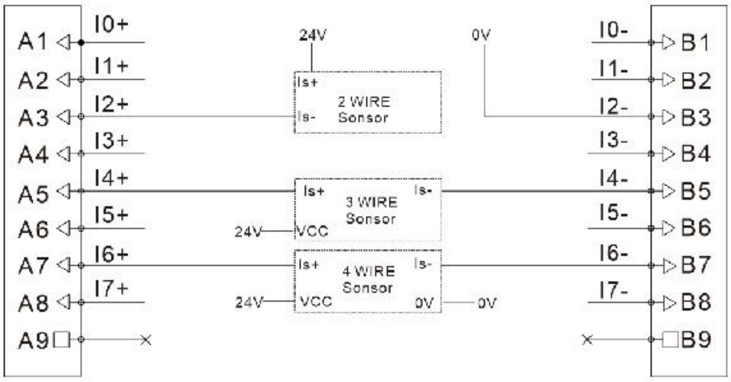
6.2.2 LED Indicatordefinition



<table>
<tr><th>Indicator Lights</th><th colspan="2">meaning</th></tr>
<tr><td rowspan="2">PW</td><td colspan="2">Green:System bus power inputnormal</td></tr>
<tr><td colspan="2">Green Kill:System bus power inputabnormal</td></tr>
<tr><td rowspan="4">ST</td><td rowspan="2">Power-on stage</td><td>Green: Module initialization error</td></tr>
<tr><td>Green off: Module initialization is normal</td></tr>
<tr><td rowspan="2">Operational stage</td><td>Green flash: The internal bus of the module is working normally</td></tr>
<tr><td>Green off/green on: The internal bus of the module is working abnormally or the internal load power input is abnormal.</td></tr>
<tr><td rowspan="2">LP</td><td colspan="2">Green: Internal load power input is normal</td></tr>
<tr><td colspan="2">Green off: Internal load power input is abnormal</td></tr>
<tr><td rowspan="2">00～07</td><td colspan="2">Green flash: input signal is valid</td></tr>
<tr><td colspan="2">Green off: Input signal is invalid</td></tr>
</table>

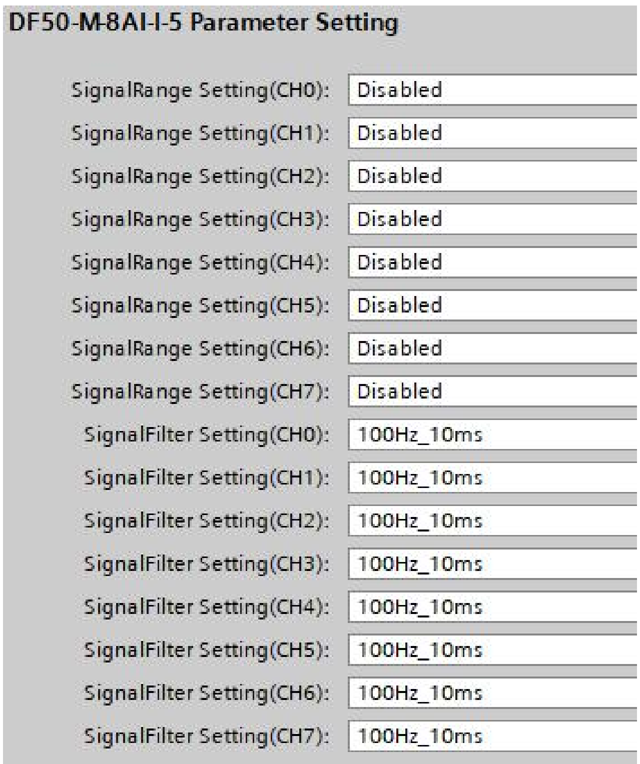
6.2.3 Wiring Diagram





6.3 Module configuration data definition

As shown in the figure, the user can configure each channelSignal range and signal filtering.



DF50-M-8AI-I-5 Parameter Setting

SignalRange Setting(CH0):	Disabled
SignalRange Setting(CH1):	Disabled
SignalRange Setting(CH2):	Disabled
SignalRange Setting(CH3):	Disabled
SignalRange Setting(CH4):	Disabled
SignalRange Setting(CH5):	Disabled
SignalRange Setting(CH6):	Disabled
SignalRange Setting(CH7):	Disabled
SignalFilter Setting(CH0):	100Hz_10ms
SignalFilter Setting(CH1):	100Hz_10ms
SignalFilter Setting(CH2):	100Hz_10ms
SignalFilter Setting(CH3):	100Hz_10ms
SignalFilter Setting(CH4):	100Hz_10ms
SignalFilter Setting(CH5):	100Hz_10ms
SignalFilter Setting(CH6):	100Hz_10ms
SignalFilter Setting(CH7):	100Hz_10ms

6.4 Module process data definition

Input data:16Byte		
ByteNo.	Word No.	meaning
Byte0-Byte1	Word0	Channel 0 input data
Byte2-Byte3	Word1	Channel 1 input data
Byte4-Byte5	Word2	Channel 2 input data
Byte6-Byte7	Word3	Channel 3 input data
Byte8-Byte9	Word4	aisle4Input Data
Byte10-Byte11	Word5	aisle5Input Data
Byte12-Byte13	Word6	aisle6Input Data
Byte14-Byte15	Word7	aisle7Input Data

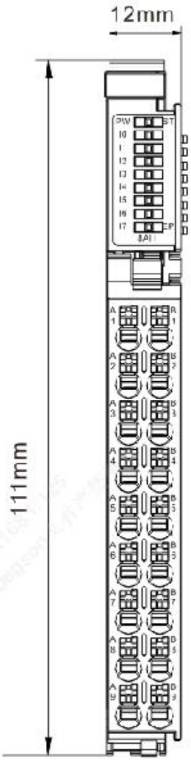
Process data definition description:

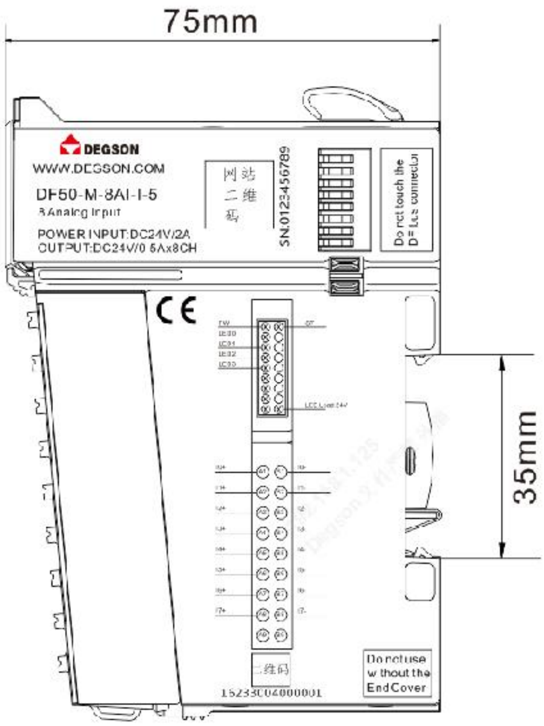
Process data description (current type)					
Signal range	Current	Decimal	Hexadecimal	scope	Conversion relationship
0～20 mA	>23.52	32767	0x7FFF	Overflow	D = 27648 x I / 20
	23.52 mA	32511	0x7EFF	Upper	
	20 mA	27648	0x6C00	Normal range	I = D x 20 / 27648
	10 mA	13824	0x3600		
	0 mA	0	0		
4～20 mA	>22.81	32767	0x7FFF	Overflow	D = 27648 x (I – 4) / 16
	22.81 mA	32511	0x7EFF	Upper	
	20 mA	27648	0x6C00	Normal	I = D x 16 / 27648 + 4

12 mA	13824	0x3600	
4 mA	0	0	
1.19 mA	-4864	0xED00	Lower
<1.19 mA	-32768	0x8000	Underflo

6.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:





7 8-channel analog input/voltage type (DF50-M-8AI-U-4)

- The analog input module can receive ±10V, 0~10V, 2~10V, ±5V, 0~5V, 1~5V standard signals.
- 8-channel analog input, voltage type.
- The two LED indicators indicate that the module is operating normally and communicating normally.
- Magnetic isolation between the field level and the system level.
- Transmitted in 16-bit resolution.
- Protection grade IP20

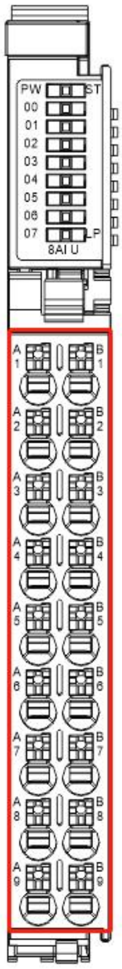
7.1 Specifications

Technical Information	
Product Description	Analog input module, 8 inputs, voltage type
Number of channels	8
Signal Type	Voltage, single-ended input
Resolution	16 Bit
Voltage measurement range	±10V, 0~10V, 2~10V, ±5V, 0~5V, 1~5V
Input Impedance	>400KΩ
Voltage input accuracy (full temperature range)	0.2%
Voltage input limit	±15V
Voltage input diagnostics	2~10V, 1~5V support disconnection detection
Isolation	The interface channels are not isolated, the power supply is isolated from the interface, and the interface is isolated from the

	bus.
Independent channel enable configuration	support
Diagnosis reporting function configuration	support
Channel Mode Configuration	Disable,±10V,0~10V, 2~10V, ±5V, 0~5V, 1~5V
Filter parameter configuration	1000Hz~50Hz configurable
Input Action Display	When the input signal is valid, the input indicator flashes (software controlled)
IO process data size	8Word
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	33mA
Internal load power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Internal load power input rated current	42mA
Wiring parameters	
Connection technology: input/output	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm/0.31～0.35inches
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Installation location	Any
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

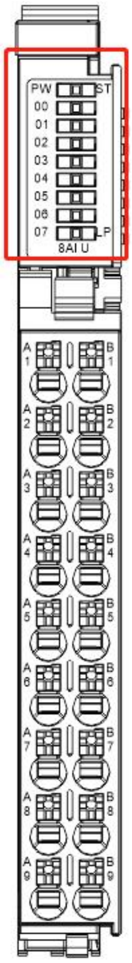
7.2 Hardware Interface

7.2.1 WiringTerminal Definition



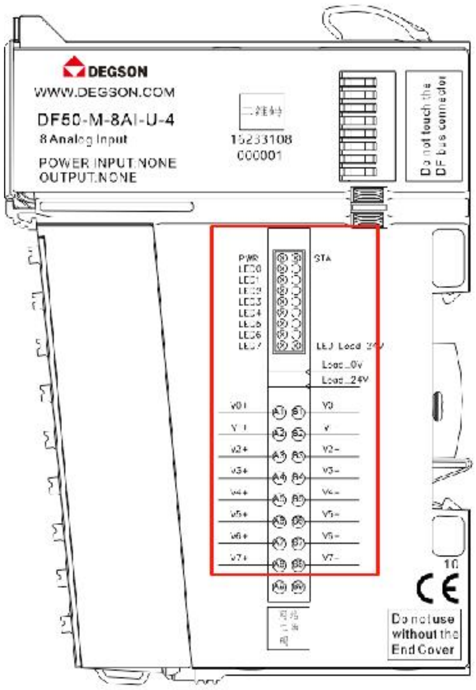
Terminal number	Signal	Terminal number	Signal	illustrate
A1	V0+	B1	V0-	Voltage input channel 0
A2	V1+	B2	V1-	Voltage input channel 1
A3	V2+	B3	V2-	Voltage input channel 2
A4	V3+	B4	V3-	Voltage input channel 3
A5	V4+	B5	V4-	Voltage input channel 4
A6	V5+	B6	V5-	Voltage input channel 5
A7	V6+	B7	V6-	Voltage input channel 6
A8	V7+	B8	V7-	Voltage input channel 7
A9	/	B9	/	/

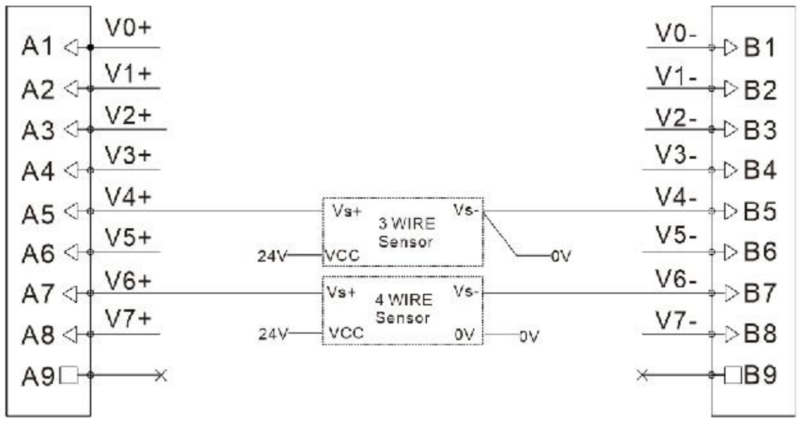
7.2.2 LED indicator definition



<table>
<tr><th>Indicator Lights</th><th colspan="2">meaning</th></tr>
<tr><td rowspan="2">PW</td><td colspan="2">Green:System bus power inputnormal</td></tr>
<tr><td colspan="2">Green Kill:System bus power inputabnormal</td></tr>
<tr><td rowspan="4">ST</td><td rowspan="2">Power-on stage</td><td>Green: Module initialization error</td></tr>
<tr><td>Green off: Module initialization is normal</td></tr>
<tr><td rowspan="2">Operational stage</td><td>Green flash: The internal bus of the module is working normally</td></tr>
<tr><td>Green off/green on: The internal bus of the module is working abnormally or the internal load power input is abnormal.</td></tr>
<tr><td rowspan="2">LP</td><td colspan="2">Green: Internal load power input is normal</td></tr>
<tr><td colspan="2">Green off: Internal load power input is abnormal</td></tr>
<tr><td rowspan="2">00～07</td><td colspan="2">Green flash: input signal is valid</td></tr>
<tr><td colspan="2">Green off: Input signal is invalid</td></tr>
</table>

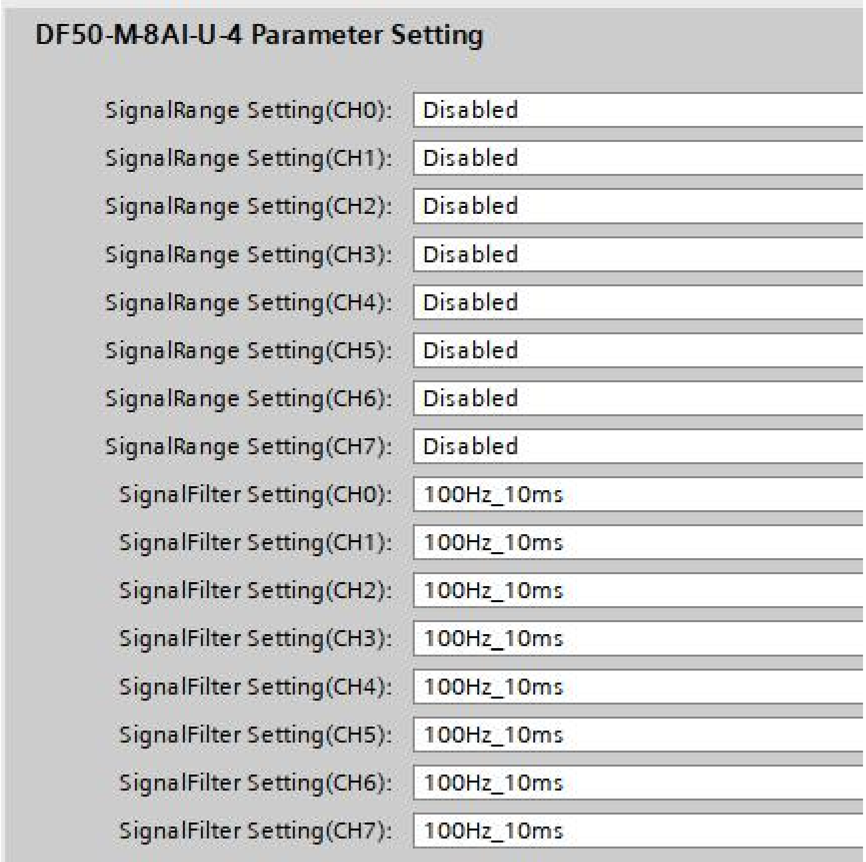
7.2.3 Wiring Diagram





7.3 Module configuration data definition

As shown in the figure, the user can configure each channelSignal range and signal filtering.



7.4 Module process data definition

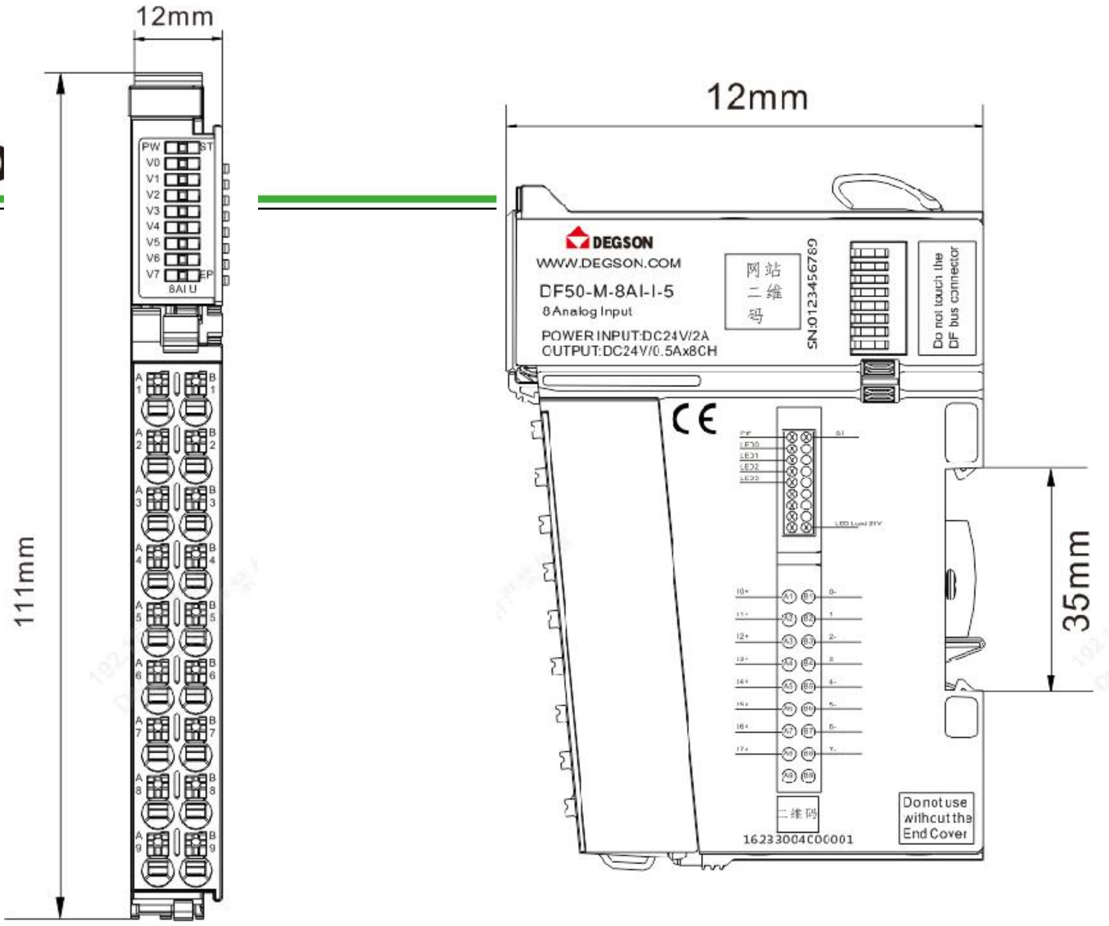
Input data:16Byte		
ByteNo.	Word No.	meaning
Byte0-Byte1	Word0	Channel 0 input data
Byte2-Byte3	Word1	Channel 1 input data
Byte4-Byte5	Word2	Channel 2 input data
Byte6-Byte7	Word3	Channel 3 input data
Byte8-Byte9	Word4	aisle4Input Data
Byte10-Byte11	Word5	aisle5Input Data
Byte12-Byte13	Word6	aisle6Input Data

Byte14-Byte15	Word7	aisle7Input Data

Process data definition description:

Process data description (voltage type)					
Signal range	Voltage value	Decimal data	Hexadecimal data	Scope	Conversion relationship
±10V	>11.76V	32767	0x7FFF	Overflow	D = 27648 x U / 10 U = D x 10 / 27648
	11.76V	32511	0x7EFF	Upper limit	
	10V	27648	0x6C00	Normal range	
	5V	13824	0x3600		
	0V	0	0x0000		
	-5V	-13824	0xCA00		
	-10V	-27648	0x9400		
	-11.76V	-32511	0x8100	Lower limit	
	<-11.76V	-32768	0x8000	Underflow	
0~10V	>11.76V	32767	0x7FFF	Overflow	D = 27648 x U / 10 U = D x 10 / 27648
	11.76V	32511	0x7EFF	Upper limit	
	10V	27648	0x6C00	Normal range	
	5V	13824	0x3600		
	0V	0	0x0000		
2~10V	>11.41V	32767	0x7FFF	Overflow	D = 27648 x (U – 2) / 8 U = D x 8 / 27648 + 2
	11.41V	32511	0x7EFF	Upper limit	
	10V	27648	0x6C00	Normal range	
	6V	13824	0x3600		
	2V	0	0x0000		
	0.59 V	-4864	0xED00	Lower limit	
	<0.59 V	-32768	0x8000	Underflow	
±5V	>5.88V	32767	0x7FFF	Overflow	D = 27648 x U / 5
	5.88V	32511	0x7EFF	Upper limit	

	5V	27648	0x6C00	Normal range	
	2.5V	13824	0x3600		
	0V	0	0x0000		
	-2.5V	-13824	0xCA00		
	-5V	-27648	0x9400		
	-5.88V	-32511	0x8100	Lower limit	
	<-5.88V	-32768	0x8000	Underflow	
0~5V	>5.88V	32767	0x7FFF	Overflow	D = 27648 x U / 5 U = D x 5 / 27648
	5.88V	32511	0x7EFF	Upper limit	
	5V	27648	0x6C00	Normal range	
	2.5V	13824	0x3600		
	0V	0	0x0000		
1-5V	>5.7V	32767	0x7FFF	Overflow	D = 27648 x (U – 1) / 4 U = D x 4 / 27648 + 1
	5.7V	32511	0x7EFF	Upper limit	
	5V	27648	0x6C00	Normal range	
	3V	13824	0x3600		
	1V	0	0x0000		
	0.3V	-4864	0xED00	Lower limit	
	<0.3V	-32768	0x8000	Underflow	

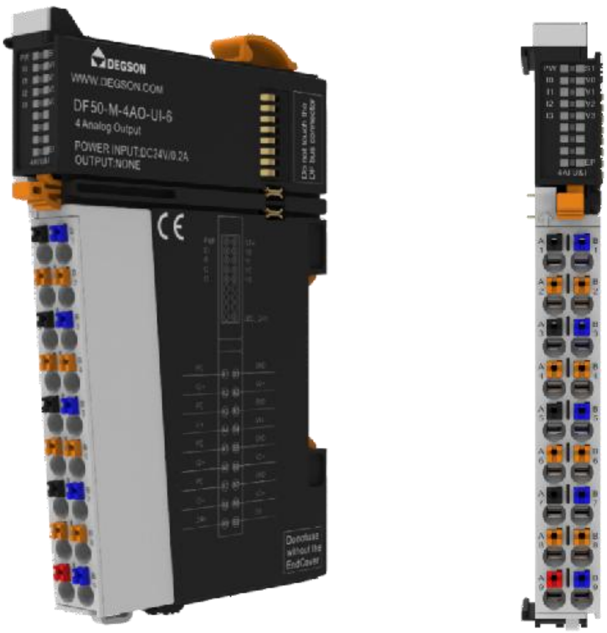


7.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:

8 4-channel analog output/voltage type/current type (DF50-M-4AO-UI-6)

- The analog output module can output voltage and current standard signals.
- 4-channel analog output, voltage type, current type.
- The two LED indicators indicate that the module is operating normally and communicating normally.
- Magnetic isolation between the field level and the system level.
- Transmitted in 16-bit resolution.
- Protection grade IP20



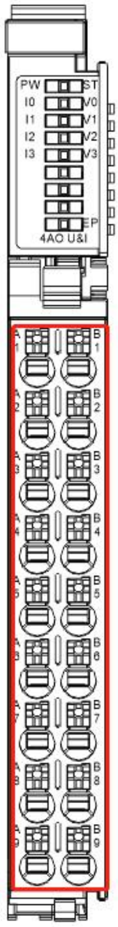
8.1 Specifications

Technical Information	
Product Description	Analog output module, 4 outputs, voltage & current
Number of channels	4
Signal Type	Voltage/current, single-ended signal
Resolution	16 Bit
Voltage output range	±10V, 0~10V, 2~10V, ±5V, 0~5V, 1~5V
Voltage output load	>1KΩ
Voltage output accuracy	±0.1%
Current output range	0~20mA, 4~20mA
Current output load	<600Ω
Current output accuracy	±0.1%

Isolation	The interface channels are not isolated, the power supply is isolated from the interface, and the interface is isolated from the bus.
Independent channel enable configuration	support
Diagnosis reporting function configuration	support
Channel Mode Configuration	Disable,±10V, 0~10V, 2~10V, ±5V, 0~5V, 1~5V, 0~20mA, 4~20mA
Output status configuration after shutdown	Clear to zero, keep current value
Stop Mode	In the fault shutdown mode, no more refresh
Input Action Display	When the output signal is valid, the output indicator light flashes (software controlled)
IO process data size	4 Word
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	35mA
Terminal power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power input rated current	90mA
Wiring parameters	
Connection technology	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

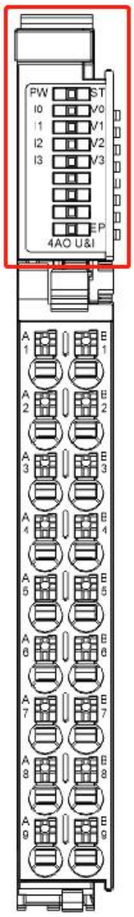
8.2 Hardware Interface

8.2.1 WiringTerminal Definition



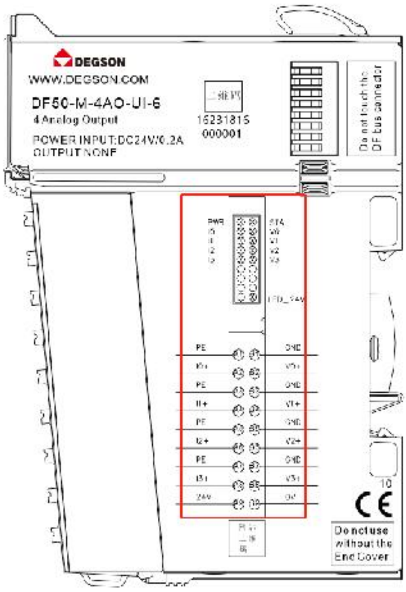
Terminal number	Signal	illustrate	Terminal number	Signal	illustrate
A1	PE	Safely	B1	GND	Negative voltage/current
A2	I0+	Current output channel 0	B2	V0+	Voltage output channel 0
A3	PE	Safely	B3	GND	Negative voltage/current
A4	I1+	Current output channel 1	B4	V1+	Voltage output channel 1
A5	PE	Safely	B5	GND	Negative voltage/current
A6	I2+	Current output channel 2	B6	V2+	Voltage output channel 2
A7	PE	Safely	B7	GND	Negative voltage/current
A8	I3+	Current output channel 3	B8	V3+	Voltage output channel 3
A9	24V	Terminal power input 24V	B9	0V	Terminal power input 0V

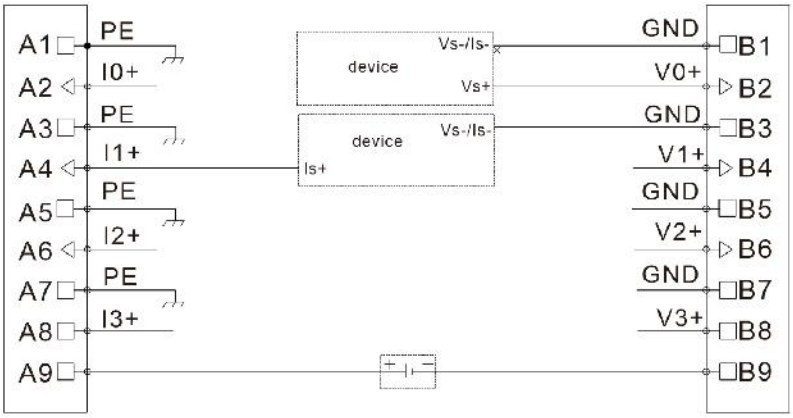
8.2.2 LED indicatorsdefinition



<table>
<tr><th>Indicator Lights</th><th colspan="2">meaning</th></tr>
<tr><td rowspan="2">PW</td><td colspan="2">Green:System bus powerSource Inputnormal</td></tr>
<tr><td colspan="2">Green Kill:System bus powerSource Inputabnormal</td></tr>
<tr><td rowspan="4">ST</td><td rowspan="2">Power-on stage</td><td>Green: Module initialization error</td></tr>
<tr><td>Green off: Module initialization is normal</td></tr>
<tr><td rowspan="2">Operational stage</td><td>Green flash: The internal bus of the module is working normally</td></tr>
<tr><td>Green off/green on: The internal bus of the module is working abnormally or the terminal power input is abnormal</td></tr>
<tr><td rowspan="2">EP</td><td colspan="2">Green: The terminal power input is normal</td></tr>
<tr><td colspan="2">Green off: Terminal power input abnormality</td></tr>
<tr><td rowspan="2">I0～I3,V0～V3</td><td colspan="2">Green flash: output signal is valid</td></tr>
<tr><td colspan="2">Green off: Output signal is invalid</td></tr>
</table>

8.2.3 Wiring diagram

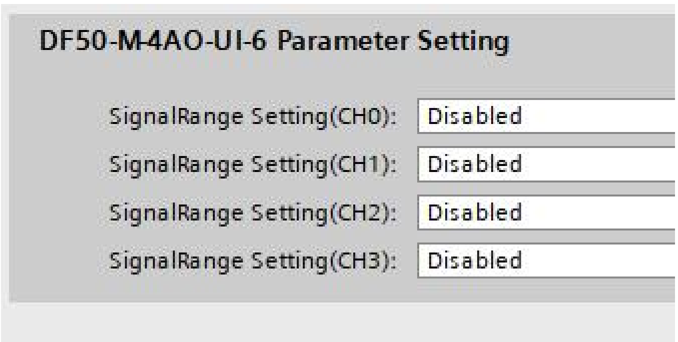




Note: A9 and B9 are external power input interfaces.

8.3 Module Configuration Data Definition

As shown in the figure, the user can configure each channelSignal range.



8.4 Module process data definition

loseoutData: 8 Bytes		
ByteNo.	Word No.	meaning
Byte0-Byte1	Word0	Channel 0 Inputoutdata
Byte2-Byte3	Word1	aisle1loseoutdata
Byte4-Byte5	Word2	aisle2loseoutdata
Byte6-Byte7	Word3	aisle3loseoutdata

Channel output data description:

Signal range	Voltage value (U)	Decimal data	Hexadecimal data	Scope	Conversion relationship
±10V	0V	>32511	>0x7EFF	Overflow	D = 27648 x U / 10 U = D x 10 / 27648
	11.76V	32511	0x7EFF	Upper limit	
	10V	27648	0x6C00	Normal range	
	5V	13824	0x3600		
	0V	0	0x0000		
	-5V	-13824	0xCA00		
	-10V	-27648	0x9400		
	-11.76V	-32511	0x8101	Lower limit	
	0V	<-32511	<0x8101	Underflow	
0~10V	0V	>32511	>0x7EFF	Overflow	D = 27648 x U / 10

	11.76V	32511	0x7EFF	Upper limit	U = D x 10 / 27648
	10V	27648	0x6C00	Normal range	
	5V	13824	0x3600		
	0V	0	0x0000		
2~10V	0V	>32511	>0x7EFF	Overflow	D = 27648 x (U – 2) / 8 U = D x 8 / 27648 + 2
	11.41V	32511	0x7EFF	Upper limit	
	10V	27648	0x6C00	Normal range	
	6V	13824	0x3600		
	2V	0	0x0000		
	0.59 V	-4864	0xED00	Lower limit	
	0 V	<-4864	<ED00	Underflow	
±5V	0V	>32511	>7EFF	Overflow	D = 27648 x U / 5 U = D x 5 / 27648
	5.88V	32511	0x7EFF	Upper limit	
	5V	27648	0x6C00	Normal range	
	2.5V	13824	0x3600		
	0V	0	0x0000		
	-2.5V	-13824	0xCA00		
	-5V	-27648	0x9400		
	-5.88V	-32511	0x8100	Lower limit	
	0V	<-32511	<0x8100	Underflow	

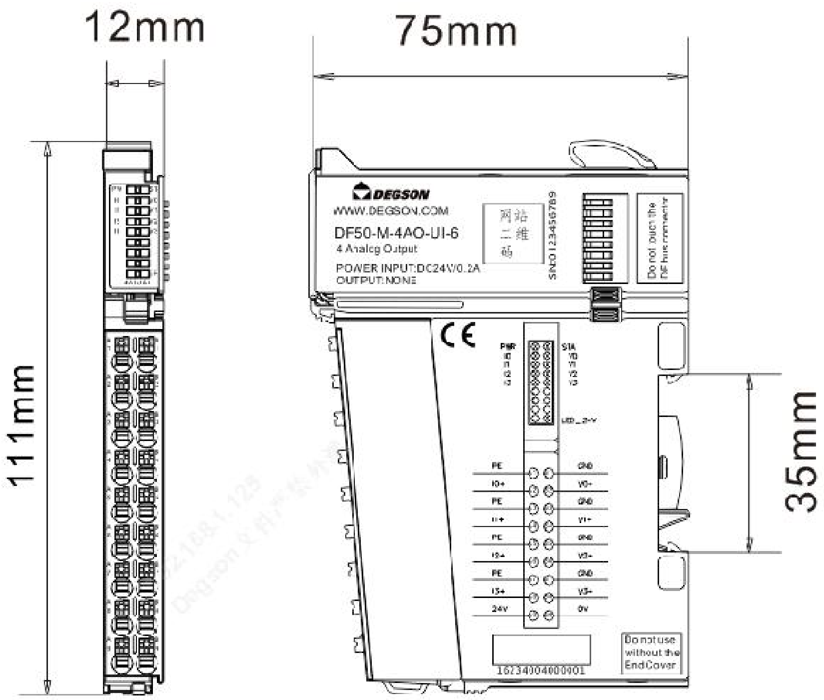
0~5V	0V	>32511	>0x7EFF	Overflow	D = 27648 x U / 5 U = D x 5 / 27648
	5.88V	32511	0x7EFF	Upper limit	
	5V	27648	0x6C00	Normal range	
	2.5V	13824	0x3600		
	0V	0	0x0000		
1~5V	0V	>32511	>0x7EFF	Overflow	D = 27648 x (U – 1) / 4 U = D x 4 / 27648 + 1

Signal range	Current value (I)	Decimal data	Hexadecimal data	Scope	Conversion relationship
0~20ma	0ma	>32511	>0x7EFF	Overflow	D = 27648 xI/ 20 I= D x 20/ 27648
	23.52ma	32511	0x7EFF	Upper limit	
	20ma	27648	0x6C00	Normal range	
	10ma	13824	0x3600		
	0ma	0	0x0000		
4~20ma	0ma	>32511	>0x7EFF	Overflow	D = 27648 x (I– 4) / 16 I= D x 16 / 27648 + 4
	22.81ma	32511	0x7EFF	Upper limit	
	20ma	27648	0x6C00	Normal range	
	12ma	13824	0x3600		
	4ma	0	0x0000		
	1.19ma	-4864	0xED00	Lower limit	

	0ma	<-4864	<0xED00	Underflow	

8.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



9 8-channel analog output/voltage type (DF50-M-8AO-U-4)

- The analog output module can output voltage standard signal.
- 8-channel analog output, voltage type.
- The two LED indicators indicate that the module is operating normally and communicating normally.
- Magnetic isolation between the field level and the system level.
- Transmitted in 16-bit resolution.
- Protection grade IP20

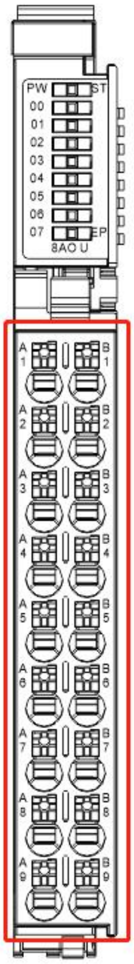
9.1 Specifications

Technical Information	
Product Description	Analog output module, 8 outputs, voltage type
Number of channels	8
Output signal type	Voltage, single-ended signal
Resolution	16 Bit
Voltage output range	±10V, 0~10V, 2~10V, ±5V, 0~5V, 1~5V
Voltage output load	>1KΩ
Voltage output accuracy (full temperature range)	±0.1%
Isolation	The interface channels are not isolated, the power supply is

	isolated from the interface, and the interface is isolated from the bus.
Independent channel enable configuration	support
Diagnosis reporting function configuration	support
Channel Mode Configuration	Disable,±10V, 0~10V, 2~10V, ±5V, 0~5V, 1~5V
Output status configuration after shutdown	Clear and keep current output
Stop Mode	In the fault shutdown mode, no more refresh
Input Action Display	When the output signal is valid, the output indicator light flashes (software controlled)
IO process data size	8Word
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	35mA
Terminal power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power input rated current	90mA
Wiring parameters	
Connection technology: Output	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree (5)	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

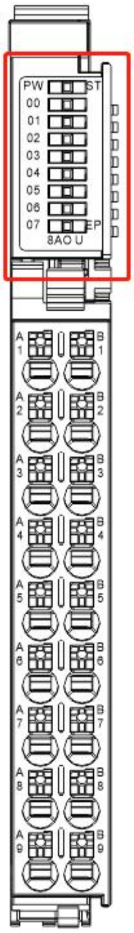
9.2 Hardware Interface

9.2.1 WiringTerminal Definition



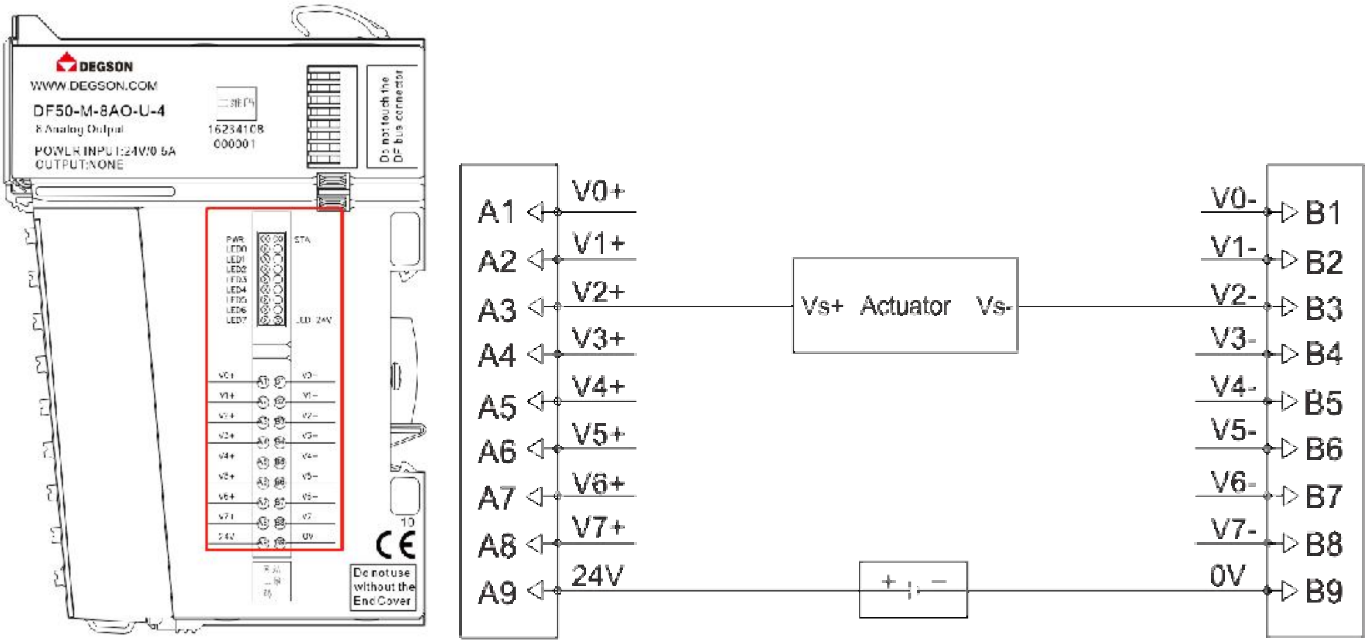
Terminal number	Signal	Terminal number	Signal	illustrate
A1	V0+	B1	V0-	Voltage output channel0
A2	V1+	B2	V1-	Voltage output channel1
A3	V2+	B3	V2-	Voltage output channel2
A4	V3+	B4	V3-	Voltage output channel3
A5	V4+	B5	V4-	Voltage output channel4
A6	V5+	B6	V5-	Voltage output channel5
A7	V6+	B7	V6-	Voltage output channel6
A8	V7+	B8	V7-	Voltage output channel7
A9	24V	B9	0V	Terminal power input

9.2.2 LED indicatorsdefinition



Indicator Lights	meaning	
PW	Green:System bus powerSource Inputnormal	
	Green Kill:System bus powerSource Inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally
		Green off/green on: The internal bus of the module is working abnormally or the terminal power input is abnormal
EP	Green: The terminal power input is normal	
	Green off: Terminal power input abnormality	
V0～V7	Green flash: output signal is valid	
	Green off: Output signal is invalid	

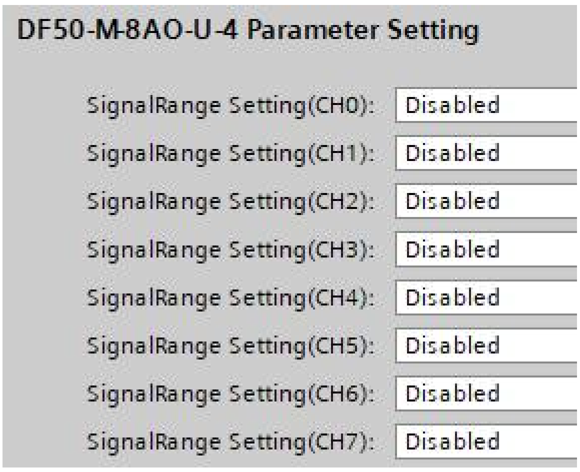
9.2.3 Wiring Diagram



Note: A9, B9 24V power supply is provided externally.

9.3 Module Configuration Data Definition

As shown in the figure, the user can configure each channelSignal range.



9.4 Module process data definition

loseoutdata:16Byte		
ByteNo.	Word No.	meaning

Byte0-Byte1	Word0	Channel 0 Inputoutdata
Byte2-Byte3	Word1	aisle1loseoutdata
Byte4-Byte5	Word2	aisle2loseoutdata
Byte6-Byte7	Word3	aisle3loseoutdata
Byte8-Byte9	Word4	aisle4loseoutdata
Byte10-Byte11	Word5	aisle5loseoutdata
Byte12-Byte13	Word6	aisle6loseoutdata
Byte14-Byte15	Word7	aisle7loseoutdata

Channel output data description:

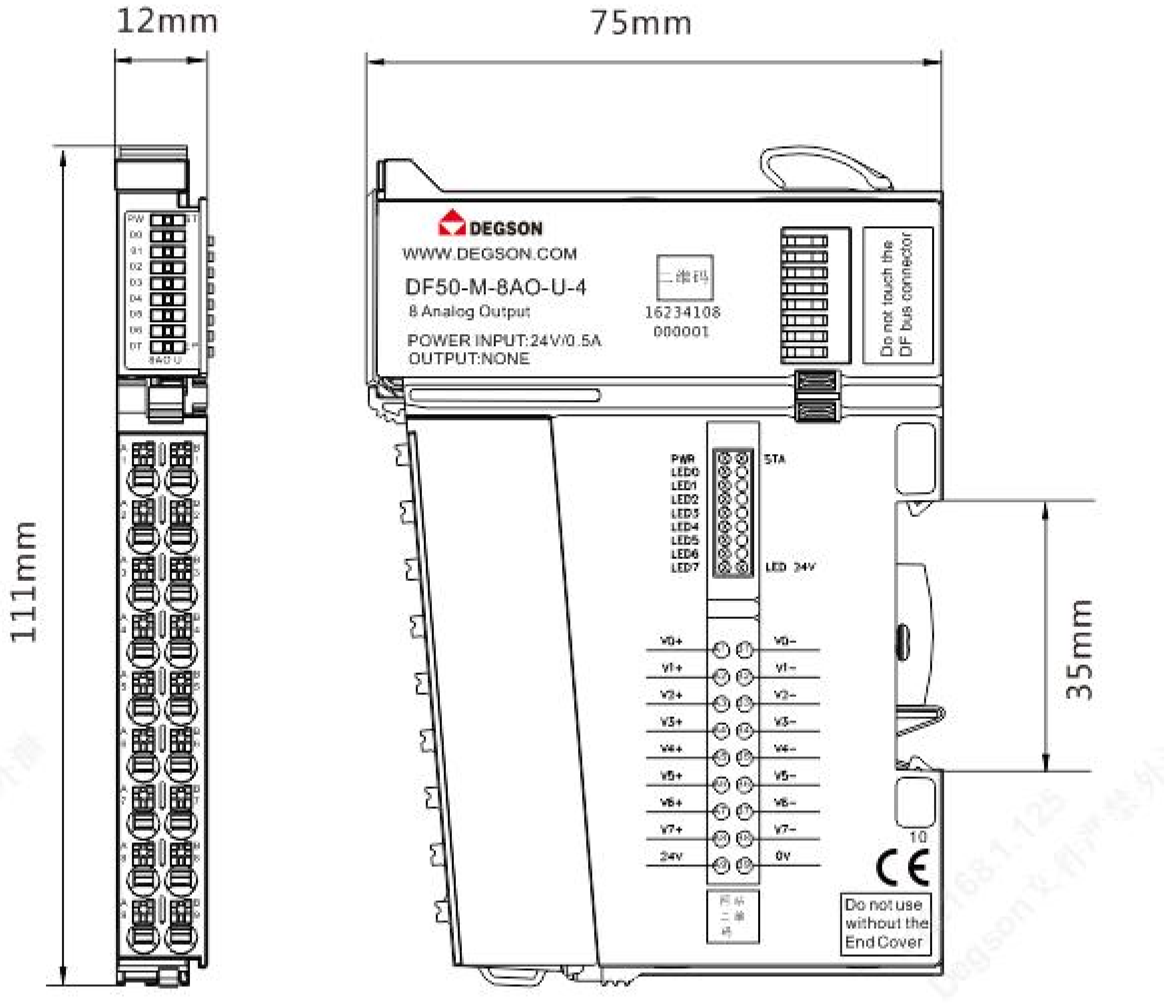
Signal range	Voltage value (U)	Decimal data	Hexadecimal data	Scope	Conversion relationship
±10V	0V	>32511	>0x7EFF	Overflow	D = 27648 x U / 10 U = D x 10 / 27648
	11.76V	32511	0x7EFF	Upper limit	
	10V	27648	0x6C00	Normal range	
	5V	13824	0x3600		
	0V	0	0x0000		
	-5V	-13824	0xCA00		
	-10V	-27648	0x9400		
	-11.76V	-32511	0x8101	Lower limit	
	0V	<-32511	<0x8101	Underflow	
0~10V	0V	>32511	>0x7EFF	Overflow	D = 27648 x U / 10

	11.76V	32511	0x7EFF	Upper limit	U = D x 10 / 27648
	10V	27648	0x6C00	Normal range	
	5V	13824	0x3600		
	0V	0	0x0000		
2~10V	0V	>32511	>0x7EFF	Overflow	D = 27648 x (U – 2) / 8 U = D x 8 / 27648 + 2
	11.41V	32511	0x7EFF	Upper limit	
	10V	27648	0x6C00	Normal range	
	6V	13824	0x3600		
	2V	0	0x0000		
	0.59 V	-4864	0xED00	Lower limit	
	0 V	<-4864	<0xED00	Underflow	
±5V	0V	>32511	>0x7EFF	Overflow	D = 27648 x U / 5 U = D x 5 / 27648
	5.88V	32511	0x7EFF	Upper limit	
	5V	27648	0x6C00	Normal range	
	2.5V	13824	0x3600		
	0V	0	0x0000		
	-2.5V	-13824	0xCA00		
	-5V	-27648	0x9400		
	-5.88V	-32511	0x8100	Lower limit	
	0V	<-32511	<0x8101	Underflow	

0~5V	0V	>32511	>0x7EFF	Overflow	D = 27648 x U / 5 U = D x 5 / 27648
	5.88V	32511	0x7EFF	Upper limit	
	5V	27648	0x6C00	Normal range	
	2.5V	13824	0x3600		
	0V	0	0x0000		
1~5V	0V	>32511	>0x7EFF	Overflow	D = 27648 x (U – 1) / 4 U = D x 4 / 27648 + 1
	5.7V	32511	0x7EFF	Upper limit	
	5V	27648	0x6C00	Normal range	
	3V	13824	0x3600		
	1V	0	0x0000		
	0.3V	-4864	0xED00	Lower limit	
	0V	<-4864	<0xED00	Underflow	

9.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



10 8-channel analog output/current type (DF50-M-8AO-I-5)

- The analog output module can output current standard signal.
- 8-channel analog output, current type.
- The two LED indicators indicate that the module is operating normally and communicating normally.
- Magnetic isolation between the field level and the system level.
- Transmitted in 16-bit resolution.
- Protection grade IP20

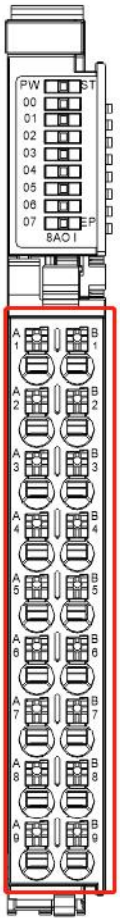
10.1 Specifications

Technical Information	
Product Description	Analog output module, 8 outputs, current type
Number of channels	8
Output signal type	Current, single-ended output
Resolution	16 Bit
Current output range	0~20mA, 4~20mA
Current output load	<600Ω
Current output accuracy	±0.1%
Isolation	The interface channels are not isolated, the power supply is

	isolated from the interface, and the interface is isolated from the bus.
Independent channel enable configuration	support
Diagnosis reporting function configuration	support
Channel Mode Configuration	Disable,0-20mA, 4-20mA
Output status configuration after shutdown	Clear and keep current output
Stop Mode	In the fault shutdown mode, no more refresh
Input Action Display	When the output signal is valid, the output indicator light flashes (software controlled)
IO process data size	8 Word
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	35mA
Terminal power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power input rated current	33mA
Wiring parameters	
Connection technology: Output	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree (5)	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

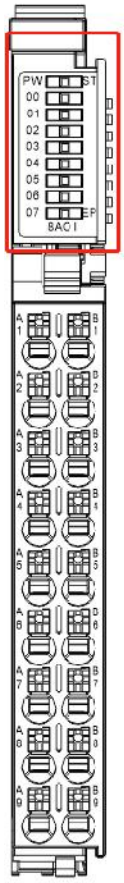
10.2 Hardware Interface

10.2.1 WiringTerminal Definition



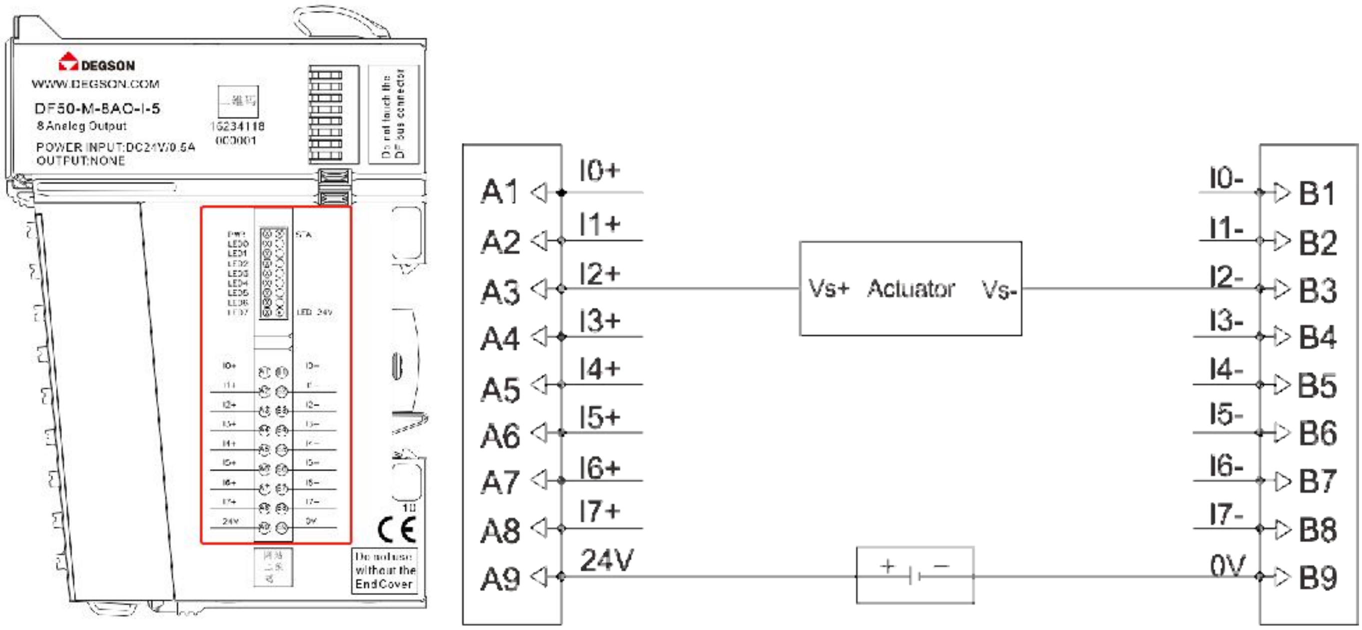
Terminal number	Signal	Terminal number	Signal	illustrate
A1	I0+	B1	I0-	Current output channel 0
A2	I1+	B2	I1-	Current output channel 1
A3	I2+	B3	I2-	Current output channel 2
A4	I3+	B4	I3-	Current output channel 3
A5	I4+	B5	I4-	Current output channel 4
A6	I5+	B6	I5-	Current output channel 5
A7	I6+	B7	I6-	Current output channel 6
A8	I7+	B8	I7-	Current output channel 7
A9	24V	B9	0V	Terminal power input

10.2.2 LED Indicatordefinition



Indicator Lights	meaning	
PW	Green:System bus powerSource Inputnormal	
	Green Kill:System bus powerSource Inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally
		Green off/green on: The internal bus of the module is working abnormally or the terminal power input is abnormal
EP	Green: The terminal power input is normal	
	Green off: Terminal power input abnormality	
I0～I7	Green flash: output signal is valid	
	Green off: Output signal is invalid	

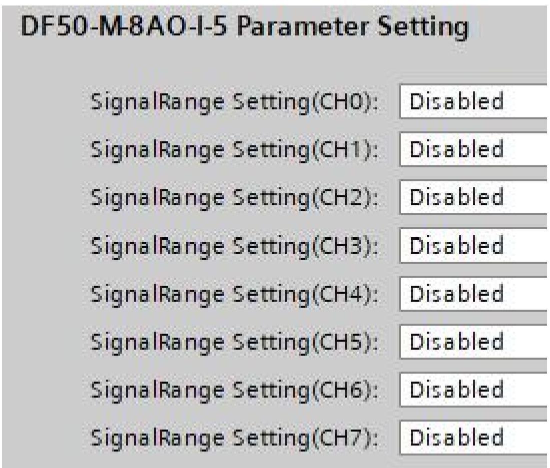
10.2.3 Wiring Diagram



Note: A9, B9 24V power supply is provided externally.

10.3 Module Configuration Data Definition

likeAs shown in the figure, users can configure each channelSignal range.



10.4 Module process data definition

loseoutdata:16Byte		
ByteNo.	Word No.	meaning
Byte0-Byte1	Word0	Channel 0 Inputoutdata
Byte2-Byte3	Word1	aisle1loseoutdata
Byte4-Byte5	Word2	aisle2loseoutdata
Byte6-Byte7	Word3	aisle3loseoutdata
Byte8-Byte9	Word4	aisle4loseoutdata
Byte10-Byte11	Word5	aisle5loseoutdata
Byte12-Byte13	Word6	aisle6loseoutdata
Byte14-Byte15	Word7	aisle7loseoutdata

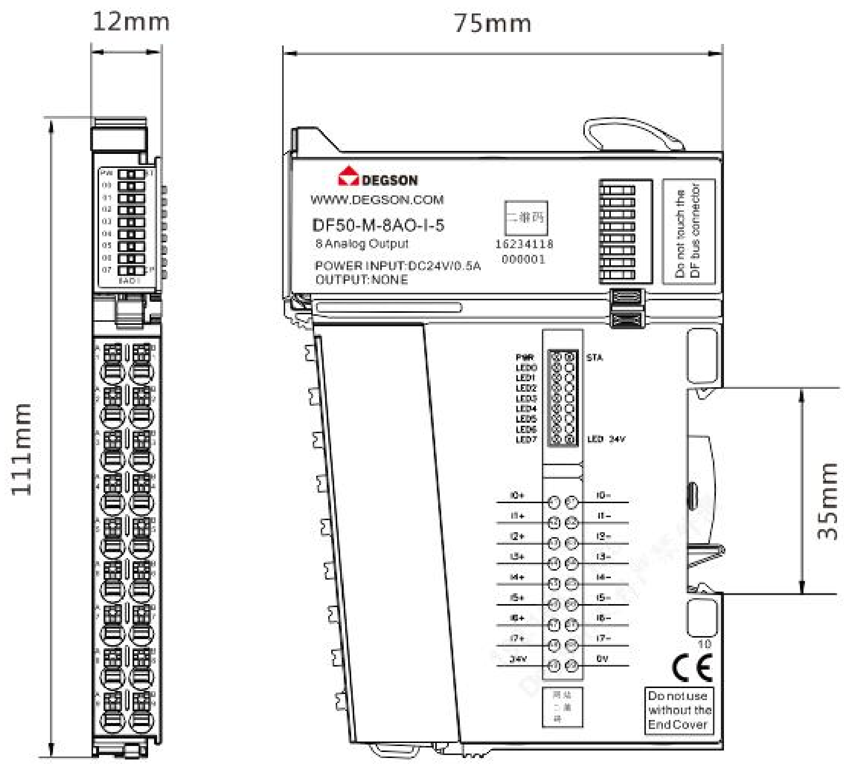
Channel output data description:

Signal range	Current value (I)	Decimal data	Hexadecimal data	Scope	Conversion relationship
0~20ma	0ma	>32511	>0x7EFF	Overflow	D = 27648 xI/ 20 I= D x 20/ 27648
	23.52ma	32511	0x7EFF	Upper limit	
	20ma	27648	0x6C00	Normal range	
	10ma	13824	0x3600		
	0ma	0	0x0000		
4~20ma	0ma	>32511	>0x7EFF	Overflow	D = 27648 x (I– 4) / 16 I= D x 16 / 27648 + 4
	22.81ma	32511	0x7EFF	Upper limit	

	20ma	27648	0x6C00	Normal range	
	12ma	13824	0x3600		
	4ma	0	0x0000		
	1.19ma	-4864	0xED00	Lower limit	
	0ma	<-4864	<-0xED00	Underflow	

10.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



11 4-channel thermal resistance measurement (DF50-M-4RTD-PT)

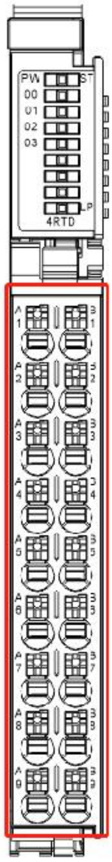
- The module uses 4-channel thermal resistance measurement and supports 13 conventional thermal resistances.
- Supports four sensors.
- Supports 2-wire, 3-wire, and 4-wire sensors.
- The two LED indicators indicate that the module is operating normally and communicating normally.
- Each channel has an LED indicator.
- Magnetic isolation between the field level and the system level.
- Transmitted in 16-bit resolution.
- Protection grade IP20.

11.1 Specifications

Technical Information	
Product Description	RTD measurement module, 16-bit resolution, 4 channels
Number of channels	4
Sensor Type	Pt100, Pt200, Pt500, Pt1000, Ni100, Ni120, Ni 200, Ni500, Ni1000, Cu10,Cu50,Cu53,Cu100KTY83-110, KTY83-120,KTY83-121,KTY83-122,KTY83-150,KTY83-151, NTC-5K,NTC-20K,TY84-130,KTY84-150,KTY84-151, 40 Ω, 80 Ω, 150 Ω, 300 Ω, 500 Ω, 1 kΩ, 2 kΩ, 4 kΩ
Resolution/Display sensitivity	16bit, 0.1°C/bit
Accuracy	±0.3%
Connection method	Two-wire/three-wire system
Isolation	Isolation between interface channels, isolation between interface and bus
Channel diagnostics	Over-limit alarm, over-lower limit alarm, disconnection alarm, overflow error
Diagnosis reporting function configuration	support
Frequency interference suppression	50Hz | 60Hz
Sampling frequency	7.5Hz~1.25Hz configurable,
Input Action Display	When the input signal is valid, the input indicator flashes (software controlled)
IO process data size	4 Word
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	30mA
Internal load power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Internal load power input rated current	10mA
Wiring parameters	
Connection technology:	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60°C
Permissible ambient temperature (storage)	-40～85°C
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

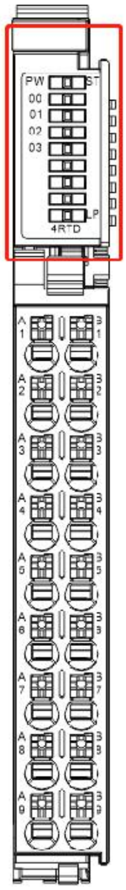
11.2 Hardware Interface

11.2.1 WiringTerminal Definition



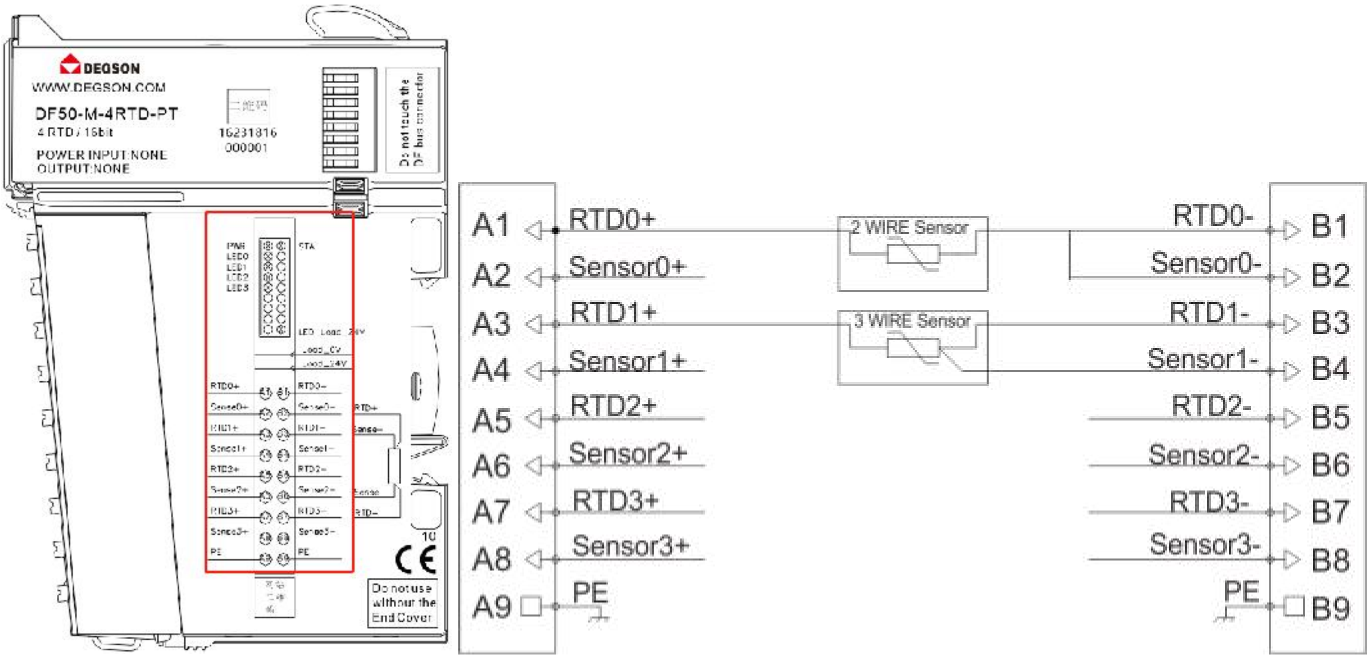
Terminal number	Signal	Terminal number	Signal	illustrate
A1	RTD0+	B1	RTD0-	The first channel signal input
A2	Sense0+	B2	Sense0-	
A3	RTD1+	B3	RTD1-	Second channel signal input
A4	Sense1+	B4	Sense1-	
A5	RTD2+	B5	RTD2-	The third channel signal input
A6	Sense2+	B6	Sense2-	
A7	RTD3+	B7	RTD3-	The fourth channel signal input
A8	Sense3+	B8	Sense3-	
A9	/	B9	/	Reserved for hanging

11.2.2 LED Indicatordefinition



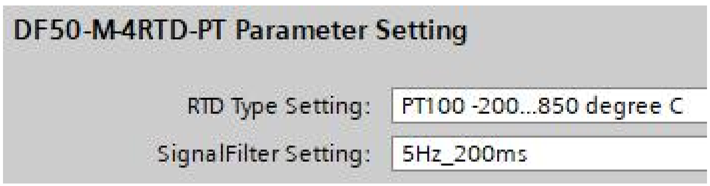
Indicator Lights	meaning	
PW	Green:System bus powerSource Inputnormal	
	Green Kill:System bus powerSource Inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally
		Green off/green on: The internal bus of the module is working abnormally orInternal LoadPower input abnormality
LP	Green:Internal load power inputnormal	
	Green off:Internal load power inputabnormal	
00～03	Green flash: input signal is valid	
	Green off: Input signal is invalid	

11.2.3 Wiring Diagram



11.3 Module Configuration Data Definition

likeAs shown in the figure, users can configure each channelSignal type.



11.4 Module process data definition

loseenterdata:8Byte		
ByteNo.	Word No.	meaning
Byte0-Byte1	Word0	Channel 0 Inputenterdata
Byte2-Byte3	Word1	aisle1loseenterdata
Byte4-Byte5	Word2	aisle2loseenterdata
Byte6-Byte7	Word3	aisle3loseenterdata

Channel output data description:

PT100			
temperature	Decimal	hexadecimal	Scope
>850	32767	0x7FFF	Overflow
850	8500	0x2134	Normal range
-200	-2000	0xF830	
<-200	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

PT200			
temperature	Decimal	hexadecimal	Scope
>850	32767	0x7FFF	Overflow
850	8500	0x2134	Normal range
-200	-2000	0xF830	
<-200	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

PT500			
temperature	Decimal	hexadecimal	Scope

>850	32767	0x7FFF	Overflow
850	8500	0x2134	Normal range
-200	-2000	0xF830	
<-200	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

PT1000			
temperature	Decimal	hexadecimal	Scope
>850	32767	0x7FFF	Overflow
850	8500	0x2134	Normal range
-200	-2000	0xF830	
<-200	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

Ni100			
temperature	Decimal	hexadecimal	Scope
>250	32767	0x7FFF	Overflow
250	2500	0x09C4	Normal range
-60	-600	0xFDA8	
<-60	-32767	0x8001	Underflow

Sensor not connected	-32768	0x8000	Disconnection detection

Ni120			
temperature	Decimal	hexadecimal	Scope
>309	32767	0x7FFF	Overflow
309	3090	0x0C12	Normal range
-79	-790	0xFCEA	
<-79	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

NI200			
temperature	Decimal	hexadecimal	Scope
>250	32767	0x7FFF	Overflow
250	2500	0x09C4	Normal range
-60	-600	0xFDA8	
<-60	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

Ni500			
temperature	Decimal	hexadecimal	Scope

>250	32767	0x7FFF	Overflow
250	2500	0x09C4	Normal range
-60	-600	0xFDA8	
<-60	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

Ni1000			
temperature	Decimal	hexadecimal	Scope
>250	32767	0x7FFF	Overflow
250	2500	0x09C4	Normal range
-60	-600	0xFDA8	
<-60	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

Cu10 type			
temperature	Decimal	hexadecimal	Scope
>159	32767	0x7FFF	Overflow
159	1590	0x0636	Normal range
-59	-590	0xFDB2	
<-59	-32767	0x8001	Underflow

Sensor not connected	-32768	0x8000	Disconnection detection

Cu50			
temperature	Decimal	hexadecimal	Scope
>159	32767	0x7FFF	Overflow
159	1590	0x0636	Normal range
-59	-590	0xFDB2	
<-59	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

Cu53			
temperature	Decimal	hexadecimal	Scope
>150	32767	0x7FFF	Overflow
150	1500	0x05DC	Normal range
-50	-500	0xFE0C	
<-50	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

Cu100			
temperature	Decimal	hexadecimal	Scope

>159	32767	0x7FFF	Overflow
159	1590	0x0636	Normal range
-59	-590	0xFDB2	
<-59	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

KTY84_130			
temperature	Decimal	hexadecimal	Scope
>280	32767	0x7FFF	Overflow
280	2800	0x0AF0	Normal range
-40	-400	0xFE70	
<-40	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

KTY84_150			
temperature	Decimal	hexadecimal	Scope
>280	32767	0x7FFF	Overflow
280	2800	0x0AF0	Normal range
-40	-400	0xFE70	
<-40	-32767	0x8001	Underflow

Sensor not connected	-32768	0x8000	Disconnection detection

KTY84_151			
temperature	Decimal	hexadecimal	Scope
>280	32767	0x7FFF	Overflow
280	2800	0x0AF0	Normal range
-40	-400	0xFE70	
<-40	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

0-40ohm type			
Ohm value	Decimal	hexadecimal	Scope
>319.25ohm	-32768	0x8000	Beyond the limit
>47.03ohm	32767	0x7FFF	Upper limit
47.03ohm	32511	0x7EFF	Overflow
40ohm	27648	0x6C00	Normal range
0ohm	0	0x0000	
Sensor not connected	-32768	0x8000	Disconnection detection

0-80ohm type

Ohm value	Decimal	hexadecimal	Scope
>319.25ohm	-32768	0x8000	Beyond the limit
>94.07ohm	32767	0x7FFF	Upper limit
94.07ohm	32511	0x7EFF	Overflow
80ohm	27648	0x6C00	Normal range
0ohm	0	0x0000	
Sensor not connected	-32768	0x8000	Disconnection detection

0-150ohm type			
Ohm value	Decimal	hexadecimal	Scope
>319.25ohm	-32768	0x8000	Beyond the limit
>176.38ohm	32767	0x7FFF	Upper limit
176.38ohm	32511	0x7EFF	Overflow
150ohm	27648	0x6C00	Normal range
0ohm	0	0x0000	
Sensor not connected	-32768	0x8000	Disconnection detection

0-300ohm type			
Ohm value	Decimal	hexadecimal	Scope
>638.5ohm	-32768	0x8000	Beyond the limit
>352.77ohm	32767	0x7FFF	Upper limit

352.77ohm	32511	0x7EFF	Overflow
300ohm	27648	0x6C00	Normal range
0ohm	0	0x0000	
Sensor not connected	-32768	0x8000	Disconnection detection

0-500ohm type			
Ohm value	Decimal	hexadecimal	Scope
>638.5ohm	-32768	0x8000	Beyond the limit
>587.94ohm	32767	0x7FFF	Upper limit
587.94ohm	32511	0x7EFF	Overflow
500ohm	27648	0x6C00	Normal range
0ohm	0	0x0000	
Sensor not connected	-32768	0x8000	Disconnection detection

0-1000ohm type			
Ohm value	Decimal	hexadecimal	Scope
>1277ohm	-32768	0x8000	Beyond the limit
>1175.89ohm	32767	0x7FFF	Upper limit
1175.89ohm	32511	0x7EFF	Overflow
1000ohm	27648	0x6C00	Normal range

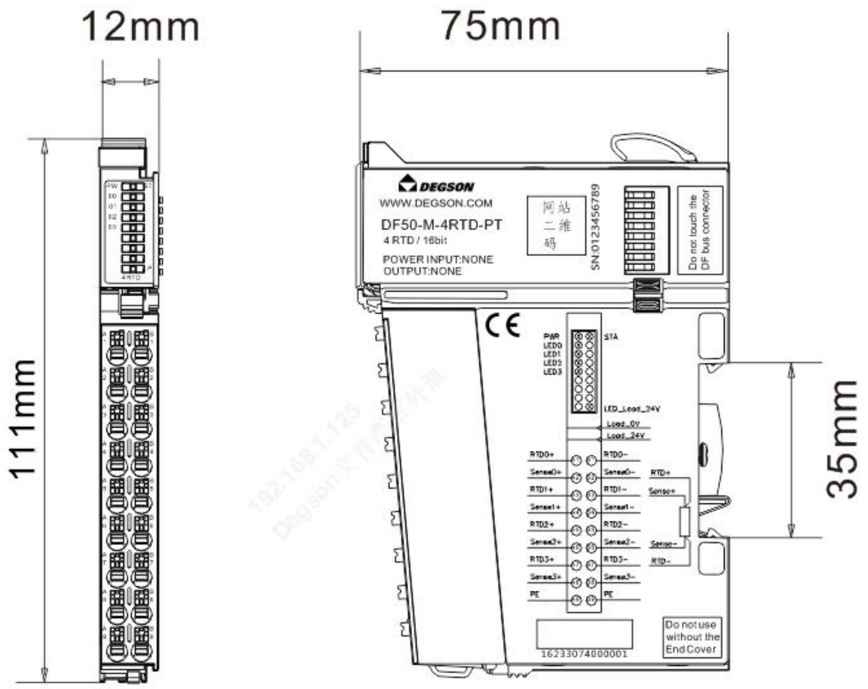
0ohm	0	0x0000	
Sensor not connected	-32768	0x8000	Disconnection detection

0-2000ohm type			
Ohm value	Decimal	hexadecimal	Scope
>2554ohm	-32768	0x8000	Beyond the limit
>2351.78ohm	32767	0x7FFF	Upper limit
2351.78ohm	32511	0x7EFF	Overflow
2000ohm	27648	0x6C00	Normal range
0ohm	0	0x0000	
Sensor not connected	-32768	0x8000	Disconnection detection

0-4000ohm type			
Ohm value	Decimal	hexadecimal	Scope
>5108ohm	-32768	0x8000	Beyond the limit
>4703.56ohm	32767	0x7FFF	Upper limit
4703.56ohm	32511	0x7EFF	Overflow
4000ohm	27648	0x6C00	Normal range
0ohm	0	0	
Sensor not connected	-32768	0x8000	Disconnection detection

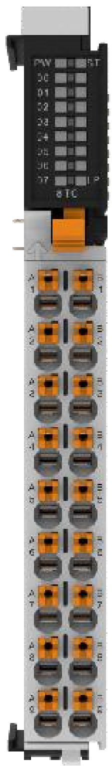
11.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



12 8-channel thermocouple measurement (DF50-M-8TC)

- The module uses 8-channel thermocouple measurement and supports K/E/T/J/B/S/R/N/L and millivolt voltage sensors.
- Supports eight sensors.
- Supports 2-wire sensors.
- This module reserves eight cold-end compensation output channels to compensate for cold-end temperature differences.
- Each channel has an LED indicator.
- The two LED indicators indicate that the module is operating normally and communicating normally.
- Each channel has an LED indicator.
- Magnetic isolation between the field level and the system level.
- Transmitted in 16-bit resolution.
- Protection grade IP20.



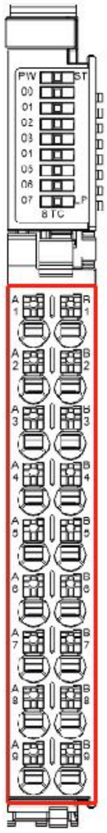
12.1 Specifications

Technical Information	
Product Description	Thermocouple measurement module, 16-bit resolution, 8 channels
Number of channels	8

Sensor Type	K, E, T, J, B, S, R, N, L and millivolt voltage sensors
Resolution/Display sensitivity	16bit, 0.1℃/bit
Connection method	Two lines
Accuracy	±0.3%
Isolation	Isolation between interface channels, isolation between interface and bus
Channel diagnostics	Over-limit alarm, over-lower limit alarm, disconnection alarm, overflow error
Diagnosis reporting function configuration	support
Frequency interference suppression	50Hz | 60Hz
Filter time	61.25ms~7200ms configurable,
Input Action Display	When the input signal is valid, the input indicator flashes (software controlled)
IO process data size	8 Word
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	35mA
Internal load power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Internal load power input rated current	10mA
Wiring parameters	
Connection technology	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

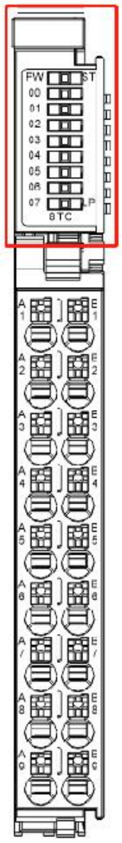
12.2 Hardware Interface

12.2.1 WiringTerminal Definition



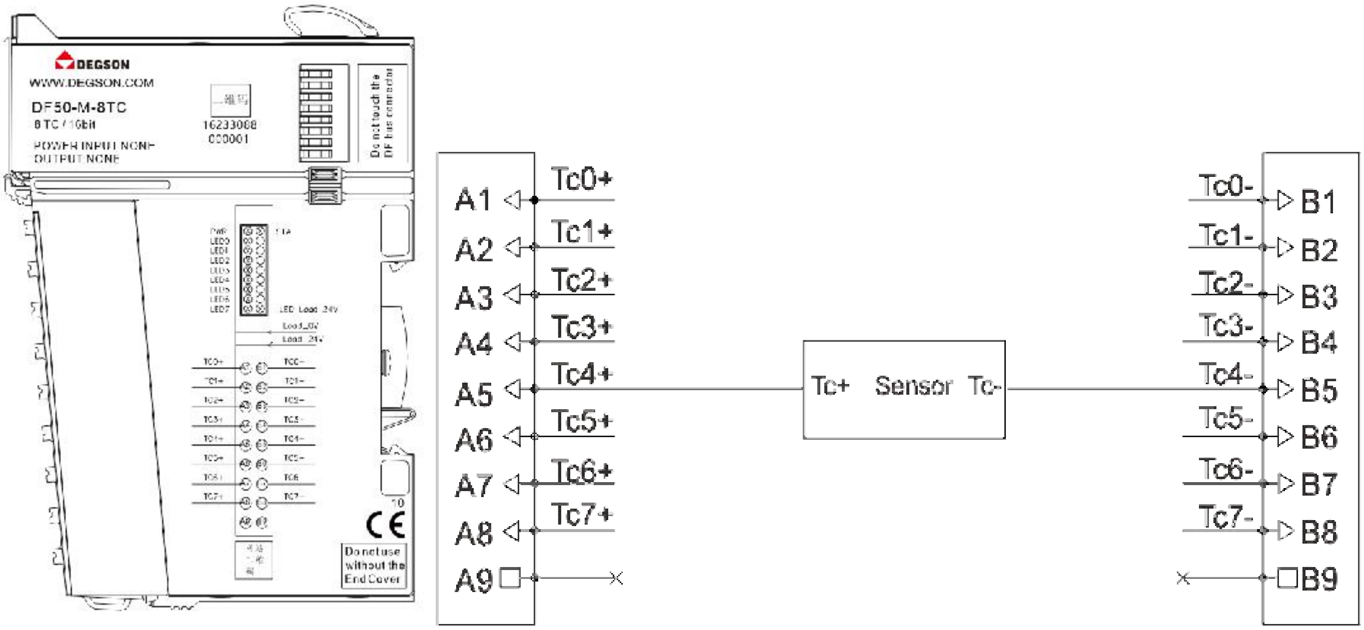
Terminal number	Signal	Terminal number	Signal	illustrate
A1	TC0+	B1	TC0-	Signal input channel 0
A2	TC1+	B2	TC1-	Signal input channel 1
A3	TC2+	B3	TC2-	Signal input channel 2
A4	TC3+	B4	TC3-	Signal input channel 3
A5	TC4+	B5	TC4-	Signal input channel 4
A6	TC5+	B6	TC5-	Signal input channel 5
A7	TC6+	B7	TC6-	Signal input channel 6
A8	TC7+	B8	TC7-	Signal input channel 7
A9	/	B9	/	Reserved for hanging

12.2.2 LED Indicatordefinition



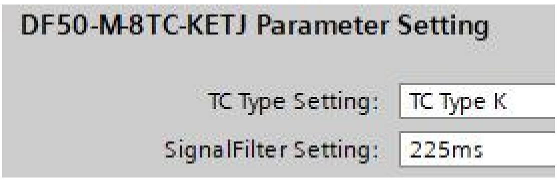
Indicator Lights	meaning	
PW	Green:System bus powerSource Inputnormal	
	Green Kill:System bus powerSource Inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally
		Green off/green on: The internal bus of the module is working abnormally orInternal LoadPower input abnormality
LP	Green:Internal load power inputnormal	
	Green off:Internal load power inputabnormal	
00～07	Green flash: input signal is valid	
	Green off: Input signal is invalid	

12.2.3 Wiring Diagram



12.3 Module Configuration Data Definition

likeAs shown in the figure, users can configure each channelSignal type.



12.4 Module process data definition

loseenterdata:16Byte		
ByteNo.	Word No.	meaning
Byte0-Byte1	Word0	Channel 0 Inputenterdata
Byte2-Byte3	Word1	aisle1loseenterdata
Byte4-Byte5	Word2	aisle2loseenterdata
Byte6-Byte7	Word3	aisle3loseenterdata
Byte8-Byte9	Word4	aisle4loseenterdata

Byte10-Byte11	Word5	aisle5loseenterdata
Byte12-Byte13	Word6	aisle6loseenterdata
Byte14-Byte15	Word7	aisle7loseenterdata

loseoutdata:16Byte		
ByteNo.	Word No.	meaning
Byte0-Byte1	Word0	Channel 0compensatedata
Byte2-Byte3	Word1	aisle1 Compensationdata
Byte4-Byte5	Word2	aisle2 Compensationdata
Byte6-Byte7	Word3	aisle3. Compensationdata
Byte8-Byte9	Word4	aisle4 Compensationdata
Byte10-Byte11	Word5	aisle5. Compensationdata
Byte12-Byte13	Word6	aisle6 Compensationdata
Byte14-Byte15	Word7	aisle7. Compensationdata

Channel output data description:

K-Type			
temperature	Decimal	hexadecimal	Scope
>1370	32767	0x7FFF	Overflow
1370	13700	0x3584	Normal range
-270	-2700	0xF574	

<-270	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

Type E			
temperature	Decimal	hexadecimal	Scope
>1000	32767	0x7FFF	Overflow
1000	10000	0x2710	Normal range
-270	-2700	0xF574	
<-270	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

T-Type			
temperature	Decimal	hexadecimal	Scope
>400	32767	0x7FFF	Overflow
400	4000	0x0FA0	Normal range
-270	-2700	0xF574	
<-270	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

J-Type			
temperature	Decimal	hexadecimal	Scope
>1200	32767	0x7FFF	Overflow
1200	12000	0x2EE0	Normal range
-210	-2100	0xF7CC	
<-210	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

Type B			
temperature	Decimal	hexadecimal	Scope
>1830	32767	0x7FFF	Overflow
1830	18300	0x477C	Normal range
50	500	0x01F4	
<50	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

S-Type			
temperature	Decimal	hexadecimal	Scope
>1760	32767	0x7FFF	Overflow
1760	17600	0x44C0	Normal range

-50	-500	0xFE0C	
<-50	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

R-Type			
temperature	Decimal	hexadecimal	Scope
>250	32767	0x7FFF	Overflow
250	2500	0x09C4	Normal range
-60	-600	0xFDA8	
<-60	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

Ni500			
temperature	Decimal	hexadecimal	Scope
>1770	32767	0x7FFF	Overflow
1770	17700	0x4524	Normal range
-50	-500	0xFE0C	
<-50	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

Type C			
temperature	Decimal	hexadecimal	Scope
>2320	32767	0x7FFF	Overflow
2320	23200	0x5AA0	Normal range
0	0	0	
<0	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

L-type			
temperature	Decimal	hexadecimal	Scope
>900	32767	0x7FFF	Overflow
900	9000	0x2328	Normal range
-200	-2000	0xF830	
<-200	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

N-type			
temperature	Decimal	hexadecimal	Scope
>1300	32767	0x7FFF	Overflow
1300	13000	0x32C8	Normal range

-270	-2700	0xF574	
<-270	-32767	0x8001	Underflow
Sensor not connected	-32768	0x8000	Disconnection detection

±15.625mV			
Signal	Decimal	hexadecimal	Scope
15.625mV	32767	0x7FFF	Normal range
-15.625mV	-32767	0x8001	
Sensor not connected	-32768	0x8000	Disconnection detection

±31.25mV			
Signal	Decimal	hexadecimal	Scope
31.25mV	32767	0x7FFF	Normal range
-31.25mV	-32767	0x8001	
Sensor not connected	-32768	0x8000	Disconnection detection

±62.5mV			
Signal	Decimal	hexadecimal	Scope
62.5mV	32767	0x7FFF	Normal range
-62.5mV	-32767	0x8001	

Sensor not connected	-32768	0x8000	Disconnection detection

±125mV			
Signal	Decimal	hexadecimal	Scope
125mV	32767	0x7FFF	Normal range
-125mV	-32767	0x8001	
Sensor not connected	-32768	0x8000	Disconnection detection

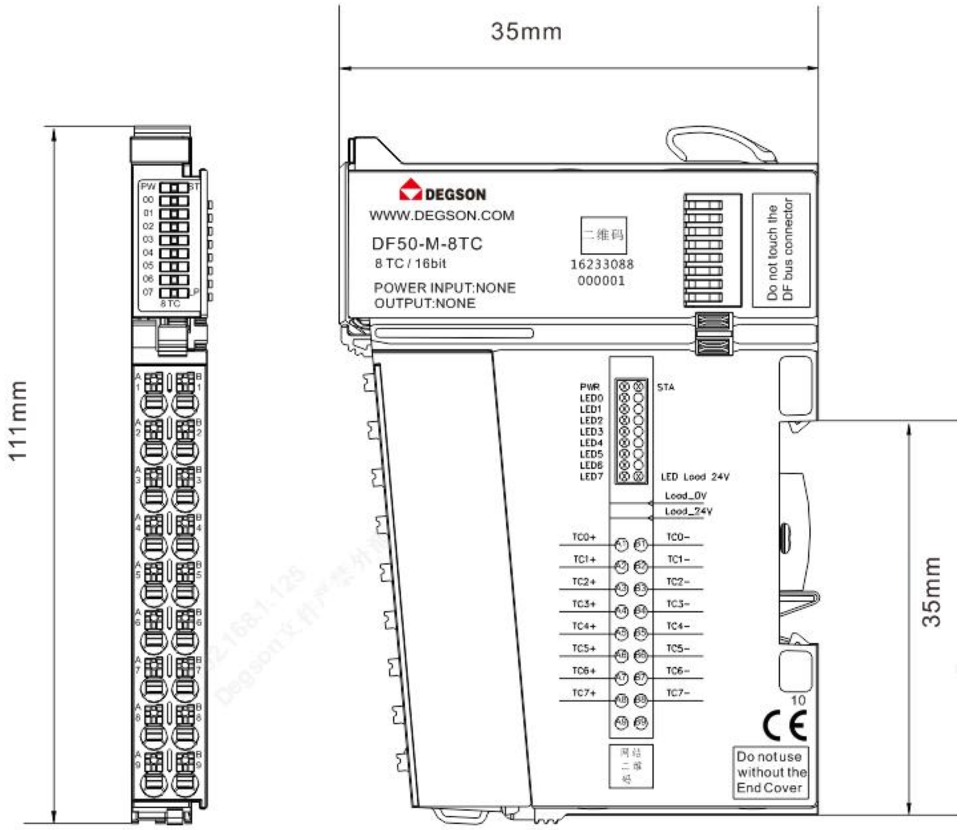
±500mV			
Signal	Decimal	hexadecimal	Scope
500mV	32767	0x7FFF	Normal range
-500mV	-32767	0x8001	
Sensor not connected	-32768	0x8000	Disconnection detection

±1000mV			
Signal	Decimal	hexadecimal	Scope
1000mV	32767	0x7FFF	Normal range
-1000mV	-32767	0x8001	
Sensor not connected	-32768	0x8000	Disconnection detection

±2000mV			
Signal	Decimal	hexadecimal	Scope
2000mV	32767	0x7FFF	Normal range
-2000mV	-32767	0x8001	
Sensor not connected	-32768	0x8000	Disconnection detection

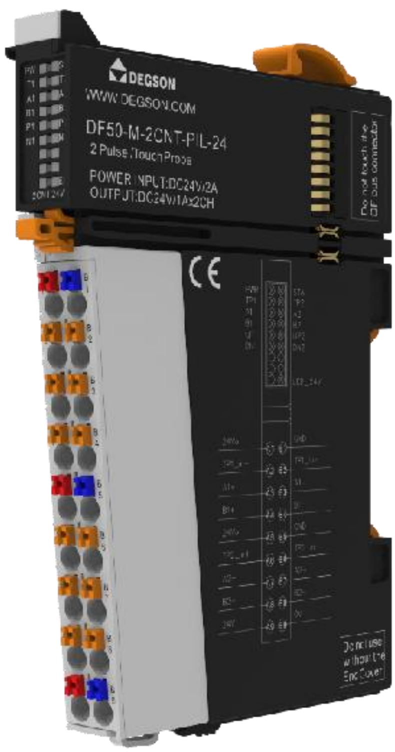
12.5 Mechanical Installation

InstallSize letterinterestAs shown in the figure below, the unit is (mm）:



13 2-channel encoder pulse counting/24VDC (DF50-M-2CNT-PIL-24)

- The encoder pulse counting module adopts 2-channel pulse counting. The input signal voltage is 24VDC.
- Each input module is equipped with an anti-interference filter.
- The two LED indicators indicate that the module is operating normally and communicating normally.
- Magnetic isolation between the field level and the system level.
- Protection grade IP20.



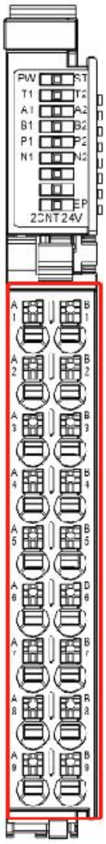
13.1 Specifications

Technical Information	
Product Description	High speed counting module, 2 channels
Number of channels	2
Signal Type	Incremental encoder AB / pulse + direction signal
Maximum input frequency	1MHZ
Input signal voltage	24V DC
Connection Type	2-wire/4-wire
Quadrature encoder frequency multiplication	x1/x2/x4
Counting Mode	Linear counter form, ring counter form

Count latch/reset function	Support, configurable
Filter function	Support, configurable
Counting range	–2147483648~2147483647
Accuracy	±1 pulse
Isolation method	Photoelectric isolation from the field layer
Error diagnosis	support
Input Action Display	When the input is in driving state, the indicator light is on (software control)
IO process data size	Output: 10 Byte; Input: 18 Byte
IO data mapping	Supports 3 IO mapping modes: bit-based access, byte-based access, and word-based access
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	115mA
Terminal power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power input rated current	2A
Terminal power output rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power output rated current	1A
Wiring parameters	
Connection technology:	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

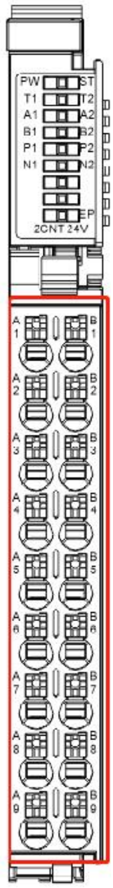
13.2 Hardware Interface

13.2.1 WiringTerminal Definition



Terminal number	Signal	Terminal number	Signal	illustrate
A1	24Vo	B1	GND	Terminal power output
A2	TP1_in+	B2	TP1_in-	DI signal input
A3	A1+	B3	A1-	Orthogonal encoding mode A phase signal input/ Pulse plus direction mode direction signal input
A4	B1+	B4	B1-	Orthogonal encoding mode B phase signal input/ Pulse plus direction mode pulse signal input
A5	24Vo	B5	GND	Terminal power output
A6	TP2_in+	B6	TP2_in-	DI signal input
A7	A2+	B7	A2-	Orthogonal encoding mode A phase signal input/ Pulse plus direction mode direction signal input
A8	B2+	B8	B2-	Orthogonal encoding mode B phase signal input/ Pulse plus direction mode pulse signal input
A9	24Vin	B9	0V	Terminal power input

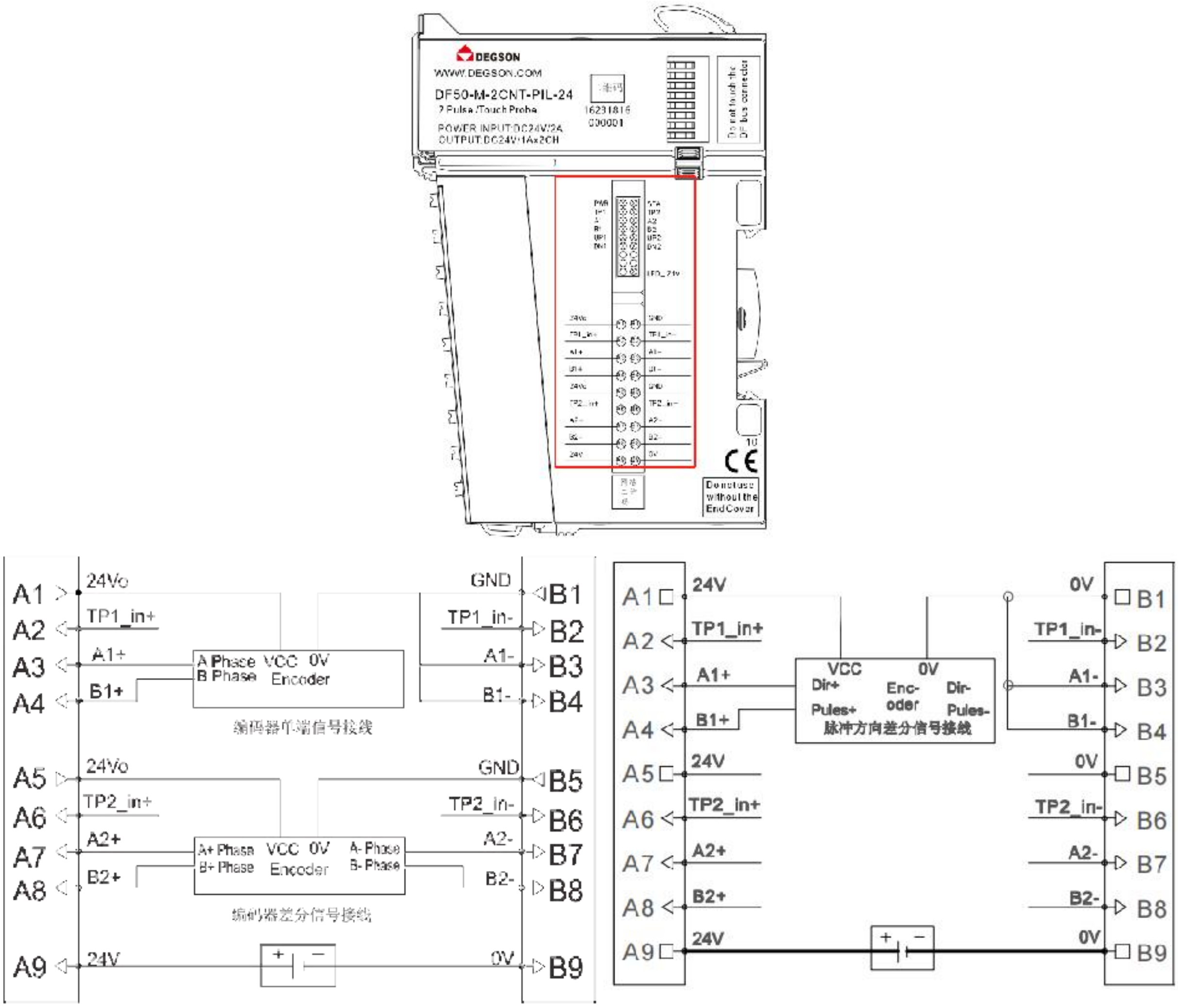
13.2.2 LED Indicatordefinition



Indicator Lights	meaning	
PW	Green:System bus powerSource Inputnormal	
	Green Kill:System bus powerSource Inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally.
		Green off/green on: The internal bus of the module is working abnormally or the terminal power input is abnormal
T1/T2	Green: DI input signal is valid	
	Green off: DI input signal is invalid	
A1/A2	Green: Input signal is valid	
	Green off: Input signal is invalid	
B1/B2	Green: Input signal is valid	
	Green off: Input signal is invalid	
P1/P2	Green: Encoder is rotating forward	

	Green off: Encoder is stationary or reversed
N1/N2	Green: Encoder reverse
	Green off: Encoder is stationary or rotating forward
EP	Green: The terminal power input is normal
	Green off: Terminal power input abnormality

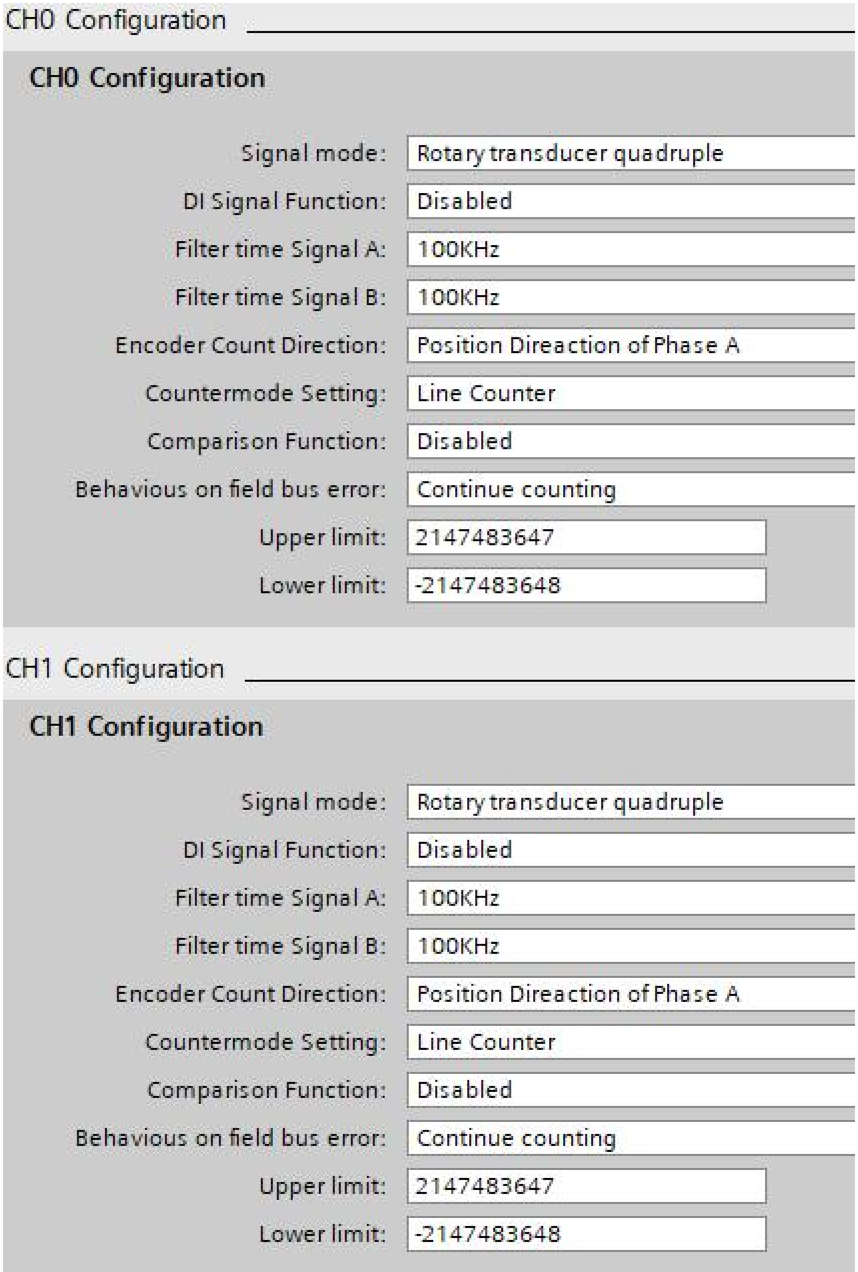
13.2.3 Wiring Diagram



Note: A9, B9 24V power supply is provided externally.

13.3 Module Configuration Data Definition

likeAs shown in the figure, users canAs neededConfigure each channelSignal type.



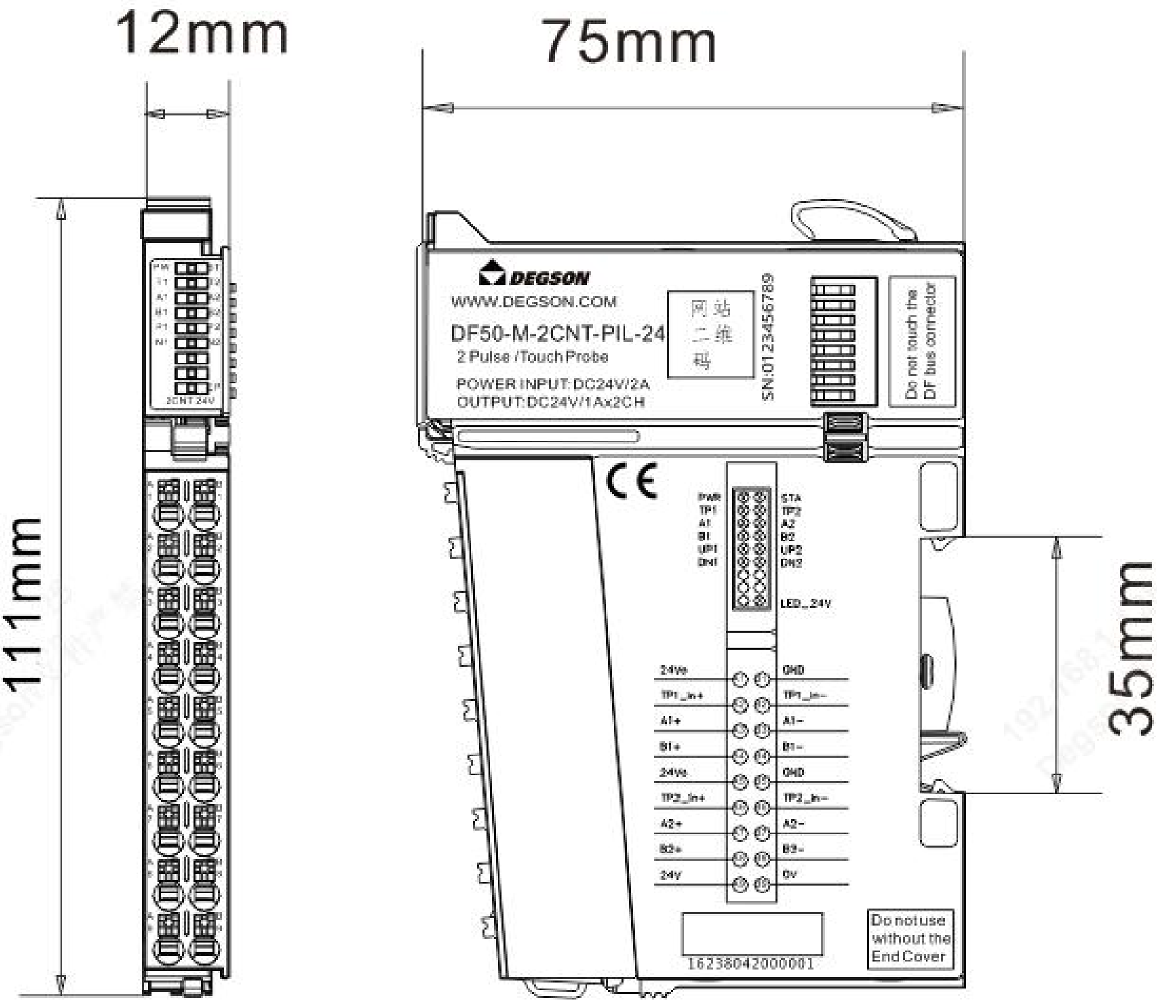
13.4 Module process data definition

Output data meaning		
The first channel output data		
Byte0	bit7~bit1	reserve
	bit0	0: Channel 1 stops counting and the original count is reset to zero; 1: Channel 1 starts
Byte1~Byte4		Channel 1 pulse comparison value output, range:–2147483648~2147483647
Second channel output data		
Byte5	bit7~bit1	reserve
	bit0	0: Channel 2 stops counting and the original count is cleared; 1: Channel 2 starts
Byte6~Byte9		Channel 2 pulse comparison value output, range:–2147483648~2147483647

Input data meaning		
First channel input data		
Byte0	bit7~bit5	reserve
	bit3~bit4	0: Channel 1 stops; 1: Channel 1 counts up; 2: Channel 1 counts down
	bit2	0: Channel 1 count value is less than the comparison value; 1: Channel 1 count value is
	bit1	0: No electronic probe/1st channel count reset signal 1: Electronic probe/channel count
	bit0	0: Channel 1 counting stop state, the original count is cleared; 1: Channel 1 counting state
Byte1~Byte4		Channel 1 pulse input value, range:–2147483648~2147483647
Byte5~Byte8		Channel 1 pulse input latch value, range:–2147483648~2147483647
Second channel input data		
Byte9	bit7~bit5	Reserved seat
	bit3~bit4	0: Channel 2 stops; 1: Channel 2 counts up; 2: Channel 2 counts down
	bit2	0: Channel 2 count value is less than the comparison value; 1: Channel 2 count value is
	bit1	0: No electronic probe/channel 2 count reset signal 1: Electronic probe/channel count reset
	bit0	0: Channel2Counting stop state, the original count is cleared; 1: Channel2Counting status
Byte10~Byte13		aisle2Pulse input value, range:–2147483648~2147483647
Byte14~Byte17		aisle2Pulse input latch value, range:–2147483648~2147483647

13.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



14 2-channel encoder pulse counting/5VDC (DF50-M-2CNT-PIL-5)

- The encoder pulse counting module adopts 2-channel pulse counting. The input signal voltage is 5VDC.
- Each input module is equipped with an anti-interference filter.
- The two LED indicators indicate that the module is operating normally and communicating normally.
- Magnetic isolation between the field level and the system level.
- Protection grade IP20.

