

关于以太网通讯的配置说明

流程行业自动化赛项

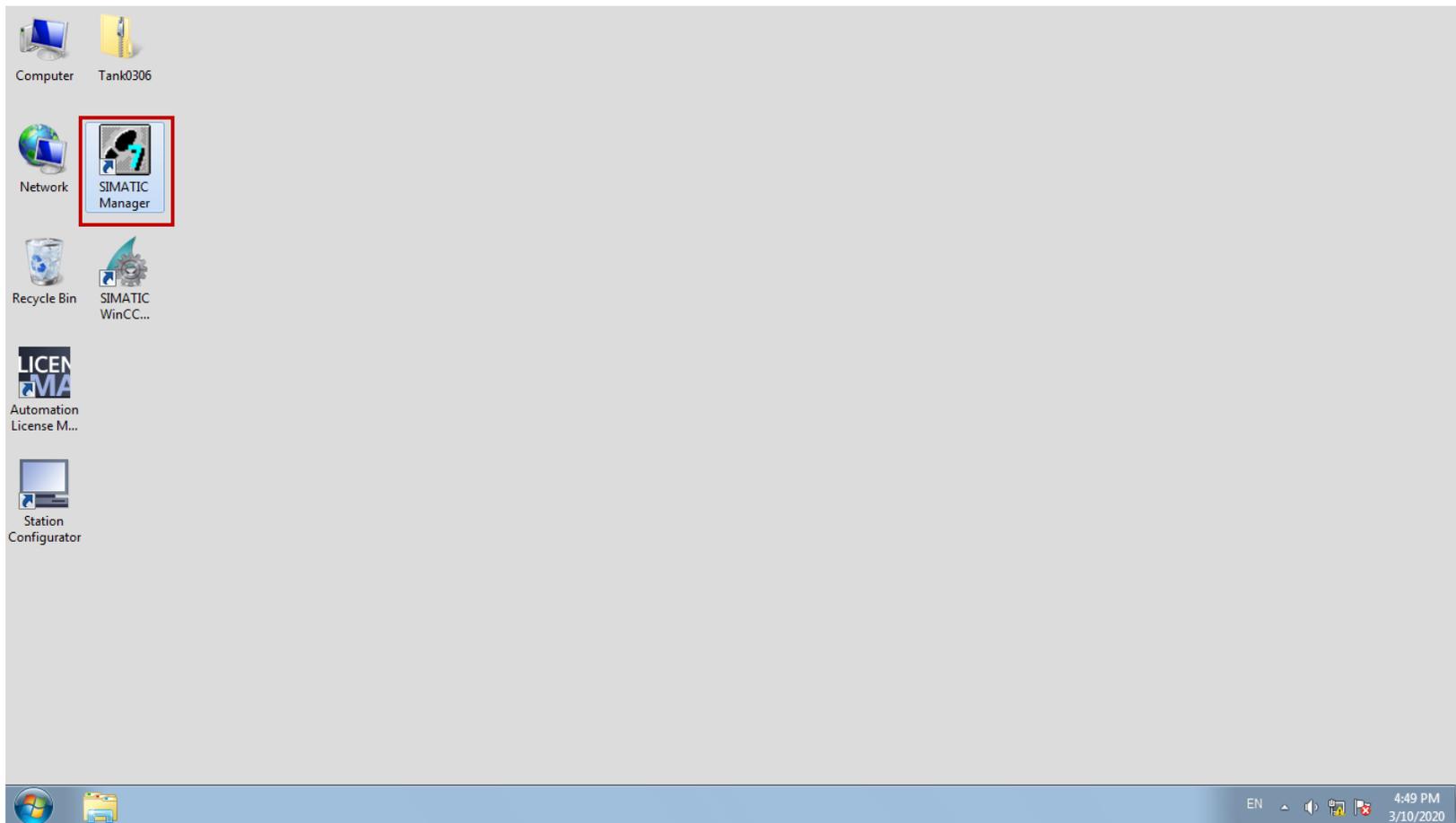
1

硬件组态

- 1 创建 PCS 7 项目**
- 2 使用 HW Config 组态 AS 站
- 3 下载硬件配置到CPU

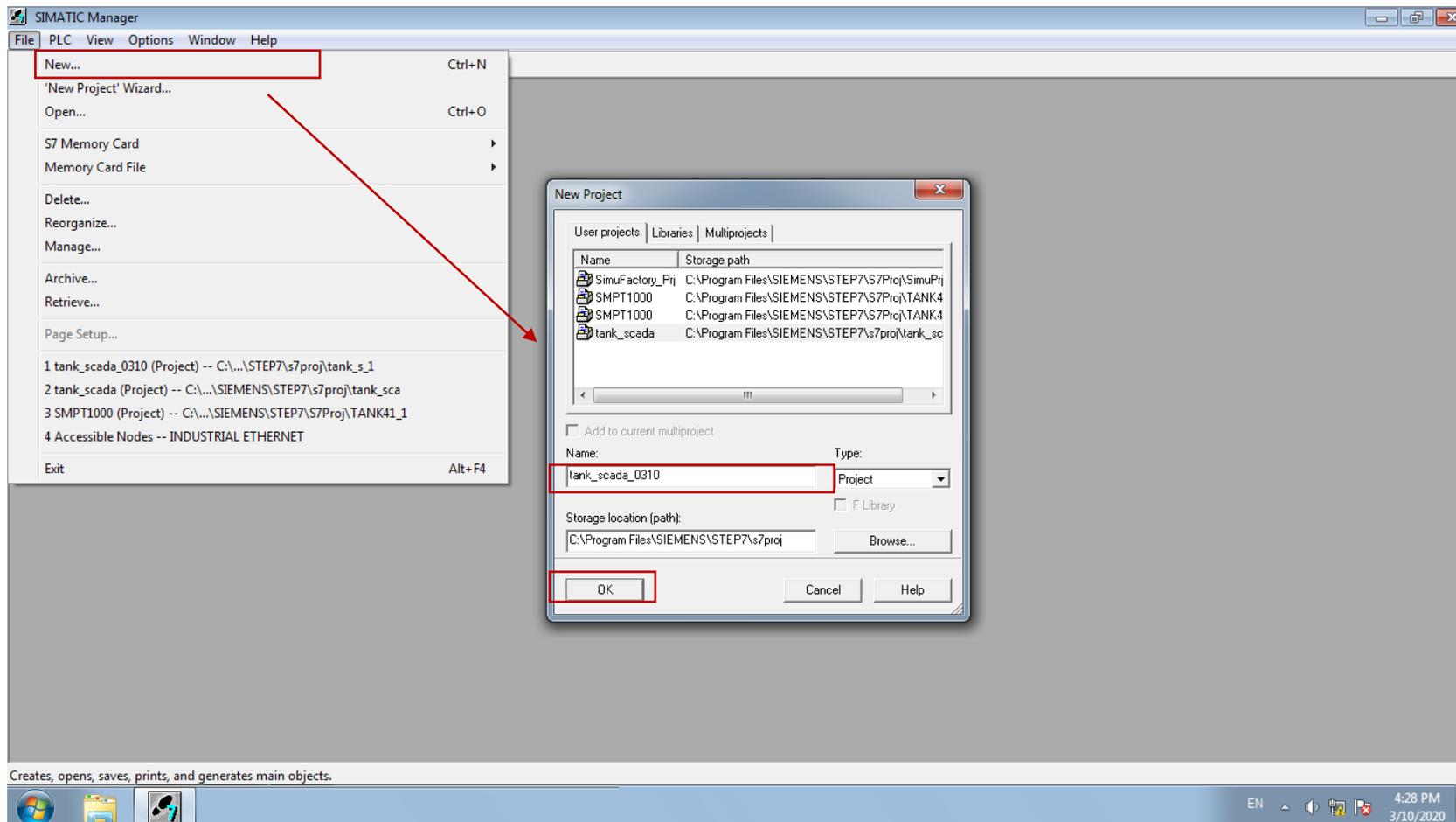
创建 PCS 7 项目

➤ 启动 SIMATIC Manager



