

PROFINET

PN7 Series Integrated I/ O

User Manual



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1 product description

1.1 Product Introduction

PN7 series integrated I/O module adopts PROFINET industrial Ethernet bus interface. It is a PROFINET slave device with standard IO equipment. It can be compatible with PROFINET networks of multiple manufacturers, providing users with high-speed data collection, optimizing system configuration, and simplifying on-site wiring, improving system reliability and etc, a variety of options.

1.2 Product Features

- Input and output configurable
 Input or output function switching can be achieved by configuring DIO channel parameters .
- IP67 protection level Suitable for harsh industrial environments.
- Compact size

Ideal for applications where space is limited.

• High speed

Based on high-performance communication chips.

• Easy to diagnose

The innovative channel indicator light design is close to the channel, the channel status is clear at a glance, detection and maintenance are convenient.

• Easy to configure

The configuration is simple and supports all major mainstream PROFINET master stations.

• Wiring is quick and easy Using standard cables, wiring is simple.

2 Naming rules

2.1 Naming Rules

$\frac{PN}{(1)} \frac{7}{(2)} - \frac{1}{(3)} \frac{08}{(4)} \frac{08}{(5)} \frac{A}{(6)} \frac{+}{(7)}$

serial	meaning	Value description				
number						
(1)	bus protocol	PN: PROFINET protocol al	obreviation			
(2)	Protection	7 : IP 67				
	level					
(3)	I/O type	Default: digital				
(4)	Input signal	16 : 16 channel input 08 : 8 channel input 0 0 : 0 channel input			0 0 : 0 channel input	
	points					
(5)	Output signal	16 : 16 channel output 08 : 8 channel output 0 0 : 0 channel output			0 0 : 0 channel output	
	points					
(6)	signal type	A: NPN		B: PNP		
(7)	Channel	+: Channel configurable		Default: ch	annel type is fixed and	
	characteristics	input/output		cannot be	configured	

2.2 Model List

model	Product Description
PN7-1600A	16-channel digital input module , NPN type
PN7-0016A	16-channel digital output module , NPN type
PN7-0808A	8-channel digital input and output module , NPN type

PN7-1600B	16-channel digital input module , PNP type
PN7-0016B	16-channel digital output module , PNP type
PN7-0808B	8-channel digital input and output module , PNP type
PN7-0016A+	16-channel digital input and output configurable module , NPN type
PN7-0016B+	16-channel digital input and output configurable module , PNP type

3 Product parameters

3.1 General Parameters

Interface Parameters				
bus protocol	PROFINET			
bus interface	2×M12-D, 4Pin, female, blue			
electrical isolation	500 VAC			
data transmission	Category 5 or above UTP or STP (STP recommended)			
medium				
Transmission distance	≤100 m (distance between stations)			
Technical Parameters				
Configuration method	Via main station			
Power interface	2×M12-L, 5Pin, male & female, red			
Power supply	24VDC (18V ~ 30V)			
U _s total current	Max : 16A			
US current consumption	≤ 40mA			
U_L total current	Max : 16A			
U_L consumption current	25mA			
	+Sensor supply current			
	+Load output current			
Electrical isolation	yes			
between GND $_{\rm S}$ and				
GNDL				
Weight	480g			
Size	225×62×35.1mm			
Operating temperature	-25℃~+70℃			
Storage temperature	-40℃~+85℃			
Relative humidity	95%, no condensation			
Protection level	IP67			

3.2 Digital Parameters

Digital input					_	
Product model	PN7-1600A	PN7-1600B	PN7-0808A	PN7-0808B	PN7-0016A	PN7-0016B
Rated voltage	24 VDC (18V~30V)					
signal points	16		8	8		
input interface		8×M12-A, 5	Pin, Female			
signal type	NPN	PNP	NPN	PNP		
" 0" signal voltage	15~30V	-3~+3 V	15~30V	-3~+3V		
" 1" signal voltage	-3~+3 V	15~30V	-3~+3V	15~30V		
Input filtering		3r	ns			
Input Current		4n	nA			-
Sensor power		Max : 2A	(from U $_{L}$)			
supply sum						
Isolation method		Optically-cou	pled isolation			
Isolation		500	VAC			
withstand voltage						
Channel indicator	Green LED light					
light						
Digital output	I					
Rated voltage	-			24 VDC (18V~30V)	
signal points	-		8	3	1	6
Output Interface	-			8×M12-A, 5	Pin, Female	
signal type	-		NPN	PNP	NPN	PNP
Load type	-		Resistive load, inductive load			ł
Single channel			Max : 500 mA (from U $_{L}$)			
rated current	-				1	
Output total		-	Max: 4 A	(from U $_{L}$)	Max: 8 A	(from U $_{L}$)
current	-					
Port protection	Overcurrent protection					
Isolation method	Optically-coupled isolation					
Isolation	500VAC					
withstand voltage						
Channel indicator	Green LED light					
light						

digital input					
Product number	PN7-0016A+	PN7-0016 B +			
Rated voltage	24 VDC (18V~30V)				
signal points	Input and output are conf	igurable , up to 16 points			
input interface	M12-A, 5 P	in, Female			
signal type	NPN	PNP			
" 0" signal voltage	15~30V	-3~+3 V			
" 1" signal voltage	-3~+3 V	15~30V			
Input filtering	3n	าร			
Input Current	4m	A			
Sensor power	Max : 2A (from U L)			
supply sum					
Isolation method	Optically-coup	oled isolation			
Isolation	500\	/AC			
withstand voltage					
Channel indicator	Green LED light				
light					
Digital output					
Rated voltage	24 VDC (18V~30V)				
signal points	Input and output are conf	igurable , up to 16 points			
Output Interface	M12-A, 5 P	in, Female			
signal type	NPN	PNP			
Load type	Resistive load,	inductive load			
Single channel	Max : 500 mA (from U L)				
rated current					
Output total	Max: 8 A (from U $_{L}$)				
current					
Port protection	Overcurrent protection				
Isolation method	Optocoupler isolation				
Isolation	500VAC				
withstand voltage					
Channel indicator	Green LED light				
light					

4 panel

4.1 Product Structure

Names of each part of the product



4.2 Indicator Function

Name	ID	Color	State	Status description	
Network	L/A1	green	ON	Establish a network connection	
indicator IN			Flashing	Network connection and data exchange	
			OFF	No data interaction or exception	
Network	L/A2	green	ON	Establish a network connection	
indicator OUT			Flashing	Network connection and data exchange	
			OFF	No data interaction or exception	
System power	U s	green	ON	The power supply is normal	
indicator			OFF	The product is not powered on or the power supply is	
				abnormal.	
Load power	UL	green	ON	The power supply is normal	
indicator light			OFF	The product is not powered on or the power supply is	
				abnormal.	
Running status	R	green	ON	N Module runs normally	
indicator RUN			OFF	Module operation abnormality	
System alarm	SF	red	ON	The system is working abnormally	
indicator light			OFF	The system is running normally or is not powered on	
Network alarm	BF	red	ON	Network connection abnormality	
indicator light			OFF	Network connection is normal	
Input channel	0 ~ F	green	ON	The module channel has signal input	
indicator			OFF	There is no signal input in the module channel or the	
				signal input is abnormal.	
Output channel	0 ~ F	green	ON	The module channel has signal output	
indicator			OFF	The module channel has no signal output or the	
				signal output is abnormal.	

4.3 Bus Interface Definition

Bus interface connection view (M12-D, 4 Pin, female end)



Definition

Pin	Function
1	TX + , data + for sending
2	RX + , receiving data +
3	TX - , data for sending -
4	RX - , receiving data -

4.4 Power Interface Definition

Power interface connection view (M12- L, 5 Pin, male & female)



P in	Function	Wire core
		color
1	+24V U _s	Brown
2	$0V \text{ GND}_{L}$	White
3	0V GND _s	Blue
4	+24V U _L	Black
5	PE	Gris

Definition

4.5 I/O Interface Definition

I/ O interface connection female)	view (M12-A,5 Pin,		Definition	
$\frac{1}{2}$	2	P in	Function	Wire core color
$\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$	ζος ζος	1	+24V U _L / NC	Brown
4 3	1	2	OV GND	Blue
וח		4	DI/DO A	Black
וט	00			Crite

5

ΡE

Gris

5 Installation and wiring

5.1 Dimensional Drawing

Overall specifications (unit: mm)



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5.2 Installation Environment Requirements

In order to give full play to the performance of the PN7 module and improve its reliability, please avoid installing it in the following places :

- Places exposed to direct sunlight
- Places where the ambient temperature or relative humidity exceeds module specifications
- Places with corrosive gases and flammable gases
- Places with acid, oil, and chemical droplets
- Places with dust, iron filings and sparks flying
- Places where the module body is directly subject to impact or vibration
- Places with strong electric fields, magnetic fields, radiation, and static electricity interference
- Places with power lines and AC power lines nearby

5.3 Module installation

• Please use M4*22mm and above screws to fasten the module body .