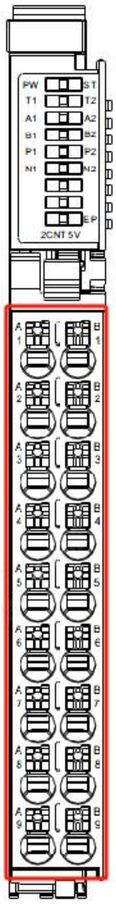
14.1 Specifications

Technical Information	
Product Description	High speed counting module, 2 channels
Number of channels	2
Signal Type	Incremental encoder AB / pulse + direction signal
Maximum input frequency	1MHZ
Input signal voltage	5V DC

Connection Type	2-wire/4-wire
Quadrature encoder frequency multiplication	x1/x2/x4
Counting Mode	Linear counter form, ring counter form
Count latch/reset function	Support, configurable
Filter function	Support, configurable
Counting range	–2147483648~2147483647
Accuracy	±1 pulse
Isolation method	Photoelectric isolation from the field layer
Error diagnosis	support
Input Action Display	When the input is in driving state, the indicator light is on (software control)
IO process data size	Output: 10 Byte; Input: 18 Byte
IO data mapping	Supports 3 IO mapping modes: bit-based access, byte-based access, and word-based access
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	115mA
Terminal power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power input rated current	2A
Terminal power output rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power output rated current	1A
Wiring parameters	
Connection technology:	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

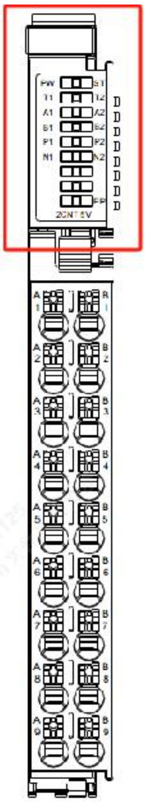
14.2 Hardware Interface

14.2.1 Terminal Block Definition



Terminal number	Signal	Terminal number	Signal	illustrate
A1	24Vo	B1	GND	Terminal power output
A2	TP1_in+	B2	TP1_in-	DI signal input
A3	A1+	B3	A1-	Orthogonal encoding mode A phase signal input/ Pulse plus direction mode direction signal input
A4	B1+	B4	B1-	Orthogonal encoding mode B phase signal input/ Pulse plus direction mode pulse signal input
A5	24Vo	B5	GND	Terminal power output
A6	TP2_in+	B6	TP2_in-	DI signal input
A7	A2+	B7	A2-	Orthogonal encoding mode A phase signal input/ Pulse plus direction mode direction signal input
A8	B2+	B8	B2-	Orthogonal encoding mode B phase signal input/ Pulse plus direction mode pulse signal input
A9	24Vin	B9	0V	Terminal power input

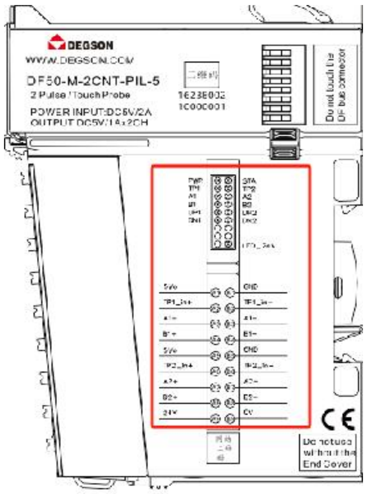
14.2.2 LED indicator definition

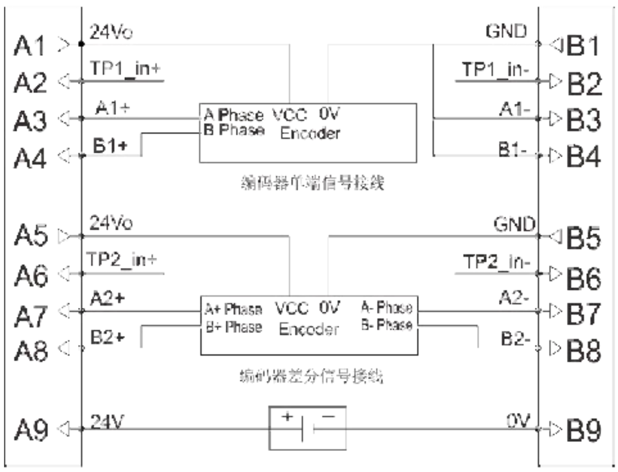


Indicator Lights	meaning	
PW	Green:System bus powerSource Inputnormal	
	Green Kill:System bus powerSource Inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally.
		Green off/green on: The internal bus of the module is working abnormally or the terminal power input is abnormal
T1/T2	Green: DI input signal is valid	
	Green off: DI input signal is invalid	
A1/A2	Green: Input signal is valid	
	Green off: Input signal is invalid	
B1/B2	Green: Input signal is valid	

	Green off: Input signal is invalid
P1/P2	Green: Encoder is rotating forward
	Green off: Encoder is stationary or reversed
N1/N2	Green: Encoder reverse
	Green off: Encoder is stationary or rotating forward
EP	Green: The terminal power input is normal
	Green off: Terminal power input abnormality

14.2.3 Wiring Diagram

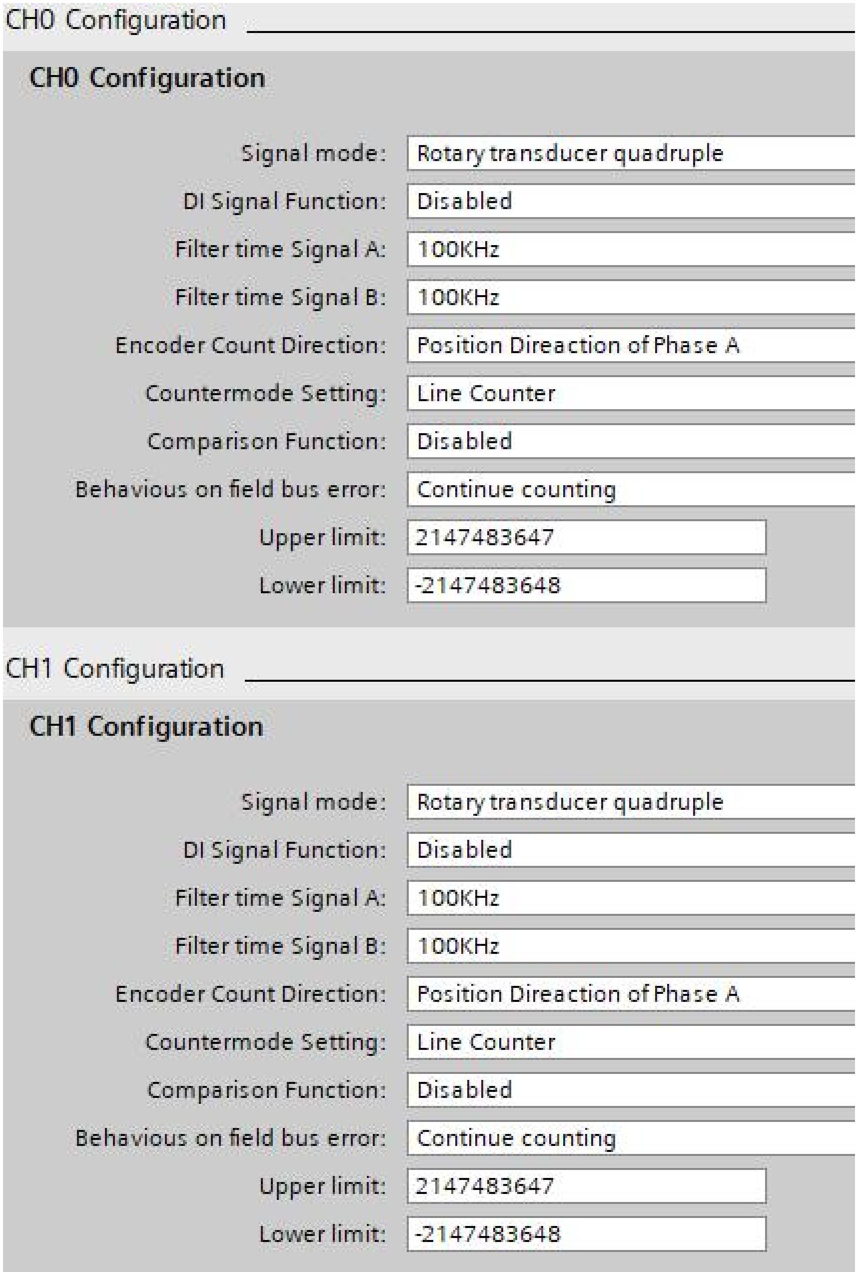




Note: A9, B9 24V power supply is provided externally.

14.3 Module Configuration Data Definition

likeAs shown in the figure, users canAs neededConfigure each channelSignal type.



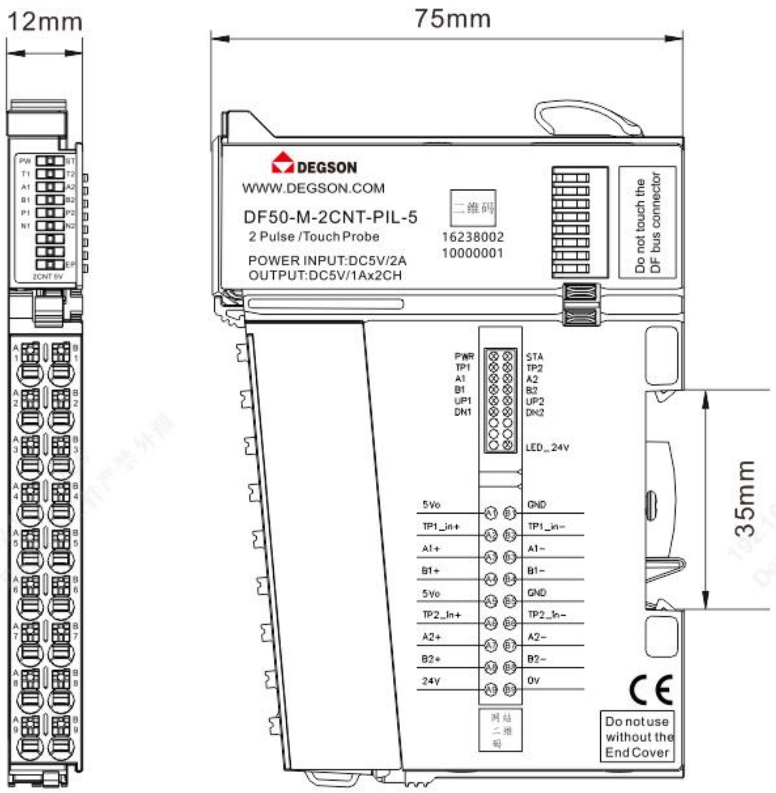
14.4 Module process data definition

Output data meaning		
The first channel output data		
Byte0	bit7~bit1	reserve
	bit0	0: Channel 1 stops counting and the original count is reset to zero; 1: Channel 1 starts
Byte1~Byte4		Channel 1 pulse comparison value output, range:–2147483648~2147483647
Second channel output data		
Byte5	bit7~bit1	reserve
	bit0	0: Channel 2 stops counting and the original count is cleared; 1: Channel 2 starts
Byte6~Byte9		Channel 2 pulse comparison value output, range:–2147483648~2147483647

Input data meaning		
First channel input data		
Byte0	bit7~bit5	reserve
	bit3~bit4	0: Channel 1 stops; 1: Channel 1 counts up; 2: Channel 1 counts down
	bit2	0: Channel 1 count value is less than the comparison value; 1: Channel 1 count value is
	bit1	0: No electronic probe/1st channel count reset signal 1: Electronic probe/channel count
	bit0	0: Channel 1 counting stop state, the original count is cleared; 1: Channel 1 counting state
Byte1~Byte4		Channel 1 pulse input value, range:–2147483648~2147483647
Byte5~Byte8		Channel 1 pulse input latch value, range:–2147483648~2147483647
Second channel input data		
Byte9	bit7~bit5	Reserved seat
	bit3~bit4	0: Channel 2 stops; 1: Channel 2 counts up; 2: Channel 2 counts down
	bit2	0: Channel 2 count value is less than the comparison value; 1: Channel 2 count value is
	bit1	0: No electronic probe/channel 2 count reset signal 1: Electronic probe/channel count reset
	bit0	0: Channel2Counting stop state, the original count is cleared; 1: Channel2Counting status
Byte10~Byte13		aisle2Pulse input value, range:–2147483648~2147483647
Byte14~Byte17		aisle2Pulse input latch value, range:–2147483648~2147483647

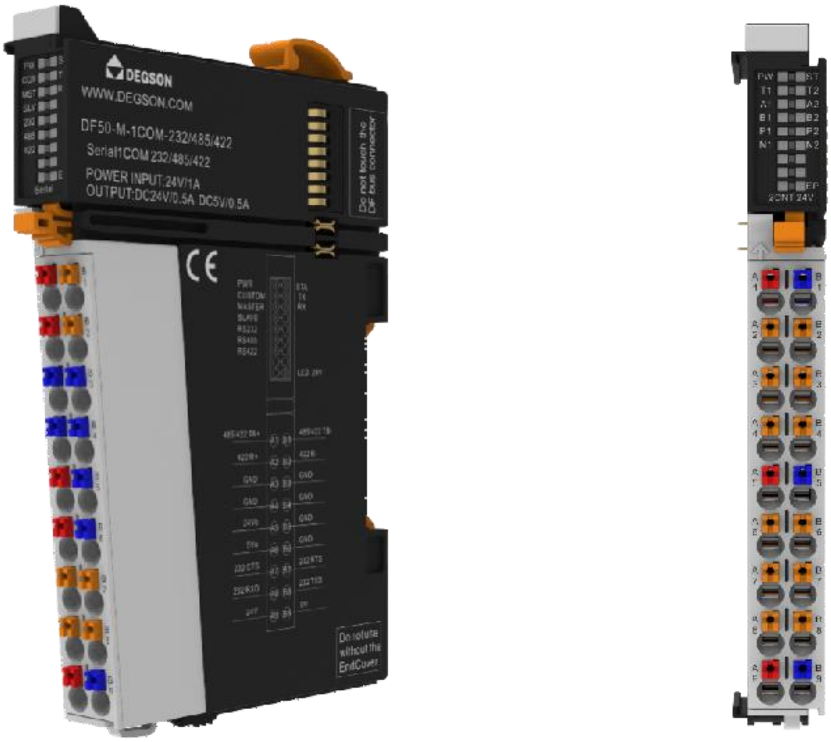
14.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



15 serial communication module (DF50-M-1COM-232/485/422)

- Support 1-way RS485, RS232 or RS422 (choose one from three);
- Support Modbus/RTU master, slave and free transparent transmission modes;
- Applicable to PLC, inverter, scanner, electric meter, water meter, field measuring equipment and other instruments.



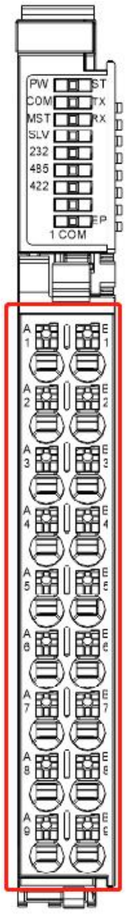
15.1 Specifications

Technical Information	
Product Description	Serial port module, 1 channel, supportsRS232/RS485/RS422
Number of channels	1
Communication Protocol	Modbus RTU master and slave modes; free transparent transmission mode
Baud rate	2400bps~512000bps
Data bits	7bit/8bit
Check digit	None/Even/Odd
Stop bits	1bit/2bit
Diagnosis reporting function configuration	support
Input/output action display	When the input/output signal is valid, the corresponding indicator light flashes
IO process data size	Configurable
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)

System bus input power rated current	55mA
Terminal power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power input rated current	730mA
Terminal 24V power output rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal 24V power output rated current	500mA/each power output channel
Terminal 5V power output rated voltage	5V DC (4.75V DC~ 5.25V DC)
Terminal 5V power supply output rated current	500mA/each power output channel
Wiring parameters	
Connection technology	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	Light Gray
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm
Firmware Upgrade	support

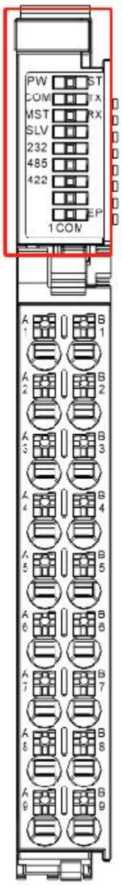
15.2 Hardware Interface

15.2.1 WiringTerminal Definition



Terminal number	Signal	Terminal number	Signal	illustrate
A1	485/422 TA+	B1	485/422 TB-	RS422/RS485
A2	422 R+	B2	422 R-	RS422
A3	GND	B3	GND	Power Ground
A4	GND	B4	GND	Power Ground
A5	24Vo	B5	GND	Terminal 24V power output
A6	5Vo	B6	GND	Terminal 5V power output
A7	232CTS	B7	232RTS	RS232
A8	232RXD	B8	232TXD	RS232
A9	24V	B9	0V	Terminal power input

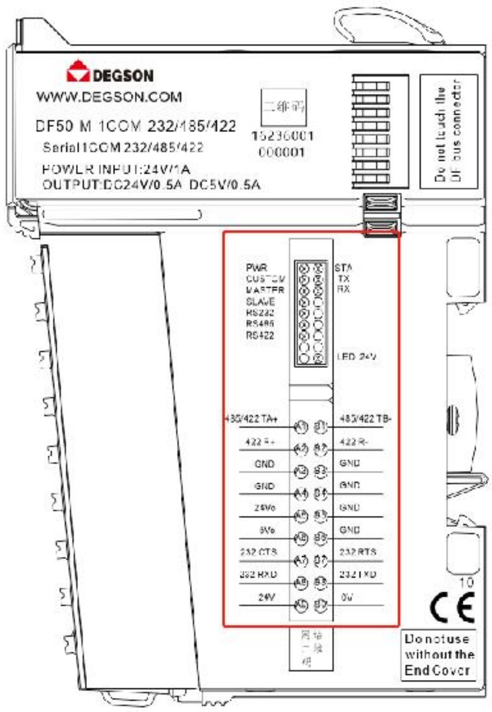
15.2.2 LED Indicatordefinition

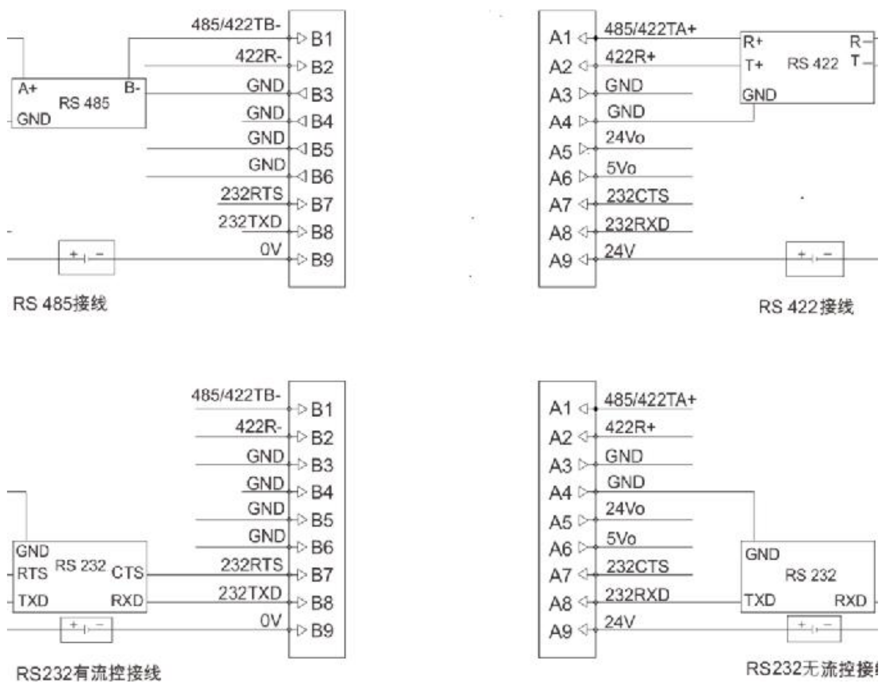


<table>
<tr><th>Indicator Lights</th><th colspan="2">meaning</th></tr>
<tr><td rowspan="2">PW</td><td colspan="2">Green:System bus power inputnormal</td></tr>
<tr><td colspan="2">Green Kill:System bus power inputabnormal</td></tr>
<tr><td rowspan="4">ST</td><td rowspan="2">Power-on stage:</td><td>Green: Module initialization abnormality,</td></tr>
<tr><td>Green off: Module initialization is normal</td></tr>
<tr><td rowspan="2">Operation phase:</td><td>Green flash: The internal bus of the module is working normally</td></tr>
<tr><td>Green off/Green on: The internal bus of the module is working abnormally or the terminal power input is abnormal.</td></tr>
<tr><td rowspan="2">COM</td><td colspan="2">Green: The module is working in free transparent transmission mode</td></tr>
<tr><td colspan="2">Green off: The module is not working in free transparent transmission mode</td></tr>
<tr><td rowspan="2">MST</td><td colspan="2">Green: The module is working in ModBus master mode</td></tr>
<tr><td colspan="2">Green off: The module is not working in ModBus master mode</td></tr>
</table>

SLV	Green: The module is working in ModBus slave mode
	Green off: The module is not working in ModBus slave mode
232	Green: Enable 232 communication interface
	Green off: 232 communication interface disabled
485	Green: Enable 485 communication interface
	Green off: 485 communication interface disabled
422	Green: Enable the 422 communication interface
	Green off: 422 communication interface disabled
TX	Green flash: The module is sending data
	Green off: The module does not receive data
RX	Green flash: The module is receiving data
	Green off: The module does not receive data
EP	Green: The terminal power input is normal
	Green off: Terminal power input abnormality

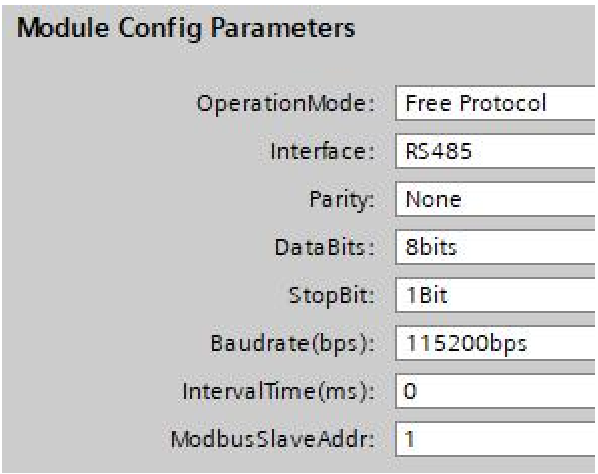
15.2.3 Wiring Diagram





15.3 Module Configuration Data Definition

As shown in the figure, the module communication parameters can be configured.



15.4 Module process data definition

Free transparent transmission mode process data structure:

F: Control Status Module subslot data structure is as follows:

Output Data			
Byte offset	name	length	meaning
Byte:0-1	CtrlWord	2byte	Control Word
Byte:2	TxDataLEN	1byte	Send data length
Byte:3	TxDataCNT	1byte	Send data sequence number
Input Data			
Byte Sequence Number	name	length	meaning
Byte:0-1	StateWord	2byte	Status word
Byte:2	RxDataLEN	1byte	Receive data length
Byte:3	RxDataCNT	1byte	Receive data sequence number
Byte:4-11	/	8byte	reserve

inCtrlWord and State form a control state machine. CtrlWord contains the following commands:

Command Value	Command Name	meaning
16#00A1	CONFIGUREPORT	Configuration command (no operation required for PN bus)
16#00C1	WRITECUSTOM	Free mode write dataOrder
16#00C2	READCUSTOM	Free mode read dataOrder

Note: CouplerEach time the power is turned on again, the configuration will be automatically sentCONFIGUREPORTThe command configures the serial port module. After success, the serial port module entersREADCUSTOMStatus and feedbackStateWordThe status is 16#0003.

StateWord contains the following states:

Normal state value	Status Name	meaning
16#0000	OP_SUCCESS	Configuration or write operation successful
16#0001	DATA_FULL	dataUpdated,Readable
16#0002	WRITE_IDLE	Write idle, writable
16#0003	DATA_EMPTY	Read idle, receive data not updated
Error Status Value	Status Name	meaning
16#E0A1	WRITE_BUSY	Write busy, can't write
16#E0A2	DATA_LARGE	Data length exceeds limit
16#E0A3	CMD_ERR	Command Error
16#E0A4	PARA_ERR	Configuration parameter error
16#E0A5	CHECK_ERR	Verification Error
16#E0A6	SLAVE_NOEXIT	The slave device does not exist
16#E0A7	PACK_LOSS	Packet Loss
16#E0A8	OVER_FLOW	Data overflow

Different input and output data can be obtained according to the different sub-slots added later.

F: Free-Port Input 0064 Bytes is input data, a total of 64 Bytes;

F: Free-Port Output 0064 Bytes is the output data, a total of 64Bytes;

Modbus RTU Slave mode process data structure:

S: Modbus Status Input (1 Word) is the diagnostic information of the slave station. The PLC program can clearly understand the current slave station status by monitoring the diagnostic information. The diagnostic information includes the following:

Normal state value	Status Name	meaning
16#0000	OP_SUCCESS	Configuration or write operation successful
16#0001	DATA_FULL	dataUpdated,Readable
16#0002	WRITE_IDLE	Write idle, writable

16#0003	DATA_EMPTY	Read idle, receive data not updated
Error Status Value	Status Name	meaning
16#E0A1	WRITE_BUSY	Write busy, can't write
16#E0A2	DATA_LARGE	Data length exceeds limit
16#E0A3	CMD_ERR	Command Error
16#E0A4	PARA_ERR	Configuration parameter error
16#E0A5	CHECK_ERR	Verification Error
16#E0A6	SLAVE_NOEXIT	The slave device does not exist
16#E0A7	PACK_LOSS	Packet Loss
16#E0A8	OVER_FLOW	Data overflow

Different input and output data can be obtained according to the different sub-slots added later.

Modbus RTU Master mode process data structure:

M: Error Code Input (28 CH) contains 28 word data, corresponding to the diagnostic information of 28 slave slots. The PLC program can clearly understand the current slave status by monitoring the diagnostic information. The diagnostic information includes the following:

Normal state value	Status Name	meaning
16#0000	OP_SUCCESS	Configuration or write operation successful
16#0001	DATA_FULL	dataUpdated,Readable
16#0002	WRITE_IDLE	Write idle, writable
16#0003	DATA_EMPTY	Read idle, receive data not updated
Error Status Value	Status Name	meaning
16#E0A1	WRITE_BUSY	Write busy, can't write
16#E0A2	DATA_LARGE	Data length exceeds limit
16#E0A3	CMD_ERR	Command Error
16#E0A4	PARA_ERR	Configuration parameter error
16#E0A5	CHECK_ERR	Verification Error
16#E0A6	SLAVE_NOEXIT	The slave device does not exist
16#E0A7	PACK_LOSS	Packet Loss
16#E0A8	OVER_FLOW	Data overflow

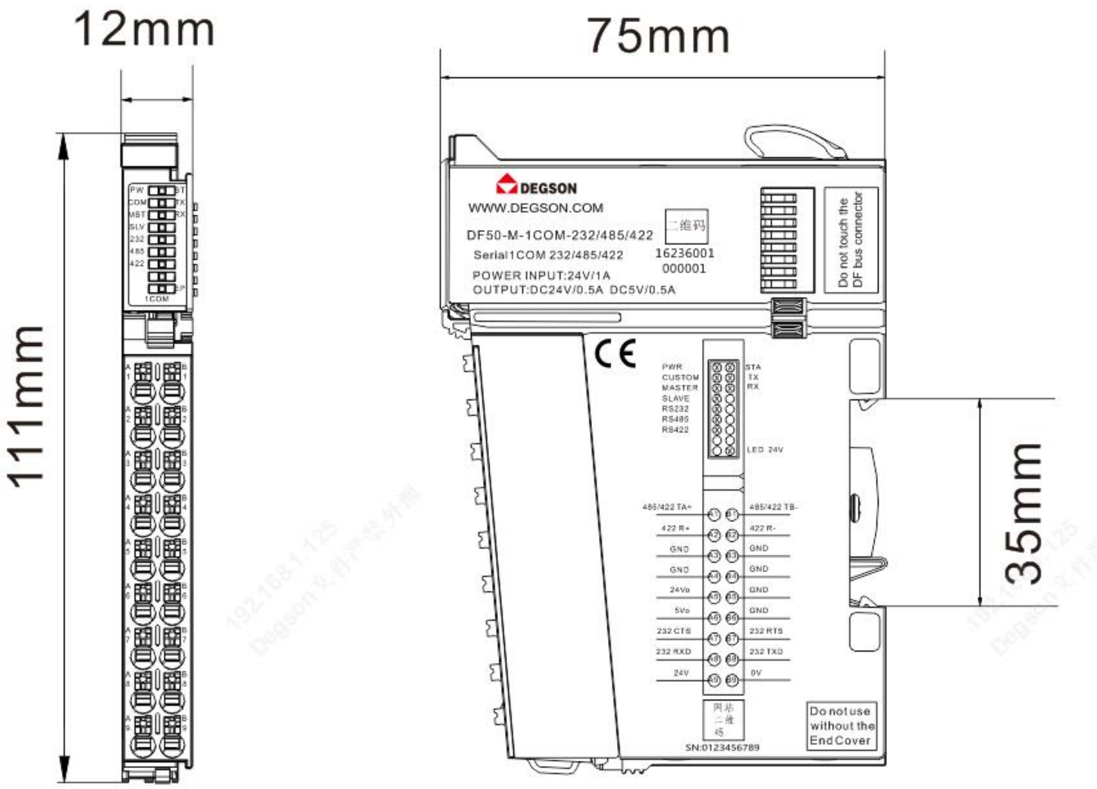
Different input and output data can be obtained according to the different sub-slots added later.

M: Read 16 Words 4xxxxContains 16 words of data.

M: Write 02 Words 4xxxxContains 2 word data.

15.5 Mechanical Installation

The installation dimension information is shown in the figure below, the unit is (mm)



16 16 channels/24VDC/voltage distribution (DF50-M-DC-U-24)

- Independent of fieldbus application and connection type.
- Provides 16 channels of 24VDC rated voltage to the external field.
- Protection grade IP20.

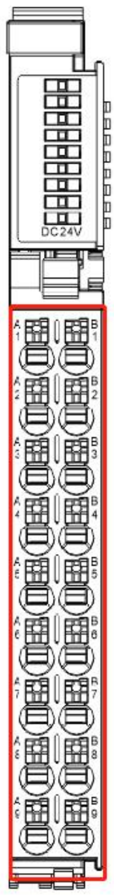
16.1 Specifications

Technical Information	
Product Description	Voltage distribution module, 16 channels, 24V
Number of channels	16
Operating voltage	24VDC (-15%~+20%) through power jumper contacts
Provide on-site voltage	24VDC (-15%～+20%)
Provides the maximum current on site	8A
Number of input power jumper contacts	2
Number of external power jumper contacts	2
Wiring parameters	
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black

Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

16.2 Hardware Interface

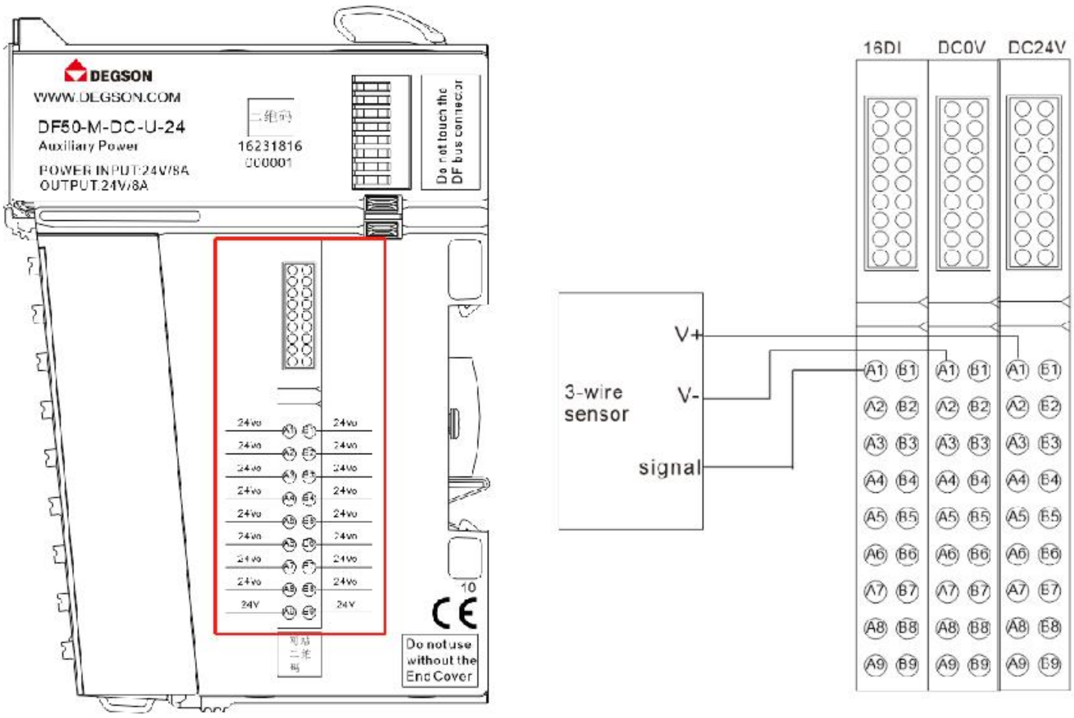
16.2.1 WiringTerminal Definition



Terminal number		Signal	illustrate
A1	B1	On-site power supply 24VDC	Provides 16 channels of 24VDC rated voltage

A2	B2		for external loads
A3	B3		
A4	B4		
A5	B5		
A6	B6		
A7	B7		
A8	B8		
A9	B9	External voltage input 24VDC	External 24VDC voltage input jumper contacts

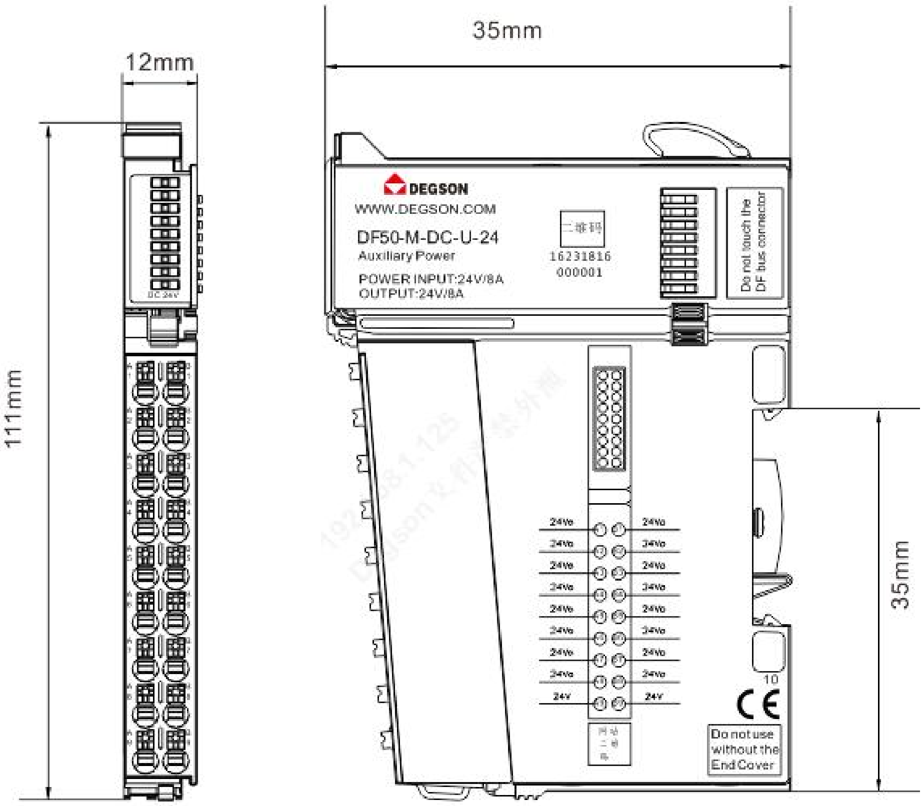
16.2.2 Wiring Diagram



Note: Each of the 16 channels can provide a 24VDC rated voltage to the external load. A9/B9 provides 24VDC externally.

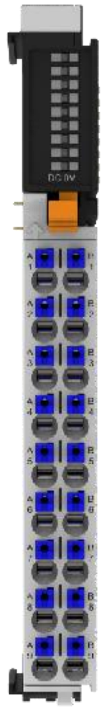
16.3 Mechanical Installation

InstallSize letterinterestAs shown in the figure below, the unit is (mm）:



17 16 channels/0VDC/voltage distribution (DF50-M-DC-U-0)

- Independent of fieldbus application and connection type.
- Provides 16 channels of 0VDC rated voltage for external fields.
- Protection grade IP20.



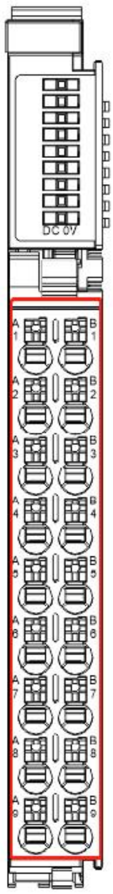
17.1 Specifications

Technical Information	
Product Description	Voltage distribution module, 16 channels, 0V
Number of channels	16
Operating voltage	0VDC (-15% to +20%) through power jumper contacts
Provide on-site voltage	0VDC (-15%～+20%)
Provides the maximum current on site	8A
Number of input power jumper contacts	2
Number of external power jumper contacts	2
Wiring parameters	
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	

Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

17.2 Hardware Interface

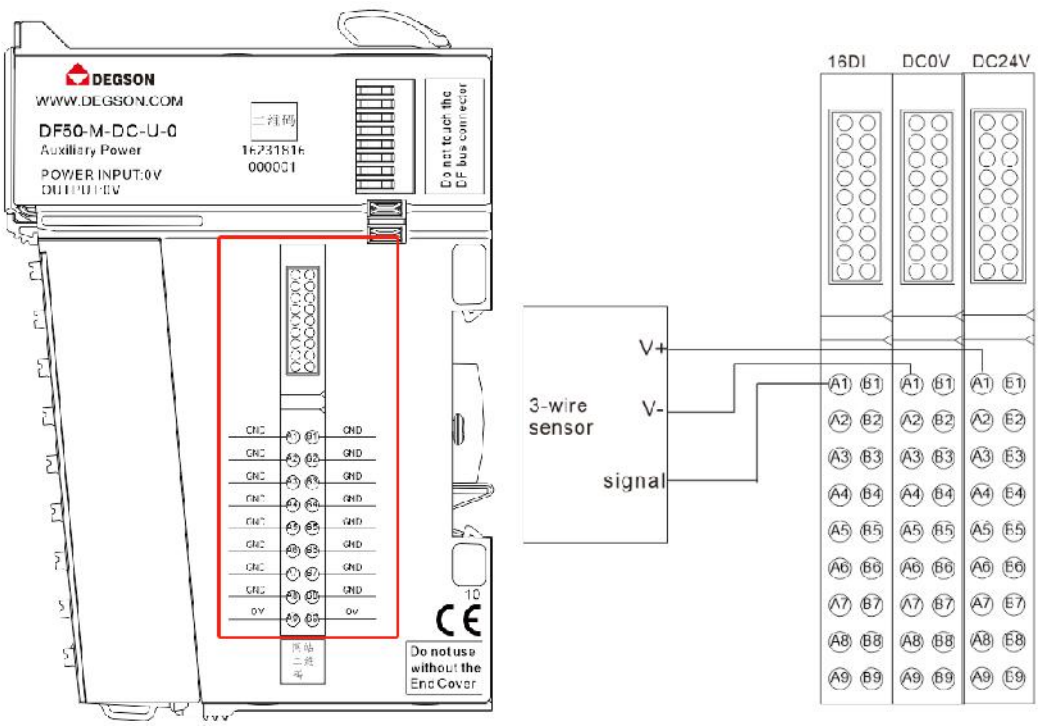
17.2.1 WiringTerminal Definition



Terminal number		Signal	illustrate
A1	B1	On-site power supply 0VDC	Provides 16 channels of 0VDC rated voltage for

A2	B2		external loads
A3	B3		
A4	B4		
A5	B5		
A6	B6		
A7	B7		
A8	B8		
A9	B9	External voltage input 0VDC	External 0VDC voltage input jumper contacts

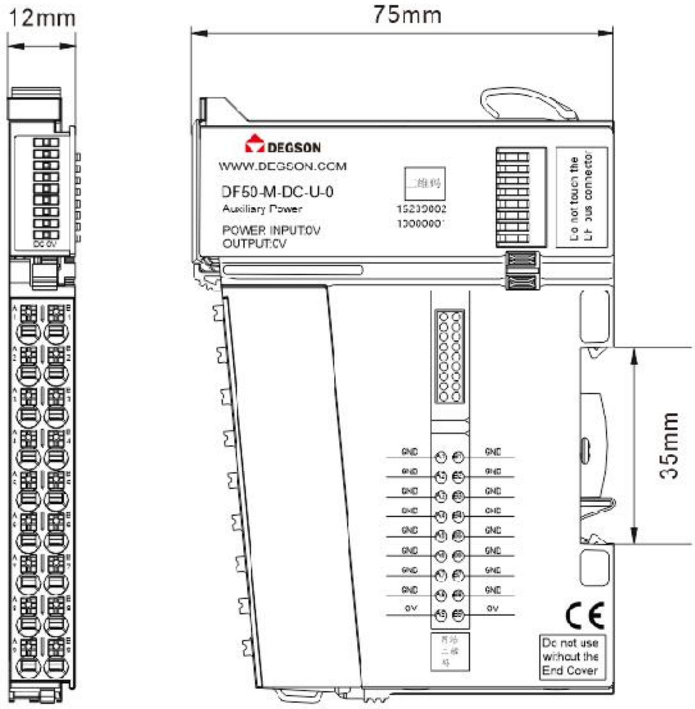
17.2.2 Wiring Diagram



Remark:Each of the 16 channels can provide a 0VDC rated voltage to an external load. A9/B9 provides 0VDC externally.

17.3 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



18 IO-Link communication module (DF50-M-4IOL)

- Support 4-channel IO-Link communication
- Supports unshielded 3-core or 5-core standard cables
- Applied to sensors, RFID readers, valves, motor starters, I/O modules, etc.

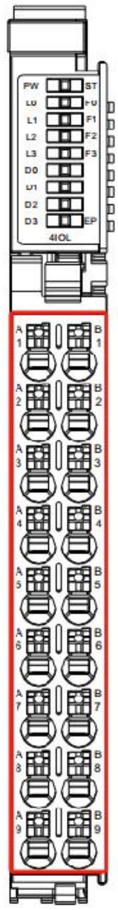
18.1 Specifications

productinformation	
Product Name	DF50-M-4IOL
Product Description	IO-Link communication module
Technical Information	
ordinaryDigital quantityportenterparameter	
Number of channels	4-wire
Signal Type	IEC 61131-2: Type 1 PNP
Input voltage range, "0" signal	-0.3 V DC ... 8 V DC
Input voltage range, "1" signal	12.9 V DC ... 24.3 V DC
IO-LINK port input parameters	
IO-LINK Mode	
Number of ports	4
Connection	Push-in connection
Connecting the system	3 lines\5 lines
Port Type	Category A
Connect the cables	3-wire or 5-wire unshielded standard cable
Digital input mode	
Input Description	IO-Link port in digital input (DI) mode
Input quantity	Max 4
Input Type	IEC 61131-2 :Type 1 PNP
Connection	Push-in connection
Connecting the system	3 lines
Rated input voltage	24 V DC
Input voltage range, "0" signal	-0.3 V DC ... 8 V DC
Input voltage range, "1" signal	12.9 V DC ... 24.3 V DC

Digital output mode	
Output Description	IO-Link port in digital output (DO) mode
Number of outputs	Max 4
Output Type	IEC 61131-2 :Type 0.5 PNP
Connection	Push-in connection
Connecting the system	2, 3 lines
Rated output voltage	24 V DC
Rated current per channel	500 mA
Power parameters	
Operating voltage	24V DC +20 %/ -15 %
wiringparameter	
Connection technology: input/output	PUSH-IN Terminal Blocks
Connection Type	Input/Output
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	Light Gray
Housing Material	PC plastic, PA66
Conformance mark	CE
environmentwantbeg	
allowAmbient temperature (Runtime）	-25~60℃
allowAmbient temperature (store）	-40~85℃
Protectiontype	IP20
pollutegrade	2,conform toIEC 61131-2 Standard
Workaltitude	temperatureNo derating:0～2000m
Relative humidity（No condensation）	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, in accordance with IEC 60068-2-27standard
EMC-resistantDisruptive	Complies with EN 61000-6-2
EMC—Radiated interference	Complies with EN 61000-6-3
anti-Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

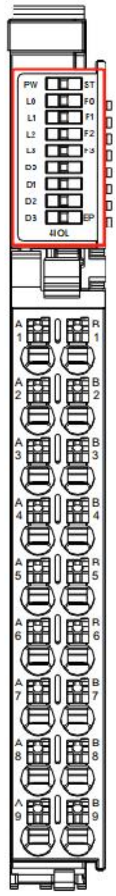
18.2 Hardware Interface

18.2.1 WiringTerminal Definition



Terminal number	Signal	illustrate	Terminal number	Signal	illustrate
A1	C/Q0	Channel 0 C/Q signal	B1	DI0	Channel 0 DI signal
A2	L+ 0	Channel 0 24V output	B2	L-0	Channel 0 0V output
A3	C/Q1	Channel 1 C/Q signal	B3	DI1	Channel 1 DI signal
A4	L+1	Channel 1 24V output	B4	L-1	Channel 1 0V output
A5	C/Q2	Channel 2 C/Q signal	B5	DI2	Channel 2 DI signal
A6	L+2	Channel 2 24V output	B6	L-2	Channel 2 0V output
A7	C/Q3	Channel 3 C/Q signal	B7	DI3	Channel 3 DI signal
A8	L+3	Channel 3 24V output	B8	L-3	Channel 3 0V output
A9	24V	External power input positive	B9	0V	External power input negative pole

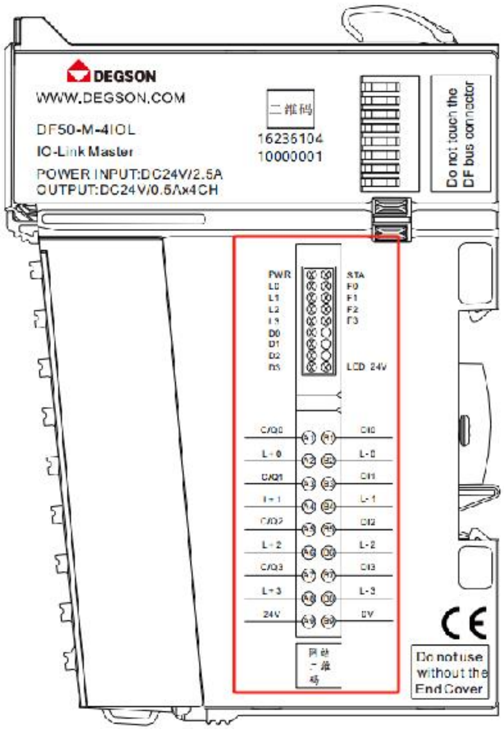
18.2.2 LED Indicatorsdefinition

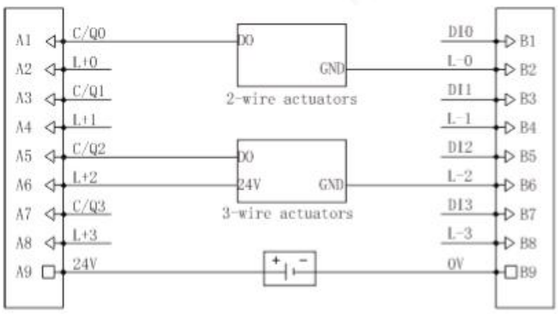


<table>
<tr><th>Indicator Lights</th><th colspan="2">meaning</th></tr>
<tr><td rowspan="2">PW</td><td colspan="2">On: Internal bus power supplynormal</td></tr>
<tr><td colspan="2">Off: Internal bus power supply abnormalityoften</td></tr>
<tr><td rowspan="4">ST</td><td rowspan="2">Power-on stage:</td><td>Green: Module initialization error</td></tr>
<tr><td>Green off: Module initialization is normal</td></tr>
<tr><td rowspan="2">Operation phase:</td><td>Green flash: The internal bus of the module is working normally</td></tr>
<tr><td>Green off: The internal bus of the module is working abnormally</td></tr>
<tr><td rowspan="3">L0~L3</td><td colspan="2">Green: The corresponding channel IO-LINK is communicating normally</td></tr>
<tr><td colspan="2">Green flash: No IO-LINK slave is connected to the corresponding channel</td></tr>
<tr><td colspan="2">Green off: The corresponding channel is not configured as IO-LINK mode</td></tr>
<tr><td rowspan="2">F0~F3</td><td colspan="2">Red: The corresponding channel reports an error</td></tr>
<tr><td colspan="2">Red off: No error reported on the corresponding channel</td></tr>
<tr><td rowspan="2">D0~D3</td><td colspan="2">Green: DI input valid signal</td></tr>
<tr><td colspan="2">Green off: DI has no valid input signal</td></tr>
<tr><td rowspan="2">EP</td><td colspan="2">On: The external interface of the module is powered normally</td></tr>
<tr><td colspan="2">Off: The power supply of the module's external interface is abnormal.</td></tr>
</table>

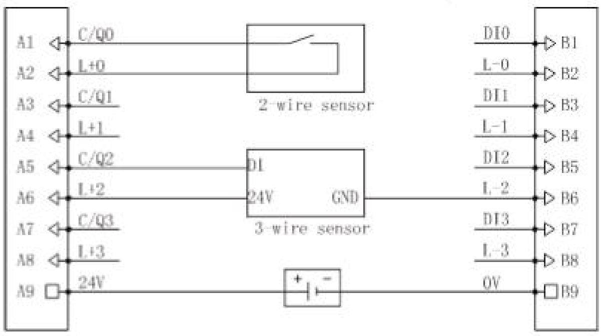
Note: When the C/Q port is used as DI input, no indicator light will be displayed.

18.2.2 Wiring Diagram

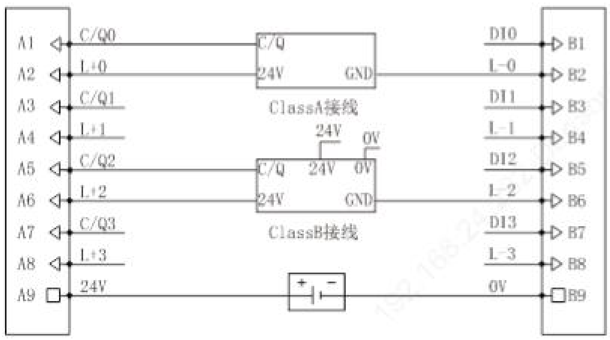




C/Q为DO时接线



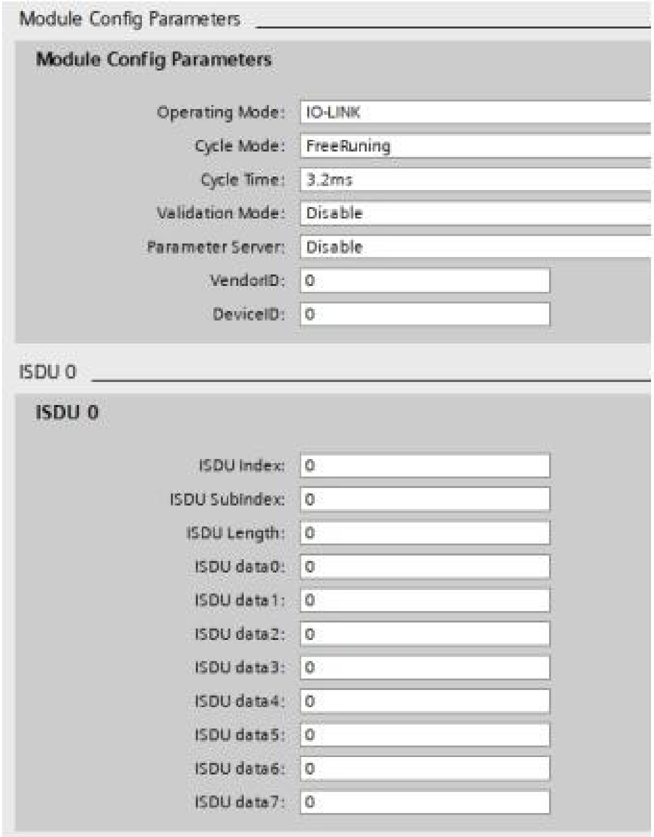
C/Q为DI时接线



C/Q为IO-Link模式接线图

18.3 Module Configuration Data Definition

likeAs shown in the figure, users canAs neededConfigurationThe working mode of each PORT, the specific meaning is detailed in the table below.



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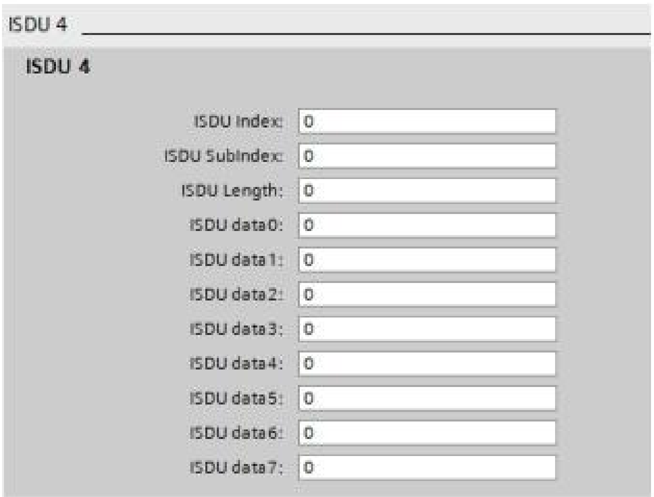


Configuration items	Configuration parameters	default value
Operating Mode Working Mode	0:disable 1:IO-LINK 2:DI 4:DO	1
Cycle Mode Cycle Mode	0:Free Running 1:Fixed Time 2:Message sync (not supported yet)	0
Cycle Time Cycle time	3.2ms~132.8ms (This parameter is only effective when Cycle Mode is Fixed Time)	3.2ms
Validation Mode	0:disable 1:compatible	0

Verification Mode	2:identical (not supported yet)	
Parameter Server Parameter Service	0:disable 1:BackUp/Restore 2:Restore	0
VendorID Vendor ID	Vendor ID (unsigned 16 bits)	0
DeviceID Device ID	Device ID (unsigned 32-bit) binary	0
ISDU Parameter 0	ISDU Index	0~65535
	ISDU Subindex	0~255
	ISDU Length	0~8
	ISDU data 0	0~255
	ISDU data 1	0~255
	ISDU data 2	0~255
	ISDU data 3	0~255
	ISDU data 4	0~255
	ISDU data 5	0~255
	ISDU data 6	0~255
	ISDU data 7	0~255
ISDU Parameter 1	ISDU Index	0~65535
	ISDU Subindex	0~255
	ISDU Length	0~8
	ISDU data 0	0~255
	ISDU data 1	0~255
	ISDU data 2	0~255
	ISDU data 3	0~255
	ISDU data 4	0~255
	ISDU data 5	0~255
	ISDU data 6	0~255
	ISDU data 7	0~255
ISDU Parameter 2	ISDU Index	0~65535
	ISDU Subindex	0~255
	ISDU Length	0~8
	ISDU data 0	0~255
	ISDU data 1	0~255
	ISDU data 2	0~255
	ISDU data 3	0~255
	ISDU data 4	0~255
	ISDU data 5	0~255
	ISDU data 6	0~255
	ISDU data 7	0~255
ISDU Parameter 3	ISDU Index	0~65535
	ISDU Subindex	0~255
	ISDU Length	0~8
	ISDU data 0	0~255
	ISDU data 1	0~255
	ISDU data 2	0~255
	ISDU data 3	0~255
	ISDU data 4	0~255
	ISDU data 5	0~255

	ISDU data 6	0~255
	ISDU data 7	0~255
ISDU Parameter 4	ISDU Index	0~65535
	ISDU Subindex	0~255
	ISDU Length	0~8
	ISDU data 0	0~255
	ISDU data 1	0~255
	ISDU data 2	0~255
	ISDU data 3	0~255
	ISDU data 4	0~255
	ISDU data 5	0~255
	ISDU data 6	0~255
	ISDU data 7	0~255

18.4 Module Process Data Definition

18.4.1 "IO-LINK State" process data

Input Data				
	Bit 7	Bit 6	Bit 5	Bit 4~Bit 0
Byte0~Byte1	The most recent event code of port 0. For details, see the port event code table.			
Byte2	reserve	0: Normal working state 1: Error working state (Port 0 device error real-time flag)	0: Slave disconnected 1: Slave connection status (Real-time flag of port 0 device communication status)	reserve
Byte3~Byte4	The most recent event code of port 1. For details, see the port event code table.			
Byte5	reserve	0: Normal working state 1: Error working state (Port 1 device error real-time flag)	0: Slave disconnected 1: Slave connection status (Real-time flag of port 1 device communication status)	reserve
Byte6~Byte7	The most recent event code of port 2. For details, see the port event code table.			
Byte8	reserve	0: Normal working state 1: Error working state (Port 2 device error real-time flag)	0: Slave disconnected 1: Slave connection status (Real-time flag of port 2 device communication status)	reserve
Byte9~Byte10	The most recent event code of port 3. For details, see the port event code table.			

Byte11	reserve	0: Normal working state 1: Error working state (Port 3 device error real-time flag)	0: Slave disconnected 1: Slave connection status (Real-time flag of port 3 device communication status)	reserve
Output Data				
Byte 0	Port 0 operation commands, see the port operation code table for details			
Byte 1	Port 1 operation command, for details, see the port operation code table			
Byte 2	Port 2 operation commands, see the port operation code table for details			
Byte 3	Port 3 operation commands, see the port operation code table for details			

Port event code:

Event Code	illustrate
0x1800	IO-LINK slave is offline, check the slave connection
0x1801	Wrong startup parameters
0x1802	VendorID does not match
0x1803	DeviceID does not match
0x1804	C/Q short circuit
0x1805	PHY chip overheating
0x1806	L+ L- short circuit
0x1807	L+ overcurrent
0x1808	Device event overflow
0x1809	Backup inconsistent, memory out of range
0x180A	Backup inconsistent, identity verification error
0x180B	Backup inconsistency, non-specific error with data storage
0x180C	Backup inconsistent, upload error
0x180D	Parameters are inconsistent, download failure
0x180E	P24 (Class B) missing or overvoltage
0x180F	Short circuit at P24 (Class B), check wire connections
0x1810	I/Q check line has short circuit
0x1811	C/Q is short-circuited when used as digital output
0x1812	I/Q Overcurrent
0x1813	C/Q is overcurrent when output as digital
0x4000	Slave over temperature
0x5000	Slave hardware failure
0x5100	Slave power failure
0x5101	The slave fuse is blown
0x6320	Slave parameter error
0x6321	Slave parameter missing
other	View slave manual

Port operation code:

Command	illustrate
0x00	Normally obtain the port event code
0x01	Clear port event codes

other	reserve

18.4.2Port0~Port3 subslot process data

Input data (1 byte fixed data + N bytes of data exchanged with slaves)				
Byte 0 (fixed data)	Bit 7~Bit 3	Bit 2	Bit 1	Bit 0
	reserve	Valid bit Note 1	C/Q DI Note 2	DI
Byte 1...Byte N	Process data of IO-Link decisions			
Output data (1 byte fixed data + N bytes and slave station interactive data)				
	Bit 7~Bit 3	Bit 2	Bit 1	Bit 0
Byte 0 (fixed data)	reserve	Valid bit Note 1	C/Q DO Note 3	reserve
Byte 1...Byte N	Process data of IO-Link decisions			

Note 1: Valid bit indicates data validity. Whether the data is valid is determined by whether this bit is true.

Note 2: When the channel is configured in IO-link mode, this bit is invalid;

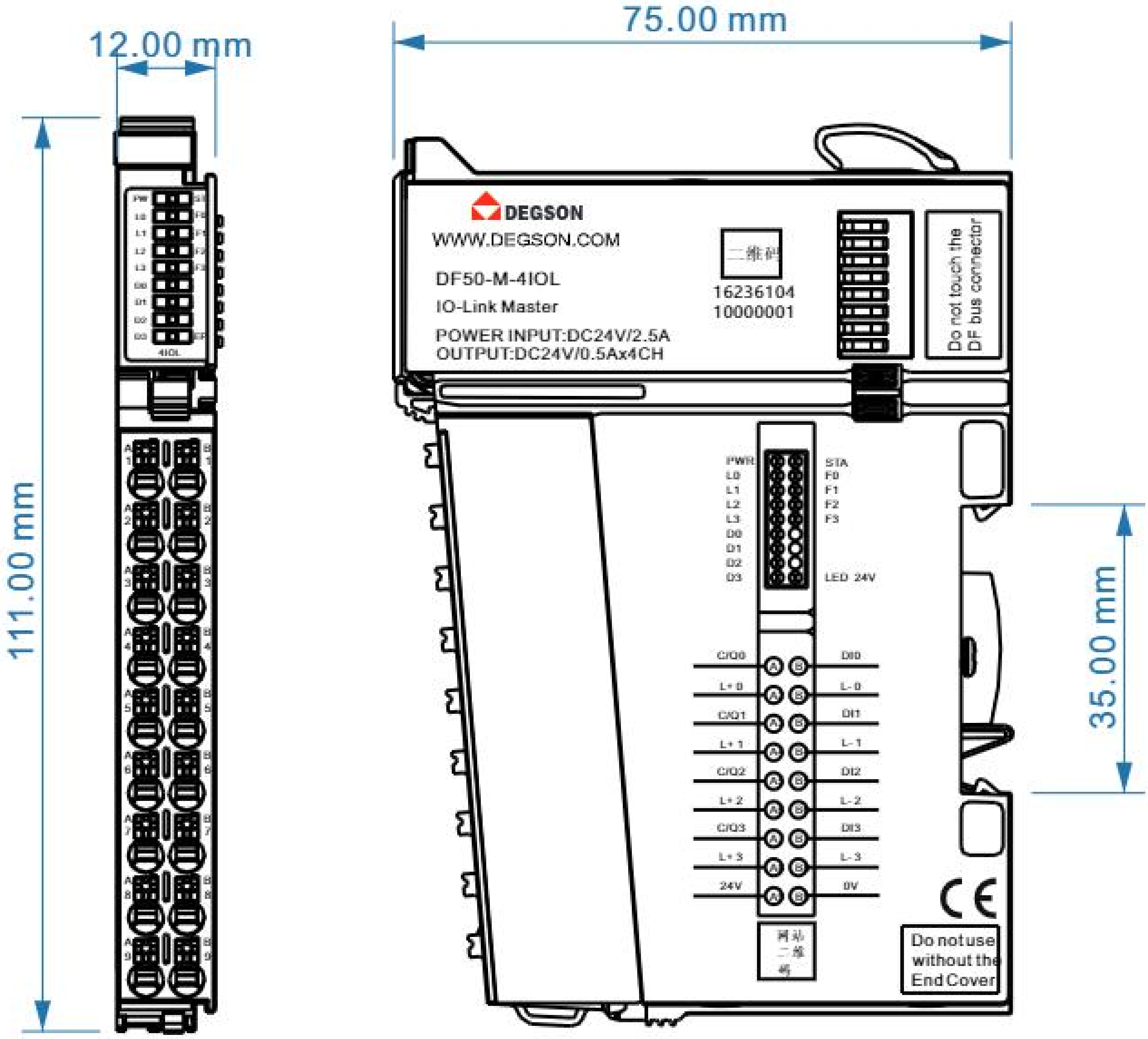
When the channel is configured in DI mode, this bit indicates the peripheral input status.

Note 3: When the channel is configured in IO-link mode, this bit is invalid;

When the channel is configured as DO mode, this bit is used to control the module channel output.

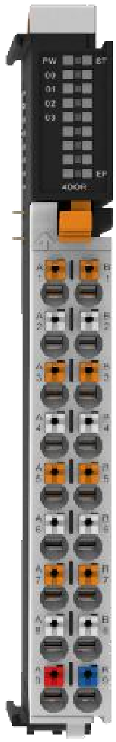
18.5 Mechanical Installation

The installation dimension information is shown in the figure below, the unit is (mm)



19 4-channel relay output/24VDC (DF50-M-4DOR)

- 4-channel digital output.
- Each output channel has an LED indicator.
- The field layer and the system layer are isolated by photocouplers.
- Protection grade IP20.



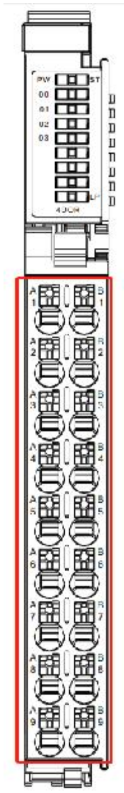
19.1 Specifications

Technical Information	
Product Description	Relay output module, 4 outputs
Number of channels	4
Contact Type	NO contact
Maximum output current	Maximum output current of single channel: 5A
	Module output maximum current: 20A
Maximum switching voltage	250VAC/30VDC
Reverse circuit protection	Yes
Short circuit protection	Yes
Isolation method	Photoelectric isolation from the field layer
Module error diagnosis	Yes
Switching frequency	30Hz
Response time of protection circuit	< 100μs
Leakage Current	Maximum value: 0uA
Output Impedance	<200mΩ
Output delay	OFF to ON:Max.100us, ON to OFF:Max.150us
Protection function	Over temperature shutdown: typical 125℃
Load Type	Resistive (5A/point, 20A/module)
Output action display	When the output is in driving state, the indicator light is on.

IO Mapping	Support bit-mapped mode
Fault shutdown output status mode	Clear to zero, keep current value
In stop mode	In the fault shutdown mode, no more refresh
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	30mA
Terminal power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power input rated current	50mA
Wiring parameters	
Connection technology: Output	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

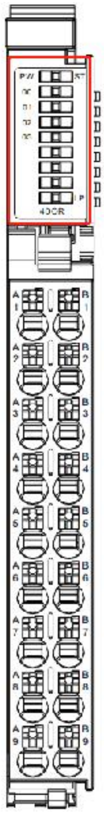
19.2 Hardware Interface

19.2.1 Terminal Block Definition



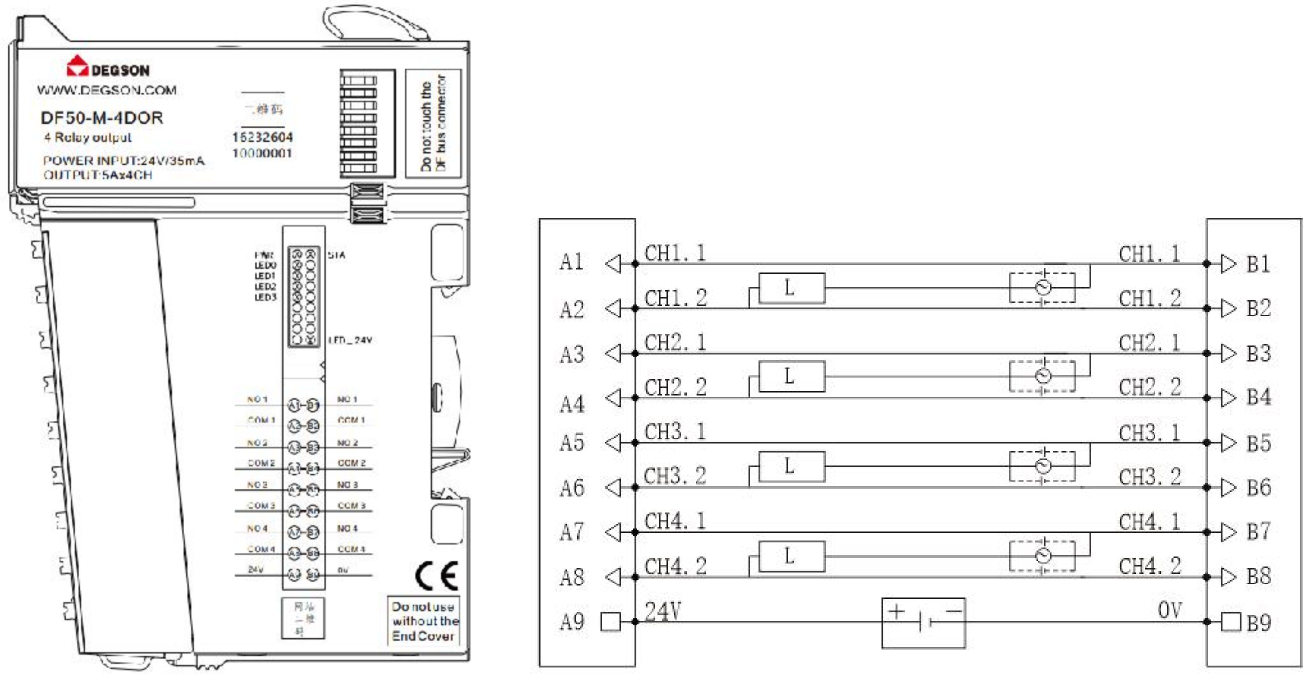
Terminal number	Signal	Terminal number	Signal	illustrate
A1	CH1 contact 1	B1	CH1 contact 1	CH1 relay interface 1
A2	CH1 contact 2	B2	CH1 contact 2	CH1 relay interface 2
A3	CH2 contact 1	B3	CH2 contact 1	CH2 relay interface 1
A4	CH2 contact 2	B4	CH2 contact 2	CH2 relay interface 2
A5	CH3 contact 1	B5	CH3 contact 1	CH3 relay interface 1
A6	CH3 contact 2	B6	CH3 contact 2	CH3 relay interface 2
A7	CH4 contact 1	B7	CH4 contact 1	CH4 relay interface 1
A8	CH4 contact 2	B8	CH4 contact 2	CH4 relay interface 2
A9	24V	B9	0V	Terminal power input

19.2.2 LED indicator definition



<table>
<tr><th>Indicator Lights</th><th colspan="2">meaning</th></tr>
<tr><td rowspan="2">PW</td><td colspan="2">Green:System bus power inputnormal</td></tr>
<tr><td colspan="2">Green Kill:System bus power inputabnormal</td></tr>
<tr><td rowspan="4">ST</td><td rowspan="2">Power-on stage</td><td>Green: Module initialization error</td></tr>
<tr><td>Green off: Module initialization is normal</td></tr>
<tr><td rowspan="2">Operational stage</td><td>Green flash: The internal bus of the module is working normally</td></tr>
<tr><td>Green off/green on: The internal bus of the module is working abnormally or the terminal power input is abnormal</td></tr>
<tr><td rowspan="2">LP</td><td colspan="2">Green: 24V module power supply is normal</td></tr>
<tr><td colspan="2">Green off: 24V module power supply is abnormal</td></tr>
<tr><td rowspan="2">00～03</td><td colspan="2">Green: Relay closed</td></tr>
<tr><td colspan="2">Green off: relay disconnected</td></tr>
</table>

19.2.3 Wiring Diagram



Note: A9, B9 24V power supply is provided externally.

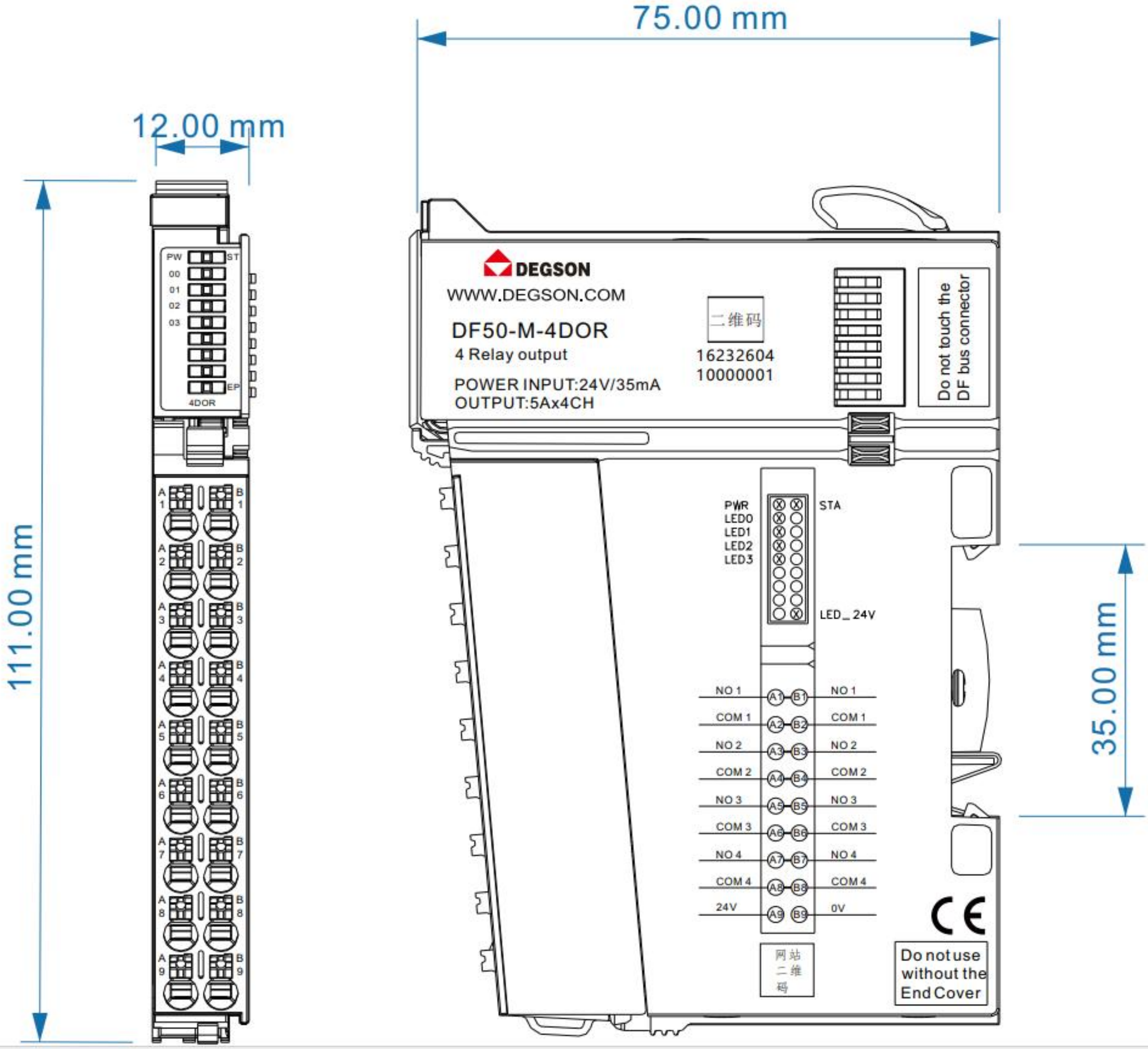
19.3 Process Data Definition

DF50-M-4DOR ModulesProcess data definition

Output Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Reserved	Reserved	Reserved	Reserved	DO 3	DO 2	DO 1	DO 0

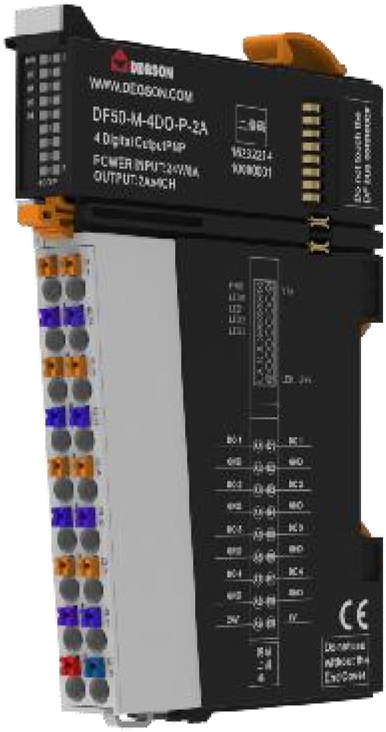
19.4 Mechanical Installation

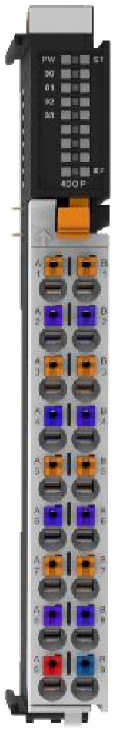
The installation dimensions are shown in the figure below, in mm:



20 4-channel digital output/24VDC/PNP (DF50-M-4DO-P-2A)

- 4-channel digital output.
- Each output channel has an LED indicator.
- The field layer and the system layer are isolated by photocouplers.
- Protection grade IP20.





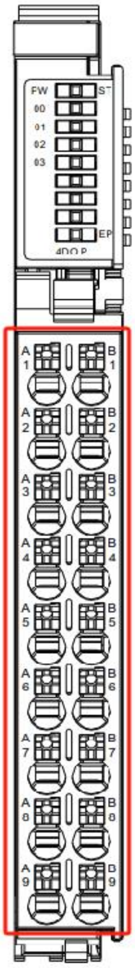
20.1 Specifications

Technical Information	
Product Description	Digital output modules,4Output,PNP, 24VDC
Number of channels	4
Signal Type	PNP
"OFF" signal voltage	High impedance
"ON" signal voltage	twenty fourV DC
Data size	1Byte
Connection Type	1-wire
Reverse circuit protection	Yes
Overcurrent protection	Yes
Short circuit protection	Yes
Isolation method	Photoelectric isolation from the field layer
Error diagnosis	Yes
Switching frequency (resistive)	100Hz
Switching frequency (lamp)	10Hz
Switching frequency (inductive)	0.2Hz
Response time of protection circuit	< 100μs
Maximum output current per channel	2A
Leakage Current	Maximum value:0.18uA
Hardware response time	100us/100us
Output Impedance	<200mΩ
Output delay	OFF to ON:Max.100us, ON to OFF:Max.150us
Protection function	Over temperature shutdown: typical value 135℃ Overcurrent protection:4A. Typical value2A Support short circuit protection
Load Type	Inductive (7.2W/point, 24W/module), Resistive (0.5A/point, 4A/module), Light (5W/point, 18W/module)

Output action display	When the output is in driving state, the indicator light is on.
Input derating	When working at 55℃, the rating is reduced by 50% (the output current of ON at the same time does not exceed 2A), or the rating is reduced by 10℃ when all output points are ON
IO Mapping	Support bit-mapped mode
Fault shutdown output status mode	Clear to zero, keep current value
In stop mode	In the fault shutdown mode, no more refresh
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	100mA
Terminal power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power input rated current	8A
Wiring parameters	
Connection technology: Output	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

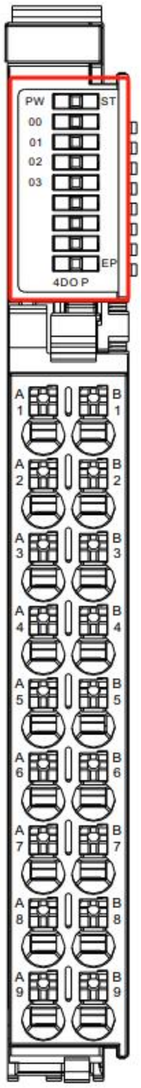
20.2 Hardware Interface

20.2.1wiringTerminal Definition



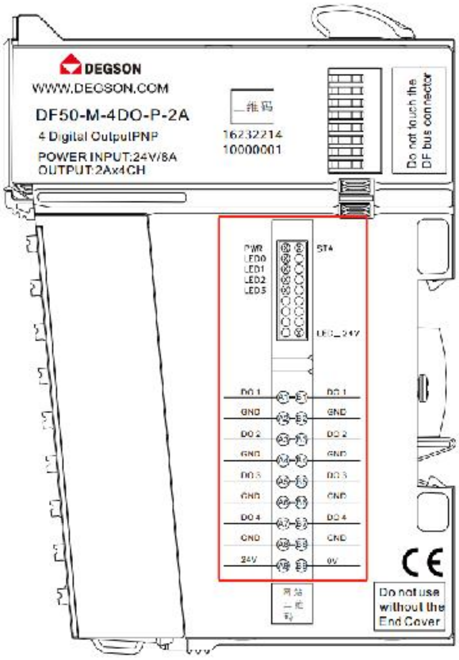
Terminal number	Signal	Terminal number	Signal	illustrate
A1	DO 1	B1	DO 1	DO1 signal output
A2	GND	B2	GND	
A3	DO 2	B3	DO 2	DO2 signal output
A4	GND	B4	GND	
A5	DO 3	B5	DO 3	DO3 signal output
A6	GND	B6	GND	
A7	DO 4	B7	DO 4	DO4 signal output
A8	GND	B8	GND	
A9	24V	B9	0V	Terminal power input

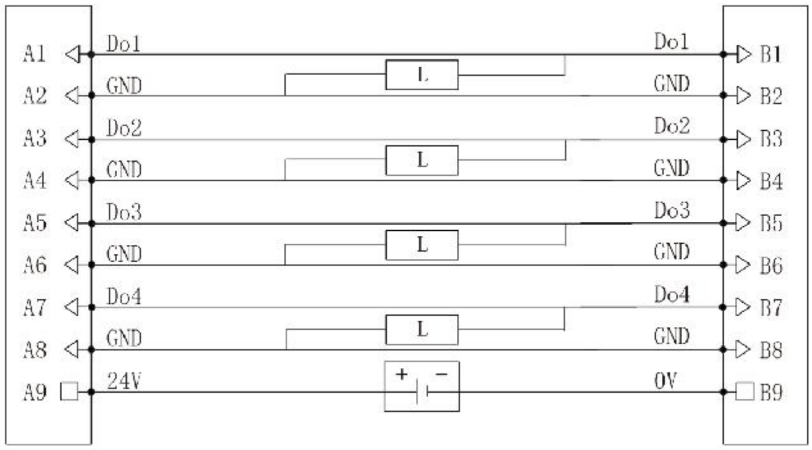
20.2.2 LED Indicatorsdefinition



<table>
<tr><th>Indicator Lights</th><th colspan="2">meaning</th></tr>
<tr><td rowspan="2">PW</td><td colspan="2">Green:System bus power inputnormal</td></tr>
<tr><td colspan="2">Green Kill:System bus power inputabnormal</td></tr>
<tr><td rowspan="4">ST</td><td rowspan="2">Power-on stage</td><td>Green: Module initialization error</td></tr>
<tr><td>Green off: Module initialization is normal</td></tr>
<tr><td rowspan="2">Operational stage</td><td>Green flash: The internal bus of the module is working normally</td></tr>
<tr><td>Green off/green on: The internal bus of the module is working abnormally or the terminal power input is abnormal</td></tr>
<tr><td rowspan="2">EP</td><td colspan="2">Green: 24V module power supply is normal</td></tr>
<tr><td colspan="2">Green off: 24V module power supply is abnormal</td></tr>
<tr><td rowspan="2">00～03</td><td colspan="2">Green: Output signal is valid</td></tr>
<tr><td colspan="2">Green off: Output signal is invalid</td></tr>
</table>

20.2.3 Wiring Diagram





Note: A9, B9 The 24V power supply is provided externally.

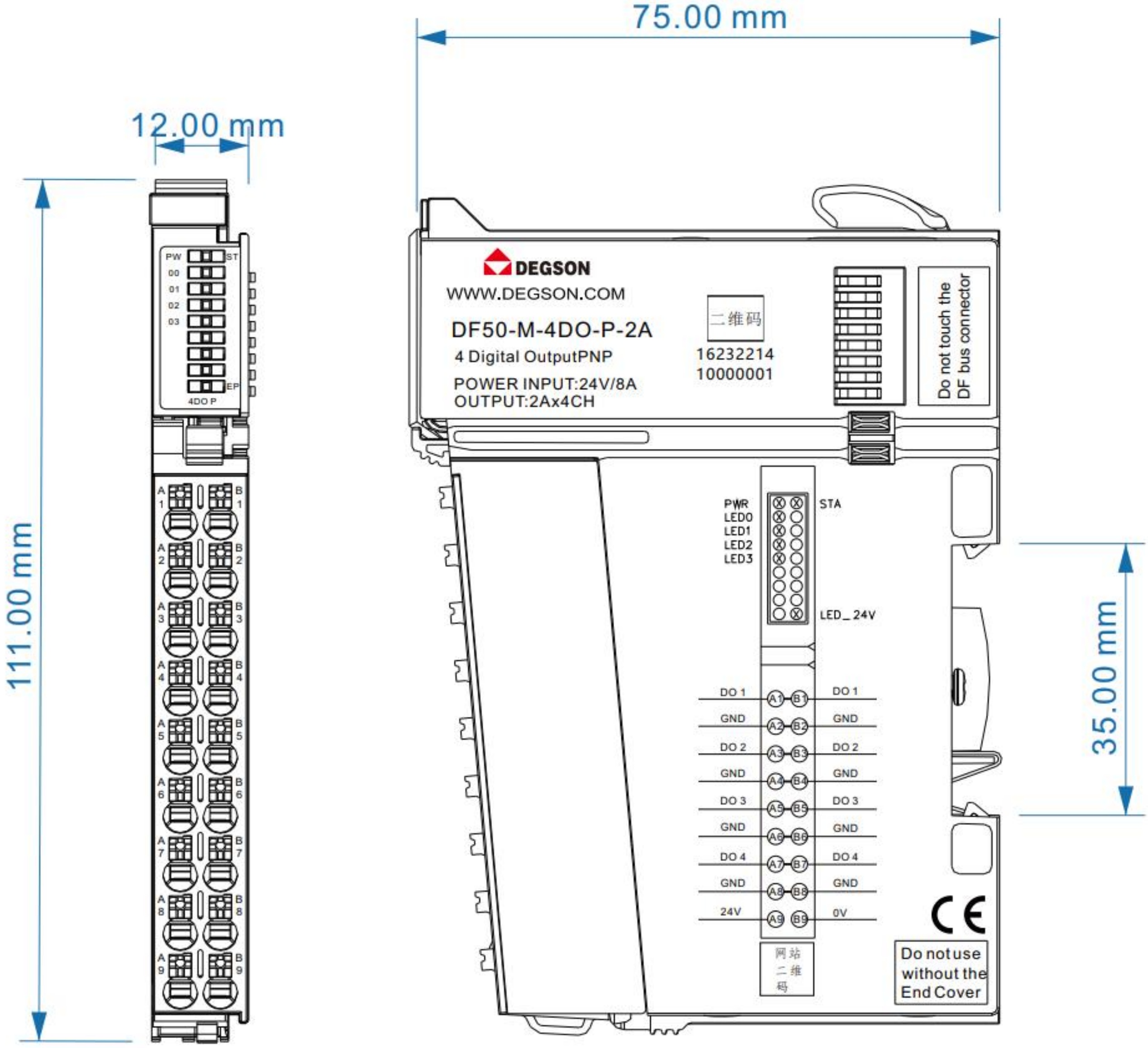
20.4 Process Data Definition

DF50-M-4DO-P-2A moduleProcess data definition

Output Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Reserved	Reserved	Reserved	Reserved	DO 3	DO 2	DO 1	DO 0
Input Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 1	Reserved	Reserved	Reserved	Reserved	Overcurrent3	Overcurrent2	Overcurrent1	Overcurrent0

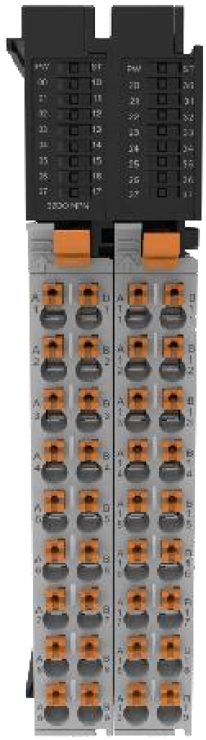
20.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



21 32-channel digital output/24VDC/NPN (DF50-M-32DO-N)

- 32Channel digital output,NPN LowThe level is valid.
- Each output channel has an LED indicator.
- The field layer and the system layer are isolated by photocouplers.
- Protection grade IP20.



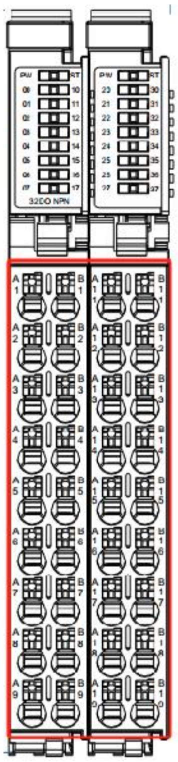
21.1 Specifications

Technical Information	
Product Description	Digital output modules,32Output,NPN, 24VDC
Number of channels	32
Signal Type	NPN
"OFF" signal voltage	High impedance
"ON" signal voltage	0V DC
Data size	4Byte
Connection Type	1-wire
Reverse circuit protection	Yes
Overcurrent protection	Yes
Short circuit protection	Yes
Isolation method	Photoelectric isolation from the field layer
Error diagnosis	Yes
Switching frequency (resistive)	100Hz
Switching frequency (lamp)	10Hz
Switching frequency (inductive)	0.2Hz
Response time of protection circuit	< 100μs
Maximum output current per channel	500 mA
Leakage Current	Maximum value: 10uA
Hardware response time	100us/100us
Output Impedance	<200mΩ
Output delay	OFF to ON:Max.100us, ON to OFF:Max.150us
Protection function	Over temperature shutdown: typical value 135℃ Overcurrent protection: 1.1A. Typical value 0.5A Support short circuit protection

Load Type	0.5A/point,8A/Module
Output action display	When the output is in driving state, the indicator light is on.
Input derating	When working at 55℃, the rating is reduced by 50% (the output current of ON at the same time does not exceed 2A), or the rating is reduced by 10℃ when all output points are ON
IO Mapping	Support bit-by-bit or word-by-word mapping
Fault shutdown output status mode	Clear, keep current value or output according to preset value
In stop mode	In the fault shutdown mode, no more refresh
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	200mA
Terminal power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power input rated current	8A
Wiring parameters	
Connection technology: Output	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

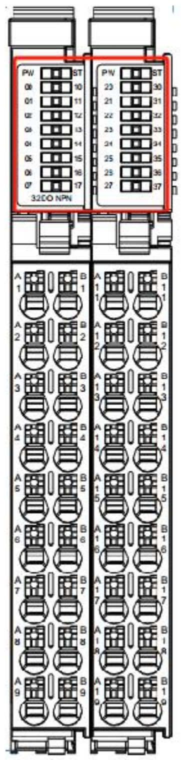
21.2 Hardware Interface

21.2.1 Terminal Block Definition



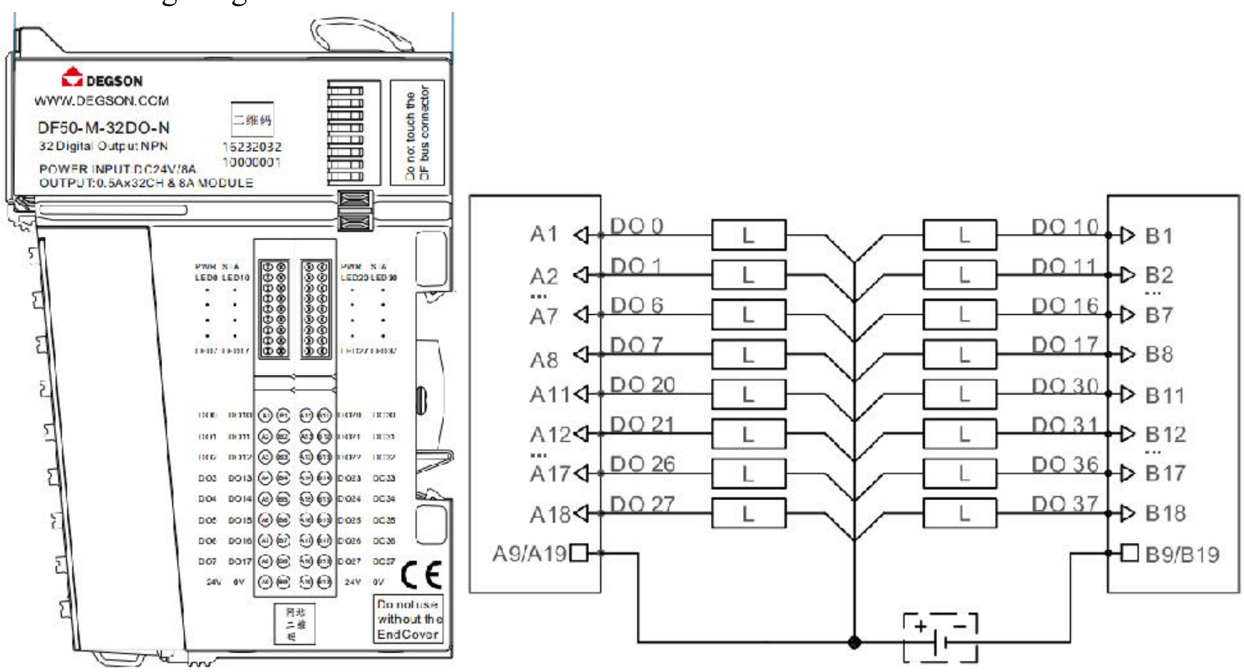
Terminal number	Signal	Terminal number	Signal	Terminal number	Signal	Terminal number	Signal	illustrate
A1	DO0	B1	DO10	C1	DO 20	D1	DO 30	DOSignal inputout
A2	DO1	B2	DO11	C2	DO 21	D2	DO 31	
A3	DO2	B3	DO12	C3	DO 22	D3	DO 32	
A4	DO3	B4	DO13	C4	DO 23	D4	DO 33	
A5	DO4	B5	DO14	C5	DO 24	D5	DO 34	
A6	DO5	B6	DO15	C6	DO 25	D6	DO 35	
A7	DO6	B7	DO16	C7	DO 26	D7	DO 36	
A8	DO7	B8	DO17	C8	DO 27	D8	DO 37	
A9	24V	B9	0V	C9	24V	D9	0V	Terminal power input

21.2.2 LED indicator definition



Indicator Lights	meaning	
PW	Green:System bus power inputnormal	
	Green Kill:System bus power inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally
		Green off: The internal bus of the module is working abnormally
00～07,10～17 20～27,30～37	Green: Input signal is valid	
	Green off: Input signal is invalid	

21.2.3 Wiring Diagram



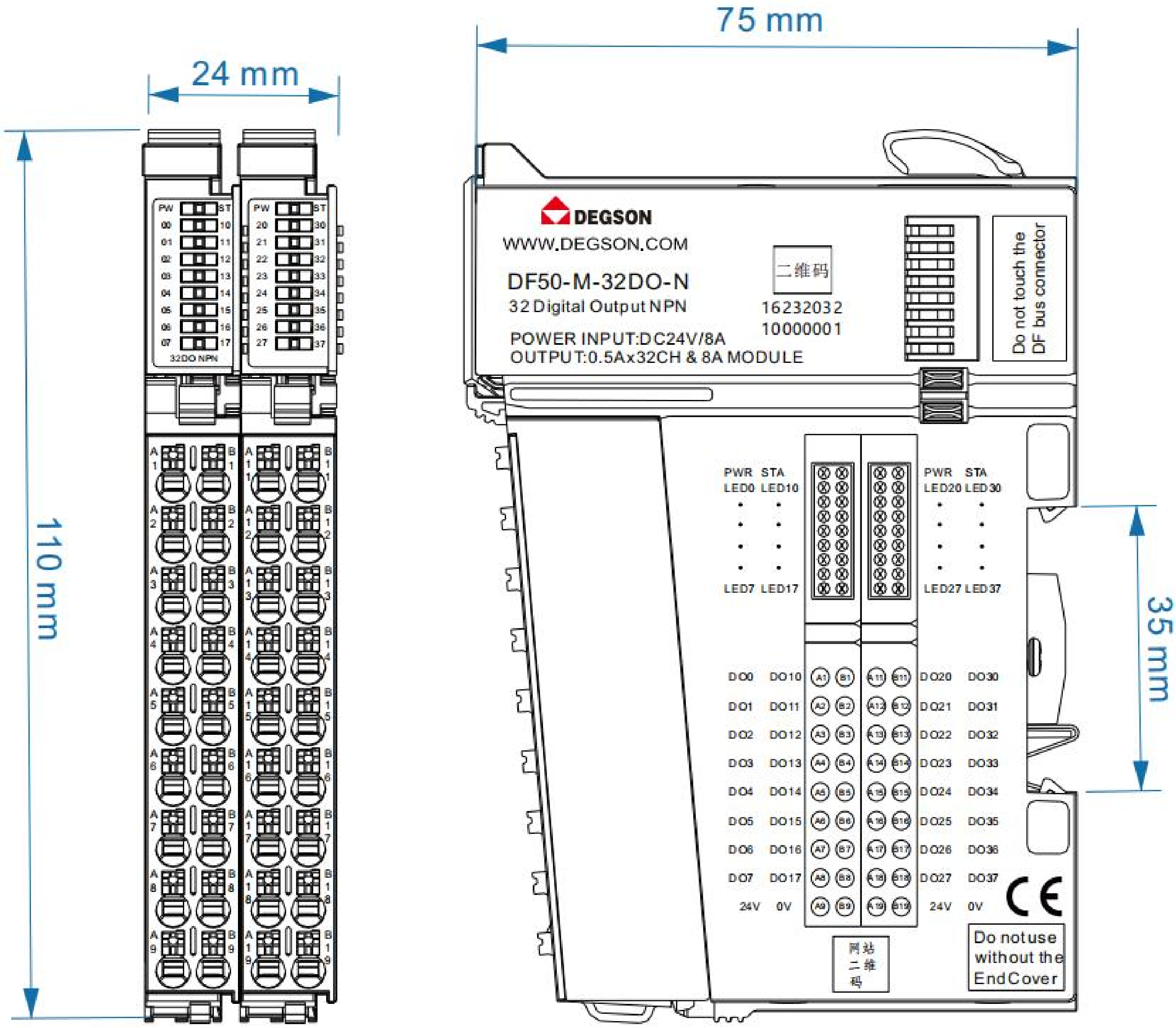
21.3 Process Data Definition

DF50-M-32DO-NModulesProcess data definition

Output Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DO 7	DO 6	DO 5	DO 4	DO 3	DO 2	DO 1	DO 0
Byte 1	DO 17	DO16	DO 15	DO 14	DO 13	DO 12	DO 11	DO 10
Byte 2	DO 27	DO 26	DO 25	DO 24	DO 23	DO 22	DO 21	DO 20
Byte 3	DO 37	DO 36	DO 35	DO 34	DO 33	DO 32	DO 31	DO 30

21.4 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



22 32-channel digital output/24VDC/PNP (DF50-M-32DO-P)

- 32Channel digital output,PNP HighThe level is valid.
- Each output channel has an LED indicator.
- The field layer and the system layer are isolated by photocouplers.
- Protection grade IP20.