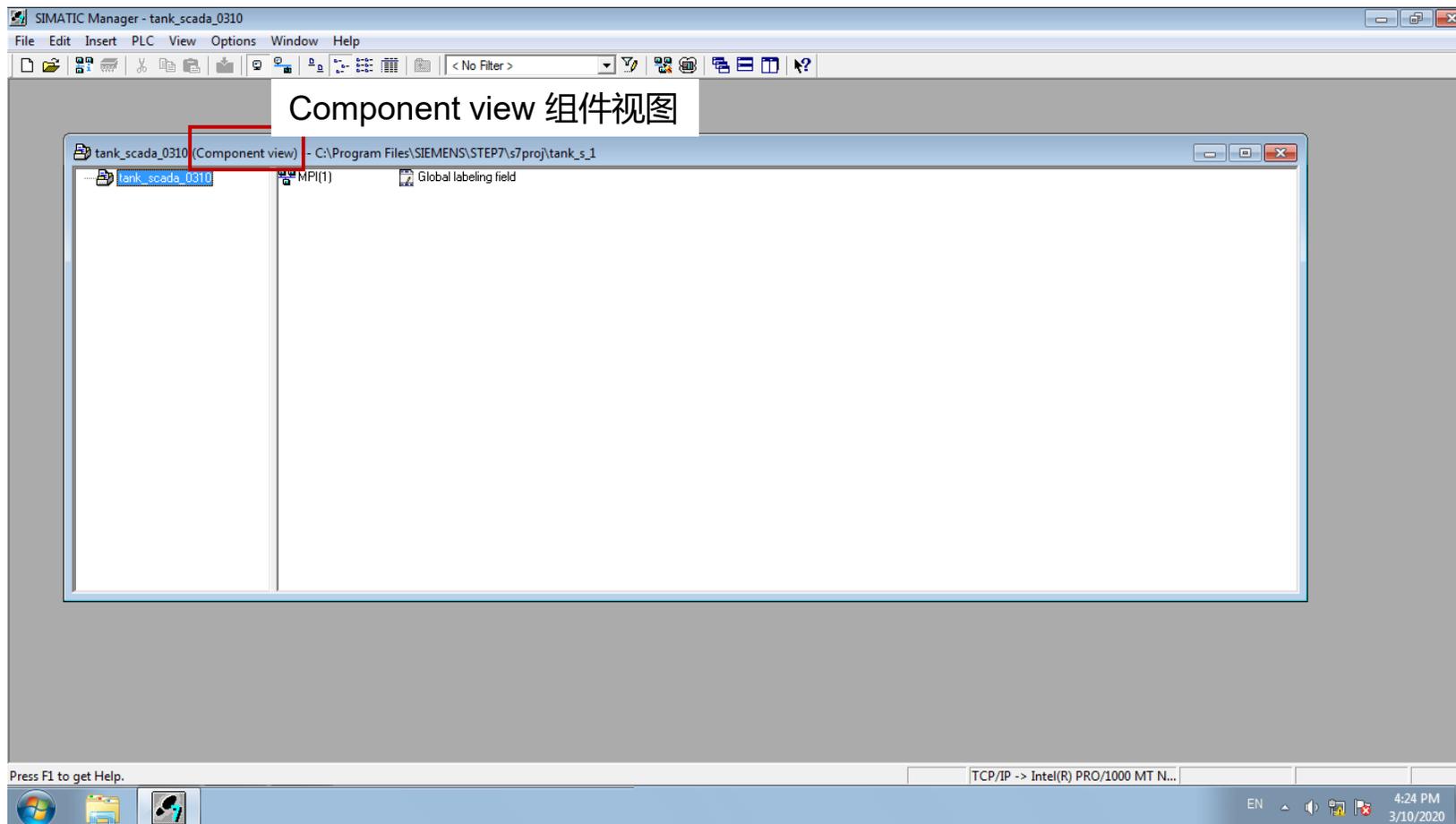
创建 PCS 7 项目

- 菜单栏 File > New..., 弹出 New Project 对话框, 输入项目名称, 选择存储路径, 点击OK按钮



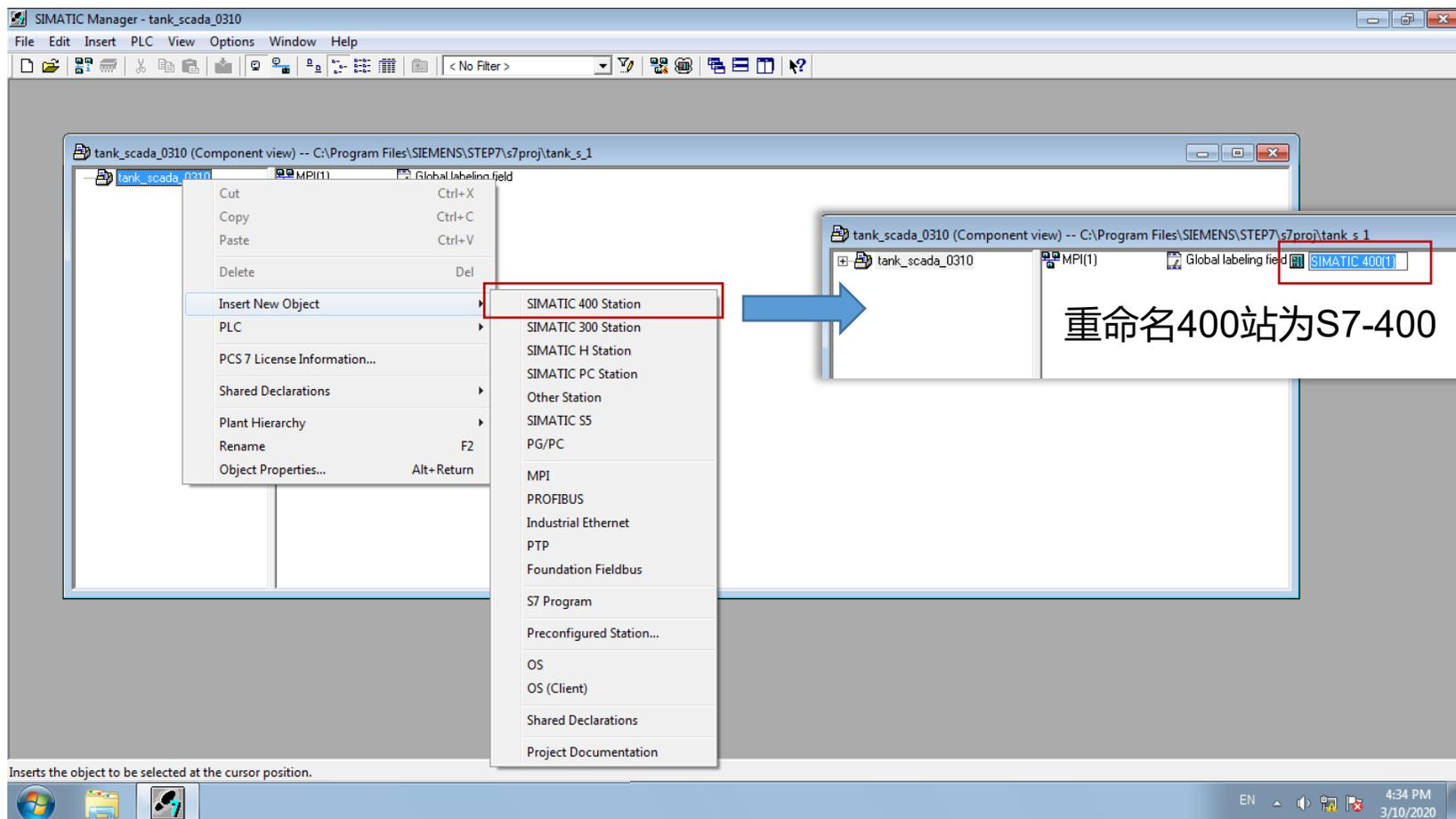
创建 PCS 7 项目

- 成功创建了空白项目，默认显示**组件视图**。



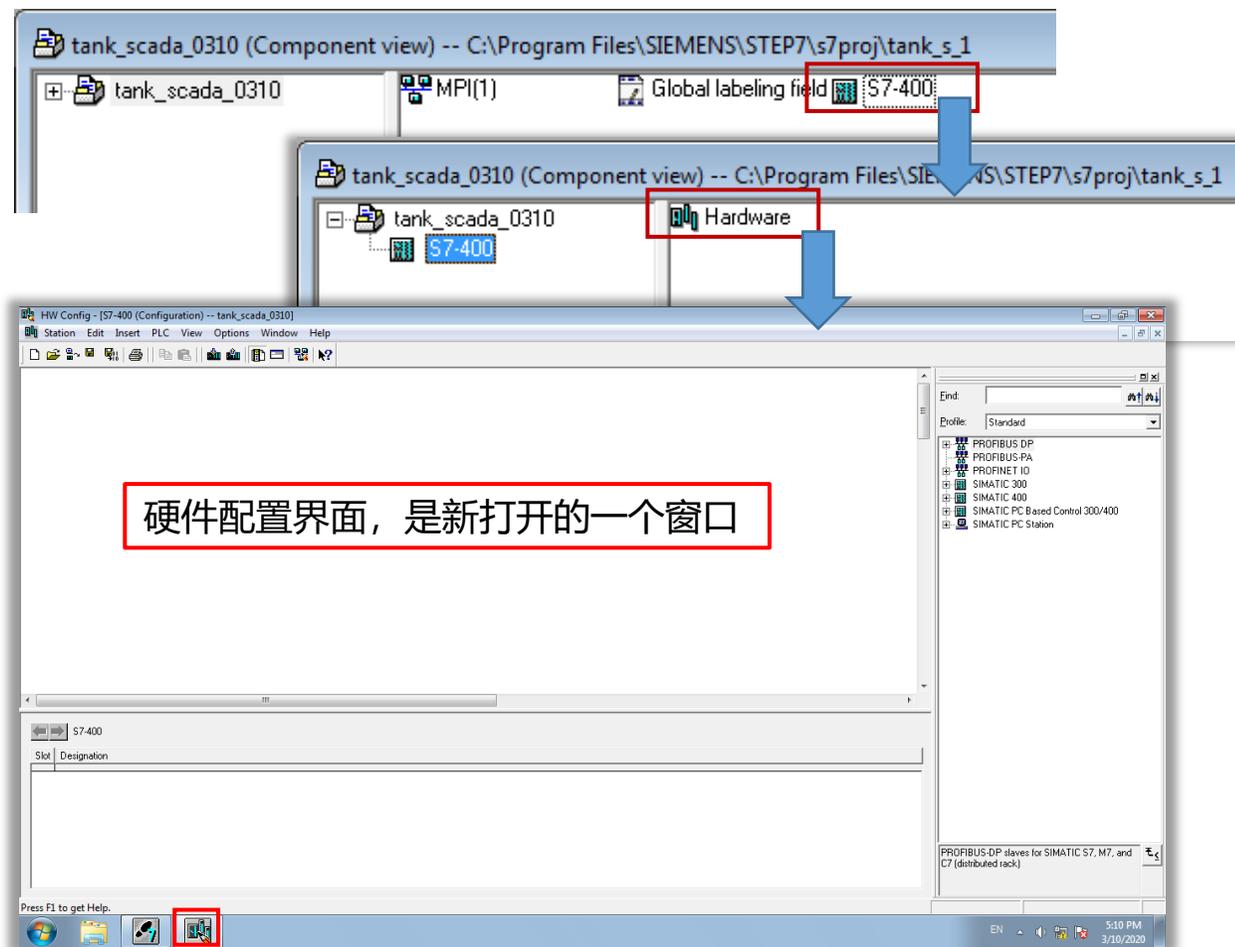
添加 AS 站