• The module mounting hole dimensions are as shown in the figure below.



Precautions

• The transparent cover on the module is a reserved rotary switch cover. The cover has been tightened before leaving the factory. Please do not disassemble it at will to avoid damaging the IP67 protection level.

• Please fix the module correctly. Failure to do so may cause failure due to vibration.

5.4 Wiring Guide

5.4.1 Power Interface Wiring Diagram



Precautions

• It is recommended that the system power supply and load power supply use different switching power supplies to ensure the stability of operation.

• For power supply rules, please refer to the " <u>Power Supply Rules</u> " chapter.

5.4.2 I/ O Interface Wiring Diagram



NPN Output





Precautions

• Please install the waterproof cap provided by the module on the unused connector interface and tighten it, to avoid damaging the IP67 protection level.

• Pin 1 of the PNP output interface is NC, pin 1 of other types of interfaces is +24V U_L.

6 Power supply rules

6.1 Direct power supply rules

The power supply of each module is directly connected from the switching power supply without using the OUT interface. The total current consumption of the load power supply of each module should be $\leq 8A$.



The voltage drop in the power cable varies depending on the total current consumption of the module's load power supply and the cable material. The following table shows the voltage drop when using our company's standard cables.

Total current	Voltage drop at different cable lengths (V)					
consumption of the	1m	3m	5m	10m		
power supply (A)						
8	0.64	1.12	1.6 0	2.72		
7	0.56	0.98	1.4 0	2.38		
6	0.48	0.84	1.2 0	2.04		

5	0.40	0.70	1.00	1.70
4	0.32	0.56	0.80	1.36
3	0.24	0.42	0.60	1.02
2	0.16	0.28	0.40	0.68
1	0.08	0.14	0.20	0.34

■ Calculation example of total module current consumption when directly powered

For example, module 1 is PN7-1600A, module 2 is PN7-0808A, and module 3 is PN7-0016A. The usage of each module is as shown in the following table :

modulo		I /0 I	port	external connection device		
name port Pin I/O mod		I/O mode	Product name	Specification		
		Pin4	4 DI (input current 4mA) 2 DI (input current 4mA) 3-wire sensor		Current consumption: 30mA	
Module 1	Port 1 ~8	Pin2			Current consumption: 30mA	
		Pin4	DI (input current 4mA)		Current consumption: 30mA	
Module 2	Port 1 ~4	Pin2	DI (input current 4mA)	3-wire sensor	Current consumption: 30mA	
		Pin4	DO	The	Load current: 500mA	
	Port 4 ~8	Pin2	DO	electromagnetic valve	Load current: 500mA	
		Pin4	DO	The	Load current: 500mA	
Module 3	Port 1 ~8	Pin2	DO	electromagnetic valve	Load current: 500mA	

Calculate the total current consumption . The calculated current of a single module is as shown in the

following table:

module	Power	Total current consumption	Calculation results
name	supply type	calculation items	
	System	System surrent consumption	Module system side power consumption
	power U _s	system current consumption	40 mA
			for all ports
Module 1	Lood power	Madula input summat and	(sensor current consumption) + (channel
	ULULUULUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU	sensor current consumption	input current * Enter points)
			= (30mA * 16) + (4mA * 16)
			= 544mA
	System	Custom summert consumption	Module system side power consumption
Madula 2	power U _s	System current consumption	40mA
wodule 2	Load power	Module input current and	For ports 1 ~4
	UL	sensor current consumption	(Sensor current consumption) + (Channel

			input current * Enter points)
			= (30mA * 8) + (4mA * 8)
			= 272mA
			For ports 5~8
			Channel output current * number of
		Load output current	output points
			= 500 mA * 8
			= 4A
	System	System current concumption	Module system side power consumption
	power U _s	System current consumption	40mA
			For ports 1 ~8
Module 3	Load power	Ch	Channel output current * number of
		Load output current	output points
			= 500 mA * 16
			= 8A

To sum up, the current consumption of each module is as follows:

- For the system power supply U_s, each module consumes 40mA.
- For load supply U_L:

 U_L of module 1 (PN7-1600A) is 544 mA , which is less than the maximum current of the module load power supply U_L of 8 A.

 U_L of module 2 (PN7-0808A) is 272 mA + 4A = 4.272A, which is less than the maximum current of the module load power supply U_L of 8A.

 U_L of module 3 (PN7-0016A) is 8A , which is equal to the maximum current of the module load power supply U_L 8A.

In this example, since the total current consumption of each module satisfies the sum of module load

power supply current consumption $\leq 8A$, the requirement is met .

6.2 Series power supply rules

The modules are powered in series through the OUT interface. The total current consumption of the load power supply of each module should be \leq 8A, and the total current consumption of the system power supply and load power supply of all modules should be \leq 16A.



When power is supplied in series, the consumption current of the series-connected modules will flow inside the module, so a voltage drop will occur in the internal circuit of the module. The voltage drop in the power cable varies depending on the total current consumption of the module's load power supply and the cable material. The following table shows the voltage drop when using our company's standard cables.

Total current	Voltage drop in the	Voltage drop at different cable lengths(V)			
consumption of the	module's internal	1m	2m	5m	10 m
power supply (A)	circuit (V)		5111	5111	
16	0.64	1.28	2.24	3.20	5.44
15	0.60	1.20	2.10	3.00	5.10
14	0.56	1.12	1.96	2.80	4.76
13	0.52	1.04	1.82	2.60	4.42
12	0.48	0.96	1.68	2.40	4.08
11	0.44	0.88	1.54	2.20	3.74
10	0.4 0	0.80	1.40	2.00	3.40
9	0.36	0.72	1.26	1.80	3.06
8	0.32	0.64	1.12	1.60	2.72
7	0.28	0.56	0.98	1.40	2.38
6	0.24	0.48	0.84	1.20	2.04
5	0.20	0.40	0.70	1.00	1.70
4	0.16	0.32	0.56	0.80	1.36
3	0.12	0.24	0.42	0.60	1.02
2	0.08	0.16	0.28	0.40	0.68
1	0.04	0.08	0.14	0.20	0.34

Precautions

• The total current consumption of the load power supply of each module should be ≤8A.

As shown in the figure above, when powered in series, the sum of the current consumption of the

system power supply and load power supply of all modules should meet the rule of "1+2+3" $\leq 16A$.

Calculation example of total current consumption of modules when powered in series

For example, module 1 is PN7-1600A, module 2 is PN7-0808A, and module 3 is PN7-0016A. The usage of each module is the same as " <u>Example of calculation of total module current consumption when</u> directly powered.".

Calculate the total current consumption :

 $U_{s} = 40mA + 40mA + 40mA = 120mA$

U_L = 544mA + 4.272A + 8A = 12.816A

In this example, since the total current consumption of the system power supply U_s and load power supply U_L of all modules meets the rule of "1+2+3" \leq 16A, the requirements are met .

Precautions

• In series power supply mode, if the total current consumption of the system power supply U_s or the total current consumption of the load power supply U_L exceeds 16A, please change some modules to the direct power supply mode to ensure that the total current consumption of the system power supply U_s or the total current consumption of the load power supply $U_L \le 16A$.

7 Use

7.1 Parameters and function configuration

7.1.1 Digital input filter function

Digital input filtering prevents the program from responding to unexpected rapid changes in the input signal, which may occur due to switch contact jumps or electrical noise. The current fixed configuration of digital input filtering is 3ms, which can filter out clutter within 3ms. Channels cannot be configured individually.

3 ms input filter time of ms represents a single signal changing from "0" to "1", or from "1" to "0" for 3 ms can be detected, and shorter than 3 ms single high or low pulse of ms will not be detected.

7.1.2 Output clear hold function

The clear /hold function is aimed at the output signal of the module . This function can configure the module output action in the bus abnormal state .

Keep output: When communication is disconnected, the module output channel always keeps output.

Clear output: When communication is disconnected, the module output channel clears the output.

7.1.3 Channel input and output configuration

For modules with configurable input and output, parameters can be configured to enable each channel to implement input or output functions, and each channel can be configured independently.

This manual uses TIA Portal V17 as an example to introduce the parameter configuration method. For detailed steps, see <u>Parameter Settings</u>.