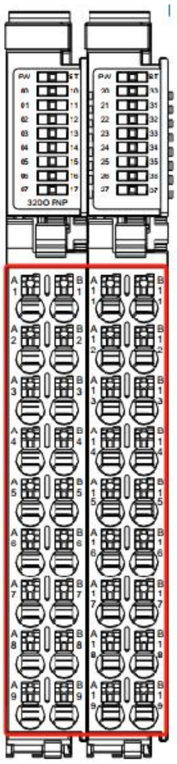
22.1 Specifications

Technical Information	
Product Description	Digital output modules,32Output,PNP, 24VDC
Number of channels	32
Signal Type	PNP
"OFF" signal voltage	High impedance
"ON" signal voltage	twenty fourV DC
Data size	4Byte
Connection Type	1-wire
Reverse circuit protection	Yes
Overcurrent protection	Yes
Short circuit protection	Yes
Isolation method	Photoelectric isolation from the field layer
Error diagnosis	Yes
Switching frequency (resistive)	100Hz
Switching frequency (lamp)	10Hz
Switching frequency (inductive)	0.2Hz
Response time of protection circuit	< 100µs
Maximum output current per channel	500 mA
Leakage Current	Maximum value: 10uA
Hardware response time	100us/100us
Output Impedance	<200mΩ
Output delay	OFF to ON:Max.100us, ON to OFF:Max.150us
Protection function	Over temperature shutdown: typical value 135℃ Overcurrent protection: 1.1A. Typical value 0.5A Support short circuit protection

Load Type	0.5A/point,8A/Module
Output action display	When the output is in driving state, the indicator light is on.
Input derating	When working at 55℃, the rating is reduced by 50% (the output current of ON at the same time does not exceed 2A), or the rating is reduced by 10℃ when all output points are ON
IO Mapping	Support bit-by-bit or word-by-word mapping
Fault shutdown output status mode	Clear, keep current value or output according to preset value
In stop mode	In the fault shutdown mode, no more refresh
Power parameters	
System bus input power rated voltage	5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current	200mA
Terminal power input rated voltage	24V DC (20.4V DC~ 28.8V DC)
Terminal power input rated current	8A
Wiring parameters	
Connection technology: Output	PUSH-IN Terminal Blocks
Wire crimping area	0.2～1.5mm2/26～16AWG
Stripping length	8～10mm
Installation	DIN-35 rail
Material parameters	
color	black
Housing Material	PC plastic, PA66
Conformance mark	CE
Environmental requirements	
Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

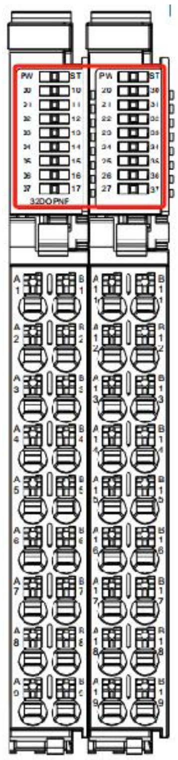
22.2 Hardware Interface

22.2.1 Terminal Block Definition



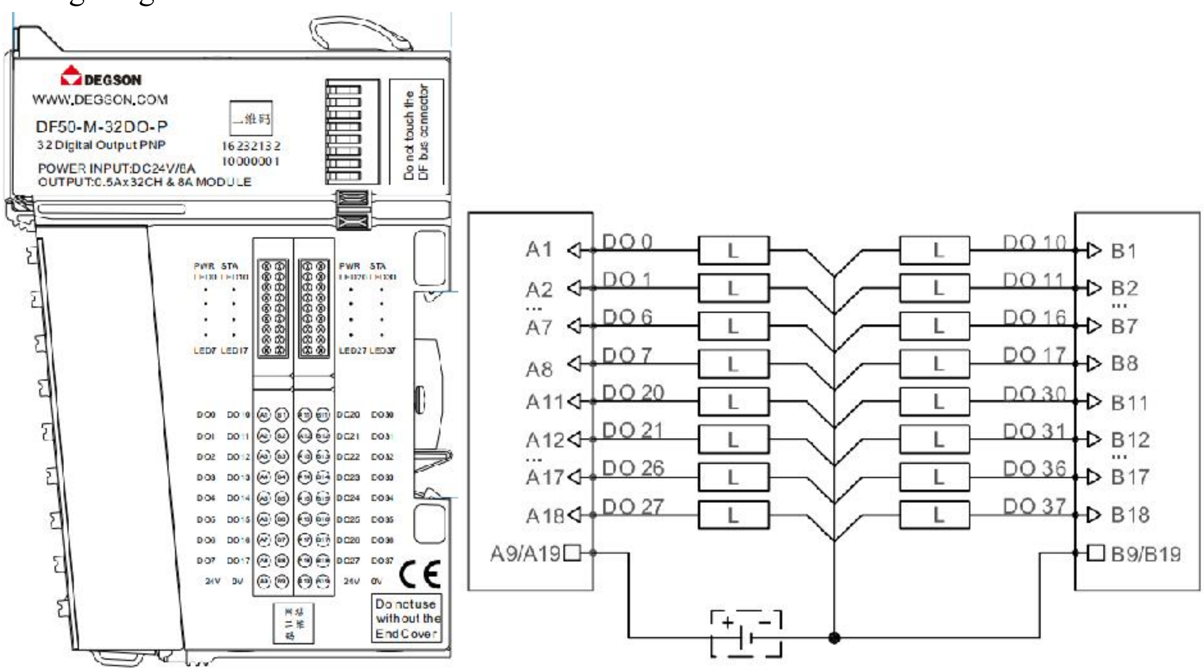
Terminal number	Signal	Terminal number	Signal	Terminal number	Signal	Terminal number	Signal	illustrate
A1	DO0	B1	DO10	C1	DO 20	D1	DO 30	DOSignal inputout
A2	DO1	B2	DO11	C2	DO 21	D2	DO 31	
A3	DO2	B3	DO12	C3	DO 22	D3	DO 32	
A4	DO3	B4	DO13	C4	DO 23	D4	DO 33	
A5	DO4	B5	DO14	C5	DO 24	D5	DO 34	
A6	DO5	B6	DO15	C6	DO 25	D6	DO 35	
A7	DO6	B7	DO16	C7	DO 26	D7	DO 36	
A8	DO7	B8	DO17	C8	DO 27	D8	DO 37	
A9	24V	B9	0V	C9	24V	D9	0V	Terminal power input

22.2.2 LED indicator definition



Indicator Lights	meaning	
PW	Green:System bus power inputnormal	
	Green Kill:System bus power inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally
		Green off: The internal bus of the module is working abnormally
00～07,10～17 20～27,30～37	Green: Input signal is valid	
	Green off: Input signal is invalid	

22.2.3 Wiring Diagram



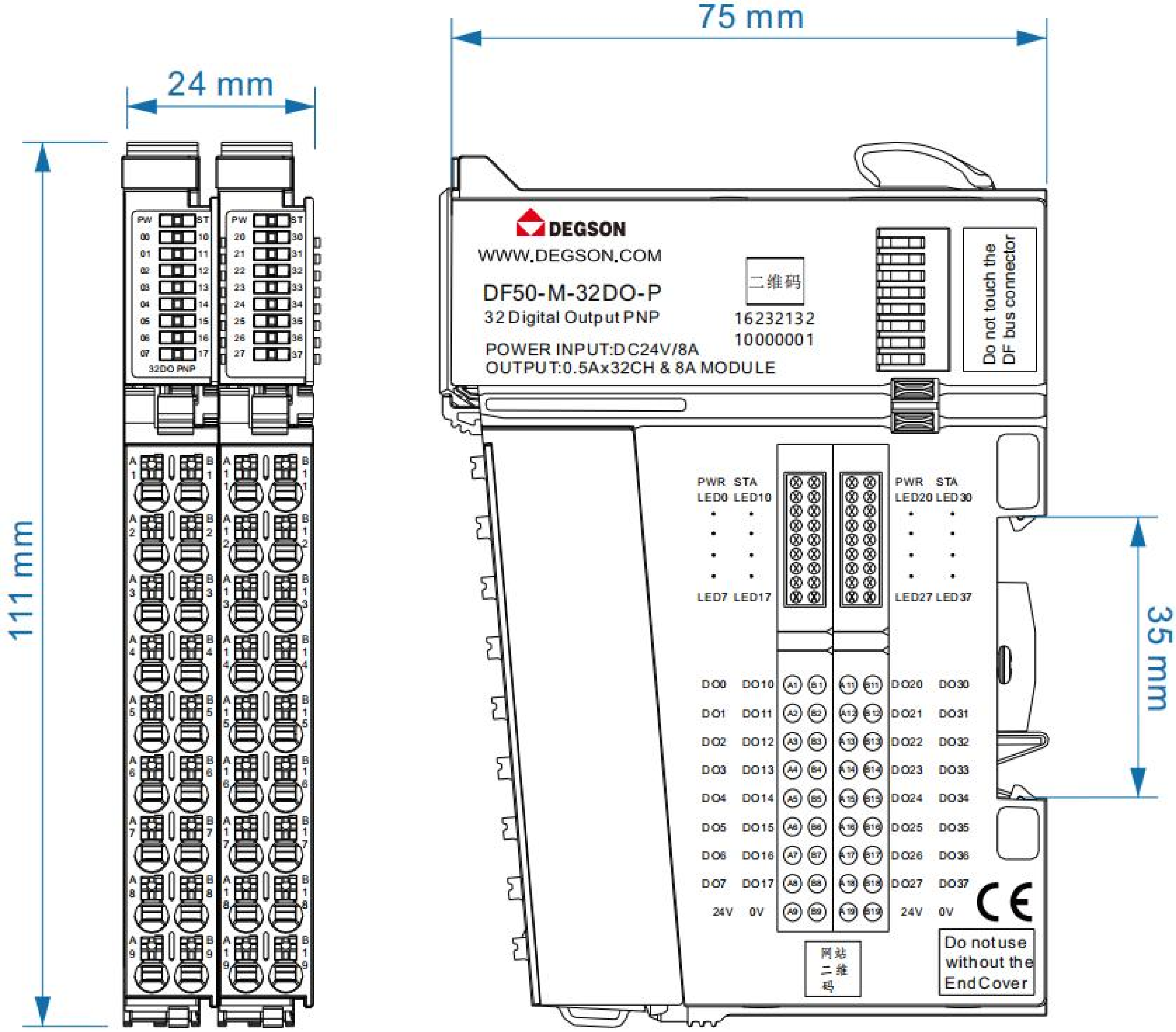
22.3 Module Process Data Definition

DF50-M-32DO-PModulesProcess data definition

Output Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DO 7	DO 6	DO 5	DO 4	DO 3	DO 2	DO 1	DO 0
Byte 1	DO 17	DO16	DO 15	DO 14	DO 13	DO 12	DO 11	DO 10
Byte 2	DO 27	DO 26	DO 25	DO 24	DO 23	DO 22	DO 21	DO 20
Byte 3	DO 37	DO 36	DO 35	DO 34	DO 33	DO 32	DO 31	DO 30

22.4 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



23 16-channel digital input & 16-channel digital output / 24VDC / NPN (DF50-M-16DI-16DO-N)

- The digital quantityThe module supports 16-channel input and 16-channel output, NPN low level is effective.
- Each input module is equipped with an anti-interference filter.
- Each inputOutputAll modules have LED indicators.
- The field layer and the system layer are isolated by photocouplers.
- Protection grade IP20.

23.1 Specifications

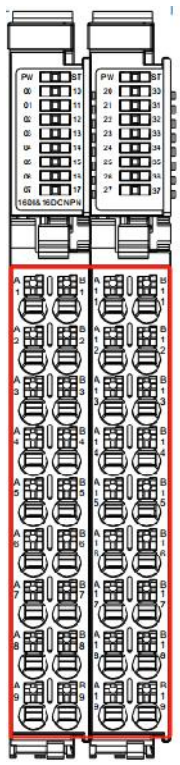
Technical Information		
Product Description		Digital inputOutputModules,16enter+16 output, NPN, 24VDC
Number of channels		16enter+16 output
Signal Type		NPN
Input channel parameters		
Signal range	"ON" signal voltage	Voltage difference > 11VDC (voltage difference with common input)
	"OFF" signal voltage	Voltage difference <5VDC (voltage difference with common input)
Hardware response time		200us/200us
Data size		4Byte

Connection Type		1-wire, Type 1/Type 3, according to IEC 61131-2
Reverse circuit protection		Yes
Isolation method		Photoelectric isolation from the field layer
Error diagnosis		Yes
Filter time		0~40ms configurable
Input Impedance		>7.5kΩ
Input Action Display		When the input is in driving state, the input indicator light is on.
IO Mapping		Support bit-by-bit or word-by-word mapping
Output channel parameters		
"OFF" signal voltage		High impedance
"ON" signal voltage		0V DC
Data size		2 Byte
Connection Type		1-wire
Reverse circuit protection		Yes
Overcurrent protection		Yes
Short circuit protection		Yes
Isolation method		Photoelectric isolation from the field layer
Error diagnosis		Yes
Switching frequency (resistive)		100Hz
Switching frequency (lamp)		10Hz
Switching frequency (inductive)		0.2Hz
Response time of protection circuit		< 100μs
Maximum output current per channel		500 mA
Leakage Current		Maximum value: 10uA
Hardware response time		100us/100us
Output Impedance		<200mΩ
Output delay		OFF to ON:Max.100us, ON to OFF:Max.150us
Protection function		Over temperature shutdown: typical value 135℃ Overcurrent protection: 1.1A. Typical value 0.5A Support short circuit protection
Load Type		Inductive (7.2W/point, 24W/module), Resistive (0.5A/point, 4A/module), Light (5W/point, 18W/module)
Output action display		When the output is in driving state, the indicator light is on.
Input derating		When working at 55℃, the rating is reduced by 50% (the output current of ON at the same time does not exceed 2A), or the rating is reduced by 10℃ when all output points are ON
IO Mapping		Support bit-by-bit or word-by-word mapping
Fault shutdown output status mode		Clear, keep current value or output according to preset value
In stop mode		In the fault shutdown mode, no more refresh
Power parameters		
System bus input power rated voltage		5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current		145mA
Input ChannelsTerminal power supply (common terminal) input voltage	NPN signal type	24V
	PNP signal type	0V
Wiring parameters		
Connection technology: Input		PUSH-IN Terminal Blocks
Wire crimping area		0.2～1.5mm2/26～16AWG
Stripping length		8～10mm²
Installation		DIN-35 rail
Material parameters		
color		black
Housing Material		PC plastic, PA66
Conformance mark		CE
Environmental requirements		

Allowable ambient temperature (operating)	-25～60℃
Permissible ambient temperature (storage)	-40～85℃
Protection type	IP20
Pollution degree	2. Comply with IEC 61131-2 standard
Operating altitude	Temperature without derating: 0～2000m
Relative humidity (non-condensing)	5～95%RH
Vibration resistance	1g, in accordance with IEC 60068-2-6
Shock resistance	15g, compliant with IEC 60068-2-27
EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

23.2 Hardware Interface

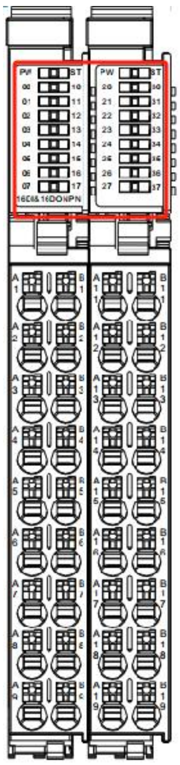
23.2.1Terminal Block Definition



Terminal number	Signal	Terminal number	Signal	Terminal number	Signal	Terminal number	Signal	illustrate
A1	DI 0	B1	DI 10	C1	DO 20	D1	DO 30	DI signal input: A1~B9 DO signal
A2	DI 1	B2	DI 11	C2	DO 21	D2	DO 31	
A3	DI 2	B3	DI 12	C3	DO 22	D3	DO 32	

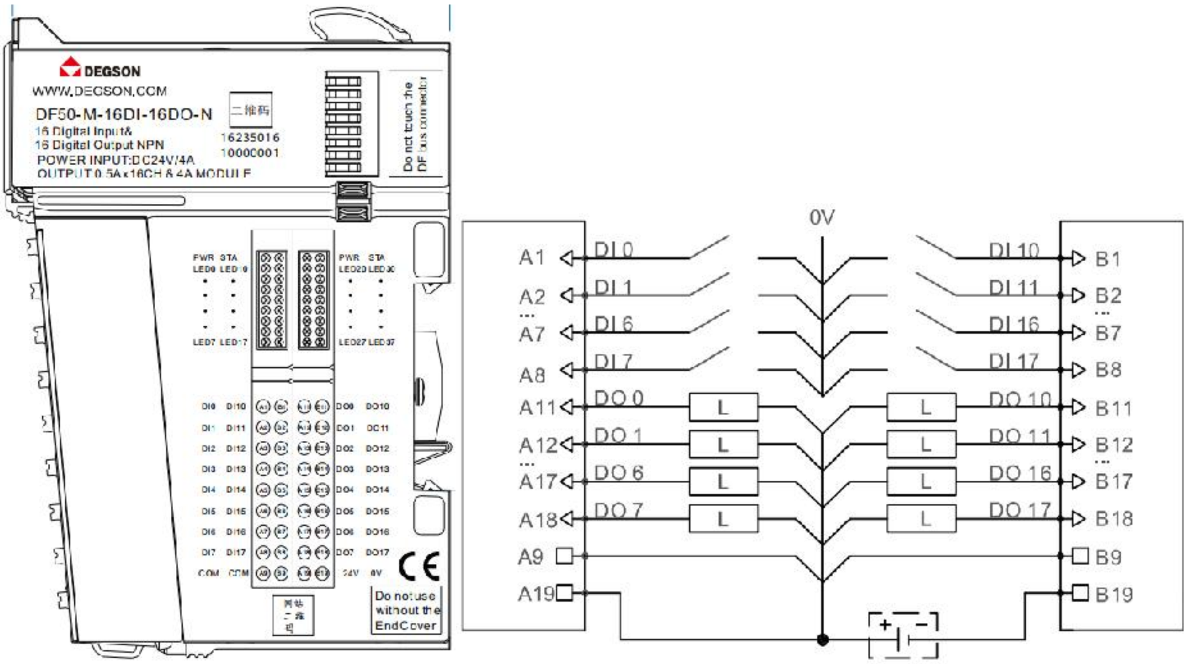
A4	DI 3	B4	DI 13	C4	DO 23	D4	DO 33	output: C1~D9
A5	DI 4	B5	DI 14	C5	DO 24	D5	DO 34	
A6	DI 5	B6	DI 15	C6	DO 25	D6	DO 35	
A7	DI 6	B7	DI 16	C7	DO 26	D7	DO 36	
A8	DI 7	B8	DI 17	C8	DO 27	D8	DO 37	
A9	COM	B9	COM	C9	24V	D9	0V	Public

23.2.2 LED indicator definition



Indicator Lights	meaning	
PW	Green:System bus power inputnormal	
	Green Kill:System bus power inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally
		Green off: The internal bus of the module is working abnormally
00～07,10～17 20～27,30～37	Green: Input signal is valid	
	Green off: Input signal is invalid	

23.2.3 Wiring Diagram



Note: COM is the common terminal, external 24V is used to realize NPN, external 0V is used to realize PNP.

23.3 Module Configuration Data Definition

As shown in the figure, users canunifiedConfigurationSignal filtering of the module.

23.4 Module Process Data Definition

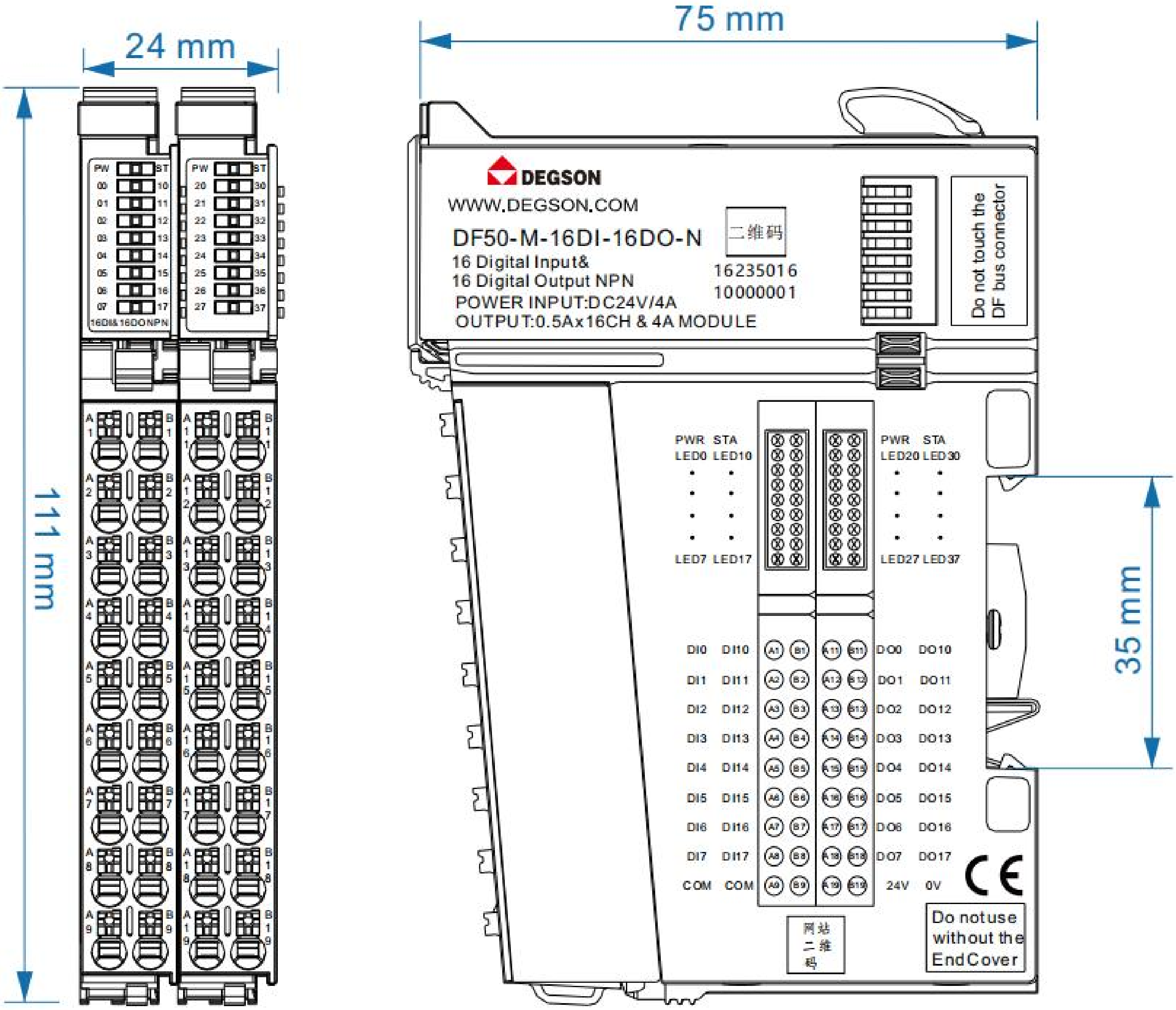
DF50-M-16DI-16DO-NModulesProcess data definition

Input Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DI 7	DI 6	DI 5	DI 4	DI 3	DI 2	DI 1	DI 0
Byte 1	DI 17	DI 16	DI 15	DI 14	DI 13	DI 12	DI 11	DI 10

Output Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DO 7	DO 6	DO 5	DO 4	DO 3	DO 2	DO 1	DO 0
Byte 1	DO 17	DO16	DO 15	DO 14	DO 13	DO 12	DO 11	DO 10

23.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



24 16-channel digital input & 16-channel digital output / 24VDC / PNP (DF50-M-16DI-16DO-P)

- The digital quantityThe module supports 16-channel input and 16-channel output, PNP high level is effective.
- Each input module is equipped with an anti-interference filter.
- Each inputOutputAll modules have LED indicators.
- The field layer and the system layer are isolated by photocouplers.
- Protection grade IP20.

24.1 Specifications

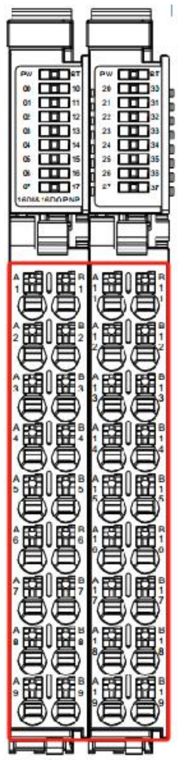
Technical Information		
Product Description		Digital inputOutputModules,16enter+16 output,PNP, 24VDC
Number of channels		16enter+16 output
Signal Type		PNP
Input channel parameters		
Signal range	"ON" signal voltage	Voltage difference > 11VDC (voltage difference with common input)
	"OFF" signal voltage	Voltage difference <5VDC (voltage difference with common input)
Hardware response time		200us/200us
Data size		4Byte
Connection Type		1-wire, Type 1/Type 3, according to IEC 61131-2
Reverse circuit protection		Yes
Isolation method		Photoelectric isolation from the field layer
Error diagnosis		Yes
Filter time		0~40ms configurable

Input Impedance		>7.5kΩ
Input Action Display		When the input is in driving state, the input indicator light is on.
IO Mapping		Support bit-by-bit or word-by-word mapping
Output channel parameters		
"OFF" signal voltage		High impedance
"ON" signal voltage		twenty fourV DC
Data size		2 Byte
Connection Type		1-wire
Reverse circuit protection		Yes
Overcurrent protection		Yes
Short circuit protection		Yes
Isolation method		Photoelectric isolation from the field layer
Error diagnosis		Yes
Switching frequency (resistive)		100Hz
Switching frequency (lamp)		10Hz
Switching frequency (inductive)		0.2Hz
Response time of protection circuit		< 100μs
Maximum output current per channel		500 mA
Leakage Current		Maximum value: 10uA
Hardware response time		100us/100us
Output Impedance		<200mΩ
Output delay		OFF to ON:Max.100us, ON to OFF:Max.150us
Protection function		Over temperature shutdown: typical value 135℃ Overcurrent protection: 1.1A. Typical value 0.5A Support short circuit protection
Load Type		Inductive (7.2W/point, 24W/module), Resistive (0.5A/point, 4A/module), Light (5W/point, 18W/module)
Output action display		When the output is in driving state, the indicator light is on.
Input derating		When working at 55℃, the rating is reduced by 50% (the output current of ON at the same time does not exceed 2A), or the rating is reduced by 10℃ when all output points are ON
IO Mapping		Support bit-by-bit or word-by-word mapping
Fault shutdown output status mode		Clear, keep current value or output according to preset value
In stop mode		In the fault shutdown mode, no more refresh
Power parameters		
System bus input power rated voltage		5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current		145mA
Input ChannelsTerminal power supply (common terminal) input voltage	NPN signal type	24V
	PNP signal type	0V
Wiring parameters		
Connection technology: Input		PUSH-IN Terminal Blocks
Wire crimping area		0.2～1.5mm2/26～16AWG
Stripping length		8～10mm²
Installation		DIN-35 rail
Material parameters		
color		black
Housing Material		PC plastic, PA66
Conformance mark		CE
Environmental requirements		
Allowable ambient temperature (operating)		-25～60℃
Permissible ambient temperature (storage)		-40～85℃
Protection type		IP20
Pollution degree		2. Comply with IEC 61131-2 standard
Operating altitude		Temperature without derating: 0～2000m
Relative humidity (non-condensing)		5～95%RH
Vibration resistance		1g, in accordance with IEC 60068-2-6
Shock resistance		15g, compliant with IEC 60068-2-27

EMC anti-interference level	Compliant with IEC 61000-4
Corrosion resistance	Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity	10ppm
Permissible SO2 pollutant concentration at 75% relative humidity	25ppm

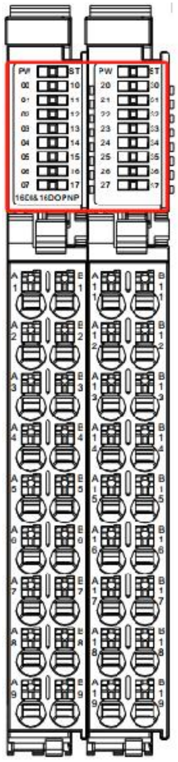
24.2 Hardware Interface

24.2.1 Terminal Block Definition



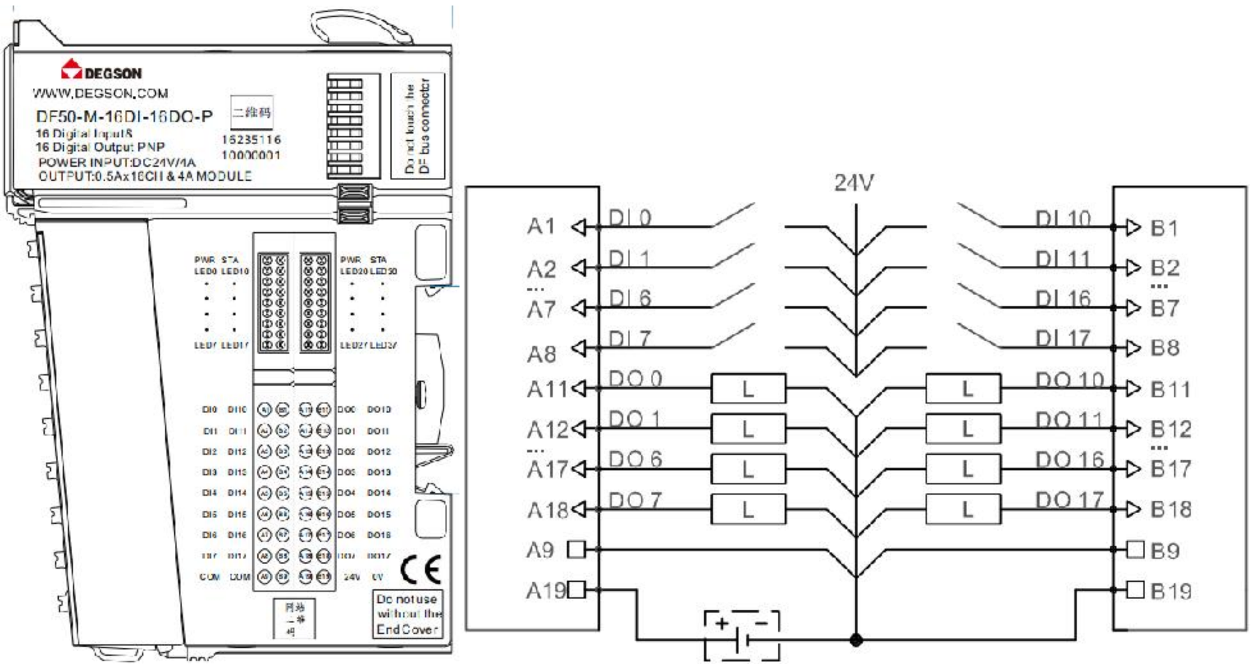
Terminal number	Signal	Terminal number	Signal	Terminal number	Signal	Terminal number	Signal	illustrate
A1	DI 0	B1	DI 10	C1	DO 20	D1	DO 30	DI signal input: A1~B9 DO signal output: C1~D9
A2	DI 1	B2	DI 11	C2	DO 21	D2	DO 31	
A3	DI 2	B3	DI 12	C3	DO 22	D3	DO 32	
A4	DI 3	B4	DI 13	C4	DO 23	D4	DO 33	
A5	DI 4	B5	DI 14	C5	DO 24	D5	DO 34	
A6	DI 5	B6	DI 15	C6	DO 25	D6	DO 35	
A7	DI 6	B7	DI 16	C7	DO 26	D7	DO 36	
A8	DI 7	B8	DI 17	C8	DO 27	D8	DO 37	
A9	COM	B9	COM	C9	24V	D9	0V	Public

24.2.2 LED indicator definition



Indicator Lights	meaning	
PW	Green:System bus power inputnormal	
	Green Kill:System bus power inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally
		Green off: The internal bus of the module is working abnormally
00～07,10～17 20～27,30～37	Green: Input signal is valid	
	Green off: Input signal is invalid	

24.2.3 Wiring Diagram



Note: COM is the common terminal, external 24V is used to realize NPN, external 0V is used to realize

PNP.

24.3 Module Configuration Data Definition

As shown in the figure, users canunifiedConfigurationSignal filtering of the module.

24.4 Module Process Data Definition

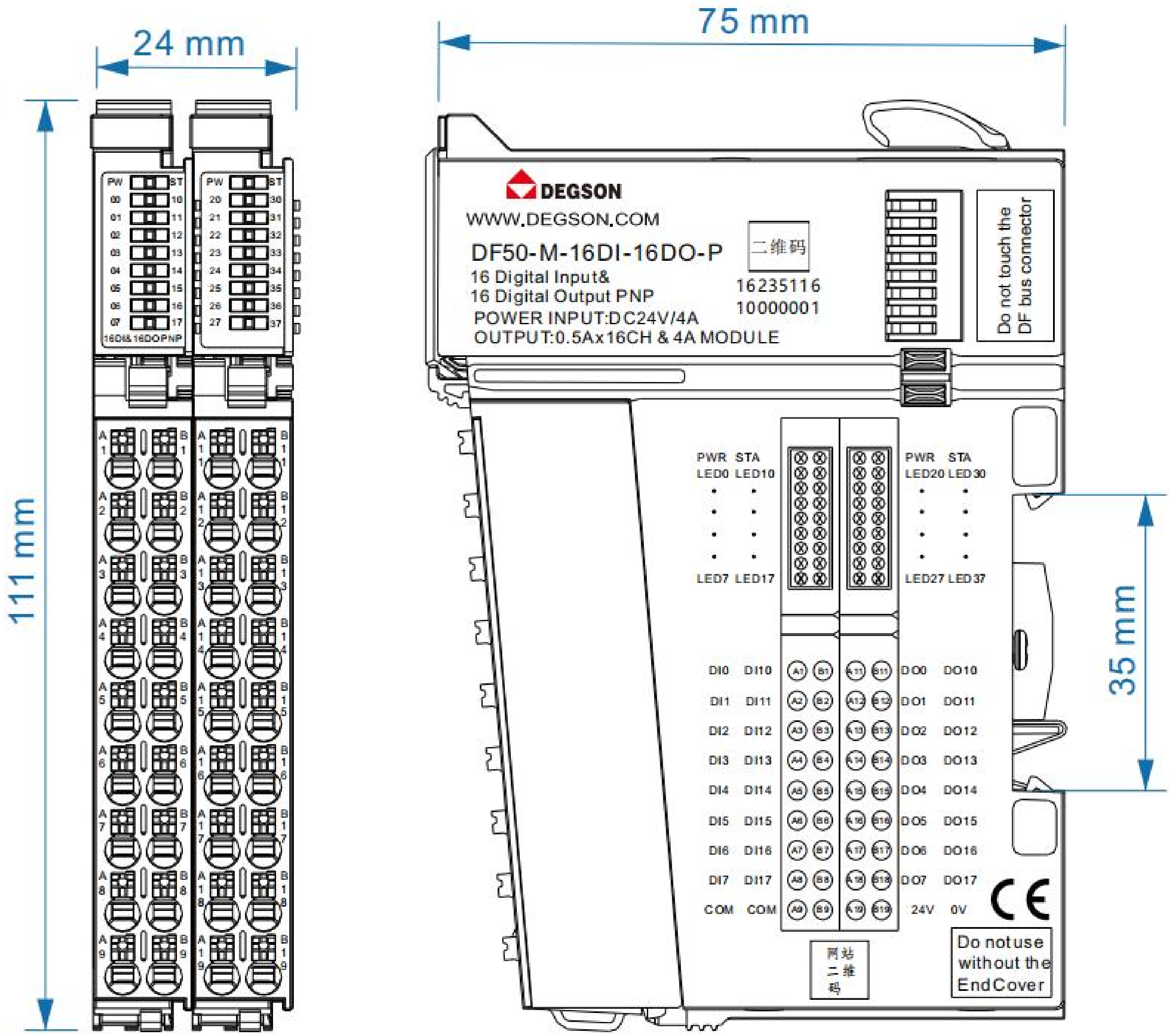
DF50-M-16DI-16DO-PModulesProcess data definition

Input Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DI 7	DI 6	DI 5	DI 4	DI 3	DI 2	DI 1	DI 0
Byte 1	DI 17	DI 16	DI 15	DI 14	DI 13	DI 12	DI 11	DI 10

Output Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DO 7	DO 6	DO 5	DO 4	DO 3	DO 2	DO 1	DO 0
Byte 1	DO 17	DO16	DO 15	DO 14	DO 13	DO 12	DO 11	DO 10

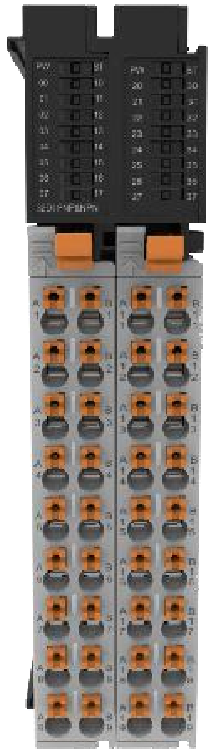
24.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



25 32-channel digital input/24VDC/PNP&NPN(DF50-M-32DI-P/N)

- The digital input module can receive control signals from field devices (such as sensors, etc.).
- 32-channel digital input, PNP&NPN valid, common terminal conversion.
- Each input module is equipped with an anti-interference filter.
- Each input module has an LED indicator.
- The field level and the system level are isolated by optocouplers.
- Protection grade IP20.

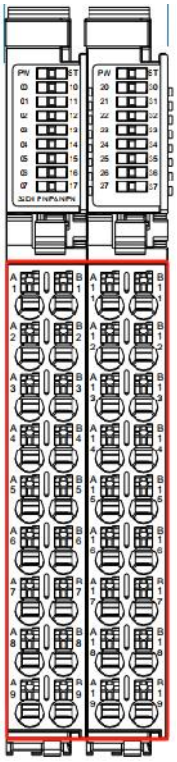


25.1 Specifications

Technical Information		
Product Description		Digital input modules,32Input, NPN & PNP, 24VDC
Number of channels		32
Signal Type		NPN & PNP
Signal range	"ON" signal voltage	Voltage difference > 11VDC (voltage difference with common input)
	"OFF" signal voltage	Voltage difference <5VDC (voltage difference with common input)
Hardware response time		200us/200us
Data size		4Byte
Connection Type		1-wire, Type 1/Type 3, according to IEC 61131-2
Reverse circuit protection		Yes
Isolation method		Photoelectric isolation from the field layer
Error diagnosis		Yes
Filter time		0-40ms configurable
Input Impedance		>7.5kΩ
Input Action Display		When the input is in driving state, the input indicator light is on.
IO Mapping		Support bit-by-bit or word-by-word mapping
Power parameters		
System bus input power rated voltage		5V DC (4.75V DC~ 5.25V DC)
System bus input power rated current		90mA
Terminal power supply (common terminal) input rated voltage	NPN signal type	24V
	PNP signal type	0V
Wiring parameters		
Connection technology: Input		PUSH-IN Terminal Blocks
Wire crimping area		0.2～1.5mm2/26～16AWG
Stripping length		8～10mm²
Installation		DIN-35 rail
Material parameters		
color		black
Housing Material		PC plastic, PA66
Conformance mark		CE
Environmental requirements		
Allowable ambient temperature (operating)		-25～60℃
Permissible ambient temperature (storage)		-40～85℃
Protection type		IP20
Pollution degree		2. Comply with IEC 61131-2 standard
Operating altitude		Temperature without derating: 0～2000m
Relative humidity (non-condensing)		5～95%RH
Vibration resistance		1g, in accordance with IEC 60068-2-6
Shock resistance		15g, compliant with IEC 60068-2-27
EMC anti-interference level		Compliant with IEC 61000-4
Corrosion resistance		Compliant with IEC 60068-2-42 and IEC 60068-2-43 standards
Permissible H2S contaminant concentration at 75% relative humidity		10ppm
Permissible SO2 pollutant concentration at 75% relative humidity		25ppm

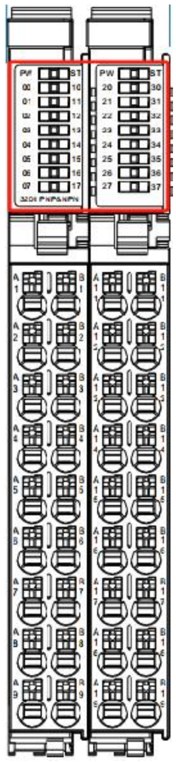
25.2 Hardware Interface

25.2.1 Terminal Block Definition



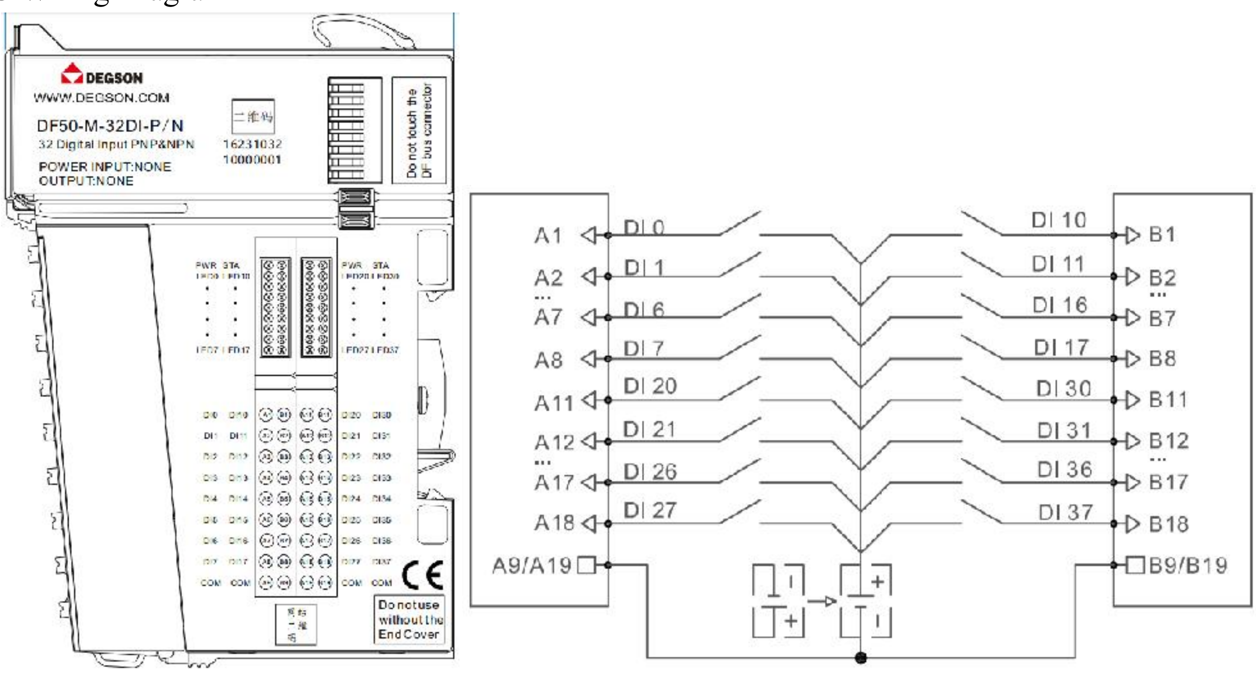
Terminal number	Signal	Terminal number	Signal	Terminal number	Signal	Terminal number	Signal	illustrate
A1	DI 0	B1	DI 10	C1	DI20	D1	DI30	DI signal input
A2	DI 1	B2	DI 11	C2	DI21	D2	DI31	
A3	DI 2	B3	DI 12	C3	DI22	D3	DI32	
A4	DI 3	B4	DI 13	C4	DI23	D4	DI33	
A5	DI 4	B5	DI 14	C5	DI24	D5	DI34	
A6	DI 5	B6	DI 15	C6	DI25	D6	DI35	
A7	DI 6	B7	DI 16	C7	DI26	D7	DI36	
A8	DI 7	B8	DI 17	C8	DI27	D8	DI37	
A9	COM	B9	COM	C9	COM	D9	COM	Public

25.2.2 LED indicator definition



Indicator Lights	meaning	
PW	Green:System bus powerSource Inputnormal	
	Green Kill:System bus powerSource Inputabnormal	
ST	Power-on stage	Green: Module initialization error
		Green off: Module initialization is normal
	Operational stage	Green flash: The internal bus of the module is working normally
		Green off: The internal bus of the module is working abnormally
00～07,10～17 20～27,30～37	Green: Input signal is valid	
	Green off: Input signal is invalid	

25.2.3 Wiring Diagram



Note: COM is the common terminal, external 24V realizes NPN; external 0V realizes PNP.

25.3 Module Configuration Data Definition

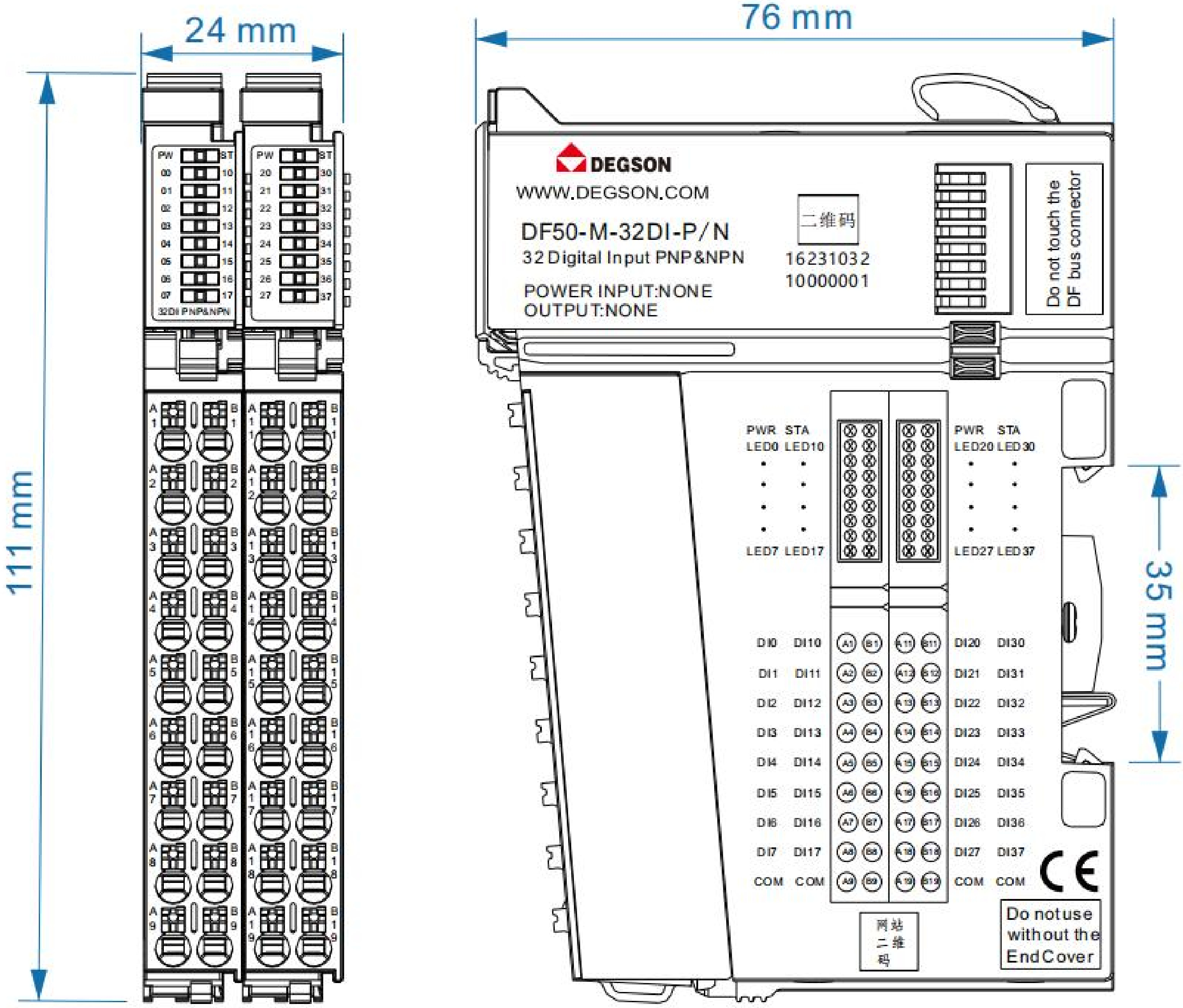
As shown in the figure, users canunifiedConfigurationSignal filtering of the module.

25.4 Module Process Data Definition

Input Data								
Bit No	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DI 7	DI 6	DI 5	DI 4	DI 3	DI 2	DI 1	DI 0
Byte 1	DI 17	DI 16	DI 15	DI 14	DI 13	DI 12	DI 11	DI 10
Byte 2	DI 27	DI 26	DI 25	DI 24	DI 23	DI 22	DI 21	DI 20
Byte 3	DI 37	DI 36	DI 35	DI 34	DI 33	DI 32	DI 31	DI 30

25.5 Mechanical Installation

The installation dimensions are shown in the figure below, in mm:



4. Software Configuration Description

1. TIA Portal V16 configuration process

This chapterspecialDon't use SiemensTIA Portal V16 As configuration software adapterDF50-C-PN-RTThe use of is introduced.

The PLC model used in this section is 6ES7212-1AE40-0XB0.

1.1. Project Creation

1.1.1. New Construction

➢ As shown in Figure 4-1-1, open the TIA Portal V16 software, then select "Create New Project" from the menu bar to create a new project:

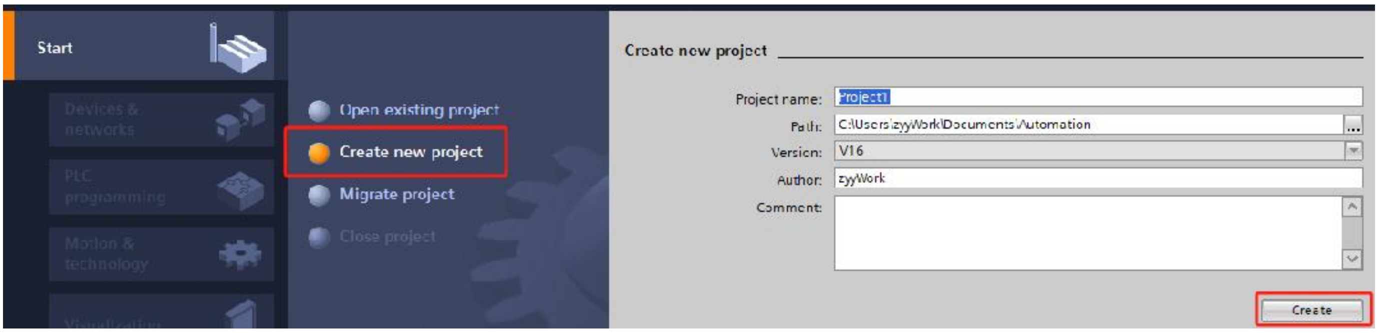


Figure 4-1-1

➢ As shown in Figure 4-1-2, create a project and open the project view:

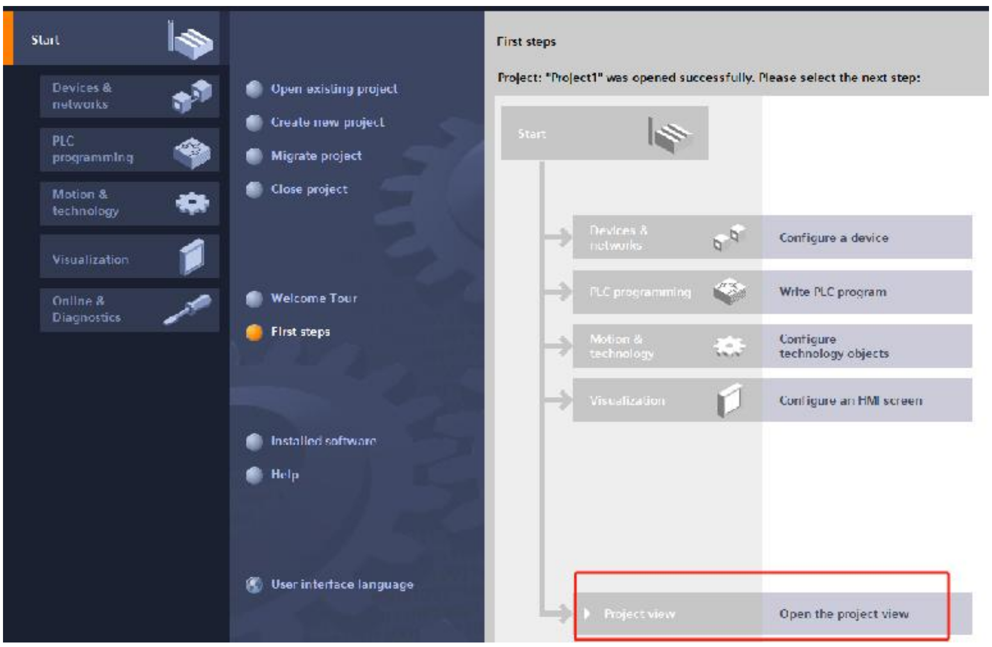


Figure 4-1-2

1.1.2. Add GSD file

➢ Add GSD file as shown in Figure 4-1-3 and 4-1-4:

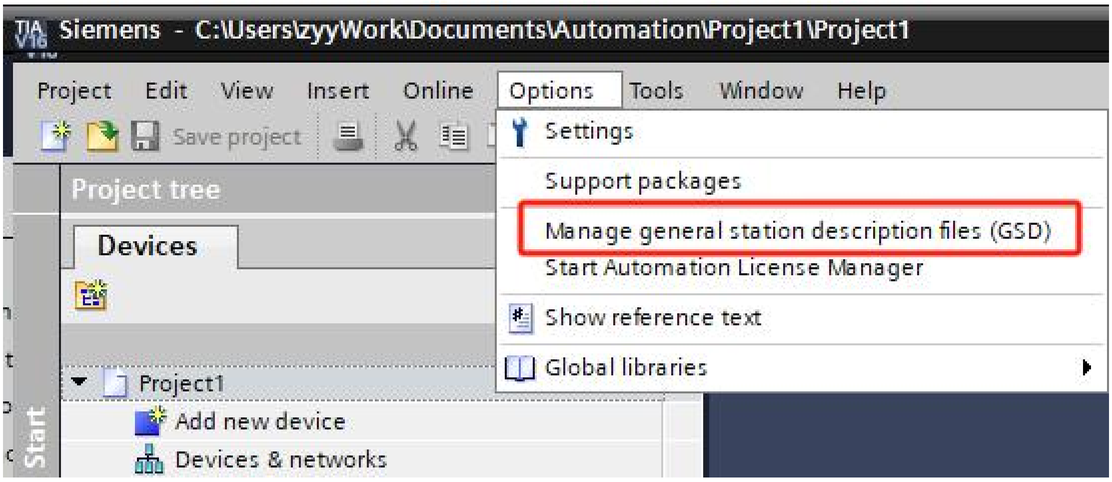


Figure 4-1-3

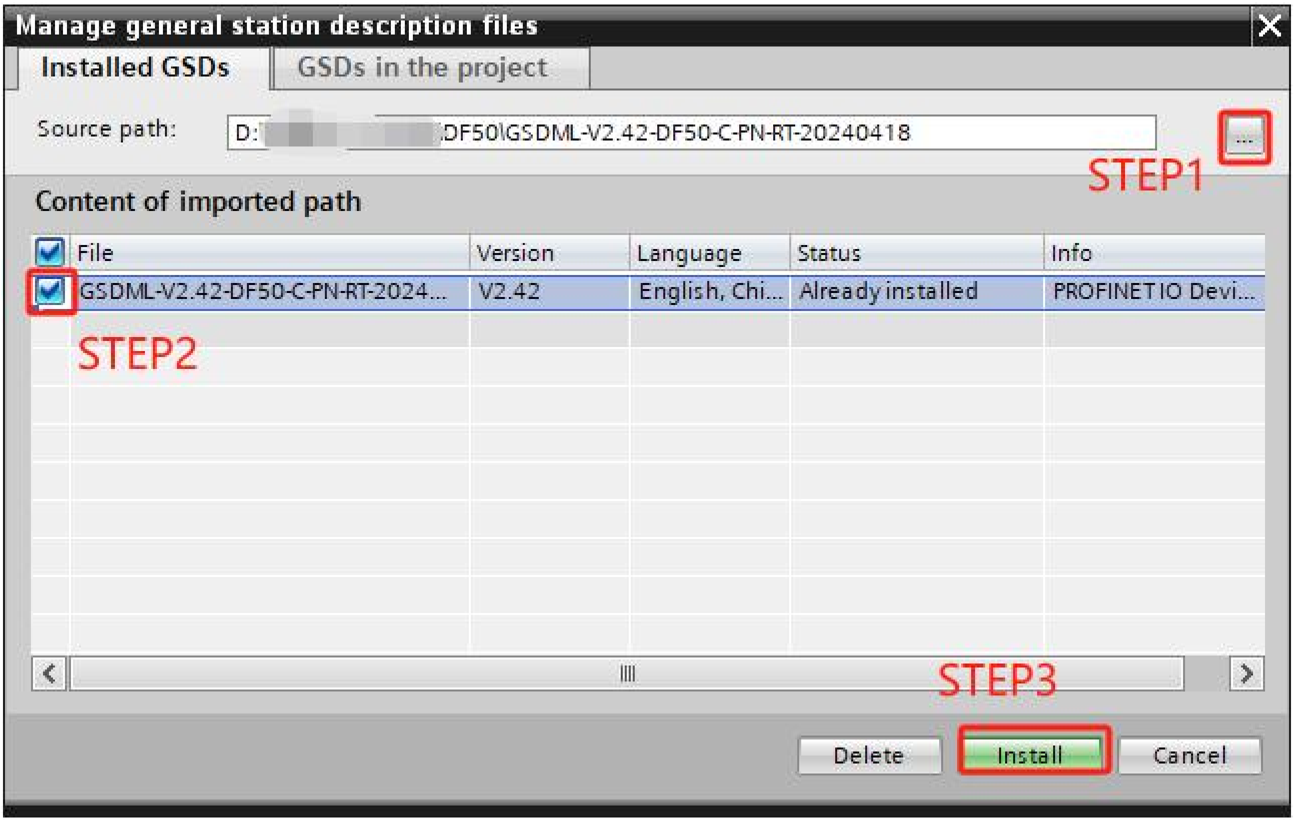


Figure 4-1-4

1.1.3. Adding controllers and adapters

➢ Add a controller as shown in Figure 4-1-5:

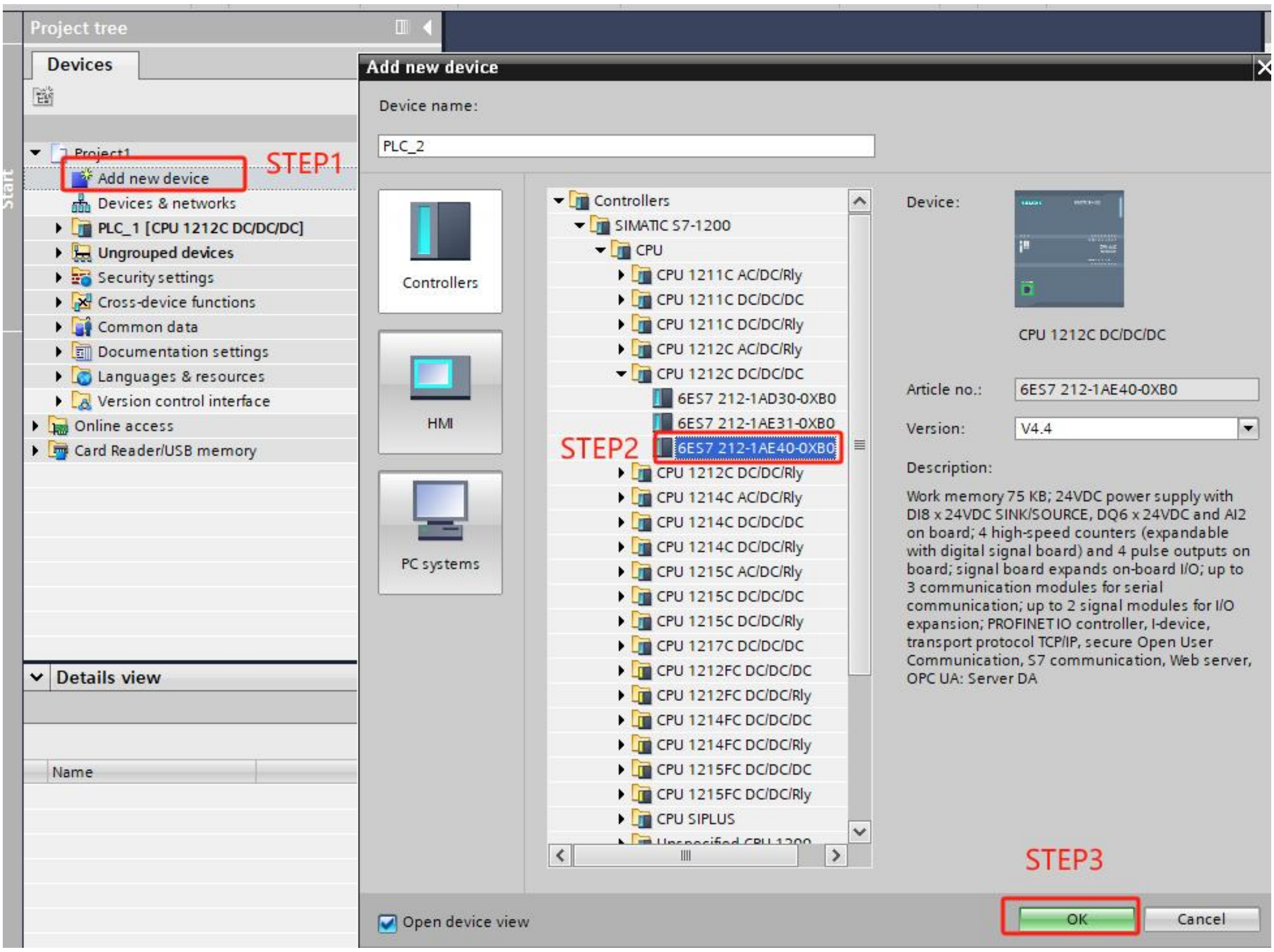


Figure 4-1-5

➢ Add an adapter as shown in Figure 4-1-6DF50-C-PN-RT:

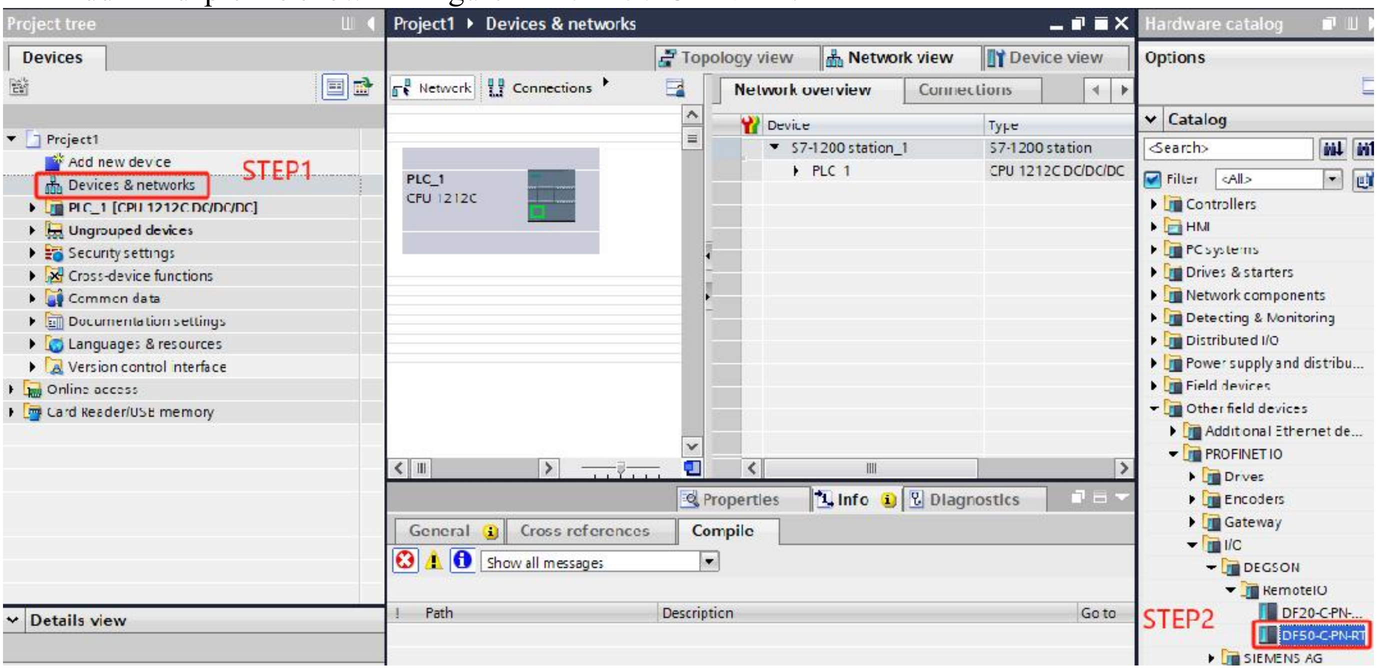


Figure 4-1-6

1.1.4. Establish connections and add IO expansion modules:

➢ Assign a network interface to the adapter (as shown in Figures 4-1-7 and 4-1-8):

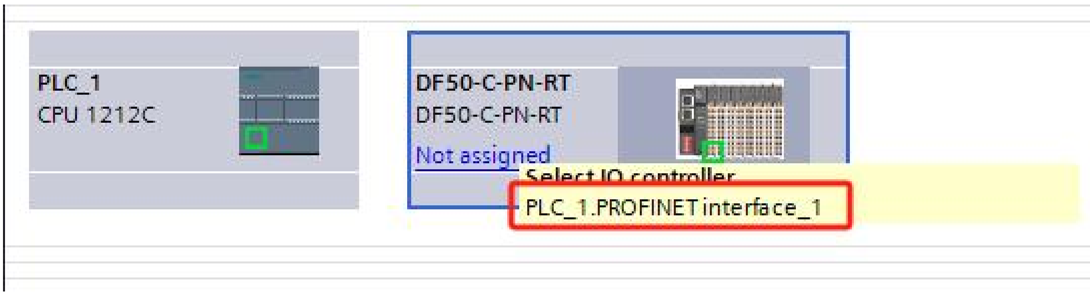


Figure 4-1-7

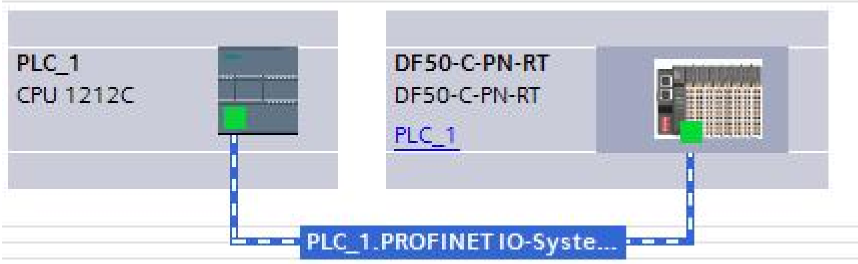


Figure 4-1-8

➢ Double-click the adapter. In the hardware catalog tab on the right, as shown in Figure 4-1-9, add modules in the device tree according to the modules inserted behind the adapter. The topology of this example is DF50-C-PN-RT, DF50-M-16DO-P, and DF50-M-16DI-P/N. The default configuration of DF50-C-PN-RT is SystemDiagnostic and AdapterDigitalInput modules, which are used to display the error information of the IO modules in the topology and the 8-channel DI input signal of the adapter.

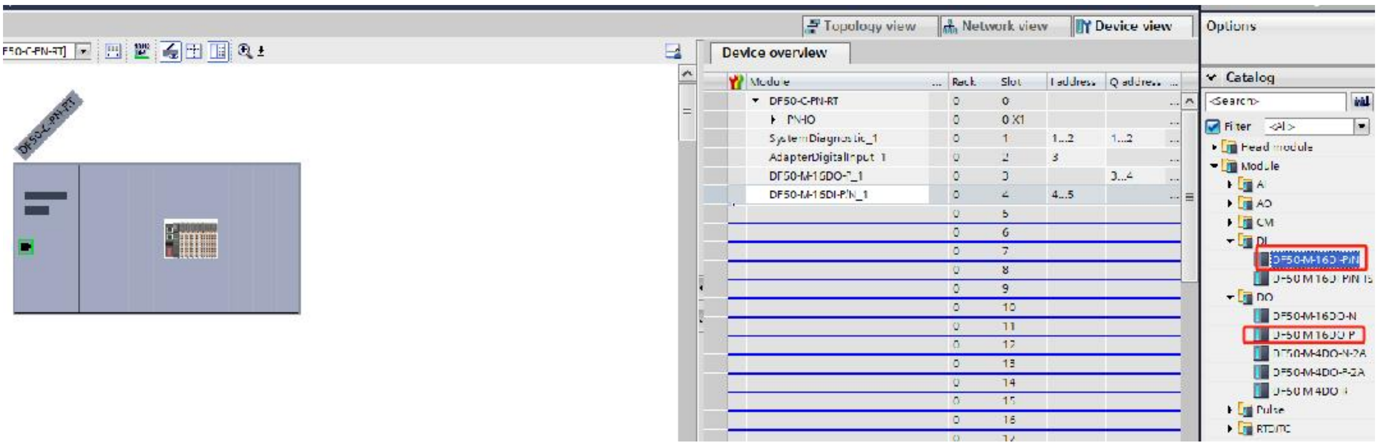


Figure 4-1-9

1.1.5. Assigning a Device Name

➢ Assign device names as shown in Figures 4-1-10 and 4-1-11. Open the Assign PROFINET Device Name column, click Update List, select the scanned device, and click Assign Name. Ensure that the Status column displays a blue check mark and the text OK is displayed.

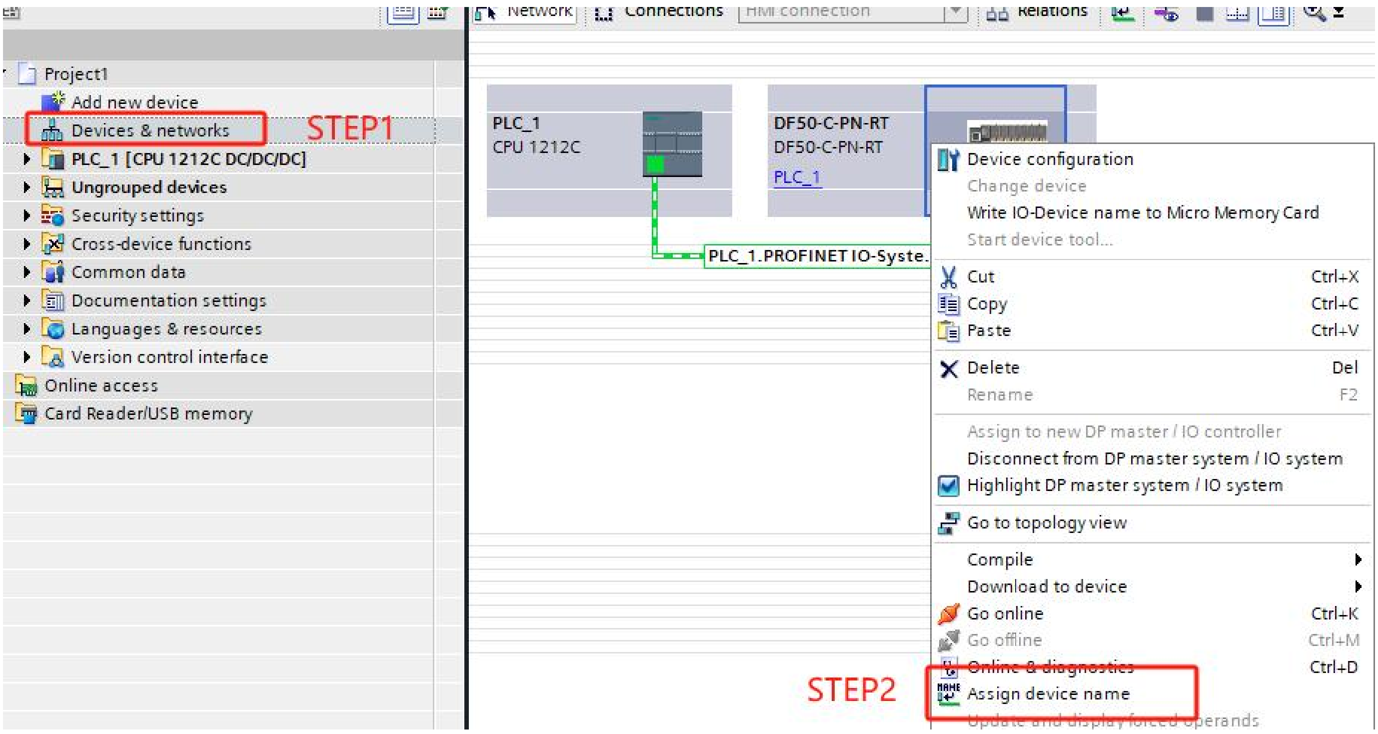


Figure 4-1-10

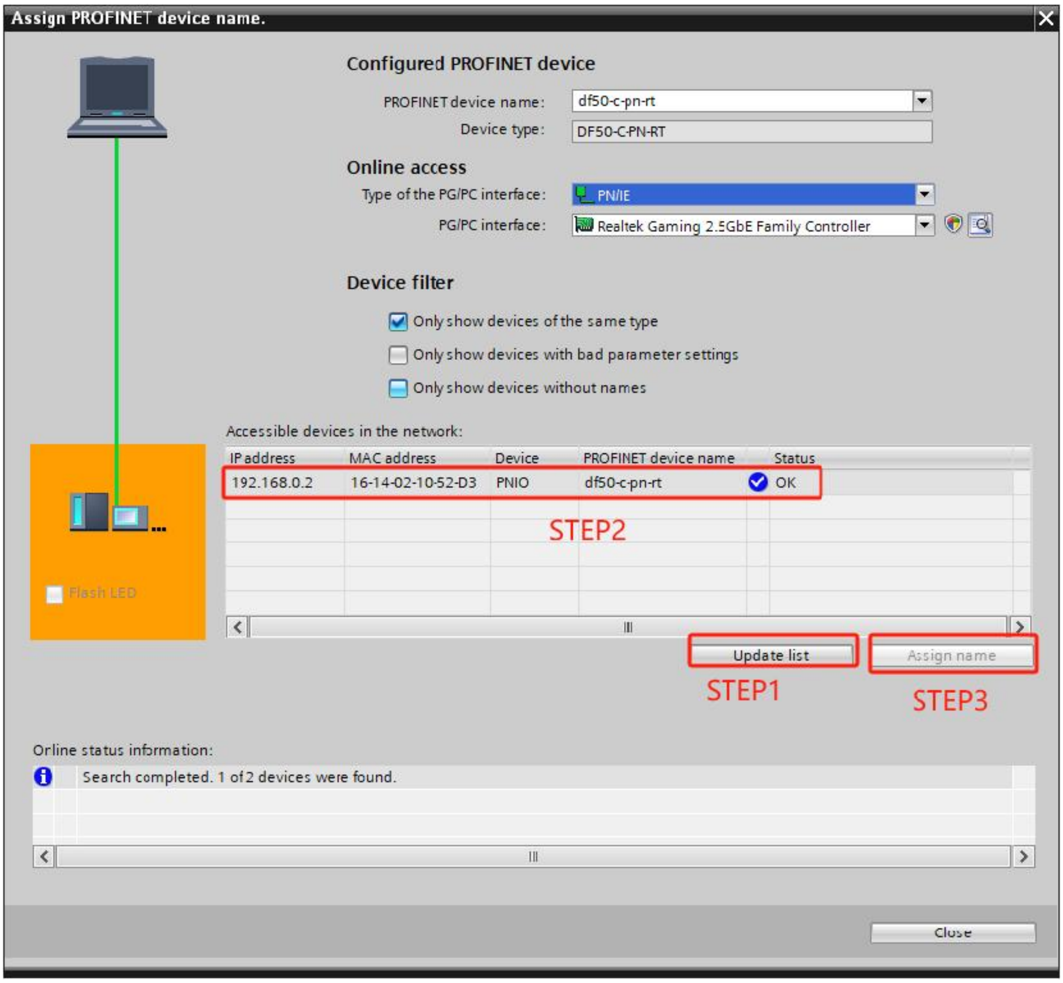


Figure 4-1-11

1.1.6. Download to device

➢ After the module configuration is completed, download the configuration to the PLC as shown in Figure 4-1-12. Make sure that the computer network segment is consistent with the PLC network segment.

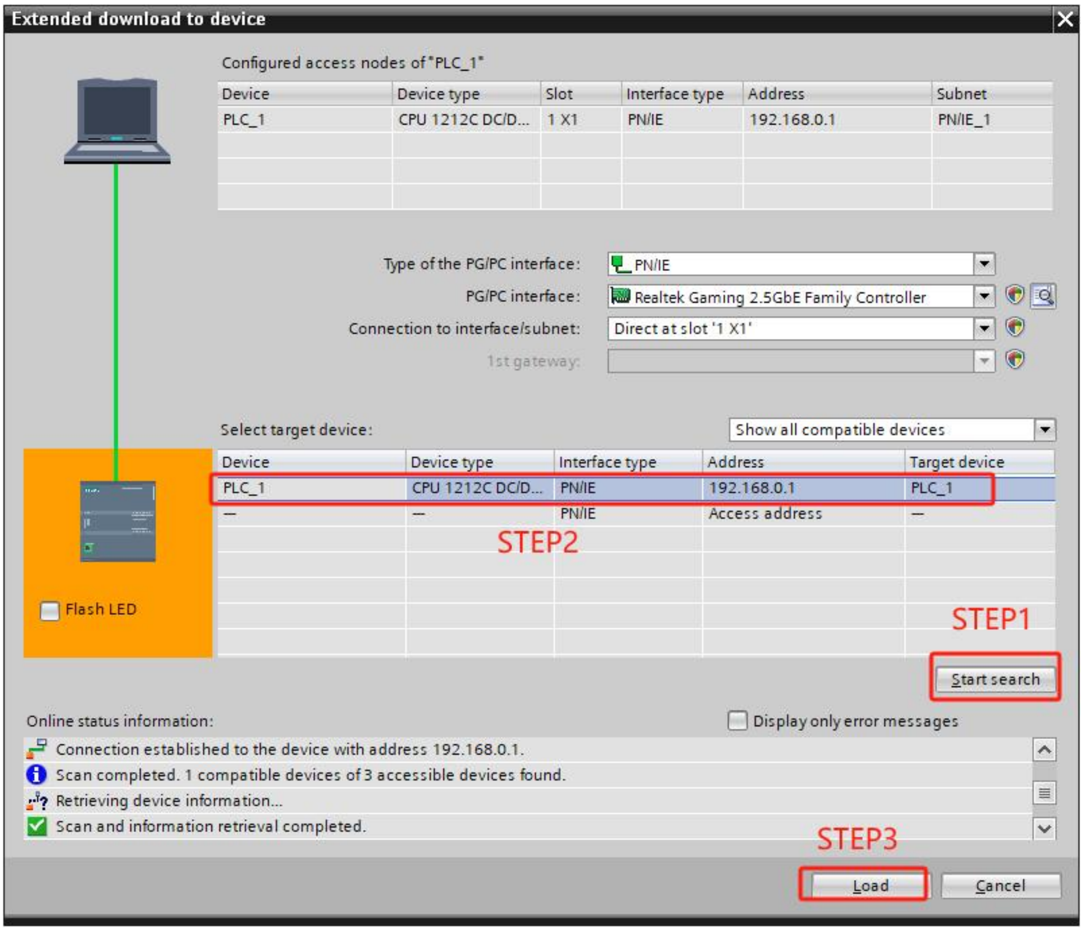


Figure 4-1-12

1.1.7. Running PLC

➢ As shown in Figure 4-1-13, click Start PLC to run the PLC in RUN state and switch to online mode. All states in the project tree list are green, indicating that the configuration is normal.

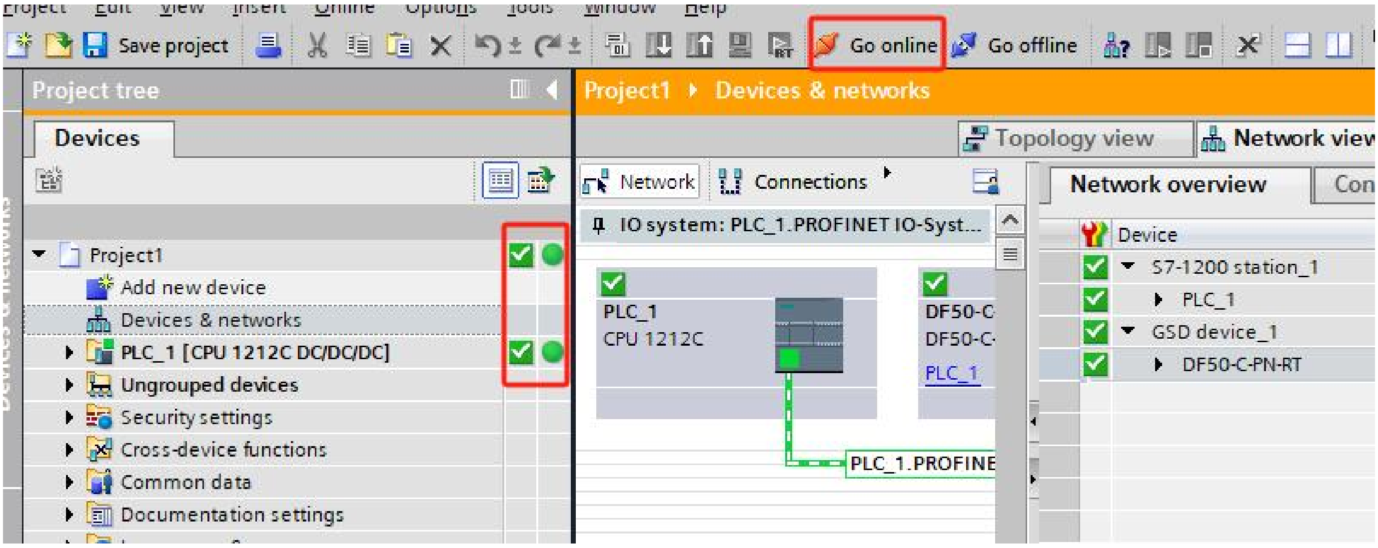


Figure 4-1-13

1.1.8. Debugging and testing

➢ As shown in Figure 4-1-14, adding a new monitoring table can monitor the data received by the IO module or force the modification of output data, which is convenient for us to debug.

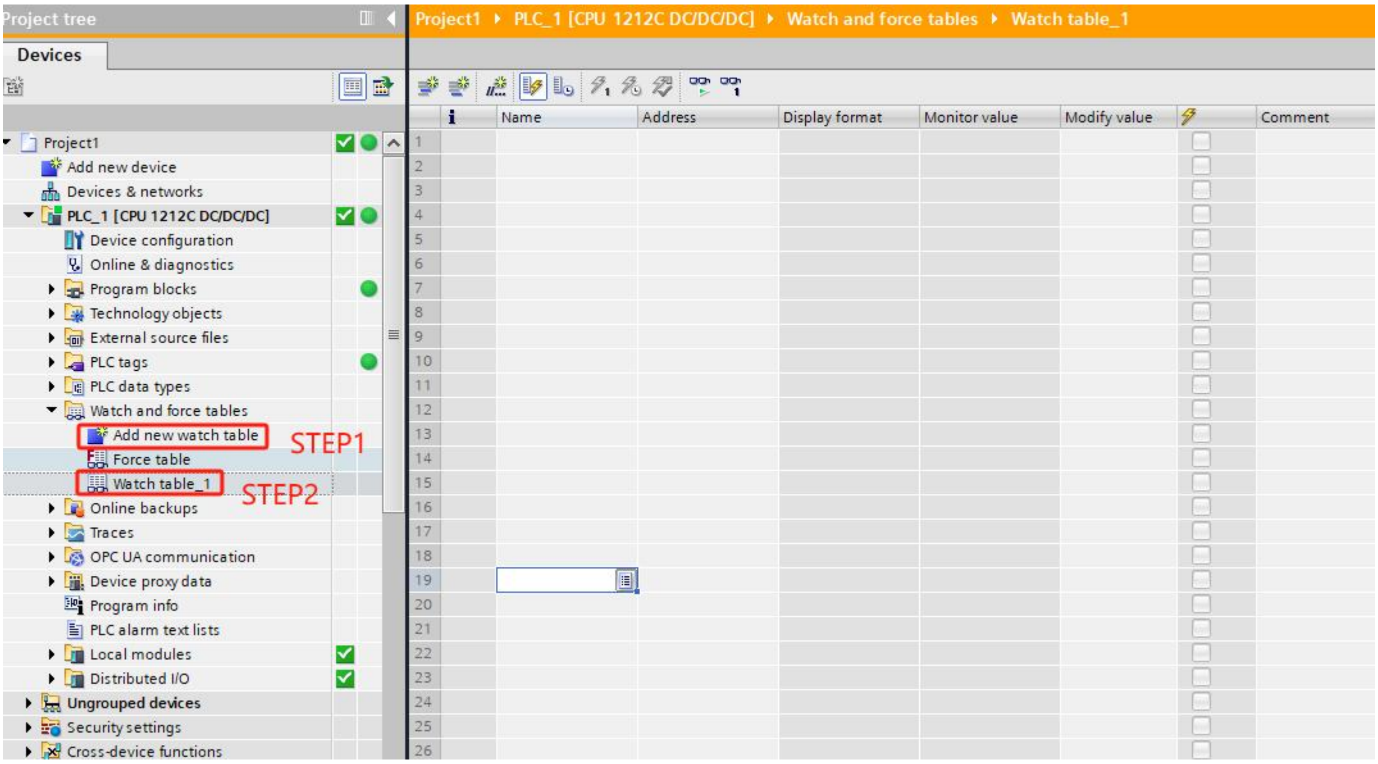
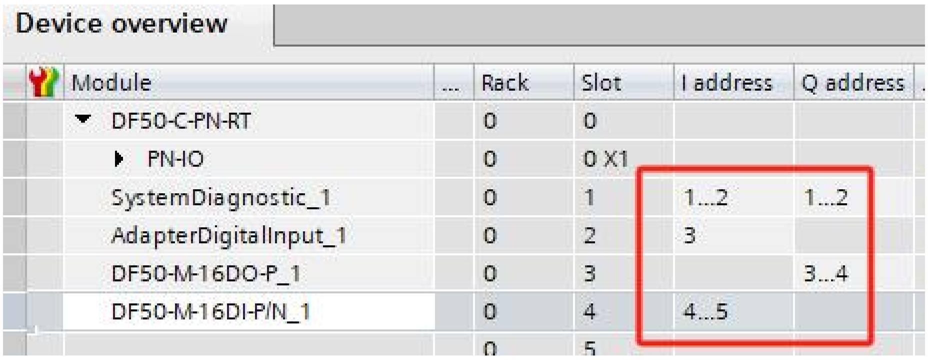


Figure 4-1-14Monitoring table

➢ Double-click the adapter in the device and network view, and a window as shown in Figure 4-1-15 will appear. The system automatically assigns the I address (input address) and Q address (output address) to the IO module.

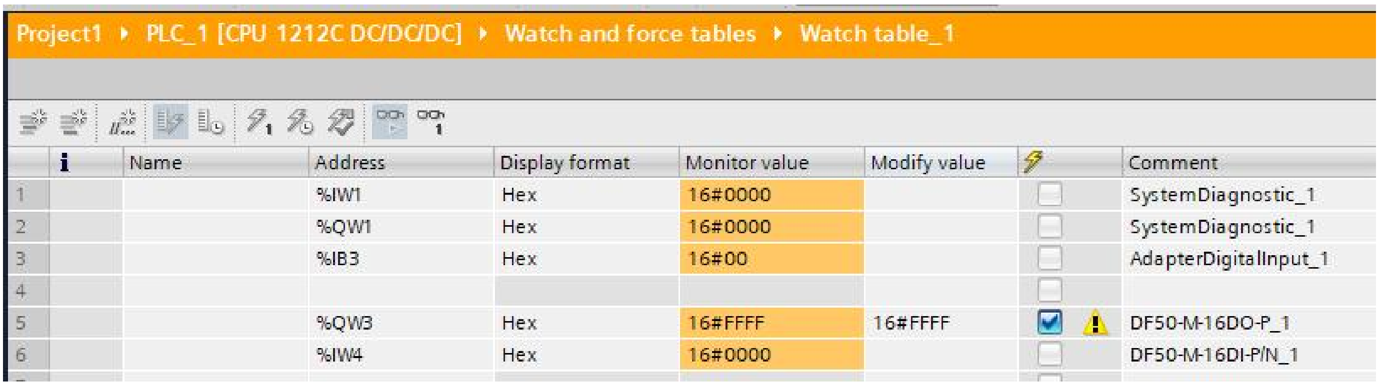


Device overview

Module	...	Rack	Slot	I address	Q address
DF50-C-PN-RT		0	0		
PN-IO		0	0 X1		
SystemDiagnostic_1		0	1	1...2	1...2
AdapterDigitalInput_1		0	2	3	
DF50-M-16DO-P_1		0	3		3...4
DF50-M-16DI-P/N_1		0	4	4...5	
		0	5		

Figure 4-1-15Device Address

➢ As shown in Figure 4-1-16, filling the module address into the monitoring table can monitor and modify the data.



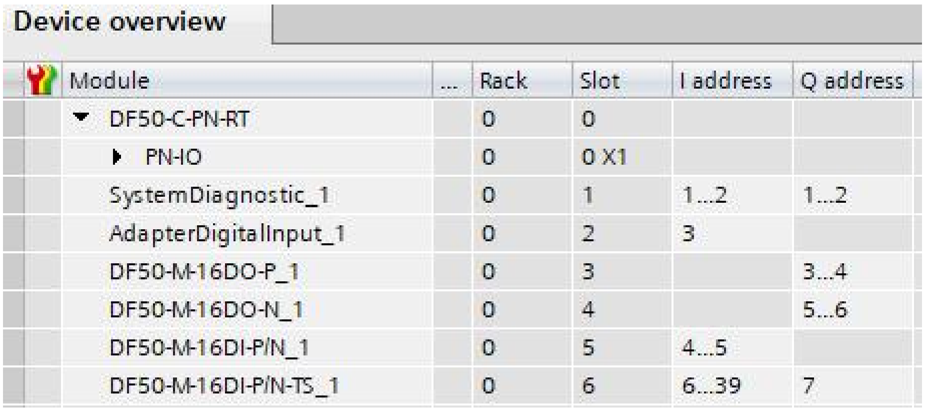
Project1 ▸ PLC_1 [CPU 1212C DC/DC/DC] ▸ Watch and force tables ▸ Watch table_1

	i	Name	Address	Display format	Monitor value	Modify value		Comment
1			%IW1	Hex	16#0000			SystemDiagnostic_1
2			%QW1	Hex	16#0000			SystemDiagnostic_1
3			%IB3	Hex	16#00			AdapterDigitalInput_1
4								
5			%QW3	Hex	16#FFFF	16#FFFF		DF50-M-16DO-P_1
6			%IW4	Hex	16#0000			DF50-M-16DI-P/N_1

Figure 4-1-16

1.2. Adapter usage examples

➢ Please refer to the wiring diagram of the adapterChapter 2 Section 2.2The example uses the DF50-C-PN-RT + DF50-M-16DO-P + DF50-M-16DO-N + DF50-M-16DI-P/N + DF50-M-16DI-P/N-TS topology. After adding the modules in sequence, the topology shown in Figure 4-1-17 is obtained: SystemDiagnostic_1 is the diagnostic module, AdapterDigitalInput_1 is the adapter 8-channel digital input display, and the other modules are the various IO module cards we inserted.


Device overview

Module	...	Rack	Slot	I address	Q address
DF50-C-PN-RT		0	0		
PN-IO		0	0 X1		
SystemDiagnostic_1		0	1	1...2	1...2
AdapterDigitalInput_1		0	2	3	
DF50-M-16DO-P_1		0	3		3...4
DF50-M-16DO-N_1		0	4		5...6
DF50-M-16DI-P/N_1		0	5	4...5	
DF50-M-16DI-P/N-TS_1		0	6	6...39	7

Figure 4-1-17

1.2.1. SystemDiagnostic: Diagnostic module

➢ The process data is shown in the following table.

Table 4.1.1

Input data: 2 Byte		
Byte No.	illustrate	Remark
Byte 0	Location of the faulty module	0x01 represents the first IO module, 0x02 represents the second module, and so on.
Byte 1	Fault Codes	See fault code table 1 for details
Output data: 2 Byte		
Byte No.	illustrate	Remark
Byte 0	No action required	/
Byte 1		/

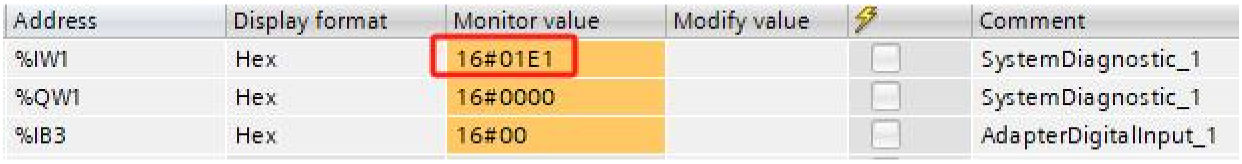
➢ The meanings of the fault codes are shown in the following table.

Table 4.1.2

Fault Codes	Fault Description	Troubleshooting
0xE1	Module power supply abnormality	Check the power cord connection
0xE2	Analog module calibration failure	Contact Supplier
0xE3	Module internal initialization exception	Contact Supplier
0xE4	Overcurrent signal detected	Check peripherals

0xE8	Serial port module communication abnormality	Check signal line wiring

➢ As shown in Figures 4-1-18 and 4-1-19, the monitoring value of the diagnostic module is "16#01E1". "01" indicates that the first IO card has a fault, and "E1" indicates that the external power supply of the module is abnormal (see Table 4.1.2 for the meaning of other fault codes). If the monitoring value is 16#02E1, it means that the second IO card has an abnormal module external power supply fault, and so on.



Address	Display format	Monitor value	Modify value		Comment
%IW1	Hex	16#01E1			SystemDiagnostic_1
%QW1	Hex	16#0000			SystemDiagnostic_1
%IB3	Hex	16#00			AdapterDigitalInput_1

Figure 4-1-18

Address	Display format	Monitor value	Modify value		Comment
%IW1	Hex	16#02E1			SystemDiagnostic_1
%QW1	Hex	16#0000			SystemDiagnostic_1
%IB3	Hex	16#00			AdapterDigitalInput_1

Figure 4-1-19

1.2.2. AdapterDigitalInput: Adapter 8-channel digital input display

➢ The process data is shown in the following table.

Table 4.1.3

Input data: 1 Byte								
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DI 07	DI 06	DI 05	DI 04	DI 03	DI 02	DI 01	DI 00

➢ As shown in the figure below, the filter parameters of the adapter's 8-channel digital input can be modified in the module properties window.

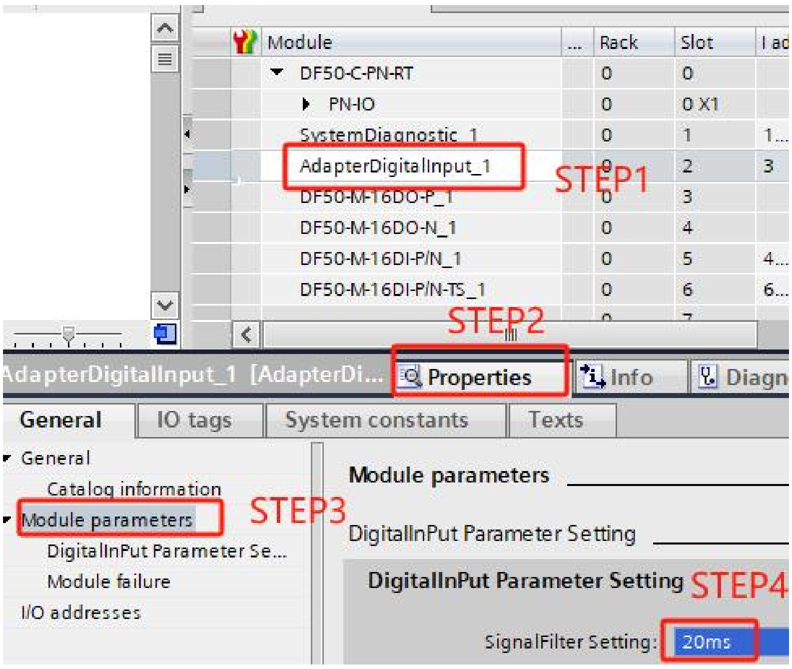


Figure 4-1-20

1.2.3. Bus Error Adapter Status Setting

➢ As shown in the figure below, you can set the behavior of the adapter when a bus error occurs. You can set it to clear the output value or keep the last value. The default is to clear the output value.

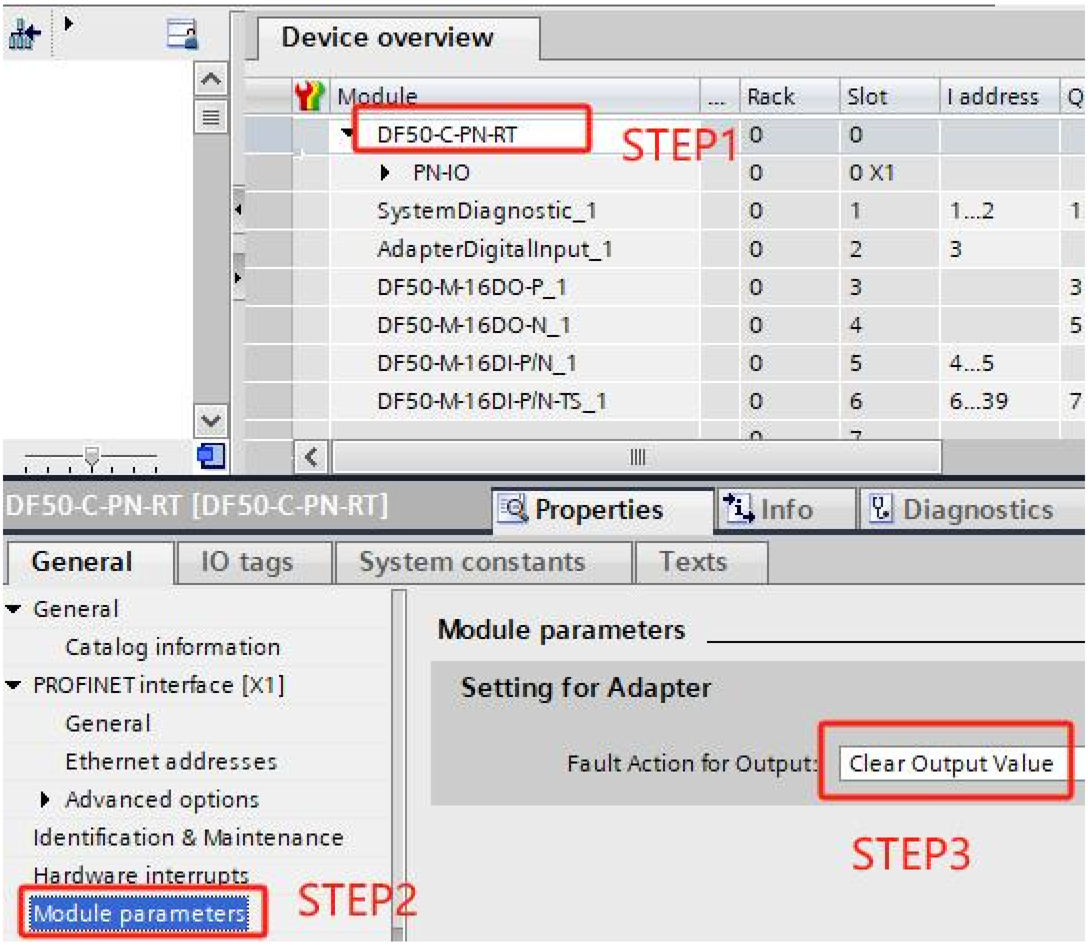


Figure 4-1-twenty one

1.2.4. Get module software version

➢ Get the adapter version information as shown in the figure below. Write "0x100" in the SystemDiagnostic_1 input address to get the adapter software version information. "0x1200" means the software version is V12.

Address	Display format	Monitor value	Modify value	⚡	Comment
%IW1	Hex	16#1200		☐	SystemDiagnostic_1
%QW1	Hex	16#0100	16#0100	☑ ⚠	SystemDiagnostic_1
%IB3	Hex	16#00		☐	AdapterDigitalInput_1

Figure 4-1-twenty two

➢ Get the subsequent IO module version information as shown in the figure below. Write "0x101" in the SystemDiagnostic_1 input address to get the software version information of the first module after the adapter. "0x1100" means the software version is V11.

Address	Display format	Monitor value	Modify value		Comment
%IW1	Hex	16#1100			SystemDiagnostic_1
%QW1	Hex	16#0101	16#0101		SystemDiagnostic_1
%IB3	Hex	16#00			AdapterDigitalInput_1

Figure 4-1-twenty three

1.3. Digital module usage routine

➢ This example uses the DF50-C-PN-RT + DF50-M-16DO-P + DF50-M-16DO-N + DF50-M-16DI-P/N + DF50-M-16DI-P/N-TS + DF50-M-4DO-P-2A + DF50-M-4DO-R topology. After adding the modules, it is shown in the figure below.

▼ DF50-C-PN-RT	0	0		
▸ PN-IO	0	0 X1		
SystemDiagnostic_1	0	1	1...2	1...2
AdapterDigitalInput_1	0	2	3	
DF50-M-16DO-P_1	0	3		3...4
DF50-M-16DO-N_1	0	4		5...6
DF50-M-16DI-P/N_1	0	5	4...5	
DF50-M-16DI-P/N-TS_1	0	6	6...39	7
DF50-M-4DO-P-2A_1	0	7	40	8
DF50-M-4DO-R_1	0	8		9
DF50-M-32DO-P_1	0	9		10...13
DF50-M-32DO-N_1	0	10		14...17
DF50-M-32DI-P/N_1	0	11	41...44	
DF50-M-16DI-16DO-P_1	0	12	45...46	18...19
DF50-M-16DI-16DO-N_1	0	13	47...48	20...21

Figure 4-1-twenty four

1.3.1. DF50-M-16DO-P digital output module

➢ Please refer to the module wiring diagramChapter 3, Section 3.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 1.2.3.

➢ Each channel output can be enabled as shown in the figure below.

Address	Display format	Monitor value	Modify value	⚡		Comment
%QW3	Hex	16#FFFF	16#FFFF	☑	⚠	DF50-M-16DO-P_1

Figure 4-1-25

1.3.2. DF50-M-16DO-N digital output module

➢ Please refer to the module wiring diagramChapter 3 Section 4.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 1.2.3.

➢ Each channel output can be enabled as shown in the figure below.

Address	Display format	Monitor value	Modify value	⚡		Comment
%QW5	Hex	16#FFFF	16#FFFF	☑	⚠	DF50-M-16DO-N_1

Figure 4-1-26

1.3.3. DF50-M-32DO-P digital output module

➢ Please refer to the module wiring diagramChapter 3, Section 22.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 1.2.3.

➢ Each channel output can be enabled as shown in the figure below.

Address	Display format	Monitor value	Modify value		Comment
%QD10	Hex	16#FFFF_FFFF	16#FFFF_FFFF		DF50-M-32DO-P_1

Figure 4-1-27

1.3.4. DF50-M-32DO-N digital output module

➢ Please refer to the module wiring diagramChapter 3, Section 21.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 1.2.3.

➢ Each channel output can be enabled as shown in the figure below.

Address	Display format	Monitor value	Modify value		Comment
%QD14	Hex	16#FFFF_FFFF	16#FFFF_FFFF		DF50-M-32DO-N_1

Figure 4-1-28

1.3.5. DF50-M-16DI-P/N digital input module

➢ Please refer to the module wiring diagramChapter 3 Section 1.2.

➢ This module can set input filtering. The setting method is shown in the figure below. The default setting is 20ms.

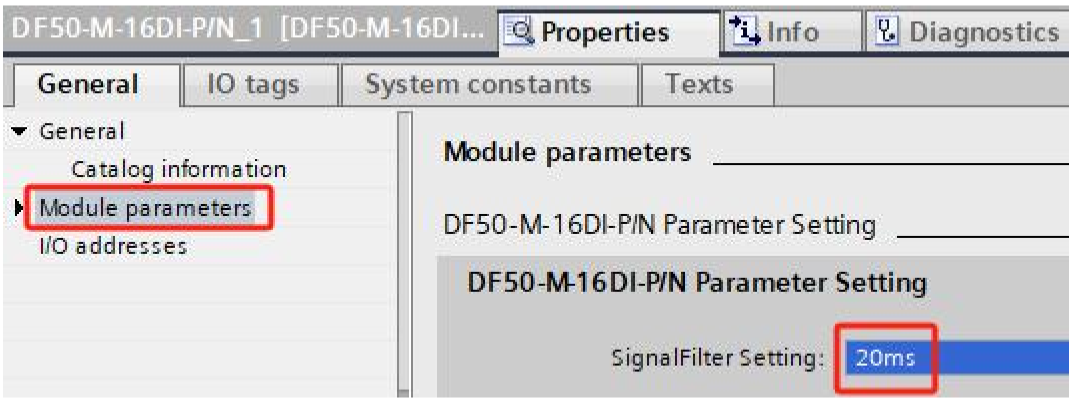


Figure 4-1-29

➢ The input data of each channel can be viewed as shown in the figure below.

Address	Display format	Monitor value	Modify value	⚡	Comment
					DF50-M-16DI-P/N_1
%I4.0	Bool	TRUE			CH0
%I4.1	Bool	FALSE			CH1
%I4.2	Bool	FALSE			CH2
%I4.3	Bool	FALSE			CH3
%I4.4	Bool	FALSE			CH4
%I4.5	Bool	FALSE			CH5
%I4.6	Bool	FALSE			CH6
%I4.7	Bool	FALSE			CH7
%I5.0	Bool	FALSE			CH8
%I5.1	Bool	FALSE			CH9
%I5.2	Bool	FALSE			CH10
%I5.3	Bool	FALSE			CH11
%I5.4	Bool	FALSE			CH12
%I5.5	Bool	FALSE			CH13
%I5.6	Bool	FALSE			CH14
%I5.7	Bool	FALSE			CH15

Figure 4-1-30

1.3.6. DF50-M-32DI-P/N digital input module

- Please refer to the module wiring diagramChapter 3 Section 25.2.
- This module can set input filtering. The setting method is shown in the figure below. The default setting is 20ms.

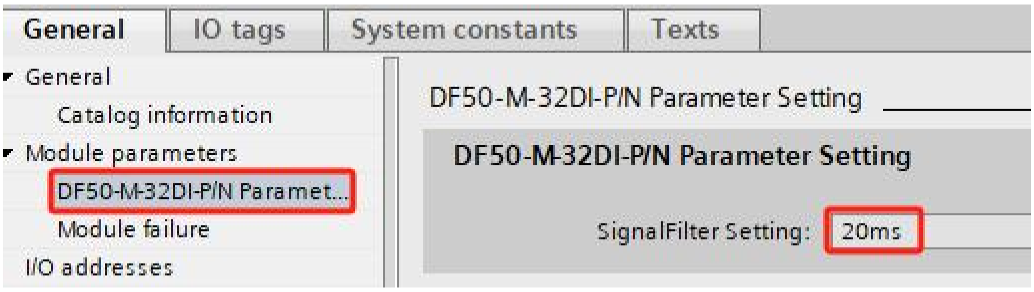


Figure 4-1-31

- The input data of each channel can be viewed as shown in the figure below.