- 右键项目名称，选择 Insert New Object > SIMATIC 400 Station



添加 AS 站

- 双击400站，出现Hardware图标，双击Hardware弹出硬件组态界面



1

硬件组态

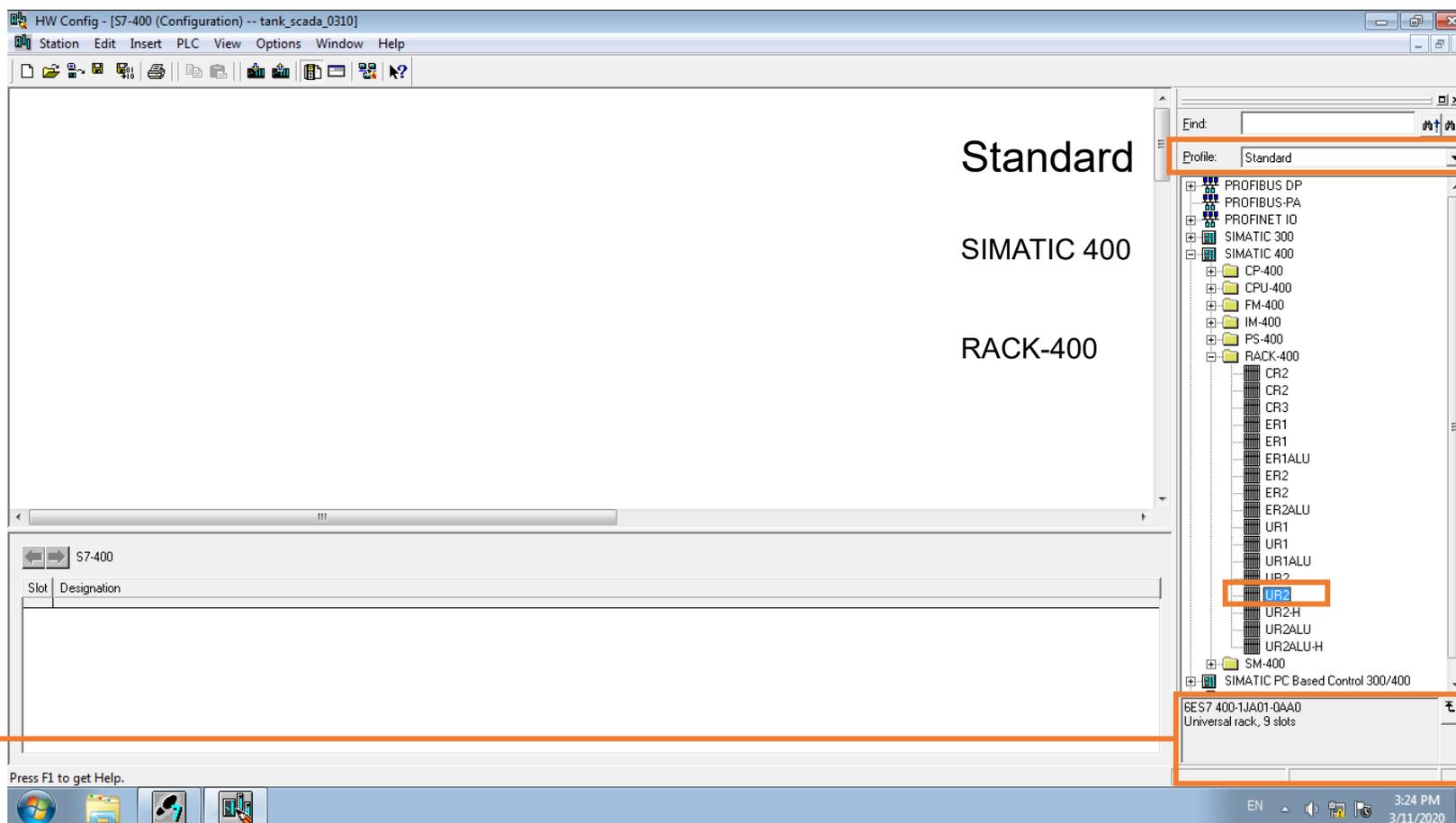
- 1 创建 PCS 7 项目
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组态机架模块