7.2 Configuration module application

7.2.1 Application in TIA Portal V17 software environment

1. Preparation

- Hardware environment
 - > Module model PN7-0016A+
 - > One computer with TIA Portal V17 software pre-installed
 - > PROFINET special shielded cable
 - > A Siemens PLC. This description uses a Siemens S7-1 200 CPU1214C DC /DC/DC as an example
 - > One switching power supply
 - > Module installation guide rails and guide rail fixings
 - Device configuration profile Configuration file acquisition address: <u>https://www.solidotech.com/documents/configfile</u>
- Hardware configuration and wiring
 Please follow the requirements of " <u>5 Installation and Wiring</u> "

2、New Construction

a. Open the TIA Portal V17 software , click "Create New Project" , and click "Create" after entering all the information, as shown in the figure below.

		create new project	
	Open existing project	Project name:	PN7
	open existing project	Path:	C:IUsers129719IDocuments
0	Create new project	Version:	V17 ×
	Minute and at	Author:	29719
	Migrate project	Comment:	<u> </u>
	Close project		V
	3		Create
۲	Welcome Tour		
	First steps		

- Project name: Customized, you can keep the default.
- Path: The project keeps the path, which can be kept as default.
- Version: You can keep the default.
- Author: You can keep the default.
- Comment: Customized, optional.

3、Add PLC controller

a. Click "Configure A Device" as shown in the figure below.



b. Click "Add New Device", select the PLC model currently used , and click "Add", as shown in the figure below. After the addition is completed, you can see that the PLC has been added to the device navigation trees.

			Totally Integrated Automation PORTAL
Start 🦃		Add new device	
Devices & series of the series	Show all devices	9 c m c 100m c . PLC_1	~
PLC programming Motion & Clausalization Online & Diagnostics	Add new device Configure networks Help	Consoler Consoler Consoler Consoler Consoler Consoler Consoler Consoler Consoler	•
		Open device view Add] _

4、 Scan for connected devices

a. Click "Online Access -> Update Accessible Devices" in the left navigation tree, as shown in the figure below.



b. After the update is completed, the connected slave devices are displayed, as shown in the figure below.

B		Network	Connections HM connection 💌 🗛 Relations 🗮 🦉 🖀 🔛 🛄 🔍 ±		
▼ [] PN7					
Add new device					=
Devices & networks		PLC_1			
PLC 1 [CPU 1214C DC/DC/DC]		CPU 1214C			
La Ungrouped devices					
Security settings					
Cross-device functions					
Common data					
Documentation settings					
Languages & resources					
Version control interface					
 Online access 					- 8
Display/hide interfaces					
 Realtek PCIe GbE Family Controller 	No.				
Opdate accessible devices					
Pisplay more information					_
plc_1 [192.168.0.1]					
pn7 [192.168.0.20]					
Intel(R) Wi-Fi 6 AX201 160MHz	100				_
PC internal [Local]	100				
USB [S7USB]	100				~
TeleService [Automatic protocol detection]	100 <	II	> 100%	· · · · · · · · · · · · · · · · · · ·	
Card Reader/USB memory			Q Properties	Info 🛛 Diagnostics	
		General	Cross-references Compile	1	
			ow all messages		
					-
		Message		Go to / Date	lime

The computer's IP address must be in the same network segment as the PLC. If not, modify the computer's IP address and repeat the above steps.

5、Add GSD configuration file

- a. In the menu bar, select "Options->Manage General Station Description File (GSDML) (D)".
- b. Click "Source Path" to select the file.
- c. whether the status of the GSD file to be added is "Not yet installed". If it is not installed, click the "Install" button. If it is already installed, click "Cancel" to skip the installation step.

Manage general station description	n files			×
Installed GSDs GSDs in the	project			
Source path: D:\				
Content of imported path				
File	Version	Language	Status	Info
GSDML-V2.3-sdot-pn7-0016a+-20	V2.3	English	Not yet installed	Solidot PRO
<	1	III		>
			Delete Insta	Cancel

6、Add slave device

- a. Double-click "Devices & Networks" in the left navigation tree" .
- b. Click the "Hardware Catalog" vertical button on the right, and the catalog is displayed as shown below .

Siemens - C:\Users\29719\Documents\PN7\PN7			- 1
ject Edit View Insert Online Options Tools	s <u>W</u> indow	Help	Tatally interreted Automation
Save project A M Ta X St C	a a las m	🕅 🖳 💋 Goonline 🧭 Goonline 🛃 The The X 🚽 🔲 Search in projects	PORTAI
Project tree	□ 4	PN7 → Devices & networks	🗙 Hardware catalog 🛛 🗊 🗎 🕨
Devices		😴 Topology view 🛛 🛔 Network view 📑 Device viev	Options
18		Network 11 Connections HM connection 💌 🗛 Relations 🕎 🗮 🗑 🖽 🔀 🔿 🛨	
• D PN7			✓ Catalog
Add new device	_		<search> M4 M1</search>
Devices & networks		PLC_1	Filter Profile: All> 💌 📑
III PLC 1 [CPU 1214C DC/DC/DC]		CPU 1214C	Controllers
Generation of the second devices			🕨 📄 HM
Security settings			PC systems
Cross-device functions			Drives & starters
Common data			Network components
Documentation settings			🕨 🍺 Detecting & Monitoring
Languages & resources			Distributed I/O
Zersion control interface			Power supply and distribution
 Online access 			Field devices
Displayhide interfaces			🗧 🚰 Other field devices
Realtek PCIe GbE Family Controller	100		AND I HAVE A
A Update accessible devices			
Display more information			14 8
plc_1 [192.168.0.1]			
pn7 [192.168.0.20]			
Intel(R) Wi-Fi 6 AX201 160MHz			
PC internal [Local]	100		
USB [S7USB]	100		
TeleService [Automatic protocol detection]	1		
Card Reader/USB memory			
		K III > 100%	

c. "PN7-0016A+" in the search box of the hardware catalog to search for the module . After the search is completed, drag or double-click "PN7-0016A+" to "Network View", as shown in the figure below. If you connect multiple modules, you can add modules in sequence according to the actual topology under the "Hardware Catalog" on the right.

Image: Connections PMS connections Image: Con	Devices & networks	🗕 🖬 🖬 🗙 Hardware catalog 📰	
twock I Connections I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I </th <th>🖉 Topology view 🛛 🔒 Network vie</th> <th>ew 🛐 Device view Options</th> <th></th>	🖉 Topology view 🛛 🔒 Network vie	ew 🛐 Device view Options	
Intervention Image: Controllers Intervention Image: Controllers Intervention Image: Controllers Image: Controllers Image: Controllers Image: Controlers <td< th=""><th>etwork 🔢 Connections 🛛 HMI connection 💌 🗛 Relations 🕎 🖏 📲 🖽 🛄 🔍 生</th><th></th><th></th></td<>	etwork 🔢 Connections 🛛 HMI connection 💌 🗛 Relations 🕎 🖏 📲 🖽 🛄 🔍 生		
1214C PNIO PNIO PRIJ-0016A+ Not assigned Prime Image: Controllers Image: Controllers		▲ ✓ Catalog	
1 1214C PNT-0016A+ PN-NORM NOT assigned PNTO PNT-0016A+ PNT-0016A		<search></search>	1 60
1214C PN7-0016A+ DP-WORM Notassigned Image: Controllers Image: Controllers Image: Controllers Image: Controllers<	1 PNIO	Filter Profile: <all></all>	-
Not assigned	1214C PN7-0016A+ DP-NORM	Controllers	
Porr supply and distribution Pour supply Po	Not assigned	🛏 🕨 🕞 HMI	
Burdensen in the second s		PC systems	
 Metwork components Detribution Distribution Distribu		Drives & starters	
 Image: Constraint of the second sec		Image: Imag	
Build of the second of th		🕨 🚺 Detecting & Monitoring	
 Image: Solubor Provinsion of the solution of the sol		Distributed I/O	
 If eld devices If eld devices If other field devices If o		Power supply and distribution	
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Additional Ethernet devices Additional Etheret devices Additional Ethernet devices Additional Ethere		🗧 🗧 👻 🛄 Other field devices	
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 ↓ I Encoders ↓ I Encoders ↓ I Gateway ↓ I Sdot ↓ I Stekens AG ↓ I Stekens AG ↓ Solubot PROFINET NO ↓ Solubot PROFINET NO ↓ I Solubot PROFINET NO ↓ I Sensors ↓ I Sensors ↓ I Sensors ↓ I PROFIBUS PR 		- 🗟 🕨 🖬 Drives	
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Image: Solid Stream State Image: Solid Stream State Image: Solid Stream Strea		▼ 110	
 ▶ Im SERVENS AG ♥ Im SOLIDOT PNOFINET NO ♥ Im SOLIDOT PROFINET NO ♥ Im SOLIDOT PROFINET NO ♥ Im PROFIBUS DP ♥ Im PROFIBUS DP ♥ Im PROFIBUS PA 		► 🛄 Sdot	
✓ III SOLIDOT PN7 SERIES ✓ IIII SOLIDOT PN7 SERIES ✓ IIIII SOLIDOT PN7 SERIES ✓ IIII		SIEMENS AG	
CUDOT PM7 SERIES SOLIDOT PM7 SERIES		▼ u solidot	
Current Solidor PROFINETIO Current Solidor PROFINETIO Current Solidor PACENIES DP Current Solidor PACENIES PA		▼ LIII SOLIDOT PN7 SERIES	
 ▶ [m] Sensors ▶ [m] PROFIBUS DP ▶ [m] PROFIBUS PA 			
 ▶ Imp PROFIBUS DP ▶ Imp PROFIBUS PA 		Sensors	
▶ 🛅 PROFIBUS PA		PROFIBUS DP	
		PROFIBUS PA	

d. Click "Not assigned (blue font)" on the slave device and select "PLC_1.PROFINET Interface_1", as shown in the figure below.