Name	Address	Display format	Monitor value	Modify value		Comment
	%I41.0	Bool	TRUE			DF50-M-32DI-P/N_1
	%I41.1	Bool	FALSE			
	%I41.2	Bool	FALSE			
	%I41.3	Bool	FALSE			
	%I41.4	Bool	FALSE			
	%I41.5	Bool	FALSE			
	%I41.6	Bool	FALSE			
	%I41.7	Bool	FALSE			
	%I42.0	Bool	FALSE			
	%I42.1	Bool	FALSE			
	%I42.2	Bool	FALSE			
	%I42.3	Bool	FALSE			
	%I42.4	Bool	FALSE			
	%I42.5	Bool	FALSE			
	%I42.6	Bool	FALSE			
	%I42.7	Bool	FALSE			
	%I43.0	Bool	FALSE			
	%I43.1	Bool	FALSE			
	%I43.2	Bool	FALSE			
	%I43.3	Bool	FALSE			
	%I43.4	Bool	FALSE			
	%I43.5	Bool	FALSE			
	%I43.6	Bool	FALSE			
	%I43.7	Bool	FALSE			
	%I44.0	Bool	FALSE			
	%I44.1	Bool	FALSE			
	%I44.2	Bool	FALSE			
	%I44.3	Bool	FALSE			
	%I44.4	Bool	FALSE			
	%I44.5	Bool	FALSE			
	%I44.6	Bool	FALSE			
	%I44.7	Bool	FALSE			

Figure 4-1-32

1.3.7. DF50-M-16DI-16DO-P digital input and output module

- Please refer to the module wiring diagramChapter 3, Section 24.2.
- This module can set input filtering. The setting method is shown in the figure below. The default setting is 20ms.

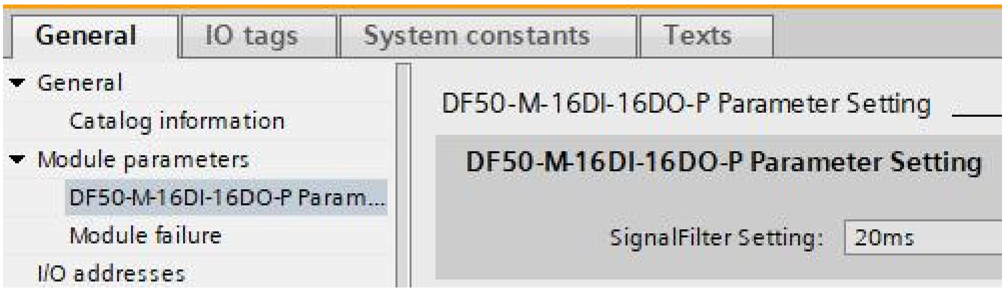


Figure 4-1-33

- As shown in the figure below, you can view the input data and output data of each channel.

Address	Display format	Monitor value	Modify value		Comment
%I45.0	Bool	TRUE			DF50-M-16DI-16DO-P_1
%I45.1	Bool	FALSE			
%I45.2	Bool	FALSE			
%I45.3	Bool	FALSE			
%I45.4	Bool	FALSE			
%I45.5	Bool	FALSE			
%I45.6	Bool	FALSE			
%I45.7	Bool	FALSE			
%I46.0	Bool	FALSE			
%I46.1	Bool	FALSE			
%I46.2	Bool	FALSE			
%I46.3	Bool	FALSE			
%I46.4	Bool	FALSE			
%I46.5	Bool	FALSE			
%I46.6	Bool	FALSE			
%I46.7	Bool	FALSE			
%QW18	Hex	16#FFFF	16#FFFF		

Figure 4-1-34

1.3.8. DF50-M-16DI-16DO-N digital input and output module

- Please refer to the module wiring diagramChapter 3, Section 23.2.
- This module can set input filtering. The setting method is shown in the figure below. The default setting is 20ms.

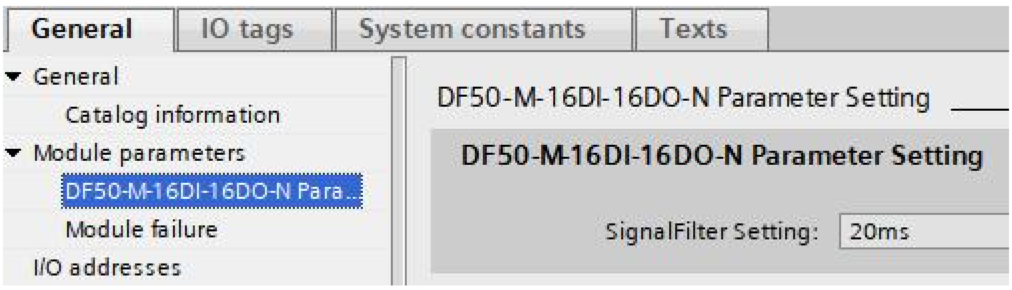


Figure 4-1-35

➢ As shown in the figure below, you can view the input data and output data of each channel.

Address	Display format	Monitor value	Modify value		Comment
%I47.0	Bool	TRUE			DF50-M-16DI-16DO-N_1
%I47.1	Bool	FALSE			
%I47.2	Bool	FALSE			
%I47.3	Bool	FALSE			
%I47.4	Bool	FALSE			
%I47.5	Bool	FALSE			
%I47.6	Bool	FALSE			
%I47.7	Bool	FALSE			
%I48.0	Bool	FALSE			
%I48.1	Bool	FALSE			
%I48.2	Bool	FALSE			
%I48.3	Bool	FALSE			
%I48.4	Bool	FALSE			
%I48.5	Bool	FALSE			
%I48.6	Bool	FALSE			
%I48.7	Bool	FALSE			
%QW20	Hex	16#FFFF	16#FFFF		

Figure 4-1-36

1.3.9. DF50-M-16DI-P/N-TS digital input with counting module

➢ Please refer to the module wiring diagram[Chapter 3 Section 2.2].

➢ As shown in the figure below, you can set the counting mode of channels CH00~CH07, which can be set to rising edge counting, falling edge counting, and double edge counting. The default is rising edge counting. The maximum counting frequency of a single channel is 1KHz.

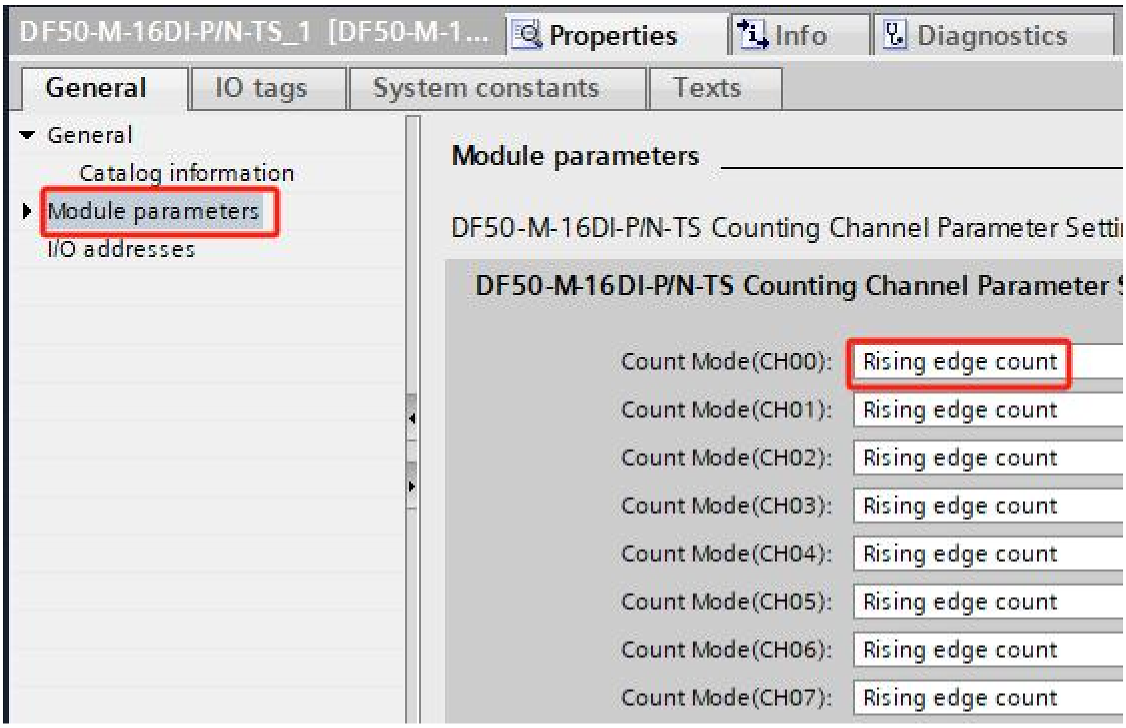


Figure 4-1-37

➢ As shown in the figure below, for input channels CH10~CH17, can be modifiedInput filter parameters, the default is 20ms.

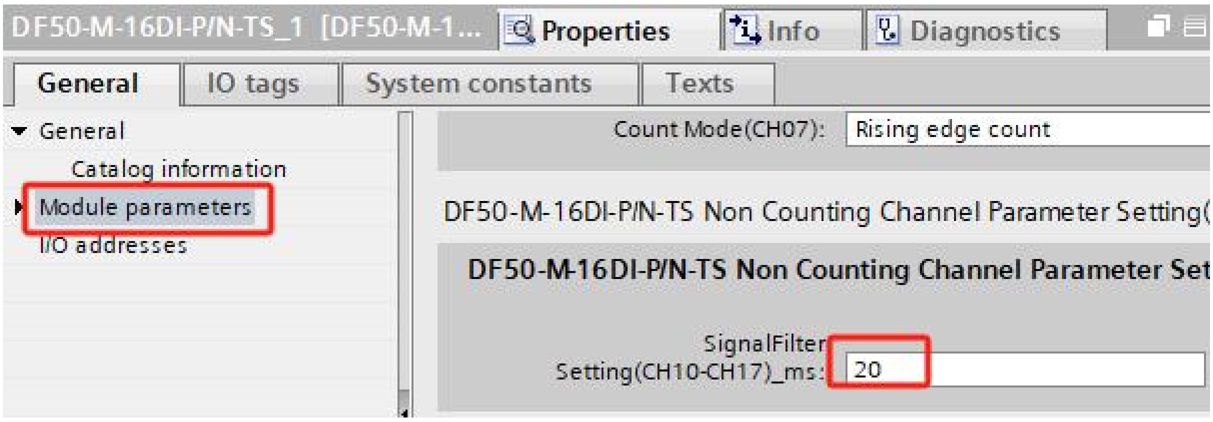


Figure 4-1-38

➢ For process data definition, please refer to[Chapter 3 Section 2.4], fill in the data we need into the monitoring table, as shown in the figure below.

Address	Display format	Monitor value	Modify value	⚡	Comment
					DF50-M-16DI-P/N_1
%I6.0	Bool	FALSE			CH0
%I6.1	Bool	FALSE			CH1
%I6.2	Bool	FALSE			CH2
%I6.3	Bool	FALSE			CH3
%I6.4	Bool	FALSE			CH4
%I6.5	Bool	FALSE			CH5
%I6.6	Bool	FALSE			CH6
%I6.7	Bool	FALSE			CH7
%I7.0	Bool	FALSE			CH8
%I7.1	Bool	FALSE			CH9
%I7.2	Bool	FALSE			CH10
%I7.3	Bool	FALSE			CH11
%I7.4	Bool	FALSE			CH12
%I7.5	Bool	FALSE			CH13
%I7.6	Bool	FALSE			CH14
%I7.7	Bool	FALSE			CH15
%ID8	Hex	16#0000_0000			CH0 Count
%ID12	Hex	16#0000_0000			CH1 Count
%ID16	Hex	16#0000_0000			CH2 Count
%ID20	Hex	16#0000_0000			CH3 Count
%ID24	Hex	16#0000_0000			CH4 Count
%ID28	Hex	16#0000_0000			CH5 Count
%ID32	Hex	16#0000_0000			CH6 Count
%ID36	Hex	16#0000_0000			CH7 Count
%QB7	Hex	16#00			Count Clear

Figure 4-1-39

➢ A1 for IO module(CH00),A2(CH01),A3(CH02)The ports input valid signals respectively, and you can see that the DI input bit of the corresponding channel becomes "1", and the count value of the corresponding channel is also increasing.

Address	Display format	Monitor value	Modify value	⚡	Comment
				☐	DF50-M-16DI-P/N_1
%I6.0	Bool	FALSE		☐	CH0
%I6.1	Bool	FALSE		☐	CH1
%I6.2	Bool	TRUE		☐	CH2
%I6.3	Bool	FALSE		☐	CH3
%I6.4	Bool	FALSE		☐	CH4
%I6.5	Bool	FALSE		☐	CH5
%I6.6	Bool	FALSE		☐	CH6
%I6.7	Bool	FALSE		☐	CH7
%I7.0	Bool	FALSE		☐	CH8
%I7.1	Bool	FALSE		☐	CH9
%I7.2	Bool	FALSE		☐	CH10
%I7.3	Bool	FALSE		☐	CH11
%I7.4	Bool	FALSE		☐	CH12
%I7.5	Bool	FALSE		☐	CH13
%I7.6	Bool	FALSE		☐	CH14
%I7.7	Bool	FALSE		☐	CH15
%ID8	Hex	16#0000_0001		☐	CH0 Count
%ID12	Hex	16#0000_0002		☐	CH1 Count
%ID16	Hex	16#0000_0005		☐	CH2 Count

Figure 4-1-40

➢ Clear the count value of CH02 as shown in the figure below.

%ID8	Hex	16#0000_0001		☐	CH0 Count
%ID12	Hex	16#0000_0002		☐	CH1 Count
%ID16	Hex	16#0000_0000		☐	CH2 Count
%ID20	Hex	16#0000_0000		☐	CH3 Count
%ID24	Hex	16#0000_0000		☐	CH4 Count
%ID28	Hex	16#0000_0000		☐	CH5 Count
%ID32	Hex	16#0000_0000		☐	CH6 Count
%ID36	Hex	16#0000_0000		☐	CH7 Count
%QB7	Bin	2#0000_0100	2#0000_0100	☑	Count Clear

Figure 4-1-41

1.3.10. DF50-M-4DO-P-2A digital output module

➢ Please refer to the module wiring diagramChapter 3, Section 20.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 1.2.3.

➢ For process data definition, please refer toChapter 3, Section 20.4Each channel output can be enabled as shown in the figure below.

Address	Display format	Monitor value	Modify value	⚡	Comment
					DF50-M-4DO-P-2A
%IB40	Bin	2#0000_0000			Overcurrent
%QB8	Bin	2#0000_1111	2#0000_1111		Output

Figure 4-1-42

➢ As shown in the figure below, the first channel output is enabled. When the module channel outputs overcurrent, the overcurrent point is 4A/channel, and the first channel bit in Overcurrent becomes "1", indicating that the first channel output is overcurrent; in addition, the system diagnostic information displays the "16#01E4" error, indicating that the first module detects an overcurrent signal. For the meaning of the diagnostic fault code, please refer toChapter 2 Section 1.3.

					DF50-M-4DO-P-2A
%IB40	Bin	2#0000_0001			Overcurrent
%QB8	Bin	2#0000_0001	2#0000_0001		Output
%IW1	Hex	16#01E4			SystemDiagnostic_1

Figure 4-1-43

1.3.11. DF50-M-4DOR relay output module

➢ Please refer to the module wiring diagramChapter 3, Section 19.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 1.2.3.

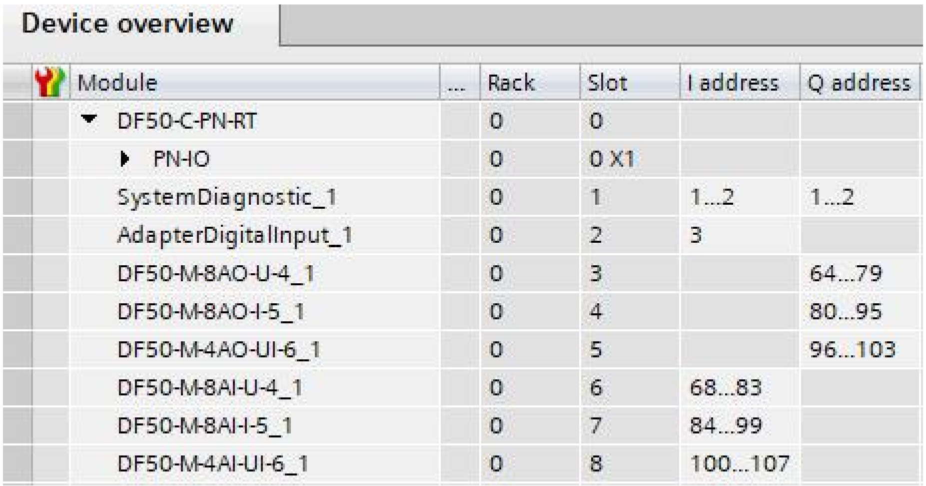
➢ For process data definition, please refer toChapter 3, Section 19.3Each channel relay can be closed as shown in the figure below.

					DF50-M-4DO-R_1
%QB9	Bin	2#0000_1111	2#0000_1111		

Figure 4-1-44

1.4. Analog module usage routine

➢ This example uses the topology of DF50-C-PN-RT + DF50-M-8AO-U-4 + DF50-M-8AO-I-5 + DF50-M-4AO-UI-6 + DF50-M-8AI-U-4 + DF50-M-8AI-I-5 + DF50-M-4AI-UI-6. After adding the modules, the structure is as shown in the figure below.


Device overview

Module	...	Rack	Slot	I address	Q address
DF50-C-PN-RT		0	0		
PN-IO		0	0 X1		
SystemDiagnostic_1		0	1	1...2	1...2
AdapterDigitalInput_1		0	2	3	
DF50-M-8AO-U-4_1		0	3		64...79
DF50-M-8AO-I-5_1		0	4		80...95
DF50-M-4AO-UI-6_1		0	5		96...103
DF50-M-8AI-U-4_1		0	6	68...83	
DF50-M-8AI-I-5_1		0	7	84...99	
DF50-M-4AI-UI-6_1		0	8	100...107	

Figure 4-1-45

1.4.1. DF50-M-8AO-U-4 voltage output module

➢ Please refer to the module wiring diagramChapter 3 Section 9.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 1.2.3.

➢ As shown in the figure below, you can set the module output voltage range, the default is Disabled. Set CH0 to 0~10V.

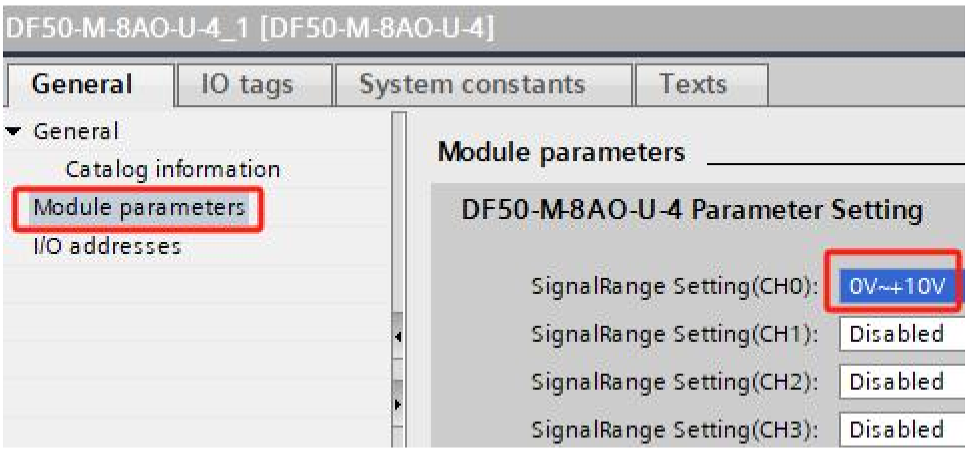


Figure 4-1-46

➢ As shown in the figure below, write the value "27648" to the module CH0 channel. Through the multimeter measurement, it can be seen that the output voltage of CH0 is 10V. The conversion relationship is shown inChapter 3 Section 9.4.

Address	Display format	Monitor value	Modify value		Comment
%QW64	DEC+/-	27648	27648		DF50-M-8AO-U-4_1

Figure 4-1-47

1.4.2. DF50-M-8AO-I-5 Current Output Module

- Please refer to the module wiring diagramChapter 3 Section 10.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 1.2.3.
- As shown in the figure below, you can set the module output current range, the default is Disabled. Set CH0 to 0~20ma.

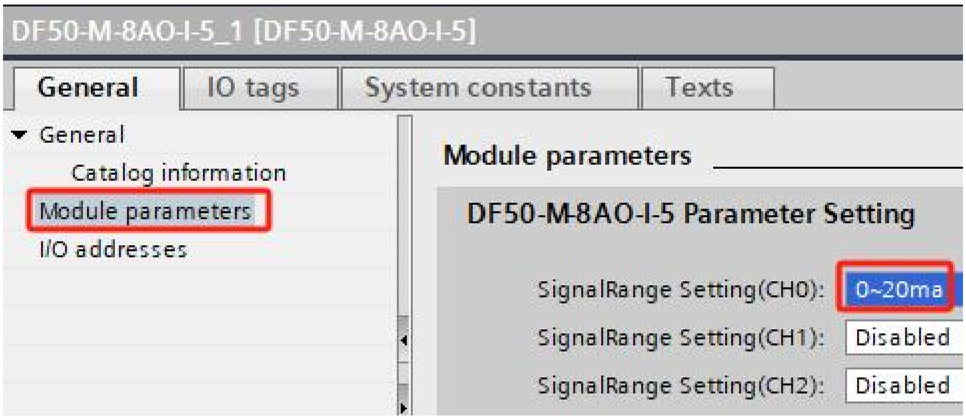


Figure 4-1-48

- As shown in the figure below, write the value "27648" to the module CH0 channel. Through the multimeter measurement, it can be seen that the CH0 output current is 20ma. The conversion relationship is shown inChapter 3 Section 10.4.

Address	Display format	Monitor value	Modify value		Comment
%QW80	DEC+/-	27648	27648		DF50-M-8AO-I-4_1

Figure 4-1-49

1.4.3. DF50-M-4AO-UI-6 Voltage/Current Output Module

- Please refer to the module wiring diagramChapter 3, Section 8.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 1.2.3.
- As shown in the figure below, you can set the module output voltage or current range, the default is Disabled. Set CH0 to 0~10V and CH1 to 0~20ma.

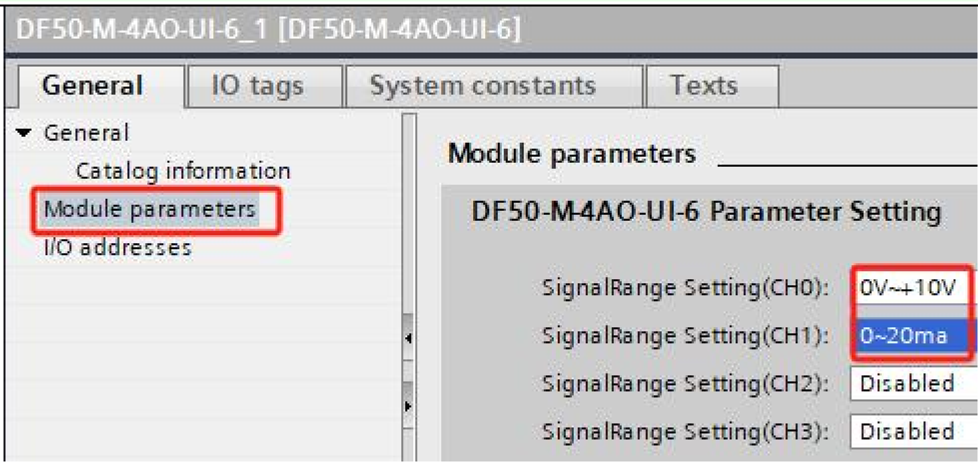
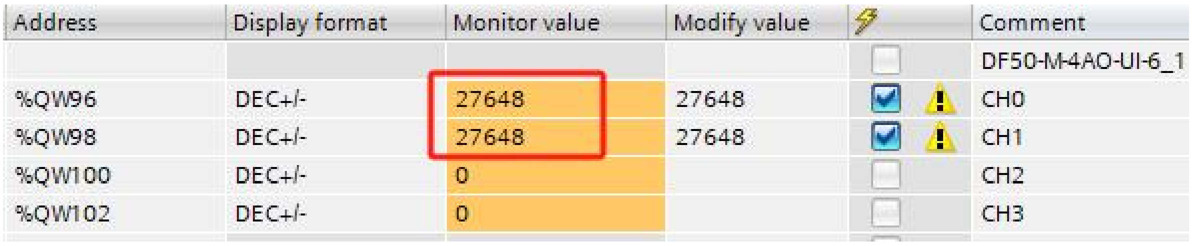


Figure 4-1-50

➢ As shown in the figure below, write the value "27648" to the module CH0 and CH1. Through the multimeter measurement, it can be seen that the output voltage of CH0 is 10V and the output current of CH1 is 20ma. The conversion relationship is shown inChapter 3, Section 8.4.



Address	Display format	Monitor value	Modify value		Comment
					DF50-M-4AO-UI-6_1
%QW96	DEC+/-	27648	27648	☑	CH0
%QW98	DEC+/-	27648	27648	☑	CH1
%QW100	DEC+/-	0		☐	CH2
%QW102	DEC+/-	0		☐	CH3

Figure 4-1-51

1.4.4. DF50-M-8AI-U-4 Voltage Input Module

➢ Please refer to the module wiring diagramChapter 3, Section 7.2As shown in the figure below, you can set the module acquisition voltage range, the default is Disabled. Set CH0 to 0~10V.

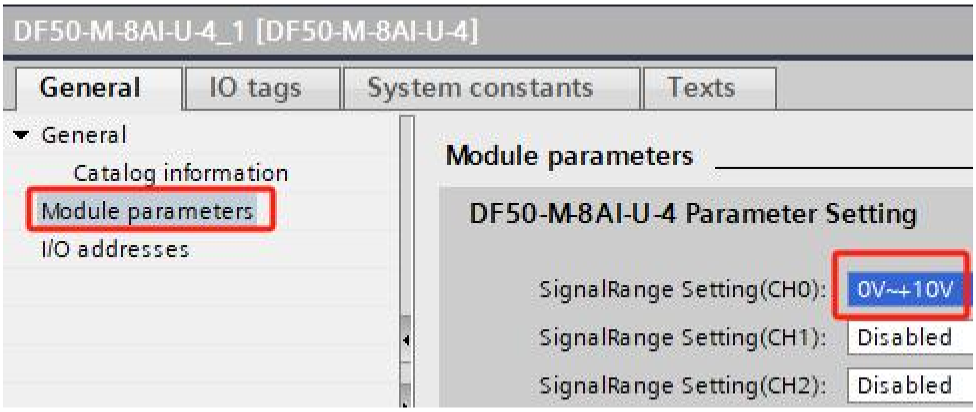


Figure 4-1-52

➢ As shown in the figure below, you can set the signal filter for each channel, the default is 100Hz_10ms.

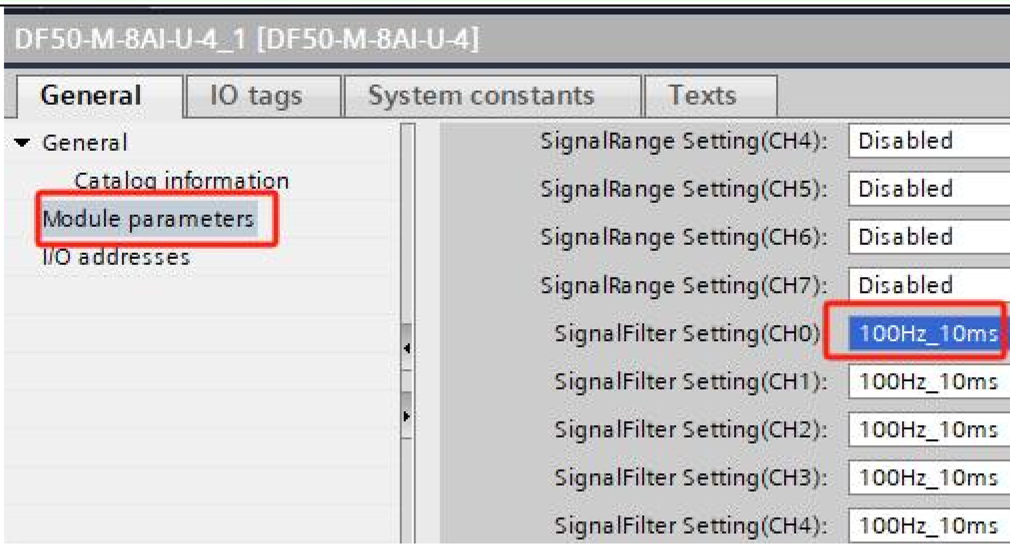
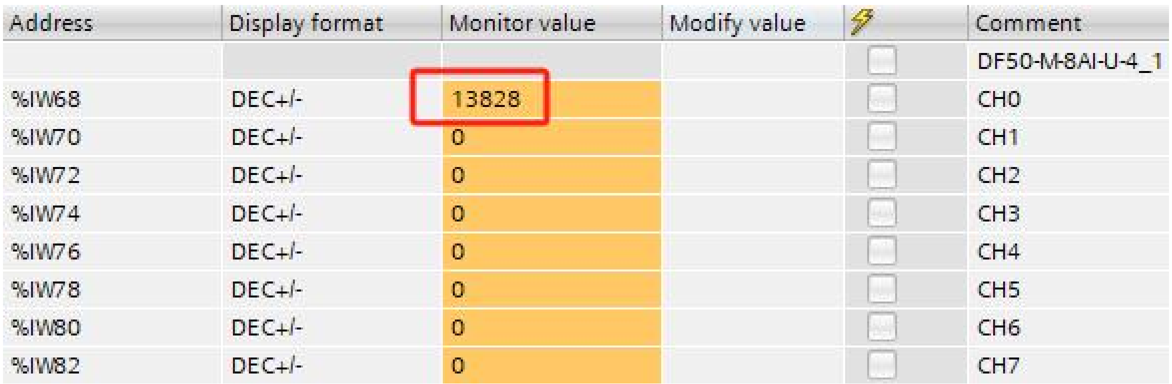


Figure 4-1-53

➢ After 5V voltage is applied to CH0, the value shown in the figure below is obtained. Through conversion, it is known that the collected voltage is 5.001V. The conversion relationship is shown inChapter 3, Section 7.4.



Address	Display format	Monitor value	Modify value		Comment
					DF50-M-8AI-U-4_1
%IW68	DEC+/-	13828			CH0
%IW70	DEC+/-	0			CH1
%IW72	DEC+/-	0			CH2
%IW74	DEC+/-	0			CH3
%IW76	DEC+/-	0			CH4
%IW78	DEC+/-	0			CH5
%IW80	DEC+/-	0			CH6
%IW82	DEC+/-	0			CH7

Figure 4-1-54

1.4.5. DF50-M-8AI-I-5 Current Input Module

➢ Please refer to the module wiring diagramChapter 3 Section 6.2As shown in the figure below, you can set the module current collection range, the default is Disabled. Set CH0 to 0~20ma.

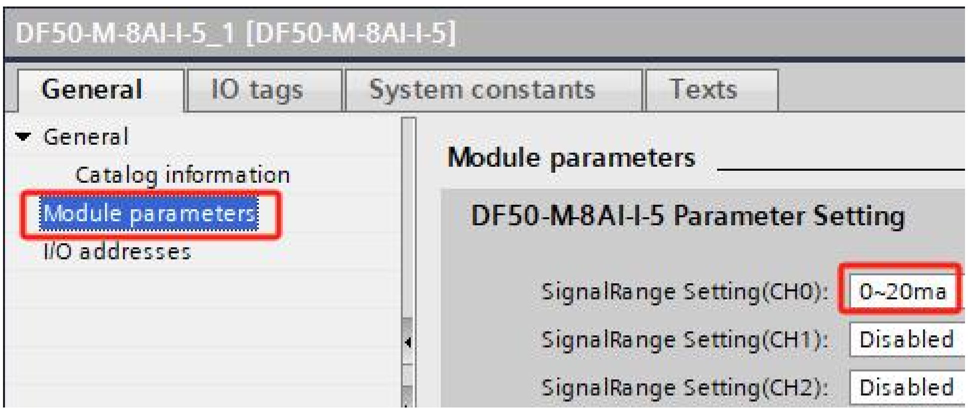


Figure 4-1-55

➢ As shown in the figure below, you can set the signal filter for each channel, the default is 100Hz_10ms.

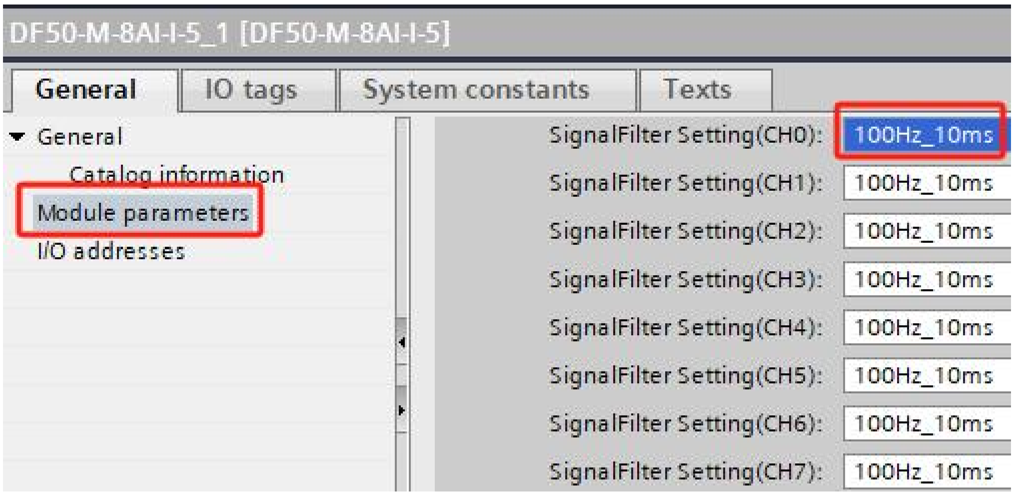
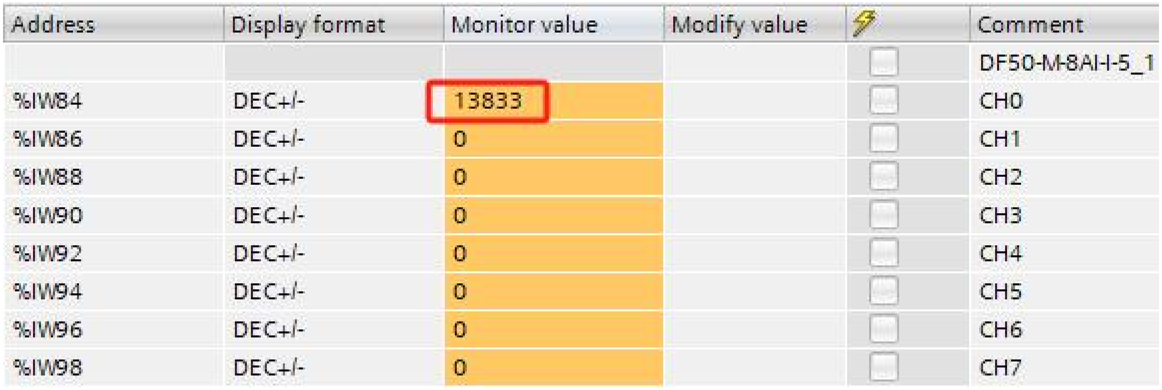


Figure 4-1-56

➢ After passing 10ma current into CH0, the value shown in the figure below is obtained. Through conversion, it is known that the collected current is 10.006ma. The conversion relationship is shown inChapter 3, Section 6.4.



Address	Display format	Monitor value	Modify value		Comment
					DF50-M-8AI-I-5_1
%IW84	DEC+/-	13833			CH0
%IW86	DEC+/-	0			CH1
%IW88	DEC+/-	0			CH2
%IW90	DEC+/-	0			CH3
%IW92	DEC+/-	0			CH4
%IW94	DEC+/-	0			CH5
%IW96	DEC+/-	0			CH6
%IW98	DEC+/-	0			CH7

Figure 4-1-57

1.4.6. DF50-M-4AI-UI-6 voltage and current input module

➢ Please refer to the module wiring diagramChapter 3 Section 5.2As shown in the figure below, you can set the module to collect voltage or current range, the default is Disabled. Set CH0 to 0~10V and CH1 to 0~20ma.

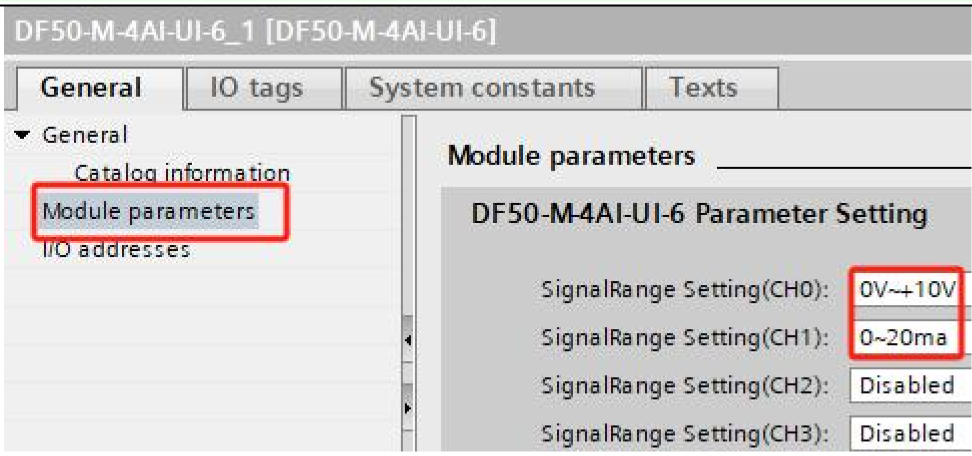


Figure 4-1-58

➢ As shown in the figure below, you can set the signal filter for each channel, the default is 100Hz_10ms.

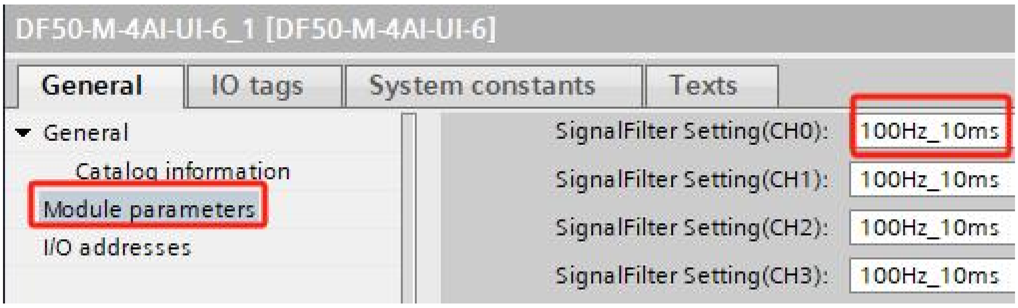


Figure 4-1-59

➢ After passing 5V voltage to CH0 and 10ma current to CH1, the values shown in the figure below are obtained. Through conversion, it is known that the voltage collected by CH0 is 5.009V and the current collected by CH1 is 10.002ma. The conversion relationship is shown inChapter 3, Section 5.4.

Address	Display format	Monitor value	Modify value		Comment
					DF50-M-4AI-UI-6_1
%IW100	DEC+/-	13849			CH0
%IW102	DEC+/-	13827			CH1
%IW104	DEC+/-	0			CH2
%IW106	DEC+/-	0			CH3

Figure 4-1-60

1.5. Routine use of thermal resistance sensor data acquisition module

➢ This example uses the DF50-C-PN-RT + DF50-M-4RTD-PT topology. After adding the modules, it is as shown in the figure below.

Device overview

Module	...	Rack	Slot	I address	Q address
DF50-C-PN-RT		0	0		
PN-IO		0	0 X1		
SystemDiagnostic_1		0	1	1...2	1...2
AdapterDigitalInput_1		0	2	3	
DF50-M-4RTD-PT_1		0	3	68...75	

Figure 4-1-61

1.5.1. DF50-M-4RTD-PT Thermal Resistance Measurement Module

➢ Please refer to the module wiring diagramChapter 3 Section 11.2As shown in the figure below, you can modify the sensor type collected by the module, the default is PT100.

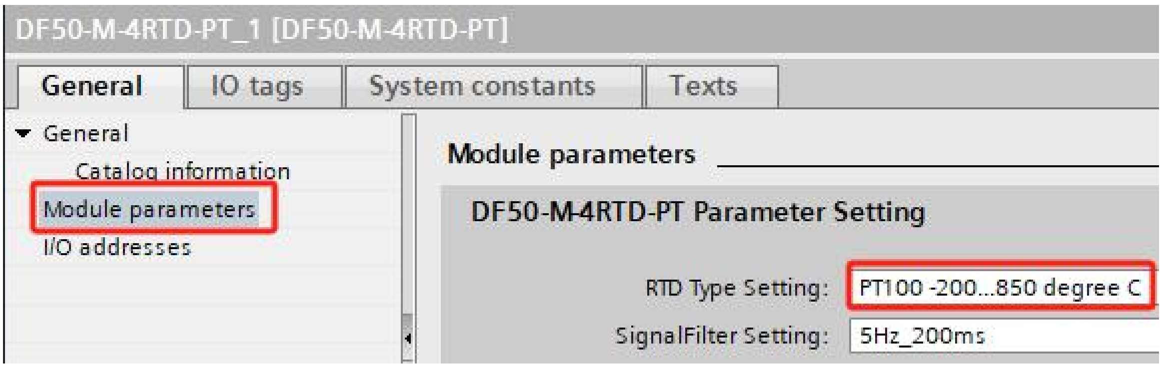


Figure 4-1-62

➢ The filter settings of this module can be adjusted as shown in the figure below, the default is 5Hz_200ms.

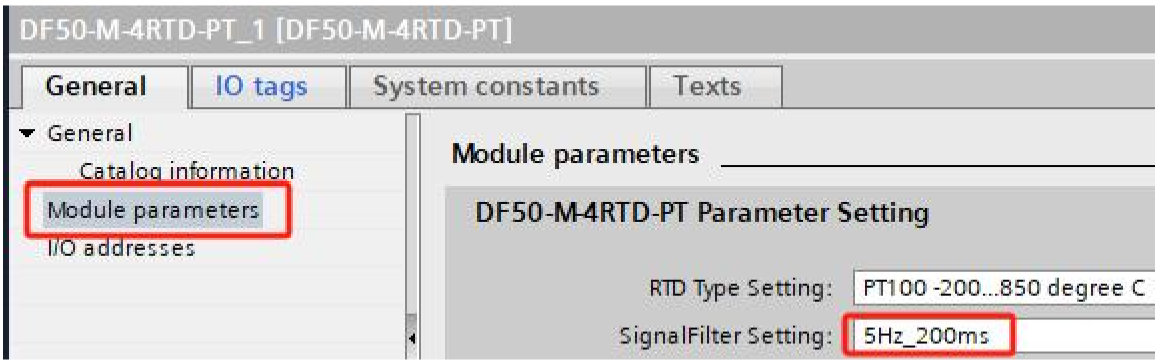


Figure 4-1-63

➢ After connecting the sensor to module CH0, the following data is obtained. "225" means the collected temperature is 22.5℃.

Address	Display format	Monitor value	Modify value	⚡	Comment
				☐	DF50-M-4RTD-PT_1
%IW68	DEC	225		☐	CH0
%IW70	DEC	32768		☐	CH1
%IW72	DEC	32768		☐	CH2
%IW74	DEC	32768		☐	CH3

Figure 4-1-64

1.6. Thermocouple temperature data acquisition module usage routine

➢ This example uses the DF50-C-PN-RT + DF50-M-8TC topology. After adding the modules, it is as shown in the figure below.

Device overview

Module	...	Rack	Slot	I address	Q address
DF50-C-PN-RT		0	0		
PN-IO		0	0 X1		
SystemDiagnostic_1		0	1	1...2	1...2
AdapterDigitalInput_1		0	2	3	
DF50-M-8TC_1		0	3	68...83	64...79

Figure 4-1-65

1.6.1. DF50-M-8TC Thermocouple Measurement Module

➢ Please refer to the module wiring diagramChapter 3, Section 12.2As shown in the figure below, you can modify the sensor type collected by this module. The default is K-type sensor.

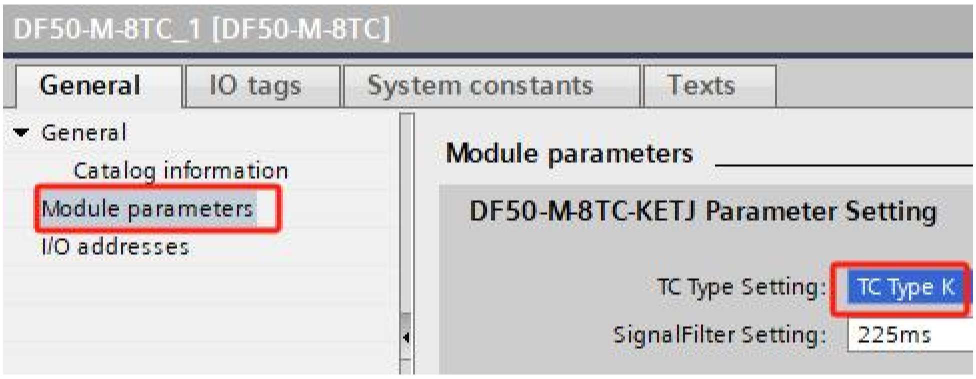


Figure 4-1-66

➢ The filter settings of this module can be adjusted as shown in the figure below, the default is 225ms.

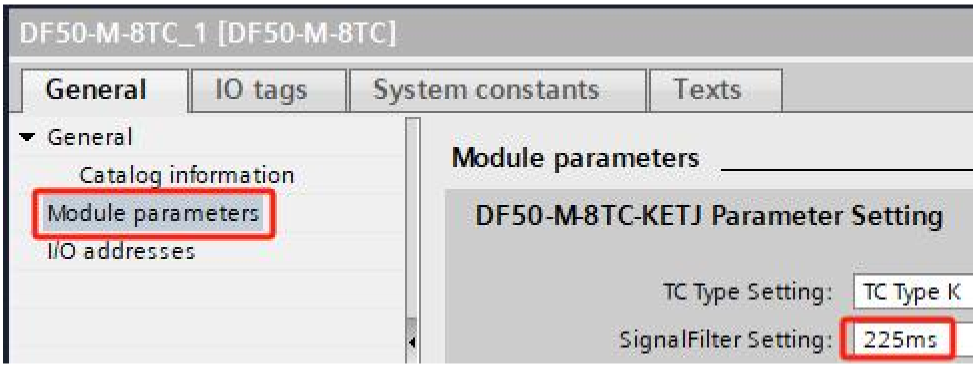


Figure 4-1-67

➢ DF50-M-8TC process data definition please refer to[Chapter 3, Section 12.4]After connecting the sensor to CH0, as shown in the figure below, "253" means 25.3℃, and no compensation value is given at this time.

%IW68	DEC	253		☐	CH0
%IW70	DEC	32768		☐	CH1
%IW72	DEC	32768		☐	CH2
%IW74	DEC	32768		☐	CH3

Figure 4-1-68

➢ When we write 50 into the compensation value of CH0, we can see that the collected value becomes "309", which means 30.9℃.

%IW68	DEC	309		☐	CH0
%IW70	DEC	32768		☐	CH1
%IW72	DEC	32768		☐	CH2
%IW74	DEC	32768		☐	CH3
%IW76	DEC	32768		☐	CH4
%IW78	DEC	32768		☐	CH5
%IW80	DEC	32768		☐	CH6
%IW82	DEC	32768		☐	CH7
				☐	
%QW64	DEC	50	50	☑ ⚠	CH0 Compensation
%QW66	DEC	0		☐	CH1 Compensation
%QW68	DEC	0		☐	CH2 Compensation
%QW70	DEC	0		☐	CH3 Compensation
%QW72	DEC	0		☐	CH4 Compensation
%QW74	DEC	0		☐	CH5 Compensation
%QW76	DEC	0		☐	CH6 Compensation
%QW78	DEC	0		☐	CH7 Compensation

Figure 4-1-69

1.7. Encoder data acquisition module usage routine

- The encoder pulse counting module has two types: DF50-M-2CNT-PIL-24 and DF50-M-2CNT-PIL-5. The wiring and usage of the two modules are the same. The difference is that the DF50-M-2CNT-PIL-5 is connected to a 5V encoder signal, and the DF50-M-2CNT-PIL-24 is connected to a 24V encoder signal. This document uses the DF50-M-2CNT-PIL-24 module as an example. For wiring methods, please refer toChapter 3, Section 13.2.
- Three LED indicator outputs. After the module is powered on, PW is always on, indicating that the module is powered on and initialized normally. Different display states of Led2 represent different working states of the module; Led2 flashes when the internal bus of the module is working normally. The external 24V power supply of the module is normal, and the EP light is always on.
- Add the DF50-M-2CNT-PIL-24 module as shown below.

Device overview

Module	...	Rack	Slot	I address	Q address
DF50-C-PN-RT		0	0		
PN-IO		0	0 X1		
SystemDiagnostic_1		0	1	1...2	1...2
AdapterDigitalInput_1		0	2	3	
DF50-M-2CNT-PIL-24_1		0	3	4...21	3...12

Figure 4-1-70

- The output status of the module can be set in the adapter. For setting methods, please refer toChapter 4, Section 1.2.3.
- As shown in the figure below, you can configure the signal mode of the DF50-M-2CNT-PIL-24 module (the frequency multiplication function is set here,Default 4x), DI signal function, filter time signal A, filter time signal B, encoder calculation direction, counter mode setting, comparison function, fieldbus error behavior, count upper limit, count lower limit.

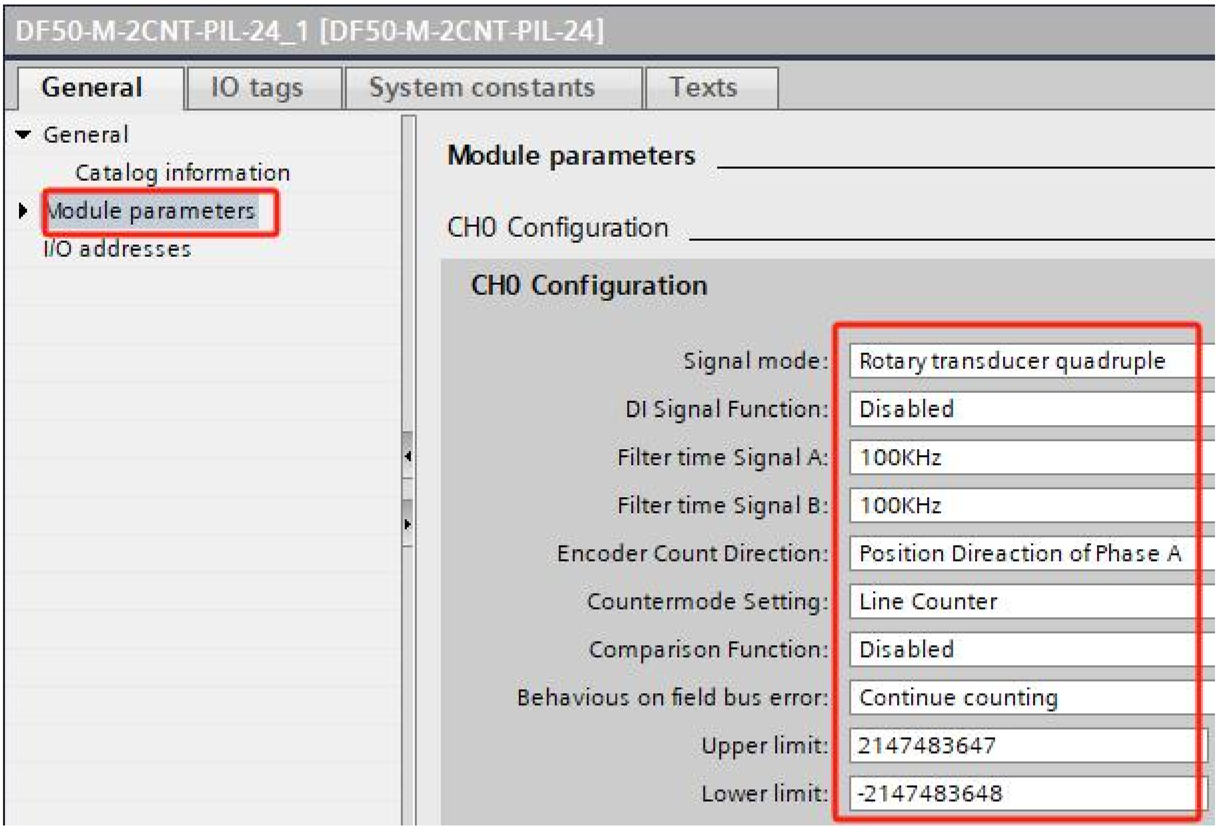


Figure 4-1-71

- As shown in the figure below, fill the address of module CH0 into the monitoring table. For the meaning of process data, please refer toSection 1.7.1 of this chapter.

Address	Display format	Monitor value	Modify value	⚡	Comment
				☐	DF50-M-2CNT-PIL-24_1
%IB4	Hex	16#00		☐	state
%ID5	Hex	16#0000_0000		☐	pulse
%ID9	Hex	16#0000_0000		☐	Latching pulses
				☐	
%QB3	Hex	16#00		☐	command
%QD4	Hex	16#0000_0000		☐	set comparison

Figure 4-1-72

➢ As shown in the figure below, write "1" in the command output data column to use the counting function normally, and the current pulse value can be read in the pulse number column.

Address	Display format	Monitor value	Modify value		Comment
					DF50-M-2CNT-PIL-24_1
%IB4	Bin	2#0000_0001			state
%ID5	DEC	2061			pulse
%ID9	DEC	0			Latching pulses
%QB3	Bin	2#0000_0001	2#0000_0001		command
%QD4	DEC	0			set comparison

Figure 4-1-73

1.7.1. Module process data description

- The ProfiNET bus adapter will allocate corresponding input and output addresses according to the different modules connected to it; the table shows the meaning, data length and data type of the input and output data.

Table 4.1.4Module data length and type

Output Data	Number of bytes	Data Types
Channel 1 command output data	1	Uint8
Channel 1 pulse comparison value output	4	int32
Channel 2 command output data	1	Uint8
Channel 2 pulse comparison value output	4	int32
Input Data	Number of bytes	Data Types
Channel 1 Status Input Data	1	Uint8
Channel 1 Pulse Number	4	int32
Channel 1 Latch pulse number	4	int32
Channel 2 status input data	1	Uint8
Channel 2 Pulse Number	4	int32
Channel 2 Latch pulse number	4	int32

Table 4.1.5Output data meaning

Output data meaning	
0 bytes	
bit7~bit1	reserve
bit0	0: Channel 1 stops counting and the original count is reset to zero; 1: Channel 1 starts counting
1~4 bytes	Channel 1 pulse comparison value output, signed 32-bit data
5 bytes	
bit7~bit1	reserve
bit0	0: Channel 2 stops counting and the original count is cleared; 1: Channel 2 starts counting
6~9 bytes	Channel 2 pulse comparison value output, signed 32-bit data

Table 4.1.6Input data meaning

Input data meaning	
0 bytes	
bit7~bit5	reserve
Bit3~bit4	0: Channel 1 stops; 1: Channel 1 counts up; 2: Channel 1 counts down
bit2	0: Channel 1 count value is less than the comparison value; 1:

	Channel 1 count value is greater than the comparison value
bit1	0: No electronic probe/1 channel count reset signal; 1: Electronic probe/channel count reset signal
bit0	0: Channel 1 counting stop state, the original count is cleared; 1: Channel 1 counting state
1~4 bytes	Channel 1 pulse input value, signed 32-bit data
5~8 bytes	Channel 1 pulse input latch value, signed 32-bit data
9 bytes	
bit7~bit5	Reserved seat
bit3~bit4	0: Channel 2 stops; 1: Channel 2 counts up; 2: Channel 2 counts down
bit2	0: Channel 2 count value is less than the comparison value; 1: Channel 2 count value is greater than the comparison value
bit1	0: No electronic probe/channel 2 count reset signal; 1: Electronic probe/channel count reset signal
bit0	0: Channel 1 counting stop state, the original count is cleared; 1: Channel 1 counting state
10~13 bytes	Channel 1 pulse input value, signed 32-bit data
14~17 bytes	Channel 1 pulse input latch value, signed 32-bit data

1.7.2. DI Signal Function Configuration

- As shown in the figure below, you can configure the DI signal function. The default setting is Disabled. The following functions are available: rising edge capture, falling edge capture, both rising and falling edge capture, rising edge reset, falling edge reset, and both rising and falling edge reset.Rising edge capture (Rising edge capture) and rising edge reset (Rising edge reset)Function.

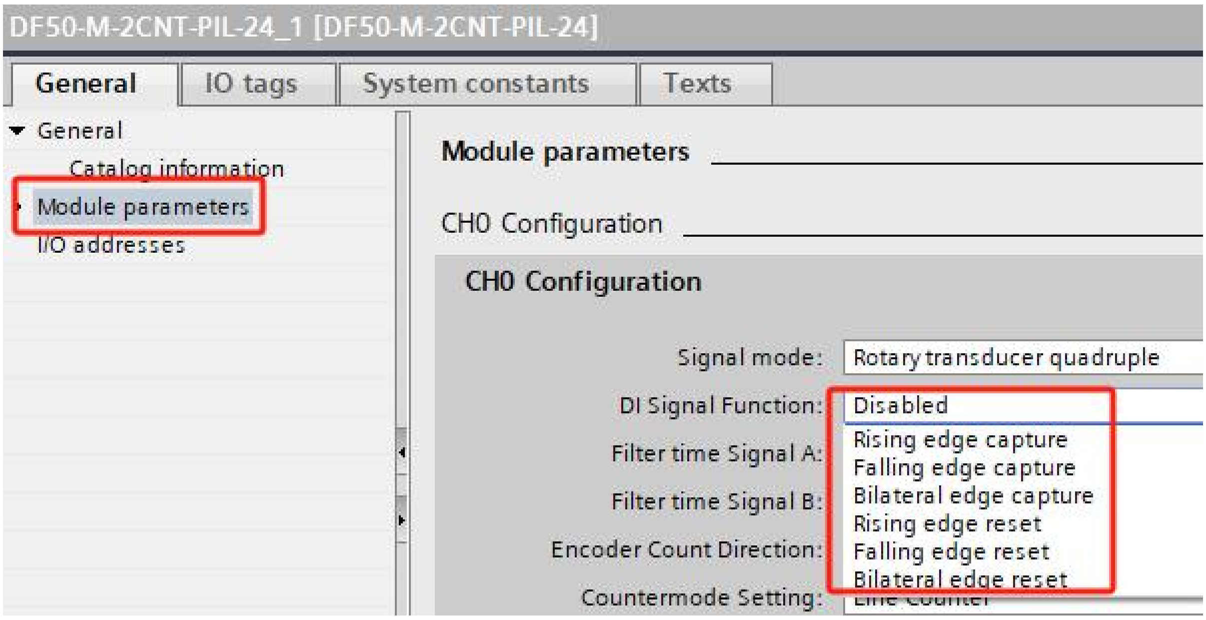


Figure 4-1-74DI data configuration

➢ DI rising edge capture:As shown in the figure below, the pulse number is "5440".

Address	Display format	Monitor value	Modify value		Comment
					DF50-M-2CNT-PIL-24_1
%IB4	Bin	2#0000_0001			state
%ID5	DEC	5440			pulse
%ID9	DEC	0			Latching pulses
%QB3	Bin	2#0000_0001	2#0000_0001	☑	command
%QD4	DEC	0			set comparison

Figure 4-1-75DI rising edge capture

➢ After a rising edge is input, as shown in the figure below, the second bit of the status input data changes to "1", then to "0", and the number of latch pulses becomes "5440".

Address	Display format	Monitor value	Modify value		Comment
					DF50-M-2CNT-PIL-24_1
%IB4	Bin	2#0000_0011			state
%ID5	DEC	5440			pulse
%ID9	DEC	5440			Latching pulses
%QB3	Bin	2#0000_0001	2#0000_0001	☑	command
%QD4	DEC	0			set comparison

Figure 4-1-76DI rising edge capture trigger

➢ DI rising edge reset:As shown in the figure below, the pulse number is "2995".

Address	Display format	Monitor value	Modify value		Comment
					DF50-M-2CNT-PIL-24_1
%IB4	Bin	2#0000_0001			state
%ID5	DEC	2995			pulse
%ID9	DEC	0			Latching pulses
%QB3	Bin	2#0000_0001	2#0000_0001	☑	command
%QD4	DEC	0			set comparison

Figure 4-1-77DI rising edge reset

➢ After a rising edge is input, as shown in the figure below, the second bit of the status input data changes to "1", then to "0", and the number of pulses becomes "0".

Address	Display format	Monitor value	Modify value		Comment
					DF50-M-2CNT-PIL-24_1
%IB4	Bin	2#0000_0011			state
%ID5	DEC	0			pulse
%ID9	DEC	0			Latching pulses
%QB3	Bin	2#0000_0001	2#0000_0001	☑	command
%QD4	DEC	0			set comparison

Figure 4-1-78DI rising edge reset trigger

1.7.3. Compare function configurations (Comparison Function）

➢ Turn on the comparison function as shown below

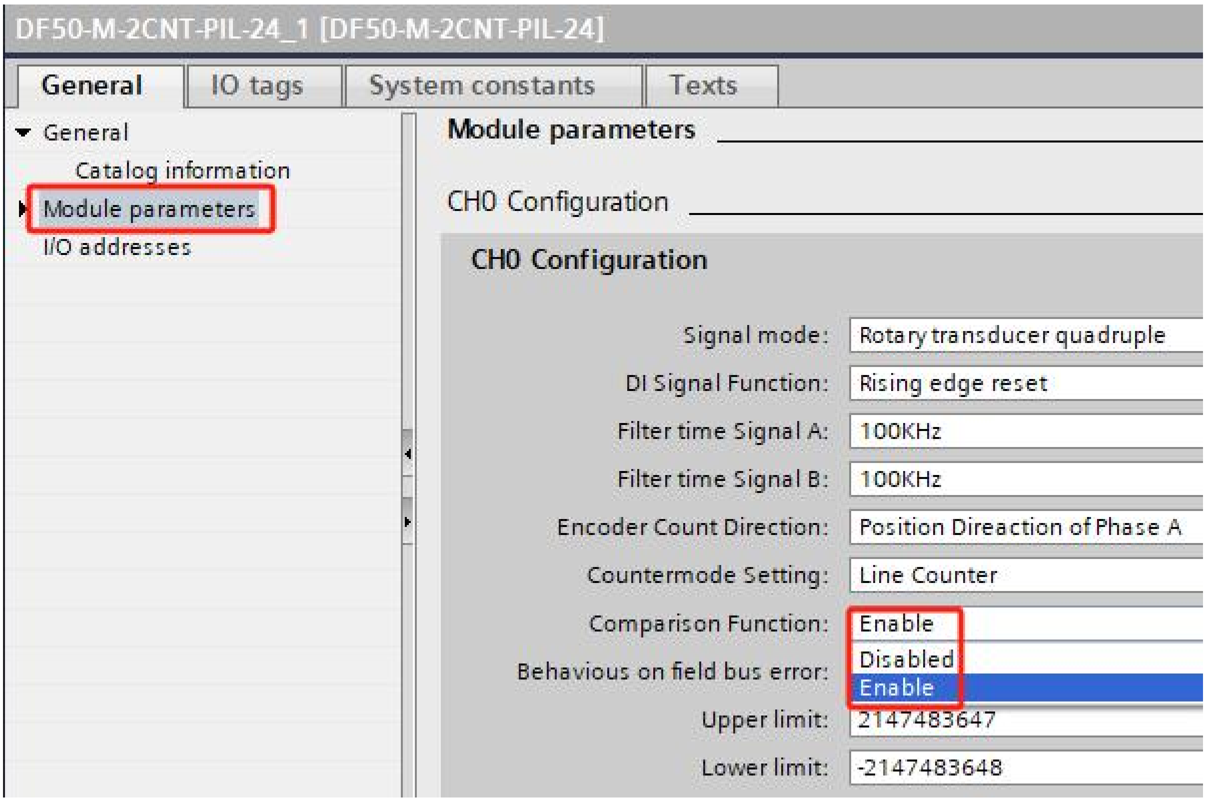


Figure 4-1-79Comparison function enable

➢ As shown in the figure below, the pulse comparison value is set to 10000. When the pulse number is "1735", the third bit of the status input data is "0".

Address	Display format	Monitor value	Modify value	⚡		Comment
				☐		DF50-M-2CNT-PIL-24_1
%IB4	Bin	2#0000_0001		☐		state
%ID5	DEC	1735		☐		pulse
%ID9	DEC	0		☐		Latching pulses
				☐		
%QB3	Bin	2#0000_0001	2#0000_0001	☑	⚠	command
%QD4	DEC	10000	10000	☑	⚠	set comparison

Figure 4-1-80Comparison count

➢ As shown in the figure below, when the pulse number is "10945", it exceeds the set value 10000, and the third bit of the status input data becomes "1".

Address	Display format	Monitor value	Modify value		Comment
					DF50-M-2CNT-PIL-24_1
%IB4	Bin	2#0000_0101			state
%ID5	DEC	10945			pulse
%ID9	DEC	0			Latching pulses
%QB3	Bin	2#0000_0001	2#0000_0001		command
%QD4	DEC	10000	10000		set comparison

Figure 4-1-81Comparison count

1.7.4. Pulse plus direction function (Signal Type: Pulse and Directions)

➢ As shown in the figure below, change the signal mode to pulse plus direction mode. For the wiring method, please refer toChapter 3, Section 13.2.3When this mode is used, the A+ and A- ports input high and low levels to indicate the direction, and the B+ and B- ports input valid levels to accumulate count values.

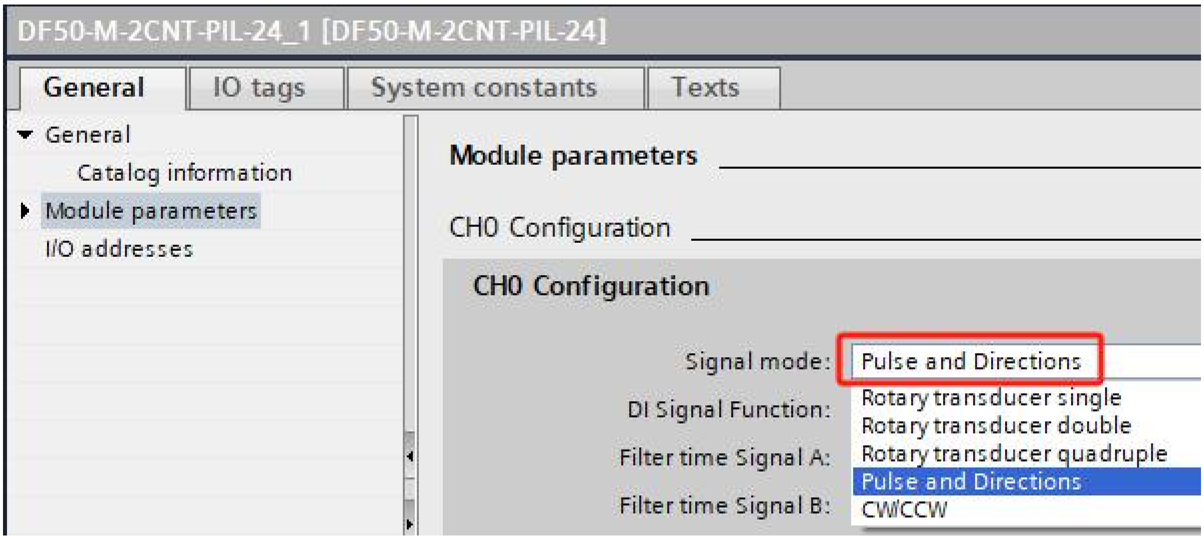


Figure 4-1-82

➢ As shown in the figure below, the count value is "0" when the sensor is stationary and the direction state is "0". For process data definition, please refer toChapter 3, Section 13.4.

Address	Display format	Monitor value	Modify value		Comment
					DF50-M-2CNT-PIL-24_1
%IB4	Bin	2#0000_0001			state
%ID5	DEC+/-	0			pulse
%ID9	DEC+/-	0			Latching pulses
%QB3	Bin	2#0000_0001	2#0000_0001		command
%QD4	DEC	0			set comparison

Figure 4-1-83

➢ When the A+ and A- voltage inputs are at a low level, pulse signals are input to B+ and B-. As shown in the figure below, the count value decreases, and the direction status bit3~bit4 is "2".

Address	Display format	Monitor value	Modify value		Comment
				☐	DF50-M-2CNT-PIL-24_1
%IB4	Bin	2#0001_0001		☐	state
%ID5	DEC+/-	-7507		☐	pulse
%ID9	DEC+/-	0		☐	Latching pulses
				☐	
%QB3	Bin	2#0000_0001	2#0000_0001	☑ ⚠	command
%QD4	DEC	0		☐	set comparison

Figure 4-1-84

➢ When the A+ and A- voltage inputs are high level, pulse signals are input to B+ and B-. As shown in the figure below, the count value increases, and the direction status bit3~bit4 is "1".

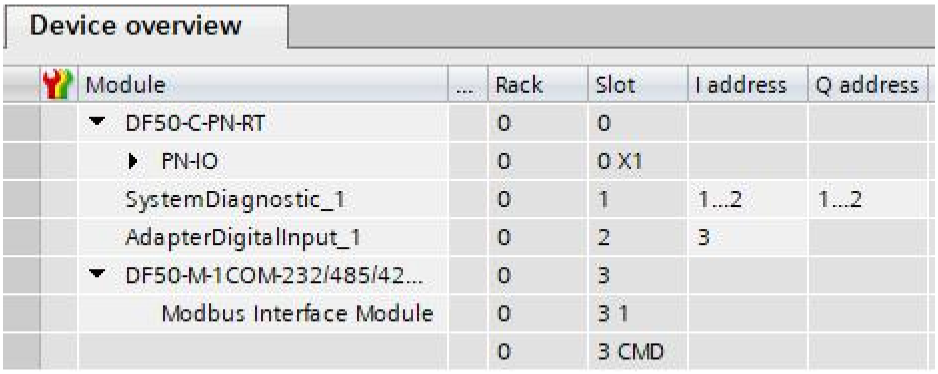
Address	Display format	Monitor value	Modify value		Comment
				☐	DF50-M-2CNT-PIL-24_1
%IB4	Bin	2#0000_1001		☐	state
%ID5	DEC+/-	2516		☐	pulse
%ID9	DEC+/-	0		☐	Latching pulses
				☐	
%QB3	Bin	2#0000_0001	2#0000_0001	☑ ⚠	command
%QD4	DEC	0		☐	set comparison

Figure 4-1-85

1.8. Serial port module usage routine

➢ This example uses the DF50-C-PN-RT + DF50-1COM-232-485-422 topology.

DF50-1COM-232-485-422 supports three modes: free transparent transmission, slave mode, and Modbus RTU master mode. The mode switching is achieved by adding different sub-slots and setting the mode in the Modbus interface Module.Section 15.2The wiring diagram is connected to the card, simulating the communication device and the DF50-1COM-232-485-422 module communication. After adding the module, it is shown as follows.



Device overview

Module	...	Rack	Slot	I address	Q address
DF50-C-PN-RT		0	0		
PN-IO		0	0 X1		
SystemDiagnostic_1		0	1	1...2	1...2
AdapterDigitalInput_1		0	2	3	
DF50-M-1COM-232/485/42...		0	3		
Modbus Interface Module		0	3 1		
		0	3 CMD		

Figure 4-1-86

➢ The parameters of Modbus interface Module are shown in the figure below. The default mode is Free Protocol.

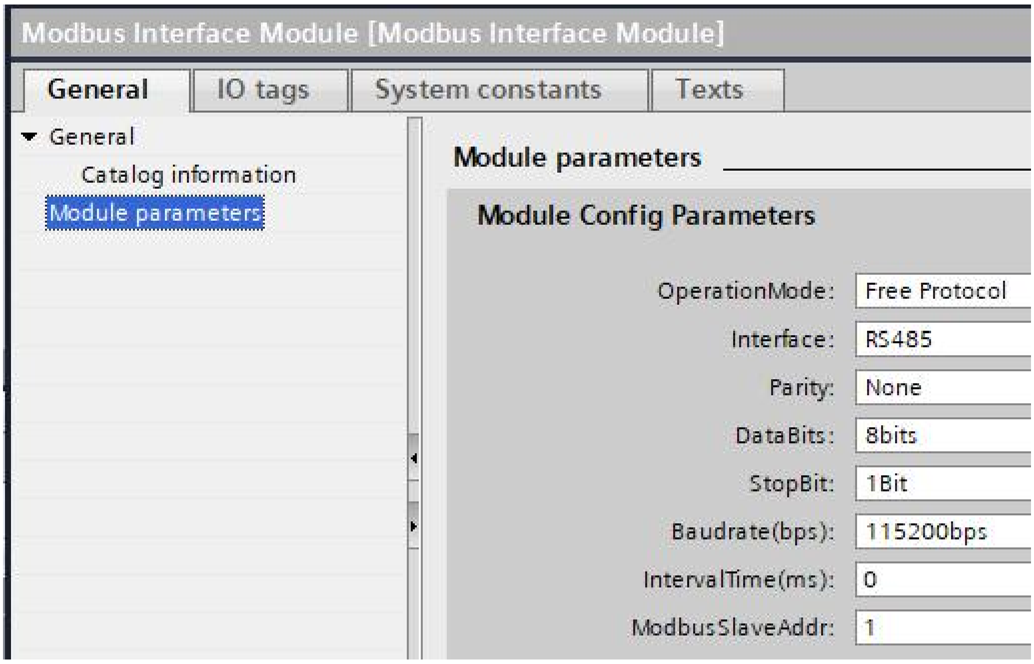


Figure 4-1-87

➢ As shown in the figure below, the number starting with F indicates free transparent transmission mode, the number starting with M indicates Modbus RTU master mode, and the number starting with S indicates Modbus RTU slave mode.

Figure 4-1-88

1.8.1. Modbus RTU Master Mode Usage Example

➢ Set the module mode to Modbus RTU Master mode, as shown below.

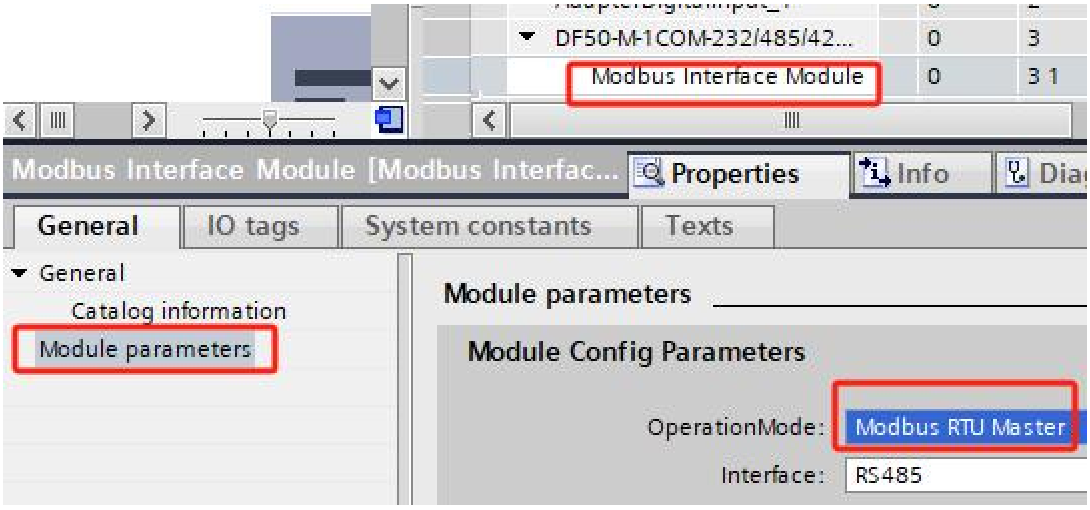


Figure 4-1-89

➢ Add the diagnostic module M: Error Code Input (28 CH) to the second subslot, which contains the diagnostic information of the subsequent 28 subslots at most, and each subslot occupies 2 bytes of diagnostic information. See Table 4.1.7 for its meaning.

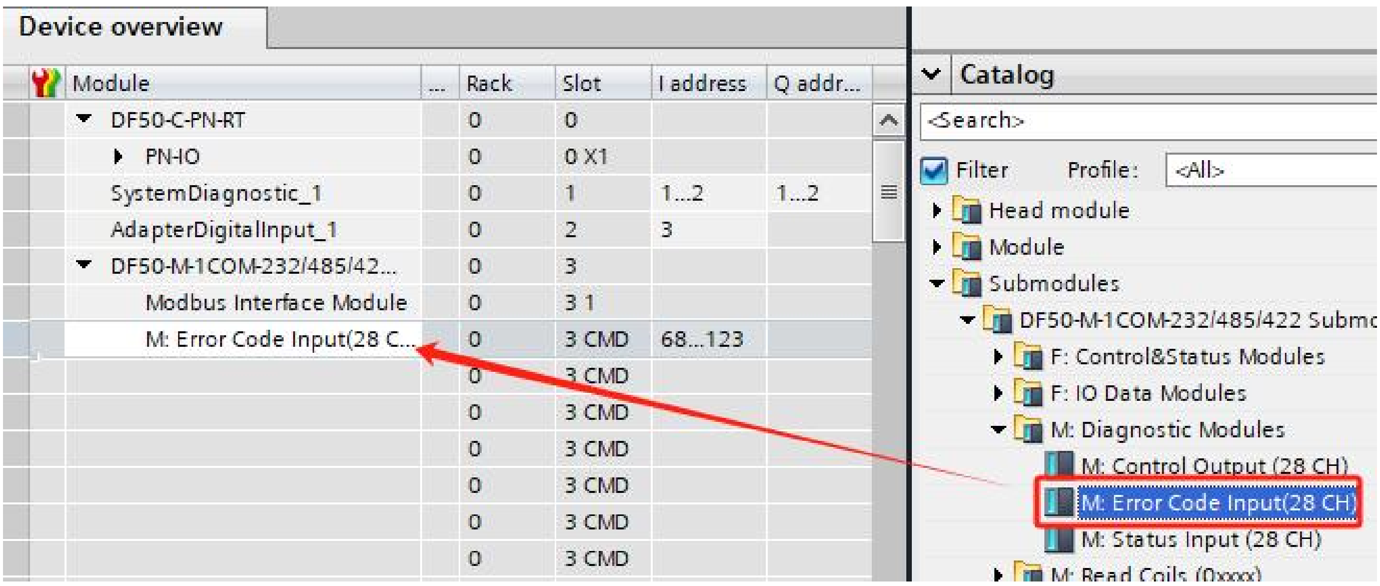


Figure 4-1-90

Table 4.1.7

Normal state value	Status Name	meaning
16#0000	OP_SUCCESS	Configuration or write operation successful
16#0001	DATA_FULL	Data has been updated and can be read
16#0002	WRITE_IDLE	Write idle, writable

16#0003	DATA_EMPTY	Read idle, receive data not updated
Error Status Value	Status Name	meaning
16#E0A1	WRITE_BUSY	Write busy, can't write
16#E0A2	DATA_LARGE	Data length exceeds limit
16#E0A3	CMD_ERR	Command Error
16#E0A4	PARA_ERR	Configuration parameter error
16#E0A5	CHECK_ERR	Verification Error
16#E0A6	SLAVE_NOEXIT	The slave device does not exist
16#E0A7	PACK_LOSS	Packet Loss
16#E0A8	OVER_FLOW	Data overflow

➢ From the 6 function codes starting with M, select the required ones and add them to the third sub-slot. If you need to read and write more data, you can add different sub-slot types continuously, up to 28 sub-slots, plus the first interface sub-slot and diagnostic sub-slot, a total of 30 sub-slots. As shown in Figures 4-1-79 and 4-1-80, add M: Read 03 Words 4xxxx and M: Write 03 Words 4xxxx.

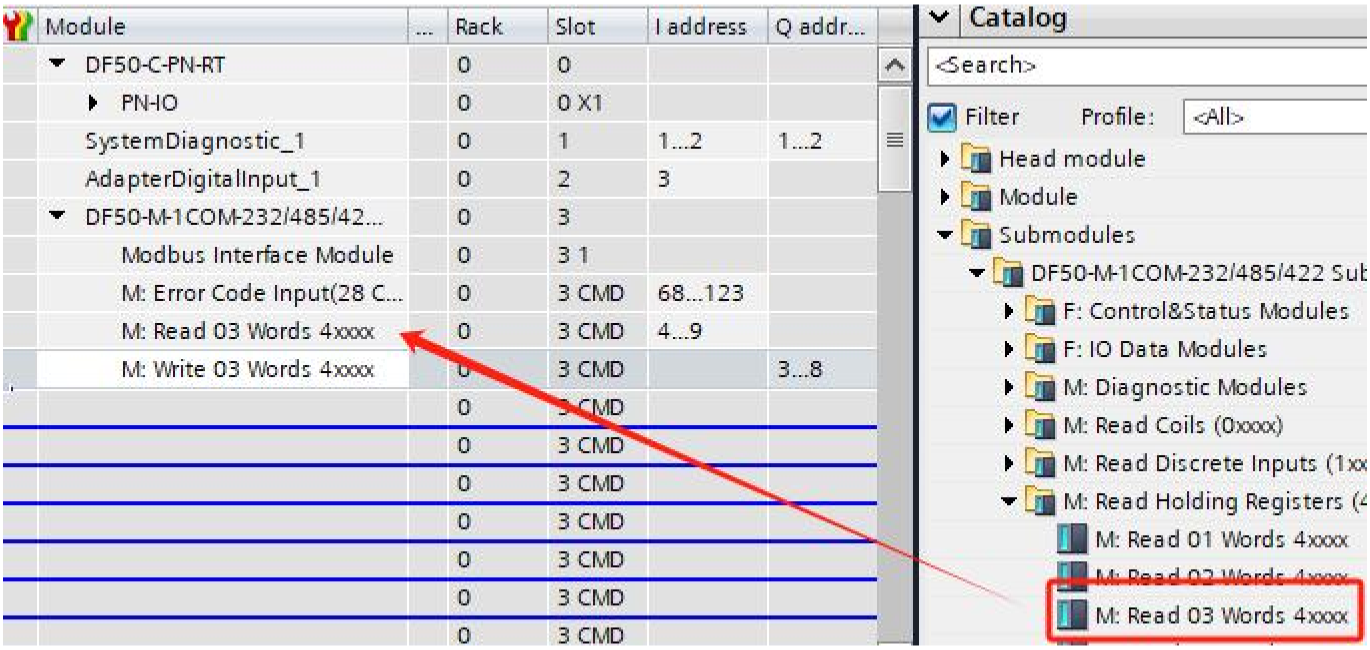


Figure 4-1-91

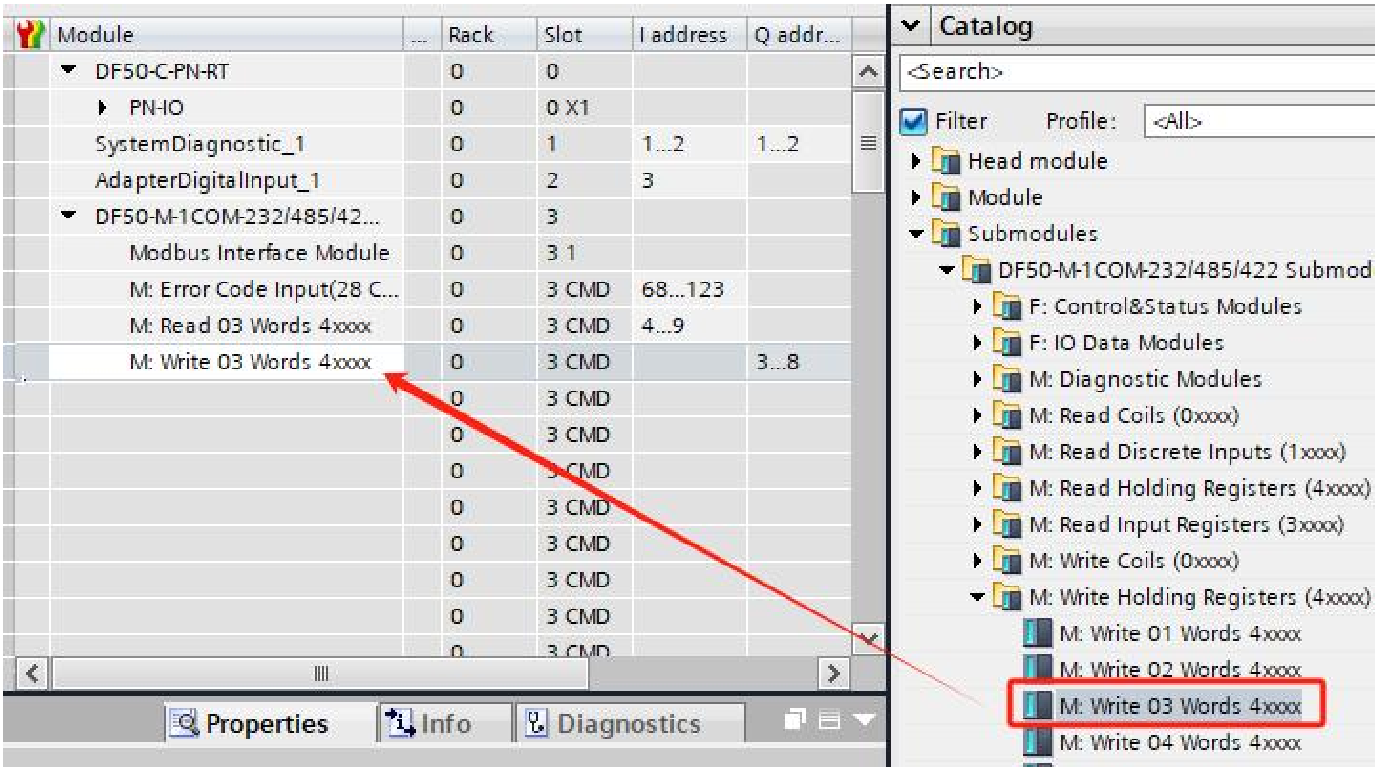


Figure 4-1-92

➢ As shown in the figure below, click M: Read 03 Words 4xxxx to enter the property interface to configure the slave device information. The meaning is shown in Table 4.1.8.

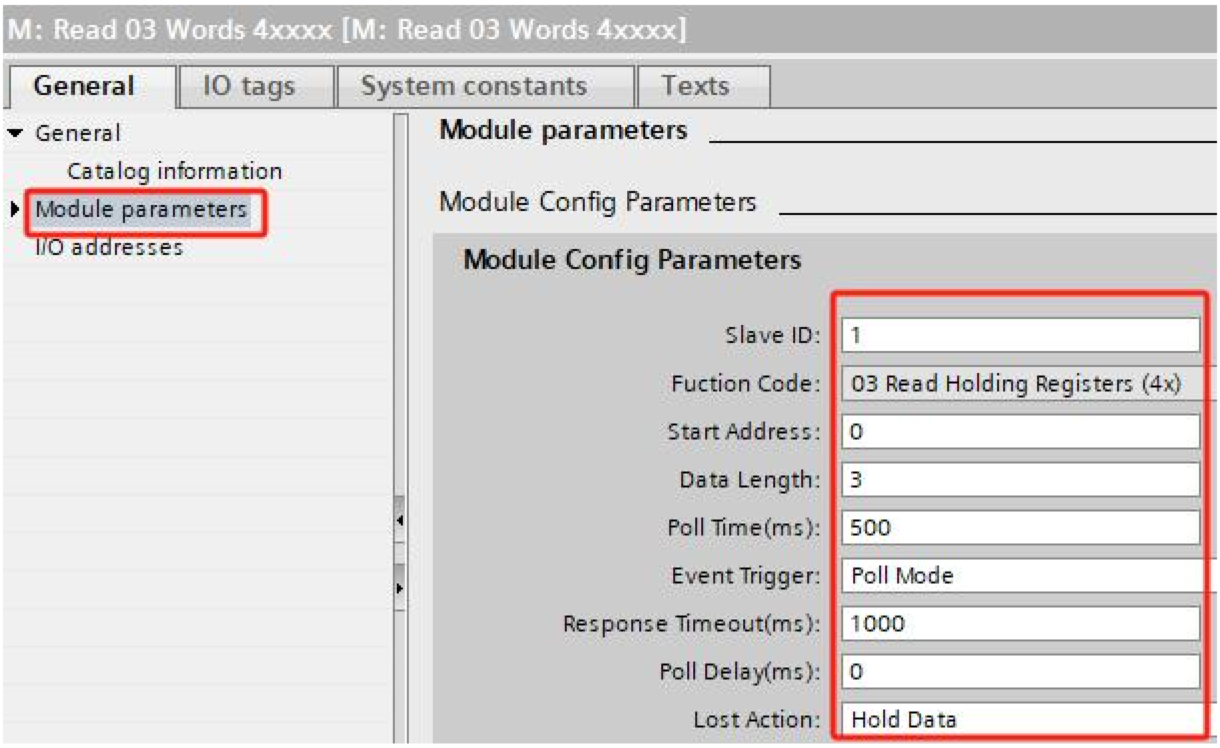


Figure 4-1-93

Table 4.1.8

SlaveID	Slave node address
Function Code	Function code

Start Address	Register start address
Data Length	Number of registers or coils
Poll Time	The period of polling this slave
Event Trigger Trigger mode selection	Poll: Polling mode
	Trigger: Trigger mode
Response TimeOut	Slave station response timeout
Poll Delay	Polling interval between slaves
Lost Action Slave loss handling	Hold: Keep the last value
	Clear: Clear
Input data processing when module fails	Input value cleared
	Keep the last value

➢ As shown in the figure below, change the register starting address of M: Write 03 Words 4xxxx to 4000.

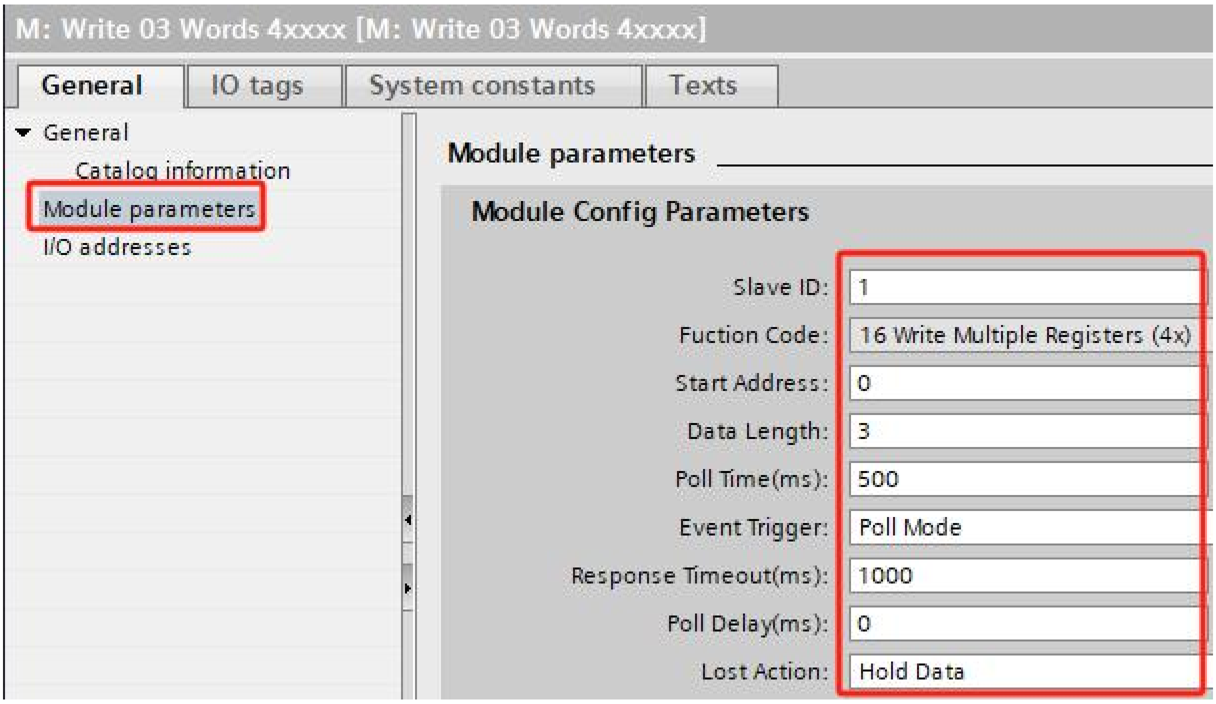


Figure 4-1-94

➢ The meanings of the two sub-slots added now are as follows:

➢ M: Read 03 Words 4xxxx contains 3 word data. According to the configuration information, the data represents the register value of the slave with node address 1 and address 0-2.

➢ M: Write 03 Words 4xxxx contains 3 words of data. According to the configuration information, the data will be written to the slave with node address 1 and registers with addresses 4000-4002.

➢ Download the configuration to the device. Fill in the information we need into the monitoring table for monitoring as shown below.

Address	Display format	Monitor value	Modify value	⚡	Comment
				☐	DF50-M-1COM-232/485/422_1
%IW68	Hex			☐	Diagnostics module(read 03 words)
%IW70	Hex			☐	Diagnostics module(write 03 words)
				☐	
%IW4	Hex			☐	M: Read 03 Words 4xxxx
%IW6	Hex			☐	M: Read 03 Words 4xxxx
%IW8	Hex			☐	M: Read 03 Words 4xxxx
				☐	
%QW3	Hex			☐	M: Write 03 Words 4xxxx
%QW6	Hex			☐	M: Write 03 Words 4xxxx
%QW8	Hex			☐	M: Write 03 Words 4xxxx

Figure 4-1-95

➢ Use Modbus Slave software to create two slave stations to communicate with the module, as shown in the figure below, with the starting addresses being 0 and 4000 respectively.

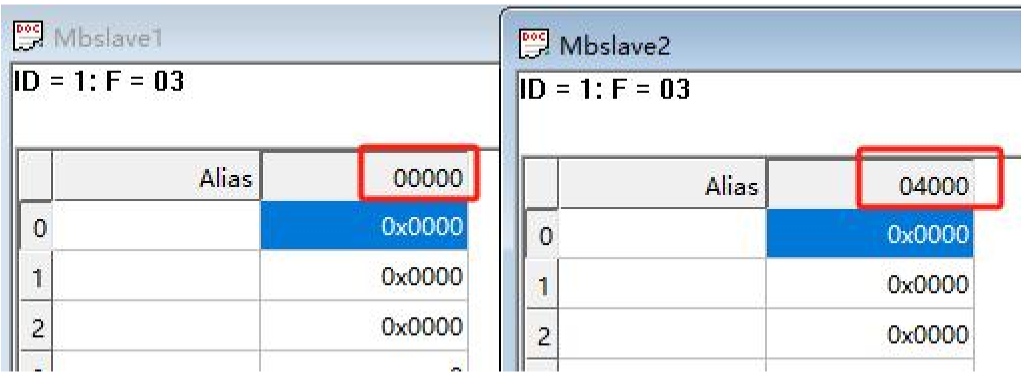


Figure 4-1-96

➢ After changing the data format to HEX and writing "11, 22, 33" into registers 0-2 of the first slave, the TIA Portal monitoring table will be displayed as shown below.

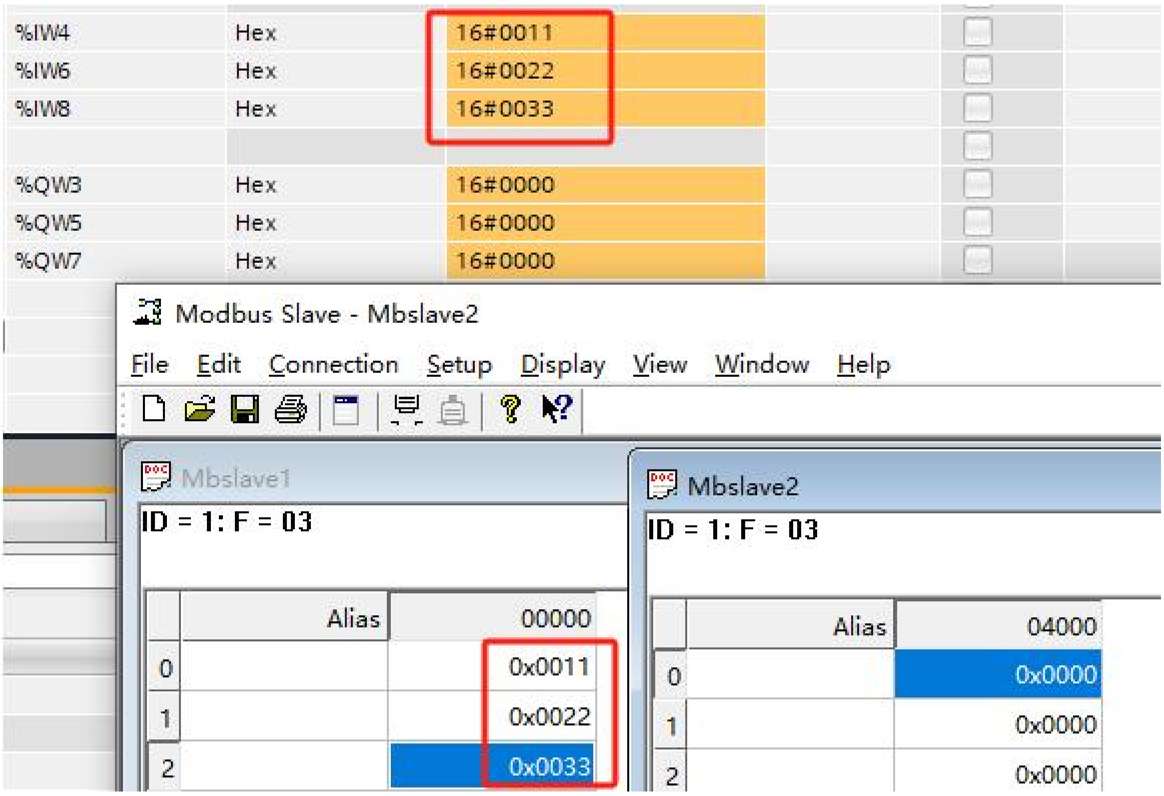


Figure 4-1-97

➢ After writing "44, 55, 66" to subslot 4 in the TIA Portal monitoring table, the second slave is displayed as shown in the figure below.

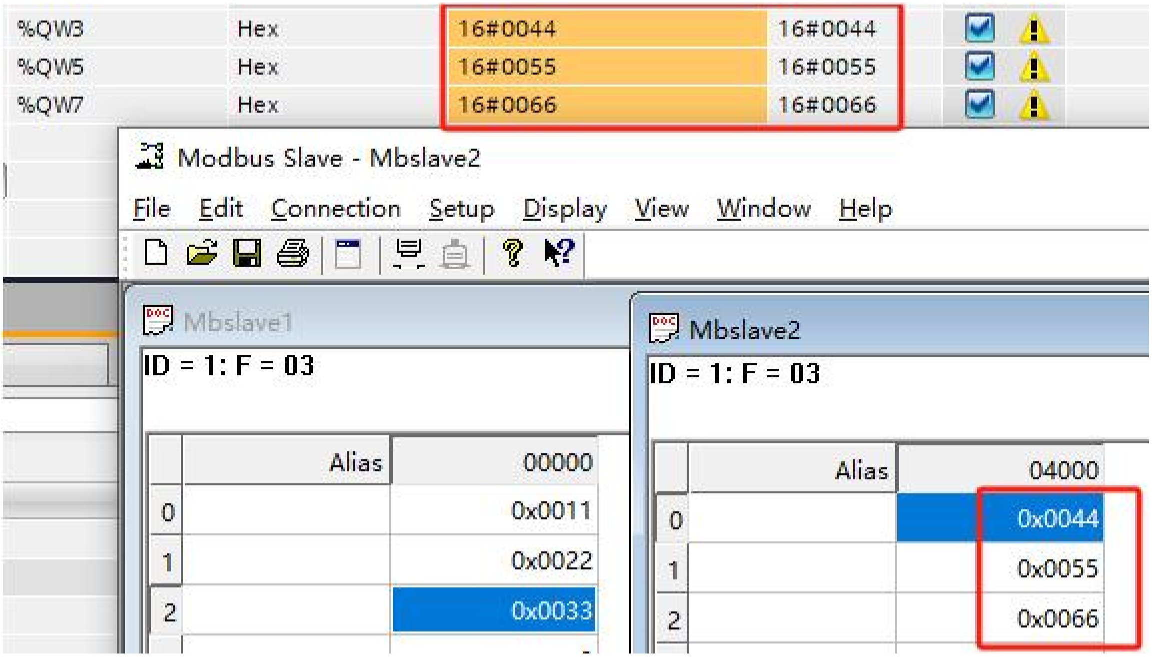


Figure 4-1-98

1.8.1. FreeRUN free transparent transmission mode usage example

➢ In the Modbus Interface Module, set the mode to Free Protocol mode, as shown in the figure below.

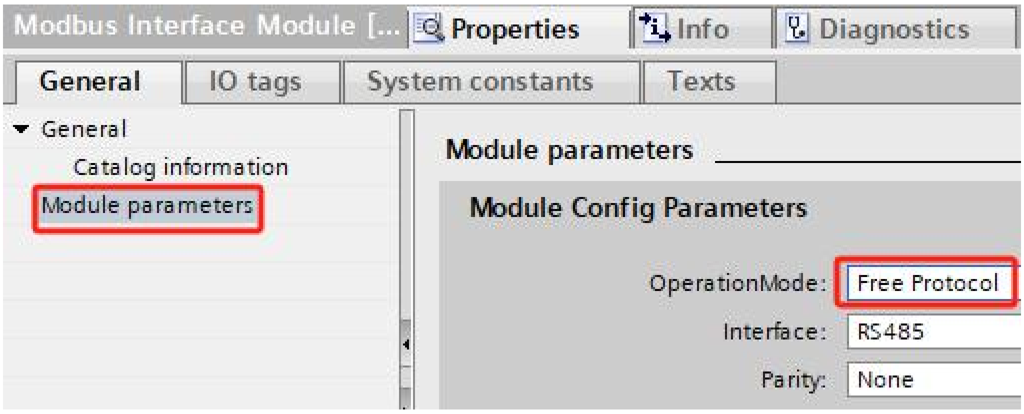


Figure 4-1-99

➢ Add the F: Control status Module module to the second subslot. See Table 4.1.9 for its data structure.

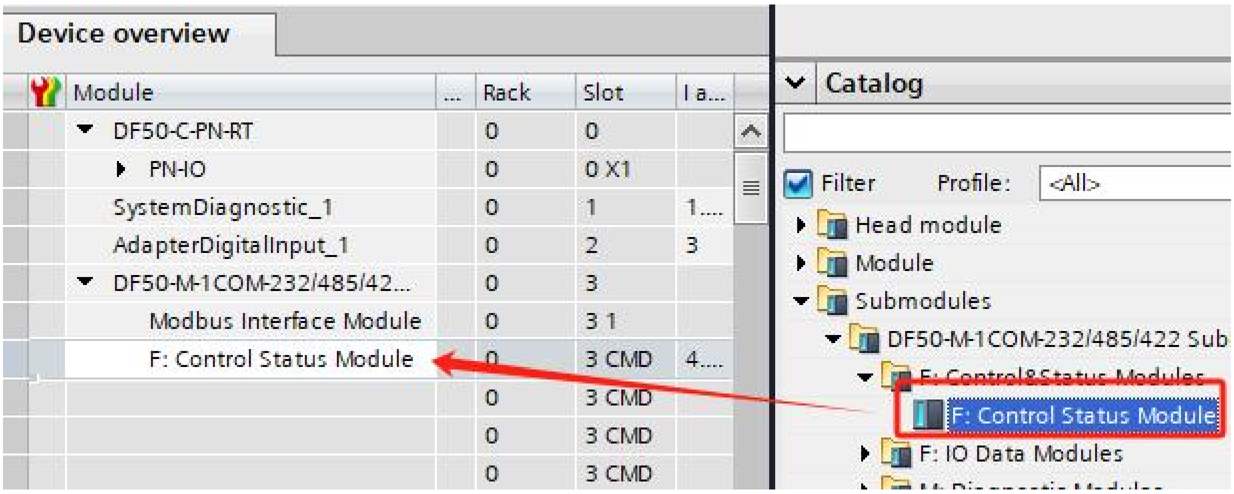


Figure 4-1-100

Table 4.1.9

Output Data			
Byte offset	name	length	meaning
Byte:0-1	CtrlWord	2byte	Control Word
Byte:2	TxDataLEN	1byte	Send data length
Byte:3	TxDataCNT	1byte	Send data sequence number
Input Data			
Byte Sequence Number	name	length	meaning
Byte:0-1	StateWord	2byte	Status word
Byte:2	RxDataLEN	1byte	Receive data length
Byte:3	RxDataCNT	1byte	Receive data sequence

			number
Byte:4-11	/	8byte	reserve

➢ From F: IO Data Modules, select the ones you need and add them to the third sub-slot. As shown in Figures 4-1-89 and 4-1-90, add F: Free-Port Input 0004 Bytes and F: Free-Port Output 0004 Bytes.