- 硬件目录中，找到机架 UR2，选中

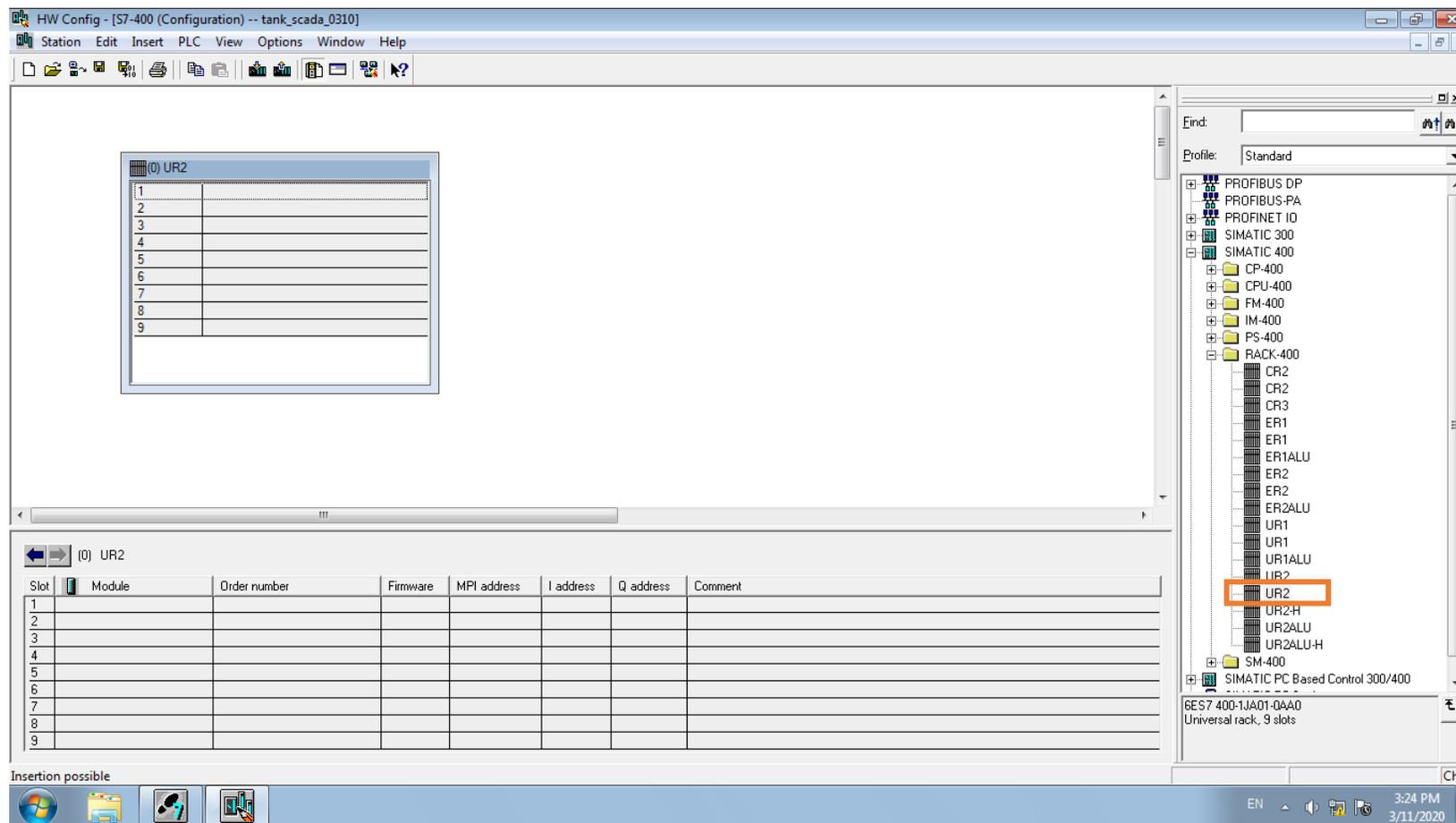
核对订货号

6ES7 400-1JA01-0AA0
Universal rack, 9 slots



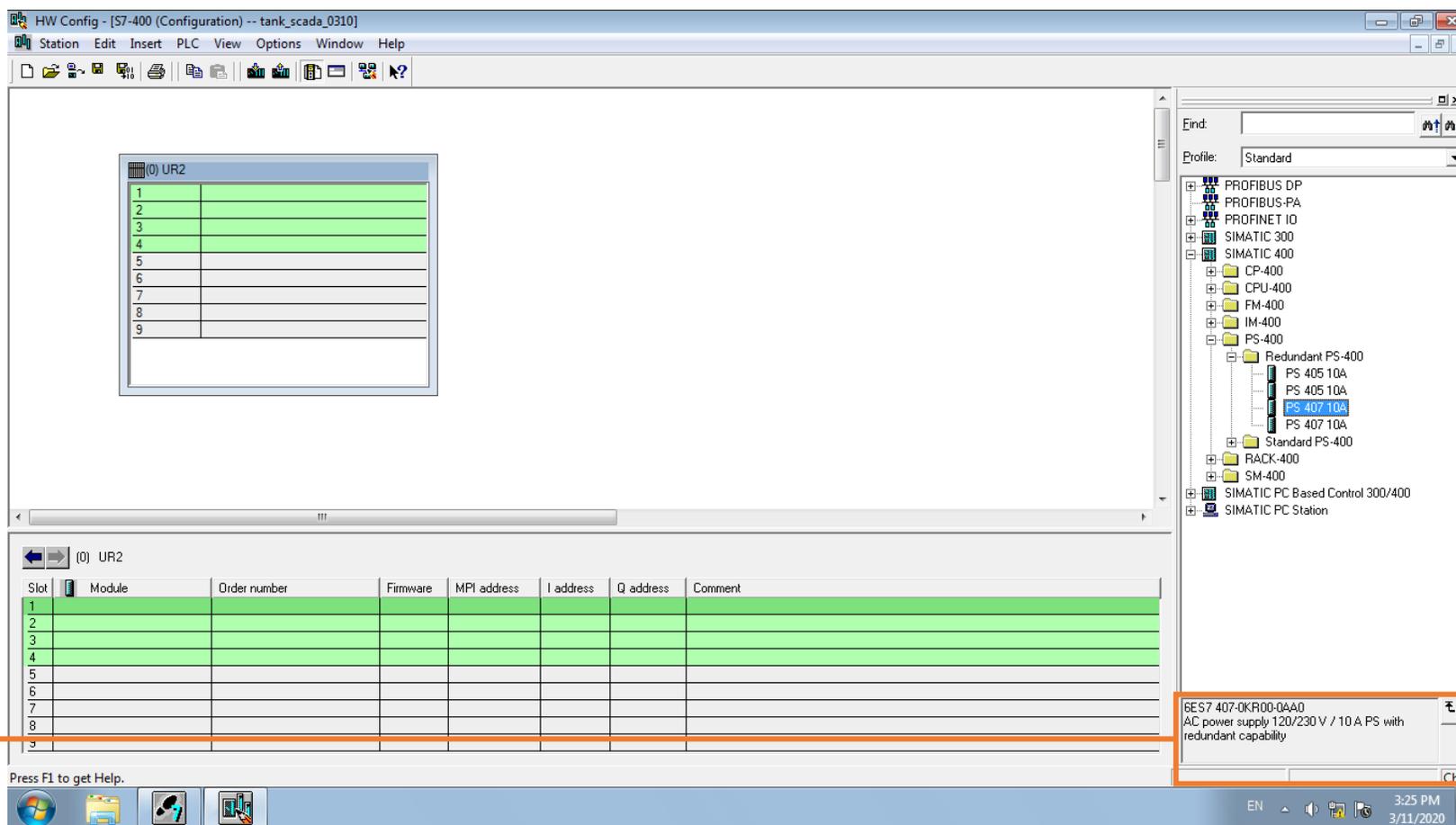
组态机架模块

- 硬件目录中，找到机架 UR2，选中
- 双击 UR2



组态电源模块

- 硬件目录中，找到冗余电源模块 PS 407 10A，选中



The screenshot shows the HW Config interface for a SIMATIC 400 station. The hardware rack is shown with slots 1-9. Slot 1 is highlighted in green. The hardware catalog on the right shows the selection path: SIMATIC 400 > PS-400 > Redundant PS-400 > PS 407 10A. The selected module is highlighted in blue.

Slot	Module	Order number	Firmware	MPI address	I address	Q address	Comment
1							
2							
3							
4							
5							
6							
7							
8							
9							

Properties for the selected module (PS 407 10A):

```

GES7 407-0KR00-0AA0
AC power supply 120/230 V / 10 A PS with
redundant capability
    
```