LC_1	PNIO	
PU 1214C	PN7-0016A+ DP-NORM Not assigned Select IO controller	-
	FIGURE Select ID controller PLC_1.PROFINET interface_1	

e. After the connection is completed, it is as shown in the figure below.

		4 IO system: F	LC_1.PROFINET IO-System (100)
PLC_1 CPU 1214C	PNIO PN7-0016A PLC_1	DP-NORM	-

f. Click the device name to rename the device, as shown in the figure below.

PLC_1 CPU 1214C	PLC_1	PN7- PN7-0016A+ PLC_1 .PROFINET IO-Syste.	DP-NORM		=

g. Click "Device View" to enter the device overview. You can see the topology configuration information, including the I/O address automatically assigned by the system . The I/ O address can be changed by yourself, as shown in the figure below.

				ŝ	Topology view	Network vi	ew 🛐 De	vice view
Device overview								
1 Module	 Rack	Slot	I address	Q address	Туре	Article number	Firmware	Commen
▼ PN7	0	0			PN7-0016A+	1234567	V10.00.00	
PN-IO	0	0 X1			PNIO			
IN/OUT_1	0	1	23	23	IN/OUT		1.0	

7. Assign device name

a. Switch to "Network View", right-click the connection line between PLC and PN7, and select "Assign Device Name", as shown in the figure below.

PN7 Devices & networks				_ @ =×
		🛃 Topology view	Network view	Device view
Network	- Relation	ons 🗮 👯 🖬 🖽 🛄	€ ±	
		뷰 IO system	n: PLC_1.PROFINET IC	0-System (100) 🛆
PLC_1 CPU 1214C PN7 PN7-0016A+ PLC_1	DP-NORM	L.		-
PLC_1.PROFINET IO-Sys	Cut	Ctrl+X Ctrl+C		
	Paste	Ctrl+V		
	Rename	F2		
	Assign to new	DP master / IO controller		Jetw.
	Compile Download to d	evice •		▲
	💋 Go online	Ctrl+K		
	Go offline	Ctrl+M		
	Assign device	name		
	 Assign PROFIsa Receive alarm: Update and dis 	afe address s splay forced operands		
	Show catalog	Ctrl+Shift+C		
	Q Properties	Alt+Enter		
L				~

b. "Assign PROFINET Device Name" interface pops up, as shown in the figure below.

	PROFINET device n	ame: pn7	-
	Device	type: PN7-0016A+	
	Online access		
	Type of the PG/PC inter	face: LPN/IE	•
	PG/PC inter	face: 🛛 🔀 Realtek PCIe GbE Fami	ly Controller 💌 🖲 💁
5	Device filter		
5	Only show day	icer of the rame hore	
	Configuration of the second se	ices or the same type	
	Only show dev	ices with bad parameter settings	
	Only show dev	ices without names	
Accessible	devices in the network:		
IP address	MAC address De	vice PROFINET device name	Status
			
<			
			Indate list Assign name
tus information:			
arch completed. 0 of 0 device	s were found.		

Check whether the MAC address on the module silk screen is the same as the MAC address of the assigned device name.

- PROFINET device name: The name set in " Assign PROFINET device name ".
- Type of PG/PC interface: PN/IE.
- PG/PC interface: The actual network adapter used.
- c. Select the slave device in turn, click "Update List", and click "Assign Name". Check whether the status of the node in "Accessible Nodes in the Network" is "OK", as shown in the figure below.

ssign PROFINET devic	ce name.						
		Configured PRO	FINET device	2			
		PROFINET devic	ce name: P	n7			-
		Dev	vice type: Pr	17-0016A+			
		Online access					
		Type of the PG/PC i	interface: 🥊	PN/IE			-
		PG/PC i	interface: 📜	Realtek PCIe GbE	Family Contro	oller	• 🖲 🖸
		Device filter					
		🛃 Only show	devices of the	same type			
		Only show	devices with bi	ad parameter sett	tings		
		Only show	devices withou	tnames			
		,,					
	Accessible devi	ces in the network:		PROFILIER I			
	192 168 0 20	MAC address	PN7-0016A+	PROFINET dev	ice name	Status	
	192.108.0.20	004 5427-20-00-00	111/00104+	puy	×	UK	
Elevel 1 FD							
					Update In	st	Assign name
Online status informatio	in:						
1 Search complete	d. 0 of 0 devices we	re found.					
 Search complete 	ed. 1 of 2 devices we	re found.					
<							
							Close

d. Click "Close" .

8. Download configuration structure

- a. In the "Network View", select the PLC.
- b. Click the Dutton in the menu bar to download the current configuration to the PLC.
- c. In the pop-up "Extended download to device" interface, the configuration is as shown in the figure below.

Device Device type Slot Interface type Address Subnet PLC_1 CPU 1214C DC/D 1 X1 PN/IE 192.168.0.1 PN/IE_1 Type of the PG/PC interface: PN/IE 192.168.0.1 PN/IE_1 Type of the PG/PC interface: PN/IE PN/IE PG/PC interface: PG/PC interface: PRealtek PCIe GbE Family Controller © Connection to interface/subnet: PN/IE_1 © © Ist gateway: © © © Select target device: Show all compatible devices PN/IE Address Target device Start searc Flash LED Display only error messages	Device Device type Slot Interface type Address Subnet PLC_1 CPU 1214C DC/D 1 X1 PN/IE 192,168.0.1 PN/IE_1 Type of the PG/PC interface: PN/IE 192,168.0.1 PN/IE_1 Type of the PG/PC interface: PN/IE PN/IE PG/PC interface: PN/IE P PO/IC		Configured access	s nodes of "PLC_1"				
PLC_1 CPU 1214C DCD 1 X1 PN/IE 192.168.0.1 PN/IE_1 Type of the PG/PC interface: PN/IE PS/PC PS/PC	PLC_1 CPU 1214C DC/D 1 X1 PN/IE 192.168.0.1 PN/IE_1 Type of the PG/PC interface: PN/IE PG/PC interface: PN/IE PG/PC interface: PG/PC		Device	Device type	Slot	Interface type	Address	Subnet
Type of the PG/PC interface: PN/E PG/PC interface: PN/E PG/PC interface: Realtek PCIe GbE Family Controller PG/PC interface: PN/E_1 Istgateway: • • • • • • • • • • • • • • • • • • •	Type of the PG/PC interface: PN/IE PG/PC interface: Realtek PCIe GbE Family Controller PG/PC interface: Realtek PCIe GbE Family Controller Connection to interface/subnet: PN/IE_1 Ist gateway: Ist gateway: Select target device: Show all compatible devices Device Device type Interface type Address Target device: Show all compatible devices Plain PN/IE Access address - Plain Interface Its gateway: Interface Select target device: Show all compatible devices Part search - Plain Interface Plain Interfa		PLC_1	CPU 1214C DC/D	1 X1	PN/IE	192.168.0.1	PN/IE_1
	Part Interface: Interface / subret Connection to interface/subnet: PN/IE_1 Ist gateway: Image: Select target device: Select target device: Show all compatible devices Device Device type Interface type Address Target device: Show all compatible devices Image: Select target device: Image: Select target device Image: Select target device: Show all compatible devices Image: Select target device: Image: Select target device Image: Select target device: Start search Image: Select target devic			Type of the PG/PC inte	rface:			
Select target device: Show all compatible devices Device Device type Interface type Address Target device: Target device Phile Access address Flash LED Start search	Select target device: Show all compatible devices Device Device type Interface type Address Target device Image: Select target device: Interface type Address Target device Image: Select target device: Interface type Address Target device Image: Select target device: Interface type Address Interface type Image: Select target device: Interface type Address Interface type Image: Select target device: Interface type Address Interface type Image: Select target device: Interface type Interface type Address Interface type Image: Select target device: Interface type Interface type Address Interface type Image: Select target device: Interface type Interface type Address Interface type Image: Select target device: Image: Select target device: Image: Select target device: Image: Select target device: Image: Select target device: Image: Select target device: Image: Select target device: <td></td> <td>c</td> <td>For Cinter Connection to interface/su</td> <td>ibnet:</td> <td>PN/IF 1</td> <td>DE Family Controller</td> <td></td>		c	For Cinter Connection to interface/su	ibnet:	PN/IF 1	DE Family Controller	
Select target device: Show all compatible devices Device Device type Interface type Address Target device PN/IE Access address P Flash LED Start search Start search Start search Device Device Device Device Start search Device Device Device Device Start search Device Device Device Device Device P Display only error messages Display only error messages Display only error messages	Select target device: Show all compatible devices Device Device type Interface type Address Target device PNIE Access address Flash LED			1st oat	eway:			
Flash LED	Flash LED Start search Start search Display only error messages		A		1		1	T
Flash LED	Flash LED Start search ne status information: Display only error messages		Device	Device type	Interf	face type Ad	dress	Target device
	ne status information: Display only error messages	и. — р	—	-	Interf PN/IE	face type Add	dress eess address	Target device
		Flash LED		Device type	Interf PN/IE	face type Ad	dress tess address	Target device

d. Click the "Start Search" button as shown in the image below.