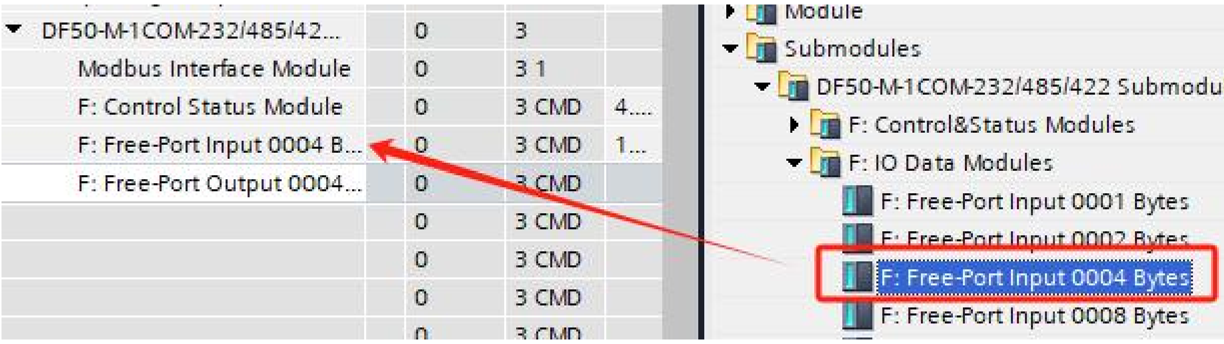


Figure 4-1-101

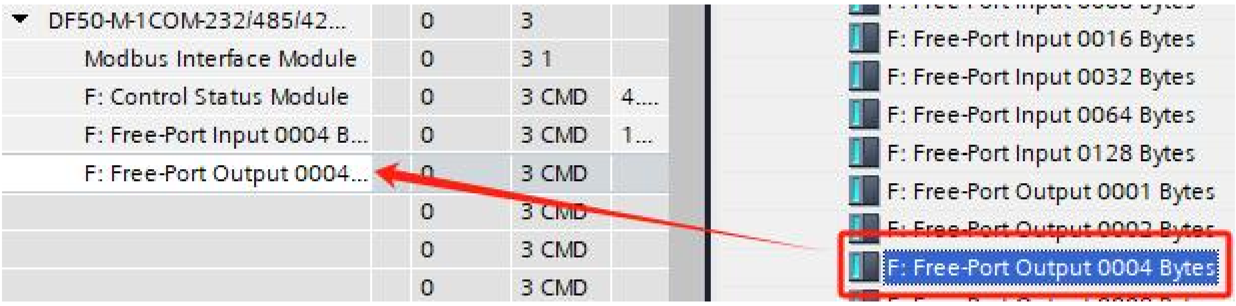


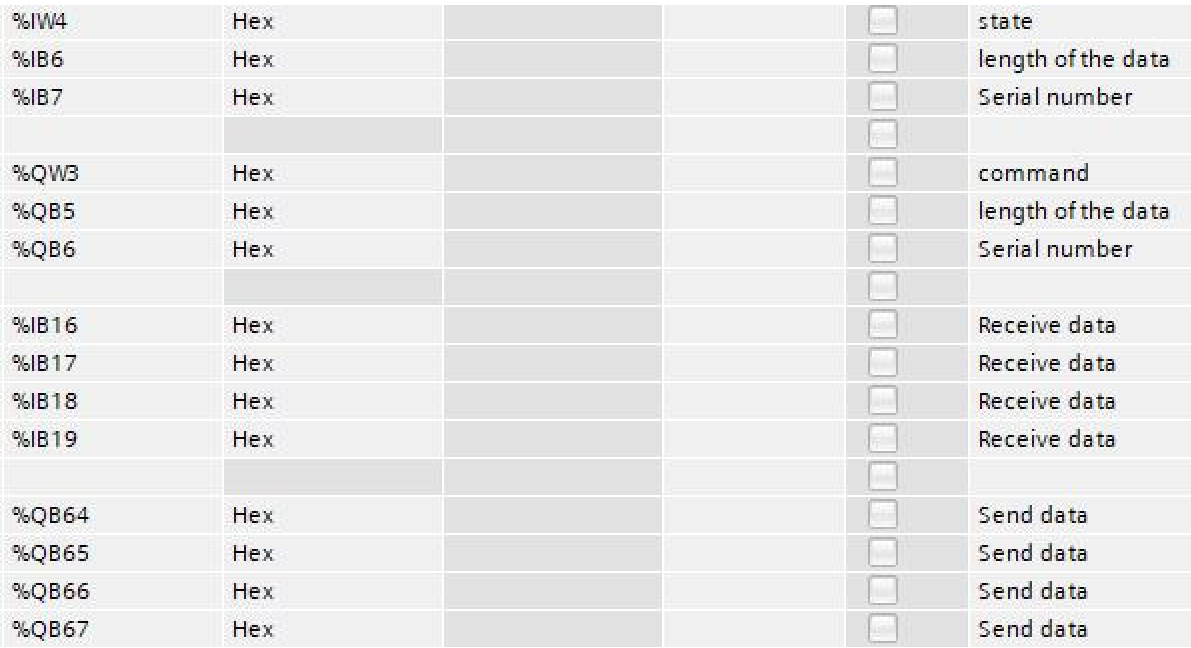
Figure 4-1-102

➢ The meanings of the two sub-slots added now are as follows:

➢ F: Free-Port Input 0004 Bytes contains 4 bytes of input data.

➢ F: Free-Port Output 0004 Bytes contains 4 bytes of output data.

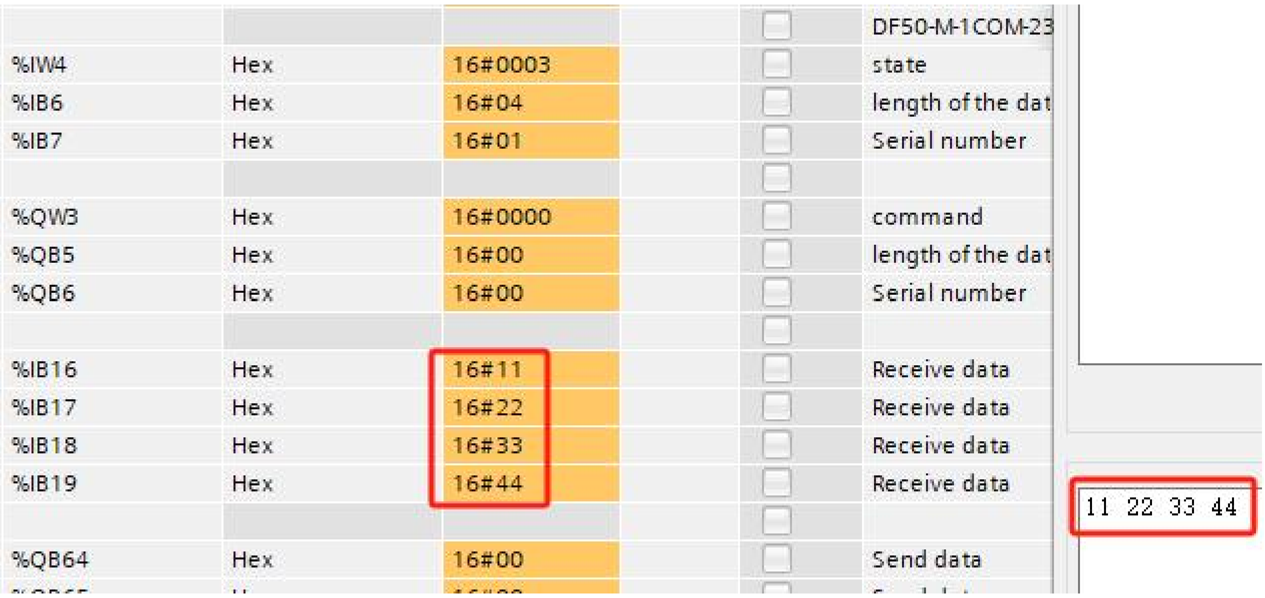
➢ Download the configuration to the device and fill in the required data into the monitoring table as shown below.



%IW4	Hex				state
%IB6	Hex				length of the data
%IB7	Hex				Serial number
%QW3	Hex				command
%QB5	Hex				length of the data
%QB6	Hex				Serial number
%IB16	Hex				Receive data
%IB17	Hex				Receive data
%IB18	Hex				Receive data
%IB19	Hex				Receive data
%QB64	Hex				Send data
%QB65	Hex				Send data
%QB66	Hex				Send data
%QB67	Hex				Send data

Figure 4-1-103

➢ Receive data test: The module will automatically enter the receive mode after being configured in free-running mode, or write16#00C2 actively switches to receiving mode. After connecting using the serial port assistant, send "11, 22, 33, 44" in HEX mode. As shown in the figure below, the data sent by the serial port assistant can be received in the receiving data of the TIA Portal monitoring table.



					DF50-M-1COM-23
%IW4	Hex	16#0003			state
%IB6	Hex	16#04			length of the dat
%IB7	Hex	16#01			Serial number
%QW3	Hex	16#0000			command
%QB5	Hex	16#00			length of the dat
%QB6	Hex	16#00			Serial number
%IB16	Hex	16#11			Receive data
%IB17	Hex	16#22			Receive data
%IB18	Hex	16#33			Receive data
%IB19	Hex	16#44			Receive data
%QB64	Hex	16#00			Send data

Figure 4-1-104

➢ The meaning of the status word is shown in the following table.

Table 4.1.10

Normal state value	Status Name	meaning
16#0000	OP_SUCCESS	Configuration or write

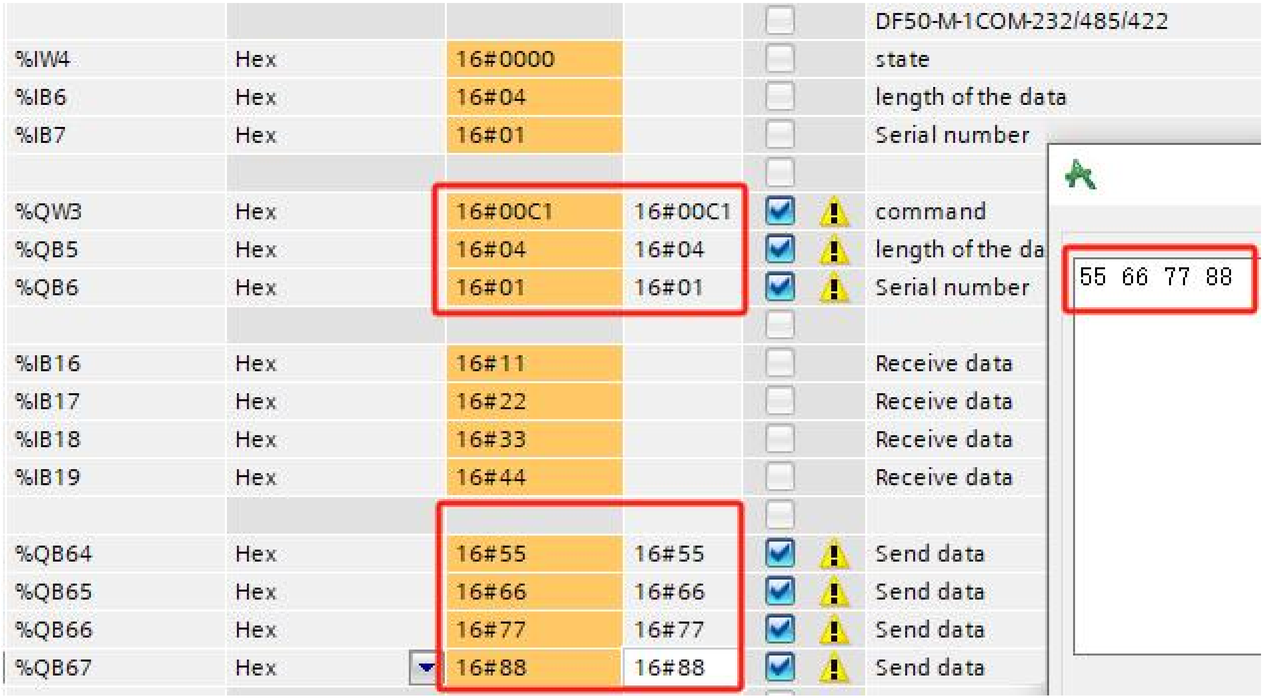
		operation successful
16#0001	DATA_FULL	Data has been updated and can be read
16#0002	WRITE_IDLE	Write idle, writable
16#0003	DATA_EMPTY	Read idle, receive data not updated
Error Status Value	Status Name	meaning
16#E0A1	WRITE_BUSY	Write busy, can't write
16#E0A2	DATA_LARGE	Data length exceeds limit
16#E0A3	CMD_ERR	Command Error
16#E0A4	PARA_ERR	Configuration parameter error
16#E0A5	CHECK_ERR	Verification Error
16#E0A6	SLAVE_NOEXIT	The slave device does not exist
16#E0A7	PACK_LOSS	Packet Loss
16#E0A8	OVER_FLOW	Data overflow

➢ The control word commands are shown in the following table.

Table 4.1.11

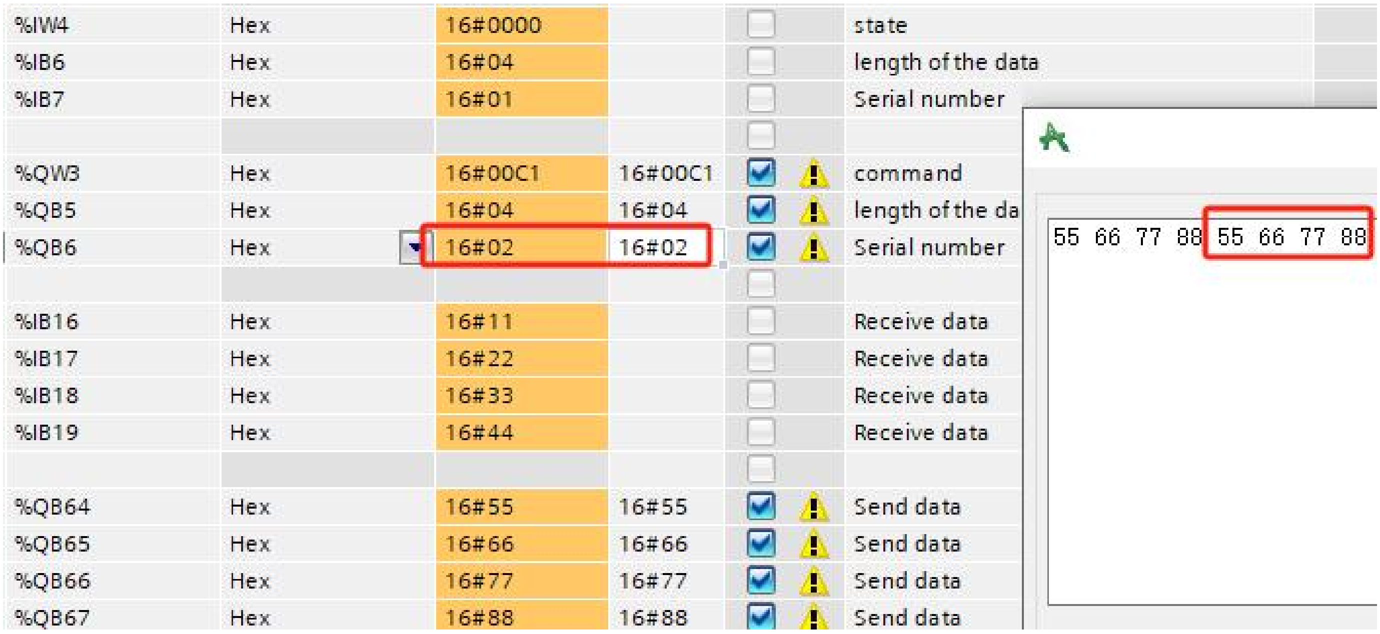
Command Value	Command Name	meaning
16#00C1	WRITECUSTOM	Free mode write data command
16#00C2	READCUSTOM	Free mode read data command

➢ Send data test: set the control word to 16#00C1, set the send data length to 4 bytes, set the send sequence number to 1, assign values to Byte1-4 of the send data respectively, and then perform the write action together. The received 4Byte data can be read using the serial port assistant, as shown in the figure below: (To send again, just loop and accumulate the send sequence number)



					DF50-M-1COM-232/485/422
%IW4	Hex	16#0000			state
%IB6	Hex	16#04			length of the data
%IB7	Hex	16#01			Serial number
%QW3	Hex	16#00C1	16#00C1	☑	command
%QB5	Hex	16#04	16#04	☑	length of the da
%QB6	Hex	16#01	16#01	☑	Serial number
%IB16	Hex	16#11			Receive data
%IB17	Hex	16#22			Receive data
%IB18	Hex	16#33			Receive data
%IB19	Hex	16#44			Receive data
%QB64	Hex	16#55	16#55	☑	Send data
%QB65	Hex	16#66	16#66	☑	Send data
%QB66	Hex	16#77	16#77	☑	Send data
%QB67	Hex	16#88	16#88	☑	Send data

Figure 4-1-105First send



%IW4	Hex	16#0000			state
%IB6	Hex	16#04			length of the data
%IB7	Hex	16#01			Serial number
%QW3	Hex	16#00C1	16#00C1	☑	command
%QB5	Hex	16#04	16#04	☑	length of the da
%QB6	Hex	16#02	16#02	☑	Serial number
%IB16	Hex	16#11			Receive data
%IB17	Hex	16#22			Receive data
%IB18	Hex	16#33			Receive data
%IB19	Hex	16#44			Receive data
%QB64	Hex	16#55	16#55	☑	Send data
%QB65	Hex	16#66	16#66	☑	Send data
%QB66	Hex	16#77	16#77	☑	Send data
%QB67	Hex	16#88	16#88	☑	Send data

Figure 4-1-106Second send

- If you need to receive data, you need to set the control word to 16#00C2 after sending the data before you can receive the data.

1.8.2. Modbus RTU Slave mode usage routine

➢ In the Modbus Interface Module, set the mode to Modbus RTU slave mode. The default value of SlaveAddr is "1" and can be modified as shown in the figure below.

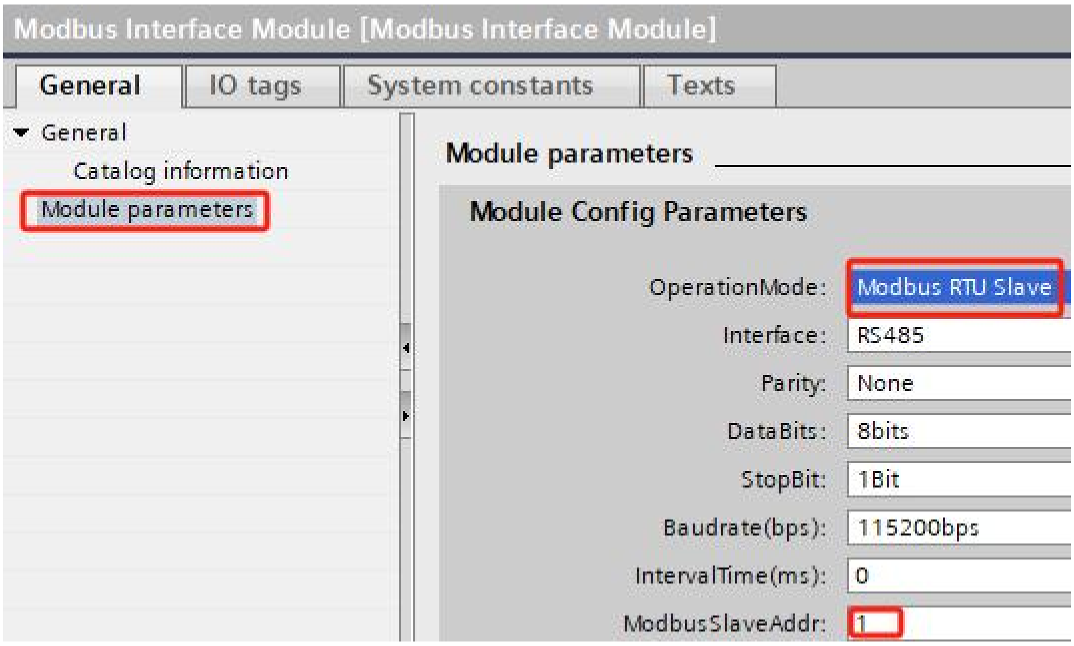


Figure 4-1-107

➢ Add the S: Modbus Status Input (1 Word) module to the second subslot. See Table 4.1.12 for its data structure.

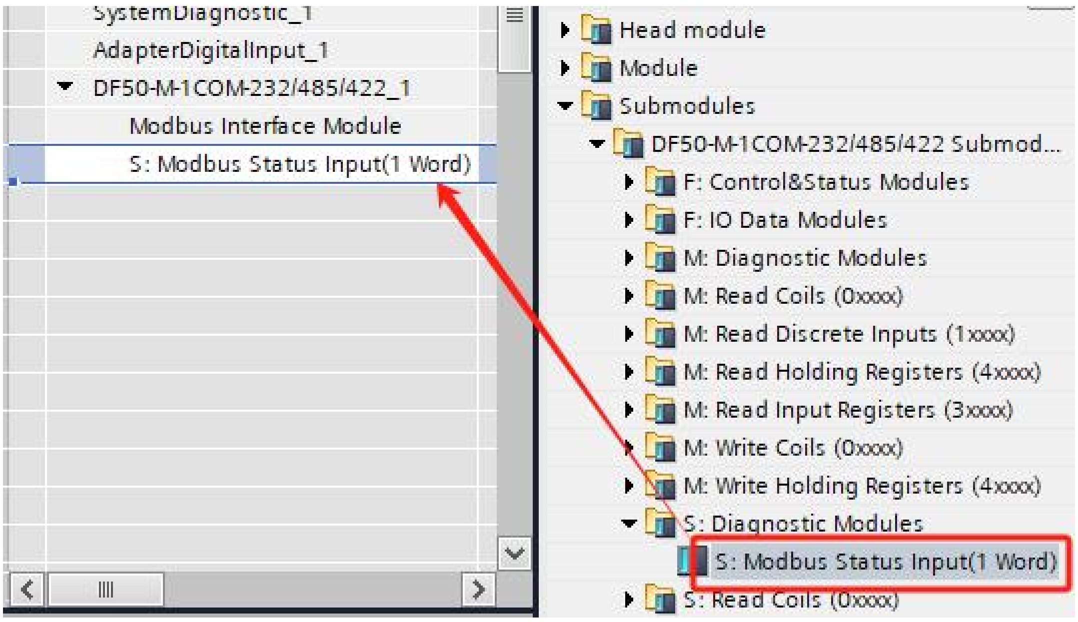


Figure 4-1-108

Table 4.1.12

Normal state value	Status Name	meaning
16#0000	OP_SUCCESS	Configuration or write operation successful
16#0001	DATA_FULL	Data has been updated and can be read
16#0002	WRITE_IDLE	Write idle, writable
16#0003	DATA_EMPTY	Read idle, receive data not updated
Error Status Value	Status Name	meaning
16#E0A1	WRITE_BUSY	Write busy, can't write
16#E0A2	DATA_LARGE	Data length exceeds limit
16#E0A3	CMD_ERR	Command Error
16#E0A4	PARA_ERR	Configuration parameter error
16#E0A5	CHECK_ERR	Verification Error
16#E0A6	SLAVE_NOEXIT	The slave device does not exist
16#E0A7	PACK_LOSS	Packet Loss
16#E0A8	OVER_FLOW	Data overflow

➢ From the 6 types starting with S, select the desired type and add it to the third subslot. If you need to read and write more data, you can add different subslot types continuously, up to 28 subslots, plus the first interface subslot and diagnostic subslot, a total of 30 subslots. Right-click the properties of the third subslot to configure the protocol information, and the register first address can be set for both reading and writing. Add S: Read 0002 Words 4xxxx and S: Write 0002 Words 4xxxx as shown in Figures 4-1-97 and 4-1-98.

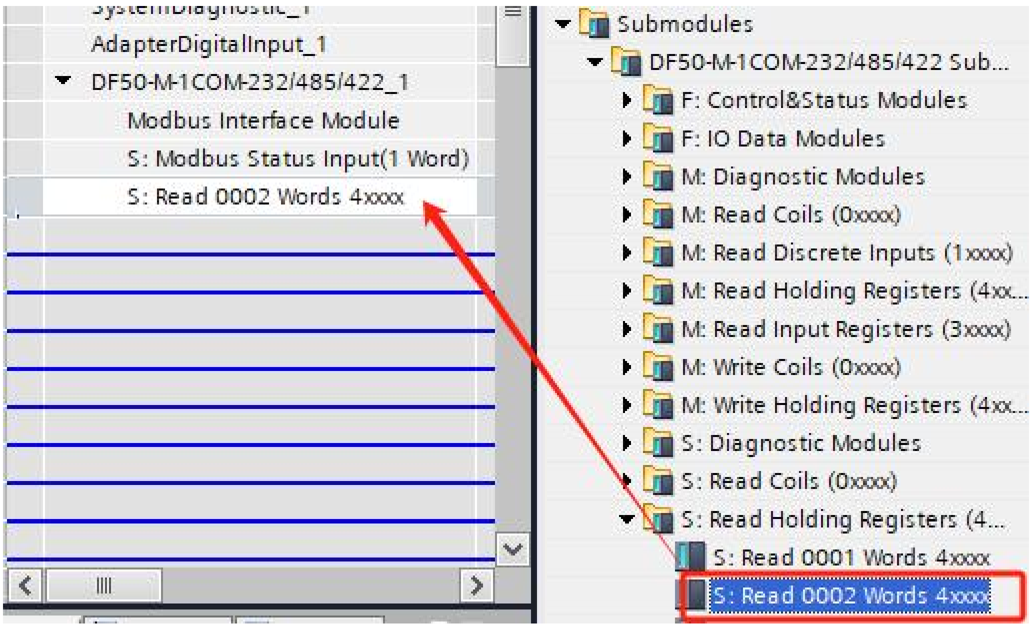


Figure 4-1-109

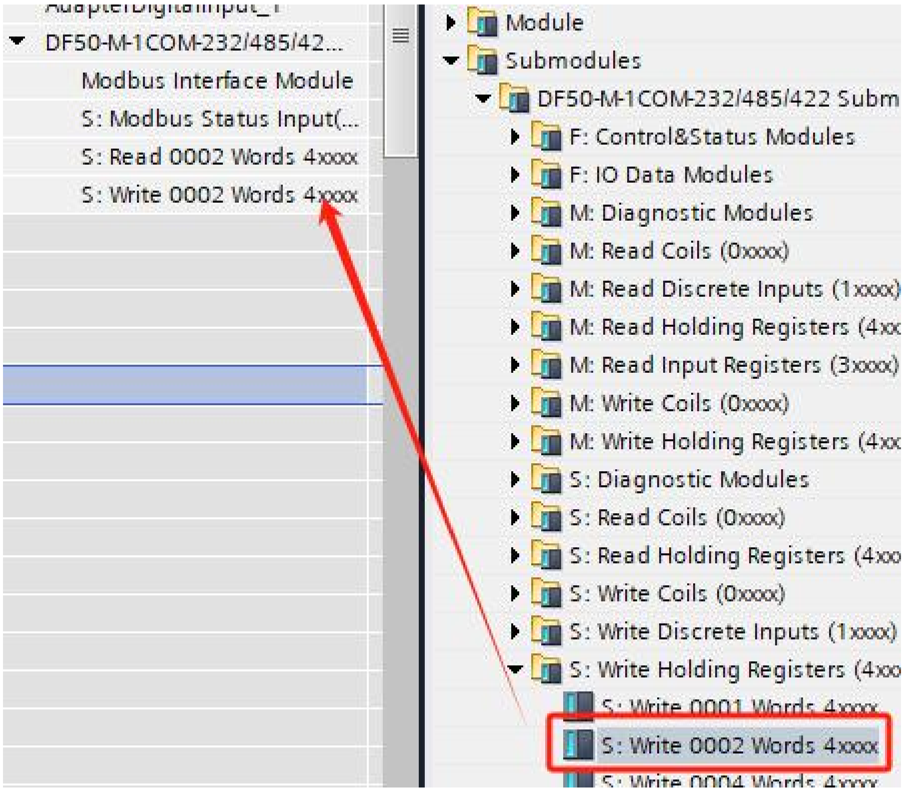


Figure 4-1-110

➢ As shown in the figure below, click S: Write 0002 Words 4xxxx to enter the property interface and change the starting address to 100.

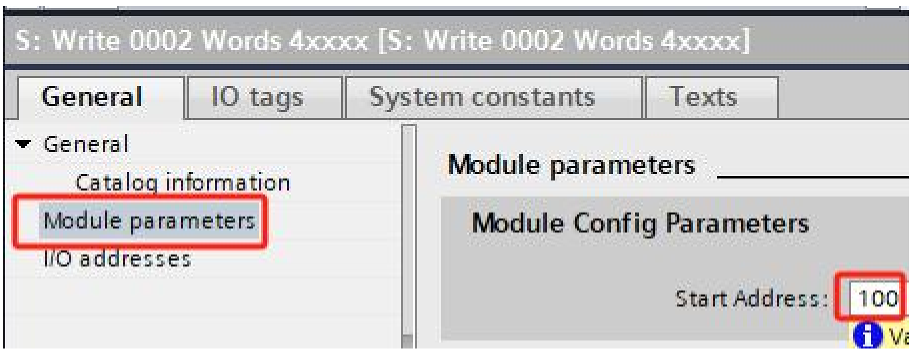


Figure 4-1-111

➢ The meanings of the two sub-slots added now are as follows:

➢ S: Read 0002 Words 4xxxx contains 2 word data. According to the configuration information, the data represents the register value at address 0-1.

➢ S: Write 0002 Words 4xxxx contains 2 words of data. According to the configuration information, the data will be written to the register at address 100-101.

➢ Download the configuration to the device. Fill in the information we need into the monitoring table for monitoring as shown below.

Figure 4-1-112

➢ Use Modbus Poll software to create two new master stations to communicate with the module, as shown in the figure below, with the starting addresses being 0 and 100 respectively.

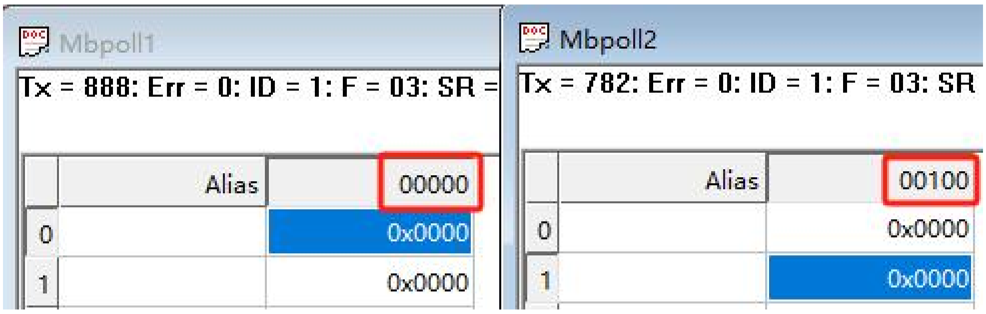


Figure 4-1-113

➢ After changing the data format to HEX and writing "11, 22" into the 0th-1st register in the first master station, the TIA Portal monitoring table will be displayed as shown in the figure below.

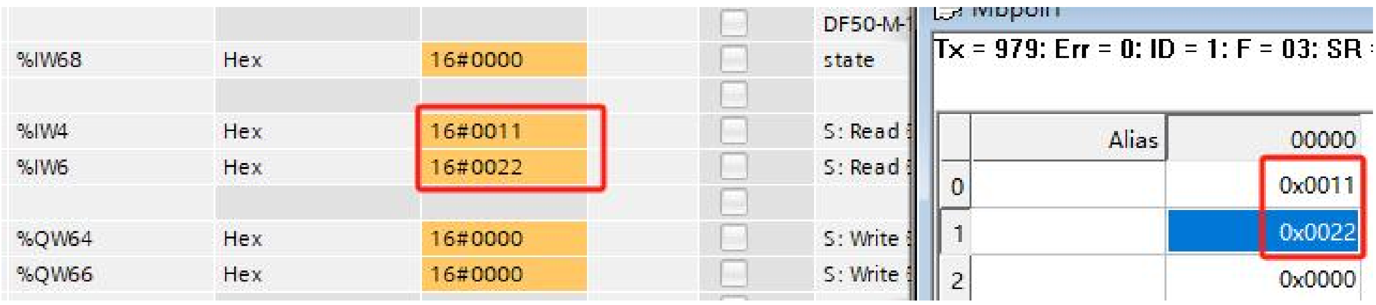


Figure 4-1-114

➢ After writing "33, 44" to subslot 4 in the TIA Portal monitoring table, the second master station is displayed as shown in the figure below.

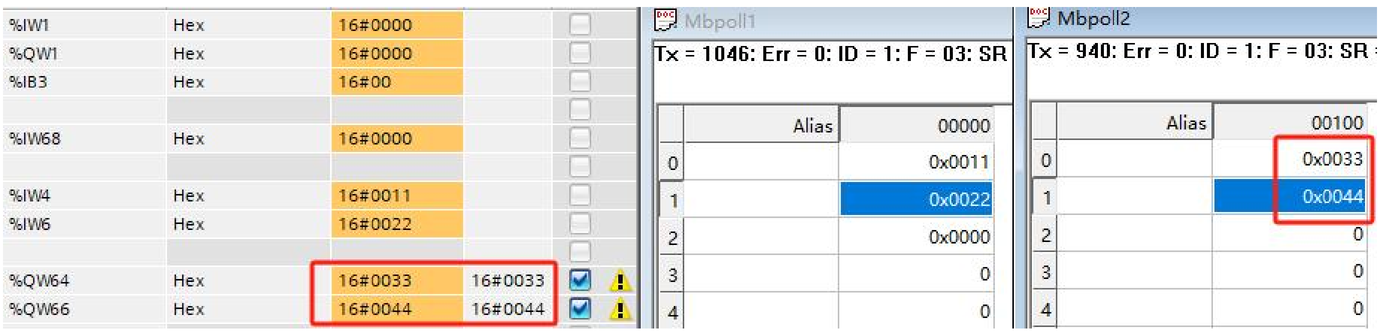


Figure 4-1-115

1.9. IO-LINK module usage routine

➢ This example uses the DF50-C-PN-RT + DF50-M-4IOL topology. For wiring methods, please refer toChapter 3, Section 18.2,After adding the module, it will look like the following figure.

Device overview

Module	...	Rack	Slot	I address	Q address
DF50-C-PN-RT		0	0		
PN-IO		0	0 X1		
SystemDiagnostic_1		0	1	1...2	1...2
AdapterDigitalInput_1		0	2	3	
DF50-M-4IOL_1		0	3		
IO-link State		0	3 1	6...17	5...8
IOL_I/O_02/02_byte		0	3 PORT0	21...23	9...11
IOL_I_00_byte		0	3 PORT1	20	
IOL_O_00_byte		0	3 PORT2		64
		0	3 PORT3		

Figure 4-1-116

➢ The submodules that can be added to PORT0~PORT3 are as follows.

- Submodules
  - DF50-M-4IOL SUBMODULE
    - IOL_I/O_01/01_byte
    - IOL_I/O_02/02_byte
    - IOL_I/O_04/02_byte
    - IOL_I/O_04/04_byte
    - IOL_I/O_06/06_byte
    - IOL_I/O_08/08_byte
    - IOL_I/O_16/16_byte
    - IOL_I/O_24/24_byte
    - IOL_I/O_32/32_byte
    - IOL_I_00_byte
    - IOL_I_01_byte
    - IOL_I_02_byte
    - IOL_I_04_byte
    - IOL_I_06_byte
    - IOL_I_08_byte
    - IOL_I_12_byte
    - IOL_I_16_byte
    - IOL_I_24_byte
    - IOL_I_32_byte
    - IOL_O_00_byte
    - IOL_O_01_byte
    - IOL_O_02_byte
    - IOL_O_04_byte
    - IOL_O_06_byte
    - IOL_O_08_byte
    - IOL_O_12_byte
    - IOL_O_16_byte
    - IOL_O_24_byte
    - IOL_O_32_byte

Figure 4-1-117

Table 4.1.13

IOL_I/O_01/01_byte	Input 1 byte Output 1 byte	IOL_I_00_byte	Enter 0 bytes for DI mode	IOL_O_00_byte	Output 0 bytes, used in DO mode
IOL_I/O_02/02_byte	Input 2 bytes Output 2 bytes	IOL_I_01_byte	Input 1 byte	IOL_O_01_byte	Output 1 byte
IOL_I/O_04/02_byte	Input 4 bytes Output 2 bytes	IOL_I_02_byte	Input 2 bytes	IOL_O_02_byte	Output 2 bytes
IOL_I/O_04/04_byte	Input 4 bytes Output 4 bytes	IOL_I_04_byte	Input 4 bytes	IOL_O_04_byte	Output 4 bytes
IOL_I/O_06/06_byte	Input 6 bytes Output 6 bytes	IOL_I_06_byte	Input 6 bytes	IOL_O_06_byte	Output 6 bytes
IOL_I/O_08/08_byte	Input 8 bytes Output 8 bytes	IOL_I_08_byte	Input 8 bytes	IOL_O_08_byte	Output 8 bytes
IOL_I/O_16/16_byte	Input 16 bytes Output 16 bytes	IOL_I_12_byte	Input 12 bytes	IOL_O_12_byte	Output 12 bytes
IOL_I/O_24/24_byte	Input 24 bytes Output 24 bytes	IOL_I_16_byte	Input 16 bytes	IOL_O_16_byte	Output 16 bytes
IOL_I/O_32/32_byte	Input 32 bytes Output 32 bytes	IOL_I_twenty four_byte	Input 24 bytes	IOL_O_twenty four_byte	Output 24 bytes
		IOL_I_32_byte	Input 32 bytes	IOL_O_32_byte	Output 32 bytes

1.9.1. IO-LINK State information

➢ After adding the DF50-M-4IOL module, there is a default slot "IO-LINK State" to display the status information of each port of the module. Fill in the IO-LINK State address into the monitoring table as shown below. For the specific meaning of State, please refer to Chapter 3, Section 18.4.2.

Address	Display format	Monitor value	Modify value		Comment
%IW6	Hex	16#0000			Port0 Event code
%I8.5	Bool	TRUE			Port0 Working status
%I8.6	Bool	FALSE			Port0 Communication status
%IW9	Hex	16#1800			Port1 Event code
%I11.5	Bool	FALSE			Port1 Working status
%I11.6	Bool	TRUE			Port1 Communication status
%IW12	Hex	16#1800			Port2 Event code
%I14.5	Bool	FALSE			Port2 Working status
%I14.6	Bool	TRUE			Port2 Communication status
%IW15	Hex	16#0000			Port3 Event code
%I17.5	Bool	FALSE			Port3 Working status
%I17.6	Bool	FALSE			Port3 Communication status
%QB5	Hex	16#00			Port0 Command
%QB6	Hex	16#00			Port1 Command
%QB7	Hex	16#00			Port2 Command
%QB8	Hex	16#00			Port3 Command

Figure 4-1-118

- PORT0 is connected to an IO-link slave, the event code is displayed as "16#0", the working status is "TRUE" indicating that it is in normal working state, and the communication status is "FALSE" indicating that it is in slave connection state.
- PORT1 and PORT2 are not connected to the device, and the event code is displayed as "16#1800". According to the port event code, the IO-LINK slave is offline. The working status is "FALSE", indicating that it is in an incorrect working state, and the communication status is "TRUE", indicating that the slave is disconnected.
- PORT3 is the monitoring information when it is not configured.
- As shown in the figure below, writing "0x01" in Port1 Command can clear the event code of Port1.

Address	Display format	Monitor value	Modify value		Comment
%IW6	Hex	16#0000			Port0 Event code
%I8.5	Bool	TRUE			Port0 Working status
%I8.6	Bool	FALSE			Port0 Communication status
%IW9	Hex	16#0000			Port1 Event code
%I11.5	Bool	FALSE			Port1 Working status
%I11.6	Bool	TRUE			Port1 Communication status
%IW12	Hex	16#1800			Port2 Event code
%I14.5	Bool	FALSE			Port2 Working status
%I14.6	Bool	TRUE			Port2 Communication status
%IW15	Hex	16#0000			Port3 Event code
%I17.5	Bool	FALSE			Port3 Working status
%I17.6	Bool	FALSE			Port3 Communication status
%QB5	Hex	16#00			Port0 Command
%QB6	Hex	16#01	16#01	☑	Port1 Command
%QB7	Hex	16#00			Port2 Command
%QB8	Hex	16#00			Port3 Command

Figure 4-1-119

1.9.2. IO-LINK Mode

➢ As shown in the figure below, configure PORT0 to IO-link mode. The default mode is IO-link mode. For other configurable information, please refer to Chapter 3, Section 18.3 ISDU is configured according to the instructions of the IO-Link slave you are using. The IO-Link slave used in this tutorial does not have a configurable ISDU. Note that you must re-download the configuration after the configuration is complete.

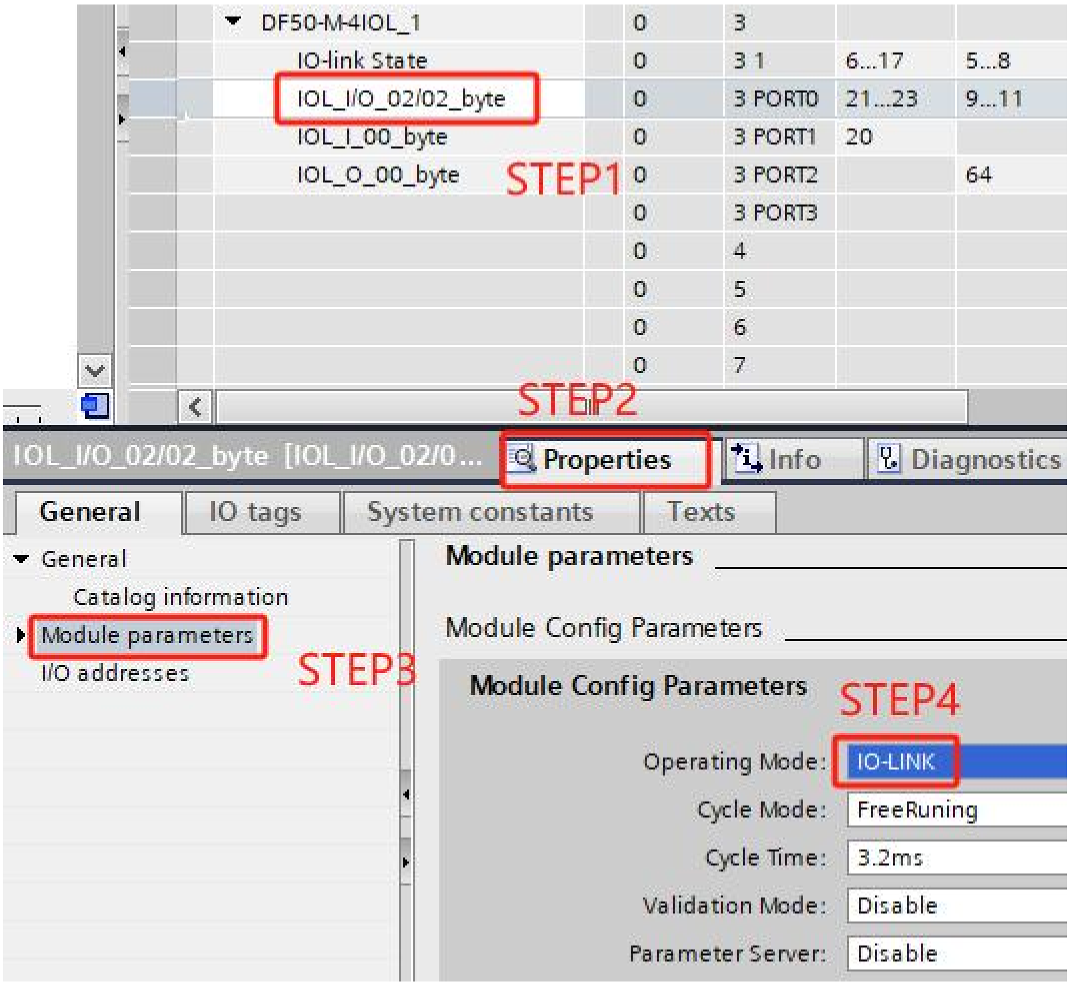


Figure 4-1-120

- Fill in the Port0 address in the monitoring table. For its meaning, please refer to Chapter 3, Section 18.4.2.

Address	Display format	Monitor value	Modify value		Comment
%I21.0	Bool	FALSE			DI
%I21.1	Bool	FALSE			C/Q D
%I21.2	Bool	TRUE			Valid bit
%IB22	Hex	16#08			Process data
%IB23	Hex	16#00			Process data
%Q9.1	Bool	FALSE			C/Q D
%Q9.2	Bool	FALSE			Valid bit
%QB10	Hex	16#00			Process data
%QB11	Hex	16#00			Process data

Figure 4-1-121

- Data reception:As shown in the figure below, if the Valid bit is "TRUE", it means the received data is valid, and the Process data is the received data. The data received this time is "16#08". In this mode, the DI and C/Q DI bits are invalid.

Address	Display format	Monitor value	Modify value		Comment
%I21.0	Bool	FALSE			DI
%I21.1	Bool	FALSE			C/Q DI
%I21.2	Bool	TRUE			Valid bit
%IB22	Hex	16#08			Process data
%IB23	Hex	16#00			Process data
%Q9.1	Bool	FALSE			C/Q DO
%Q9.2	Bool	FALSE			Valid bit
%QB10	Hex	16#00			Process data
%QB11	Hex	16#00			Process data

Figure 4-1-122

- Data sending:Setting the Valid bit to "TRUE" or "FALSE" indicates whether the sent data is valid. The Process data is the sent data, and this time "16#0F" is sent. In this mode, the C/Q DO bit is invalid.

Address	Display format	Monitor value	Modify value		Comment
%I21.0	Bool	FALSE			DI
%I21.1	Bool	FALSE			C/Q DI
%I21.2	Bool	TRUE			Valid bit
%IB22	Hex	16#08			Process data
%IB23	Hex	16#00			Process data
%Q9.1	Bool	FALSE			C/Q DO
%Q9.2	Bool	FALSE			Valid bit
%QB10	Hex	16#0F	16#0F		Process data
%QB11	Hex	16#00			Process data

Figure 4-1-123

1.9.3. DI/DO mode

➢ As shown in the figure below, configure Port1 to DI mode and Port2 to DO mode. The default mode is IO-link. Note that you need to re-download the configuration after the configuration is completed.

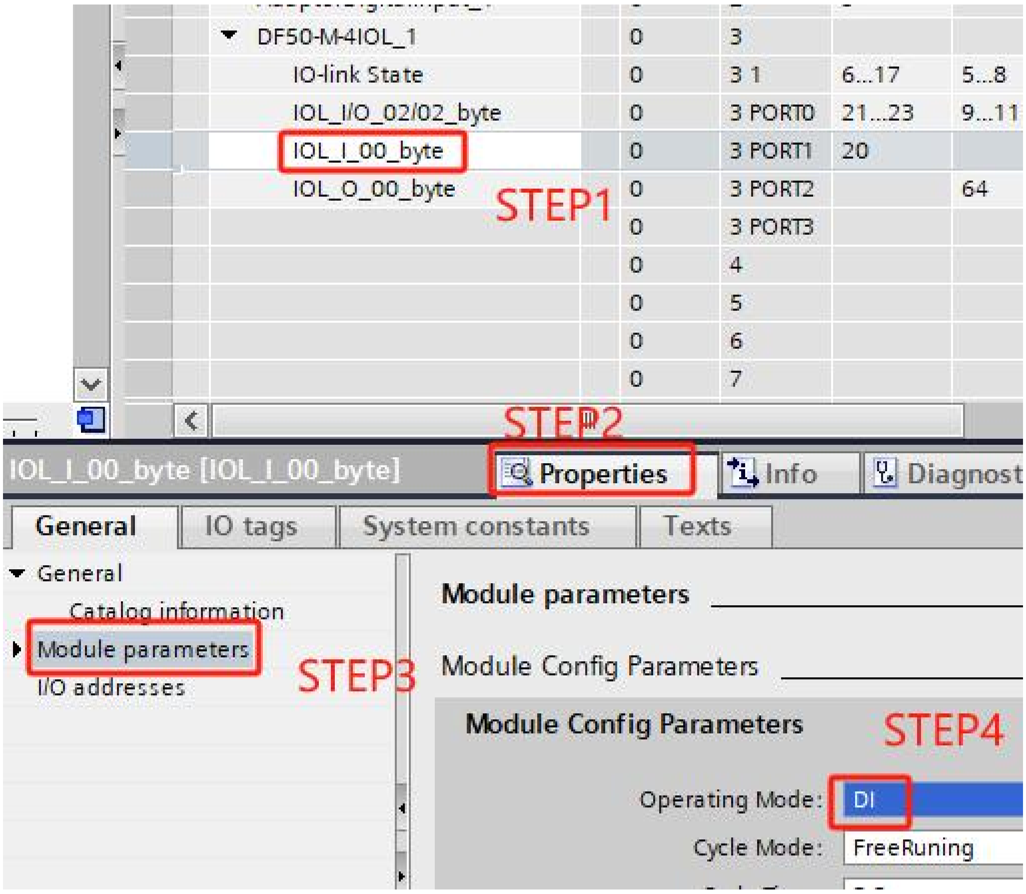


Figure 4-1-124Configured as DI

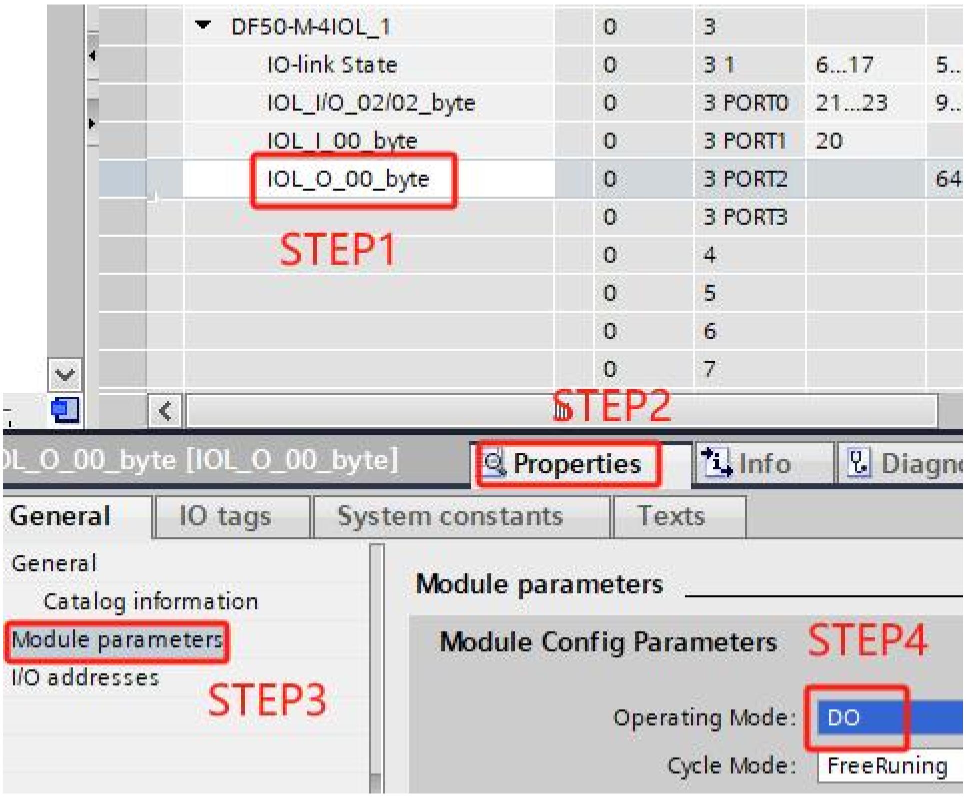


Figure 4-1-125Configured as DO

➢ Fill in the Port1 and Port2 addresses in the monitoring table. For their meanings, please refer toChapter 3, Section 18.4.2For wiring method, please refer toChapter 3, Section 18.2.2.

Address	Display format	Monitor value	Modify value	⚡	Comment
%I20.0	Bool	FALSE			Port1 DI
%I20.1	Bool	FALSE			Port1 C/Q DI
%Q64.1	Bool	FALSE			Port2 C/Q DO

Figure 4-1-126

➢ Input valid signals to Port1 DI and Port1 C/Q DI. As shown in the figure below, you can see that the corresponding address becomes "TURE".

Address	Display format	Monitor value	Modify value	⚡	Comment
%I20.0	Bool	TRUE			Port1 DI
%I20.1	Bool	TRUE			Port1 C/Q DI
%Q64.1	Bool	FALSE			Port2 C/Q DO

Figure 4-1-127

➢ As shown in the figure below, write "TRUE" to Port2 C/Q DO, and use a multimeter to measure the voltage of C/Q2 port, and you can measure the voltage to be 24V.

Address	Display format	Monitor value	Modify value		Comment
%I20.0	Bool	FALSE			Port1 DI
%I20.1	Bool	FALSE			Port1 C/Q DI
%Q64.1	Bool	TRUE	TRUE		Port2 C/Q DO

Figure 4-1-128

2. STEP 7-MicroWIN SMART software configuration process

➢ This chapter specifically introduces the use of the adapter DF50-C-PN-RT using Siemens STEP 7-MicroWIN SMART as the configuration software.

➢ The PLC model used in this section is 6ES7 288-1ST20-0AA0.

2.1. Project Creation

2.1.1. Add GSD file

➢ As shown in Figure 4-2-1 and Figure 4-2-2, find the GSD file on the computer and add the GSD file.

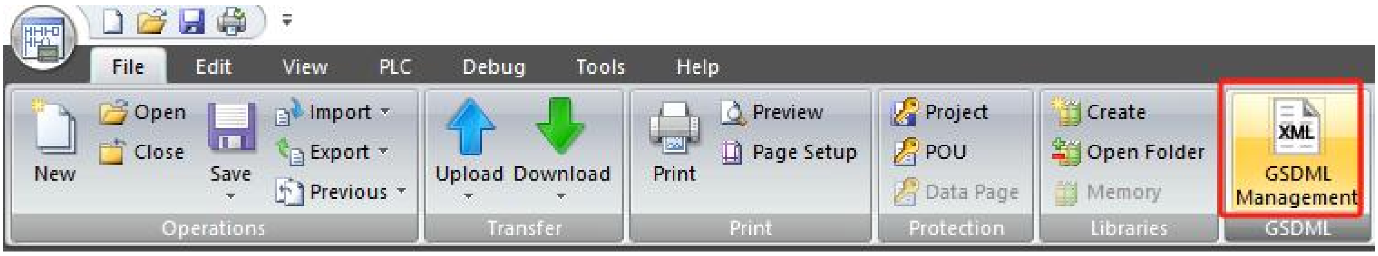


Figure 4-2-1

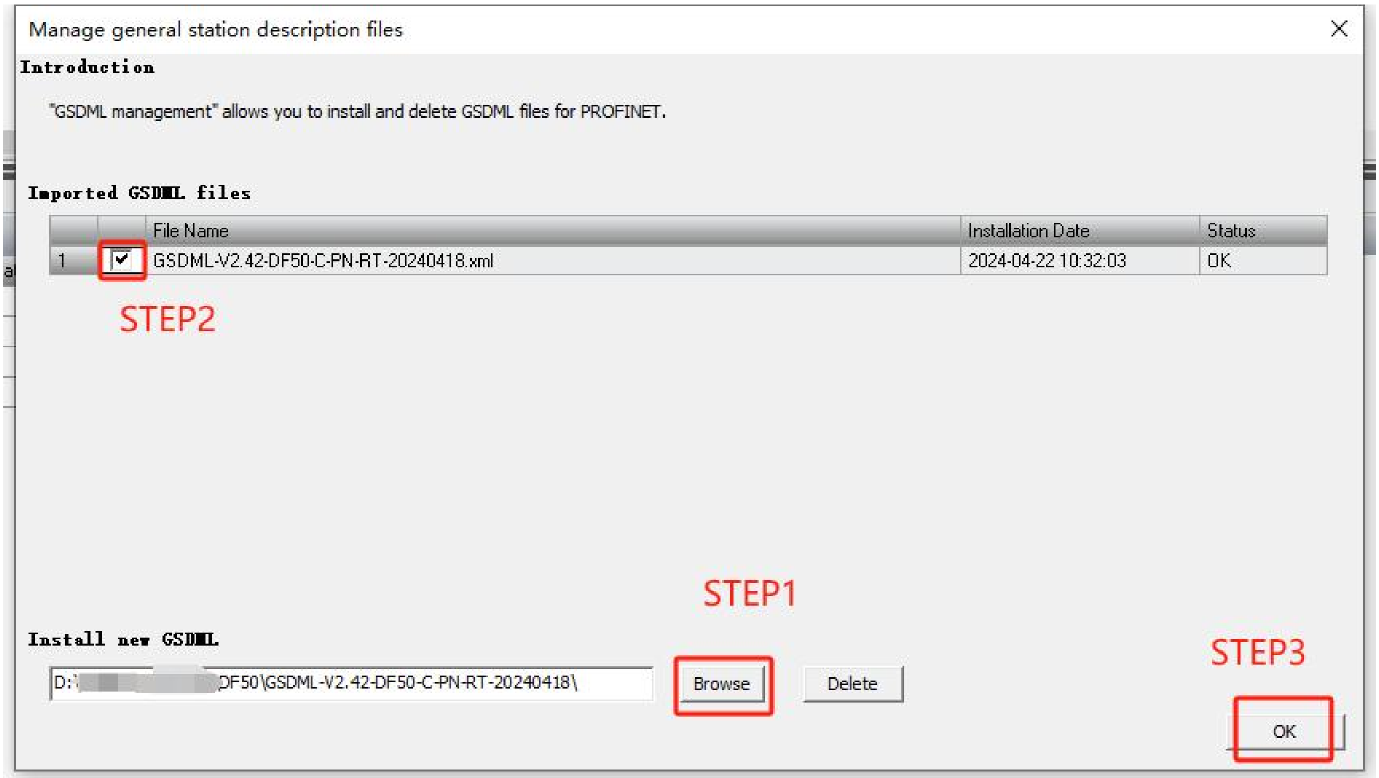


Figure 4-2-2

2.1.2. Adding a Controller

➢ As shown in Figure 4-2-3, double-click CPU ST20, select the CPU model and version number you are using, and click OK.

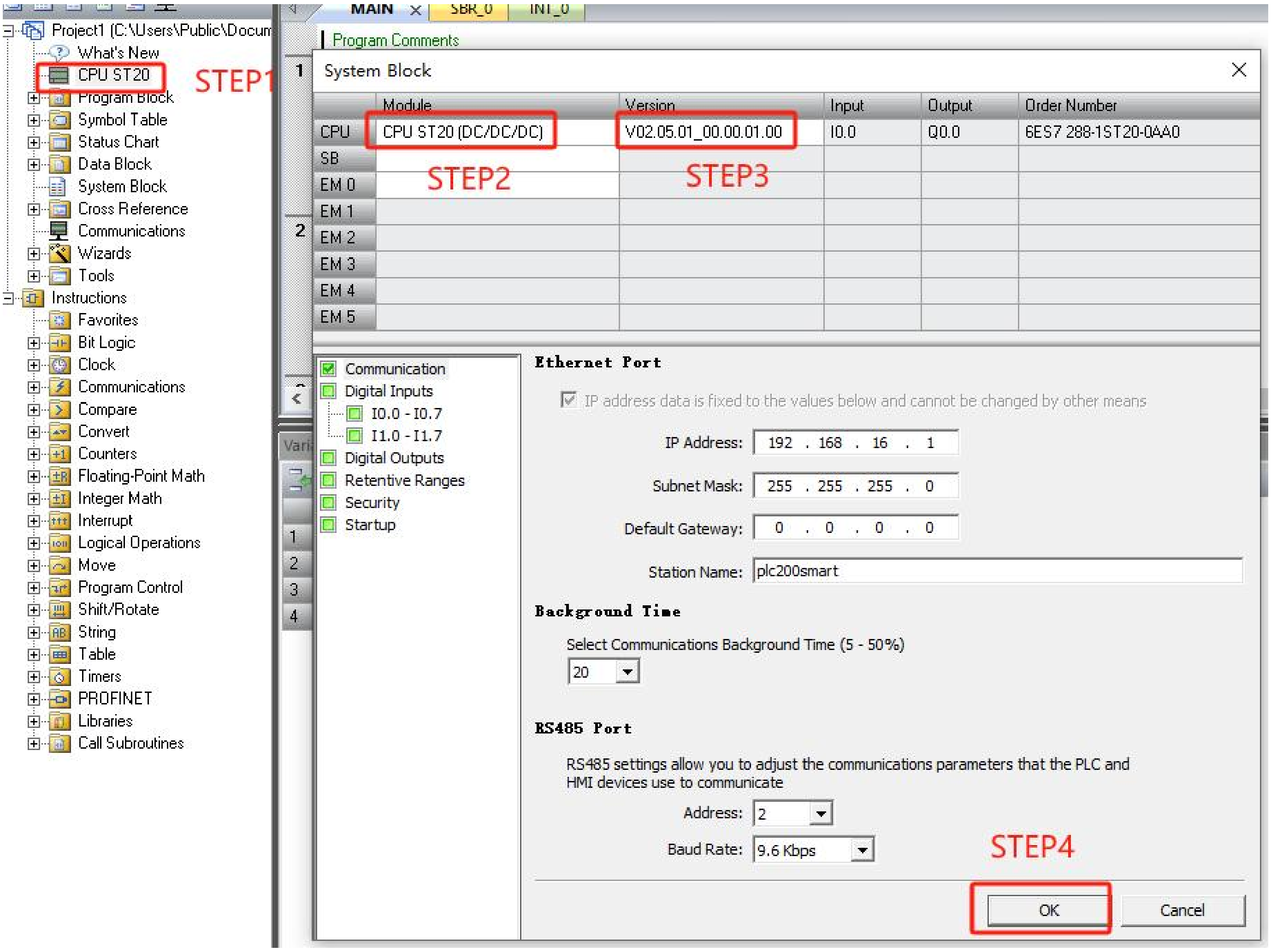


Figure 4-2-3

2.1.3. Adapter Configuration

➢ As shown in Figure 4-2-4, correctly select the network card connected to the adapter and find the DF50-C-PN-RT adapter. STEP4 You can modify the name of the adapter by yourself. Please remember the name, which will be used during configuration.

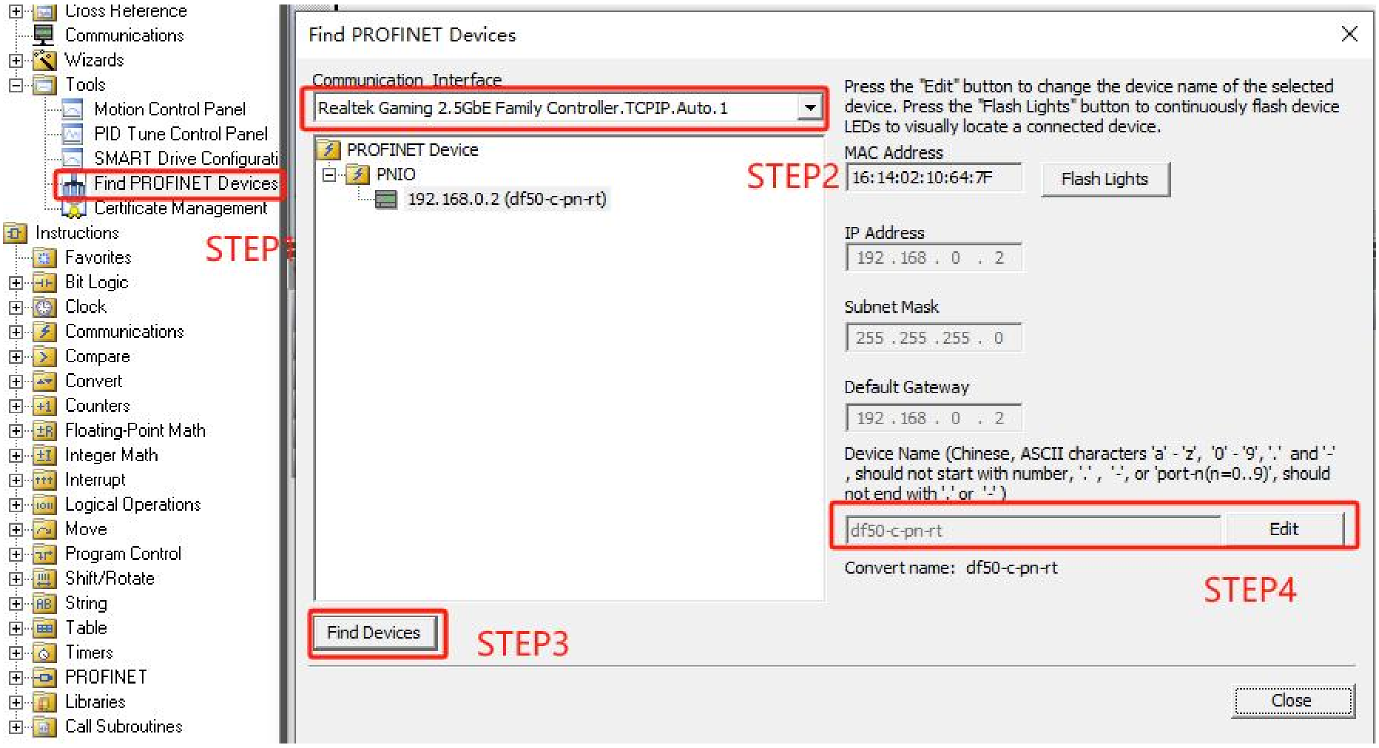


Figure 4-2-4

➢ As shown in Figure 4-2-5, double-click PROFINET, check the controller of STEP2, fill in the PLC IP address in the blank, and click Next.

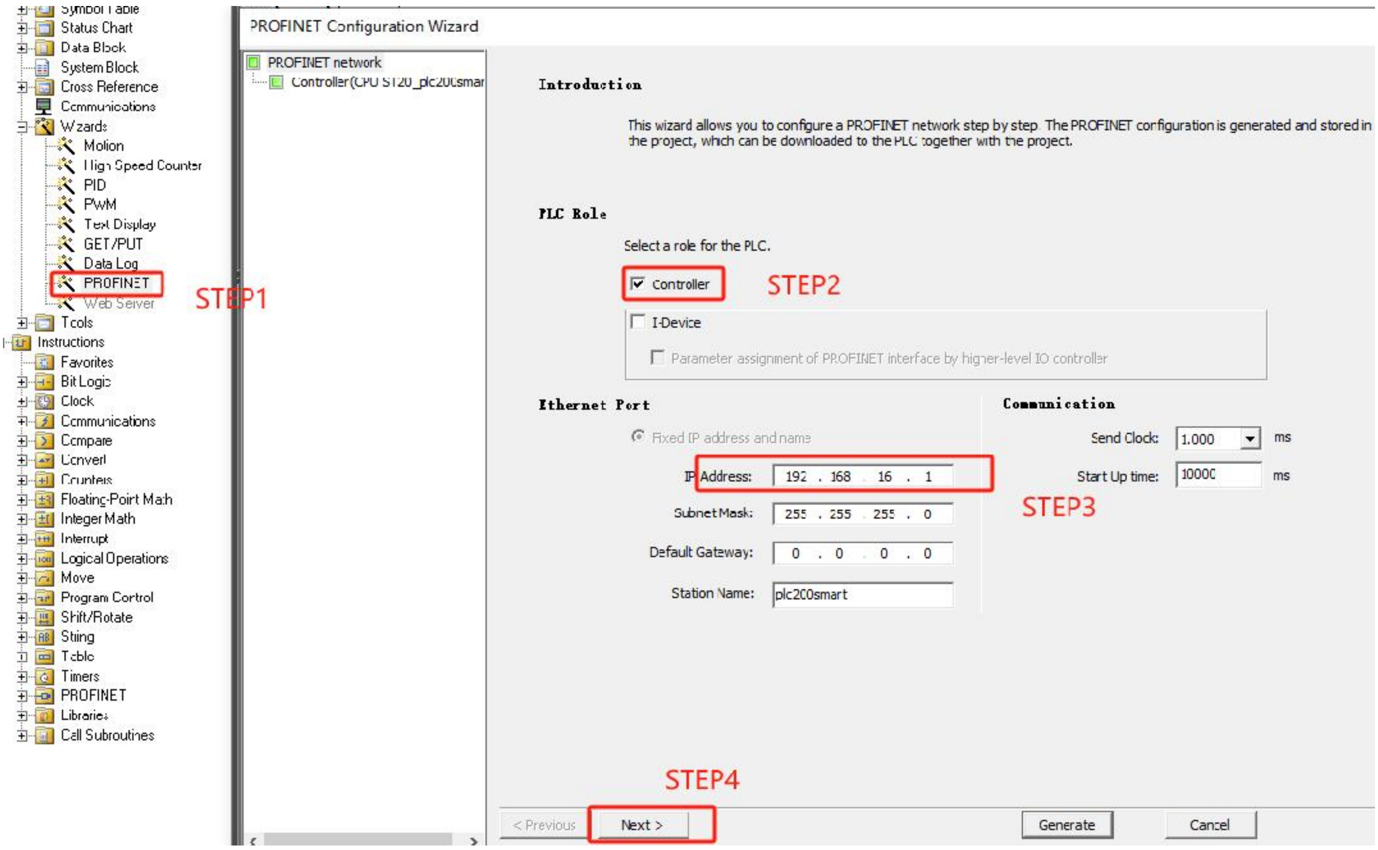


Figure 4-2-5

➢ Drag and add DF50-C-PN-RT adapter as shown in Figure 4-2-6

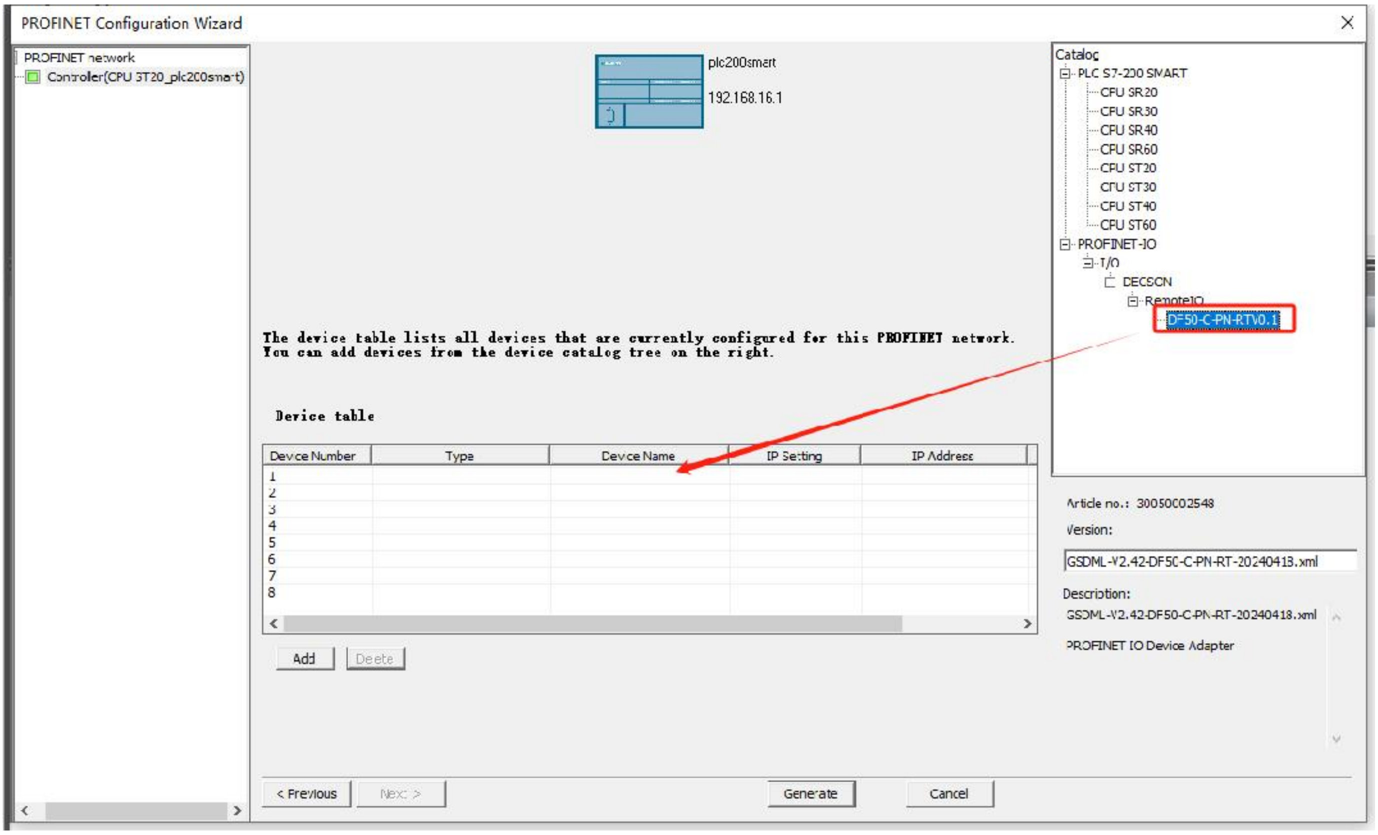


Figure 4-2-6

➢ As shown in Figure 4-2-7, change the device name to the device name set in Figure 4-2-4.STEP4, and select a fixed IP for IP settings. Click Next

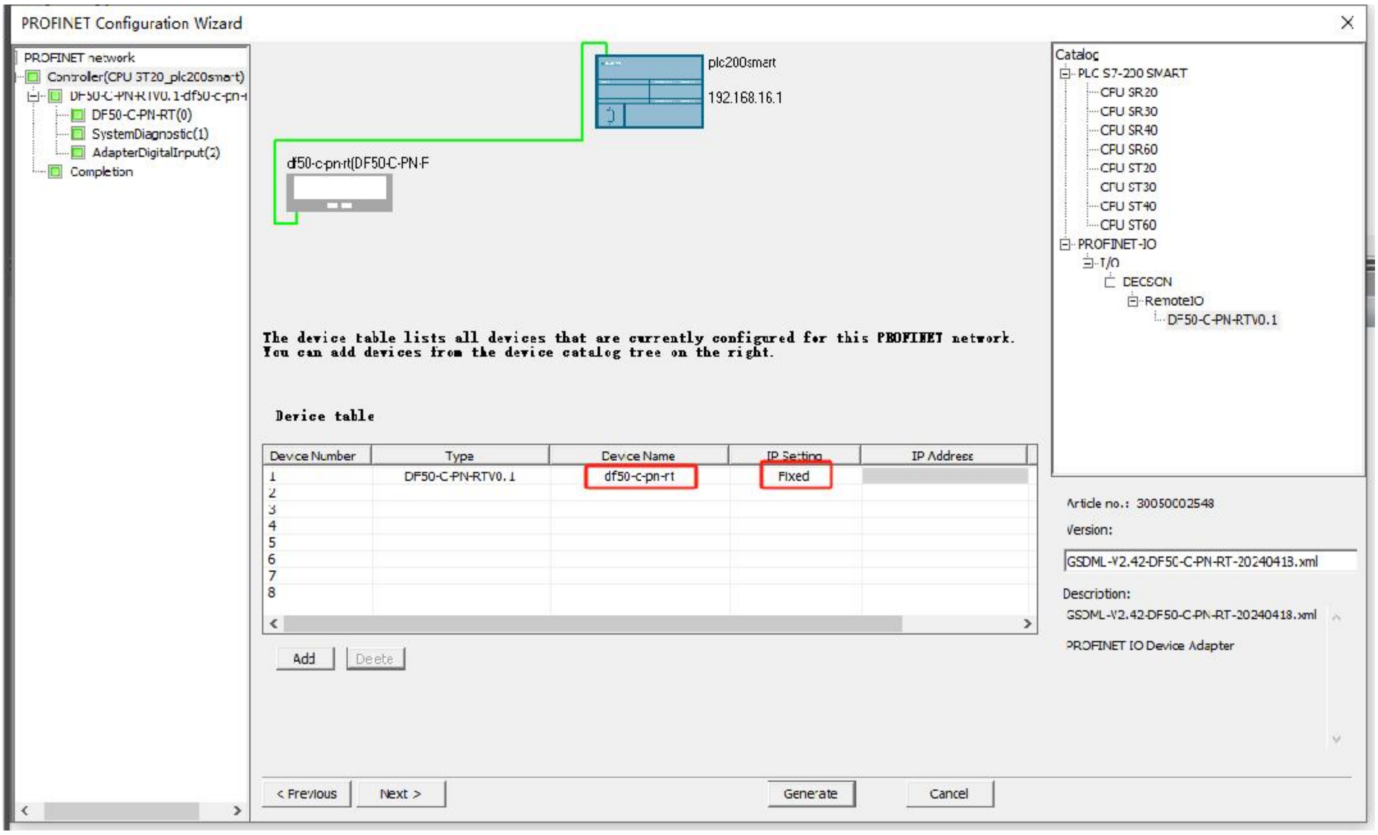


Figure 4-2-7

➢ Drag and add the required cards as shown in Figure 4-2-8. You can modify the starting address of each card on this page.

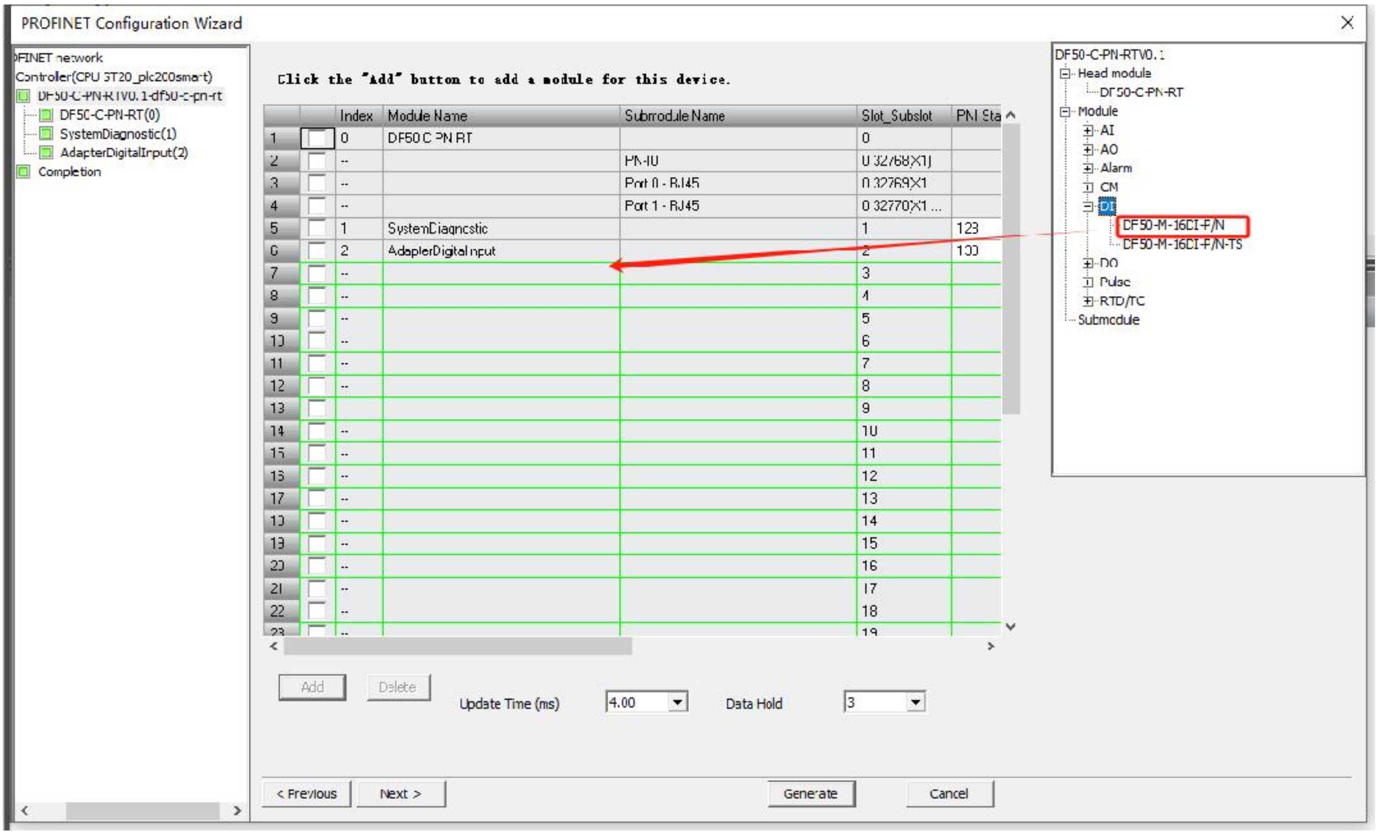


Figure 4-2-8

➢ As shown in Figure 4-2-9, click other cards under the adapter to modify their configuration information separately. Click Next.

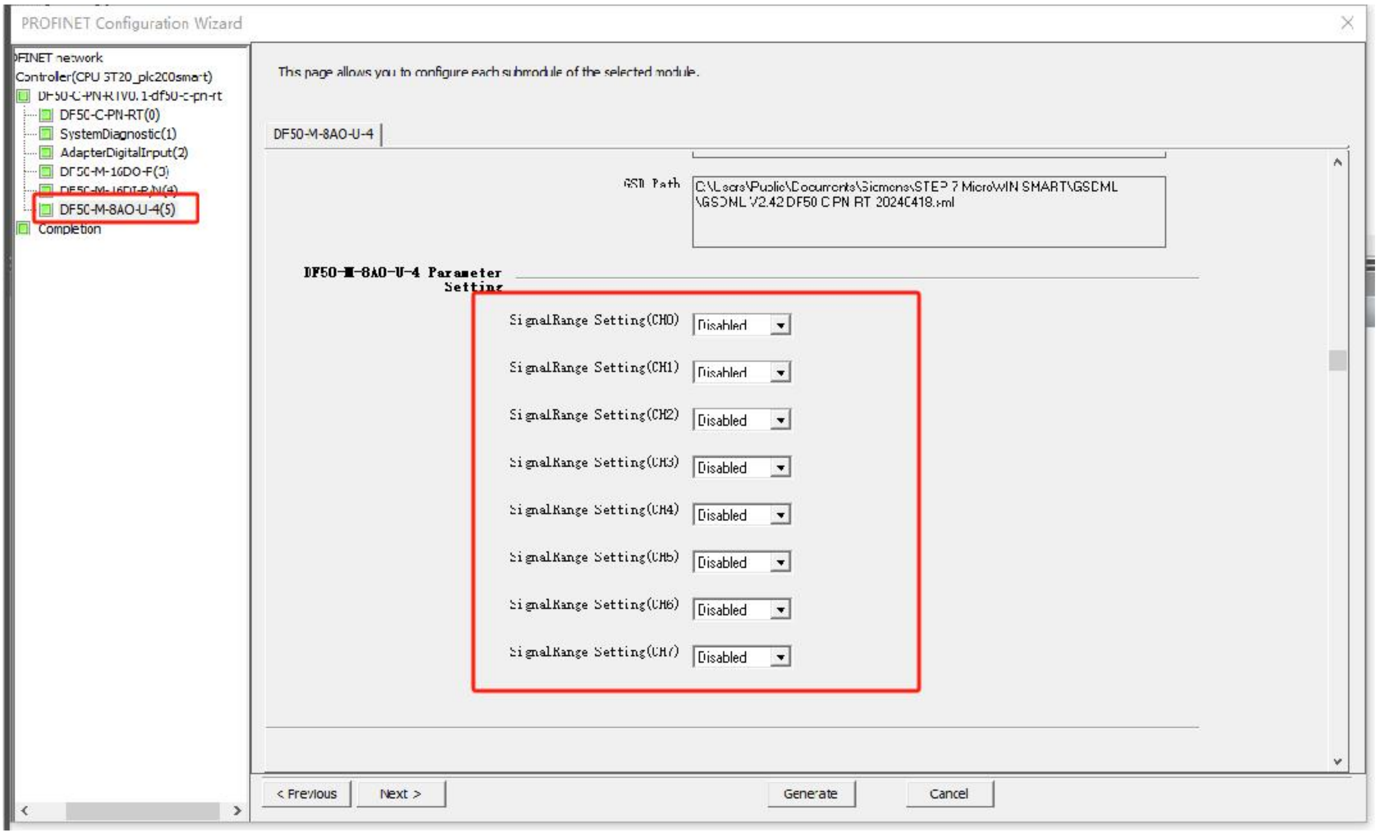


Figure 4-2-9

➢ As shown in Figure 4-2-10, on the completion page, you can see all the input and output addresses. Finally, click Generate.

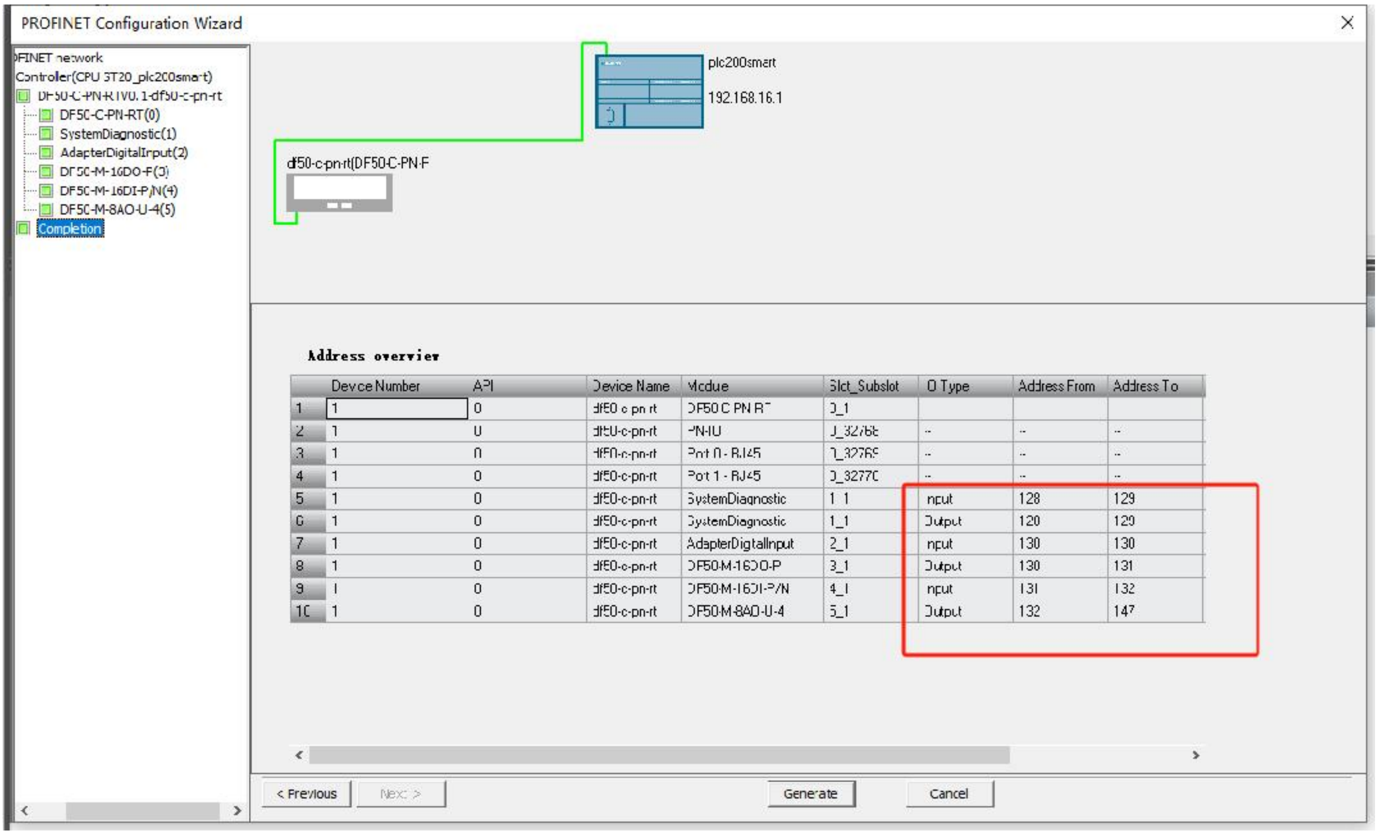


Figure 4-2-10

2.1.4. Download to PLC

➢ As shown in Figure 4-2-11, correctly select the network card connected to the PLC and download the configuration to the PLC. Then run the PLC.

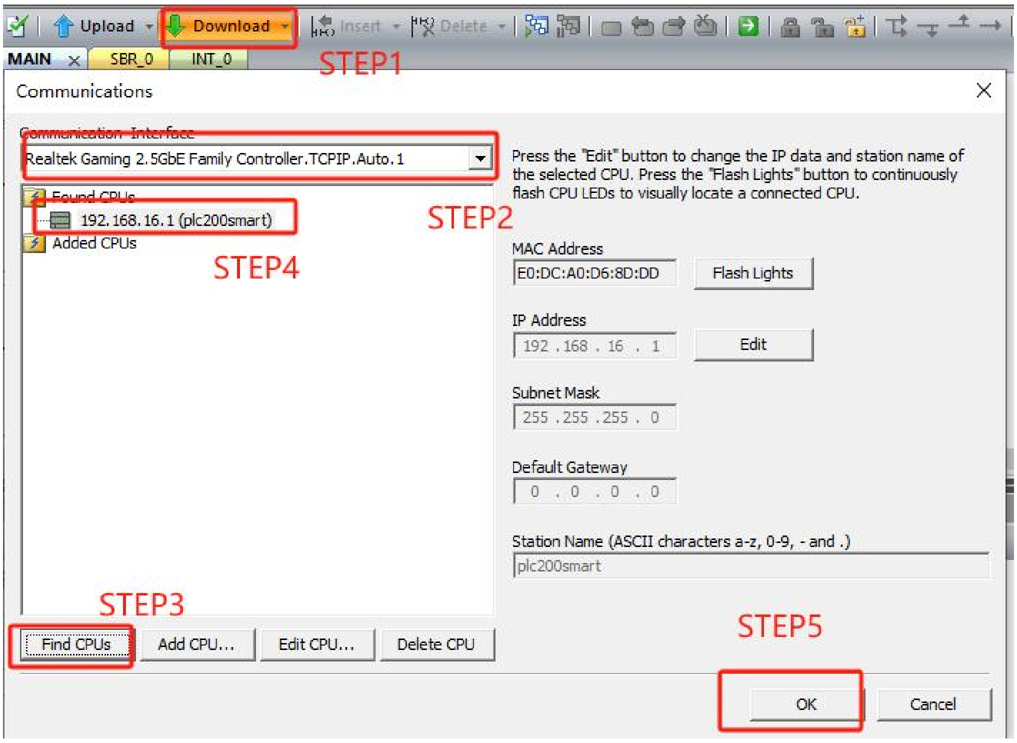


Figure 4-2-11

2.1.5. Debugging and testing

➢ As shown in Figure 4-2-12, enter the status chart and fill in the input and output addresses of each module to monitor or write data. Click the continuous monitoring button in STEP3 to monitor the data in the address in real time.

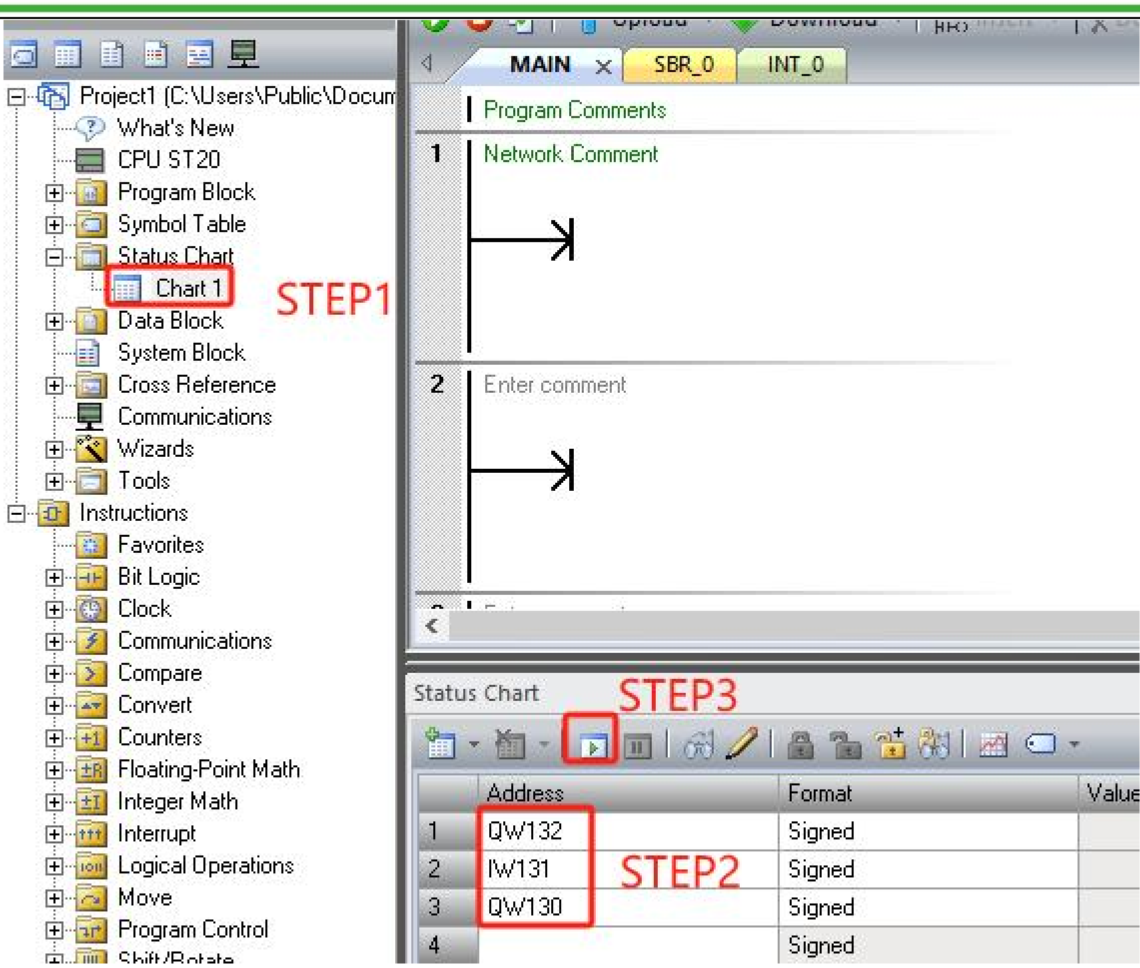

Project1 (C:\Users\Public\Docum
What's New
CPU ST20
Program Block
Symbol Table
Status Chart
Chart 1
STEP1
Data Block
System Block
Cross Reference
Communications
Wizards
Tools
Instructions
Favorites
Bit Logic
Clock
Communications
Compare
Convert
Counters
Floating-Point Math
Integer Math
Interrupt
Logical Operations
Move
Program Control
MAIN
SBR_0
INT_0
Program Comments
Network Comment
Enter comment
Status Chart
STEP3
Address
Format
Value
QW132
Signed
IW131
Signed
QW130
Signed
Signed
STEP2

Figure 4-2-12

2.2. Adapter usage examples

➢ Please refer to the wiring diagram of the adapterChapter 2 Section 2.2The example uses the DF50-C-PN-RT + DF50-M-16DO-P + DF50-M-16DO-N + DF50-M-16DI-P/N + DF50-M-16DI-P/N-TS topology. After adding the modules in sequence, the topology shown in Figure 4-2-13 is obtained: SystemDiagnostic is the diagnostic module, AdapterDigitalInput is the adapter 8-channel digital input display, and the other modules are the various IO module cards we inserted.

Device Name	Module	Slot_Subslot	IO Type	Address From	Address To
df50-c-pn-rt	DF50-C-PN-RT	0_1	--	--	--
df50-c-pn-rt	PN-IO	0_32768	--	--	--
df50-c-pn-rt	Port 0 - RJ45	0_32769	--	--	--
df50-c-pn-rt	Port 1 - RJ45	0_32770	--	--	--
df50-c-pn-rt	SystemDiagnostic	1_1	Input	128	129
df50-c-pn-rt	SystemDiagnostic	1_1	Output	128	129
df50-c-pn-rt	AdapterDigitalInput	2_1	Input	130	130
df50-c-pn-rt	DF50-M-16DO-P	3_1	Output	130	131
df50-c-pn-rt	DF50-M-16DO-N	4_1	Output	132	133
df50-c-pn-rt	DF50-M-16DI-P/N	5_1	Input	131	132
df50-c-pn-rt	DF50-M-16DI-P/N-TS	6_1	Input	133	166
df50-c-pn-rt	DF50-M-16DI-P/N-TS	6_1	Output	134	134

Figure 4-2-13

2.2.1. SystemDiagnostic: Diagnostic module

➢ The process data is shown in the following table.

Table 4.2.1

Input data: 2 Byte		
Byte No.	illustrate	Remark
Byte 0	Location of the faulty module	0x01 represents the first IO module, 0x02 represents the second module, and so on.
Byte 1	Fault Codes	See fault code table 4.2.2 for details
Output data: 2 Byte		
Byte No.	illustrate	Remark
Byte 0	No action required	/
Byte 1		/

➢ The meanings of the fault codes are shown in the following table.

Table 4.2.2

Fault Codes	Fault Description	Troubleshooting

0xE1	Module power supply abnormality	Check the power cord connection
0xE2	Analog module calibration failure	Contact Supplier
0xE3	Module internal initialization exception	Contact Supplier
0xE4	Overcurrent signal detected	Check peripherals
0xE8	Serial port module communication abnormality	Check signal line wiring

➢ As shown in Figures 4-2-14 and 4-2-15, the monitoring value of the diagnostic module is "16#01E1". "01" indicates that the first IO card has a fault, and "E1" indicates that the external power supply of the module is abnormal (see Table 4.2.2 for other fault code meanings); if the monitoring value is 16#02E1, it means that the second IO card has an abnormal module external power supply fault, and so on. Clear the fault data after powering on and off again.

Address	Format	Value
IW128	Hexadecimal	16#01E1
QW128	Unsigned	0
IB130	Unsigned	0

Figure 4-2-14

Address	Format	Value
IW128	Hexadecimal	16#02E1
QW128	Unsigned	0
IB130	Unsigned	0

Figure 4-2-15

2.2.2. AdapterDigitalInput: Adapter 8-channel digital input display

➢ The process data is shown in the following table.

Table 4.2.3

Input data: 1 Byte								
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DI 07	DI 06	DI 05	DI 04	DI 03	DI 02	DI 01	DI 00

➢ As shown in the figure below, select AdapterDigitalInput in the configuration wizard to modify the filter parameters of the adapter's 8-channel digital input.

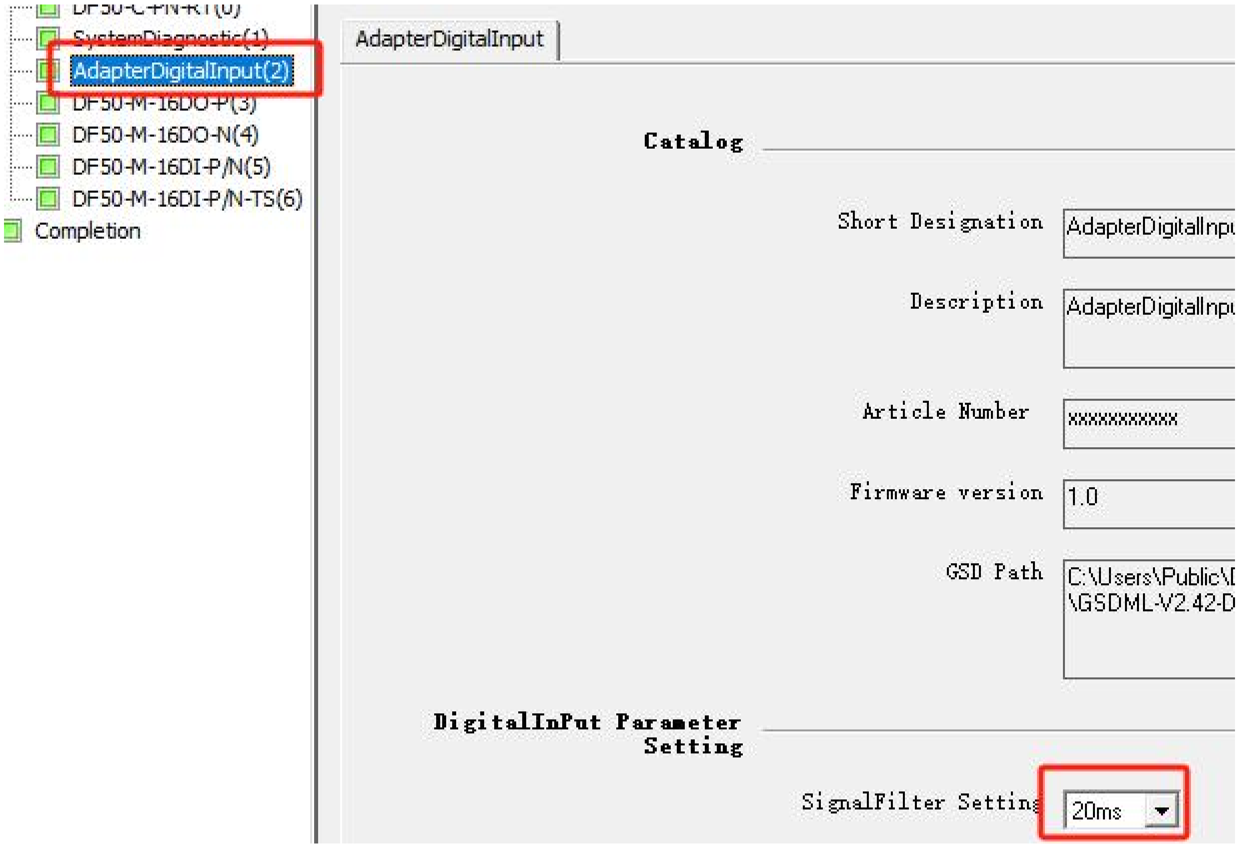


Figure 4-2-16

2.2.3. Bus Error Adapter Status Setting

➢ As shown in the figure below, you can set the behavior of the adapter when a bus error occurs in the configuration wizard. You can set it to clear the output value or keep the last value. The default is to clear the output value.

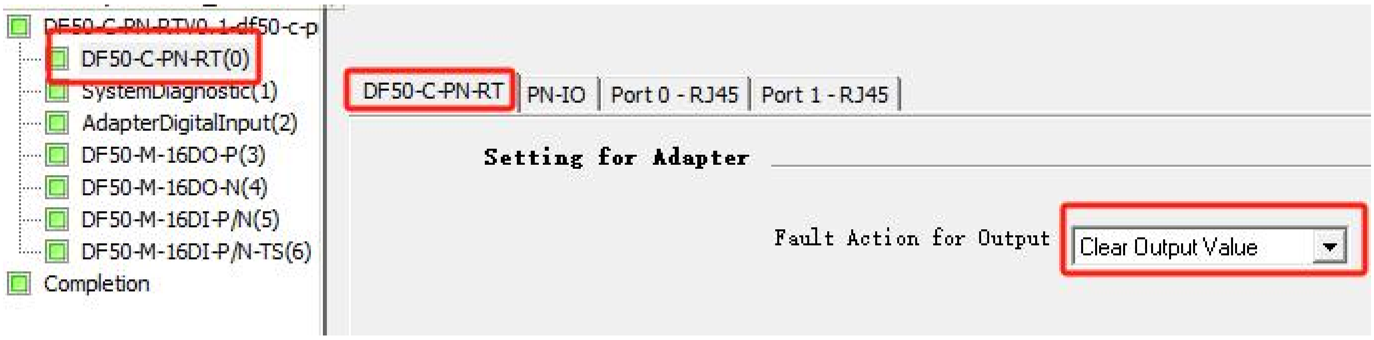


Figure 4-2-17

2.2.4. Get module software version

➢ Get the adapter version information as shown in the figure below. Write "0x100" in the SystemDiagnostic output address to get the adapter software version information. "0x1200" means the software version is V12.