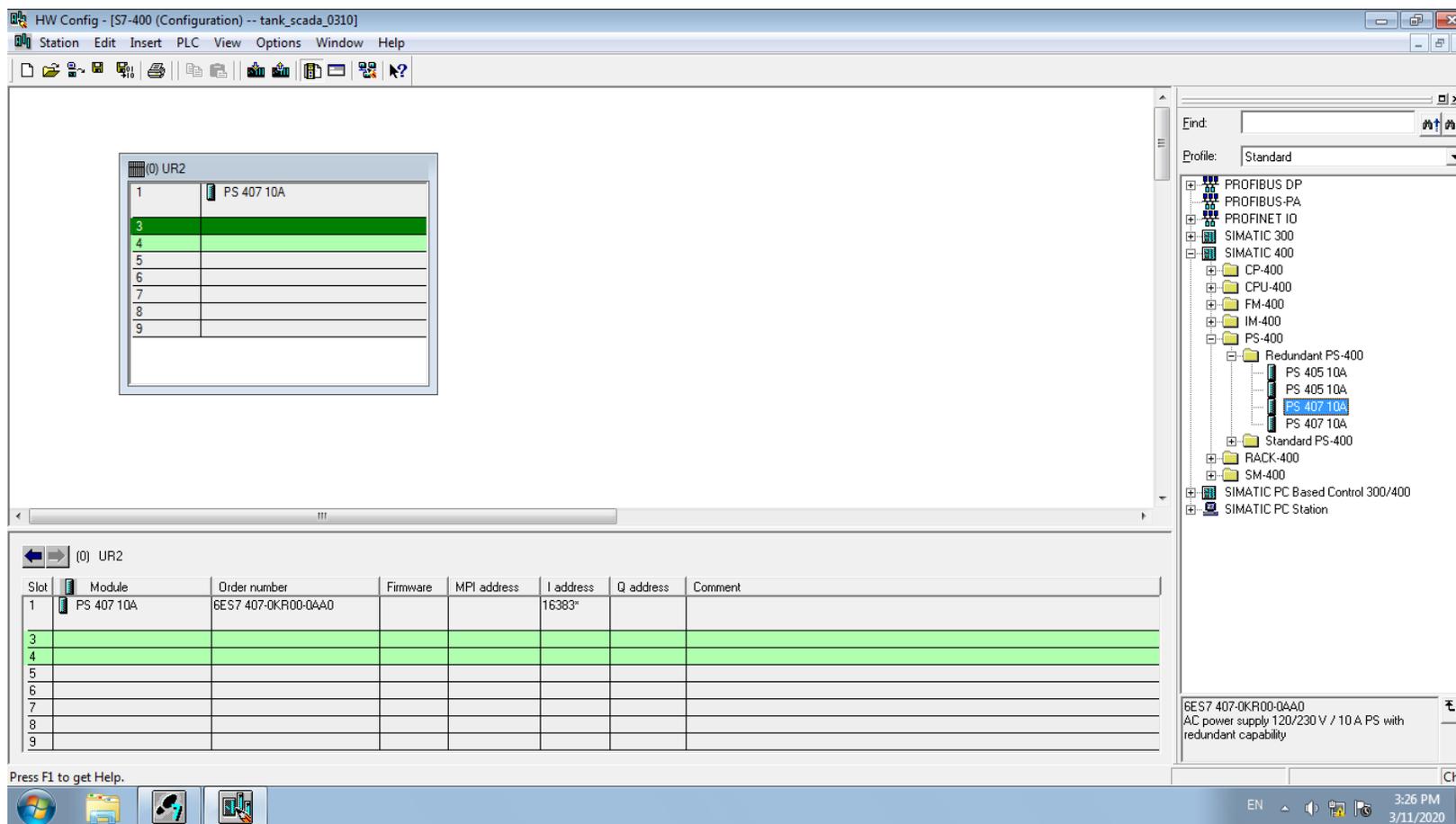
核对订货号

GES7 407-0KR00-0AA0
AC power supply 120/230 V / 10 A PS with
redundant capability

GES7 407-0KR00-0AA0
AC power supply 120/230 V / 10 A PS with
redundant capability

组态电源模块

- 硬件目录中，找到冗余电源模块 PS 407 10A，选中
- 双击所选模块



The screenshot shows the HW Config software interface for a SIMATIC 400 PLC. The main window displays a rack configuration for UR2. A small dialog box is open, showing a list of slots from 1 to 9. Slot 3 is selected, and the module 'PS 407 10A' is listed next to it. Below the dialog, a table shows the configuration details for the module in slot 1.