	Device	Device type	Slot	Interface type	Address	Subnet	_
	PLC_1	CPU 1214C DC/D	1 X1	PN/IE	192.168.0.1	PN/IE_	1
							_
		type of the PG/PC inte	nace:	PN/IE			
		PG/PC inte	rface:	Realtek PCIe	GbE Family Controller		
	Co	nnection to interface/su	bnet:	PN/IE_1			• 🕐
		1st gat	eway:				- 💎
	Select target device	:			Show all compatibl	e devices	1
	Device	Device type	Interfa	ce type Ad	dress	Target dev	ice
··· — [PLC_1	CPU 1214C DC/D	. PN/IE	19	2.168.0.1	PLC_1	
	-	-	PN/IE	Ac	cess address	-	
Flash LED							
ine status information					Display only error	Start	search
Found accessible de	vice pp7				- cospicy only circl		6
	ompatible devices of	3 accessible devices fou	ind.				
Scan completed. 1 co							1
Scan completed. 1 co Scan and information	retrieval completed.						

- e. Click "Load".
- f. Select "Continue without synchronization" as shown in the image below. Software synchronization before loading to a device ×

Software synchronization	Status	Action	
▼ PLC_1			
 'Program blocks' 			
Main [OB1]	•	Manual synchronization required	
 'PLC tags' 			
Tags	•	Manual synchronization required	
		11	

g. Select "Stop All".

	Target	Message	Action
%	▼ PLC_1	Ready for loading.	Load 'PLC_1'
4	▼ Protection	Protection from unauthorized access	
4		Devices connected to an enterprise network or directly to the internet must be appropriately protected against unauthorized access, e.g. by use of firewalls and network segmentation. For more information about industrial security, please visit http://www.siemens.com/industrialsecurity	
0	Stop modules	The modules are stopped for downloading to device.	Stop all
0	Device configuration	Delete and replace system data in target	Download to device
0	Software	Download software to device	Consistent download

- h. Click "Load".
- i. Click "Finish".
- j. Power on again the device.

9、Communication connection

a. Click **I** button, and then click the "Go Online" button. If the icons are all green, the connection is successful, as shown in the figure below.

Devices					6	🕈 Topology vie	w 🛔 Network view	Device view
19) 19)	🔲 🔿	Network	Connections	HMI connection	Relation	ns 🔛 👯 🔳	🖽 🔲 🔍 ±	
						4 10	system: PLC_1.PROFINET	IO-System (100)
 PN7 	2	-		-				
💕 Add new device			_		-			-
devices & networks		CPUL1214C		PN7-00164	55 H05H			_
PLC_1 [CPU 1214C DC/DC/DC]	2	CI 0 1214C		PLC 1	UP-NORM			
Ungrouped devices				ruc <u>r</u>				
Security settings								
Cross-device functions			PI	C 1 PROFINET IO-SV	ste			
🕨 🙀 Common data								
Documentation settings								
Languages & resources								
Version control interface								
 Online access 		1						
Y Display/hide interfaces								
 Realtek PCIe GbE Family Controller 	1							•
Pupdate accessible devices								
Display more information								
Intel(R) Wi-Fi 6 AX201 160MHz	100							
PC internal [Local]	100							
USB [S7USB]	1							
TeleService [Automatic protocol detection]	100	-						
Card Reader/USB memory								
-								

10. Parameter settings

a. Open the "Network View", and in the offline state, right-click the coupler view icon part and click "Properties", as shown in the figure below.

PN7 > Devices & networks		_ @ = X
	🛃 Topology view 🛛 🖁 Network view	Device view
Network Connections HMI connection	🛛 🔐 Relations 🕎 📆 📲 🖽 🛄 🔍 🛓	3
	4 IO system: PLC_1.PROFINET IO-	System (100) 🔨
PLC_1 CPU 1214C PN7 PN7-0016A+ <u>PLC_1</u>	DP.NORM Device configuration Change device	8
PLC_1.PROFINET IO-Syste	Write IO-Device name to Micro Memory Card Start device tool	
	X Cut Ctrl+X I Copy Ctrl-C I Paste Ctrl+V	
	X Delete Del Rename F2	
	Assign to new DP master / IO controller Disconnect from DP master system / IO system I highlight DP master system / IO system	- × 69 6
	🚽 Go to topology view	
	Compile Download to device Containent C	
	Gooffine Ctrl+N Gooffine Ctrl+M U Online & diagnostics Ctrl+D	
	Assign device name Receive alarms Update and display forced operands	
	Show catalog Ctrl+Shift+C	
	Export module labeling strips	~
< III	Q Properties Alt+Enter	 .

b. On the properties page, click "Module Parameters", as shown in the figure below. The output clear holding parameters and channel input and output configuration parameters can be configured according to actual use needs. After the configuration is completed, re-download the program to the PLC. The PLC and module need to be powered on again.

PN7 [PN7-00	16A+]			Q Properties	🛄 Info	Diagnostics	18
General	IO tags	System constants Texts					
 General PROFINET int 	erface [X1]	Module parameters					
Identification Module para	n & Main meters	General parameters					
Shared Devi	ce	Data Clear or Hold Settings:	Clear				•
		Freely configurable channel 0:	DI				•
		Freely configurable channel 1:	DI				•
		Freely configurable channel 2:	DI				•
		Freely configurable channel 3:	DI				•
		Freely configurable channel 4:	DI				
		Freely configurable channel 5:	DI				
		Freely configurable channel 6:	DI				
		Freely configurable channel 7:	DI				-
		Freely configurable channel 8:	DI				-
		Freely configurable channel 9:	DI				
		Freely configurable channel A:	DI				-
		Freely configurable channel B:	DI				
		Freely configurable channel C:	DI				
		Freely configurable channel D:	DI				
		Freely configurable channel E:	DI				
		Freely configurable channel F:	DI				
		ricely comgatable charmert.					

c. For example, configure channels 0~9 as input types, and configure channels A~F as output types, as shown in the figure below. After the configuration is completed, re-download the program to the PLC. The PLC and module need to be powered on again.

PROFINET interface [X1]	Module parameters		
Identification & Main	General parameters		
Module parameters			
Shared Device	Data Clear or Hold Settings:	Hold	
	Freely configurable channel 0:	DI	
	Freely configurable channel 1:	DI	•
	Freely configurable channel 2:	DI	
	Freely configurable channel 3:	DI	-
	Freely configurable channel 4:	DI	
	Freely configurable channel 5:	DI	•
	Freely configurable channel 6:	DI	-
	Freely configurable channel 7:	DI	-
	Freely configurable channel 8:	DI	
	Freely configurable channel 9:	DI	
	Freely configurable channel A:	DQ	-
	Freely configurable channel B:	DQ	-
	Freely configurable channel C:	DQ	-
	Freely configurable channel D:	DQ	•
	Freely configurable channel E:	DQ	
	Freely configurable channel F:	DO	

11. Functional Verification

a. Expand the project navigation on the left and select "Monitoring and Enforcement Table", as shown in the figure below.



b. Double-click "Add New Monitoring Table" to add a new monitoring table to the system, as shown in the figure below.

Project tree	0 4	PN7 →	PLC_1 [CPU '	1214C DC/DC/DC] +	Watch and force t	ables 🕨 Watch t	able_1				_∎≡×
Devices											
	1 m 2	2	1. 19 1.	9, 9, 19 00 00							
		i	Name	Address	Display format	Monitor value	Modify value	9	Comment		Tag
▼ 🛅 PN7	2 • A	1		Add new>							
Add new device											
Devices & networks											
PLC_1 [CPU 1214C DC/DC/DC]	2 •										
Device configuration											
Q Online & diagnostics											
Program blocks	•										
Technology objects	=										
External source files											
PLC tags	•										
PLC data types											
 Watch and force tables 											
Add new watch table											
Force table											
Watch table_1											
Online backups											
Traces											
OPC UA communication											
Device proxy data											
Program info											
E PLC alarm text lists											
Local modules	V										
Distributed I/O	~										
Ungrouped devices											
Security settings		<									>
Cross-device functions											
🕨 🙀 Common data							<u>Q</u> P	roperties	1 Info	3 Diagnostics	
Documentation settings		Gene	ral Cross	s-references Co	mpile						
Languages & resources		6	6 Show all r	ressanes	•						
Version control interface				incosoges [
 Online access 											
Oisele dide interferen	*	1 Me	ssage						Go to	r Date	lime
> Details view		<									>

c. Open the " Device View" and view the channel Q address (channel address of the output signal) and I address (channel address of the input signal) of the module PN7-0016A + in the device overview.