Address	Format	Value
IW128	Hexadecimal	16#1200
QW128	Hexadecimal	16#0100
IB130	Unsigned	0

Figure 4-2-18

➢ Get the subsequent IO module version information as shown in the figure below. Write "0x101" in the SystemDiagnostic output address to get the software version information of the first module after the adapter. "0x1100" means the software version is V11.

Address	Format	Value
IW128	Hexadecimal	16#1100
QW128	Hexadecimal	16#0101
IB130	Unsigned	0

Figure 4-2-19

2.3. Digital module usage routine

➢ This example uses the DF50-C-PN-RT + DF50-M-16DO-P + DF50-M-16DO-N + DF50-M-16DI-P/N + DF50-M-16DI-P/N-TS topology. After adding the modules, it will look like the following figure.

df50-c-pn-rt	SystemDiagnostic	1_1	Input	128	129
df50-c-pn-rt	SystemDiagnostic	1_1	Output	128	129
df50-c-pn-rt	AdapterDigitalInput	2_1	Input	130	130
df50-c-pn-rt	DF50-M-16DO-P	3_1	Output	130	131
df50-c-pn-rt	DF50-M-16DO-N	4_1	Output	132	133
df50-c-pn-rt	DF50-M-16DI-P/N	5_1	Input	131	132
df50-c-pn-rt	DF50-M-16DI-P/N-TS	6_1	Input	133	166
df50-c-pn-rt	DF50-M-16DI-P/N-TS	6_1	Output	134	134
df50-c-pn-rt	DF50-M-4DO-P-2A	7_1	Input	167	167
df50-c-pn-rt	DF50-M-4DO-P-2A	7_1	Output	135	135
df50-c-pn-rt	DF50-M-4DO-R	8_1	Output	136	136

Figure 4-2-20

2.3.1. DF50-M-16DO-P digital output module

➢ Please refer to the module wiring diagramChapter 3, Section 3.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 2.2.3.

➢ Each channel output can be enabled as shown in the figure below.

Address	Format	Value
IW128	Hexadecimal	16#0000
QW128	Hexadecimal	16#0000
IB130	Unsigned	0
	Signed	
QW130	Unsigned	65535

Figure 4-2-twenty one

2.3.2. DF50-M-16DO-N digital output module

➢ Please refer to the module wiring diagramChapter 3 Section 4.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 2.2.3.

➢ Each channel output can be enabled as shown in the figure below.

Address	Format	Value
IW128	Hexadecimal	16#0000
QW128	Hexadecimal	16#0000
IB130	Unsigned	0
	Signed	
QW132	Unsigned	65535

Figure 4-2-twenty two

2.3.3. DF50-M-16DI-P/N digital input module

- Please refer to the module wiring diagramChapter 3 Section 1.2.
- This module can set input filtering, which can be set in the configuration wizard, as shown in the figure below. The default setting is 20ms.

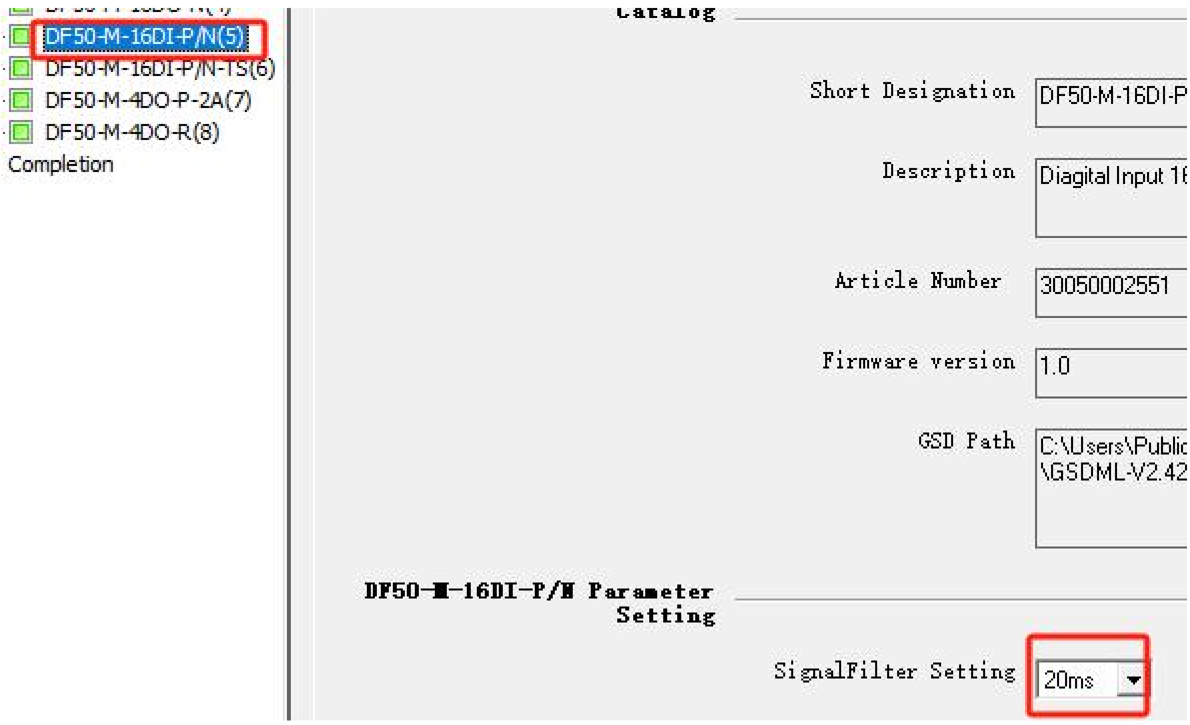


Figure 4-2-twenty three

- The input data of each channel can be viewed as shown in the figure below.

Address	Format	Value
IW128	Hexadecimal	16#0000
QW128	Hexadecimal	16#0000
IB130	Unsigned	0
	Signed	
IW131	Unsigned	256

Figure 4-2-twenty four

2.3.4. DF50-M-16DI-P/N-TS digital input with counting module

➢ Please refer to the module wiring diagramChapter 3 Section 2.2.

➢ As shown in the figure below, you can set the counting mode of channel 00 to channel 07, which can be set to rising edge counting, falling edge counting, and both rising and falling edges counting. The default is rising edge counting.

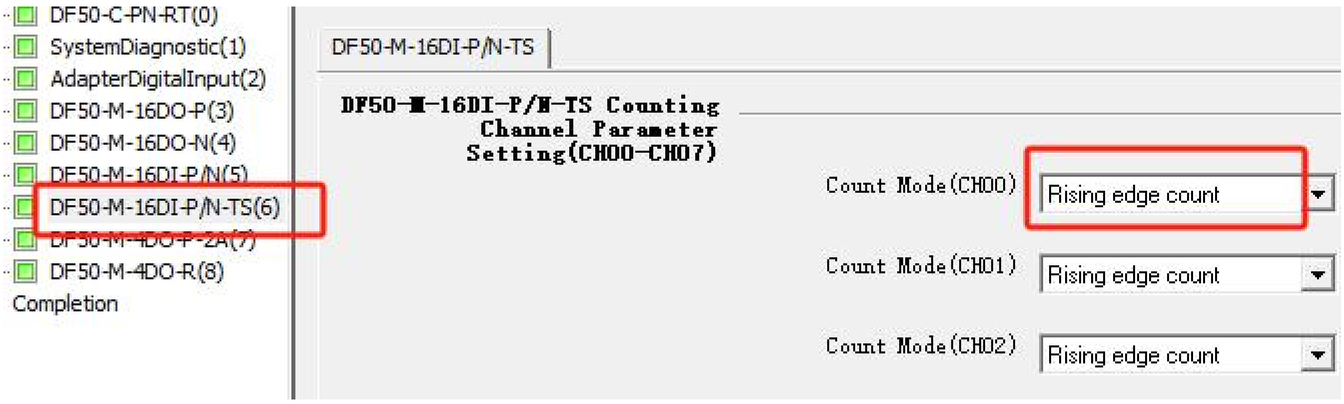


Figure 4-2-25

➢ As shown in the figure below, for input channels CH10~CH17, can be modifiedInput filter parameters, the default is 20ms.

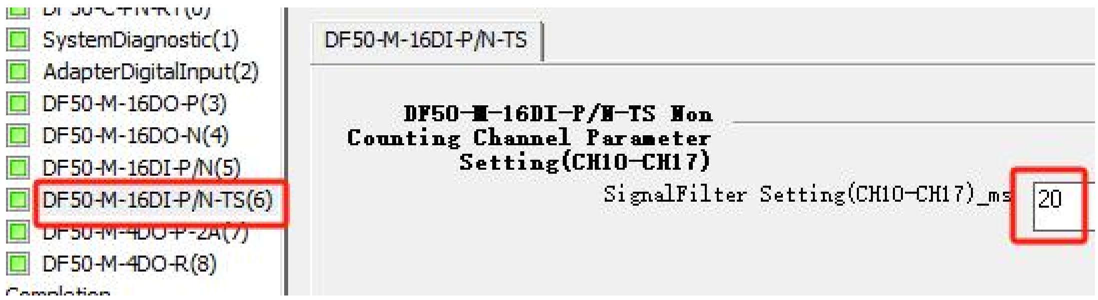


Figure 4-2-26

➢ For process data definition, please refer toChapter 3 Section 2.4, fill in the data we need into the monitoring table, as shown in the figure below.

IW133	Unsigned	0
	Signed	
ID135	Unsigned	0
ID139	Unsigned	0
	Signed	
QW134	Unsigned	0

Figure 4-2-27

➢ Input a valid signal to the A1 (CH0) port of the IO module, and you can see that the DI input bit of the corresponding channel becomes "1", and the count value of the corresponding channel increases by 1.

IW133	Unsigned	256
	Signed	
ID135	Unsigned	1
ID139	Unsigned	0
	Signed	
QW134	Unsigned	0

Figure 4-2-28

➢ Writing "1" to the clear bit of the corresponding channel can clear the count value of the corresponding channel. As shown in the figure below, the count value of A1 (CH0) is cleared.

IW133	Unsigned	0
	Signed	
ID135	Unsigned	0
ID139	Unsigned	10
	Signed	
QW134	Unsigned	256

Figure 4-2-29

2.3.5. DF50-M-4DO-P-2A digital output module

➢ Please refer to the module wiring diagramChapter 3, Section 20.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 1.2.3.

➢ Each channel output can be enabled as shown in the figure below.

Address	Format	Value
IW128	Hexadecimal	16#0000
	Signed	
QB135	Binary	2#0000_1111
IB167	Binary	2#0000_0000

Figure 4-2-30

➢ As shown in the figure below, the first channel output is enabled. When the module channel is overcurrent, the first channel bit in Overcurrent becomes "1", and the system status information shows a "16#01E4" error (the first module detects an overcurrent signal), and the first channel of the module stops outputting.

IW128	Hexadecimal	16#01E4
	Signed	
QB135	Binary	2#0000_0001
IB167	Binary	2#0000_0001

Figure 4-2-31

2.3.6. DF50-M-4DOR relay output module

- Please refer to the module wiring diagramChapter 3, Section 19.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 1.2.3.
- Each channel relay can be closed as shown in the figure below.

QB136	Binary	2#0000_1111

Figure 4-2-32

2.4. Analog module usage routine

➢ This example uses the topology of DF50-C-PN-RT + DF50-M-8AO-U-4 + DF50-M-8AO-I-5 + DF50-M-4AO-UI-6 + DF50-M-8AI-U-4 + DF50-M-8AI-I-5 + DF50-M-4AI-UI-6. After adding the modules, the structure is as shown in the figure below.

df50-c-pn-rt	SystemDiagnostic	1_1	Input	128	129
df50-c-pn-rt	SystemDiagnostic	1_1	Output	128	129
df50-c-pn-rt	AdapterDigitalInput	2_1	Input	130	130
df50-c-pn-rt	DF50-M-8AO-U-4	3_1	Output	130	145
df50-c-pn-rt	DF50-M-8AO-I-5	4_1	Output	146	161
df50-c-pn-rt	DF50-M-4AO-UI-6	5_1	Output	162	169
df50-c-pn-rt	DF50-M-8AI-U-4	6_1	Input	131	146
df50-c-pn-rt	DF50-M-8AI-I-5	7_1	Input	147	162
df50-c-pn-rt	DF50-M-4AI-UI-6	8_1	Input	163	170

Figure 4-2-33

2.4.1. DF50-M-8AO-U-4 voltage output module

➢ Please refer to the module wiring diagramChapter 3 Section 9.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 2.2.3.

➢ As shown in the figure below, you can set the module output voltage range, the default is Disabled. Set CH0 to 0~10V.

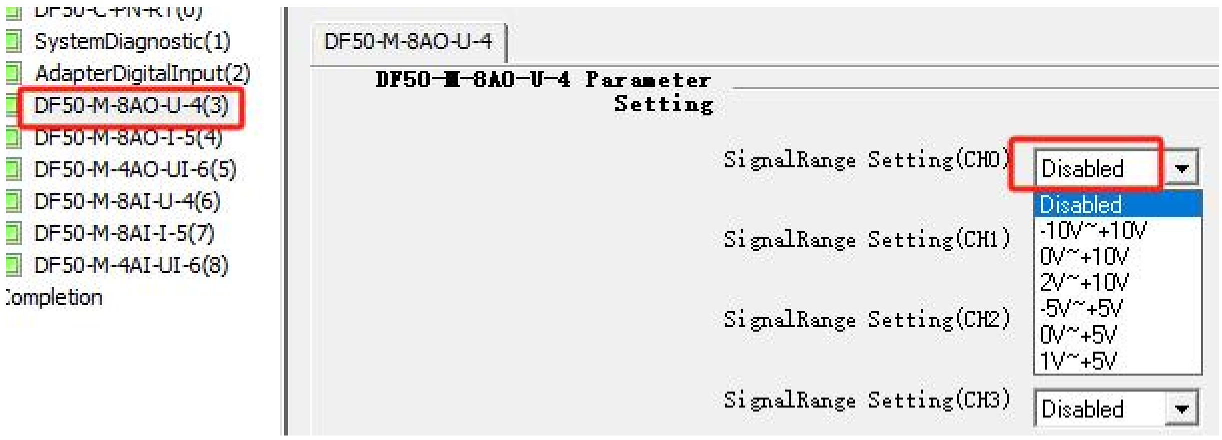


Figure 4-2-34

➢ As shown in the figure below, write the value "27648" to the module CH0 channel. Through the multimeter measurement, it can be seen that the output voltage is 10V. The conversion relationship is shown inChapter 3 Section 9.4.

Address	Format	Value
QW130	Signed	+27648

Figure 4-2-35

2.4.2. DF50-M-8AO-I-5 Current Output Module

➢ Please refer to the module wiring diagramChapter 3 Section 10.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 2.2.3.

➢ As shown in the figure below, you can set the module output current range, the default is Disabled. Set CH0 to 0~20ma.

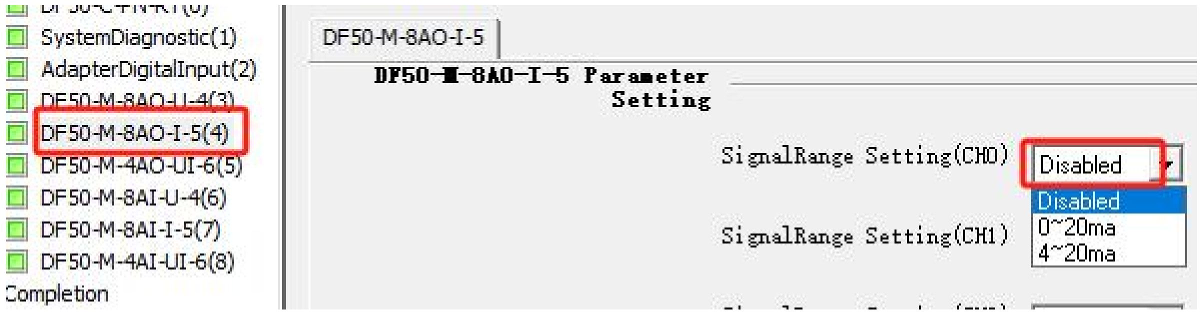


Figure 4-2-36

➢ As shown in the figure below, write the value "27648" to the module CH0 channel. Through the multimeter measurement, it can be seen that the output current is 20ma. The conversion relationship is shown inChapter 3 Section 10.4.

Address	Format	Value	New Val
QW146	Signed	+27648	+27648

Figure 4-2-37

2.4.3. DF50-M-4AO-UI-6 Voltage/Current Output Module

➢ Please refer to the module wiring diagramChapter 3, Section 8.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 2.2.3.

➢ As shown in the figure below, you can set the module output voltage or current range, the default is Disabled. Set CH0 to 0~10V and CH1 to 0~20ma.

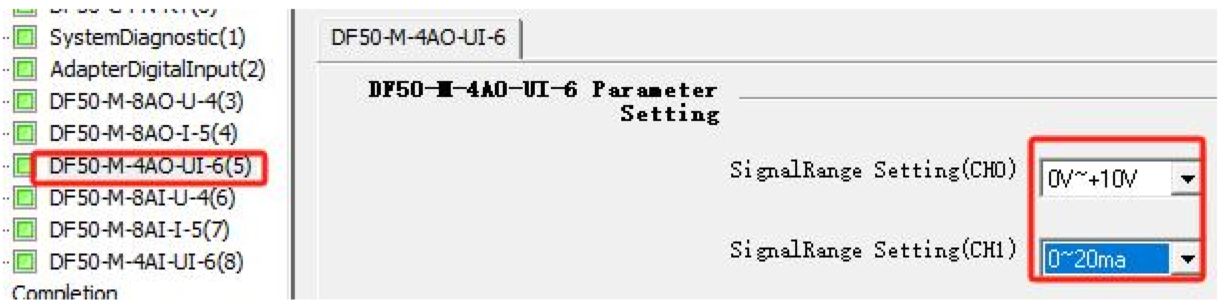
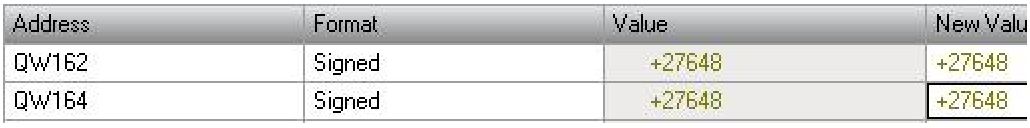


Figure 4-2-38

➢ As shown in the figure below, write the value "27648" to the module CH0 and CH1. Through the multimeter measurement, it can be seen that the output voltage of CH0 is 10V and the output current of CH1 is 20ma. The conversion relationship is shown inChapter 3, Section 8.4.



Address	Format	Value	New Valu
QW162	Signed	+27648	+27648
QW164	Signed	+27648	+27648

Figure 4-2-39

2.4.4. DF50-M-8AI-U-4 Voltage Input Module

➢ Please refer to the module wiring diagramChapter 3, Section 7.2As shown in the figure below, you can set the module acquisition voltage range, the default is Disabled. Set CH0 to 0~10V.

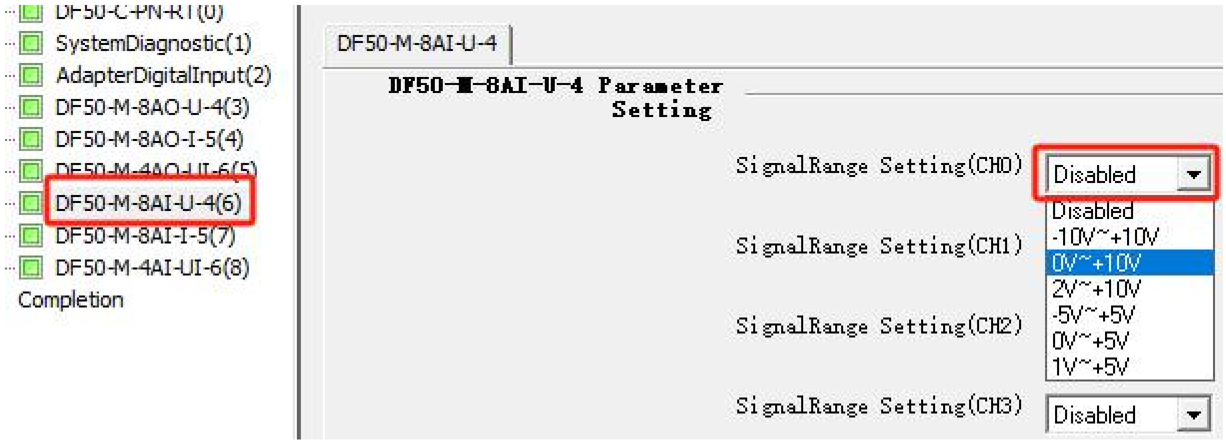


Figure 4-2-40

➢ As shown in the figure below, you can set the signal filter for each channel, the default is 100Hz_10ms.

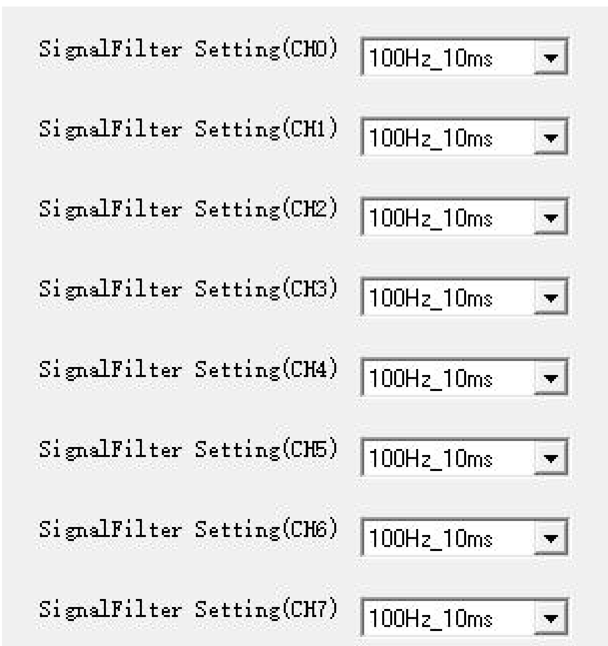


Figure 4-2-41

➢ After 5V voltage is applied to CH0, the value shown in the figure below is obtained. Through conversion, it is known that the collected voltage is 5.001V. The conversion relationship is shown inChapter 3, Section 7.4.

Address	Format	Value
IW131	Signed	+13829

Figure 4-2-42

2.4.5. DF50-M-8AI-I-5 Current Input Module

➢ Please refer to the module wiring diagramChapter 3 Section 6.2As shown in the figure below, you can set the module current collection range, the default is Disabled. Set CH0 to 0~20ma.

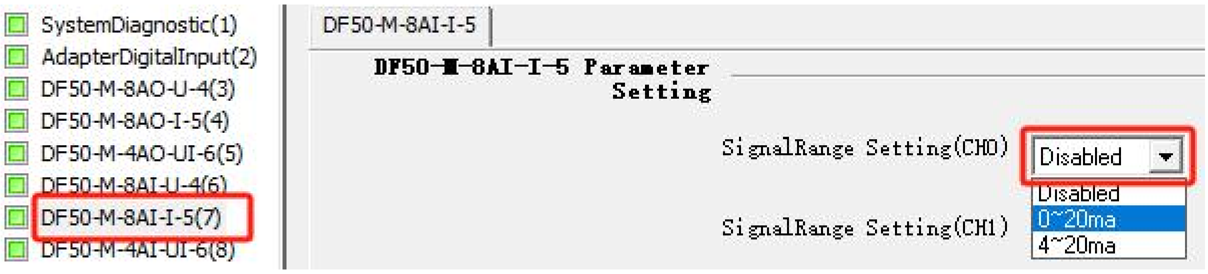


Figure 4-2-43

➢ As shown in the figure below, you can set the signal filter for each channel, the default is 100Hz_10ms.

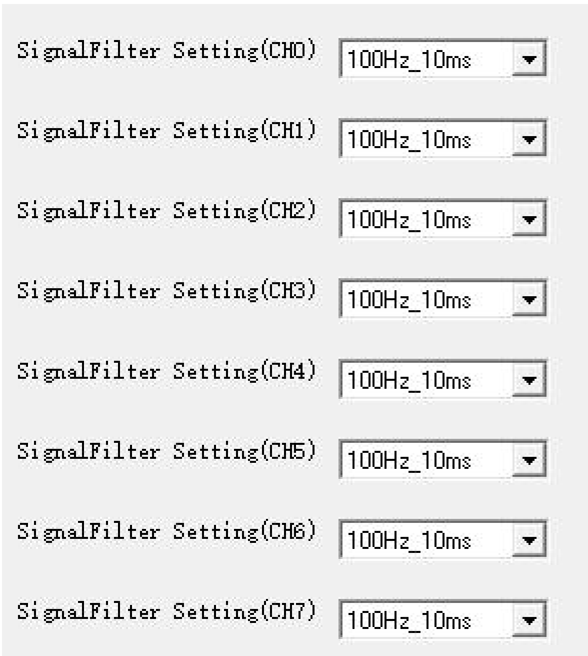


Figure 4-2-44

➢ After passing 10ma current into CH0, the value shown in the figure below is obtained. Through conversion, it is known that the collected current is 10.004ma. The conversion relationship is shown inChapter 3, Section 6.4.

地址	格式	当前值
IW147	有符号	+13830

Figure 4-2-45

2.4.6. DF50-M-4AI-UI-6 voltage and current input module

➢ Please refer to the module wiring diagramChapter 3 Section 5.2As shown in the figure below, you can set the module to collect voltage or current range, the default is Disabled. Set CH0 to 0~10V and CH1 to 0~20ma.

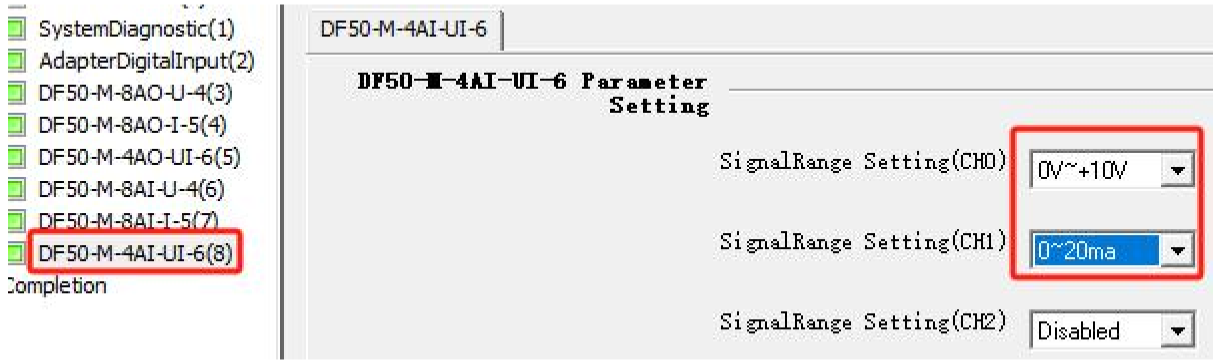


Figure 4-2-46

➢ As shown in the figure below, you can set the signal filter for each channel, the default is 100Hz_10ms.

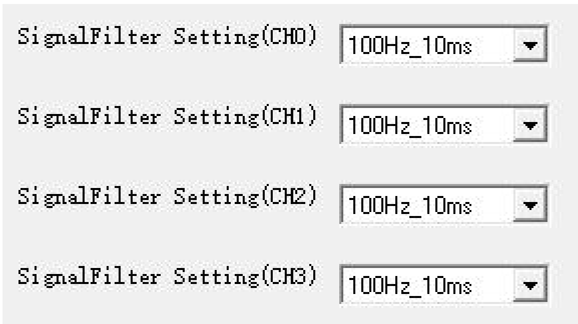


Figure 4-2-47

➢ After passing 5V voltage to CH0 and 10ma current to CH1, the values shown in the figure below are obtained. Through conversion, it is known that the voltage collected by CH0 is 5.009V and the current collected by CH1 is 10ma. The conversion relationship is shown inChapter 3, Section 5.4.

Address	Format	Value
IW163	Signed	+13850
IW165	Signed	+13824

Figure 4-2-48

2.5. Routine use of thermal resistance sensor data acquisition module

➢ This example uses the DF50-C-PN-RT + DF50-M-4RTD-PT topology. After adding the modules, it is as shown in the figure below.

df50-c-pn-rt	SystemDiagnostic	1_1	Input	128	129
df50-c-pn-rt	SystemDiagnostic	1_1	Output	128	129
df50-c-pn-rt	AdapterDigitalInput	2_1	Input	130	130
df50-c-pn-rt	DF50-M-4RTD-PT	3_1	Input	131	138

Figure 4-2-49

2.5.1. DF50-M-4RTD-PT Thermal Resistance Measurement Module

➢ Please refer to the module wiring diagramChapter 3 Section 11.2As shown in the figure below, you can modify the sensor type collected by the module, the default is PT100.

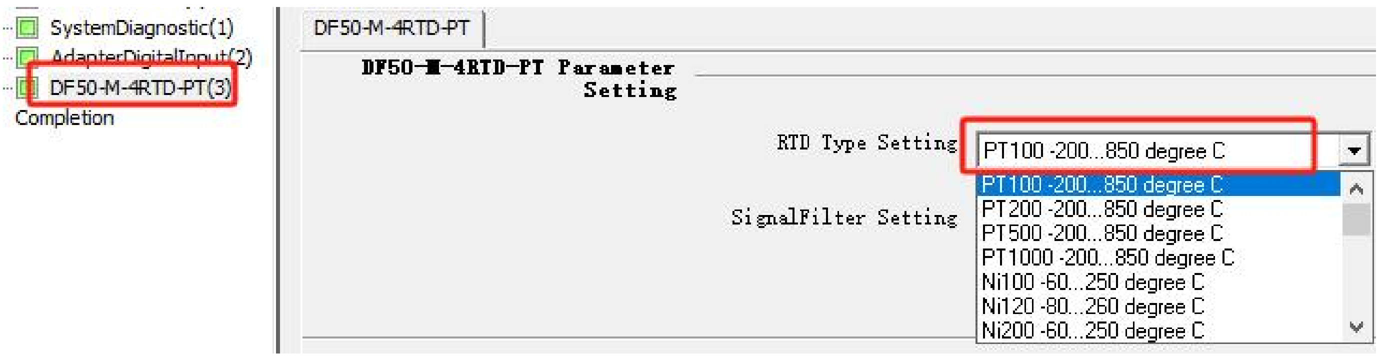


Figure 4-2-50

➢ The filter settings of this module can be adjusted as shown in the figure below, the default is 5Hz_200ms.

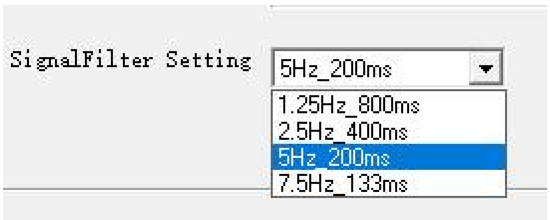


Figure 4-2-51

➢ After connecting the sensor to module CH0, the following data is obtained. "204" means the collected temperature is 20.4℃.

Address	Format	Value
IW131	Signed	+204

Figure 4-2-52

2.6. Thermocouple temperature data acquisition module usage routine

➢ This example uses the DF50-C-PN-RT + DF50-M-8TC topology. After adding the modules, it is as shown in the figure below.

df50-c-pn-rt	SystemDiagnostic	1_1	Input	128	129
df50-c-pn-rt	SystemDiagnostic	1_1	Output	128	129
df50-c-pn-rt	AdapterDigitalInput	2_1	Input	130	130
df50-c-pn-rt	DF50-M-8TC	3_1	Input	131	146
df50-c-pn-rt	DF50-M-8TC	3_1	Output	130	145

Figure 4-2-53

2.6.1. DF50-M-8TC Thermocouple Measurement Module

➢ Please refer to the module wiring diagramChapter 3, Section 12.2As shown in the figure below, you can modify the sensor type collected by this module. The default is K-type sensor.

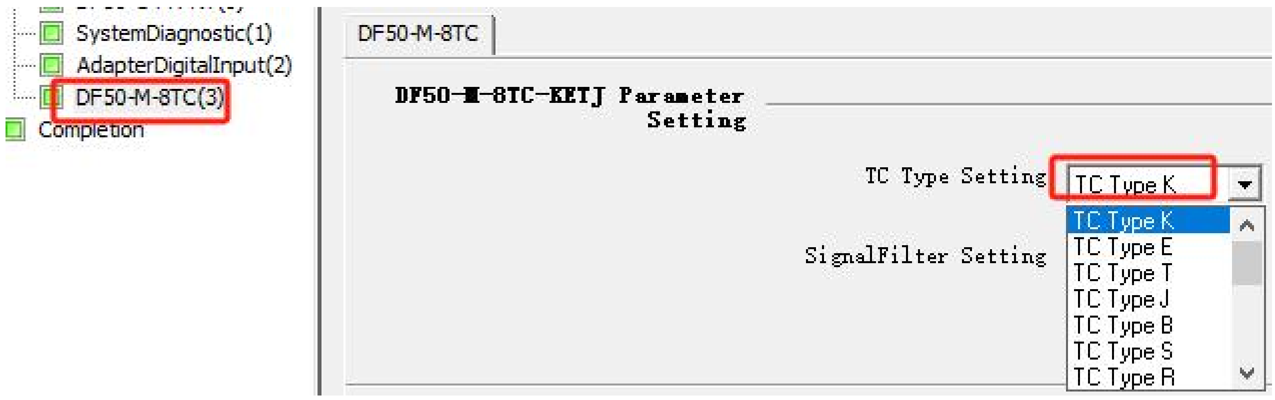


Figure 4-2-54

➢ The filter settings of this module can be adjusted as shown in the figure below, the default is 225ms.

Figure 4-2-55

➢ DF50-M-8TC process data definition please refer toChapter 3, Section 12.4After connecting the sensor to CH0, as shown in the figure below, "1003" means 100.3℃, and no compensation value is given at this time.

Address	Format	Value
IW131	Signed	+1003
QW130	Signed	+0

Figure 4-2-56

- When we write 500 into the compensation value of CH0, we can see that the collected value becomes "1508", which means 150.8℃.

Address	Format	Value	New Va
IW131	Signed	+1508	
QW130	Signed	+500	+500

Figure 4-2-57

2.7. Encoder data acquisition module usage routine

- The encoder pulse counting module has two types: DF50-M-2CNT-PIL-24 and DF50-M-2CNT-PIL-5. The wiring and usage of the two modules are the same. The difference is that the DF50-M-2CNT-PIL-5 is connected to a 5V encoder signal, and the DF50-M-2CNT-PIL-24 is connected to a 24V encoder signal. This document uses the DF50-M-2CNT-PIL-24 module as an example. For wiring methods, please refer toChapter 3, Section 13.2.
- Three LED indicator outputs. After the module is powered on, PW is always on, indicating that the module is powered on and initialized normally. Different display states of Led2 represent different working states of the module; Led2 flashes when the internal bus of the module is working normally. The external 24V power supply of the module is normal, and the EP light is always on.
- Add the DF50-M-2CNT-PIL-24 module as shown below.

df50-c-pn-rt	SystemDiagnostic	1_1	Input	128	129
df50-c-pn-rt	SystemDiagnostic	1_1	Output	128	129
df50-c-pn-rt	AdapterDigitalInput	2_1	Input	130	130
df50-c-pn-rt	DF50-M-2CNT-PIL-24	3_1	Input	131	148
df50-c-pn-rt	DF50-M-2CNT-PIL-24	3_1	Output	130	139

Figure 4-2-58

- The output status of the module can be set in the adapter. For setting methods, please refer toChapter 4, Section 2.2.3.
- As shown in the figure below, you can configure the signal mode of the DF50-M-2CNT-PIL-24 module (the frequency multiplication function is set here,Default 4x), DI signal function, filter time signal A, filter time signal B, encoder calculation direction, counter mode setting, comparison function, fieldbus error behavior, count upper limit, count lower limit.

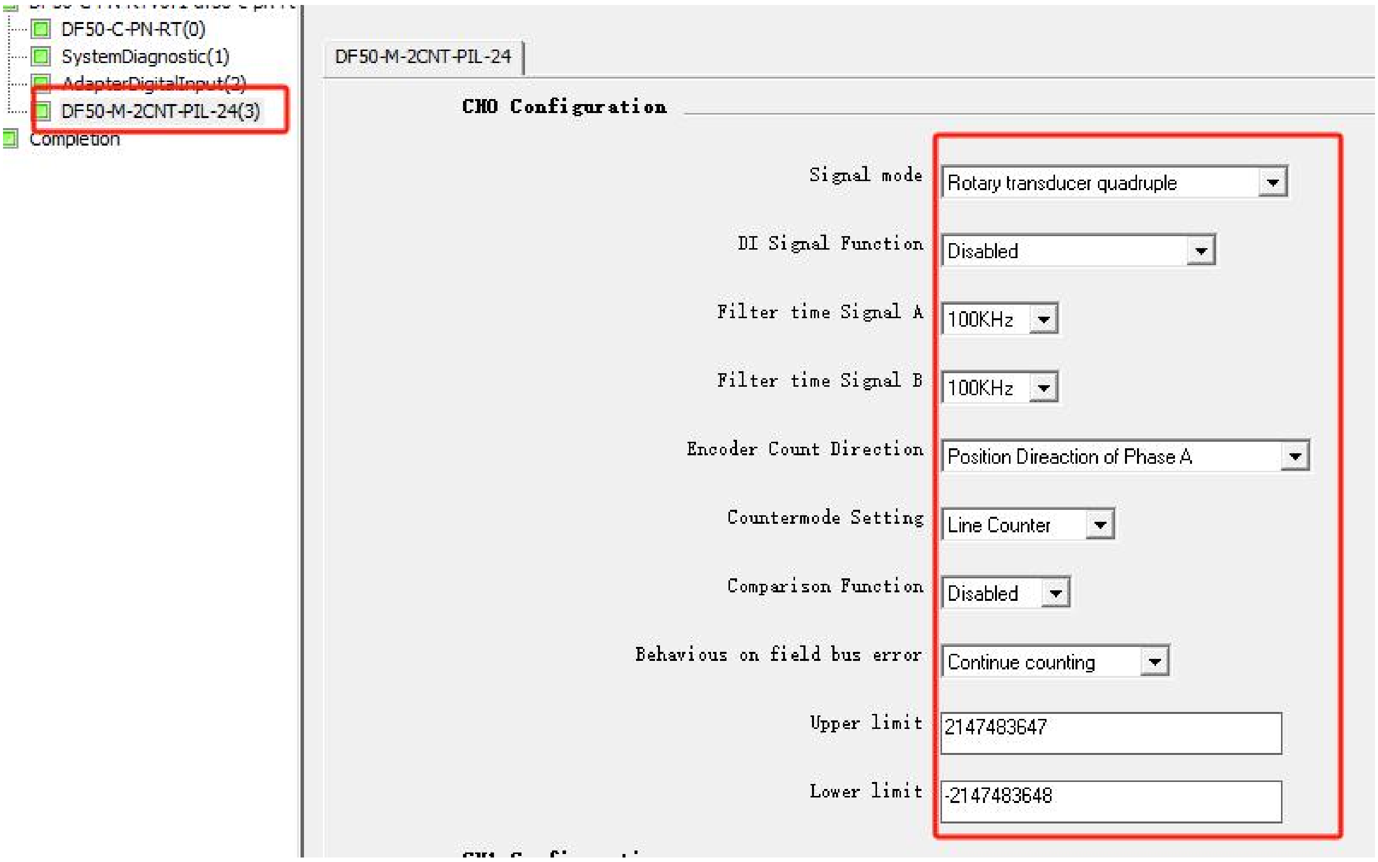


Figure 4-2-59

➢ As shown in the figure below, fill the address of module CH0 into the monitoring table. For the meaning of process data, please refer to Section 2.7.1 of this chapter.

Address	Format	Value
IB131	Binary	2#0000_0000
ID132	Signed	+0
ID136	Signed	+0
	Signed	
QB130	Binary	2#0000_0000
QD131	Signed	+0

Figure 4-2-60

➢ As shown in the figure below, write "1" in the command output data column to use the counting function normally, and the current pulse value can be read in the pulse number column.

Address	Format	Value	New Value
IB131	Binary	2#0000_0001	
ID132	Signed	+6511	
ID136	Signed	+0	
	Signed		
QB130	Binary	2#0000_0001	2#0000_0001
QD131	Signed	+0	

Figure 4-2-61

2.7.1. Module process data description

- The ProfiNET bus adapter will allocate corresponding input and output addresses according to the different modules connected to it; the table shows the meaning, data length and data type of the input and output data.

Table 4.2.4Module data length and type

Output Data	Number of bytes	Data Types
Channel 1 command output data	1	Uint8
Channel 1 pulse comparison value output	4	int32
Channel 2 command output data	1	Uint8
Channel 2 pulse comparison value output	4	int32
Input Data	Number of bytes	Data Types
Channel 1 Status Input Data	1	Uint8
Channel 1 Pulse Number	4	int32
Channel 1 Latch pulse number	4	int32
Channel 2 status input data	1	Uint8
Channel 2 Pulse Number	4	int32
Channel 2 Latch pulse number	4	int32

Table 4.2.5Output data meaning

Output data meaning	
0 bytes	
bit7~bit1	reserve
bit0	0: Channel 1 stops counting and the original count is reset to zero; 1: Channel 1 starts counting
1~4 bytes	Channel 1 pulse comparison value output, signed 32-bit data
5 bytes	
bit7~bit1	reserve
bit0	0: Channel 2 stops counting and the original count is cleared; 1: Channel 2 starts counting
6~9 bytes	Channel 2 pulse comparison value output, signed 32-bit data

Table 4.2.6Input data meaning

Input data meaning	
0 bytes	
bit7~bit5	reserve
Bit3~bit4	0: Channel 1 stops; 1: Channel 1 counts up; 2: Channel 1 counts down
bit2	0: Channel 1 count value is less than the comparison value; 1:

	Channel 1 count value is greater than the comparison value
bit1	0: No electronic probe/1 channel count reset signal; 1: Electronic probe/channel count reset signal
bit0	0: Channel 1 counting stop state, the original count is cleared; 1: Channel 1 counting state
1~4 bytes	Channel 1 pulse input value, signed 32-bit data
5~8 bytes	Channel 1 pulse input latch value, signed 32-bit data
9 bytes	
bit7~bit5	Reserved seat
bit3~bit4	0: Channel 2 stops; 1: Channel 2 counts up; 2: Channel 2 counts down
bit2	0: Channel 2 count value is less than the comparison value; 1: Channel 2 count value is greater than the comparison value
bit1	0: No electronic probe/channel 2 count reset signal; 1: Electronic probe/channel count reset signal
bit0	0: Channel 1 counting stop state, the original count is cleared; 1: Channel 1 counting state
10~13 bytes	Channel 1 pulse input value, signed 32-bit data
14~17 bytes	Channel 1 pulse input latch value, signed 32-bit data

2.7.2. DI Signal Function Configuration

- As shown in the figure below, you can configure the DI signal function. The default setting is Disabled. The following functions are available: rising edge capture, falling edge capture, both rising and falling edge capture, rising edge reset, falling edge reset, and both rising and falling edge reset.Rising edge capture (Rising edge capture) and rising edge reset (Rising edge reset)Function.

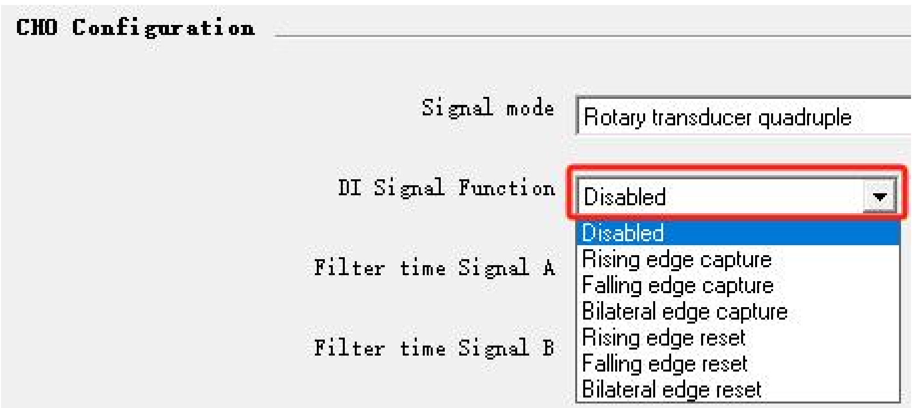


Figure 4-2-62

- DI rising edge capture:As shown in the figure below, the number of pulses is "3052".

Address	Format	Value
IB131	Binary	2#0000_0001
ID132	Signed	+3052
ID136	Signed	+0
	Signed	
QB130	Binary	2#0000_0001
QD131	Signed	+0

Figure 4-2-63

➢ After a rising edge is input, as shown in the figure below, the second bit of the status input data changes to "1", then to "0", and the number of latch pulses becomes "3052".

Address	Format	Value
IB131	Binary	2#0000_0011
ID132	Signed	+3052
ID136	Signed	+3052
	Signed	
QB130	Binary	2#0000_0001
QD131	Signed	+0

Figure 4-2-64

➢ DI rising edge reset:As shown in the figure below, the pulse number is "3789".

Address	Format	Value
IB131	Binary	2#0000_0001
ID132	Signed	+3789
ID136	Signed	+0
	Signed	
QB130	Binary	2#0000_0001
QD131	Signed	+0

Figure 4-2-65

➢ After a rising edge is input, as shown in the figure below, the second bit of the status input data changes to "1", then to "0", and the number of pulses becomes "0".

Address	Format	Value
IB131	Binary	2#0000_0011
ID132	Signed	+0
ID136	Signed	+0
	Signed	
QB130	Binary	2#0000_0001
QD131	Signed	+0

Figure 4-2-66

2.7.3. Compare function configurations (Comparison Function）

➢ Turn on the comparison function as shown in the figure below.

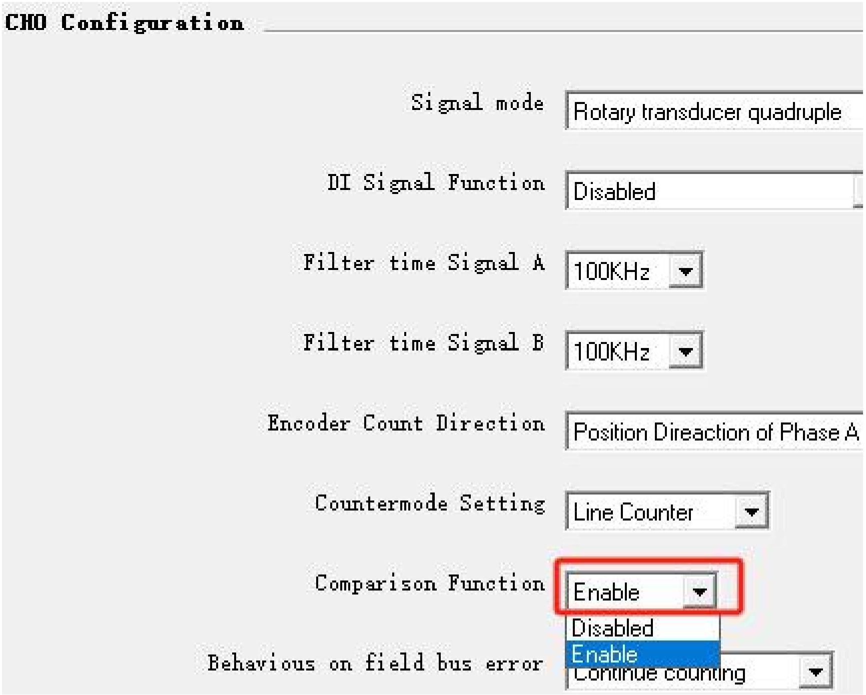


Figure 4-2-67

➢ As shown in the figure below, the pulse comparison value is set to 10000. When the pulse number is "5142", the third bit of the status input data is "0".

Address	Format	Value
IB131	Binary	2#0000_0001
ID132	Signed	+5142
ID136	Signed	+0
	Signed	
QB130	Binary	2#0000_0001
QD131	Signed	+10000

Figure 4-2-68

➢ As shown in the figure below, when the pulse number is "10940", it exceeds the set value 10000, and the third bit of the status input data becomes "1".

Address	Format	Value
IB131	Binary	2#0000_0101
ID132	Signed	+10940
ID136	Signed	+0
	Signed	
QB130	Binary	2#0000_0001
QD131	Signed	+10000

Figure 4-2-69

2.7.4. Pulse plus direction function (Signal Type: Pulse and Directions)

➢ As shown in the figure below, change the signal mode to pulse plus direction mode. For the wiring method, please refer toChapter 3, Section 13.2.3When this mode is used, the A+ and A- ports input high and low levels to indicate the direction, and the B+ and B- ports input valid levels to accumulate count values.

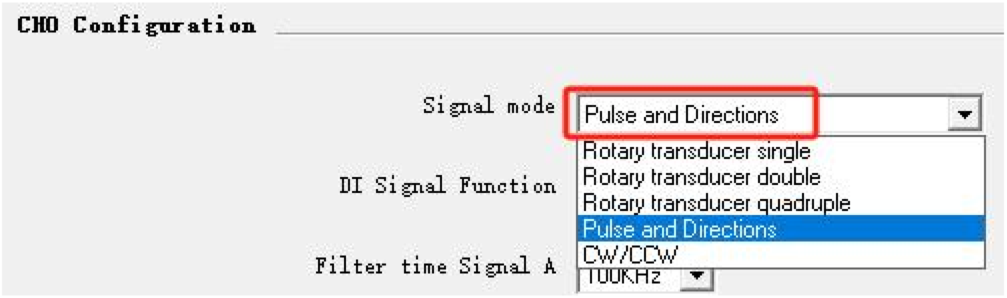


Figure 4-2-70

➢ As shown in the figure below, the count value is "0" when the sensor is stationary and the direction state is "0". For process data definition, please refer toChapter 3, Section 13.4.

Address	Format	Value
IB131	Binary	2#0000_0001
ID132	Signed	+0
ID136	Signed	+0
	Signed	
QB130	Binary	2#0000_0001
QD131	Signed	+0

Figure 4-2-71

➢ When the A+ and A- voltage inputs are at a low level, pulse signals are input to B+ and B-. As shown in the figure below, the count value decreases, and the direction status bit3~bit4 is "2".

Address	Format	Value
IB131	Binary	2#0001_0001
ID132	Signed	-1147
ID136	Signed	+0
	Signed	
QB130	Binary	2#0000_0001
QD131	Signed	+0

Figure 4-2-72

➢ When the A+ and A- voltage inputs are high level, pulse signals are input to B+ and B-. As shown in the figure below, the count value increases, and the direction status bit3~bit4 is "1".

Address	Format	Value
IB131	Binary	2#0000_1001
ID132	Signed	+826
ID136	Signed	+0
	Signed	
QB130	Binary	2#0000_0001
QD131	Signed	+0

Figure 4-2-73

2.8. Serial port module usage routine

➢ This example uses the DF50-C-PN-RT + DF50-1COM-232-485-422 topology.

DF50-1COM-232-485-422 supports three modes: free transparent transmission, slave mode, and Modbus RTU master mode. The mode switching is achieved by adding different sub-slots and setting in the Modbus interface Module sub-module.Section 15.2The wiring diagram is connected to the card, simulating the communication device and the DF50-1COM-232-485-422 module communication. After adding the module, it is shown as follows.

df50-c-pn-rt	SystemDiagnostic	1_1	Input	128	129
df50-c-pn-rt	SystemDiagnostic	1_1	Output	128	129
df50-c-pn-rt	AdapterDigitalInput	2_1	Input	130	130
df50-c-pn-rt	DF50-M-1COM-232/...	3_1	--	--	--

Figure 4-2-74

➢ The parameters of Modbus interface Module are shown in the figure below. The default mode is Free Protocol.

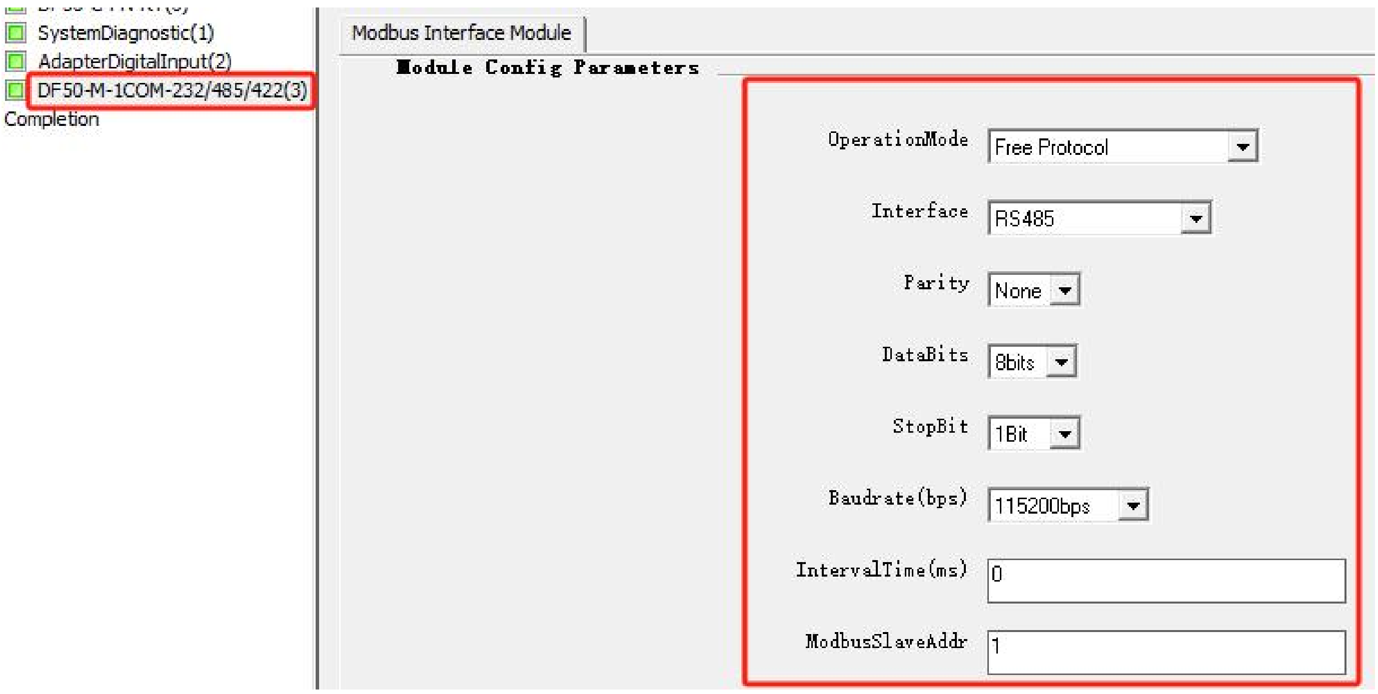


Figure 4-2-75

➢ As shown in the figure below, the number starting with F indicates free transparent transmission mode, the number starting with M indicates Modbus RTU master mode, and the number starting with S indicates Modbus RTU slave mode.

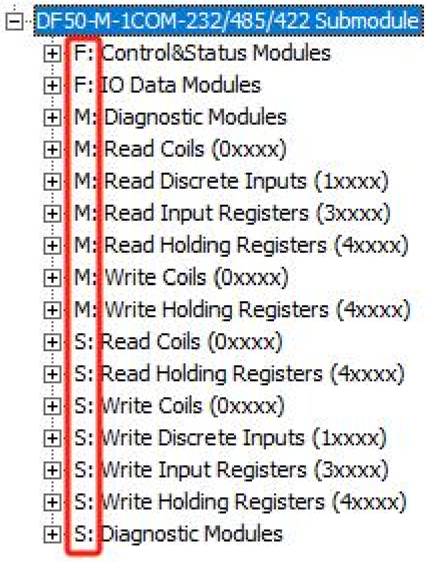


Figure 4-2-76

2.8.1. Modbus RTU Master Mode Usage Example

➢ Set the module mode to Modbus RTU Master mode, as shown below.

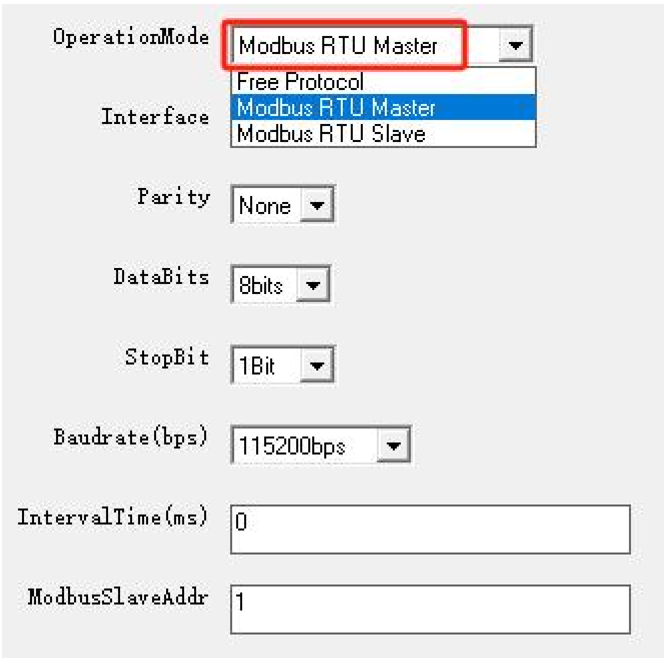


Figure 4-2-77

➢ Add the diagnostic module M: Error Code Input (28 CH) to the second subslot, which contains the diagnostic information of the subsequent 28 subslots at most, and each subslot occupies 2 bytes of diagnostic information. See Table 4.2.7 for its meaning.

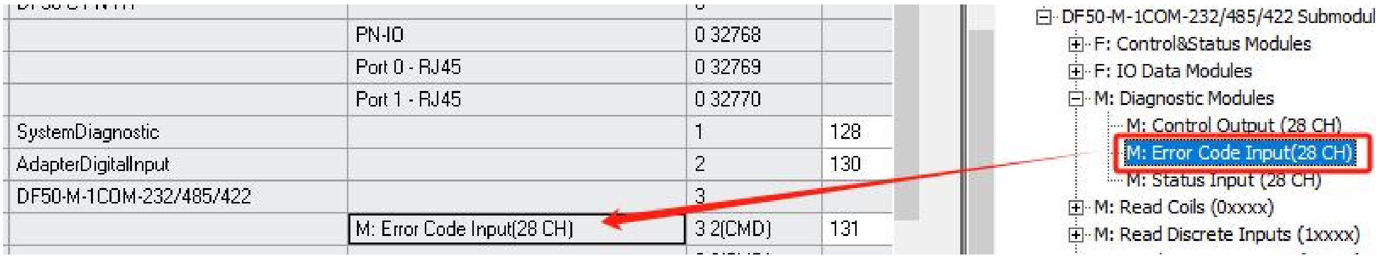


Figure 4-2-78

Table 4.2.7

Normal state value	Status Name	meaning
16#0000	OP_SUCCESS	Configuration or write operation successful
16#0001	DATA_FULL	Data has been updated and can be read
16#0002	WRITE_IDLE	Write idle, writable
16#0003	DATA_EMPTY	Read idle, receive data not updated
Error Status Value	Status Name	meaning
16#E0A1	WRITE_BUSY	Write busy, can't write
16#E0A2	DATA_LARGE	Data length exceeds limit
16#E0A3	CMD_ERR	Command Error
16#E0A4	PARA_ERR	Configuration parameter error
16#E0A5	CHECK_ERR	Verification Error
16#E0A6	SLAVE_NOEXIT	The slave device does not exist
16#E0A7	PACK_LOSS	Packet Loss
16#E0A8	OVER_FLOW	Data overflow

➢ From the 6 function codes starting with M, select the required one and add it to the third sub-slot. If you need to read and write more data, you can add different sub-slot types continuously, up to 28 sub-slots, plus the first interface sub-slot and diagnostic sub-slot, a total of 30 sub-slots. As shown in Figures 4-2-76 and 4-2-77, add M: Read 03 Words 4xxxx and M: Write 03 Words 4xxxx.

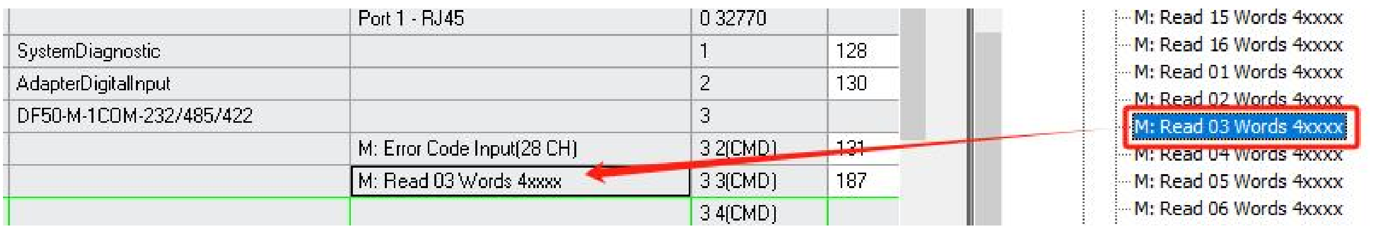


Figure 4-2-79

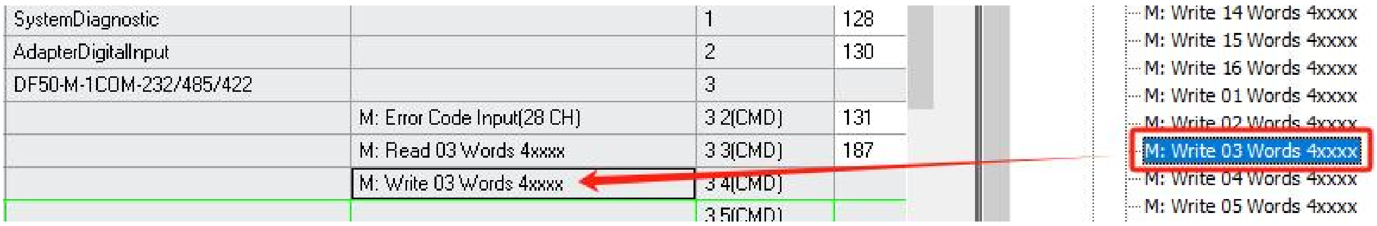


Figure 4-2-80

➢ As shown in the figure below, click M: Read 03 Words 4xxxx submodule to configure slave device information. See Table 4.2.8 for its meaning.

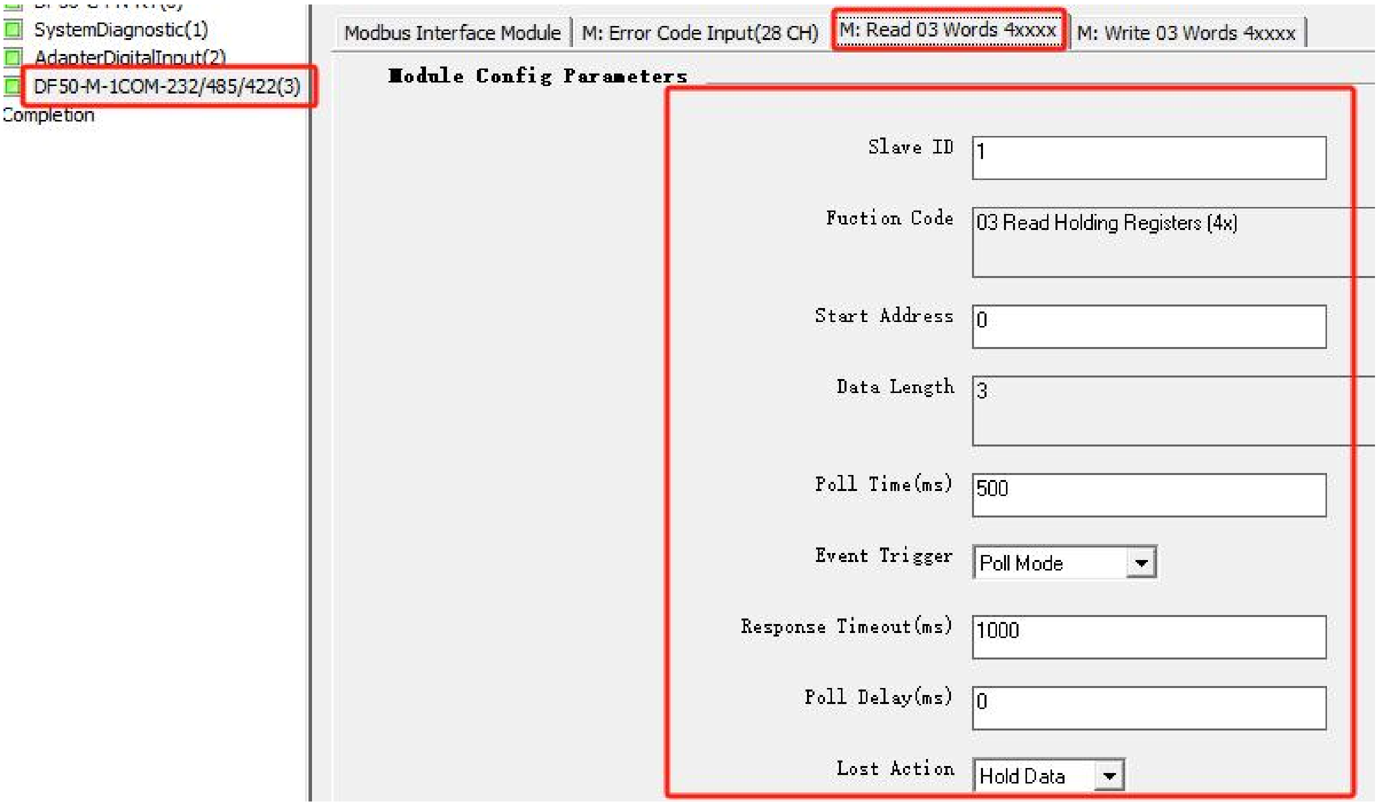


Figure 4-2-81

Table 4.2.8

SlaveID	Slave node address
Function Code	Function code
Start Address	Register start address
Data Length	Number of registers or coils
Poll Time	The period of polling this slave
Event Trigger Trigger mode selection	Poll: Polling mode
	Trigger: Trigger mode
Response TimeOut	Slave station response timeout
Poll Delay	Polling interval between slaves
Lost Action Slave loss handling	Hold: Keep the last value
	Clear: Clear

Input data processing when module fails	Input value cleared
	Keep the last value

➢ As shown in the figure below, change the register starting address of M: Write 03 Words 4xxxx to 4000.

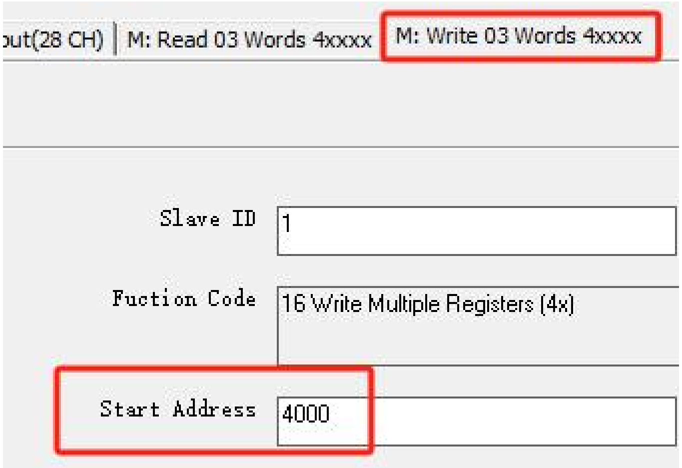


Figure 4-2-82

➢ The final address overview is as follows:

df50-c-pn-rt	SystemDiagnostic	1_1	Input	128	129
df50-c-pn-rt	SystemDiagnostic	1_1	Output	128	129
df50-c-pn-rt	AdapterDigitalInput	2_1	Input	130	130
df50-c-pn-rt	DF50-M-1COM-232/...	3_1	--	--	--
df50-c-pn-rt	M: Error Code Input(2...	3_2	Input	131	186
df50-c-pn-rt	M: Read 03 Words 4...	3_3	Input	187	192
df50-c-pn-rt	M: Write 03 Words 4...	3_4	Output	130	135

Figure 4-2-83

➢ The meanings of the two sub-slots added now are as follows:

➢ M: Read 03 Words 4xxxx contains 3 word data. According to the configuration information, the data represents the register value of the slave with node address 1 and address 0-2.

➢ M: Write 03 Words 4xxxx contains 3 words of data. According to the configuration information, the data will be written to the slave with node address 1 and registers with addresses 4000-4002.

➢ Download the configuration to the device. Fill in the information we need into the monitoring table for monitoring as shown below.

Address	Format	Value
IW187	Hexadecimal	16#0000
IW189	Hexadecimal	16#0000
IW191	Hexadecimal	16#0000
	Signed	
QW130	Hexadecimal	16#0000
QW132	Hexadecimal	16#0000
QW134	Hexadecimal	16#0000

Figure 4-2-84

➢ Use Modbus Slave software to create two slave stations to communicate with the module, as shown in the figure below, with the starting addresses being 0 and 4000 respectively.

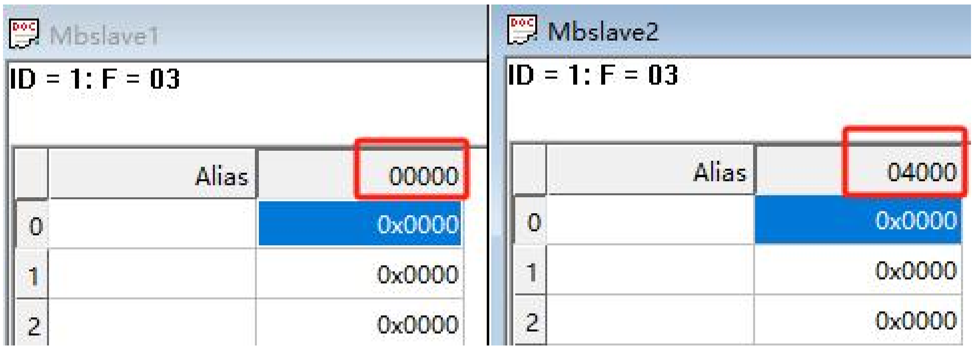


Figure 4-2-85

➢ After changing the data format to HEX and writing "11, 22, 33" into registers 0-2 in the first slave, the monitoring table is displayed as shown in the figure below.

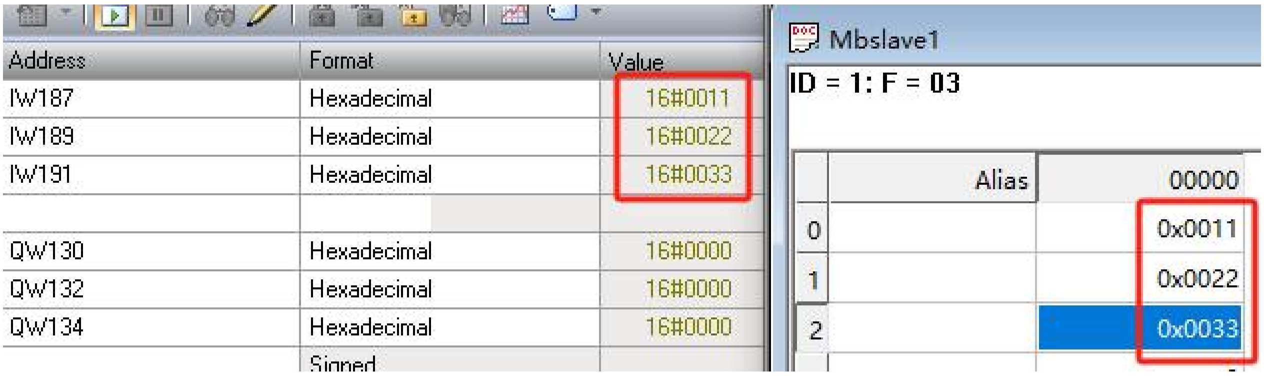


Figure 4-2-86

➢ After writing "44, 55, 66" to subslot 4 in the monitoring table, the second slave is displayed as shown below.

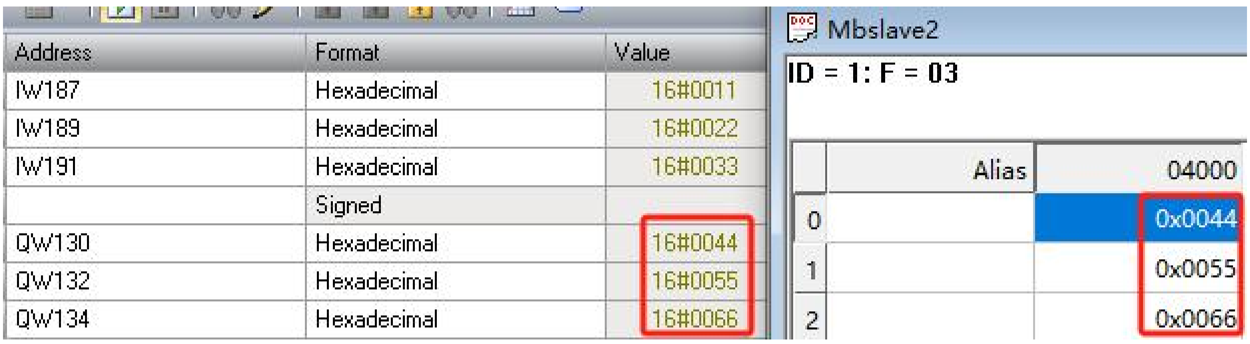


Figure 4-2-87

2.8.2. FreeRUN free transparent transmission mode usage example

➢ In the Modbus Interface Module, set the mode to Free Protocol mode, as shown in the figure below.

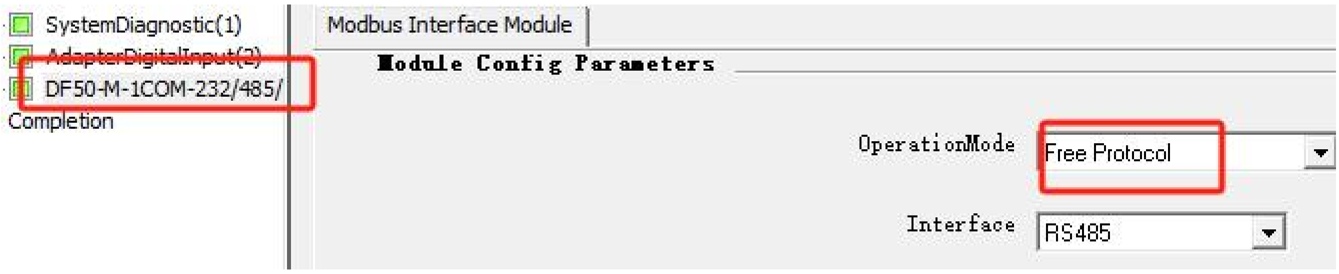


Figure 4-2-88

➢ Add the F: Control status Module module to the second subslot. See Table 4.2.9 for its data structure.

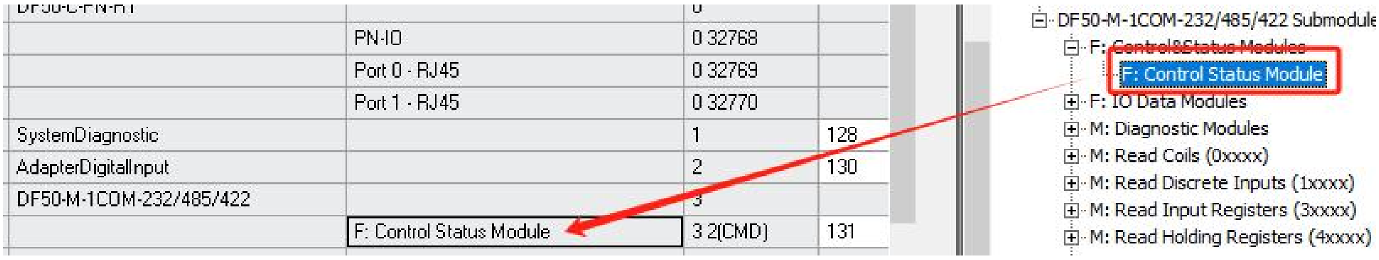


Figure 4-2-89

Table 4.2.9

Output Data			
Byte offset	name	length	meaning
Byte:0-1	CtrlWord	2byte	Control Word
Byte:2	TxDataLEN	1byte	Send data length
Byte:3	TxDataCNT	1byte	Send data sequence number
Input Data			
Byte Sequence Number	name	length	meaning
Byte:0-1	StateWord	2byte	Status word
Byte:2	RxDataLEN	1byte	Receive data length
Byte:3	RxDataCNT	1byte	Receive data sequence number
Byte:4-11	/	8byte	reserve

➢ From F: IO Data Modules, select the ones you need and add them to the third sub-slot. As shown in Figures 4-2-87 and 4-2-88, add F: Free-Port Input 0004 Bytes and F: Free-Port Output 0004 Bytes.

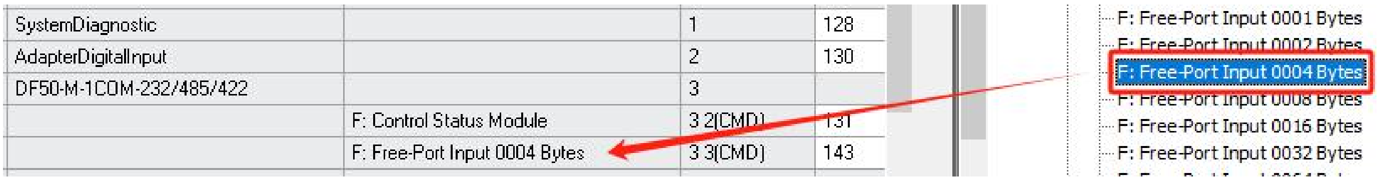


Figure 4-2-90

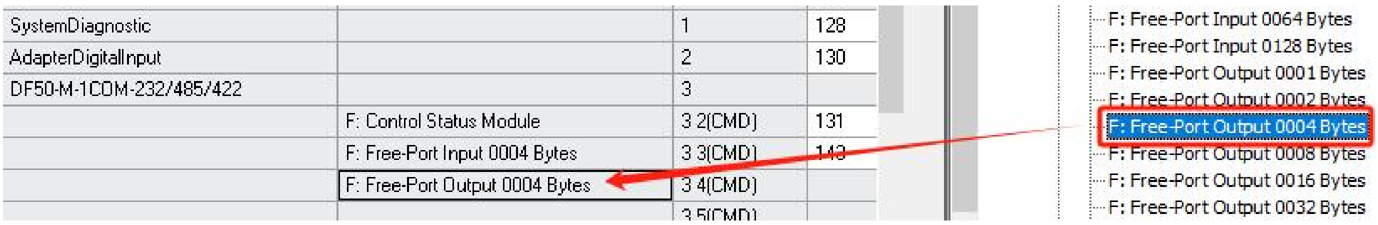


Figure 4-2-91

➢ The meanings of the two sub-slots added now are as follows:

➢ F: Free-Port Input 0004 Bytes contains 4 bytes of input data.

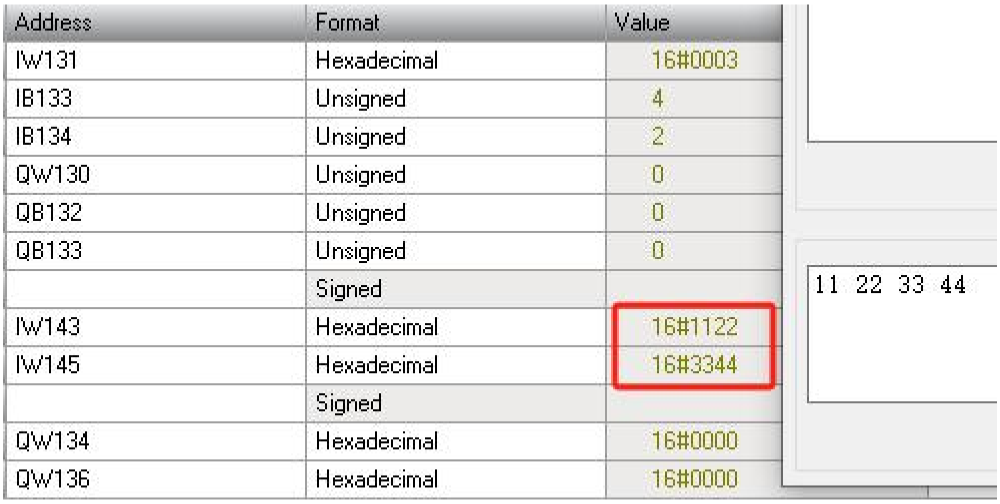
➢ F: Free-Port Output 0004 Bytes contains 4 bytes of output data.

➢ Download the configuration to the device and fill in the required data into the monitoring table as shown below.

Address	Format
IW131	Unsigned
IB133	Unsigned
IB134	Unsigned
QW130	Unsigned
QB132	Unsigned
QB133	Unsigned
	Signed
IW143	Hexadecimal
IW145	Hexadecimal
	Signed
QW134	Hexadecimal
QW136	Hexadecimal

Figure 4-2-92

➢ Receive data test: The module will automatically enter the receive mode after being configured in free-running mode, or write16#00C2 actively switches to receiving mode. After connecting using the serial port assistant, send "11, 22, 33, 44" in HEX mode. As shown in the following figure, the data sent by the serial port assistant can be received in the receiving data of the monitoring table.



Address	Format	Value
IW131	Hexadecimal	16#0003
IB133	Unsigned	4
IB134	Unsigned	2
QW130	Unsigned	0
QB132	Unsigned	0
QB133	Unsigned	0
	Signed	
IW143	Hexadecimal	16#1122
IW145	Hexadecimal	16#3344
	Signed	
QW134	Hexadecimal	16#0000
QW136	Hexadecimal	16#0000

Figure 4-2-93

- The meaning of the status word is shown in the following table.

Table 4.2.10

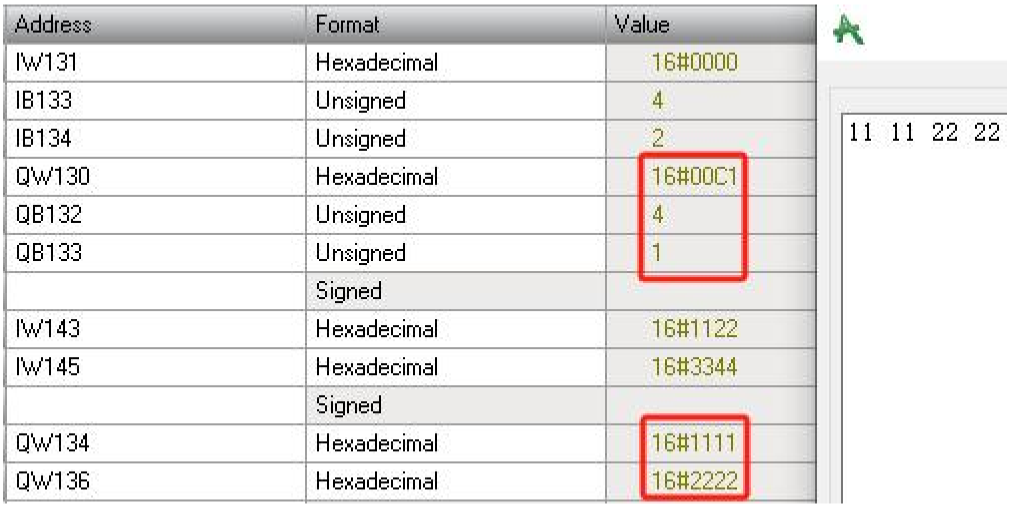
Normal state value	Status Name	meaning
16#0000	OP_SUCCESS	Configuration or write operation successful
16#0001	DATA_FULL	Data has been updated and can be read
16#0002	WRITE_IDLE	Write idle, writable
16#0003	DATA_EMPTY	Read idle, receive data not updated
Error Status Value	**Status Name**	**meaning**
16#E0A1	WRITE_BUSY	Write busy, can't write
16#E0A2	DATA_LARGE	Data length exceeds limit
16#E0A3	CMD_ERR	Command Error
16#E0A4	PARA_ERR	Configuration parameter error
16#E0A5	CHECK_ERR	Verification Error
16#E0A6	SLAVE_NOEXIT	The slave device does not exist
16#E0A7	PACK_LOSS	Packet Loss
16#E0A8	OVER_FLOW	Data overflow

- The control word commands are shown in the following table.

Table 4.2.11

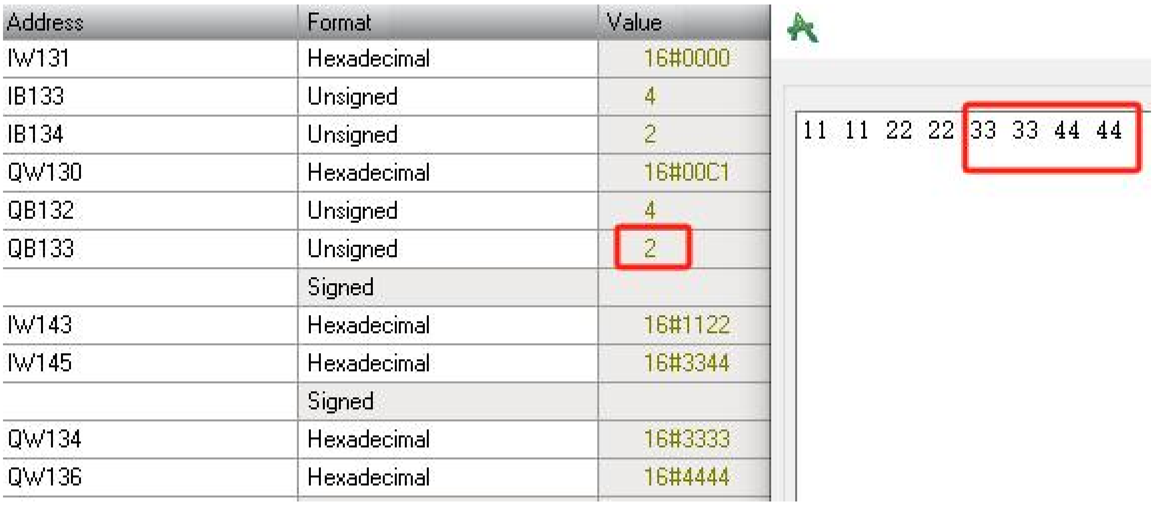
Command Value	Command Name	meaning
16#00C1	WRITECUSTOM	Free mode write data command
16#00C2	READCUSTOM	Free mode read data command

- Send data test: set the control word to 16#00C1, set the send data length to 4 bytes, set the send sequence number to 1, assign values to Byte1-4 of the send data respectively, and then perform the write action together. The received 4Byte data can be read using the serial port assistant, as shown in the figure below: (To send again, just loop and accumulate the send sequence number)



Address	Format	Value
IW131	Hexadecimal	16#0000
IB133	Unsigned	4
IB134	Unsigned	2
QW130	Hexadecimal	16#00C1
QB132	Unsigned	4
QB133	Unsigned	1
	Signed	
IW143	Hexadecimal	16#1122
IW145	Hexadecimal	16#3344
	Signed	
QW134	Hexadecimal	16#1111
QW136	Hexadecimal	16#2222

Figure 4-2-94First send



Address	Format	Value
IW131	Hexadecimal	16#0000
IB133	Unsigned	4
IB134	Unsigned	2
QW130	Hexadecimal	16#00C1
QB132	Unsigned	4
QB133	Unsigned	2
	Signed	
IW143	Hexadecimal	16#1122
IW145	Hexadecimal	16#3344
	Signed	
QW134	Hexadecimal	16#3333
QW136	Hexadecimal	16#4444

Figure 4-2-95Second send

- If you need to receive data, you need to set the control word to 16#00C2 after sending the data before you can receive the data.

2.8.3. Modbus RTU Slave mode usage routine

➢ In the Modbus Interface Module, set the mode to Modbus RTU slave mode. The default value of SlaveAddr is "1" and can be modified as shown in the figure below.

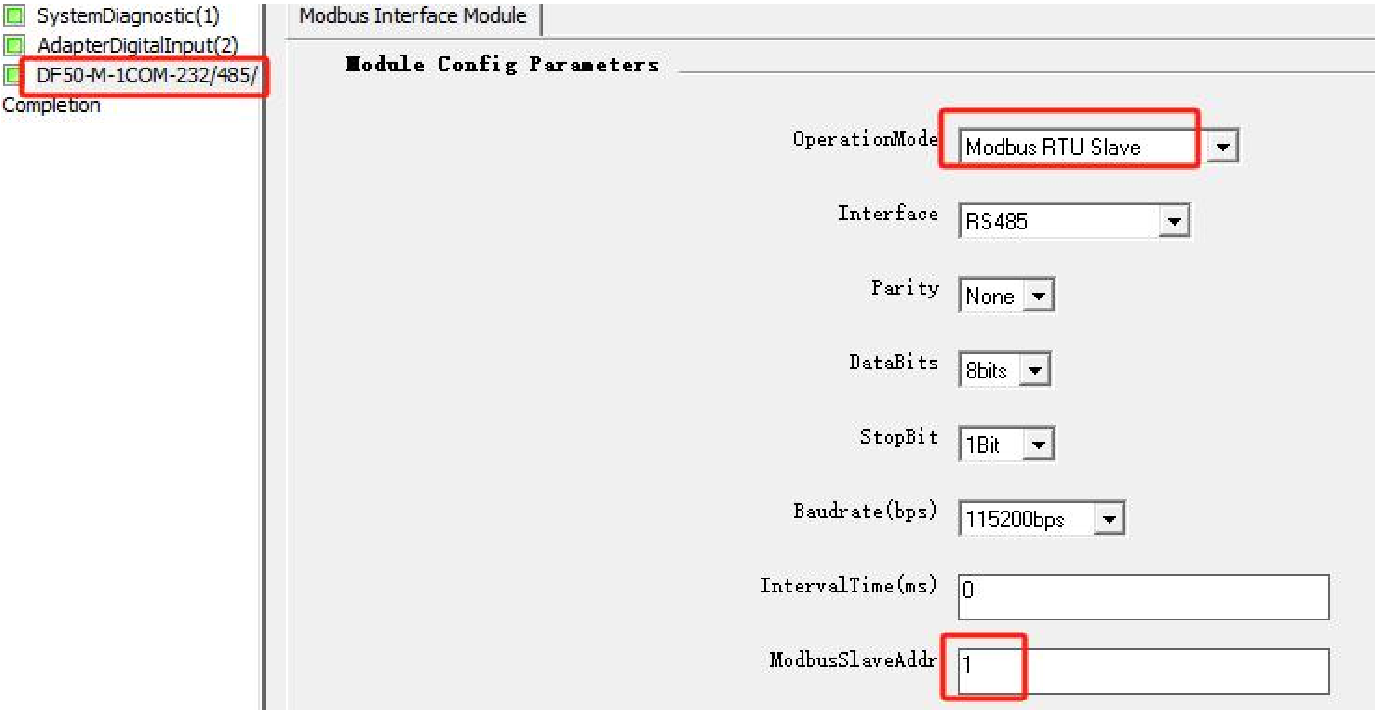


Figure 4-2-96

➢ Add the S: Modbus Status Input (1 Word) module to the second subslot. See Table 4.2.12 for its data structure.

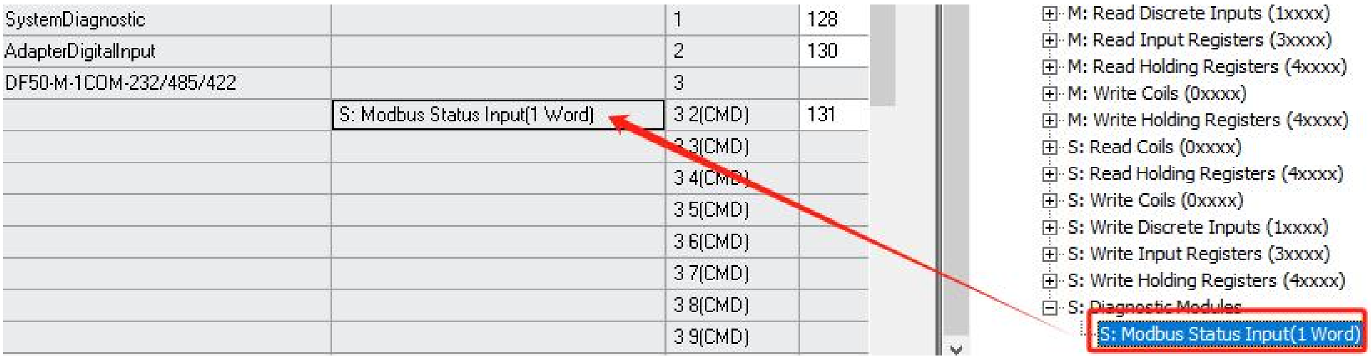


Figure 4-2-97

Table 4.2.12

Normal state value	Status Name	meaning
16#0000	OP_SUCCESS	Configuration or write operation successful
16#0001	DATA_FULL	Data has been updated and can be read
16#0002	WRITE_IDLE	Write idle, writable
16#0003	DATA_EMPTY	Read idle, receive data not

		updated
Error Status Value	Status Name	meaning
16#E0A1	WRITE_BUSY	Write busy, can't write
16#E0A2	DATA_LARGE	Data length exceeds limit
16#E0A3	CMD_ERR	Command Error
16#E0A4	PARA_ERR	Configuration parameter error
16#E0A5	CHECK_ERR	Verification Error
16#E0A6	SLAVE_NOEXIT	The slave device does not exist
16#E0A7	PACK_LOSS	Packet Loss
16#E0A8	OVER_FLOW	Data overflow

➢ From the 6 types starting with S, select the one you need and add it to the third subslot. If you need to read and write more data, you can add different subslot types continuously, up to 28 subslots, plus the first interface subslot and diagnostic subslot, a total of 30 subslots. Enter the submodule configuration page to configure the protocol information, and set the register first address for both reading and writing. Add S: Read 0002 Words 4xxxx and S: Write 0002 Words 4xxxx as shown in Figures 4-2-95 and 4-2-96.

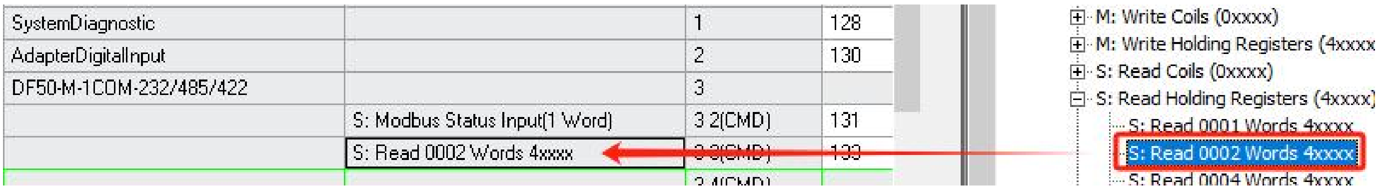


Figure 4-2-98

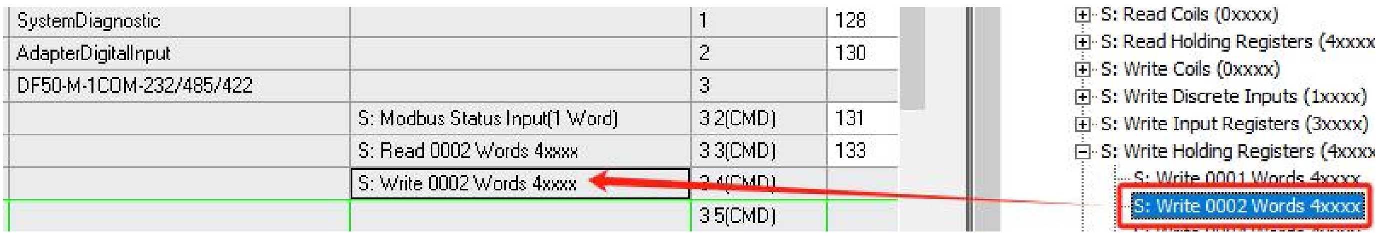


Figure 4-2-99

➢ As shown in the figure below, click S: Write 0002 Words 4xxxx to enter the property interface and change the starting address to 100.

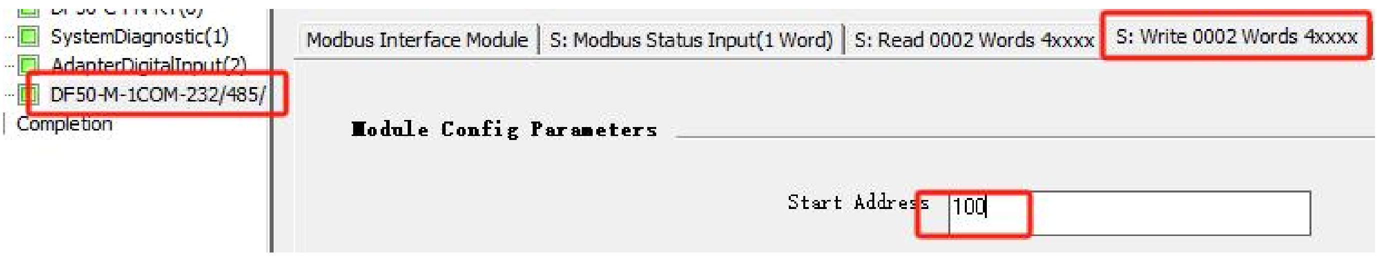


Figure 4-2-100

➢ The meanings of the two sub-slots added now are as follows:

➢ S: Read 0002 Words 4xxxx contains 2 word data. According to the configuration information, the data represents the register value at address 0-1.

➢ S: Write 0002 Words 4xxxx contains 2 words of data. According to the configuration information, the data will be written to the register at address 100-101.

➢ Download the configuration to the device. Fill in the information we need into the monitoring table for monitoring as shown below.

Address	Format
IW133	Hexadecimal
IW135	Hexadecimal
	Signed
QW130	Hexadecimal
QW132	Hexadecimal

Figure 4-2-101

➢ Use Modbus Poll software to create two new master stations to communicate with the module, as shown in the figure below, with the starting addresses being 0 and 100 respectively.

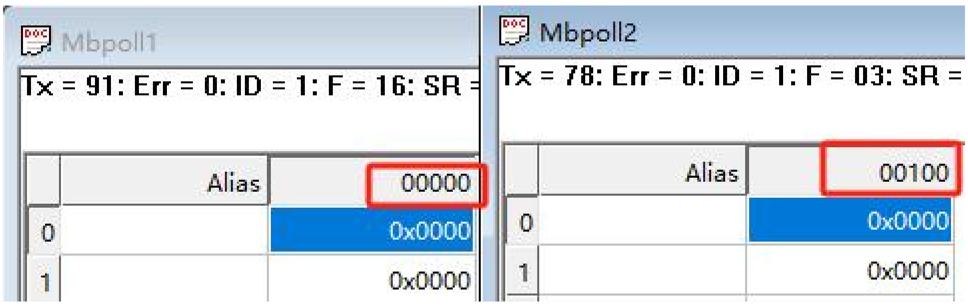


Figure 4-2-102

➢ After changing the data format to HEX and writing "11, 22" into the 0th-1st register in the first master station, the monitoring table is displayed as shown in the figure below.

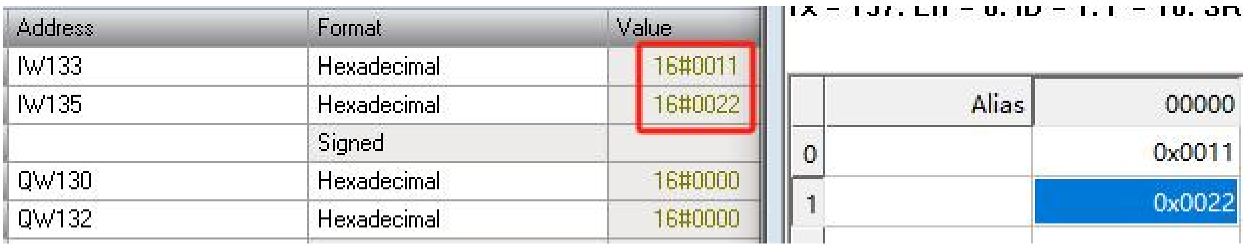


Figure 4-2-103

➢ After writing "33, 44" to subslot 4 in the monitoring table, the second master station is displayed as shown below.

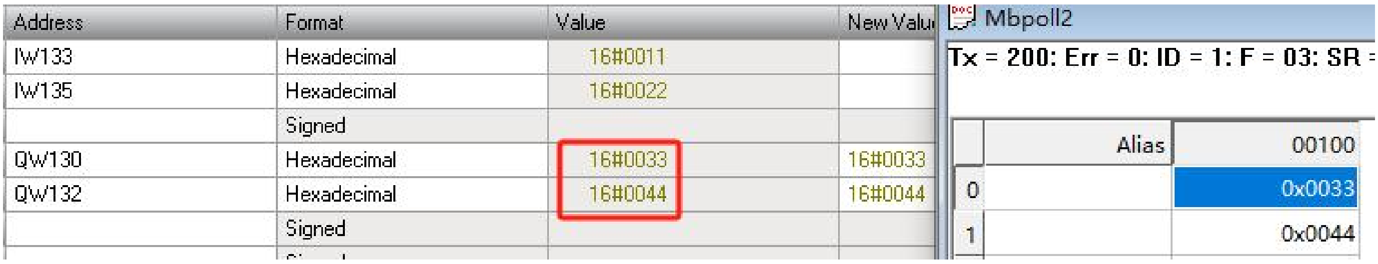


Figure 4-2-104

2.9. IO-LINK module usage routine

➢ This example uses the DF50-C-PN-RT + DF50-M-4IOL topology. For wiring methods, please refer toChapter 3, Section 18.2,After adding the module, it will look like the following figure.

df50-c-pn-rt	SystemDiagnostic	1_1	Input	128	129
df50-c-pn-rt	SystemDiagnostic	1_1	Output	128	129
df50-c-pn-rt	AdapterDigitalInput	2_1	Input	130	130
df50-c-pn-rt	DF50-M-4IOL	3_1	Input	131	142
df50-c-pn-rt	DF50-M-4IOL	3_1	Output	130	133
df50-c-pn-rt	IOL_I/O_02/02_byte	3_2	Input	143	145
df50-c-pn-rt	IOL_I/O_02/02_byte	3_2	Output	134	136
df50-c-pn-rt	IOL_I_00_byte	3_3	Input	146	146
df50-c-pn-rt	IOL_O_00_byte	3_4	Output	137	137

Figure 4-2-105

➢ The submodules that can be added to PORT0~PORT3 are as follows.

- Submodule
  - DF50-M-4IOL SUBMODULE
    - IOL_I/O_01/01_byte
    - IOL_I/O_02/02_byte
    - IOL_I/O_04/02_byte
    - IOL_I/O_04/04_byte
    - IOL_I/O_06/06_byte
    - IOL_I/O_08/08_byte
    - IOL_I/O_16/16_byte
    - IOL_I/O_24/24_byte
    - IOL_I/O_32/32_byte
    - IOL_I_00_byte
    - IOL_I_01_byte
    - IOL_I_02_byte
    - IOL_I_04_byte
    - IOL_I_06_byte
    - IOL_I_08_byte
    - IOL_I_12_byte
    - IOL_I_16_byte
    - IOL_I_24_byte
    - IOL_I_32_byte
    - IOL_O_00_byte
    - IOL_O_01_byte
    - IOL_O_02_byte
    - IOL_O_04_byte
    - IOL_O_06_byte
    - IOL_O_08_byte
    - IOL_O_12_byte
    - IOL_O_16_byte
    - IOL_O_24_byte
    - IOL_O_32_byte

Figure 4-2-106

Table 4.2.13

IOL_I/O_01/01_byte	Input 1 byte Output 1 byte	IOL_I_00_byte	Enter 0 bytes for DI mode	IOL_O_00_byte	Output 0 bytes, used in DO mode
IOL_I/O_02/02_byte	Input 2 bytes Output 2 bytes	IOL_I_01_byte	Input 1 byte	IOL_O_01_byte	Output 1 byte
IOL_I/O_04/02_byte	Input 4 bytes Output 2 bytes	IOL_I_02_byte	Input 2 bytes	IOL_O_02_byte	Output 2 bytes
IOL_I/O_04/04_byte	Input 4 bytes Output 4 bytes	IOL_I_04_byte	Input 4 bytes	IOL_O_04_byte	Output 4 bytes
IOL_I/O_06/06_byte	Input 6 bytes Output 6 bytes	IOL_I_06_byte	Input 6 bytes	IOL_O_06_byte	Output 6 bytes
IOL_I/O_08/08_byte	Input 8 bytes Output 8 bytes	IOL_I_08_byte	Input 8 bytes	IOL_O_08_byte	Output 8 bytes
IOL_I/O_16/16_byte	Input 16 bytes Output 16 bytes	IOL_I_12_byte	Input 12 bytes	IOL_O_12_byte	Output 12 bytes
IOL_I/O_24/24_byte	Input 24 bytes Output 24 bytes	IOL_I_16_byte	Input 16 bytes	IOL_O_16_byte	Output 16 bytes
IOL_I/O_32/32_byte	Input 32 bytes Output 32 bytes	IOL_I_twenty four_byte	Input 24 bytes	IOL_O_twenty four_byte	Output 24 bytes
		IOL_I_32_byte	Input 32 bytes	IOL_O_32_byte	Output 32 bytes

2.9.1. IO-LINK State information

➢ After adding the DF50-M-4IOL module, there is a default slot "IO-LINK State" to display the status information of each port of the module. Fill in the IO-LINK State address into the monitoring table as shown below. For the specific meaning of State, please refer to Chapter 3, Section 18.4.2.