Slot	Module	Order number	Firmware	MPI address	I address	Q address	Comment
1	PS 407 10A	6ES7 407-0KR00-0AA0			16383*		
3							
4							
5							
6							
7							
8							
9							

The right-hand pane shows the hardware catalog with the following structure:

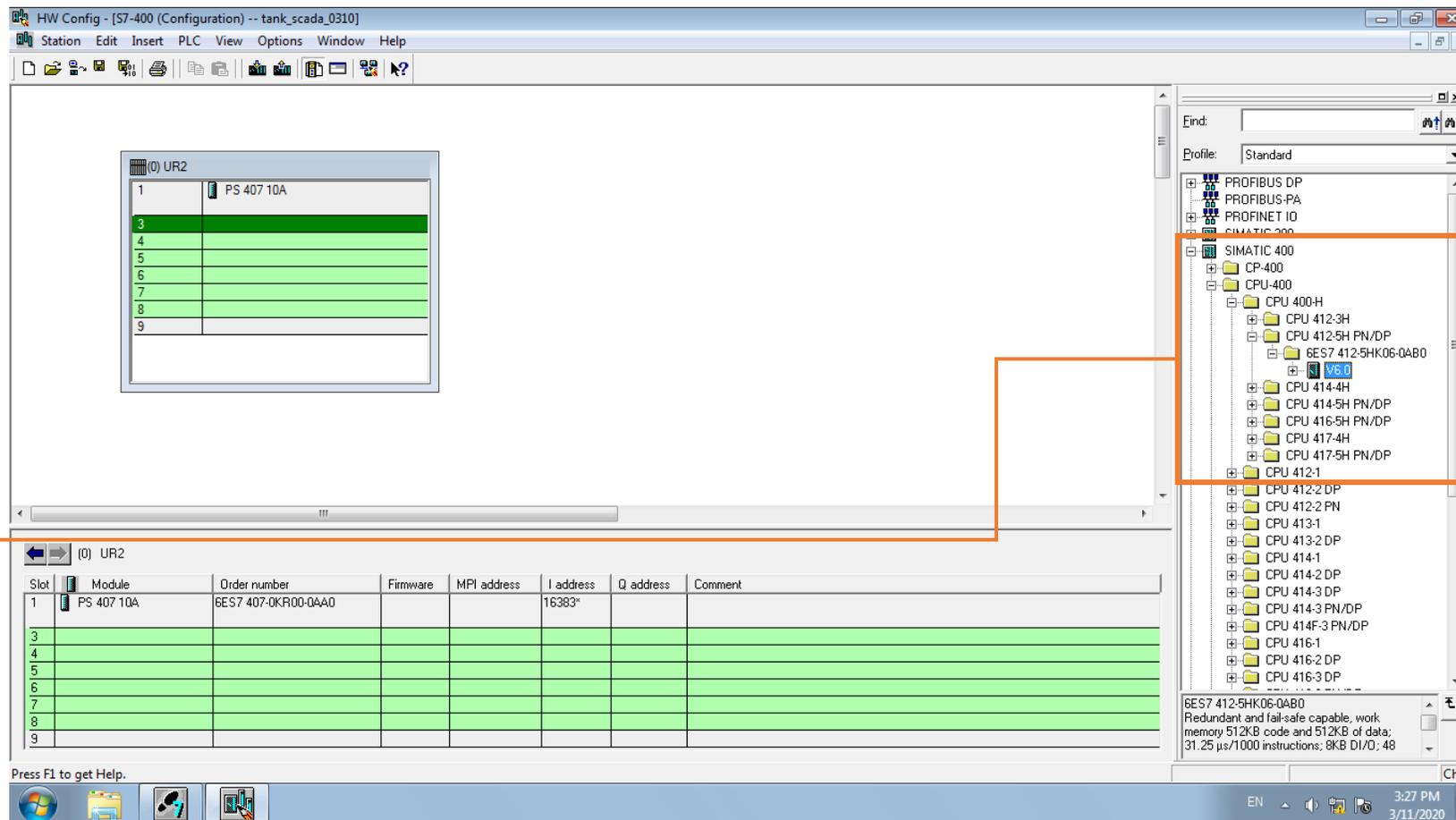
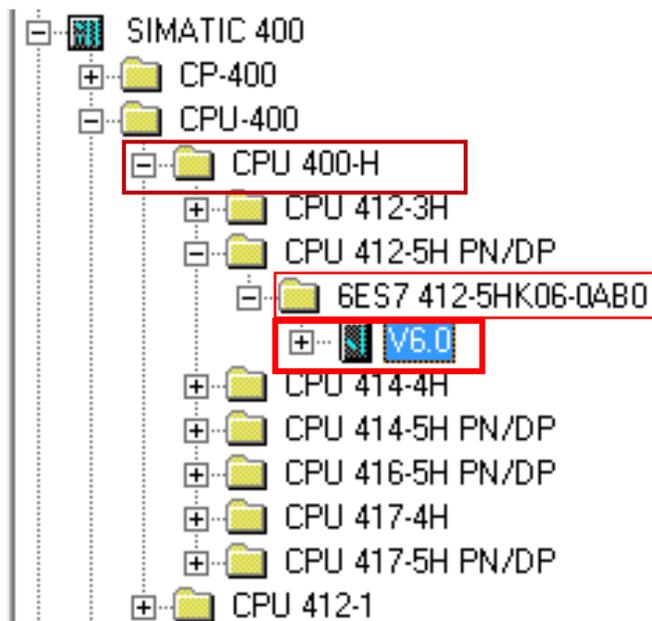
- PROFIBUS DP
- PROFIBUS-PA
- PROFINET IO
- SIMATIC 300
- SIMATIC 400
 - CP-400
 - CPU-400
 - FM-400
 - IM-400
 - PS-400
 - Redundant PS-400
 - PS 405 10A
 - PS 405 10A
 - PS 407 10A**
 - PS 407 10A
 - Standard PS-400
 - RACK-400
 - SM-400
- SIMATIC PC Based Control 300/400
- SIMATIC PC Station