For example, it is found that the "Q address" of the PN7-0016A + module is $2 \sim 3$ and the "I address " is $2 \sim 3$, as shown in the figure below.

7	► U	ngrouped devices	▶ PN7 [PN7-	0016A	+]							_ 7 =
								2	Topology view	Metwo	rk view	Device view
	Dev	ice overview										<i>.</i>
	- 11	Module		Rack	Slot	I address	Q address	Туре	Article numb	er	Firmware	Comment
		▼ PN7		0	0			PN7-0016A+	1234567		V10.00.00	
		PN-IO		0	0 X1			PNIO				
		IN/OUT_1		0	1	23	23	IN/OUT			1.0	

d. Fill in the input and output channel address in the address cell of the monitoring table. Module channels 0~9 are input types, and configuration channels A~F are output types. For example,

write "%I 2.0 " ~ "%I 3.7", "% Q2. 0" ~ "% Q3.7", press "Enter", after filling in all, click 🎬 the

button to monitor the data, as shown in the figure below. Input channels 0~9 correspond to "%I 2.0 " ~ "%I 3.1" in the monitoring table , and output channels A~F correspond to "% Q3.2" ~ "% Q3.7" in the monitoring table .

Address	Display format	Monitor value	Modify value	9	Comment				
%12.0	Bool	FALSE							
%12.1	Bool	FALSE							
%12.2	Bool	FALSE							
%12.3	Bool	FALSE							
%12.4	Bool	FALSE							
%12.5	Bool	FALSE							
%12.6	Bool	FALSE							
%12.7	Bool	FALSE							
%13.0	Bool	FALSE							
%13.1	Bool	FALSE							
%13.2	Bool	FALSE							
%13.3	Bool	FALSE							
%13.4	Bool	FALSE							
%13.5	Bool	FALSE							
%13.6	Bool	FALSE							
%13.7	Bool	FALSE							
%Q2.0	Bool	FALSE							
%Q2.1	Bool	FALSE							
%Q2.2	Bool	FALSE							
%Q2.3	Bool	FALSE							
%Q2.4	Bool	FALSE							
%Q2.5	Bool	FALSE							
%Q2.6	Bool	FALSE							
%Q2.7	Bool	FALSE							
%Q3.0	Bool	FALSE							
%Q3.1	Bool	FALSE							
%Q3.2	Bool	FALSE							
%Q3.3	Bool	FALSE							
%Q3.4	Bool	FALSE							
%Q3.5	Bool	FALSE							
%Q3.6	Bool	FALSE							
%03.7	Bool	FALSE							

e. In the "Modified Value" cells of 2 "% Q3.2" ~ "% Q3.7" write "1", click the button to write, and see the corresponding output channel A~F indicators light up, as shown in the figure below .

74 /21 [DO] /	20				
1 76 27	1				
Address	Display format	Monitor value	Modify value	1	Comment
%12.0	Bool	FALSE			
%I2.1	Bool	FALSE			
%12.2	Bool	FALSE			
%12.3	Bool	FALSE			
%12.4	Bool	FALSE			
%12.5	Bool	FALSE			
%12.6	Bool	FALSE			
%12.7	Bool	FALSE			
%I3.0	Bool	FALSE			
%I3.1	Bool	FALSE			
%13.2	Bool	FALSE			
%13.3	Bool	FALSE			
%13.4	Bool	FALSE			
%13.5	Bool	FALSE			
%13.6	Bool	FALSE			
%13.7	Bool	FALSE		Ä	
%Q2.0	Bool	FALSE		Ä	
%02.1	Bool	FALSE			
%02.2	Bool	FALSE			
%02.3	Bool	FALSE		ň	
%02.4	Bool	EALSE		Ä	
%02.5	Bool	EALSE		Ä	
%02.6	Bool	E FAI SE		H	
%02.0	Bool	EALSE		ä	
%03.0	Bool	FALSE			
%03.1	Bool	FALSE			
%03.7	Bool	TRUE	TRUE		
×02.2	Bool		TRUE		
%03.4	Bool		TRUE		
%Q3.4	Bool		TRUE		
%Q3.5	Bool		TRUE		2
%Q3.6	8001		TRUE		
%Q3.7	BOOI	TRUE	IRUE		1

f. 2 and channel 3 of the module input valid voltages, the input values can be monitored in "%I2.2"
 ~ "%I2.3", as shown in the figure below.

1	1 1 2 00 00	1				
Name	Address	Display format	Monitor value	Modify value	9	Comment
	%12.0	Bool	FALSE			
	%12.1	Bool	FALSE			
	%12.2	Bool	TRUE			
	%12.3	Bool	TRUE			
	%12.4	Bool	FALSE			
	%12.5	Bool	FALSE			
	%12.6	Bool	FALSE			
	%12.7	Bool	FALSE			
	%13.0	Bool	FALSE			
	%13.1	Bool	FALSE			
	%13.2	Bool	FALSE			
	%13.3	Bool	FALSE			
	%13.4	Bool	FALSE			
	%13.5	Bool	FALSE			
	%13.6	Bool	FALSE			
	%13.7	Bool	FALSE			
	%Q2.0	Bool	FALSE			
	%Q2.1	Bool	FALSE			
	%Q2.2	Bool	FALSE			
	%Q2.3	Bool	FALSE			
	%Q2.4	Bool	FALSE			
	%Q2.5	Bool	FALSE			
	%Q2.6	Bool	FALSE			
	%Q2.7	Bool	FALSE			
	%Q3.0	Bool	FALSE			
	%Q3.1	Bool	FALSE			
	%Q3.2	Bool	TRUE	TRUE		
	%Q3.3	Bool	TRUE	TRUE		
	%Q3.4	Bool	TRUE	TRUE		
	%Q3.5	Bool	TRUE	TRUE		
	%Q3.6	Bool	TRUE	TRUE		
	%Q3.7	Bool	TRUE	TRUE		
	wan bha					

7.2.2 In STEP 7 - MicroWIN Application under SMART software environment

1. Preparation

- Hardware environment
 - > Module model PN7-0016A+
 - > One computer, pre-installed STEP 7-MicroWIN SMART V 2.6 software
 - > PROFINET special shielded cable
 - > A Siemens PLC. This description uses a Siemens S7-200 SMART as an example
 - > One switching power supply
 - > Module installation guide rails and guide rail fixings
 - device profile
 Configuration file acquisition address: <u>https://www.solidotech.com/documents/configfile</u>
- Hardware configuration and wiring
 Please follow the requirements of "<u>5 Installation and Wiring</u>"

2、Add PLC

- a. Open STEP 7-MicroWIN SMART software.
- b. Double-click the left navigation tree ECPU ST30 button to pop up the "System Block" interface, select the CPU model corresponding to the PLC, and click the "OK" button, as shown in the figure below.

D 💕 🖬 🍪 🔻									Projec	:t1 - STEP 7	-Micro/WIN	SMART
File Edit View	v PLO	C De	bug Tools	Help								
🖉 Open 📙 👔	Import Export	Syste	em Block	, <u>-</u> , D	Preview	🔏 Project))))))	reate	VAL		×	
Save 5	Previou	-						0.1.11.1		_		
Onerations			Module		Version	input	Output	Urder Num	ier		^	
Operations	-	CPU	CPU ST30 (DC/D	C/DC) <u>-</u>	V02.06.00_00	10.0	Q0.0	6ES7 288-1	ST30-0AA1			
Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Contractions Co		CPU SEA	CPU ST30 (DC/D CPU ST30 (DC/D CPU ST30 (DC/D CPU ST40 (DC/D CPU ST40 (DC/D CPU ST40 (DC/D CPU ST40 (AC/D CPU ST40 (AC/D CPU ST40 (AC/D CPU CF0) ST40 (AC/D CPU ST40 (AC/D ST40 (AC	CPCO COC CPCO CPCO CPCO CPCO CPCO CPCI CPCI C	VIZ 06 00_00 t Port address data is fi IP Addre Subnet Mi Default Gatew Station Na Sound Time t Communication: Port S settings allow y Port Baud Re	ved to the \t	values below values below d Time (5 - v solutions) v solutions v	and cannot be	changed by othe	er means	~ ·	· ▲ → + + · ◇ - ① • • # B R R 8
	<			_	_	_	_	_				

c. Click the left navigation tree 星 通信 button to pop up the "Communications" window, switch the

communication interface to the interface actually used by the PLC, click the "Find CPUs" button, and find the PLC, as shown in the figure below .