	Address	Format	Value
1	IW131	Hexadecimal	16#0000
2	I133.5	Bit	2#1
3	I133.6	Bit	2#0
4		Signed	
5	IW134	Hexadecimal	16#1800
6	I136.5	Bit	2#0
7	I136.6	Bit	2#1
8		Signed	
9	IW137	Hexadecimal	16#1800
10	I139.5	Bit	2#0
11	I139.6	Bit	2#1
12		Signed	
13	IW140	Hexadecimal	16#0000
14	I142.5	Bit	2#0
15	I142.6	Bit	2#0
16		Signed	
17	QB130	Hexadecimal	16#00
18	QB131	Hexadecimal	16#00
19	QB132	Hexadecimal	16#00
20	QB133	Hexadecimal	16#00

Figure 4-2-107

➢ PORT0 is connected to an IO-link slave, the event code is displayed as "16#0", the working status is "TRUE" indicating that it is in normal working state, and the communication status is "FALSE" indicating that it is in slave connection state.

➢ PORT1 and PORT2 are not connected to the device, and the event code is displayed as "16#1800". According to the port event code, the IO-LINK slave is offline. The working status is "FALSE", indicating that it is in an incorrect working state, and the communication status is "TRUE", indicating that the slave is disconnected.

➢ PORT3 is the monitoring information when it is not configured.

➢ As shown in the figure below, writing "0x01" in Port1 Command can clear the event code of Port1.

	Address	Format	Value
1	IW131	Hexadecimal	16#0000
2	I133.5	Bit	2#1
3	I133.6	Bit	2#0
4		Signed	
5	IW134	Hexadecimal	16#0000
6	I136.5	Bit	2#0
7	I136.6	Bit	2#1
8		Signed	
9	IW137	Hexadecimal	16#1800
10	I139.5	Bit	2#0
11	I139.6	Bit	2#1
12		Signed	
13	IW140	Hexadecimal	16#0000
14	I142.5	Bit	2#0
15	I142.6	Bit	2#0
16		Signed	
17	QB130	Hexadecimal	16#00
18	QB131	Hexadecimal	16#01
19	QB132	Hexadecimal	16#00
20	QB133	Hexadecimal	16#00

Figure 4-2-108

2.9.2. IO-LINK Mode

➢ As shown in the figure below, configure PORT0 to IO-link mode. The default mode is IO-link mode. For other configurable information, please refer to[Chapter 3, Section 18.3]ISDU is configured according to the instructions of the IO-Link slave you are using. The IO-Link slave used in this tutorial does not have a configurable ISDU. Note that you must re-download the configuration after the configuration is complete.

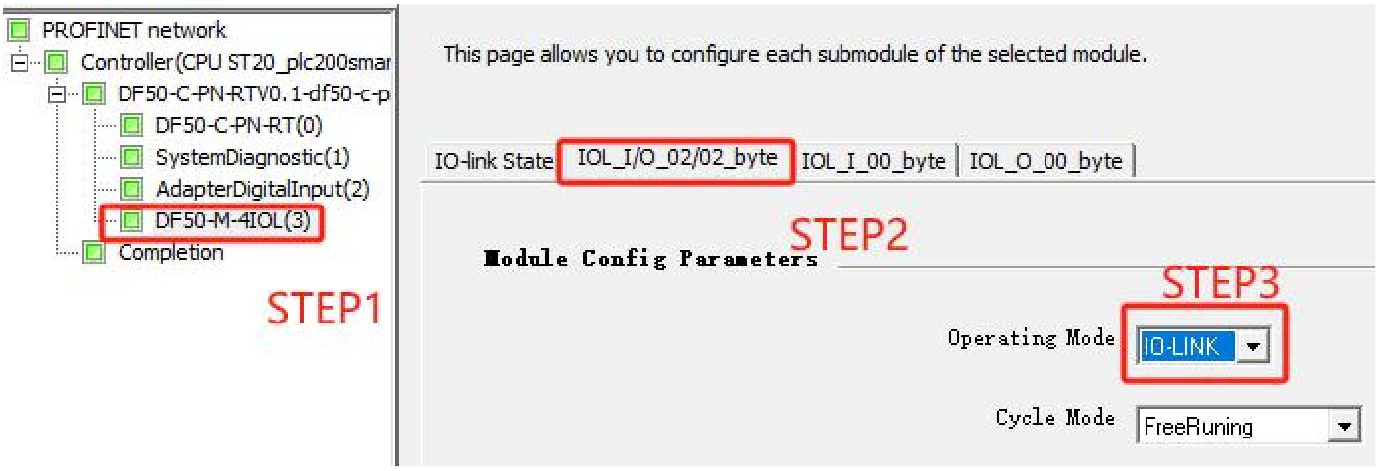


Figure 4-2-109

➢ Fill in the Port0 address in the monitoring table. For its meaning, please refer to Chapter 3, Section 18.4.2.

	Address	Format
23	I143.0	Bit
24	I143.1	Bit
25	I143.2	Bit
26	IB144	Hexadecimal
27	IB145	Hexadecimal
28		Signed
29	Q134.1	Bit
30	Q134.2	Bit
31	QB135	Hexadecimal
32	QB136	Hexadecimal

Figure 4-2-110

➢ Data reception:As shown in the figure below, if the Valid bit is "TRUE", it means the received data is valid, and the Process data is the received data. The data received this time is "16#08". In this mode, the DI and C/Q DI bits are invalid.

Address	Format	Value
I143.0	Bit	2#0
I143.1	Bit	2#0
I143.2	Bit	2#1
IB144	Hexadecimal	16#08
IB145	Hexadecimal	16#00
	Signed	
Q134.1	Bit	2#0
Q134.2	Bit	2#0
QB135	Hexadecimal	16#00
QB136	Hexadecimal	16#00

Figure 4-2-111

➢ Data sending:Setting the Valid bit to "TRUE" or "FALSE" indicates whether the sent data is valid. The Process data is the sent data, and this time "16#0F" is sent. In this mode, the C/Q DO bit is invalid.

Address	Format	Value
I143.0	Bit	2#0
I143.1	Bit	2#0
I143.2	Bit	2#1
IB144	Hexadecimal	16#08
IB145	Hexadecimal	16#00
	Signed	
Q134.1	Bit	2#0
Q134.2	Bit	2#0
QB135	Hexadecimal	16#0F
QB136	Hexadecimal	16#00

Figure 4-2-112

2.9.3. DI/DO mode

➢ As shown in the figure below, configure Port1 to DI mode and Port2 to DO mode. The default mode is IO-link. Note that you need to re-download the configuration after the configuration is completed.

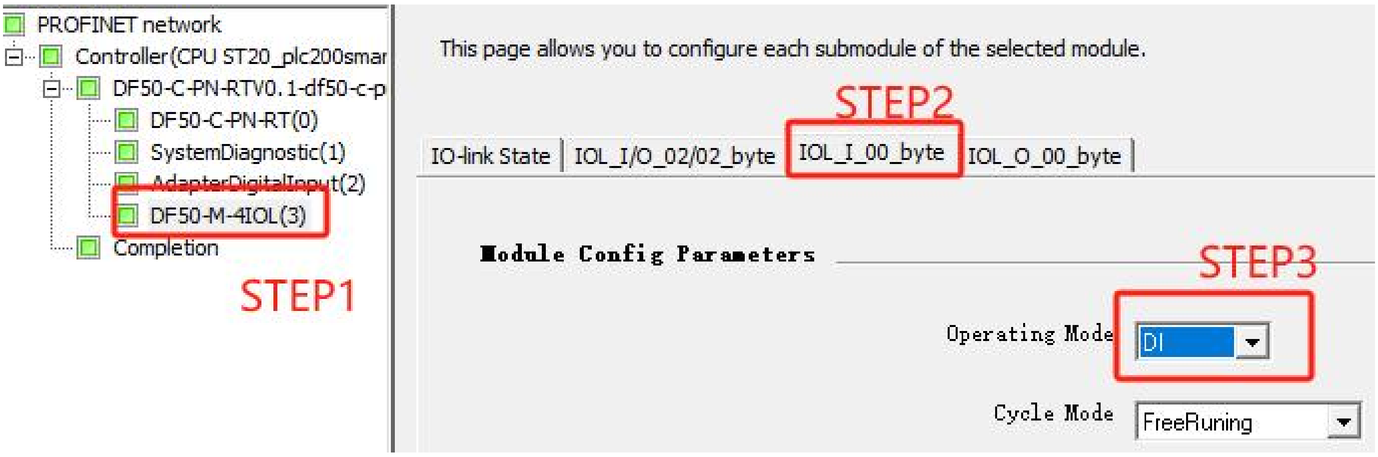


Figure 4-2-113Configured as DI

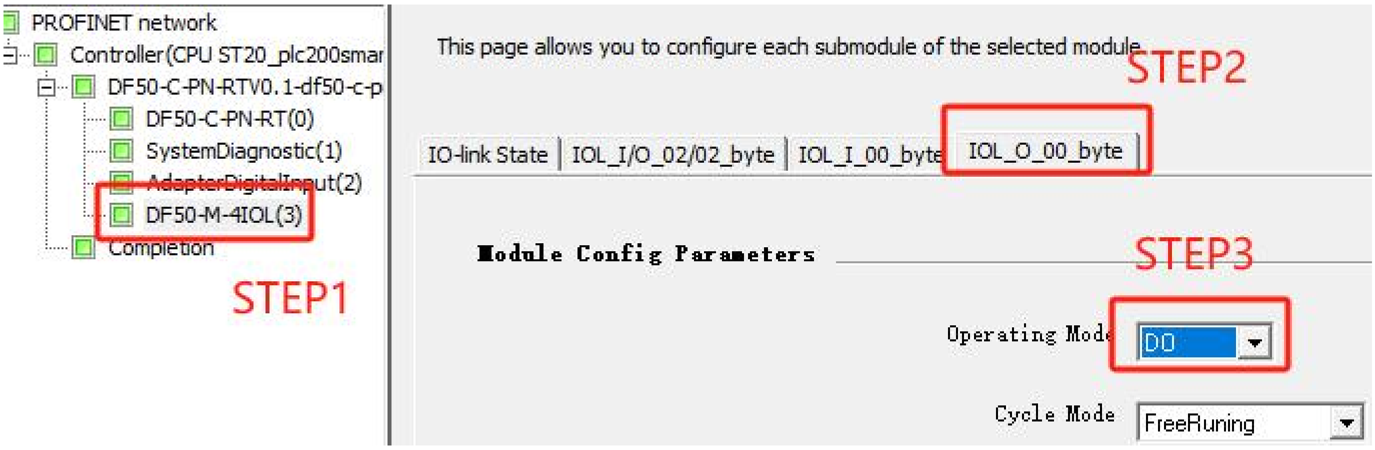


Figure 4-2-114Configured as DO

➢ Fill in the Port1 and Port2 addresses in the monitoring table. For their meanings, please refer toChapter 3, Section 18.4.2For wiring method, please refer toChapter 3, Section 18.2.2.

I146.0	Bit
I146.1	Bit
	Signed
Q137.1	Bit

Figure 4-2-115

➢ Input valid signals to Port1 DI and Port1 C/Q DI. As shown in the figure below, you can see that the corresponding address becomes "TURE".

I146.0	Bit	2#1
I146.1	Bit	2#1
	Signed	
Q137.1	Bit	2#0

Figure 4-2-116

➢ As shown in the figure below, write "TRUE" to Port2 C/Q DO, and use a multimeter to measure the voltage of C/Q2 port, and you can measure the voltage to be 24V.

I146.0	Bit	2#0
I146.1	Bit	2#0
	Signed	
Q137.1	Bit	2#1

Figure 4-2-117

3. SIMATIC Manager software configuration process

➢ This chapter specifically introduces the use of the adapter DF50-C-PN-RT using Siemens' SIMATIC Manager as the configuration software.

➢ The PLC model used in this section is 6ES7 315-2EH14-0AB0.

3.1. Project Creation

3.1.1. New Construction

➢ The software interface is shown below. Click Next.

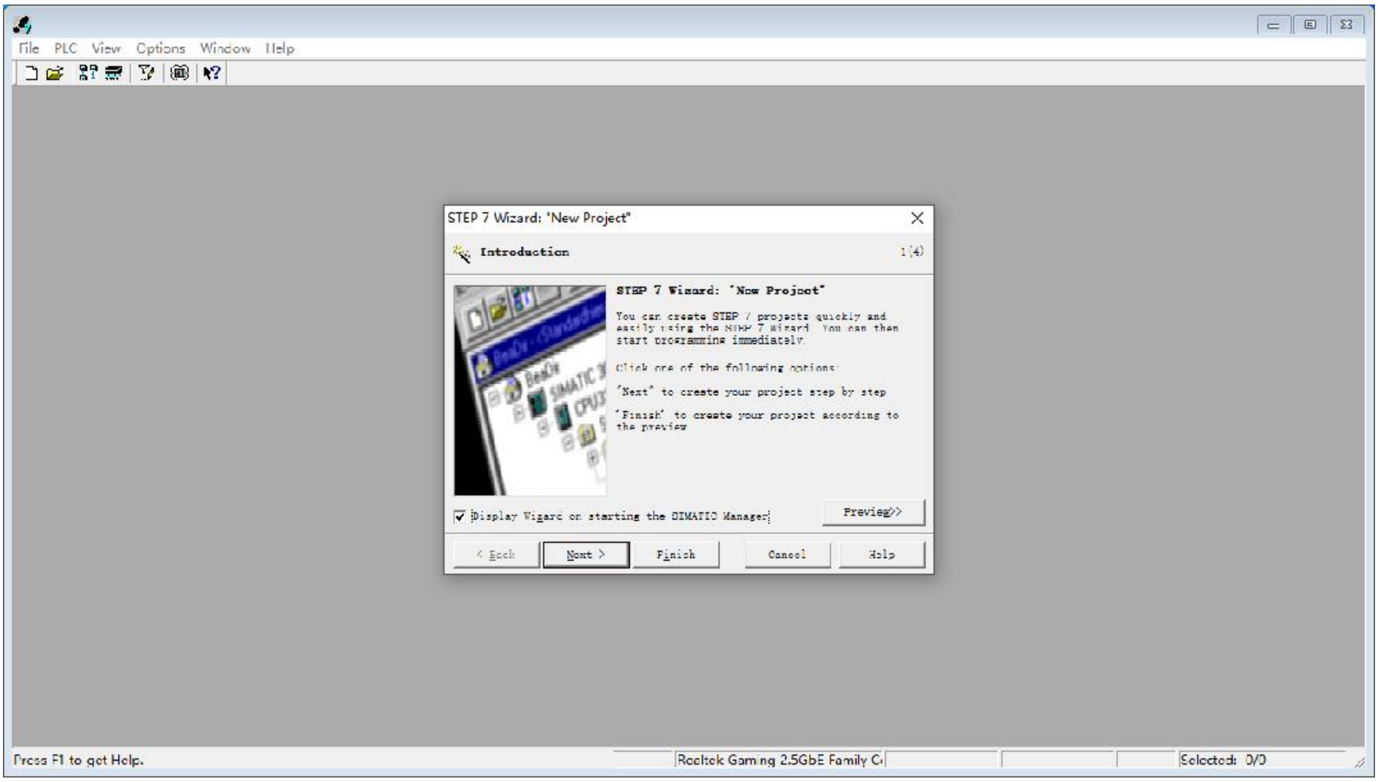


Figure 4-3-1

- Select the CPU model you are using and click Finish.

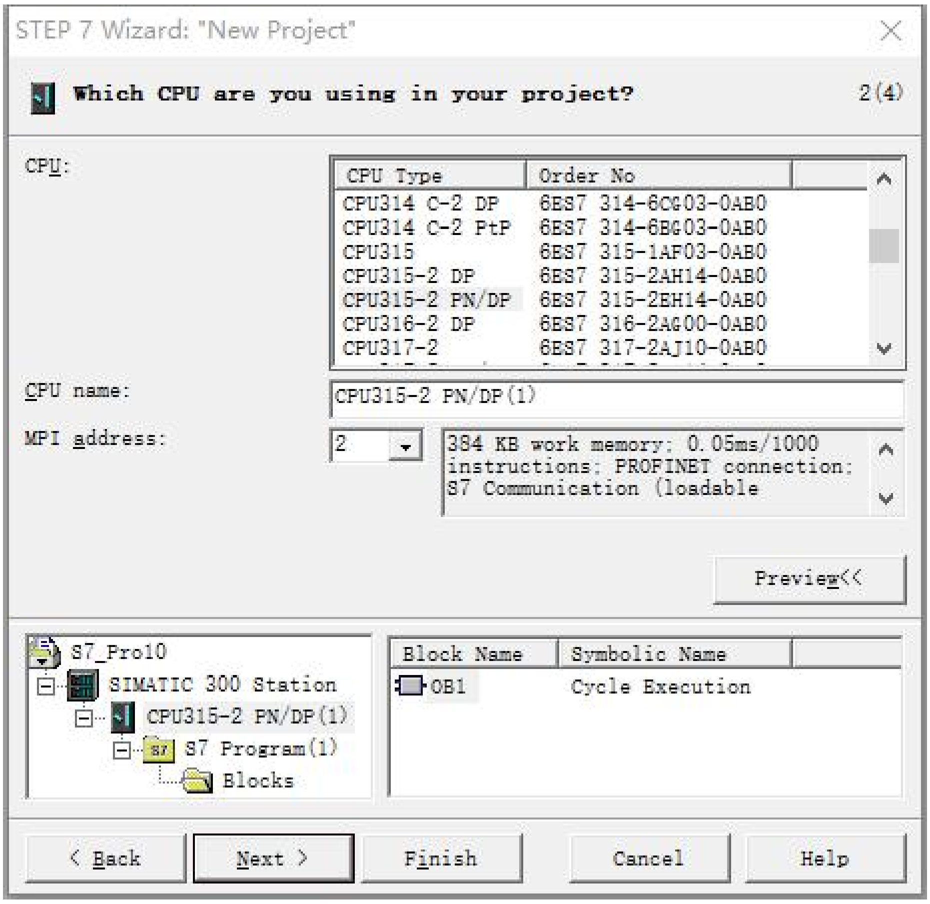


Figure 4-3-2

- The creation completion interface is shown in the figure below.

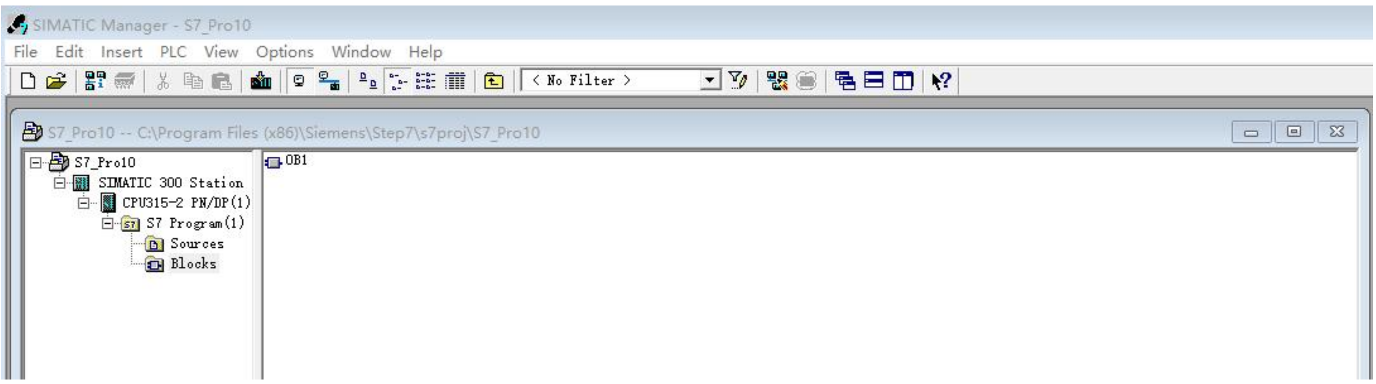


Figure 4-3-3

3.1.2. Add GSD file

➢ Double-click Hardware, as shown in the following figure.

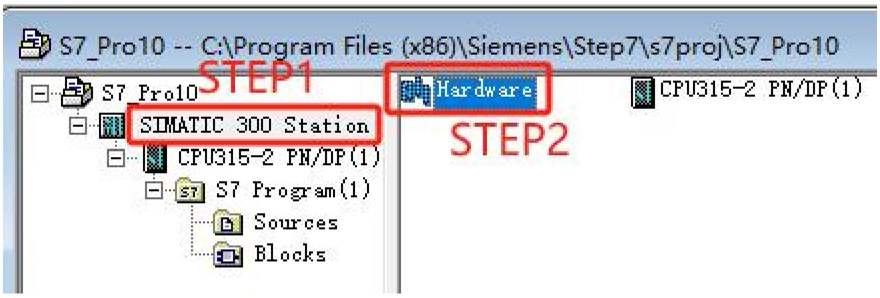


Figure 4-3-4

➢ Click Install GSD file, as shown below.

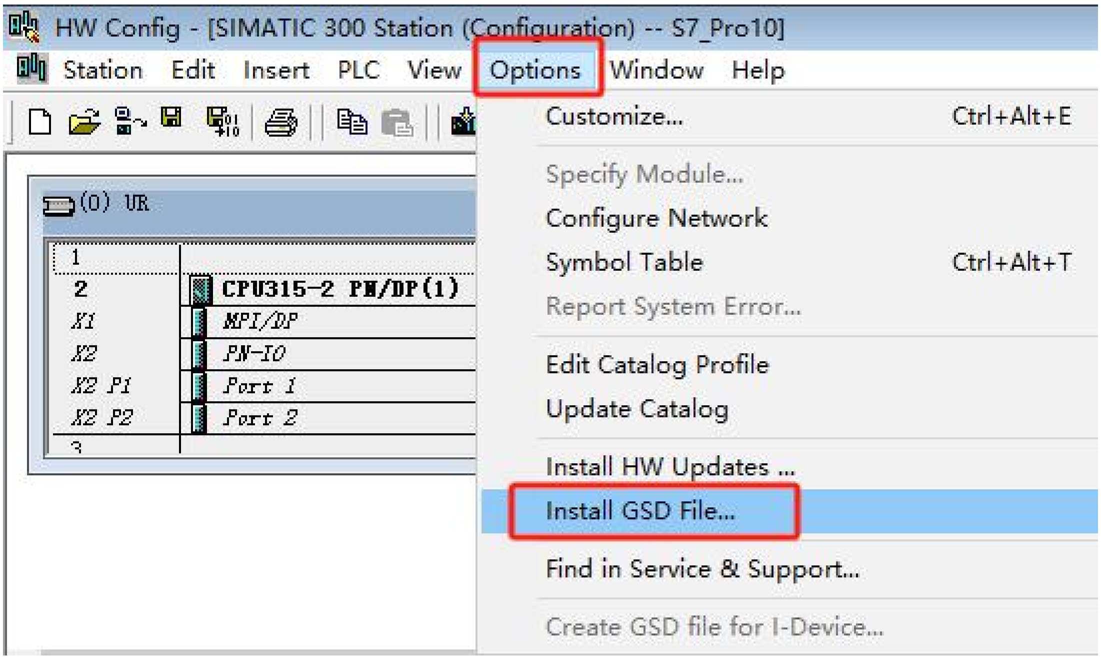


Figure 4-3-5

➢ As shown in the figure below, find the GSD file directory in the computer and add it.

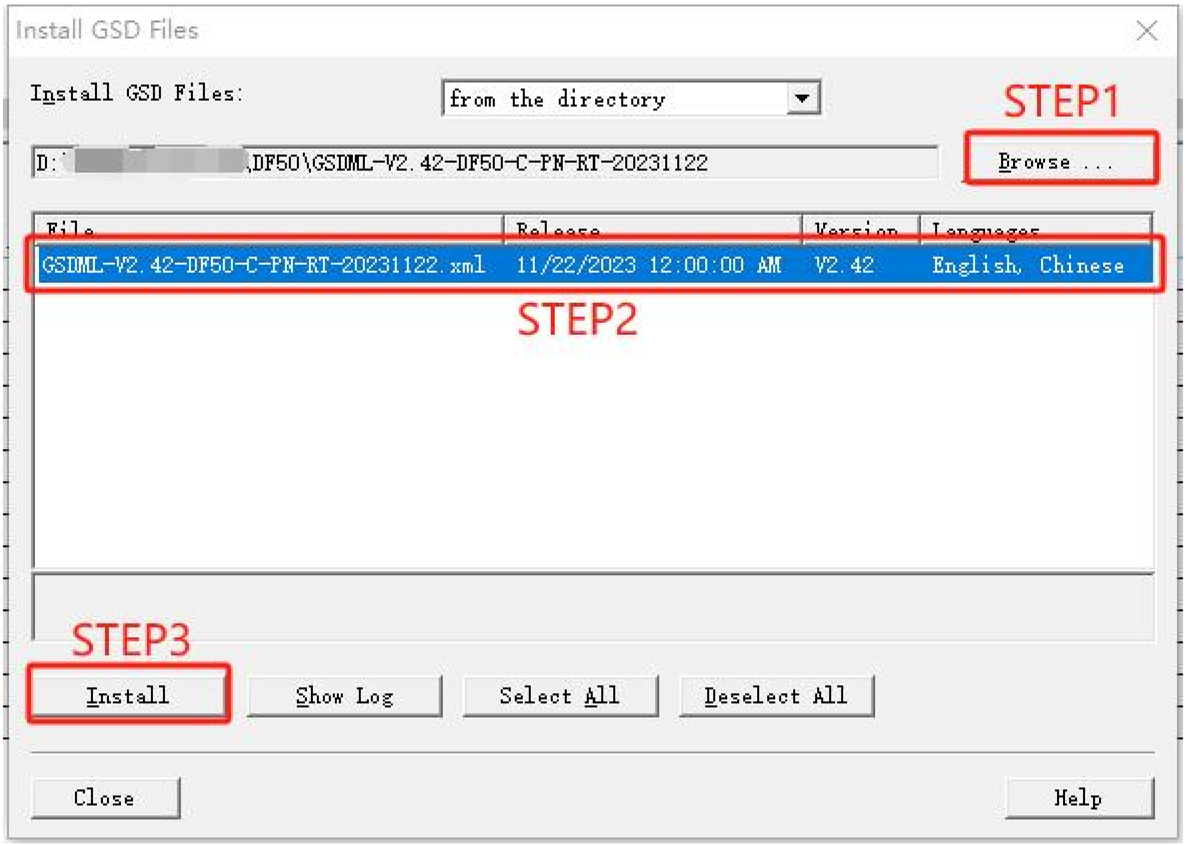


Figure 4-3-6

➢ Click the Catalog button to open the device catalog.

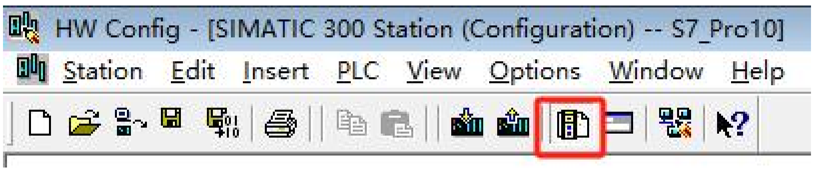


Figure 4-3-7

➢ DF50-C-PN-RT can be added to the catalog as shown in the figure below.

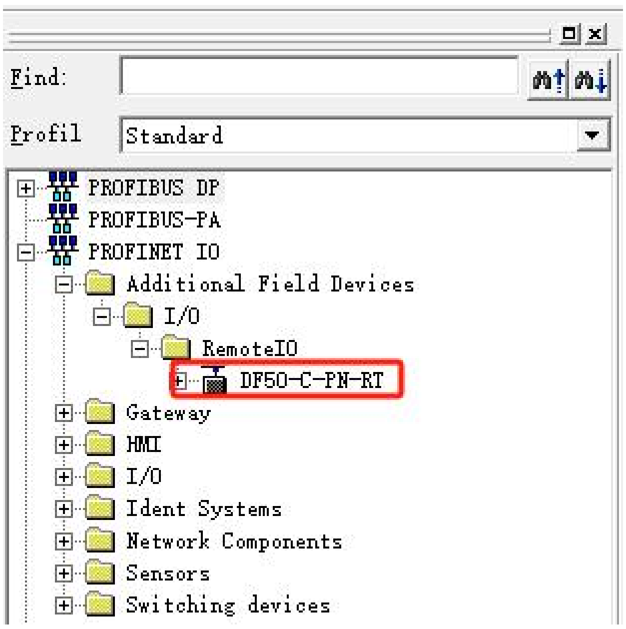


Figure 4-3-8

3.1.3. Adding an Adapter

➢ As shown in the figure below, double-click PN-IO, enter the General page, and click Properties...

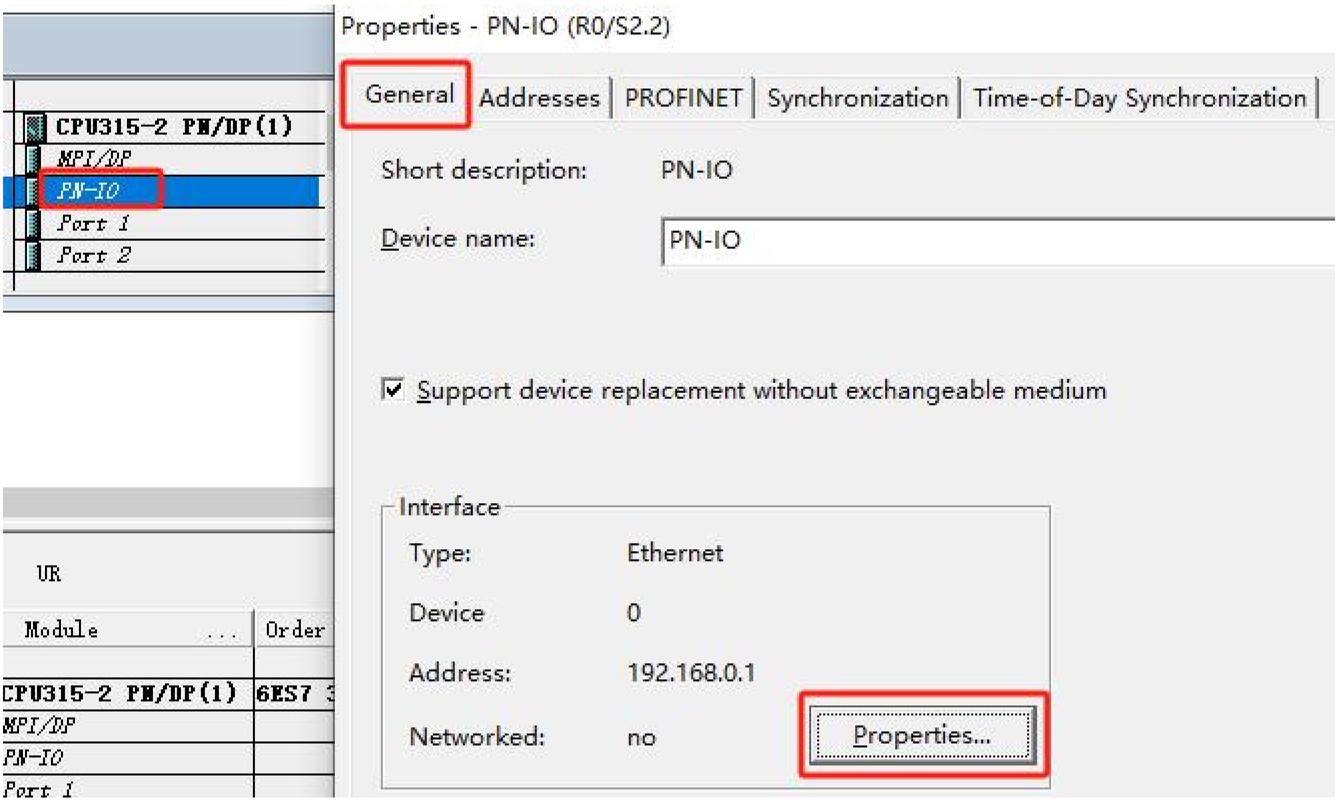


Figure 4-3-9

➢ Add a new subnet as shown in Figures 4-3-10 and 4-3-11. Then click OK.

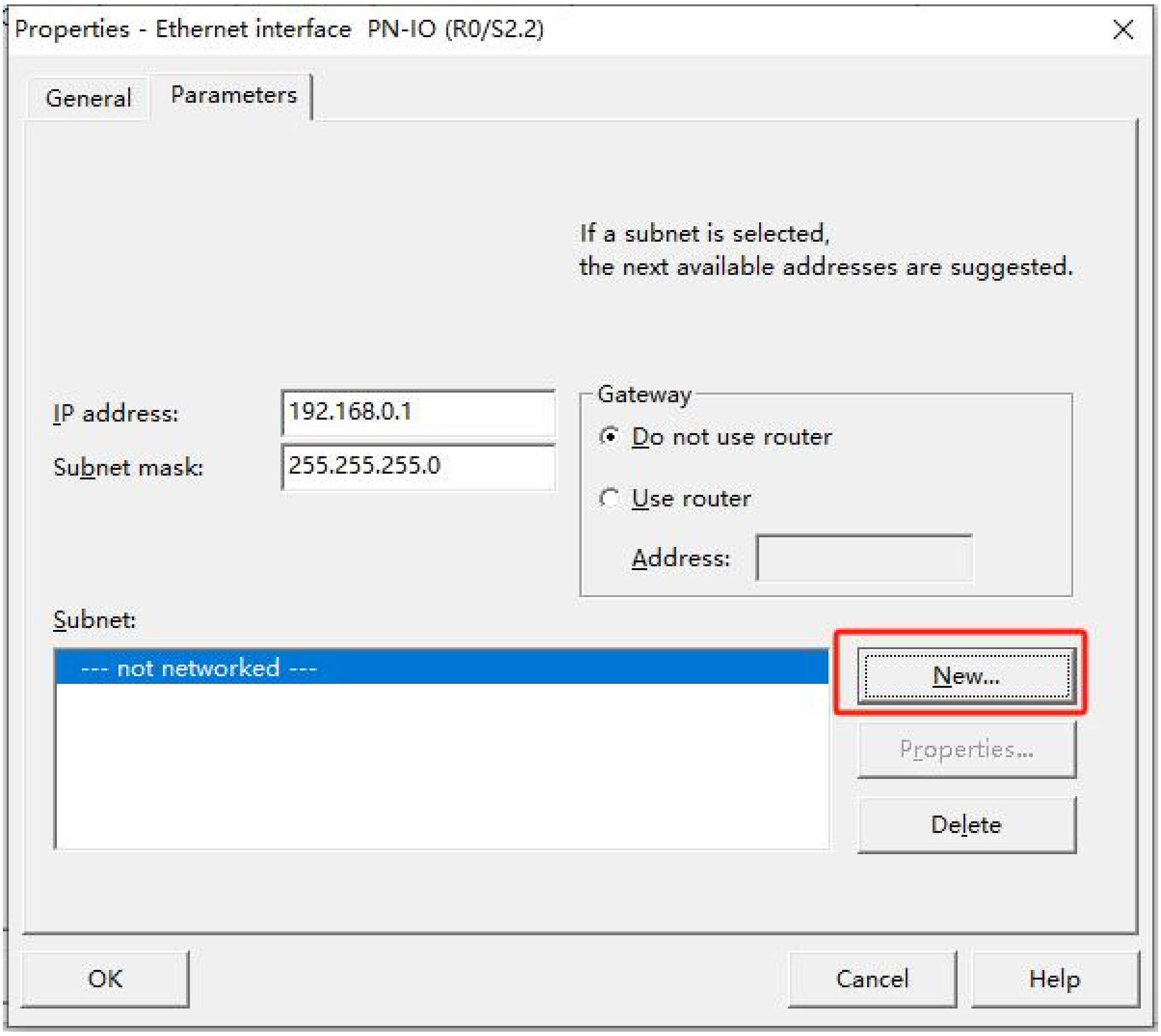


Figure 4-3-10

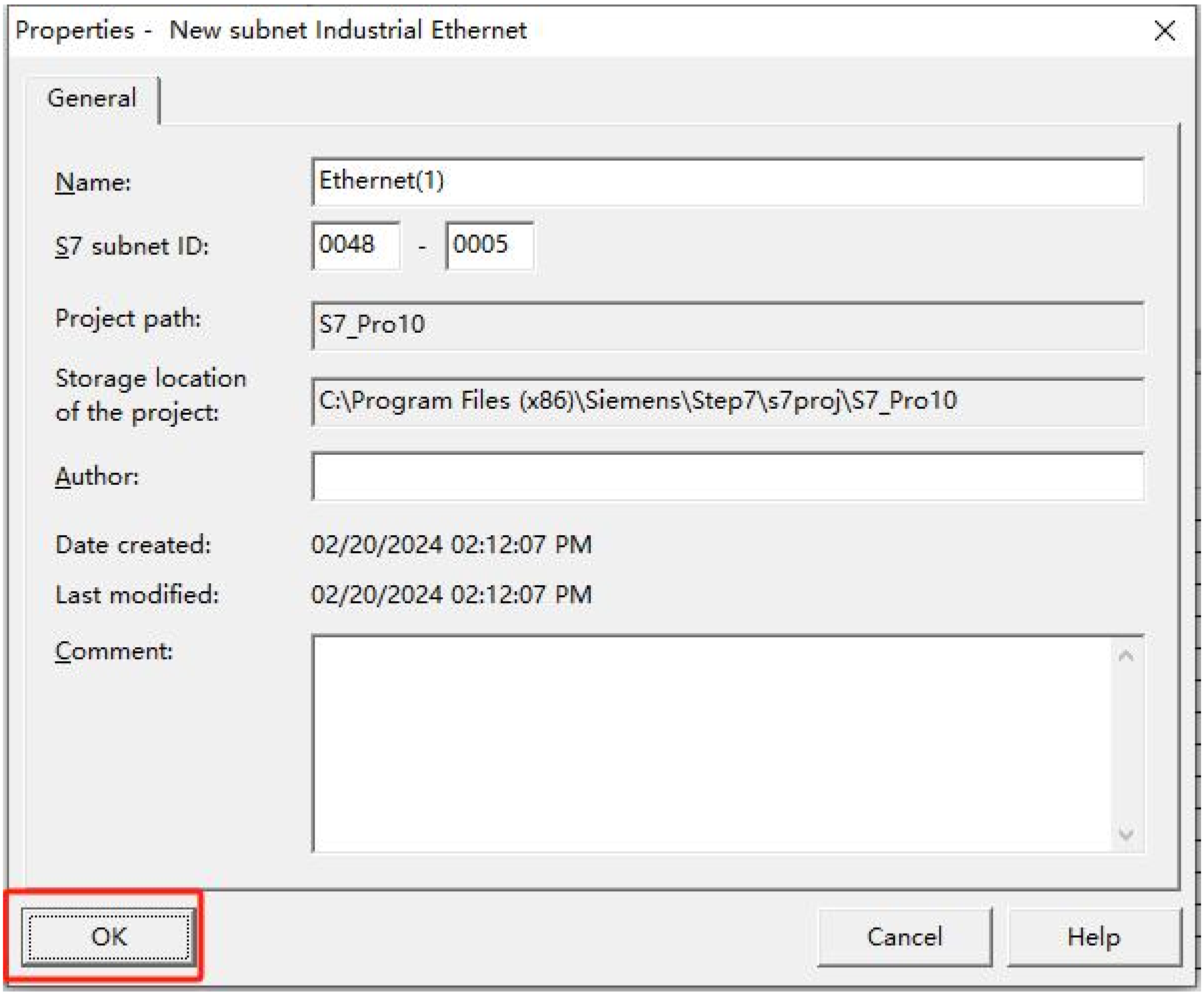


Figure 4-3-11

- After adding the subnet, the result is as shown in the following figure.

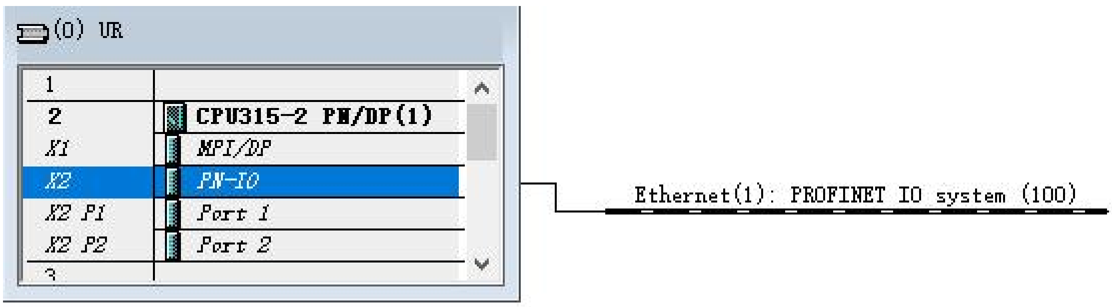


Figure 4-3-12

➢ Select the Ethernet you just added.

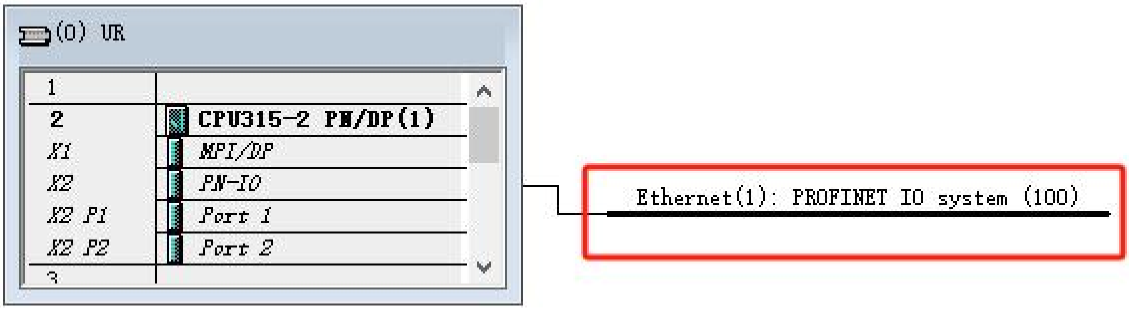


Figure 4-3-13

➢ Double-click DF50-C-PN-RT in the catalog.

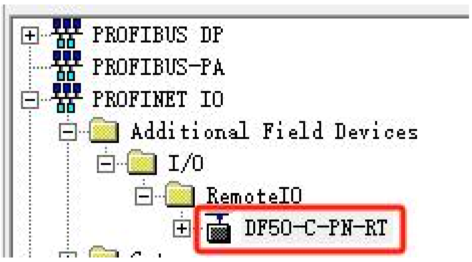
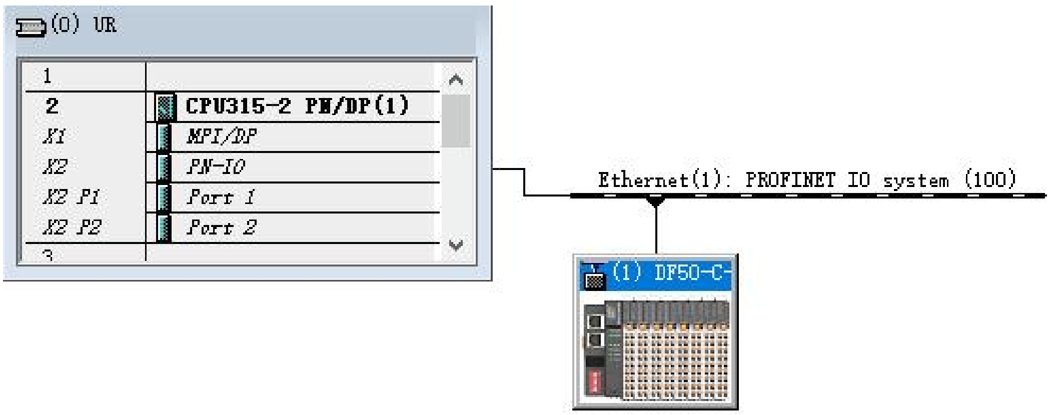
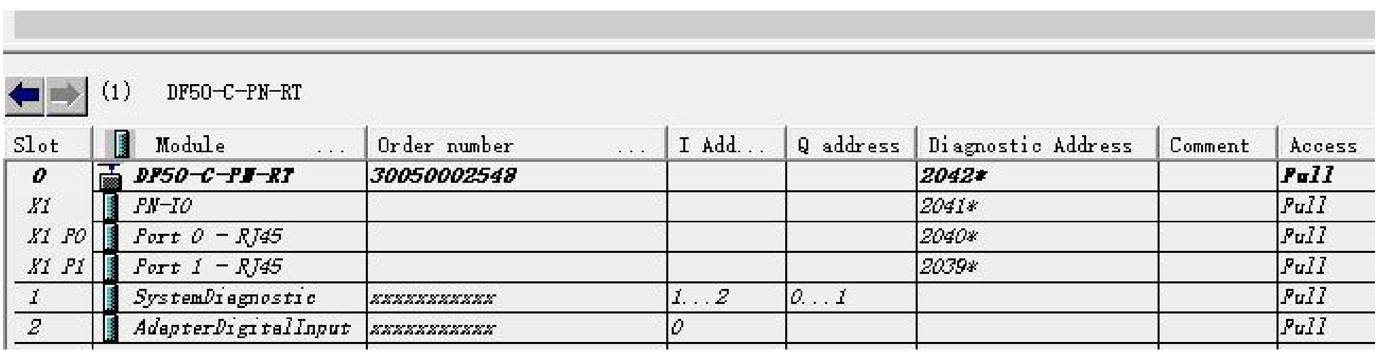


Figure 4-3-14

➢ After adding, you will get the following interface.




(1) DF50-C-PN-RT

Slot	Module	Order number	I Add...	Q address	Diagnostic Address	Comment	Access
0	DF50-C-PN-RT	30050002548			2042*		Full
X1	PN-IO				2041*		Full
X1 P0	Port 0 - RJ45				2040*		Full
X1 P1	Port 1 - RJ45				2039*		Full
1	SystemDiagnostic	xxxxxxxxxxx	1...2	0...1			Full
2	AdapterDigitalInput	xxxxxxxxxxx	0				Full

Figure 4-3-15

3.1.4. Assigning a Device Name

➢ As shown in the figure below, double-click the adapter to modify the device name of the adapter. Here, three zeros are added.

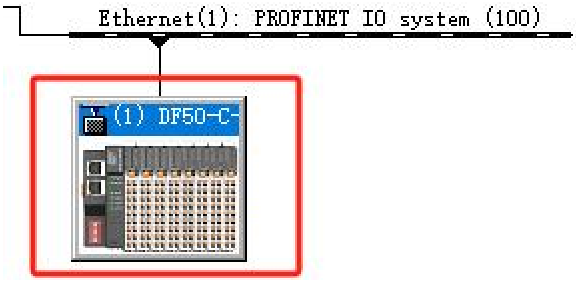


Figure 4-3-16

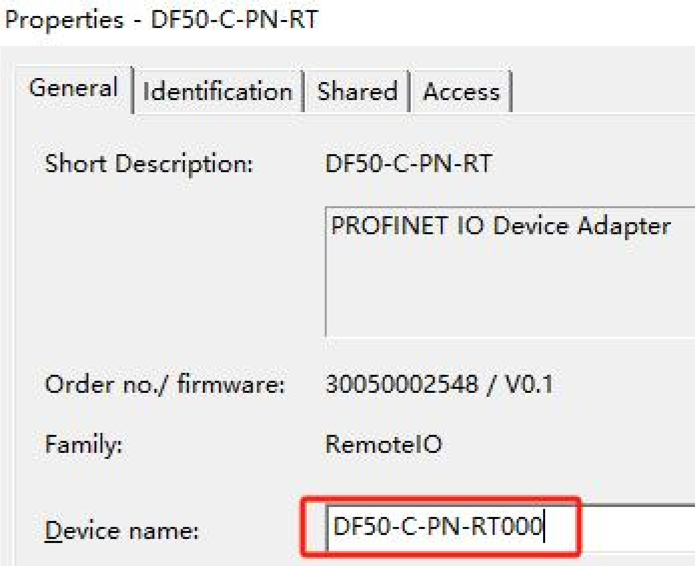


Figure 4-3-17

➢ As shown in the figure below, you can verify the device name (Verify Device Name) and assign the device name (Assign Device Name).

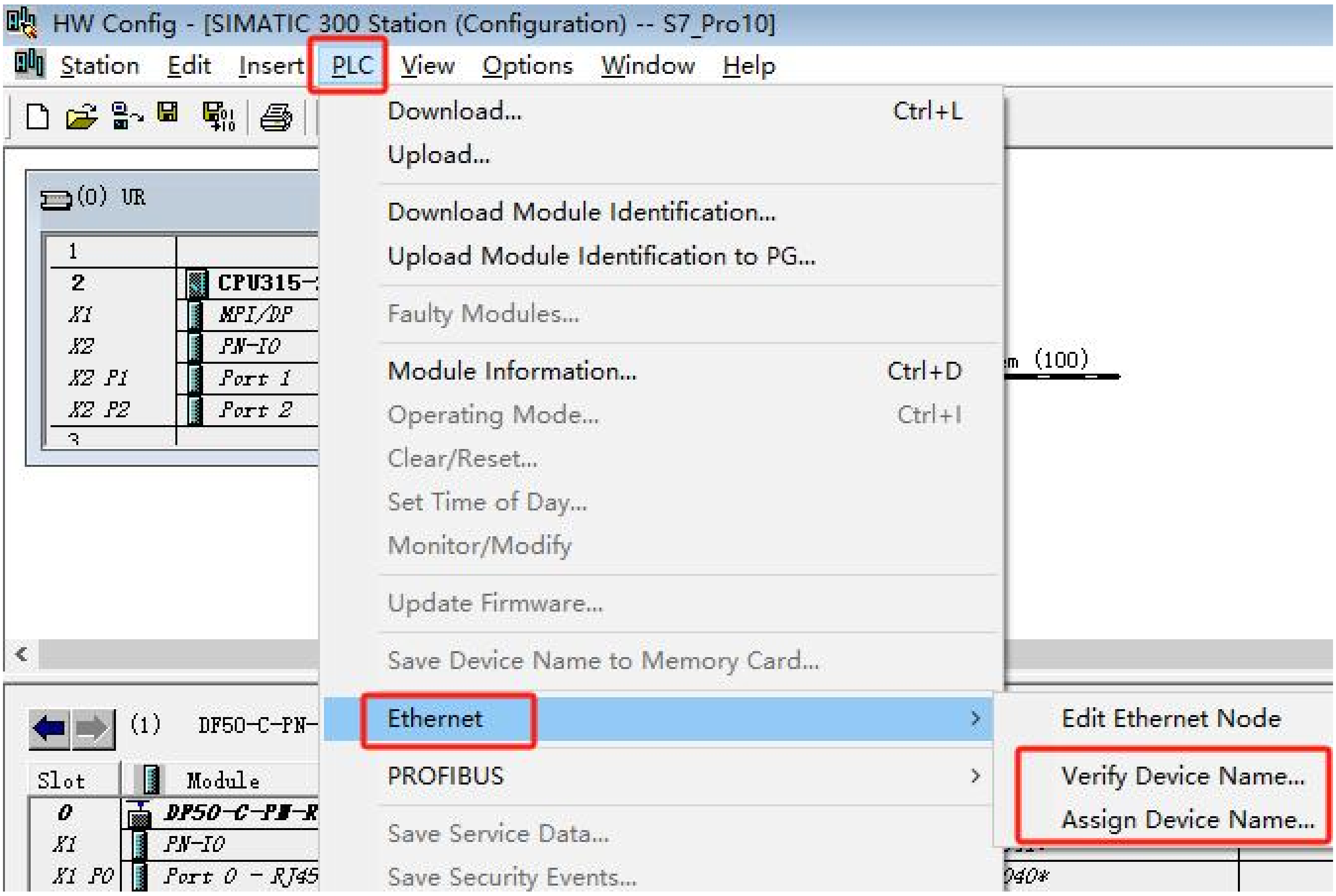


Figure 4-3-18

➢ Click Verify Device Name to get the page shown in the figure below. The red cross indicates that the device name we set does not match the actual device name and needs to be re-assigned. You can directly click Assign Name... in the figure or open Assign Device Name in Figure 4-3-18.

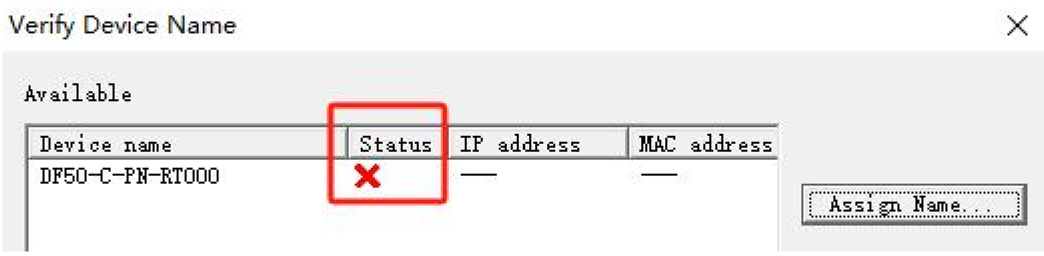


Figure 4-3-19

➢ As shown in the figure below, select the device in STEP2 and click STEP3 to specify the name. If multiple devices are configured, you can select them in STEP1.

Figure 4-3-20

➢ Verify again that the device name shows a green check.

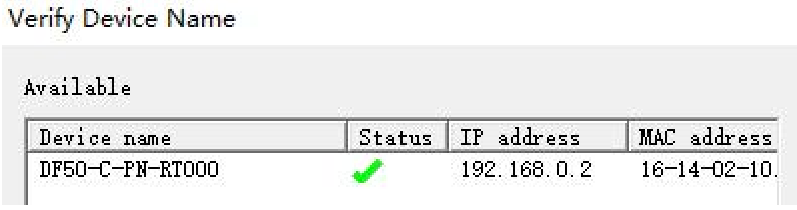


Figure 4-3-twenty one

3.1.5. Adding IO expansion modules

➢ After selecting the device, double-click the card you need in the directory on the right or drag it to the sub-slot behind. The software will automatically assign an address to it, and you can also double-click the sub-slot to modify it.

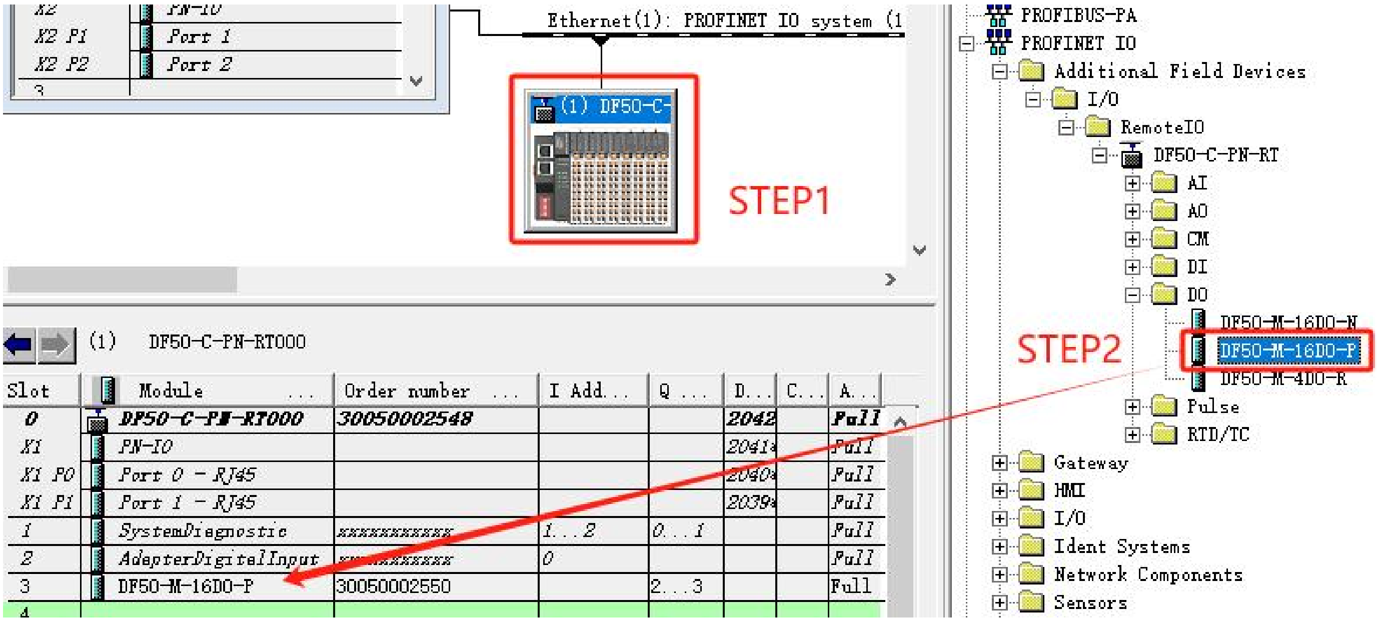


Figure 4-3-twenty two

3.1.6. Download to PLC

➢ Click Download in the PLC tab as shown below.

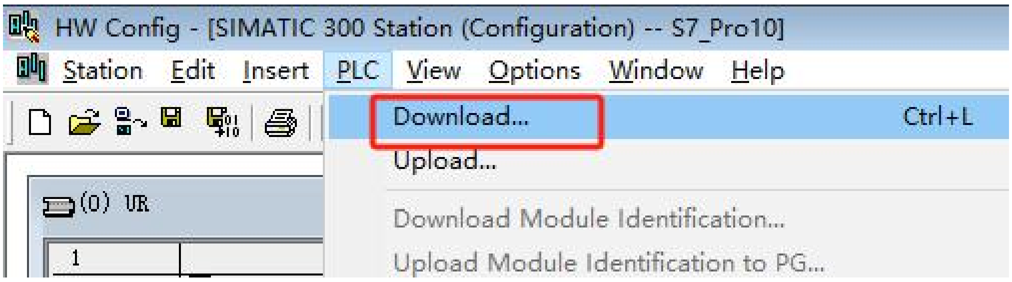


Figure 4-3-twenty three

➢ Click the button as shown below.

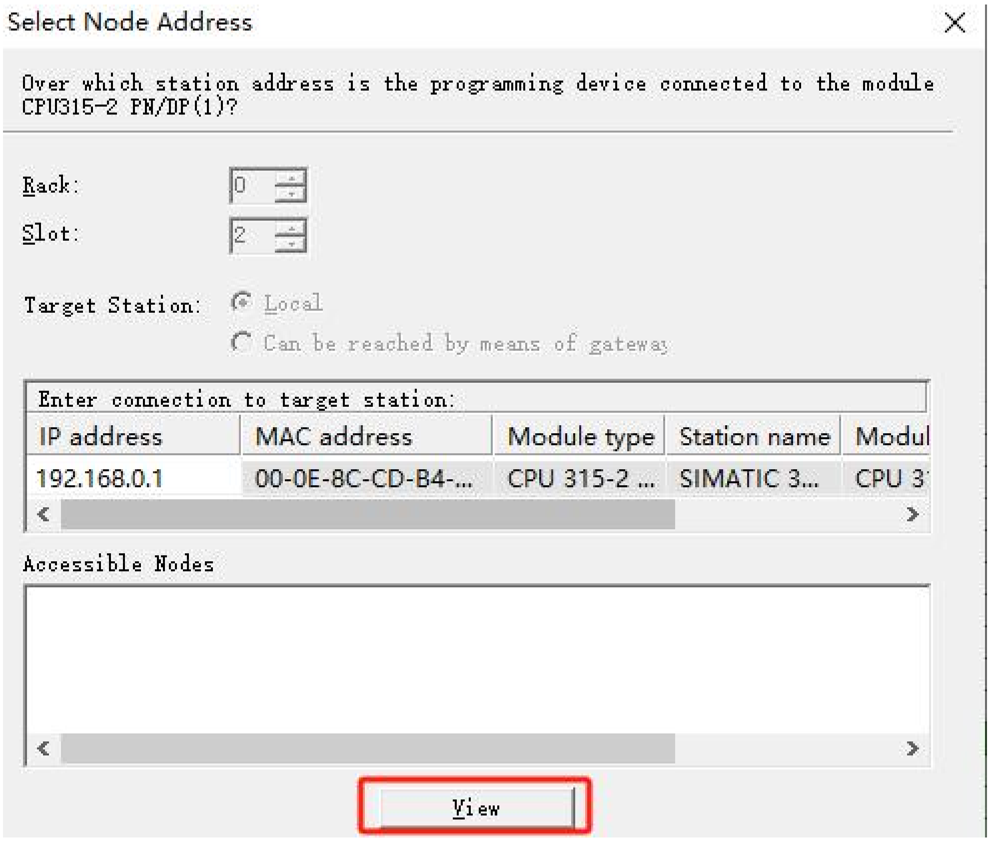


Figure 4-3-twenty four

➢ After selecting the device, click OK in sequence to complete the download.

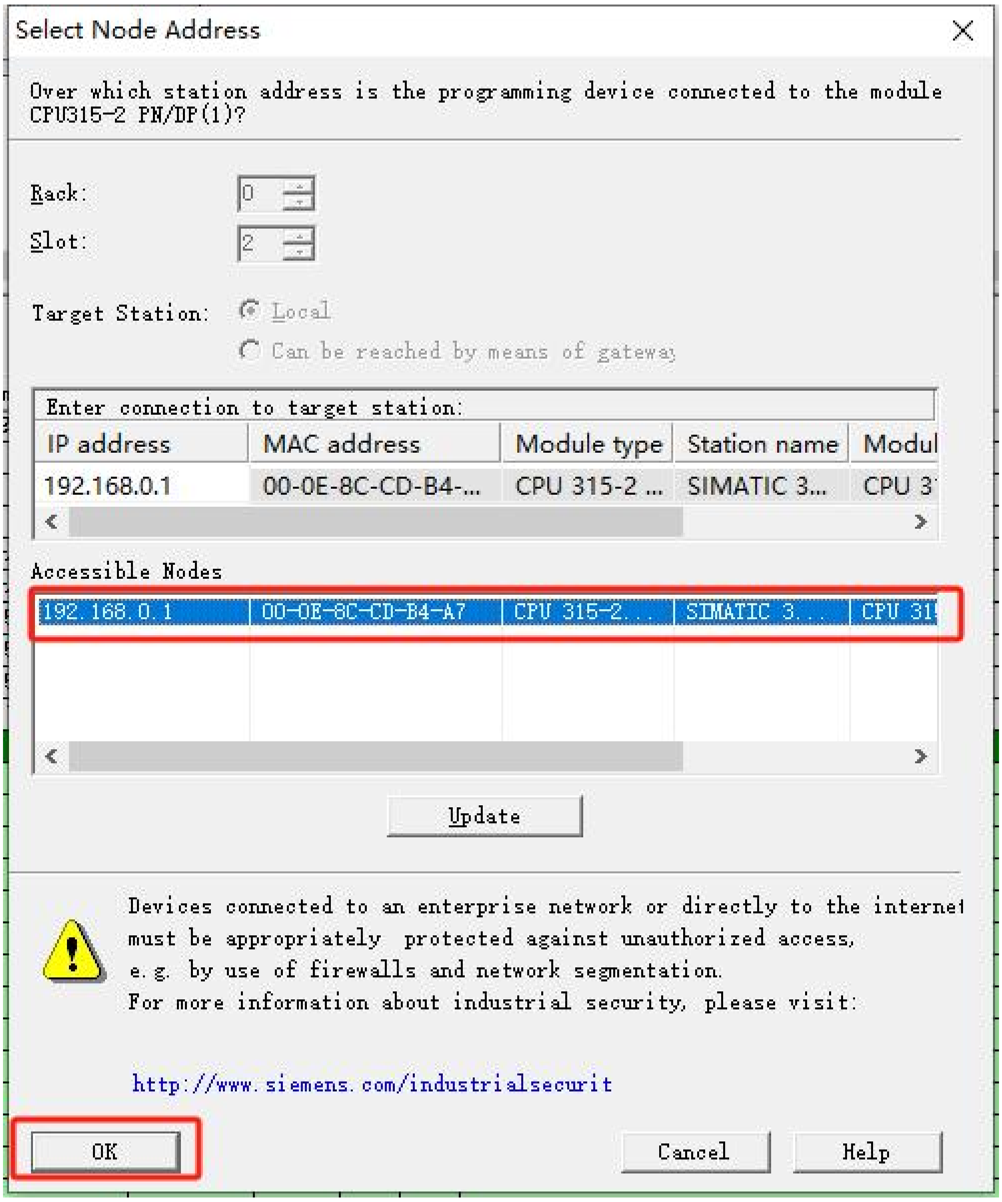


Figure 4-3-25

➢ Finally, you need to turn the switch on the PLC to RUN. If there is no red light error on the PLC and the RUN light on the DF50 adapter is always on, the configuration is complete.

3.1.7. Debugging and testing

➢ As shown in the figure below, click Blocks, right-click in the blank space on the right, and add a variable table.

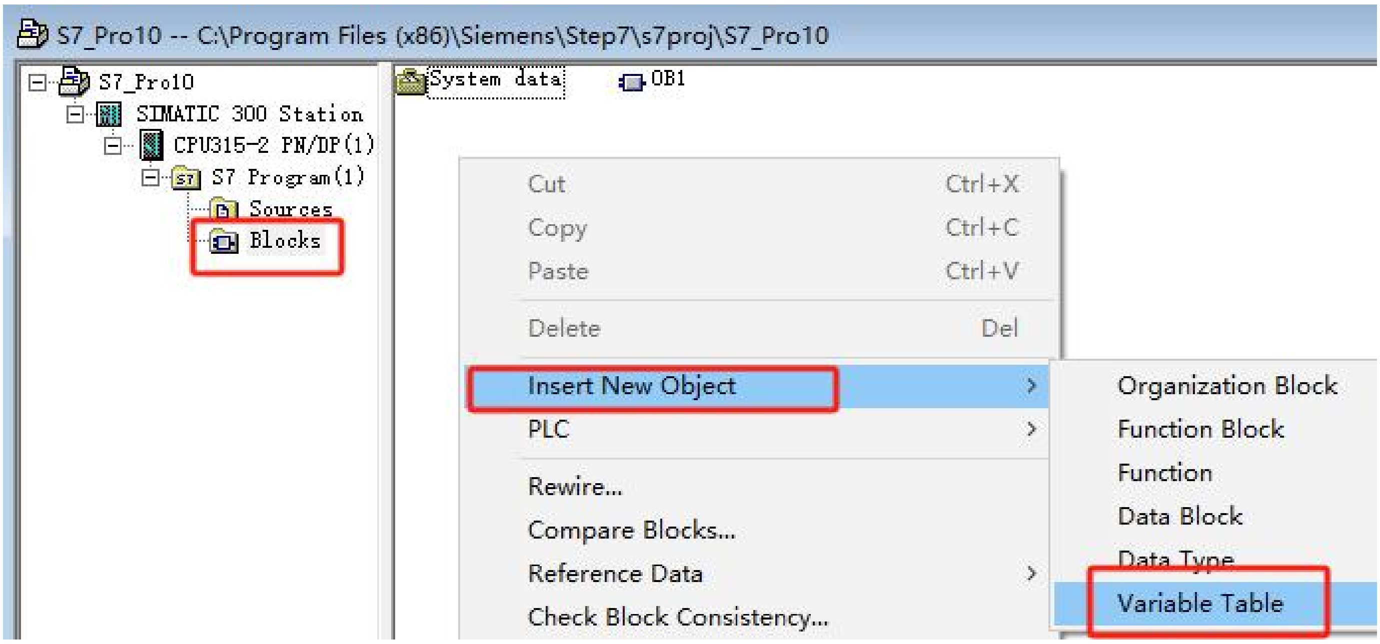


Figure 4-3-26

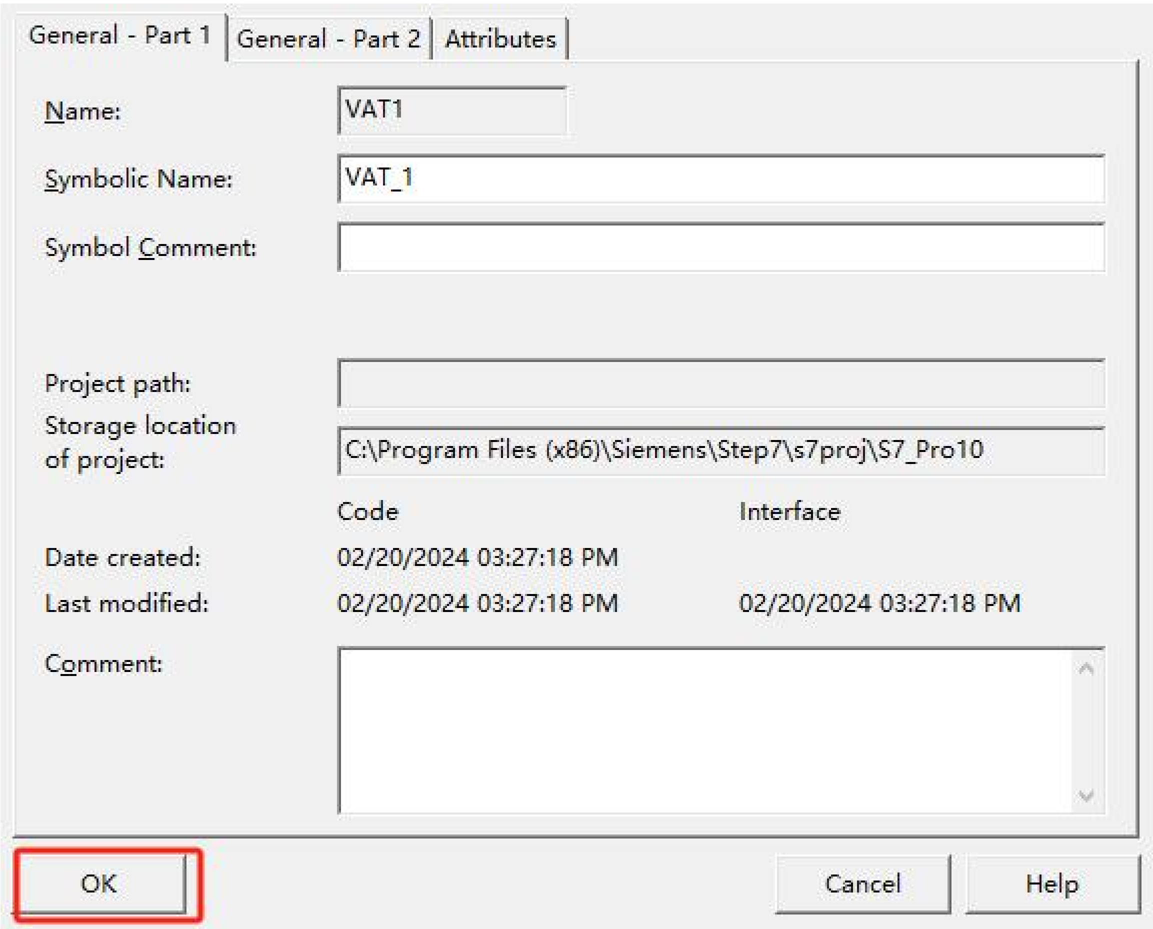


Figure 4-3-27

➢ Double-click the variable table just added to get the following interface.

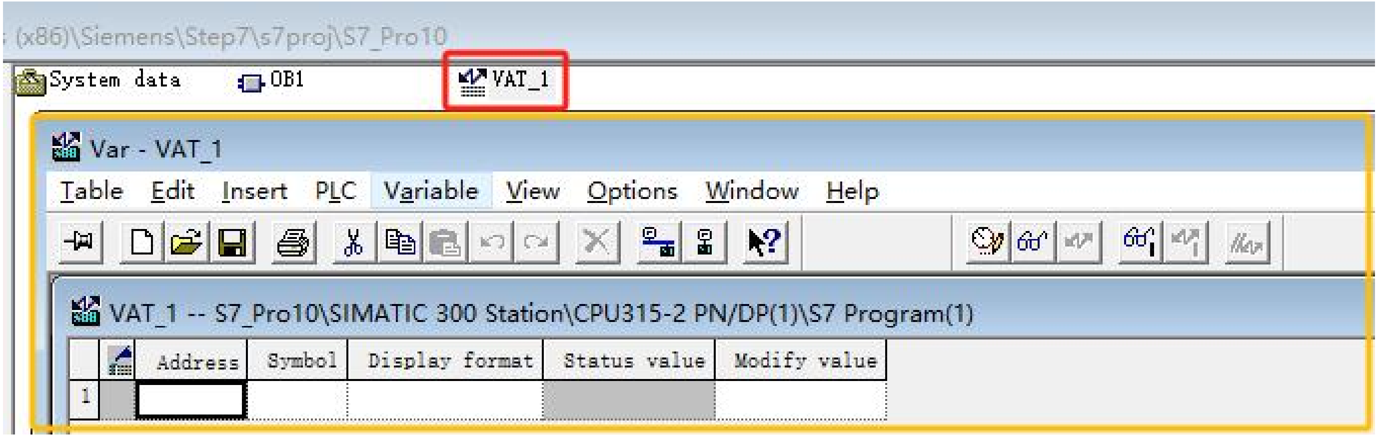


Figure 4-3-28

➢ Add an address in the orange box to monitor and modify its data. Click STEP1 and STEP2 in turn to monitor the data in the address in real time. After filling in the data in Modify value, click STEP3 to write the data.

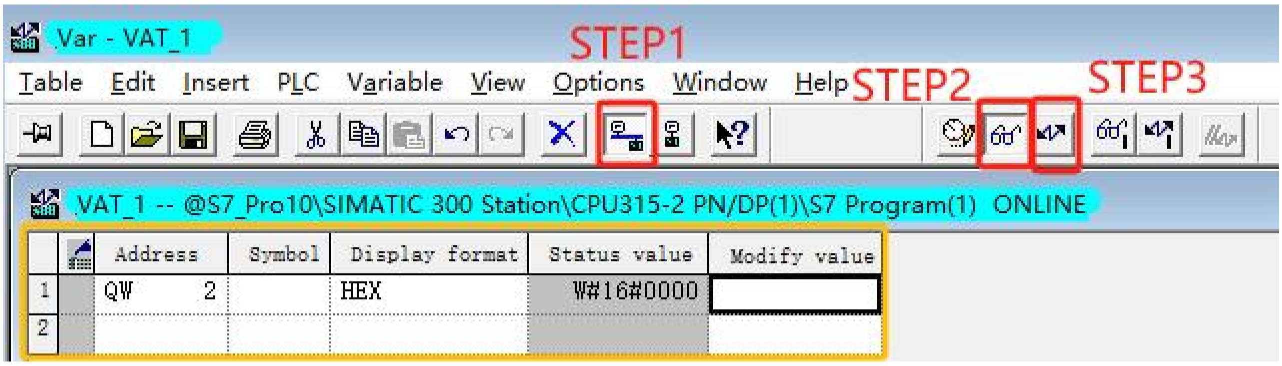


Figure 4-3-29

3.2. Adapter usage examples

➢ Please refer to the wiring diagram of the adapterChapter 2 Section 2.2The example uses the DF50-C-PN-RT + DF50-M-16DO-P + DF50-M-16DO-N + DF50-M-16DI-P/N + DF50-M-16DI-P/N-TS topology. After adding the modules in sequence, the topology shown in Figure 4-3-30 is obtained: SystemDiagnostic is the diagnostic module, AdapterDigitalInput is the adapter 8-channel digital input display, and the other modules are the various IO module cards we inserted.

Module ...	Order number ...	I Add...	Q address
DF50-C-PN-RT000	30050002548		
PN-IO			
Port 0 - RJ45			
Port 1 - RJ45			
SystemDiagnostic	xxxxxxxxxxxx	1...2	0...1
AdapterDigitalInput	xxxxxxxxxxxx	0	
DF50-M-16DO-P	30050002550		2...3
DF50-M-16DO-N	30050002552		4...5
DF50-M-16DI-P/N	30050002551	3...4	
DF50-M-16DI-P/N-TS	30050002671	5...70	6...7

Figure 4-3-30

3.2.1. SystemDiagnostic: Diagnostic module

➢ The process data is shown in the following table.

Table 4.3.1

Input data: 2 Byte		
Byte No.	illustrate	Remark
Byte 0	Location of the faulty module	0x01 represents the first IO module, 0x02 represents the second module, and so on.
Byte 1	Fault Codes	See fault code table 4.3.2 for details
Output data: 2 Byte		
Byte No.	illustrate	Remark
Byte 0	No action required	/
Byte 1		/

➢ The meanings of the fault codes are shown in the following table.

Table 4.3.2

Fault Codes	Fault Description	Troubleshooting
0xE1	Module power supply abnormality	Check the power cord connection
0xE2	Analog module calibration failure	Contact Supplier
0xE3	Module internal initialization exception	Contact Supplier
0xE4	Overcurrent signal detected	Check peripherals

0xE8	Serial port module communication abnormality	Check signal line wiring

➢ As shown in Figures 4-3-31 and 4-3-32, the monitoring value of the diagnostic module is "16#01E1". "01" indicates that the first IO card has a fault, and "E1" indicates that the external power supply of the module is abnormal (see Table 4.3.2 for other fault code meanings); if the monitoring value is 16#02E1, it means that the second IO card has an abnormal module external power supply fault, and so on. Clear the fault data after powering on and off again.

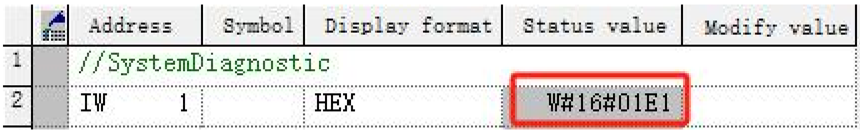


Figure 4-3-31

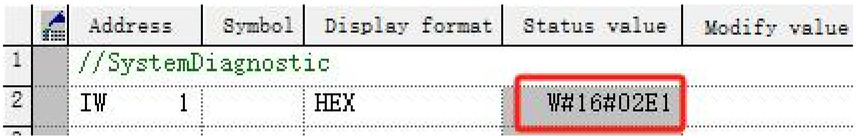


Figure 4-3-32

3.2.2. AdapterDigitalInput: Adapter 8-channel digital input display

➢ The process data is shown in the following table.

Table 4.3.3

Input data: 1 Byte								
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DI 07	DI 06	DI 05	DI 04	DI 03	DI 02	DI 01	DI 00

➢ As shown in the figure below, double-click the AdapterDigitalInput module to modify the filter parameters of the adapter's 8-channel digital input.

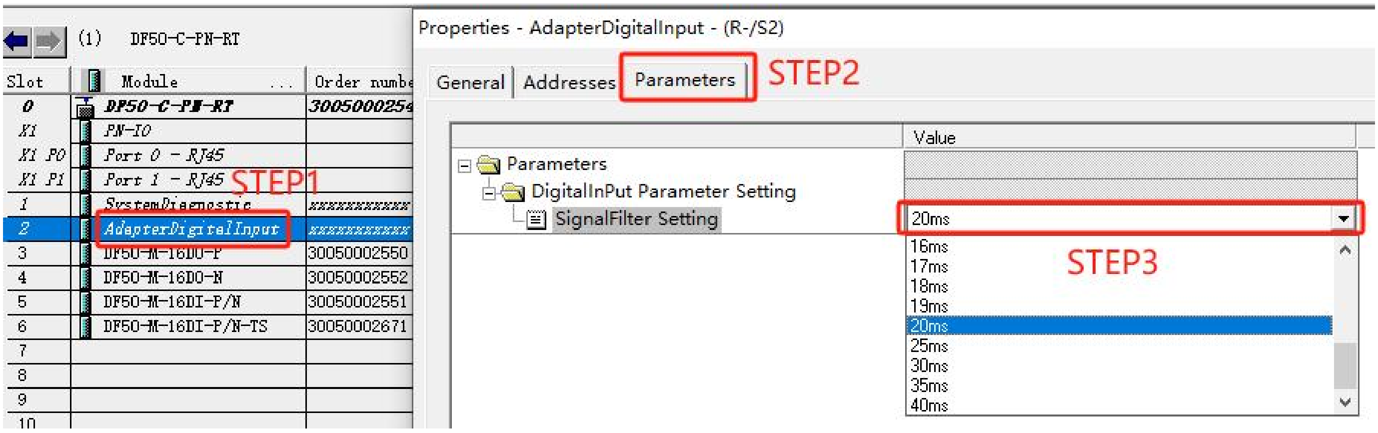


Figure 4-3-33

3.2.3. Bus Error Adapter Status Setting

➢ As shown in the figure below, you can set the behavior of the adapter when a bus error occurs. You can set it to clear the output value or keep the last value. The default is to clear the output value.

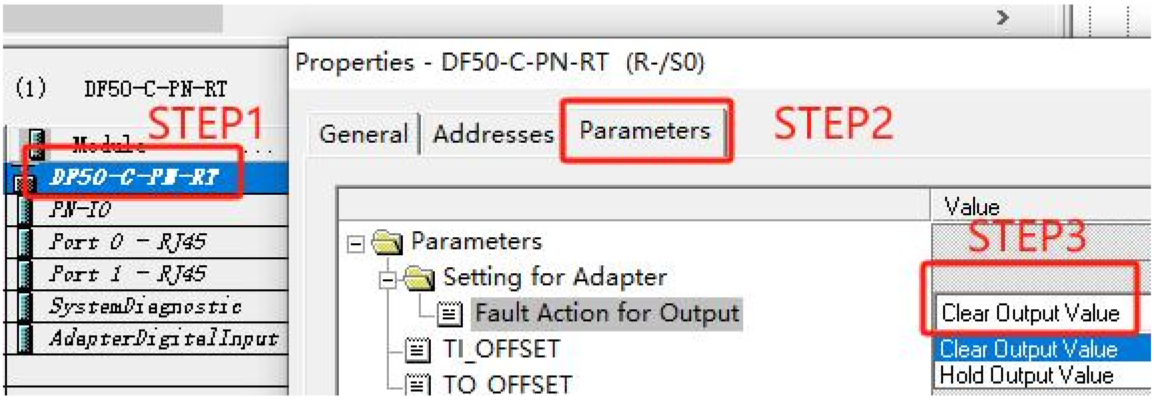


Figure 4-3-34

3.2.4. Get module software version

➢ Get the adapter version information as shown in the figure below. Write "0x100" in the SystemDiagnostic input address to get the adapter software version information. "0x1200" means the software version is V12.

Address		Symbol	Display format	Status value	Modify value
//SystemDiagnostic					
IW	1		HEX	W#16#1200	
QW	0		HEX	W#16#0100	W#16#0100

Figure 4-3-35

➢ Get the subsequent IO module version information as shown in the figure below. Write "0x101" in the SystemDiagnostic input address to get the software version information of the first module after the adapter. "0x1100" means the software version is V11.

Address		Symbol	Display format	Status value	Modify value
//SystemDiagnostic					
IW	1		HEX	W#16#1100	
QW	0		HEX	W#16#0101	W#16#0101

Figure 4-3-36

3.3. Digital module usage routine

➢ This example uses the DF50-C-PN-RT + DF50-M-16DO-P + DF50-M-16DO-N + DF50-M-16DI-P/N + DF50-M-16DI-P/N-TS topology. After adding the modules, it will look like the following figure.

DF50-C-PN-RT	30050002548		
PN-IO			
Port 0 - RJ45			
Port 1 - RJ45			
SystemDiagnostic	xxxxxxxxxxxx	1...2	0...1
AdapterDigitalInput	xxxxxxxxxxxx	0	
DF50-M-16DO-P	30050002550		2...3
DF50-M-16DO-N	30050002552		4...5
DF50-M-16DI-P/N	30050002551	3...4	
DF50-M-16DI-P/N-TS	30050002671	5...38	6
DF50-M-4DO-P-2A	30050002839	39	7
DF50-M-4DO-R	30050002838		8

Figure 4-3-37

3.3.1. DF50-M-16DO-P digital output module

➢ Please refer to the module wiring diagramChapter 3, Section 3.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 3.2.3.

➢ Each channel output can be enabled as shown in the figure below.

Address	Symbol	Display format	Status value	Modify value
//DF50-M-16DO-P				
QW 2		HEX	W#16#FFFF	W#16#FFFF

Figure 4-3-38

3.3.2. DF50-M-16DO-N digital output module

➢ Please refer to the module wiring diagramChapter 3 Section 4.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 3.2.3.

➢ Each channel output can be enabled as shown in the figure below.

Address	Symbol	Display format	Status value	Modify value
//DF50-M-16DO-N				
QW 4		HEX	W#16#FFFF	W#16#FFFF

Figure 4-3-39

3.3.3. DF50-M-16DI-P/N digital input module

➢ Please refer to the module wiring diagramChapter 3 Section 1.2.

➢ This module can set input filtering. Double-click the module to set it, as shown in the figure below. The default value is 20ms.

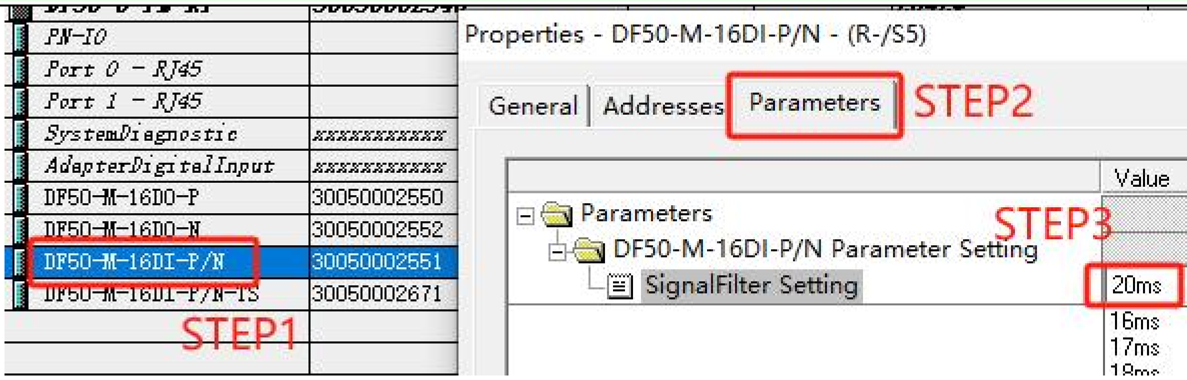


Figure 4-3-40

➢ The input data of each channel can be viewed as shown in the figure below.

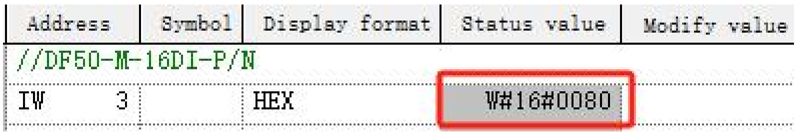


Figure 4-3-41

3.3.4. DF50-M-16DI-P/N-TS digital input with counting module

➢ Please refer to the module wiring diagramChapter 3 Section 2.2.

➢ As shown in the figure below, you can set the counting mode of channel 0 to channel 7. You can set it to rising edge counting, falling edge counting, and both rising and falling edges counting. The default is rising edge counting.

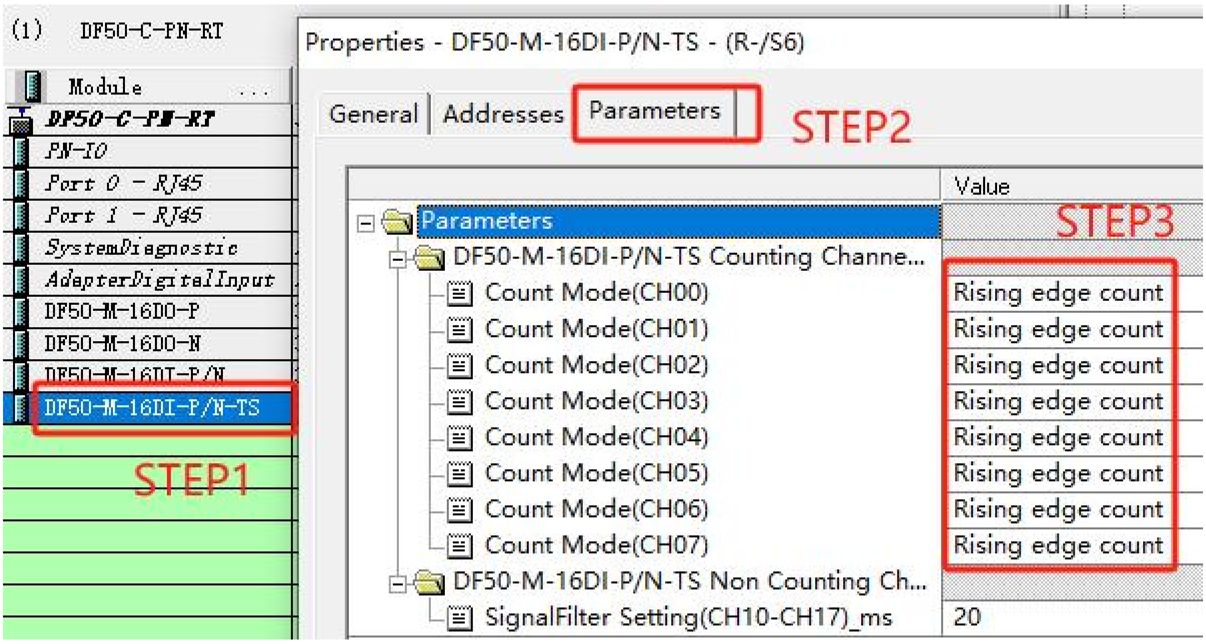


Figure 4-3-42

➢ As shown in the figure below, the filter parameters of channels 10 to 17 can be modified individually, and the default is 20ms.

Count Mode(CH06)	Rising edge count
Count Mode(CH07)	Rising edge count
DF50-M-16DI-P/N-TS Non Counting Ch...	
SignalFilter Setting(CH10-CH17)_ms	20

Figure 4-3-43

➢ For process data definition, please refer to Chapter 3 Section 2.4, fill in the data we need into the monitoring table, as shown in the figure below.

Address	Symbol	Display format	Status value
//DF50-M-16DI-P/N-TS			
//A1 (CH0)			
IW 5		HEX	W#16#0000
//A1 (CH0) Count			
ID 7		HEX	DW#16#00000000
//Count Clear			
QW 6		HEX	W#16#0000

Figure 4-3-44

➢ Input a valid signal to the A1 (CH0) port of the IO module, and you can see that the DI input bit of the corresponding channel becomes "1", and the count value of the corresponding channel increases by 1.

Address	Symbol	Display format	Status value	Modify value
//DF50-M-16DI-P/N-TS				
//A1 (CH0)				
IW 5		HEX	W#16#0100	
ID 7		HEX	DW#16#00000013	
//A1 (CH0)COUNT				
QB 6		HEX	B#16#00	B#16#00

Figure 4-3-45

➢ Writing "1" to the clear bit of the corresponding channel can clear the count value of the corresponding channel. As shown in the figure below, the count value of A1 (CH0) is cleared.

Address	Symbol	Display format	Status value	Modify value
//DF50-M-16DI-P/N-TS				
//A1 (CH0)				
IW 5		HEX	W#16#0000	
ID 7		HEX	DW#16#00000000	
//A1 (CH0)COUNT				
QB 6		BIN	2#0000_0001	2#0000_0001

Figure 4-3-46

3.3.5. DF50-M-4DO-P-2A digital output module

➢ Please refer to the module wiring diagram Chapter 3, Section 20.2 The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer to Chapter 4, Section 1.2.3.

➢ Each channel output can be enabled as shown in the figure below.

Address	Symbol	Display format	Status value	Modify value
//DF50-M-4DO-P-2A				
//Overcurrent				
IB 39		BIN	2#0000_0000	
//Output				
QB 7		BIN	2#0000_1111	2#0000_1111

Figure 4-3-47

➢ As shown in the figure below, the first channel output is enabled. When the module channel is overcurrent, the first channel bit in Overcurrent becomes "1", and the system status information shows a "16#01E4" error (the first module detects an overcurrent signal), and the first channel of the module stops outputting.

Address	Symbol	Display format	Status value	Modify value
//DF50-M-4DO-P-2A				
//Overcurrent				
IB 39		BIN	2#0000_0001	
//Output				
QB 7		BIN	2#0000_0001	2#0000_0001
//SystemDiagnostic				
IW 1		HEX	W#16#01E4	

Figure 4-3-48

3.3.6. DF50-M-4DOR relay output module

➢ Please refer to the module wiring diagramChapter 3, Section 19.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 1.2.3.

➢ Each channel relay can be closed as shown in the figure below.

//DF50-M-4DO-R				
QB 8		BIN	2#0000_1111	2#0000_1111

Figure 4-3-49

3.4. Analog module usage routine

➢ This example uses the topology of DF50-C-PN-RT + DF50-M-8AO-U-4 + DF50-M-8AO-I-5 + DF50-M-4AO-UI-6 + DF50-M-8AI-U-4 + DF50-M-8AI-I-5 + DF50-M-4AI-UI-6. After adding the modules, the structure is as shown in the figure below.

Module ...	Order number ...	I Add...	Q address
DF50-C-PN-RT	30050002548		
PN-IO			
Port 0 - RJ45			
Port 1 - RJ45			
SystemDiagnostic	xxxxxxxxxxxx	1...2	0...1
AdapterDigitalInput	xxxxxxxxxxxx	0	
DF50-M-8AO-U-4	30050002670		256...271
DF50-M-8AO-I-5	30050002669		272...287
DF50-M-4AO-UI-6	30050002554		288...295
DF50-M-8AI-U-4	30050002668	256...271	
DF50-M-8AI-I-5	30050002657	272...287	
DF50-M-4AI-UI-6	30050002553	288...295	

Figure 4-3-50

3.4.1. DF50-M-8AO-U-4 voltage output module

➢ Please refer to the module wiring diagramChapter 3 Section 9.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 3.2.3.

➢ As shown in the figure below, you can set the module output voltage range, the default is Disabled. Set CH0 to 0~10V.

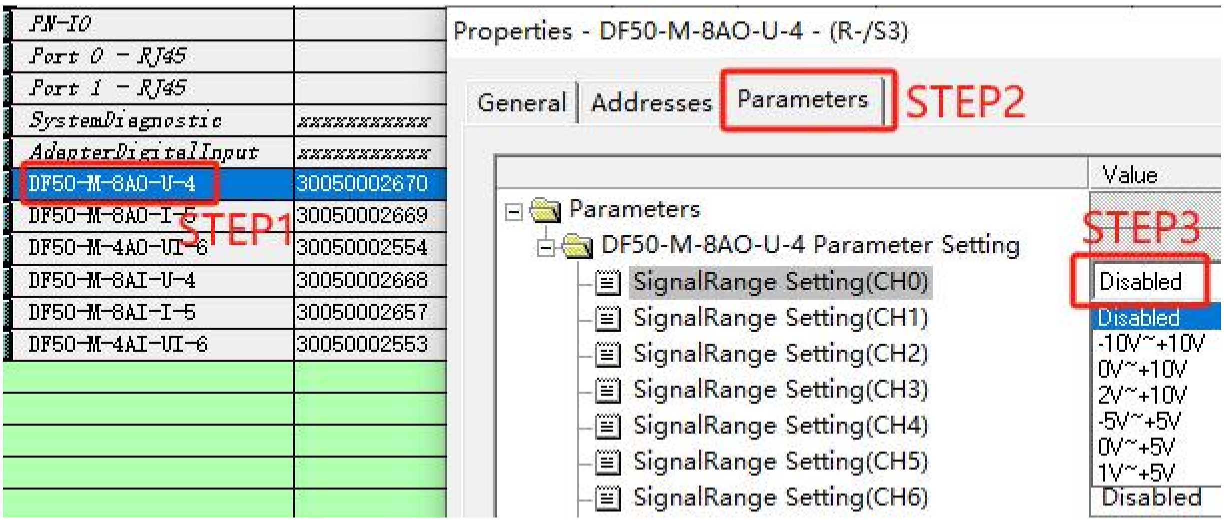


Figure 4-3-51

➢ As shown in the figure below, write the value "27648" to the module CH0 channel. Through the multimeter measurement, it can be seen that the output voltage is 10V. The conversion relationship is shown inChapter 3 Section 9.4.

Address	Symbol	Display format	Status value	Modify value
//DF50-M-8AO-U-4				
//CH0				
QW 256		DEC	27648	27648

Figure 4-3-52

3.4.2. DF50-M-8AO-I-5 Current Output Module

➢ Please refer to the module wiring diagramChapter 3 Section 10.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 3.2.3.

➢ As shown in the figure below, you can set the module output current range, the default is Disabled. Set CH0 to 0~20ma.

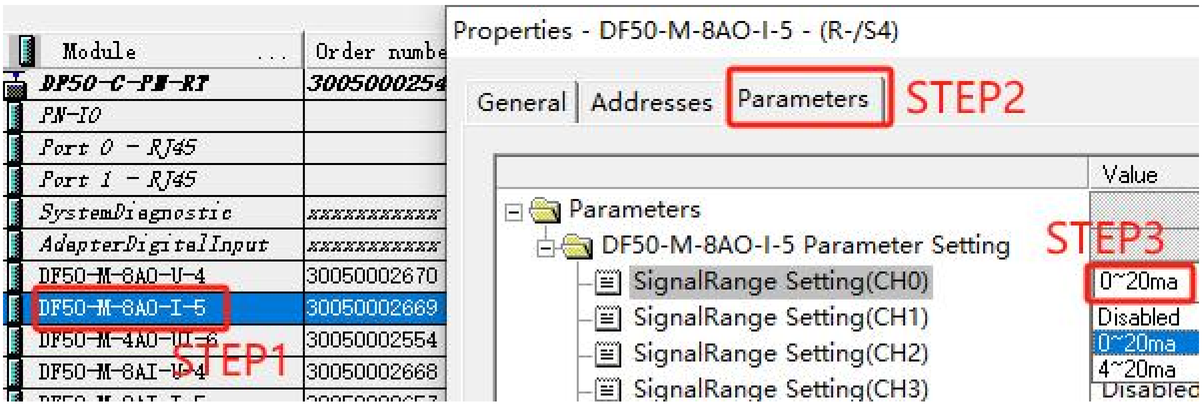


Figure 4-3-53

➢ As shown in the figure below, write the value "27648" to the module CH0 channel. Through the multimeter measurement, it can be seen that the output current is 20ma. The conversion relationship is shown inChapter 3 Section 10.4.

Address	Symbol	Display format	Status value	Modify value
//DF50-M-8AO-I-5				
//CH0				
QW 272		DEC	27648	27648

Figure 4-3-54

3.4.3. DF50-M-4AO-UI-6 Voltage/Current Output Module

➢ Please refer to the module wiring diagramChapter 3, Section 8.2The output status of the module when a PN bus error occurs can be set in the adapter. For setting methods, please refer toChapter 4, Section 3.2.3.

➢ As shown in the figure below, you can set the module output voltage or current range, the default is Disabled. Set CH0 to 0~10V and CH1 to 0~20ma.

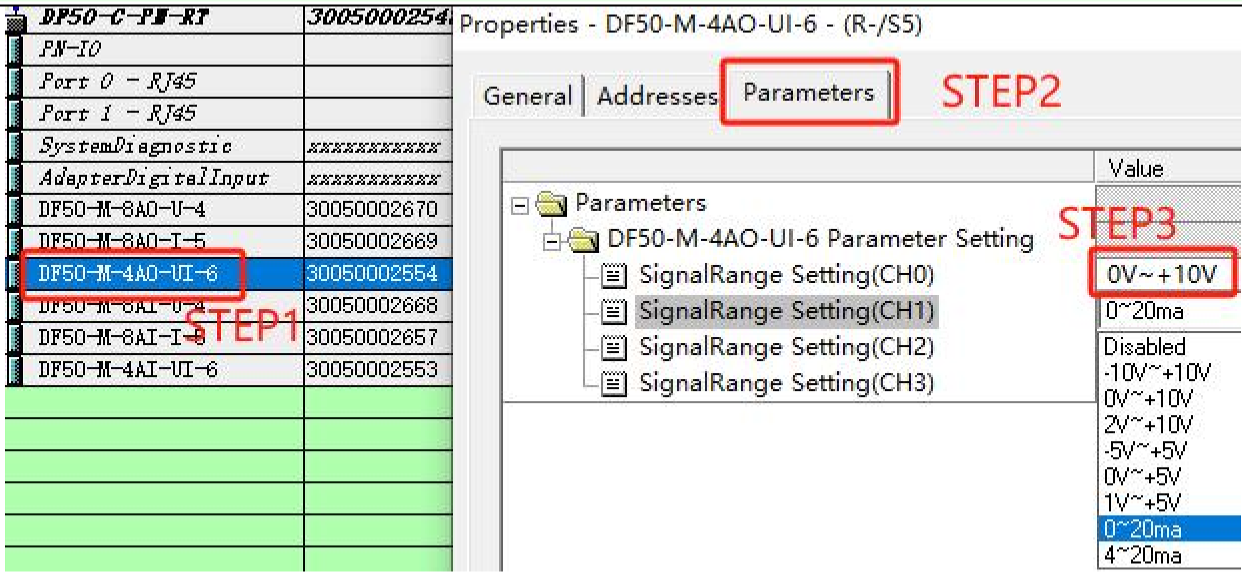
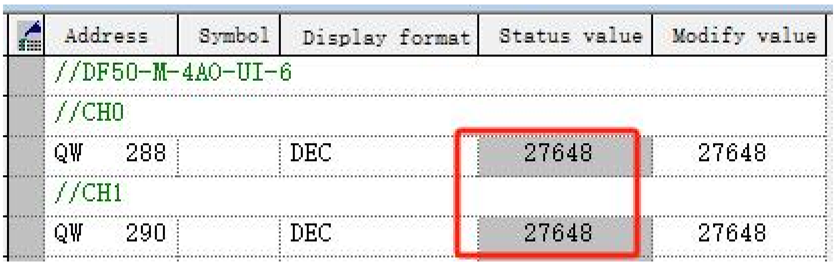


Figure 4-3-55

➢ As shown in the figure below, write the value "27648" to the module CH0 and CH1. Through the multimeter measurement, it can be seen that the output voltage of CH0 is 10V and the output current of CH1 is 20ma. The conversion relationship is shown inChapter 3, Section 8.4.



	Address	Symbol	Display format	Status value	Modify value
	//DF50-M-4AO-UI-6				
	//CH0				
	QW 288		DEC	27648	27648
	//CH1				
	QW 290		DEC	27648	27648

Figure 4-3-56

3.4.4. DF50-M-8AI-U-4 Voltage Input Module

➢ Please refer to the module wiring diagramChapter 3, Section 7.2As shown in the figure below, you can set the module acquisition voltage range, the default is Disabled. Set CH0 to 0~10V.