At the bottom right, a tooltip for the selected module provides the following information:

6ES7 407-0KR00-0AA0
AC power supply 120/230 V / 10 A PS with redundant capability

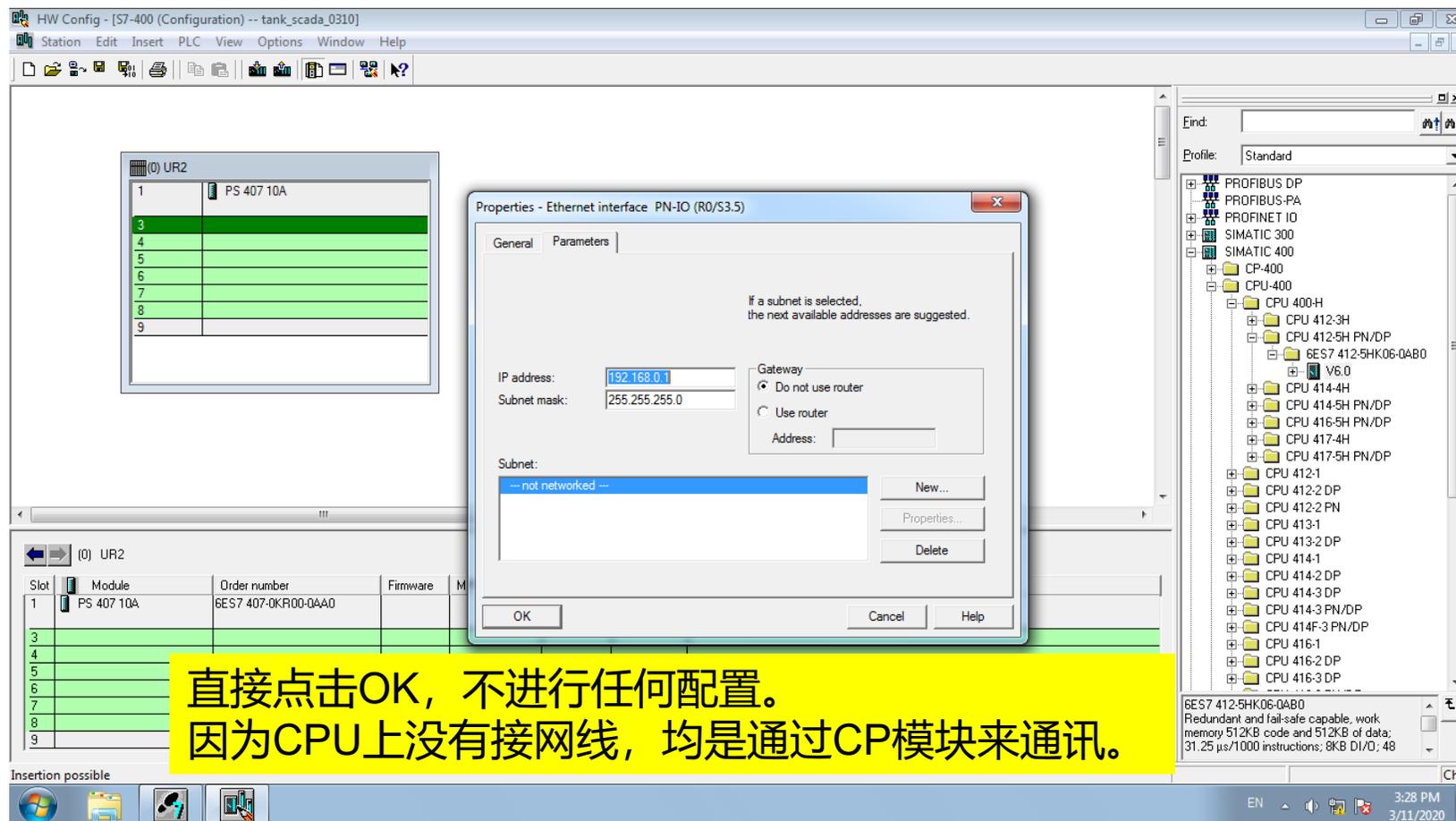
组态CPU模块

- 硬件目录中找到CPU 400H > CPU412-5H PN/DP, 选中 V6.0



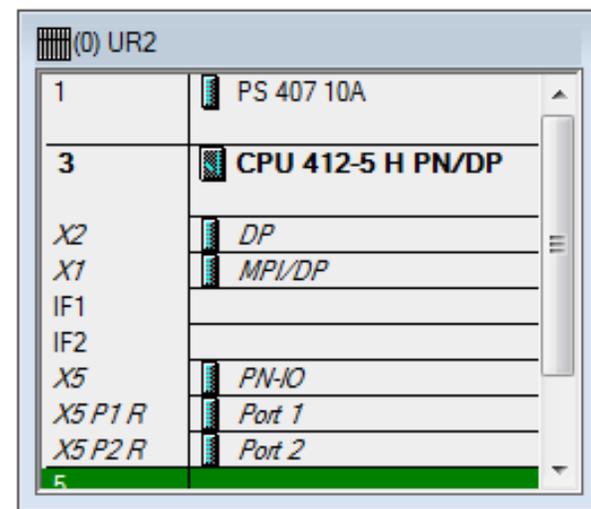
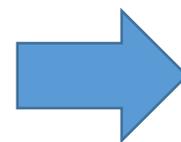
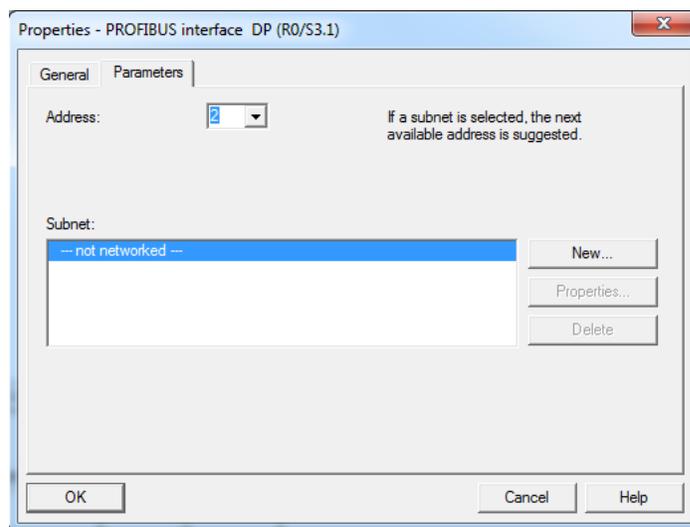
组态CPU模块