File Edit View PLC Debug Tools Hap Import - New Import - Save Import - Upload Provide Provide Provide Import - Save Import - Save <th></th>	
^O gopen ^O gopen	
	2 2 9
Progett Foreight Communications X	
Program Block 1 Communication Interface B Details Call Fraction Fraction B Communications Fraction Fraction Fraction B Communications Fraction Fraction Fraction B Communications Fraction Fraction Fraction B Communications	

d. Click the "Edit" button in the communication window. The Edit button switches to the Settings button. The IP address input box lights up. Modify the IP address and the IP address of the computer interface in the same network segment. After the modification is completed, click the "Set" button again. After the settings are completed, click the "OK" button, as shown in the figure below. Note: You can only modify the IP address of the computer's Ethernet interface, as long as it is in the same network segment as the PLC address.

Realter PCIe GDE Family Controller. I CPIP.1	Press the "Edit" button to change the IP data and station name of the selected CPU. Press the "Flash Lights" button to continuously
Found CPUs	flash CPU LEDs to visually locate a connected CPU.
192.168.0.1 (plc200smart)	
Z Added CPUS	MAC Address
	8C:F3:19:71:15:DB Flash Lights
	IP Address
	192.168.0.1 Set
	Subnet Mask
	255.255.255.0
	Default Gateway
	0.0.0.0
	Station Name (ASCII characters a-z, 0-9, - and .)
	plc200smart
	ata CDU

3、Import GSD file

a. Click "File- > GSDML Management" in the menu bar , click the "Browse" button in the GSDM L management interface select the GSDML file to be imported , and click the "Confirm" button, as shown in the figure below.

File Edit View	PLC Debug Tools Help	
New Save	mport * Saport * Vpload Download V Print * Page Setup & Print * Page Setup & Open Folder Previous * Vpload Download V Print * Page Setup & Open Folder * Data Page * Management	
Operations	Transfer Print Protection Libraries GSDML	
Main 🏨	Manage general station description files	× 💷 🗢 📲 🗹 🎜 🕈 👘
	Introduction	
Project1 What's New DPU ST30 Program Block	"GSDML management" allows you to install and delete GSDML files for PROFINET.	
😨 🖾 Symbol Table	Imported GSDML files	
B- Status Chart R- Data Block	File Name Installation Date	Status
-B System Block	1 GSDML-V2.3-sdot-pn7-0016a+-20230313.xml 2024-01-09.09.33.58	OK
Cross Reference Communications		
🗉 🔀 Wizards		
E-Cols		
Favorites		
😨 - 📴 Bit Logic		
E Clock		
Communications		
Convert		
E-3 Counters		
B-B Floating-Point Math		
e Interrupt		
E Market Contractions	T + 11 - 0000	
🖲 🚾 Move		
Program Control	D:\ Browse Delete	
E B Shing		
😥 💼 Table		OK
E O Timers		
B-B PROFINET	5 Enter comment	
E Call Subroutines		

4、Find device

a. the menu bar "Tools- > Find PROFINET Device ", a window for searching for PROFINET device will pop up , switch the communication interface to the interface actually used by the PLC, and click "Find devices", as shown in the figure below.

- (\$ 5 2 1		Project1 - STEP 7-Micro/WIN S	MART
File Edit View	v PLC Debug <mark>Tools</mark> Help		
High Speed Motion PID P Counter	WT Text Get/Put Data PROFINET Web Display Wrands	trol SMART Drive Configuration Tools	
Main #	Find PROFINET Devices	×	→ ++ ↔ -11 • → +# 🗹 🕼 🖉 😤
What's New What's New What's New What's New Crute US130 Program Block System Block System Block System Block Cruted's Select Cruted's Select System Block Cruted's Cruted	1 Communication Interface Realesk FCIc QEE Family Controller.TCPIP.1 2 3	Press the "Edit" button to change the device name of the selected device, Press the "Flash Lights" button to continuously flash device LEDs to visually locate a connected device. MAC Address [6C733:E720:00:00] Flash Lights P* Address [192:168 . 0 . 20] Flash Lights Default Gateway [192:168 . 0 . 20] Default Gateway [192:168 . 0 . 20] Derive Name (Chinese, ASCII characters 'a' - '2', '0' - '9', '' and '', should not start with number, '1, '', or 'port-r(n=0.9), adoudd not with '' or '')	
all Interrupt all Logical Operations all Logical Operations all Shit/Rotate alllllllllllllllllllllllllllllllll	4 Find Devices	Conet rame, pao	
B-B Call Subroutines	5 Enter comment		

b. Click the "Edit" button to edit the module name. After editing is completed, click the "Set" button, as shown in the figure below.



5、 Configuring the PROFINET network

a. Click "Tools->PROFINET" in the menu bar to open the PROFINET configuration wizard, as shown in the figure below.

0 🖻		()	Ŧ									Projec	:t1 - STEP 7-N	/licro/WIN SM
File	Edit	Vi	ew	PLC	Debug	Tools	Help	-						
	1				tot	荪	***			<u>//~</u>	27	th a	Ę	-
ed Mot r	tion	PID	PWM	Text Display	Get/Put	Data Log	PROFINET	Web Server	Motion Control Panel	PID Control Panel	SMART Drive Configuration 🔻	Find PROFINET Devices	Certificate Management	Options
				Wizards	5						Tools			Settings

b. On the PROFINET configuration guidance page, select the PLC role as "Controller", as shown in the figure below.

PROFINET network Controller(CPU ST30_plc200sma	Introductio	
	This wizard allows you to configure a PROFINET network the project, which can be downloaded to the PLC together	step by step. The PROFINET configuration is generated and stored in with the project.
	PLC Role Select a role for the PLC.	
	Controller Device Parameter assignment of PROFINET interface by h	ghar-level IO controller
	Ethernet Port	Communication
	Fixed IP address and name	Send Clock: 1.000 💌 ms
	IP Address: 192 , 168 , 0 , 1 Subnet Mask: 255 , 255 , 255 , 0	Start Up time: 10000 ms
	Default Gateway: 0 . 0 . 0 Station Name: plc200smart	
	r	

PROFINET Configuration Wizar	d					
PROFINET network PROFINET network Controller(CPU ST30_plc200smart) PROFINET 000000000000000000000000000000000000	The device t You can add	9016 B able lists all device devices from the devi e	p that are curren ce catalog tree o	c200smat 216801 tly configured f n the right.	or this PROFINET ne	Catalog ⊟ PLC 2200 SMART → CPU SR00 → CPU SR00 → CPU SR00 → CPU SR00 → CPU SR00 → CPU ST00 → CPU SR00 →
	Device Number 1 2 3 4	Туре PN7-0016A+V10.00.00	Device Name pnio.dev1	IP Setting Set by user	IP Address	Article no.: 1234567 Version:
	6 7 8 <	= [>	GSDML-V2.3-sdot-pn7-0016a+-20230313.xml Description: GSDML-V2.3-sdot-pn7-0016a+- 20230313.xml c-lidat PDCNUT V0
	< Previous	Next >		Generate	Cancel	

d. Double-click the input box below the device name and enter the device name, which needs to be consistent with the name set when searching for the device; double-click the input box below the IP address and enter the IP address. After the input is completed, it is as shown in the figure below. If there are other modules in the configuration, they can be added and configured in the same way.

PROFINET Configuration Wizard ROFINET network Controller(CPU ST30_plc200smart) 	Click	the	"Add" butt	on to add a 1	odule i	or this					X PN7-0016A+V10.00.00 Head module V PN7-0016A+
- PN7-0016A+(0)	device	Ind	Module Name	Submodule Na	Slot Su	PNI Start	Input Size	PNQ Start	Output Siz	Firmwar	Module
W/OUT(1)	1	0	PN7-0016A+		0				and a sure	V10.00 (IN/OUT Submodule
- E Completion	2	-		PNHO	0.32768						Submodule
	3	-		Port 1 - RJ45	0 32769						
	4	-		Port 2 - RJ45	0 32770						
	5	1	IN/OUT		1	128	2	128	2	1.0	
	<add< th=""><th>1</th><th>Delete</th><th>Update Time (ms)</th><th>4.00</th><th>Y</th><th>Data Hold</th><th>3</th><th>×</th><th>></th><th></th></add<>	1	Delete	Update Time (ms)	4.00	Y	Data Hold	3	×	>	
< >	< Previo	us	Next >				Ger	ierate	Cance	н	

Note: The device name must be consistent with the module name, and the IP address must be set in the same network segment as the PLC .

e. Click "Next" and you can see that the input and output starting addresses of the module are both 128, as shown in the figure below.