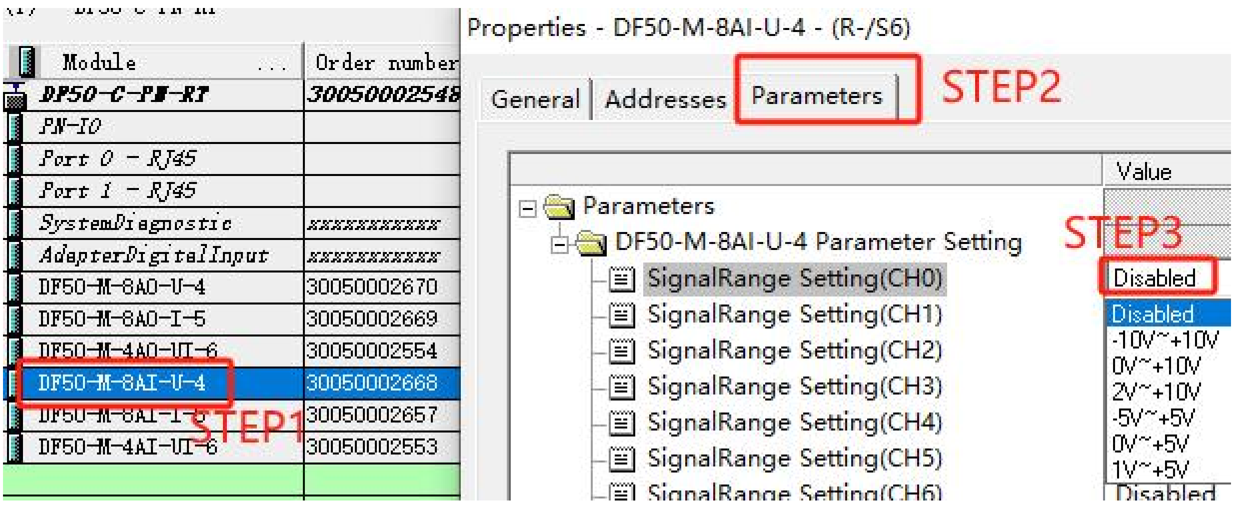


Figure 4-3-57

➢ As shown in the figure below, you can set the signal filter for each channel, the default is 100Hz_10ms.

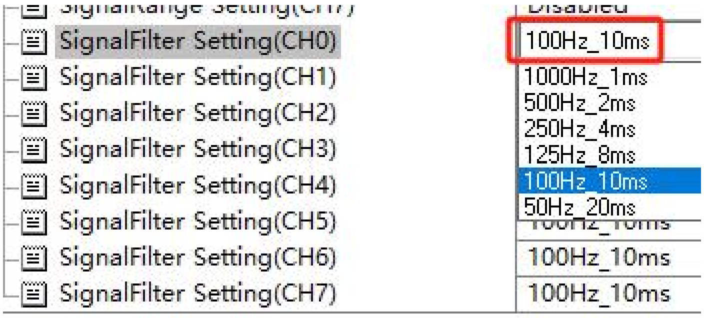


Figure 4-3-58

➢ After 5V voltage is applied to CH0, the value shown in the figure below is obtained. Through conversion, it is known that the collected voltage is 4.997V. The conversion relationship is shown inChapter 3, Section 7.4.

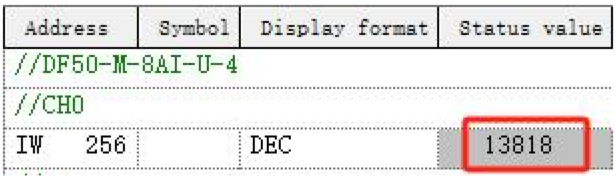


Figure 4-3-59

3.4.5. DF50-M-8AI-I-5 Current Input Module

➢ Please refer to the module wiring diagramChapter 3 Section 6.2As shown in the figure below, you can set the module current collection range, the default is Disabled. Set CH0 to 0~20ma.

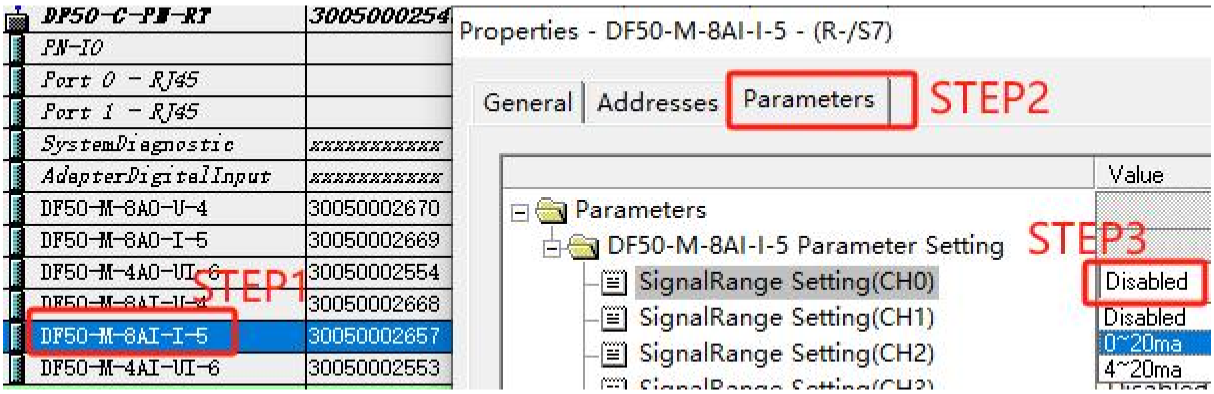


Figure 4-3-60

➢ As shown in the figure below, you can set the signal filter for each channel, the default is 100Hz_10ms.

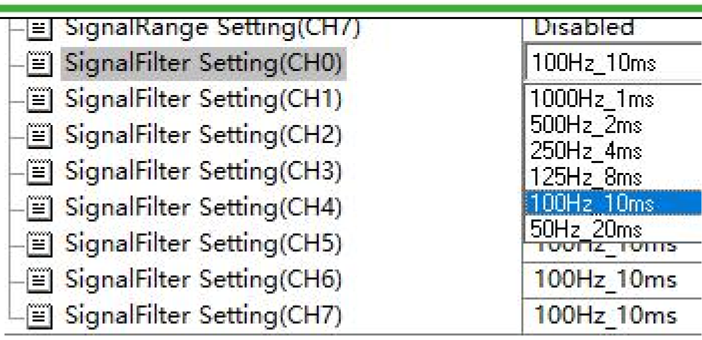


Figure 4-3-61

➢ After passing 10ma current into CH0, the value shown in the figure below is obtained. Through conversion, it is known that the collected current is 10.008ma. The conversion relationship is shown inChapter 3, Section 6.4.

Address	Symbol	Display format	Status value
//DF50-M-8AI-I-5			
//CH0			
IW 272		DEC	13836

Figure 4-3-62

3.4.6. DF50-M-4AI-UI-6 voltage and current input module

➢ Please refer to the module wiring diagramChapter 3 Section 5.2As shown in the figure below, you can set the module to collect voltage or current range, the default is Disabled. Set CH0 to 0~10V and CH1 to 0~20ma.

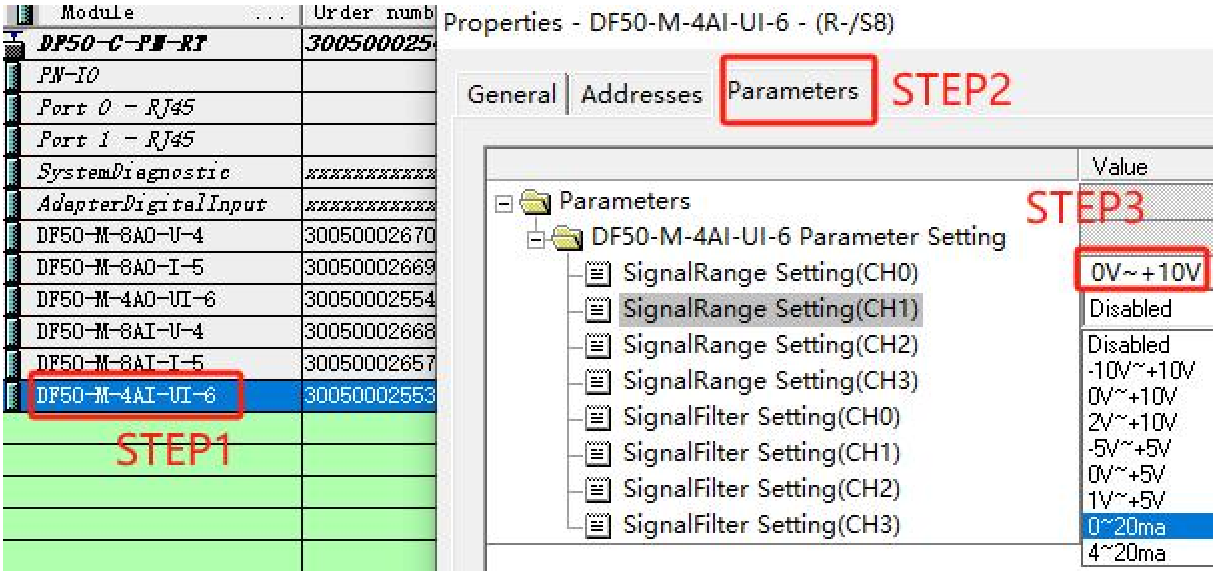


Figure 4-3-63

➢ As shown in the figure below, you can set the signal filter for each channel, the default is 100Hz_10ms.

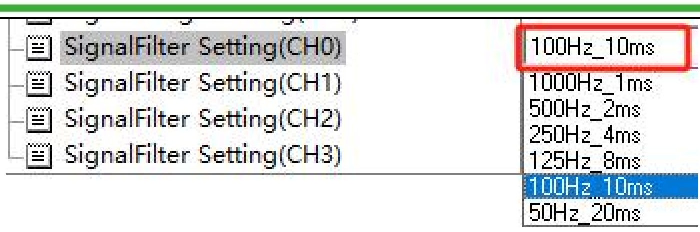


Figure 4-3-64

➢ After passing 5V voltage to CH0 and 10ma current to CH1, the values shown in the figure below are obtained. Through conversion, it is known that the voltage collected by CH0 is 5.005V and the current collected by CH1 is 10.002ma. The conversion relationship is shown inChapter 3, Section 5.4.

Address	Symbol	Display format	Status value
//DF50-M-4AI-UI-6			
//CH0			
IW 288		DEC	13839
//CH1			
IW 290		DEC	13828

Figure 4-3-65

3.5. Routine use of thermal resistance sensor data acquisition module

➢ This example uses the DF50-C-PN-RT + DF50-M-4RTD-PT topology. After adding the modules, it is as shown in the figure below.

Module	Order number	I Add...	Q address
DF50-C-PN-RT	30050002548		
PN-IO			
Port 0 - RJ45			
Port 1 - RJ45			
SystemDiagnostic	xxxxxxxxxxxx	1...2	0...1
AdapterDigitalInput	xxxxxxxxxxxx	0	
DF50-M-4RTD-PT	30050002555	256...263	

Figure 4-3-66

3.5.1. DF50-M-4RTD-PT Thermal Resistance Measurement Module

➢ Please refer to the module wiring diagramChapter 3 Section 11.2As shown in the figure below, you can modify the sensor type collected by the module, the default is PT100.

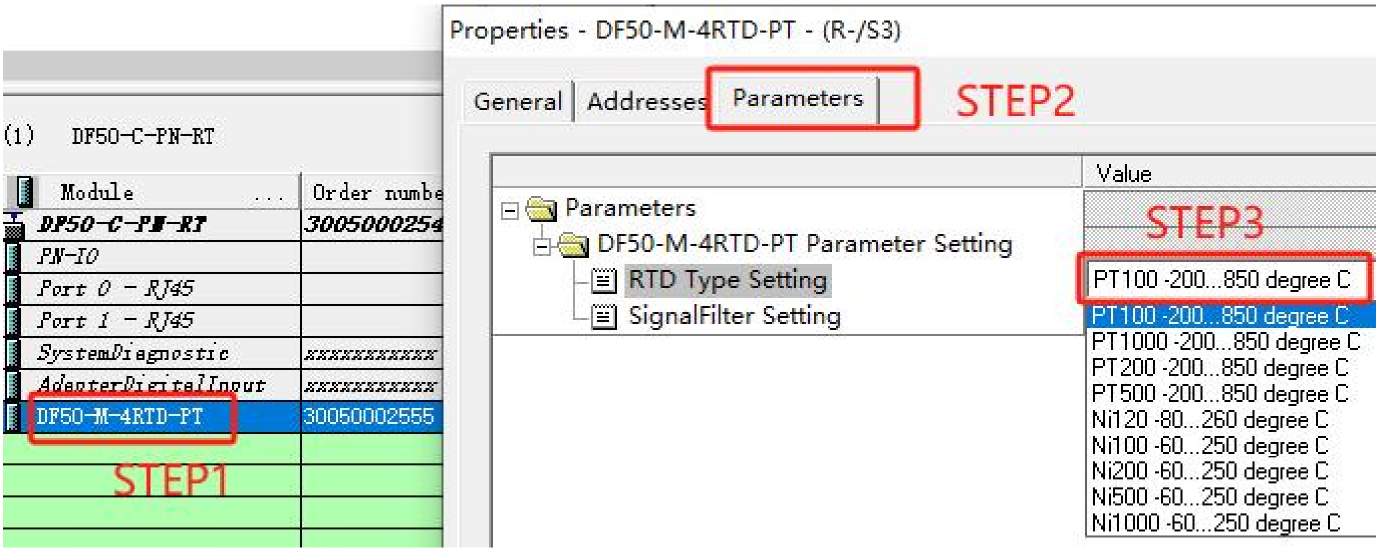


Figure 4-3-67

➢ The filter settings of this module can be adjusted as shown in the figure below, the default is 5Hz_200ms.

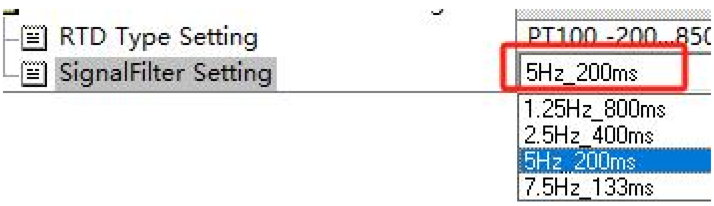


Figure 4-3-68

➢ After connecting the sensor to module CH0, the following data is obtained. "246" means the collected temperature is 24.6℃.

Address	Symbol	Display format	Status value
//DF50-M-4RTD-PT			
//CH0			
IW 256		DEC	246

Figure 4-3-69

3.6. Thermocouple temperature data acquisition module usage routine

➢ This example uses the DF50-C-PN-RT + DF50-M-8TC topology. After adding the modules, it is as shown in the figure below.

Module	Order number	I Add...	Q address
DF50-C-PN-RT	30050002548		
PN-IO			
Port 0 - RJ45			
Port 1 - RJ45			
SystemDiagnostic	xxxxxxxxxxxx	1...2	0...1
AdapterDigitalInput	xxxxxxxxxxxx	0	
DF50-M-8TC	30050002754	256...271	256...271

Figure 4-3-70

3.6.1. DF50-M-8TC Thermocouple Measurement Module

➢ Please refer to the module wiring diagramChapter 3, Section 12.2As shown in the figure below, you can modify the sensor type collected by this module. The default is K-type sensor.

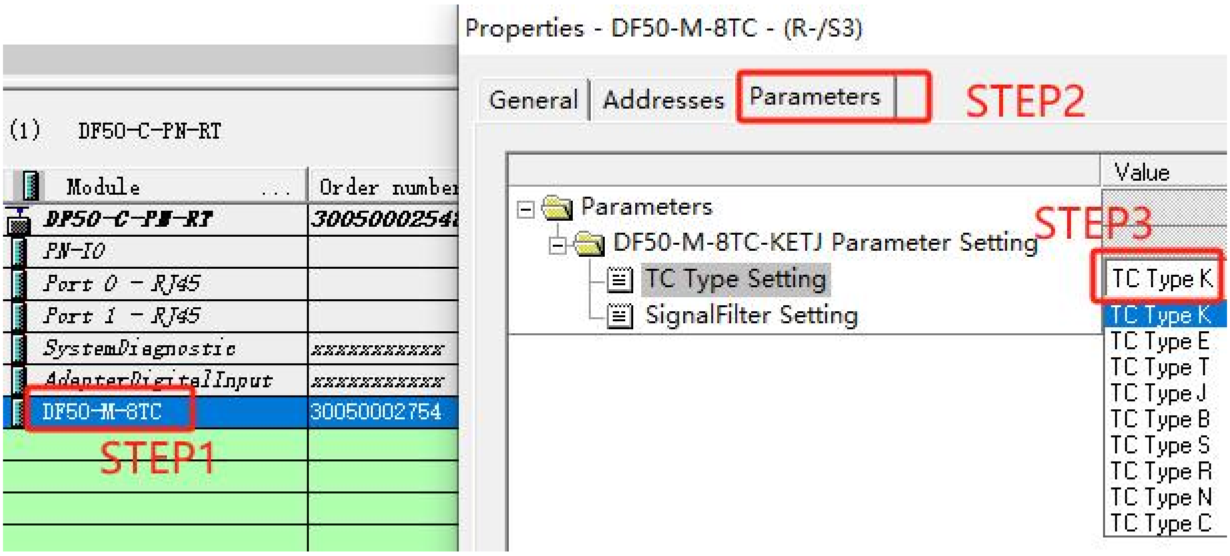


Figure 4-3-71

➢ The filter settings of this module can be adjusted as shown in the figure below, the default is 225ms.

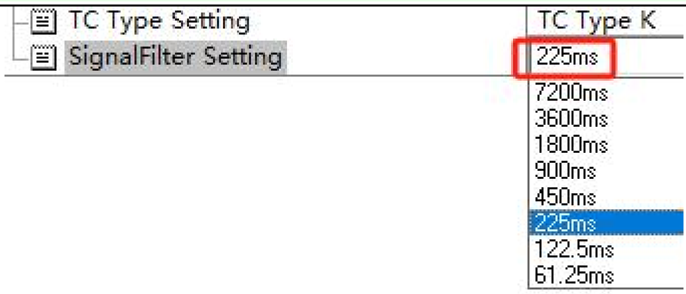


Figure 4-3-72

➢ DF50-M-8TC process data definition please refer to[Chapter 3, Section 12.4]After connecting the sensor to CH0, as shown in the figure below, "1050" means 105.0℃, and no compensation value is given at this time.

Address	Symbol	Display format	Status value	Modify value
//DF50-M-8TC				
//CH0				
IW 256		DEC	1050	
//CH0 Compensate				
QW 256		DEC	0	

Figure 4-3-73

➢ When we write 500 into the compensation value of CH0, we can see that the collected value becomes "1549", which means 154.9℃.

Address	Symbol	Display format	Status value	Modify value
//DF50-M-8TC				
//CH0				
IW 256		DEC	1549	
//CH0 Compensate				
QW 256		DEC	500	500

Figure 4-3-74

3.7. Encoder data acquisition module usage routine

- The encoder pulse counting module has two types: DF50-M-2CNT-PIL-24 and DF50-M-2CNT-PIL-5. The wiring and usage of the two modules are the same. The difference is that the DF50-M-2CNT-PIL-5 is connected to a 5V encoder signal, and the DF50-M-2CNT-PIL-24 is connected to a 24V encoder signal. This document uses the DF50-M-2CNT-PIL-24 module as an example. For wiring methods, please refer toChapter 3, Section 13.2.
- Three LED indicator outputs. After the module is powered on, PW is always on, indicating that the module is powered on and initialized normally. Different display states of Led2 represent different working states of the module; Led2 flashes when the internal bus of the module is working normally. The external 24V power supply of the module is normal, and the EP light is always on.
- Add the DF50-M-2CNT-PIL-24 module as shown below.

Module ...	Order number ...	I Add...	Q address
DF50-C-PN-RT	30050002548		
PN-IO			
Port 0 - RJ45			
Port 1 - RJ45			
SystemDiagnostic	xxxxxxxxxxxx	1...2	0...1
AdapterDigitalInput	xxxxxxxxxxxx	0	
DF50-M-2CNT-PIL-24	30050002556	3...20	2...11

Figure 4-3-75

- The output status of the module can be set in the adapter. For setting methods, please refer toChapter 4, Section 3.2.3.
- As shown in the figure below, you can configure the signal mode of the DF50-M-2CNT-PIL-24 module (the frequency multiplication function is set here,Default 4x), DI signal function, filter time signal A, filter time signal B, encoder calculation direction, counter mode setting, comparison function, fieldbus error behavior, count upper limit, count lower limit.

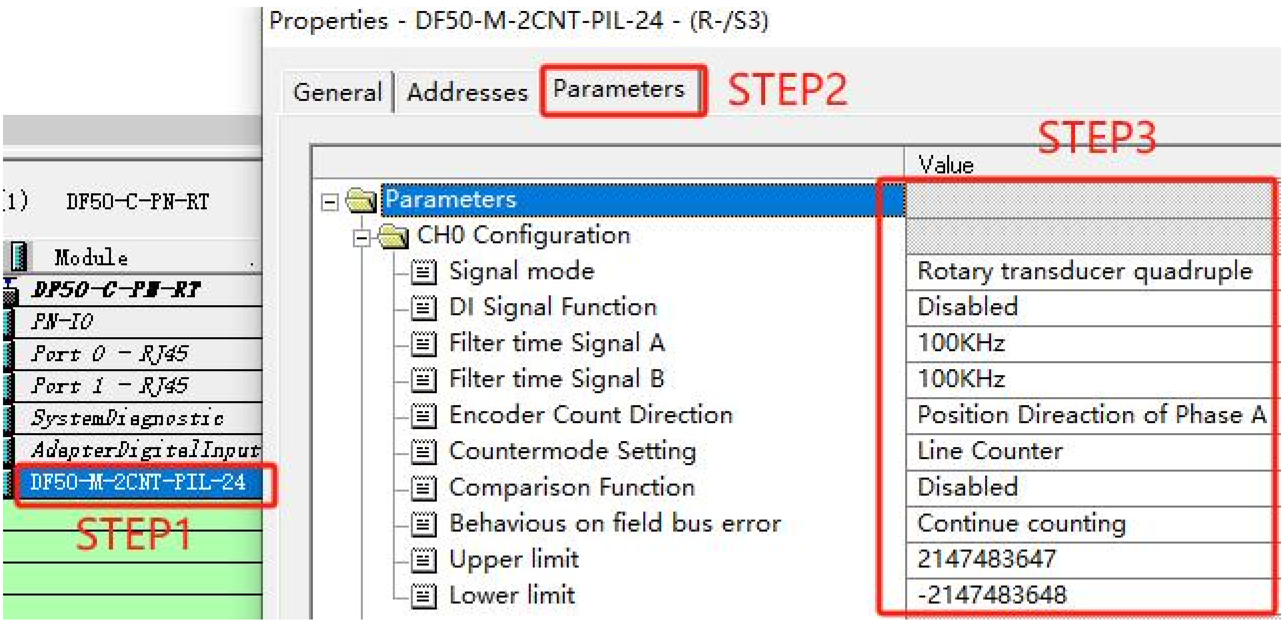
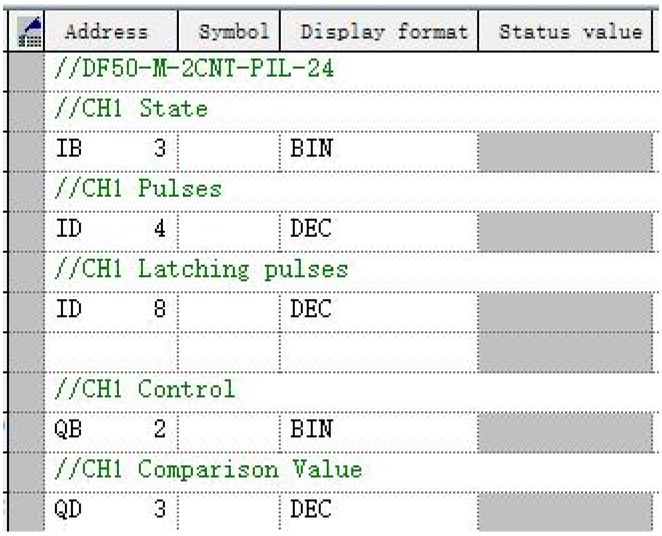


Figure 4-3-76

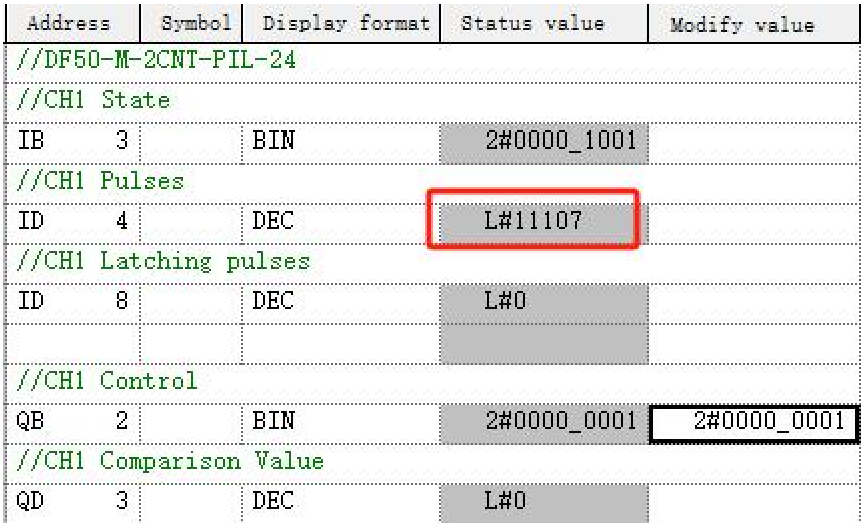
➢ As shown in the figure below, fill in the module address into the monitoring table. For the meaning of the process data, please refer to Section 3.7.1 of this chapter.



Address	Symbol	Display format	Status value
//DF50-M-2CNT-PIL-24			
//CH1 State			
IB 3		BIN	
//CH1 Pulses			
ID 4		DEC	
//CH1 Latching pulses			
ID 8		DEC	
//CH1 Control			
QB 2		BIN	
//CH1 Comparison Value			
QD 3		DEC	

Figure 4-3-77

➢ As shown in the figure below, write "1" in the command output data column to use the counting function normally, and the current pulse value can be read in the pulse number column.



Address	Symbol	Display format	Status value	Modify value
//DF50-M-2CNT-PIL-24				
//CH1 State				
IB 3		BIN	2#0000_1001	
//CH1 Pulses				
ID 4		DEC	L#11107	
//CH1 Latching pulses				
ID 8		DEC	L#0	
//CH1 Control				
QB 2		BIN	2#0000_0001	2#0000_0001
//CH1 Comparison Value				
QD 3		DEC	L#0	

Figure 4-3-78

3.7.1. Module process data description

➢ The ProfiNET bus adapter will allocate corresponding input and output addresses according to the different modules connected to it; the table shows the meaning, data length and data type of the input and output data.

Table 4.3.4Module data length and type

Output Data	Number of bytes	Data Types
Channel 1 command output data	1	Uint8
Channel 1 pulse comparison value output	4	int32

Channel 2 command output data	1	Uint8
Channel 2 pulse comparison value output	4	int32
Input Data	Number of bytes	Data Types
Channel 1 Status Input Data	1	Uint8
Channel 1 Pulse Number	4	int32
Channel 1 Latch pulse number	4	int32
Channel 2 status input data	1	Uint8
Channel 2 Pulse Number	4	int32
Channel 2 Latch pulse number	4	int32

Table 4.3.5Output data meaning

Output data meaning	
0 bytes	
bit7~bit1	reserve
bit0	0: Channel 1 stops counting and the original count is reset to zero; 1: Channel 1 starts counting
1~4 bytes	Channel 1 pulse comparison value output, signed 32-bit data
5 bytes	
bit7~bit1	reserve
bit0	0: Channel 2 stops counting and the original count is cleared; 1: Channel 2 starts counting
6~9 bytes	Channel 2 pulse comparison value output, signed 32-bit data

Table 4.3.6Input data meaning

Input data meaning	
0 bytes	
bit7~bit5	reserve
Bit3~bit4	0: Channel 1 stops; 1: Channel 1 counts up; 2: Channel 1 counts down
bit2	0: Channel 1 count value is less than the comparison value; 1: Channel 1 count value is greater than the comparison value
bit1	0: No electronic probe/1 channel count reset signal; 1: Electronic probe/channel count reset signal
bit0	0: Channel 1 counting stop state, the original count is cleared; 1: Channel 1 counting state
1~4 bytes	Channel 1 pulse input value, signed 32-bit data
5~8 bytes	Channel 1 pulse input latch value, signed 32-bit data
9 bytes	
bit7~bit5	Reserved seat
bit3~bit4	0: Channel 2 stops; 1: Channel 2 counts up; 2: Channel 2 counts

	down
bit2	0: Channel 2 count value is less than the comparison value; 1: Channel 2 count value is greater than the comparison value
bit1	0: No electronic probe/channel 2 count reset signal; 1: Electronic probe/channel count reset signal
bit0	0: Channel 1 counting stop state, the original count is cleared; 1: Channel 1 counting state
10~13 bytes	Channel 1 pulse input value, signed 32-bit data
14~17 bytes	Channel 1 pulse input latch value, signed 32-bit data

3.7.2. DI Signal Function Configuration

- As shown in the figure below, you can configure the DI signal function. The default setting is Disabled. The following functions are available: rising edge capture, falling edge capture, both rising and falling edge capture, rising edge reset, falling edge reset, and both rising and falling edge reset.Rising edge capture (Rising edge capture) and rising edge reset (Rising edge reset)Function.

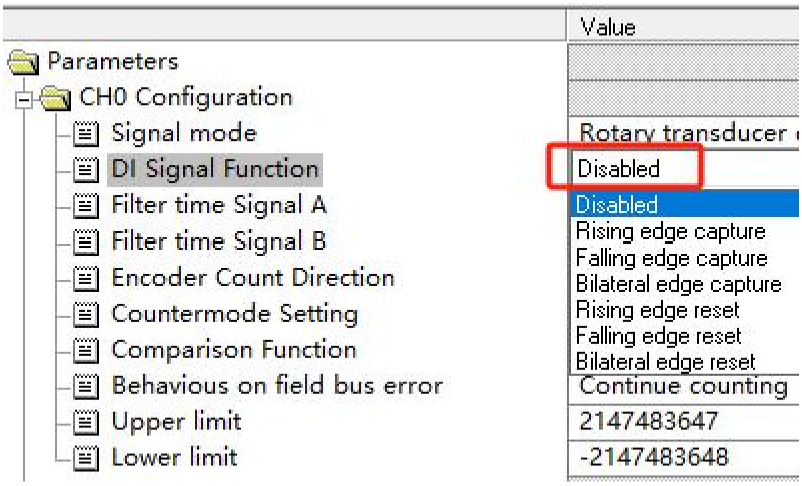
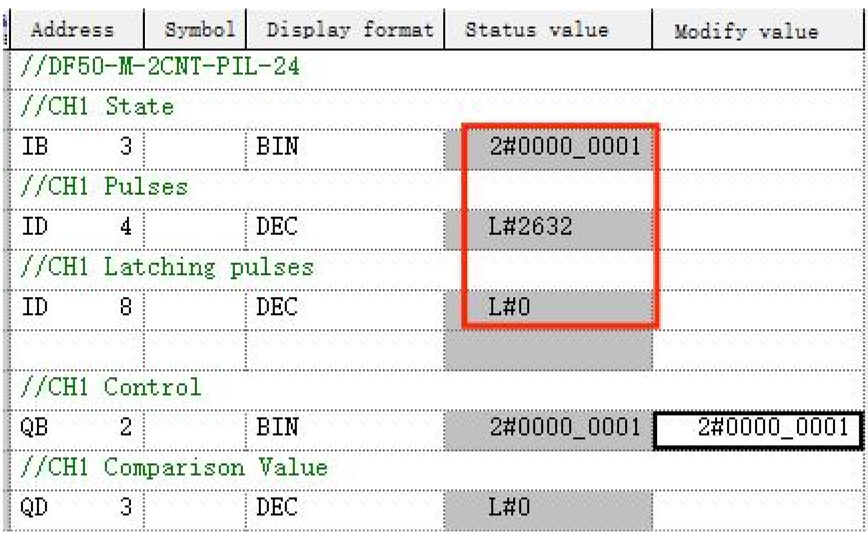


Figure 4-3-79

- DI rising edge capture:As shown in the figure below, the number of pulses is "2632".



Address	Symbol	Display format	Status value	Modify value
//DF50-M-2CNT-PIL-24				
//CH1 State				
IB 3		BIN	2#0000_0001	
//CH1 Pulses				
ID 4		DEC	L#2632	
//CH1 Latching pulses				
ID 8		DEC	L#0	
//CH1 Control				
QB 2		BIN	2#0000_0001	2#0000_0001
//CH1 Comparison Value				
QD 3		DEC	L#0	

Figure 4-3-80

➢ After a rising edge is input, as shown in the figure below, the second bit of the status input data changes to "1", then to "0", and the number of latch pulses changes to "2632".

Address	Symbol	Display format	Status value	Modify value
//DF50-M-2CNT-PIL-24				
//CH1 State				
IB 3		BIN	2#0000_0011	
//CH1 Pulses				
ID 4		DEC	L#2632	
//CH1 Latching pulses				
ID 8		DEC	L#2632	
//CH1 Control				
QB 2		BIN	2#0000_0001	2#0000_0001
//CH1 Comparison Value				
QD 3		DEC	L#0	

Figure 4-3-81

➢ DI rising edge reset:As shown in the figure below, the pulse number is "2851".

Address	Symbol	Display format	Status value	Modify value
//DF50-M-2CNT-PIL-24				
//CH1 State				
IB 3		BIN	2#0000_0001	
//CH1 Pulses				
ID 4		DEC	L#2851	
//CH1 Latching pulses				
ID 8		DEC	L#0	
//CH1 Control				
QB 2		BIN	2#0000_0001	2#0000_0001
//CH1 Comparison Value				
QD 3		DEC	L#0	

Figure 4-3-82

➢ After a rising edge is input, as shown in the figure below, the second bit of the status input data changes to "1", then to "0", and the number of pulses becomes "0".

Address	Symbol	Display format	Status value	Modify value
//DF50-M-2CNT-PIL-24				
//CH1 State				
IB 3		BIN	2#0000_0011	
//CH1 Pulses				
ID 4		DEC	L#0	
//CH1 Latching pulses				
ID 8		DEC	L#0	
//CH1 Control				
QB 2		BIN	2#0000_0001	2#0000_0001
//CH1 Comparison Value				
QD 3		DEC	L#0	

Figure 4-3-83

3.7.3. Compare function configurations (Comparison Function）

➢ Turn on the comparison function as shown in the figure below.

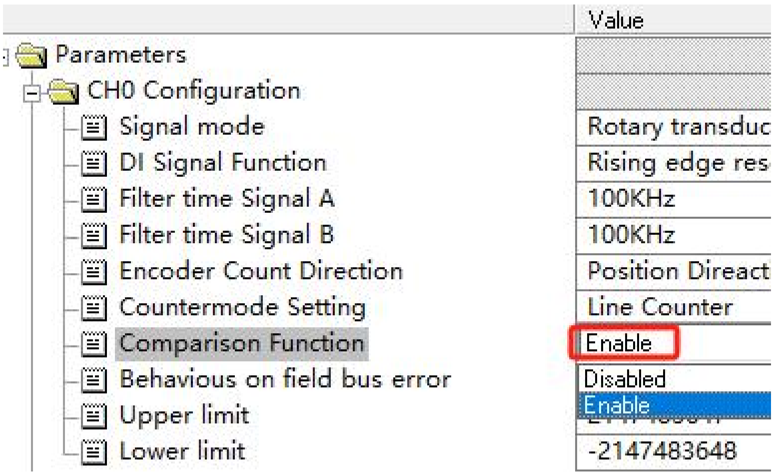


Figure 4-3-84

➢ As shown in the figure below, the pulse comparison value is set to 10000. When the pulse number is "4077", the third bit of the status input data is "0".

Address		Symbol	Display format	Status value	Modify value
//CH1 State					
IB	3		BIN	2#0000_0001	
//CH1 Pulses					
ID	4		DEC	L#4077	
//CH1 Latching pulses					
ID	8		DEC	L#0	
//CH1 Control					
QB	2		BIN	2#0000_0001	2#0000_0001
//CH1 Comparison Value					
QD	3		DEC	L#10000	L#10000

Figure 4-3-85

➢ As shown in the figure below, when the pulse number is "11825", it exceeds the set value 10000, and the third bit of the status input data becomes "1".

Address		Symbol	Display format	Status value	Modify value
//CH1 State					
IB	3		BIN	2#0000_0101	
//CH1 Pulses					
ID	4		DEC	L#11825	
//CH1 Latching pulses					
ID	8		DEC	L#0	
//CH1 Control					
QB	2		BIN	2#0000_0001	2#0000_0001
//CH1 Comparison Value					
QD	3		DEC	L#10000	L#10000

Figure 4-3-86

3.7.4. Pulse plus direction function (Signal Type: Pulse and Directions)

➢ As shown in the figure below, change the signal mode to pulse plus direction mode. For the wiring method, please refer toChapter 3, Section 13.2.3When this mode is used, the A+ and A- ports input high and low levels to indicate the direction, and the B+ and B- ports input valid levels to accumulate count values.

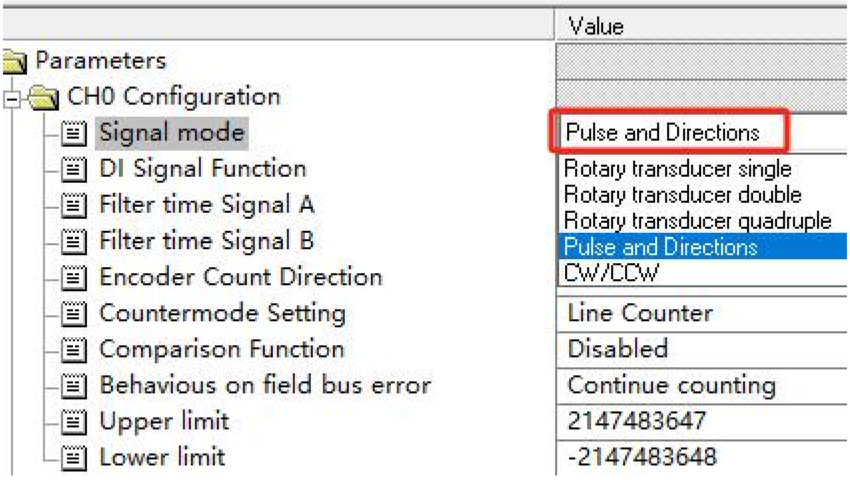
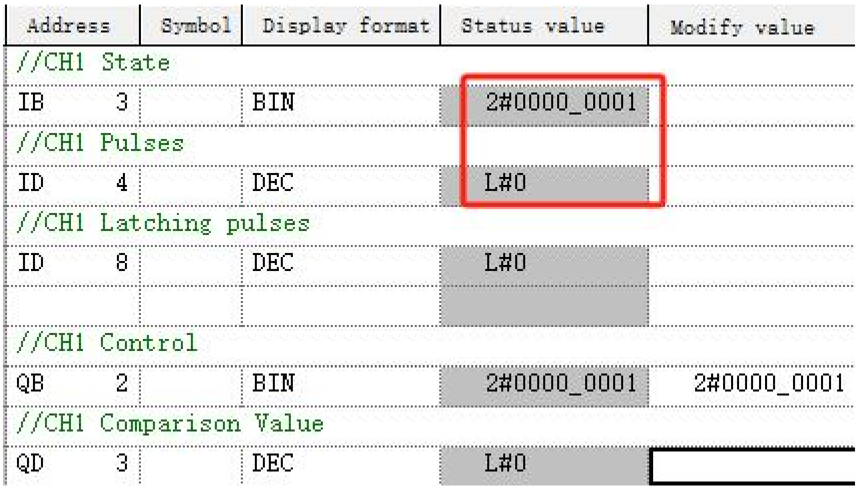


Figure 4-3-87

➢ As shown in the figure below, the count value is "0" when the sensor is stationary and the direction state is "0". For process data definition, please refer toChapter 3, Section 13.4.



Address		Symbol	Display format	Status value	Modify value
//CH1 State					
IB	3		BIN	2#0000_0001	
//CH1 Pulses					
ID	4		DEC	L#0	
//CH1 Latching pulses					
ID	8		DEC	L#0	
//CH1 Control					
QB	2		BIN	2#0000_0001	2#0000_0001
//CH1 Comparison Value					
QD	3		DEC	L#0	

Figure 4-3-88

➢ When the A+ and A- voltage inputs are at a low level, pulse signals are input to B+ and B-. As shown in the figure below, the count value decreases, and the direction status bit3~bit4 is "2".

Address	Symbol	Display format	Status value	Modify value
//CH1 State				
IB 3		BIN	2#0001_0001	
//CH1 Pulses				
ID 4		DEC	L#-742	
//CH1 Latching pulses				
ID 8		DEC	L#0	
//CH1 Control				
QB 2		BIN	2#0000_0001	2#0000_0001
//CH1 Comparison Value				
QD 3		DEC	L#0	

Figure 4-3-89

➢ When the A+ and A- voltage inputs are high level, pulse signals are input to B+ and B-. As shown in the figure below, the count value increases, and the direction status bit3~bit4 is "1".

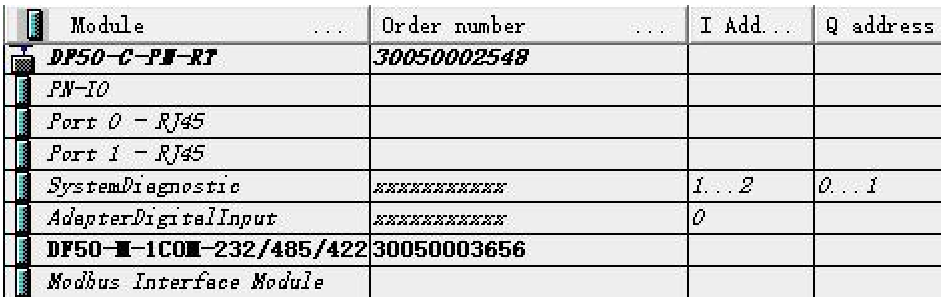
Address	Symbol	Display format	Status value	Modify value
//CH1 State				
IB 3		BIN	2#0000_1001	
//CH1 Pulses				
ID 4		DEC	L#818	
//CH1 Latching pulses				
ID 8		DEC	L#0	
//CH1 Control				
QB 2		BIN	2#0000_0001	2#0000_0001
//CH1 Comparison Value				
QD 3		DEC	L#0	

Figure 4-3-90

3.8. Serial port module usage routine

➢ This example uses the DF50-C-PN-RT + DF50-1COM-232-485-422 topology.

DF50-1COM-232-485-422 supports three modes: free transparent transmission, slave mode, and Modbus RTU master mode. The mode switching is achieved by adding different sub-slots and setting in the Modbus interface Module sub-module.Section 15.2The wiring diagram is connected to the card, simulating the communication device and the DF50-1COM-232-485-422 module communication. After adding the module, it is shown as follows.



Module ...	Order number ...	I Add...	Q address
DF50-C-PN-RT	30050002548		
PN-IO			
Port 0 - RJ45			
Port 1 - RJ45			
SystemDiagnostic	xxxxxxxxxxxx	1...2	0...1
AdapterDigitalInput	xxxxxxxxxxxx	0	
DF50-M-1COM-232/485/422	30050003656		
Modbus Interface Module			

Figure 4-3-91

➢ The parameters of Modbus interface Module are shown in the figure below. The default mode is Free Protocol.

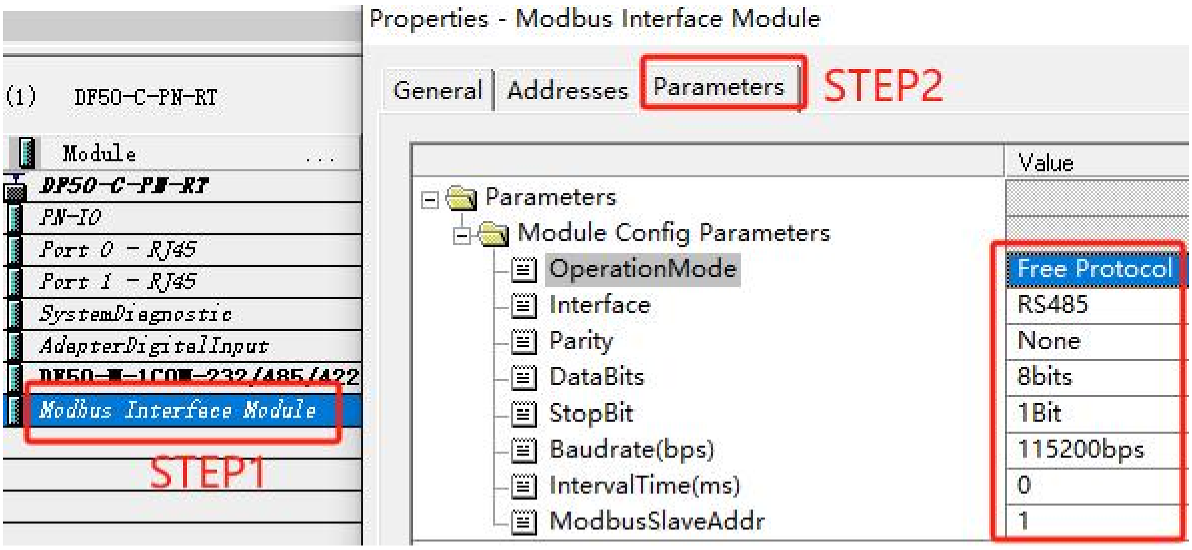


Figure 4-3-92

➢ As shown in the figure below, the number starting with F indicates free transparent transmission mode, the number starting with M indicates Modbus RTU master mode, and the number starting with S indicates Modbus RTU slave mode.

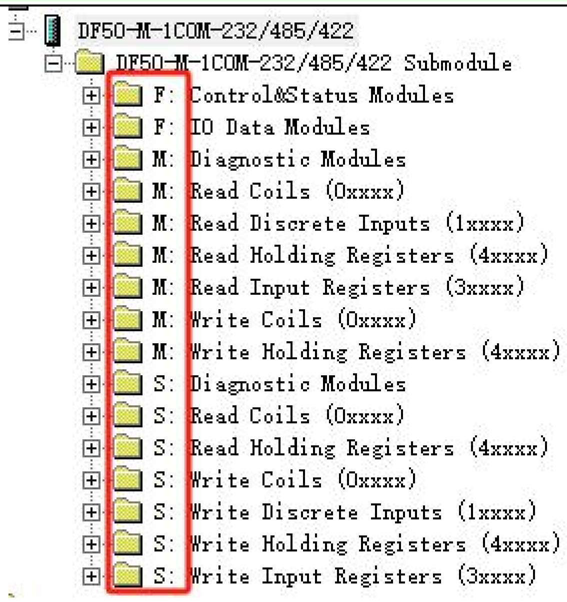


Figure 4-3-93

3.8.1. Modbus RTU Master Mode Usage Example

➢ Set the module mode to Modbus RTU Master mode, as shown below.

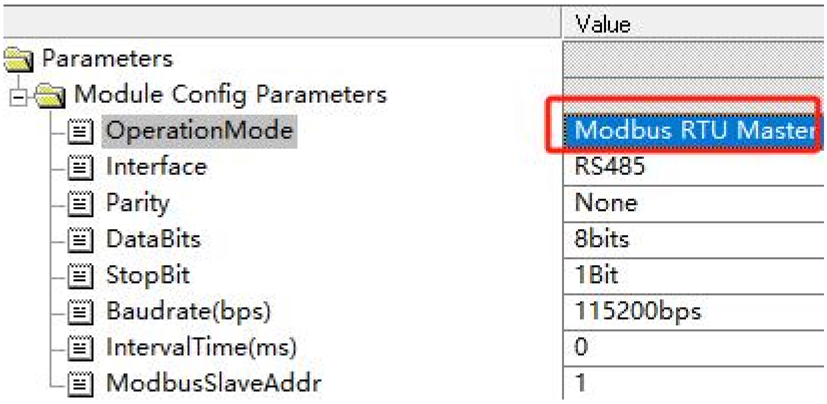


Figure 4-3-94

➢ Add the diagnostic module M: Error Code Input (28 CH) to the second subslot, which contains the diagnostic information of the subsequent 28 subslots at most, and each subslot occupies 2Bytes of diagnostic information. See Table 4.3.7 for its meaning.

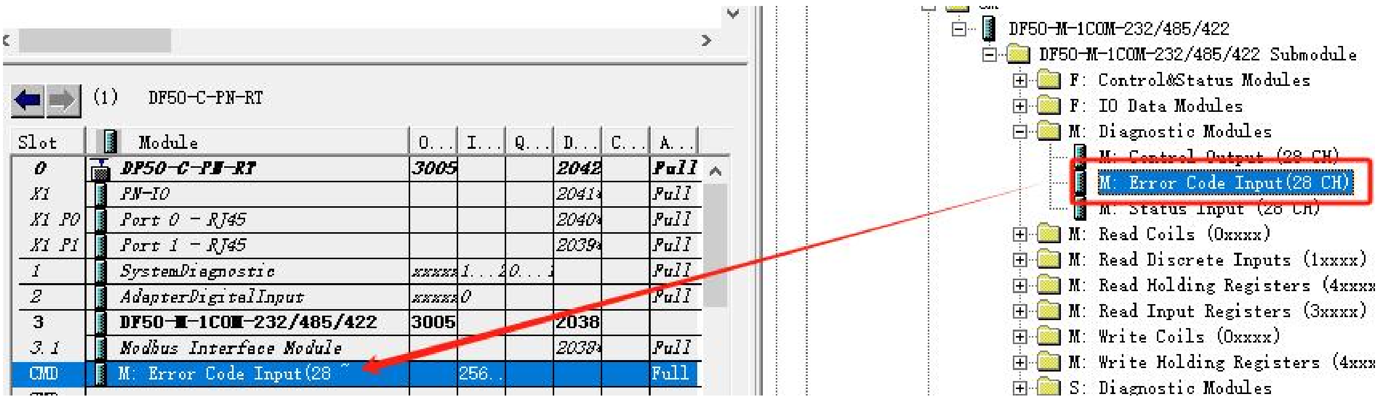


Figure 4-3-95

Table 4.3.7

Normal state value	Status Name	meaning
16#0000	OP_SUCCESS	Configuration or write operation successful
16#0001	DATA_FULL	Data has been updated and can be read
16#0002	WRITE_IDLE	Write idle, writable
16#0003	DATA_EMPTY	Read idle, receive data not updated
Error Status Value	Status Name	meaning
16#E0A1	WRITE_BUSY	Write busy, can't write
16#E0A2	DATA_LARGE	Data length exceeds limit
16#E0A3	CMD_ERR	Command Error
16#E0A4	PARA_ERR	Configuration parameter error
16#E0A5	CHECK_ERR	Verification Error
16#E0A6	SLAVE_NOEXIT	The slave device does not exist
16#E0A7	PACK_LOSS	Packet Loss
16#E0A8	OVER_FLOW	Data overflow

➢ From the 6 function codes starting with M, select the required one and add it to the third sub-slot. If you need to read and write more data, you can add different sub-slot types continuously, up to 28, plus the first interface sub-slot and diagnostic sub-slot, a total of 30 sub-slots. As shown in Figures 4-3-93 and 4-3-94, add M: Read 03 Words 4xxxx and M: Write 03 Words 4xxxx.

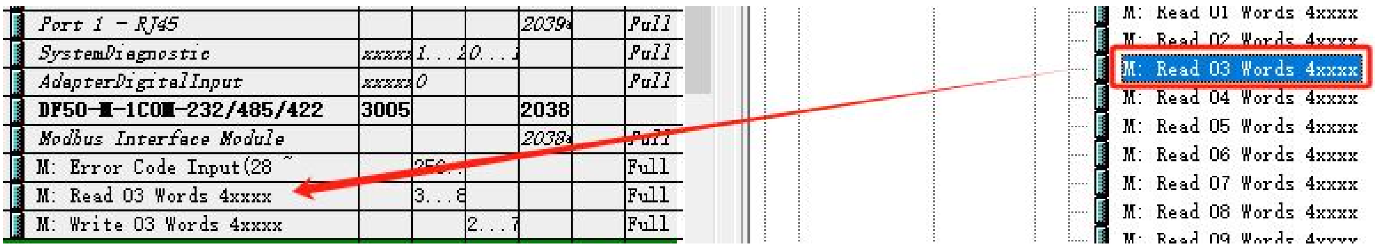


Figure 4-3-96

Figure 4-3-97

➢ As shown in the figure below, click M: Read 03 Words 4xxxx submodule to configure slave device information. See Table 4.3.8 for its meaning.

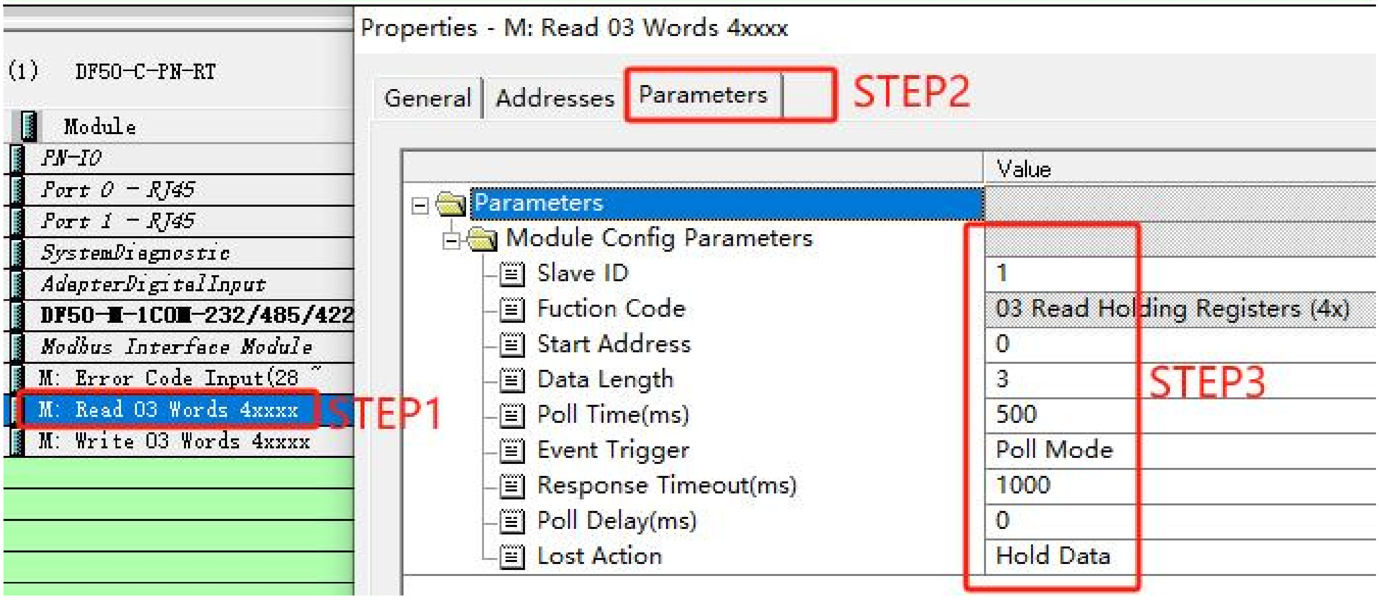


Figure 4-3-98

Table 4.3.8

<table>
<tr><td>SlaveID</td><td>Slave node address</td></tr>
<tr><td>Function Code</td><td>Function code</td></tr>
<tr><td>Start Address</td><td>Register start address</td></tr>
<tr><td>Data Length</td><td>Number of registers or coils</td></tr>
<tr><td>Poll Time</td><td>The period of polling this slave</td></tr>
<tr><td rowspan="2">Event Trigger
Trigger mode selection</td><td>Poll: Polling mode</td></tr>
<tr><td>Trigger: Trigger mode</td></tr>
<tr><td>Response TimeOut</td><td>Slave station response timeout</td></tr>
<tr><td>Poll Delay</td><td>Polling interval between slaves</td></tr>
<tr><td rowspan="2">Lost Action
Slave loss handling</td><td>Hold: Keep the last value</td></tr>
<tr><td>Clear: Clear</td></tr>
<tr><td rowspan="2">Input data processing when module fails</td><td>Input value cleared</td></tr>
<tr><td>Keep the last value</td></tr>
</table>

➢ As shown in the figure below, change the register starting address of M: Write 03 Words 4xxxx to 4000.

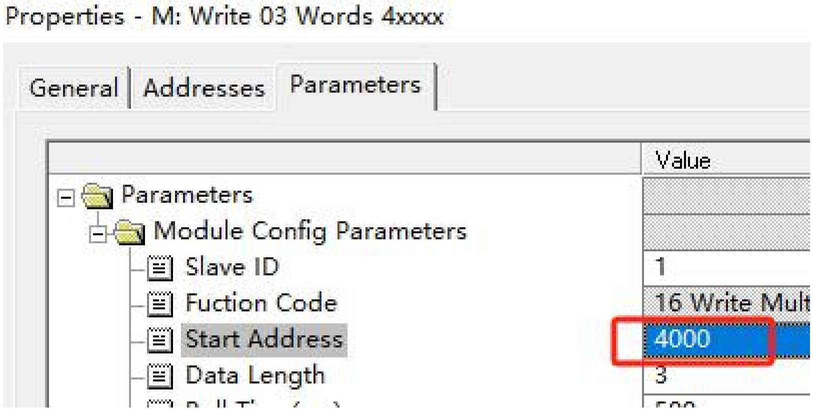


Figure 4-3-99

➢ The final address overview is as follows:

DF50-M-1COM-232/485/422	30050003656		
Modbus Interface Module			
M: Error Code Input(28 ~		256...311	
M: Read 03 Words 4xxxx		3...8	
M: Write 03 Words 4xxxx			2...7

Figure 4-3-100

➢ The meanings of the two sub-slots added now are as follows:

➢ M: Read 03 Words 4xxxx contains 3 word data. According to the configuration information, the data represents the register value of the slave with node address 1 and address 0-2.

➢ M: Write 03 Words 4xxxx contains 3 words of data. According to the configuration information, the data will be written to the slave with node address 1 and registers with addresses 4000-4002.

➢ Download the configuration to the device. Fill in the information we need into the monitoring table for monitoring as shown below.

Address	Symbol	Display fo
//DF50-M-1COM-232/485/422		
//Read 03 Words		
IW 3		HEX
IW 5		HEX
IW 7		HEX
//Write 03 Words		
QW 2		HEX
QW 4		HEX
QW 6		HEX

Figure 4-3-101

➢ Use Modbus Slave software to create two slave stations to communicate with the module, as shown in the figure below, with the starting addresses being 0 and 4000 respectively.

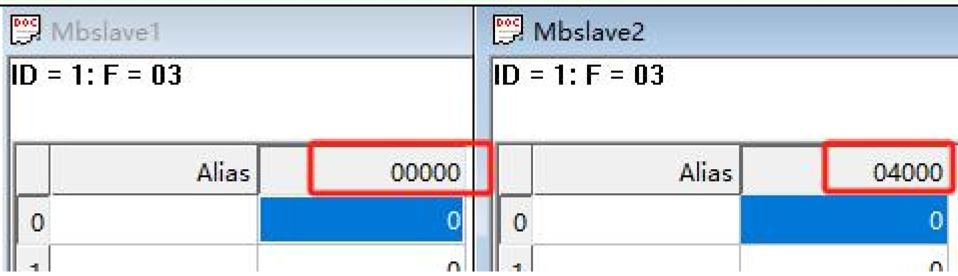


Figure 4-3-102

➢ After changing the data format to HEX and writing "11, 22, 33" into registers 0-2 in the first slave, the monitoring table is displayed as shown in the figure below.

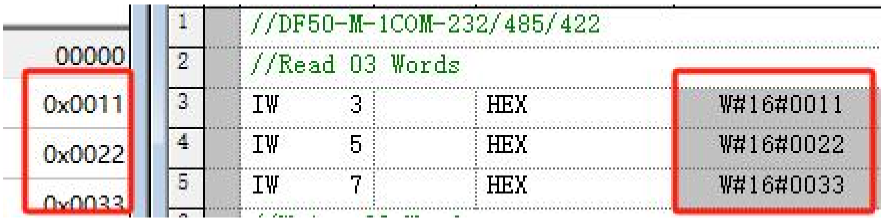


Figure 4-3-103

➢ After writing "44, 55, 66" to subslot 4 in the monitoring table, the second slave is displayed as shown below.

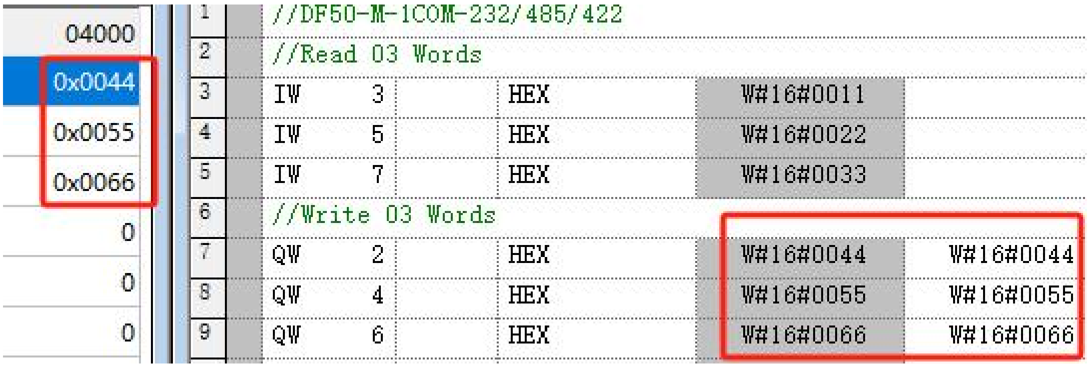


Figure 4-3-104

3.8.2. FreeRUN free transparent transmission mode usage example

➢ In the Modbus Interface Module, set the mode to Free Protocol mode, as shown in the figure below.

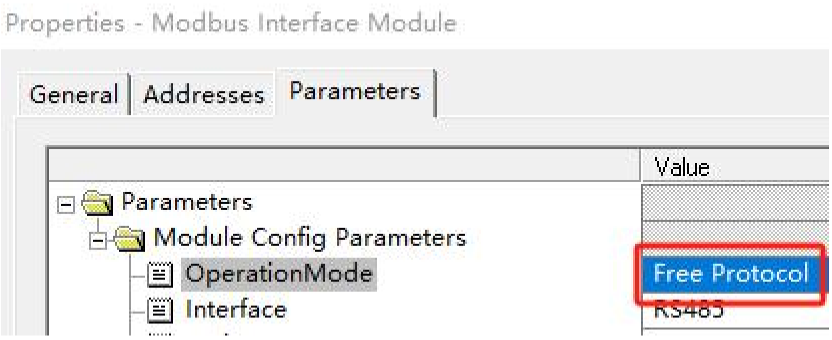


Figure 4-3-105

➢ Add the F: Control status Module module to the second subslot. See Table 4.3.9 for its data structure.

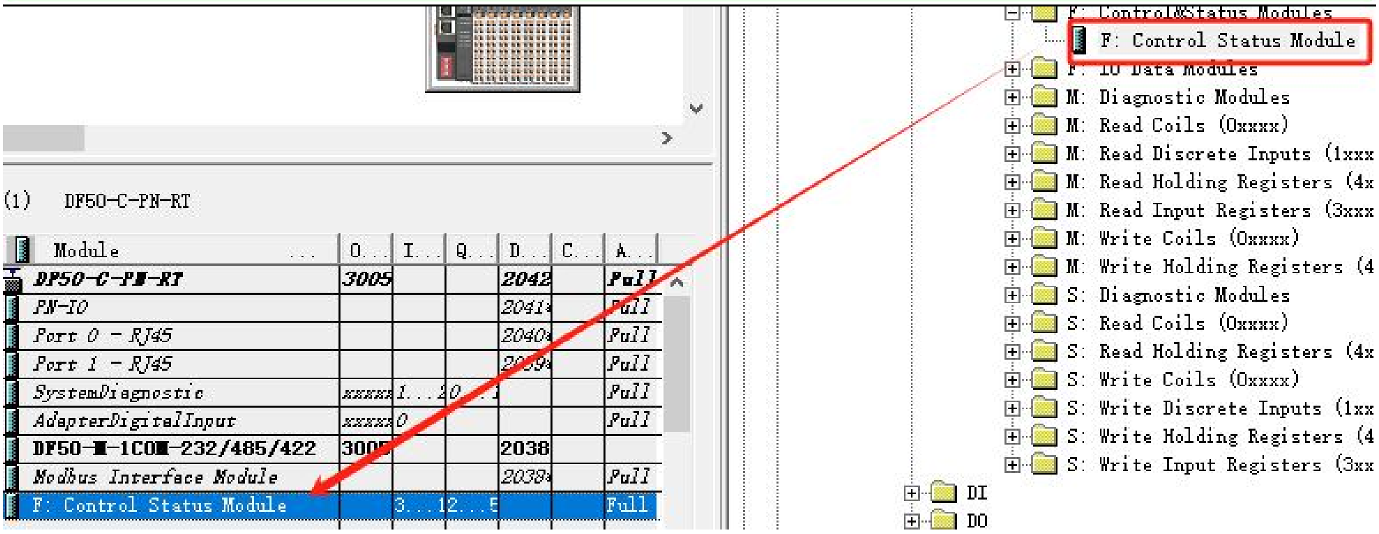


Figure 4-3-106

Table 4.3.9

Output Data			
Byte offset	name	length	meaning
Byte:0-1	CtrlWord	2byte	Control Word
Byte:2	TxDataLEN	1byte	Send data length
Byte:3	TxDataCNT	1byte	Send data sequence number
Input Data			
Byte Sequence Number	name	length	meaning
Byte:0-1	StateWord	2byte	Status word
Byte:2	RxDataLEN	1byte	Receive data length
Byte:3	RxDataCNT	1byte	Receive data sequence number
Byte:4-11	/	8byte	reserve

➢ From F: IO Data Modules, select the ones you need and add them to the third sub-slot. As shown in Figures 4-3-104 and 4-3-105, add F: Free-Port Input 0004 Bytes and F: Free-Port Output 0004 Bytes.

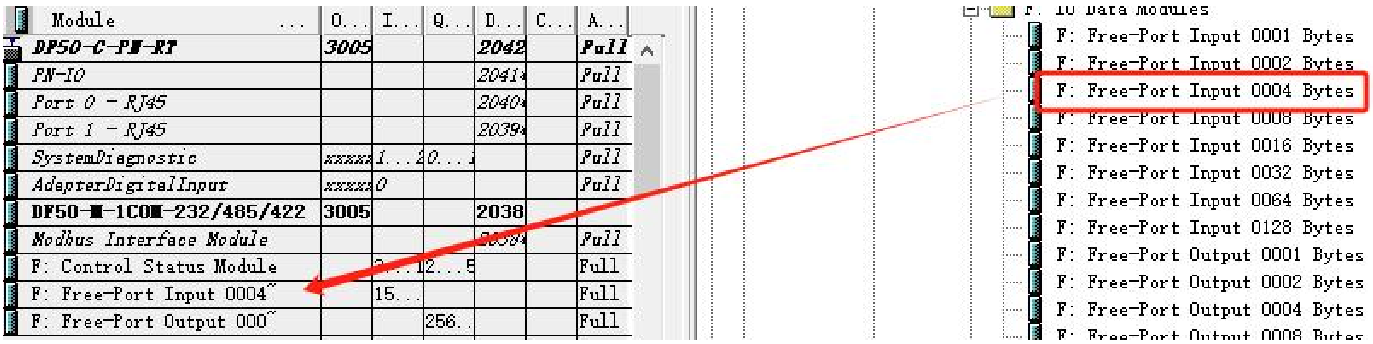


Figure 4-3-107

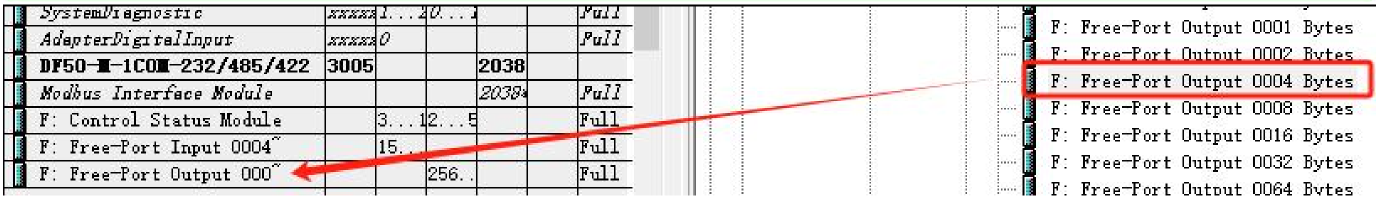


Figure 4-3-108

- ➢ The meanings of the two sub-slots added now are as follows:
- ➢ F: Free-Port Input 0004 Bytes contains 4 bytes of input data.
- ➢ F: Free-Port Output 0004 Bytes contains 4 bytes of output data.
- ➢ Download the configuration to the device and fill in the required data into the monitoring table as shown below.

Address	Symbol	Display format	St
//DF50-M-1COM-232/485/422			
//F: Free-Port Input 0004 Bytes			
IW 15		HEX	
IW 17		HEX	
//F: Free-Port Output 0004 Bytes			
QW 256		HEX	
QW 258		HEX	
//CtrlWord、TxDataLEN、TxDataCNT			
QW 2		HEX	
QB 4		HEX	
QB 5		HEX	
//StateWord、RxDataLEN、RxDataCNT			
IW 3		HEX	
IB 5		HEX	
IB 6		HEX	

Figure 4-3-109

- ➢ Receive data test: The module will automatically enter the receive mode after being configured in free-running mode, or write16#00C2 actively switches to receiving mode. After connecting using the serial port assistant, send "11, 22, 33, 44" in HEX mode. As shown in the following figure, the data sent by the serial port assistant can be received in the receiving data of the monitoring table.

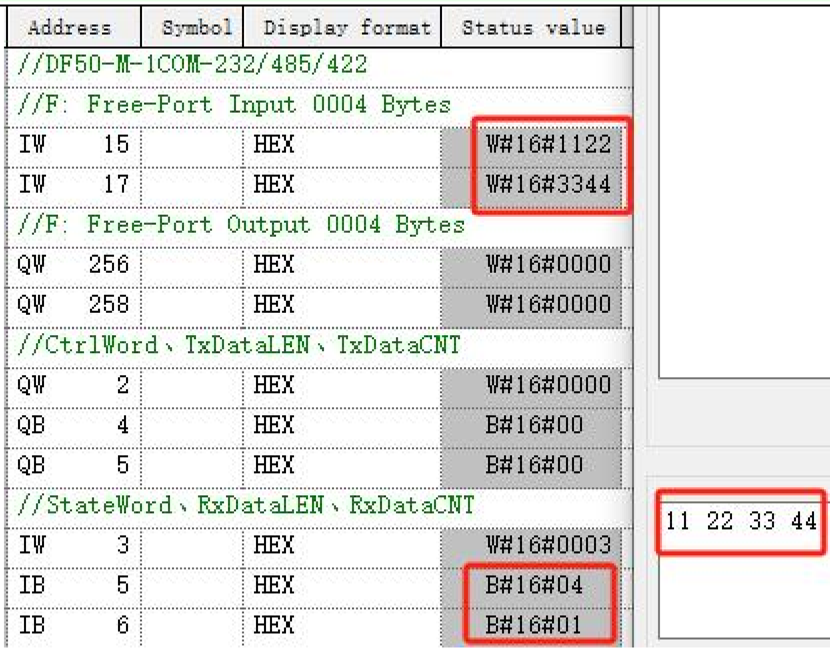


Figure 4-3-110

➢ The meaning of the status word is shown in the following table.

Table 4.3.10

Normal state value	Status Name	meaning
16#0000	OP_SUCCESS	Configuration or write operation successful
16#0001	DATA_FULL	Data has been updated and can be read
16#0002	WRITE_IDLE	Write idle, writable
16#0003	DATA_EMPTY	Read idle, receive data not updated
Error Status Value	**Status Name**	**meaning**
16#E0A1	WRITE_BUSY	Write busy, can't write
16#E0A2	DATA_LARGE	Data length exceeds limit
16#E0A3	CMD_ERR	Command Error
16#E0A4	PARA_ERR	Configuration parameter error
16#E0A5	CHECK_ERR	Verification Error
16#E0A6	SLAVE_NOEXIT	The slave device does not exist
16#E0A7	PACK_LOSS	Packet Loss
16#E0A8	OVER_FLOW	Data overflow

➢ The control word commands are shown in the following table.

Table 4.3.11

Command Value	Command Name	meaning
16#00C1	WRITECUSTOM	Free mode write data command
16#00C2	READCUSTOM	Free mode read data command

➢ Send data test: set the control word to 16#00C1, set the send data length to 4 bytes, set the send sequence number to 1, assign values to Byte1-4 of the send data respectively, and then perform the write action together. The received 4Byte data can be read using the serial port assistant, as shown in the figure below: (To send again, just loop and accumulate the send sequence number)

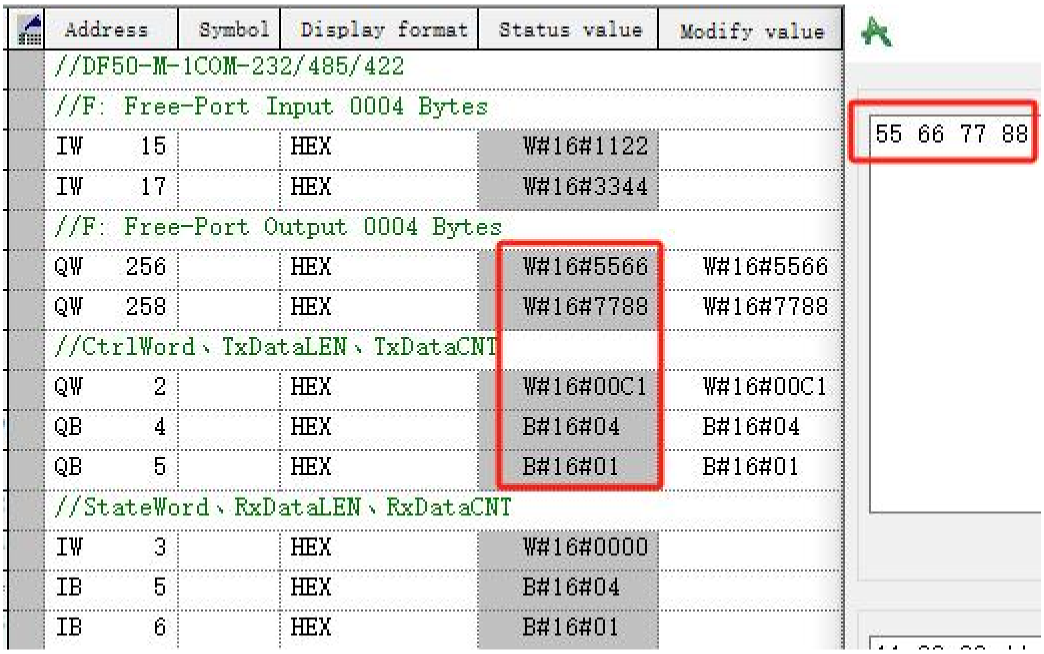


Figure 4-3-111First send

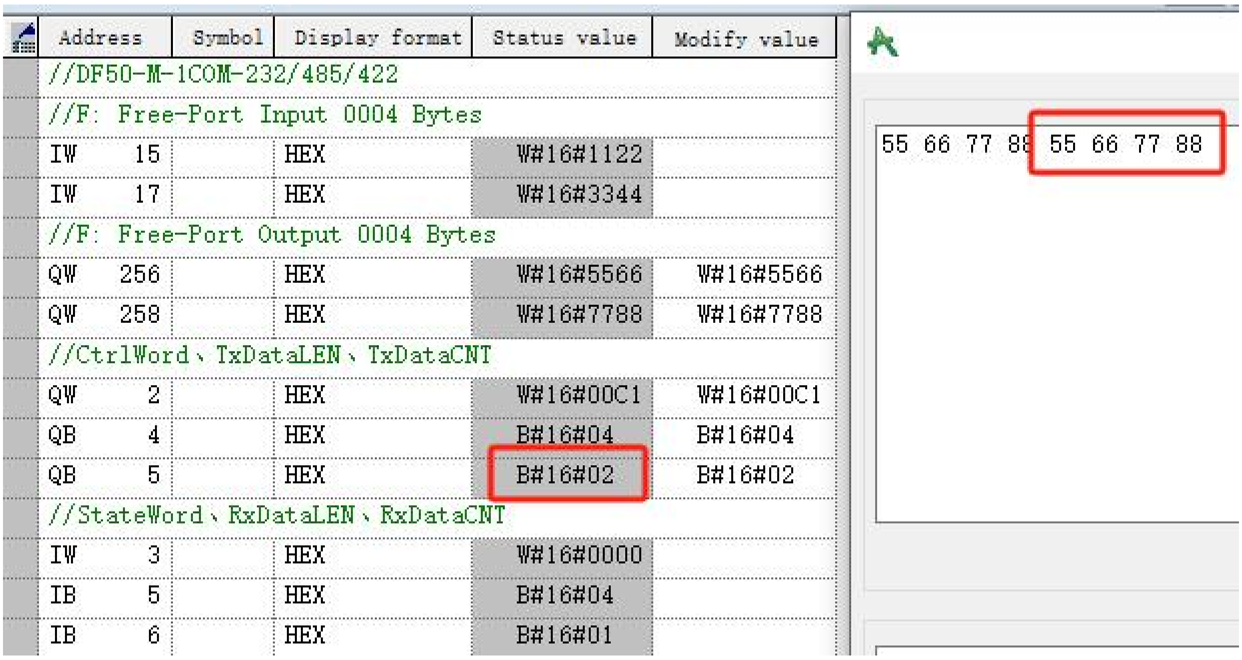


Figure 4-3-112Second send

➢ If you need to receive data, you need to set the control word to 16#00C2 after sending the data before you can receive the data.

3.8.3. Modbus RTU Slave mode usage routine

➢ In the Modbus Interface Module, set the mode to Modbus RTU slave mode. The default value of SlaveAddr is "1" and can be modified as shown in the figure below.

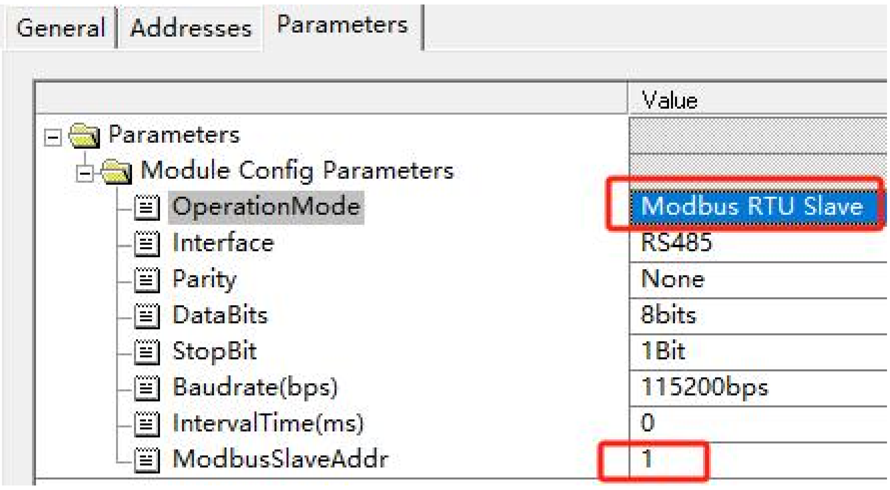


Figure 4-3-113

➢ Add the S: Modbus Status Input (1 Word) module to the second subslot. See Table 4.3.12 for its data structure.

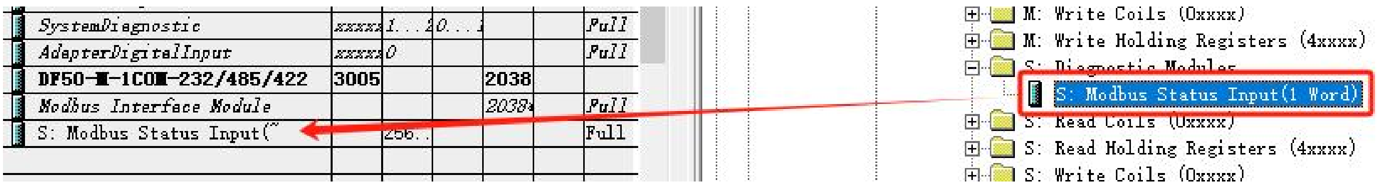


Figure 4-3-114

Table 4.3.12

Normal state value	Status Name	meaning
16#0000	OP_SUCCESS	Configuration or write operation successful
16#0001	DATA_FULL	Data has been updated and can be read
16#0002	WRITE_IDLE	Write idle, writable
16#0003	DATA_EMPTY	Read idle, receive data not updated
Error Status Value	Status Name	meaning
16#E0A1	WRITE_BUSY	Write busy, can't write
16#E0A2	DATA_LARGE	Data length exceeds limit
16#E0A3	CMD_ERR	Command Error
16#E0A4	PARA_ERR	Configuration parameter error
16#E0A5	CHECK_ERR	Verification Error
16#E0A6	SLAVE_NOEXIT	The slave device does not exist

16#E0A7	PACK_LOSS	Packet Loss
16#E0A8	OVER_FLOW	Data overflow

➢ From the 6 types starting with S, select the one you need and add it to the third subslot. If you need to read and write more data, you can add different subslot types continuously, up to 28 subslots, plus the first interface subslot and diagnostic subslot, a total of 30 subslots. Enter the submodule configuration page to configure the protocol information, and set the register first address for both reading and writing. Add S: Read 0002 Words 4xxxx and S: Write 0002 Words 4xxxx as shown in Figures 4-3-112 and 4-3-113.

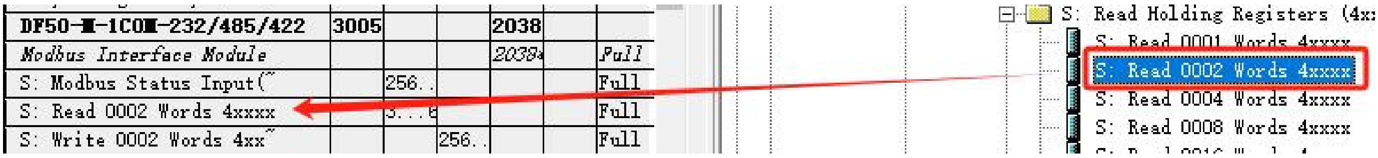


Figure 4-3-115

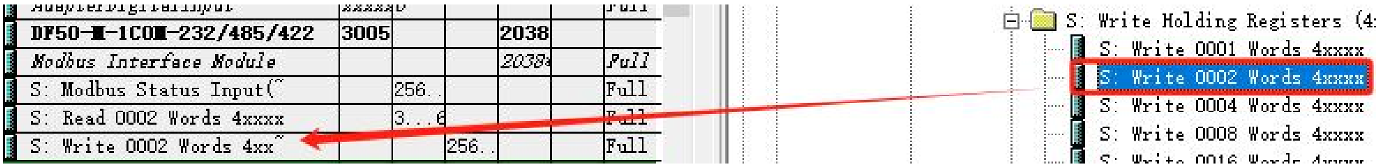


Figure 4-3-116

➢ As shown in the figure below, click S: Write 0002 Words 4xxxx to enter the property interface and change the starting address to 100.

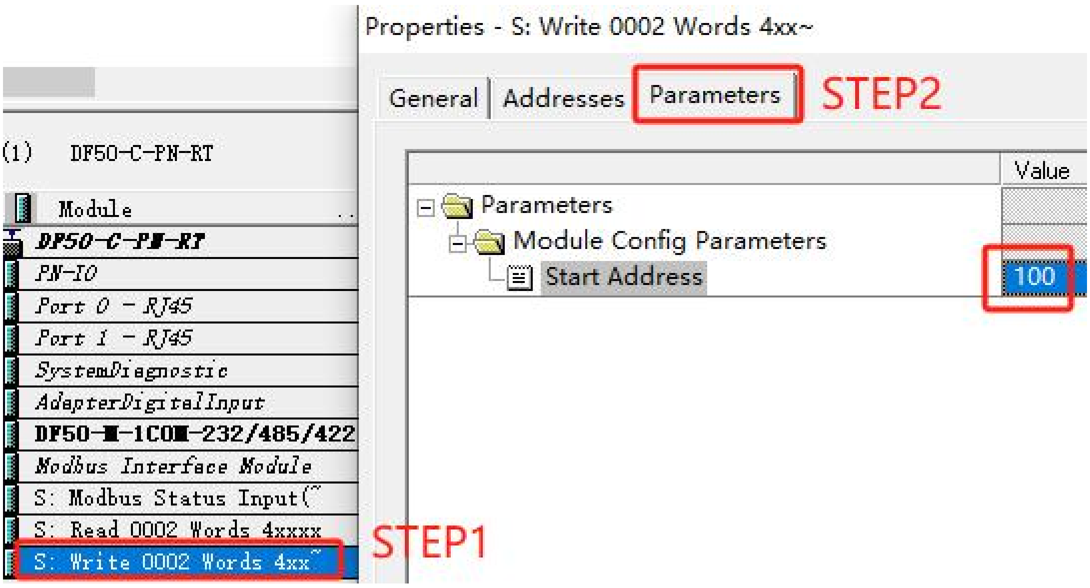


Figure 4-3-117

➢ The meanings of the two sub-slots added now are as follows:

➢ S: Read 0002 Words 4xxxx contains 2 word data. According to the configuration information, the data represents the register value at address 0-1.

➢ S: Write 0002 Words 4xxxx contains 2 words of data. According to the configuration information, the data will be written to the register at address 100-101.

➢ Download the configuration to the device. Fill in the information we need into the monitoring table for monitoring as shown below.

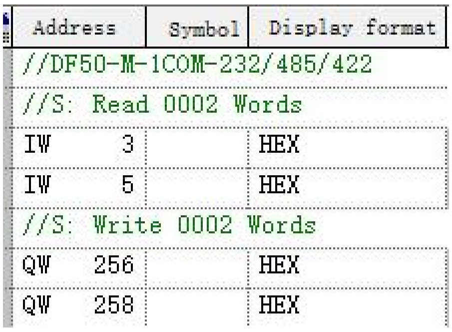


Figure 4-3-118

➢ Use Modbus Poll software to create two new master stations to communicate with the module, as shown in the figure below, with the starting addresses being 0 and 100 respectively.

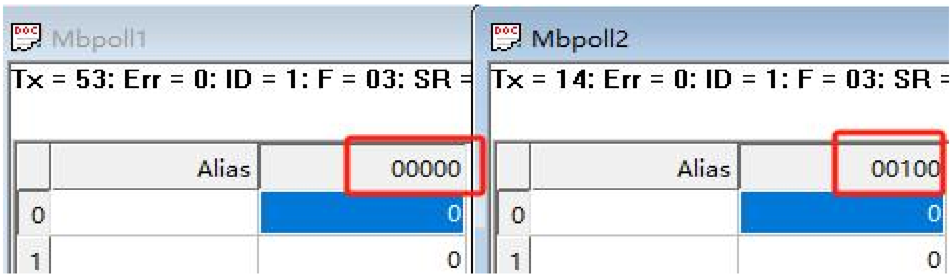


Figure 4-3-119

➢ After changing the data format to HEX and writing "11, 22" into the 0th-1st register in the first master station, the monitoring table is displayed as shown in the figure below.

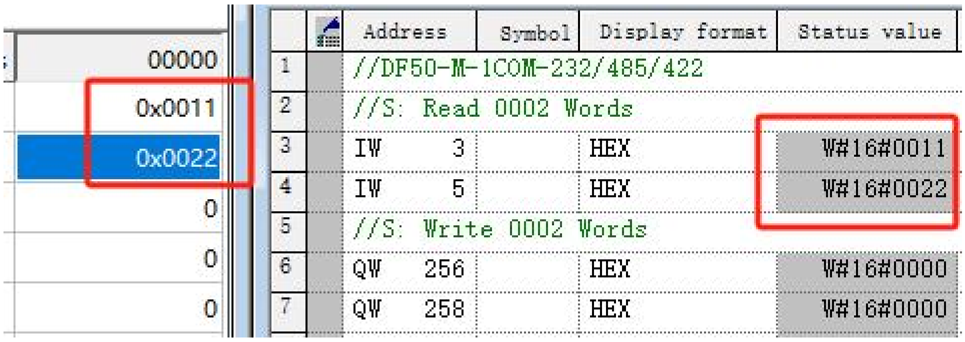


Figure 4-3-120

➢ After writing "33, 44" to subslot 4 in the monitoring table, the second master station is displayed as shown below.

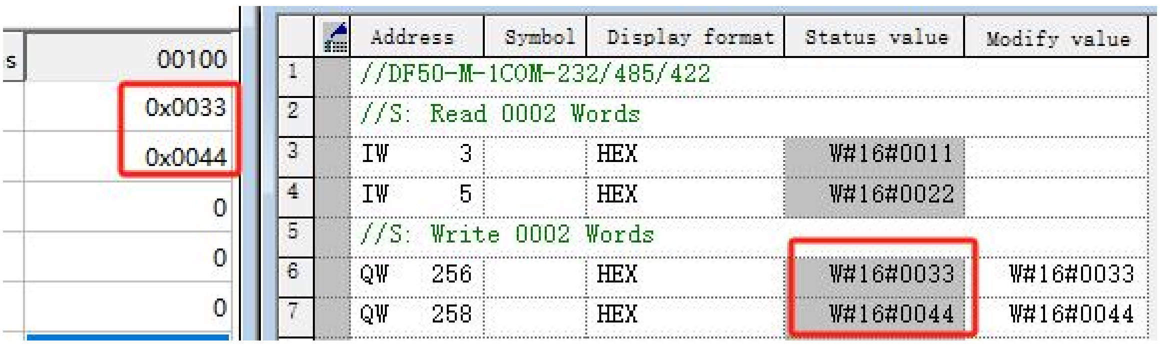


Figure 4-3-121

3.9. IO-LINK module usage routine

➢ This example uses the DF50-C-PN-RT + DF50-M-4IOL topology. For wiring methods, please refer toChapter 3, Section 18.2,After adding the module, it will look like the following figure.

SystemDiagnostic	xxxxxxxxxxxx	1...2	0...1
AdapterDigitalInput	xxxxxxxxxxxx	0	
DF50-M-4IOL	**30050002841**		
IO-link State		3...14	2...5
IOL_I/O_02/02_byte		15...17	256...258
IOL_I_00_byte		18	
IOL_O_00_byte			259

Figure 4-3-122

➢ The submodules that can be added to PORT0~PORT3 are as follows.

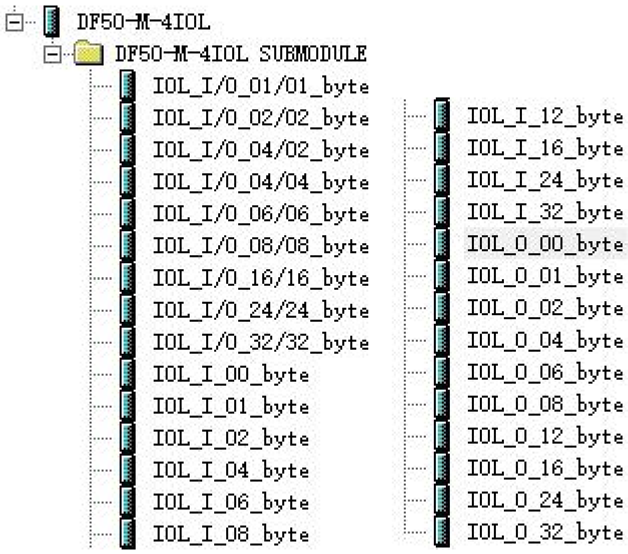


Figure 4-3-123

Table 4.3.13

IOL_I/O_01/01_byte	Input 1 byte Output 1 byte	IOL_I_00_byte	Enter 0 bytes for DI mode	IOL_O_00_byte	Output 0 bytes, used in DO mode
IOL_I/O_02/02_byte	Input 2 bytes Output 2 bytes	IOL_I_01_byte	Input 1 byte	IOL_O_01_byte	Output 1 byte
IOL_I/O_04/02_byte	Input 4 bytes Output 2 bytes	IOL_I_02_byte	Input 2 bytes	IOL_O_02_byte	Output 2 bytes
IOL_I/O_04/04_byte	Input 4 bytes Output 4 bytes	IOL_I_04_byte	Input 4 bytes	IOL_O_04_byte	Output 4 bytes
IOL_I/O_06/06_byte	Input 6 bytes Output 6 bytes	IOL_I_06_byte	Input 6 bytes	IOL_O_06_byte	Output 6 bytes
IOL_I/O_08/08_byte	Input 8 bytes Output 8 bytes	IOL_I_08_byte	Input 8 bytes	IOL_O_08_byte	Output 8 bytes
IOL_I/O_16/16_byte	Input 16 bytes Output 16 bytes	IOL_I_12_byte	Input 12 bytes	IOL_O_12_byte	Output 12 bytes
IOL_I/O_24/24_byte	Input 24 bytes Output 24 bytes	IOL_I_16_byte	Input 16 bytes	IOL_O_16_byte	Output 16 bytes
IOL_I/O_32/32_byte	Input 32 bytes Output 32 bytes	IOL_I_twenty four_byte	Input 24 bytes	IOL_O_twenty four_byte	Output 24 bytes
		IOL_I_32_byte	Input 32 bytes	IOL_O_32_byte	Output 32 bytes

3.9.1. IO-LINK State information

➢ After adding the DF50-M-4IOL module, there is a default slot "IO-LINK State" to display the status information of each port of the module. Fill in the IO-LINK State address into the monitoring table as shown below. For the specific meaning of State, please refer toChapter 3, Section 18.4.2.

Address	Symbol	Display format	Status value	Modify value
//DF50-M-4IOL				
//Port0 Event code;Port0 Working status;Port0 Communication status				
IW 3		HEX	W#16#0000	
I 5.5		BOOL	true	
I 5.6		BOOL	false	
//Port1 Event code;Port1 Working status;Port1 Communication status				
IW 6		HEX	W#16#1800	
I 8.5		BOOL	false	
I 8.6		BOOL	true	
//Port2 Event code;Port2 Working status;Port2 Communication status				
IW 9		HEX	W#16#1800	
I 11.5		BOOL	false	
I 11.6		BOOL	true	
//Port3 Event code;Port3 Working status;Port3 Communication status				
IW 12		HEX	W#16#0000	
I 14.5		BOOL	false	
I 14.6		BOOL	false	
//Port0 command				
QB 2		HEX	B#16#00	
//Port1 command				
QB 3		HEX	B#16#00	
//Port2 command				
QB 4		HEX	B#16#00	
//Port3 command				
QB 5		HEX	B#16#00	

Figure 4-3-124

➢ PORT0 is connected to an IO-link slave, the event code is displayed as "16#0", the working status is "TRUE" indicating that it is in normal working state, and the communication status is "FALSE" indicating that it is in slave connection state.

➢ PORT1 and PORT2 are not connected to the device, and the event code is displayed as "16#1800". According to the port event code, the IO-LINK slave is offline. The working status is "FALSE", indicating that it is in an incorrect working state, and the communication status is "TRUE", indicating that the slave is disconnected.

➢ PORT3 is the monitoring information when it is not configured.

➢ As shown in the figure below, writing "0x01" in Port1 Command can clear the event code of Port1.

Address	Symbol	Display format	Status value	Modify value
//DF50-M-4IOL				
//Port0 Event code;Port0 Working status;Port0 Communication status				
IW 3		HEX	W#16#0000	
I 5.5		BOOL	true	
I 5.6		BOOL	false	
//Port1 Event code;Port1 Working status;Port1 Communication status				
IW 6		HEX	W#16#0000	
I 8.5		BOOL	false	
I 8.6		BOOL	true	
//Port2 Event code;Port2 Working status;Port2 Communication status				
IW 9		HEX	W#16#1800	
I 11.5		BOOL	false	
I 11.6		BOOL	true	
//Port3 Event code;Port3 Working status;Port3 Communication status				
IW 12		HEX	W#16#0000	
I 14.5		BOOL	false	
I 14.6		BOOL	false	
//Port0 command				
QB 2		HEX	B#16#00	
//Port1 command				
QB 3		HEX	B#16#01	B#16#01
//Port2 command				
QB 4		HEX	B#16#00	
//Port3 command				
QB 5		HEX	B#16#00	

Figure 4-3-125

3.9.2. IO-LINK Mode

➢ As shown in the figure below, configure PORT0 to IO-link mode. The default mode is IO-link mode. For other configurable information, please refer to[Chapter 3, Section 18.3]ISDU is configured according to the instructions of the IO-Link slave you are using. The IO-Link slave used in this tutorial does not have a configurable ISDU. Note that you must re-download the configuration after the configuration is complete.

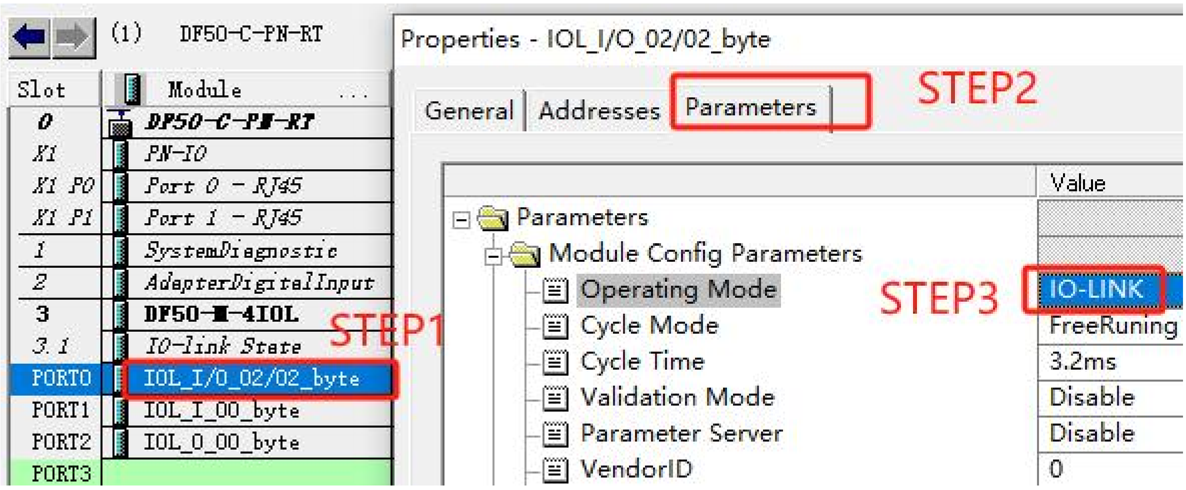


Figure 4-3-126

➢ Fill in the Port0 address in the monitoring table. For its meaning, please refer to[Chapter 3, Section 18.4.2].

Address	Symbol	Display format	Status value
//DI;C/Q DI;Valid bit;Process data;Process data			
I 15.0		BOOL	
I 15.1		BOOL	
I 15.2		BOOL	
IB 16		HEX	
IB 17		HEX	
//C/Q DO;Valid bit;Process data;Process data			
Q 256.1		BOOL	
Q 256.2		BOOL	
QB 257		HEX	
QB 258		HEX	

Figure 4-3-127

➢ Data reception:As shown in the figure below, if the Valid bit is "TRUE", it means the received data is valid, and the Process data is the received data. The data received this time is "16#08". In this mode, the DI and C/Q DI bits are invalid.

Address	Symbol	Display format	Status value
//DI;C/Q DI;Valid bit;Process data;Process data			
I 15.0		BOOL	false
I 15.1		BOOL	false
I 15.2		BOOL	true
IB 16		HEX	B#16#08
IB 17		HEX	B#16#00
//C/Q DO;Valid bit;Process data;Process data			
Q 256.1		BOOL	false
Q 256.2		BOOL	false
QB 257		HEX	B#16#00
QB 258		HEX	B#16#00

Figure 4-3-128

➢ Data sending:Setting the Valid bit to "TRUE" or "FALSE" indicates whether the sent data is valid. The Process data is the sent data, and this time "16#0F" is sent. In this mode, the C/Q DO bit is invalid.

Address	Symbol	Display format	Status value	Modify value
//DI;C/Q DI;Valid bit;Process data;Process data				
I 15.0		BOOL	false	
I 15.1		BOOL	false	
I 15.2		BOOL	true	
IB 16		HEX	B#16#08	
IB 17		HEX	B#16#00	
//C/Q DO;Valid bit;Process data;Process data				
Q 256.1		BOOL	false	
Q 256.2		BOOL	false	
QB 257		HEX	B#16#0F	B#16#0F
QB 258		HEX	B#16#00	

Figure 4-3-129

3.9.3. DI/DO mode

➢ As shown in the figure below, configure Port1 to DI mode and Port2 to DO mode. The default mode is IO-link. Note that you need to re-download the configuration after the configuration is completed.

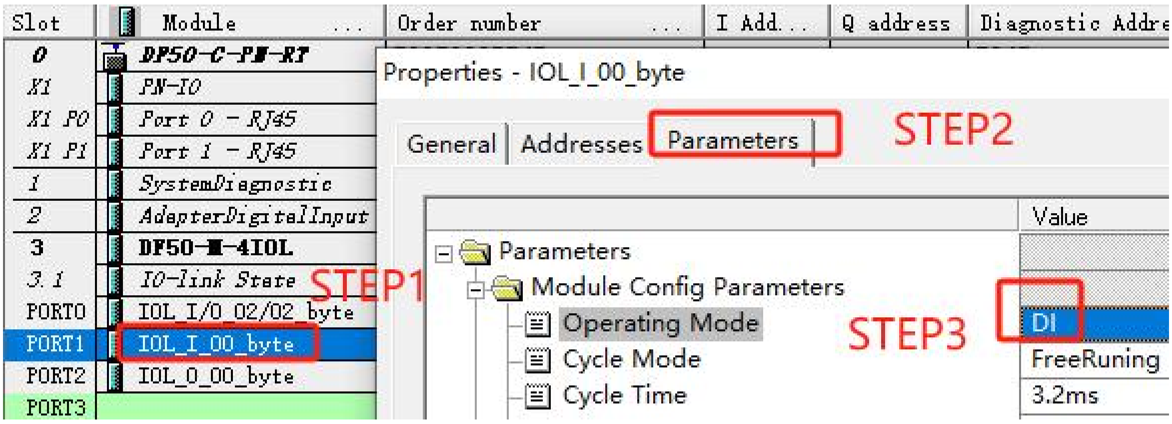


Figure 4-3-130Configured as DI

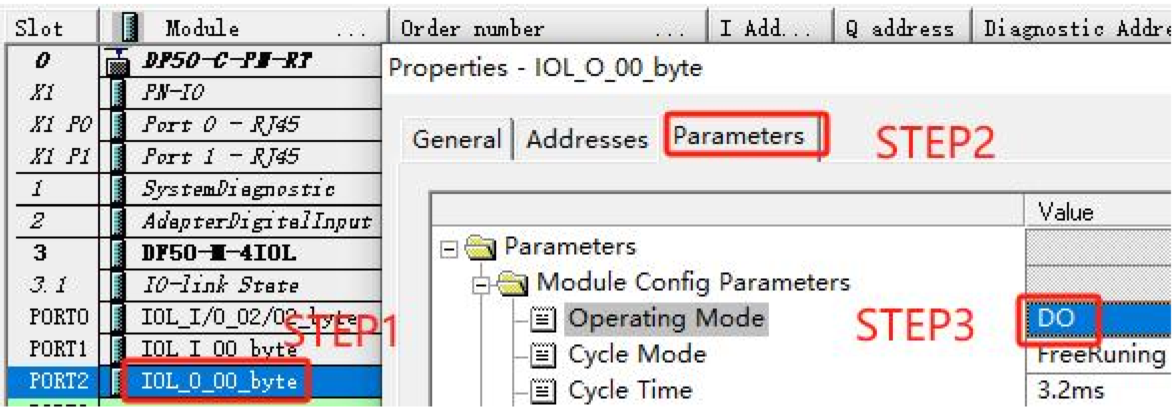


Figure 4-3-131Configured as DO

➢ Fill in the Port1 and Port2 addresses in the monitoring table. For their meanings, please refer toChapter 3, Section 18.4.2For wiring method, please refer toChapter 3, Section 18.2.2.

Address	Symbol	Display format	Status value
//Port1 DI;Port1 C/Q DI			
I 18.0		BOOL	false
I 18.1		BOOL	false
//Port2 C/Q DO			
Q 259.1		BOOL	false

Figure 4-3-132

➢ Input valid signals to Port1 DI and Port1 C/Q DI. As shown in the figure below, you can see that the corresponding address becomes "TURE".

Address	Symbol	Display format	Status value
//Port1 Dl:Port1 C/Q DI			
I 18.0		BOOL	true
I 18.1		BOOL	true
//Port2 C/Q DO			
Q 259.1		BOOL	false

Figure 4-3-133

➢ As shown in the figure below, write "TRUE" to Port2 C/Q DO, and use a multimeter to measure the voltage of C/Q2 port, and you can measure the voltage to be 24V.

Address	Symbol	Display format	Status value	Modify value
//Port1 Dl:Port1 C/Q DI				
I 18.0		BOOL	false	
I 18.1		BOOL	false	
//Port2 C/Q DO				
Q 259.1		BOOL	true	true

Figure 4-3-134