PROFINET Configuration Wizard	Н										×
ROFINET network]										PN7-0016A+V10.00.00
Controller(CPU ST30_plc200smart)	Cli	ck th	e "Add" butt	on to add a m	nodule i	for this					PN7-0016A+
E PN7-0016A+(0)	uev	Ind	Module Name	Submodule Na	Slot Su	PNI Start	Input Size	PN0 Start	Output Siz	Eirmwar	Module
IN/OUT(1)	1	0	PN7-0016A+		0					V10.00.0	±-IN/OUT
Completion	2	-		PN-I0	0 32768	-					Submodule
	3			Port 1 - RJ45	0 32769						
	4	-		Port 2 - RJ45	0 32770						
	5 [1	IN/OUT		1	128	2	128	2	1.0	
											P
	<									>	
		Add	Delete								
				Update Time (ms)	4.00	_	Data Hold	3	-		
	< Pre	evious	Next >				Ge	enerate	Cance	el	
< >											

f. Click "Next" to see the module's device information, as shown in the figure below.

	×
This page allows you to configure each submodule of the selected module.	
Solidot Development PN+10 Port 1 - R345 Port 2 - R345	
Device Identification	
IP Address 192.168.0.20	
Device Name pn7	
Catalog	
Short Designation PN7-0016A+	
Description SolidotPROFINETVO	
Article Number 1734567	
Firmware version (V100000	
GSD Path C(Users)Public(Documents(Siements)STEP 7-MicroWIN SMART	
Goodine (Goodine rive, Josephin rub to reveau of 1 Juni	
Identification Taintenance	
Flant designation	
Location Designation	
	~
< Previous Next > Generate Cancel	
	This page allows you to configure each submodule of the selected module. Solidot Development PH-D0 Port 1 - RMS Port 2 - RMS Device Identification IP Address 192168.020 Device Identification IP Address 192168.020 Device Name pn7 Device Name pn7 Catalog Short Designation PM/P0016A+ Description Solidor PROFINET VO Article Number 1236667 Firnware version V10.00.00 GSD Path CMUsers/Phublic/Document/Siement/SIETP 7-Mero/WIN SMART SSOMU/GSDML-V2.3-edot-pn7-0016e+-20230313.vml Identification Flant designation Inclassion Inclassion Location Designation Flant designation Inclassion Vervicus Mexi > Generate Cancel

g. Pull down the module information page and you can see the parameter configuration information of the module, as shown in the figure below. The output clearing hold parameters and channel input and output configuration parameters can be configured according to actual use needs. For example, configure channels 0~9 as input types, and configure channels A~F as output types.

PROFINET Configuration Wizard		×
PROFINET network Gontroller(CPU ST30_plc200sma G- PN7-0016A+V10.00.00-pn7 G PN7-0016A+(0)	This page allows you to configure each submodule of the selected module.	
IN/OUT(1)	Solidot Development PN-J0 Port 1 - R345 Port 2 - R345	
	Data Clear or Hold Settings Clear 💌	
	Freely configurable channel 0 DI	
	Freely configurable channel 1 $D_{\underline{D}}$	
	Freely configurable channel 2 DI 💌	
	Freely configurable channel 3 DI 💌	
	Freely configurable channel 4 DI	
	Freely configurable channel 5 DI 💌	
	Freely configurable channel 6 DI 💌	
	Freely configurable channel 7 DI 💌	
	Freely configurable channel 8 DI 💌	
	Freely configurable channel 9 DI 💌	
	Freely configurable channel A DI 💌	
	Freely configurable channel B DI 💌	
	Freely configurable channel C DI 💌	
	Freely configurable channel D DI 💌	
	Freely configurable channel B DI 💌	~
	< Previous Next > Generate Cancel	

h. Click "Next" and then click "Next" again. The network configuration is as shown in the figure below. Click "Generate" to complete the configuration.

PROFINET Configuration Wizard										×
PROFINET network General CPU ST30_plc200sma PN7-0016A+V10.00.00-pn7 PN7-0016A+(0) D1V/0016A+(0) Completion			Ŭ	192	200smart 168.0.1					
	pn7(PN7-0016A+\	AC.								
_	Address o	verview								
	Device No	mbor API	Device N	Modulo	Slot Subs	IO Tuno	Addross E	Address To	Sizol	
	1 1		nn7	PN7-00164+	0.1	-	-	-	-	
	2 1	0	nn7	PNHO	0_1	-	-	-	-	
	3 1	n n	nn7	Port 1 - B.145	0_32769	-	-	-	-	
	4 1	0	nn7	Port 2 - B.145	0_32770	-	-	-	-	
	5 1	0	nn7	IN/OUT	1 1	Innut	128	129	2	
	6 1	0	pn7	IN/OUT	1.1	Outout	128	129	2	
	< Previous	ext >			Gener	ate	Cancel			_

6. Download program

a. "File- > Download" button in the menu bar to pop up the download window, click "Download", as shown in the figure below.

n 🗋 📬 🖬 🏟 🕫		Project1 - STEP 7-Micro/W	N SMART
File Edit View	v PLC Debug Tools Help		
ew Close Save Save	Import * Export * Previous * Upload Download Transfer Print Page Setup Print Page Setup	Project Create POU Copen Folder Data Page Externing Externing GSDML Management GSDML Management	
n Ø	🗘 🗿 🏹 🏦 Upload 👻 😓 Download 👻 🔝 Insert 🔹	1 1 2 Delete - 3 3 3	
	4 MAIN × SBR 0 INT 0		
Project1 	Program Comments Network Comment		
 Symbol Table Status Chart 	 	Download	×
Data Block Data Block Data Block System Block Constructions Constructions Tools Instructions Revortes Developic Dools Dools	2 Enter comment	Derminad blocks to CPU Select blocks to download.	
Compare Convert Convert Convert Convert Convert Convert Convert Integer Math Integer Math Converting		Blocks Options 'Program Block 'Prompton 'Data Block 'Prompton' 'F' System Block 'Close data	RUN to STOP STOP to FUN g on success
Constant Control Contro Control Control Control Control Control	4 Enter comment	Click for Help and Support	Download Close
 B PROFINET B I Ubraries B II Call Subroutines 	5 Enter comment		

b. After the download window prompts that the download has completed successfully, click "Close".

Download	×
Download blocks to CPU Select blocks to download.	
Download completed successfully!	
Blocks	Options
🔽 Program Block	Prompt on RUN to STOP
🔽 Data Block	Prompt on STOP to RUN
✓ System Block	Close dialog on success
Click for Help and Support	Download Close

Note: After the download is completed, power on the module again .

7、Functional Verification

a. " PLC -> RUN" button in the menu bar , a confirmation window will pop up, click the "Yes" button to confirm, as shown in the figure below.



 b. Click " Status Chart -> Chart 1" in the left navigation tree and enter the corresponding channel address and data format in Chart 1. You can perform forced output and input monitoring operations on the IO module here.

						Projecti - STEP / -IVIICRO/WIN SI
File Edit View	PLC De	ebug Tools	Help			
RUN STOP Compile	load Download	Program	일 PLC 같 Compare	Warm Start	1	
Operations	Iranster	Iviemory card	Information	Modity	Den Contra a contra	×
Main #	003	1 Upload 👻		• HR Insert • HR Delete •	第四 🗆 🕾 🖻	🖄 🔁 🔒 🛍 🛱 🛨 .
Project What's New CPU ST30 Program Block Symbol Table Status Chart Chart 1 Data Block Data Block System Block	Program Program Network	N × SBR_0 I Comments Comment	INT_0			
E Cross Reference						
Communications Communications Communications Communications Communications Compare Convert	Status Chart # × [™] • [™] • ■ ⊕ ⊕ / ⊕ ⊕ [™] ₩ ₩ □ •					
	Address	s	Format	Value	New Value	
	1 QB128	1	Hexadecimal	16#00		
	2 QB129		Hexadecimal	16#00		
	3 IB128		Hexadecimal	16#00		-
	4 IB129		Hexadecimal	16#00	-	
Floating-Point Math File Floating-Point Math Gal Integer Gal Gal			-			
B - Main String B - Main Table B - Main Timers B - Main PROFINET B - Main Libraries B - Main Call Subroutines						

c. the new value input box corresponding to the output line QB 129 of the state chart, the output value can be written. For example, if "252 " is written, the values of the six output A~F channels are all set to 1, and all the output channel lights are on. When the module's input channels 0~1 have valid voltage input, the input value can be monitored in IB 128, as shown in the figure below.



8 FAQ

8.1 When updating accessible devices, the device cannot be found

- 1. Confirm that TIA Portal software is installed correctly.
- 2. Make sure that no other software is occupying the network adapter used by the Porto software.
- 3. Confirm that the network cable, network card, and network port can work normally.
- 4. Check whether the IP address or MAC address conflicts.

8.2The load button is gray when downloading the configuration

- 1. Confirm that there are no forced values in the PLC.
- 2. Confirm that the PLC is in a stopped state.