- 双击所选模块，弹出属性对话框-以太网接口配置，直接点击OK



组态CPU模块

- 继续弹出DP接口配置，
直接点击OK

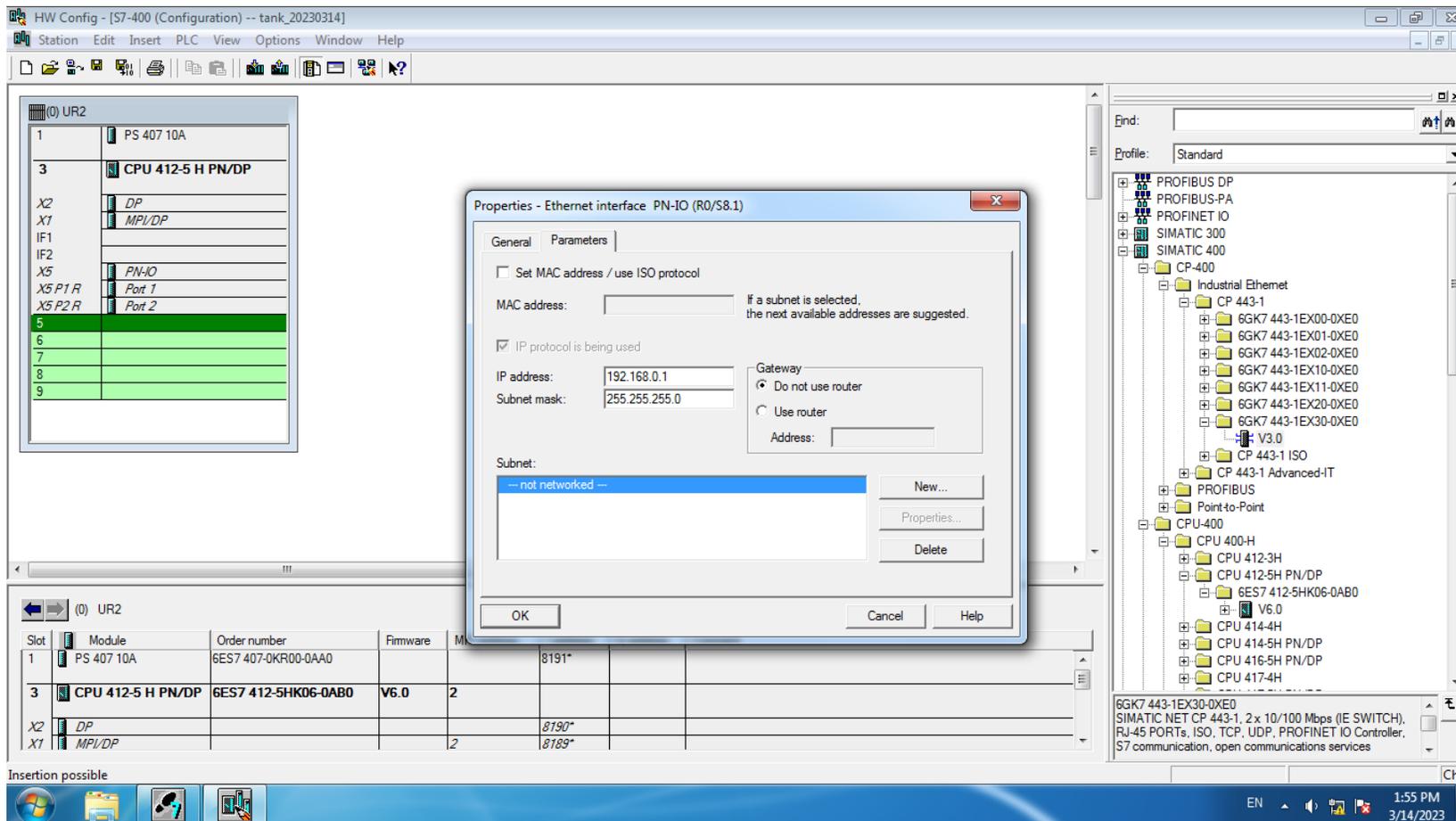


直接点击OK，不进行DP接口的配置。
因为和现场设备的通讯使用以太网模式，不是DP通讯。

CPU组态完成

组态CP模块

- 硬件目录中，找到CP，拖拽到机架上，弹出以太网配置对话框



HW Config - [S7-400 (Configuration) -- tank_20230314]

Station Edit Insert PLC View Options Window Help

(0) UR2

Slot	Module	Order number	Firmware	MPI Address	DP Address
1	PS 407 10A	6ES7 407-0KR00-0AA0		8191*	
3	CPU 412-5 H PN/DP	6ES7 412-5HK06-0AB0	V6.0	2	
X2	DP				8190*
X1	MPI/DP				8189*

Properties - Ethernet interface PN-IO (R0/S8.1)

General Parameters

Set MAC address / use ISO protocol

MAC address: If a subnet is selected, the next available addresses are suggested.

IP protocol is being used

IP address:

Subnet mask:

Subnet:

Gateway

Do not use router

Use router

Address:

New... Properties... Delete

OK Cancel Help

End:

Profile: Standard

PROFIBUS DP
PROFIBUS-PA
PROFINET IO
SIMATIC 300
SIMATIC 400

CP-400

Industrial Ethernet

CP 443-1

6GK7 443-1EX00-0XE0
6GK7 443-1EX01-0XE0
6GK7 443-1EX02-0XE0
6GK7 443-1EX10-0XE0
6GK7 443-1EX11-0XE0
6GK7 443-1EX20-0XE0
6GK7 443-1EX30-0XE0

V3.0

CP 443-1 ISO

CP 443-1 Advanced-IT

PROFIBUS

Point-to-Point

CPU-400

CPU 400-H

CPU 412-3H
CPU 412-5H PN/DP
6ES7 412-5HK06-0AB0
V6.0

CPU 414-4H
CPU 414-5H PN/DP
CPU 416-5H PN/DP
CPU 417-4H

6GK7 443-1EX30-0XE0
SIMATIC NET CP 443-1, 2 x 10/100 Mbps (IE SWITCH), RJ-45 PORTs, ISO, TCP, UDP, PROFINET IO Controller, S7 communication, open communications services

Insertion possible

1:55 PM
3/14/2023

组态CP模块

配置CP的以太网接口

给CP设定的IP地址

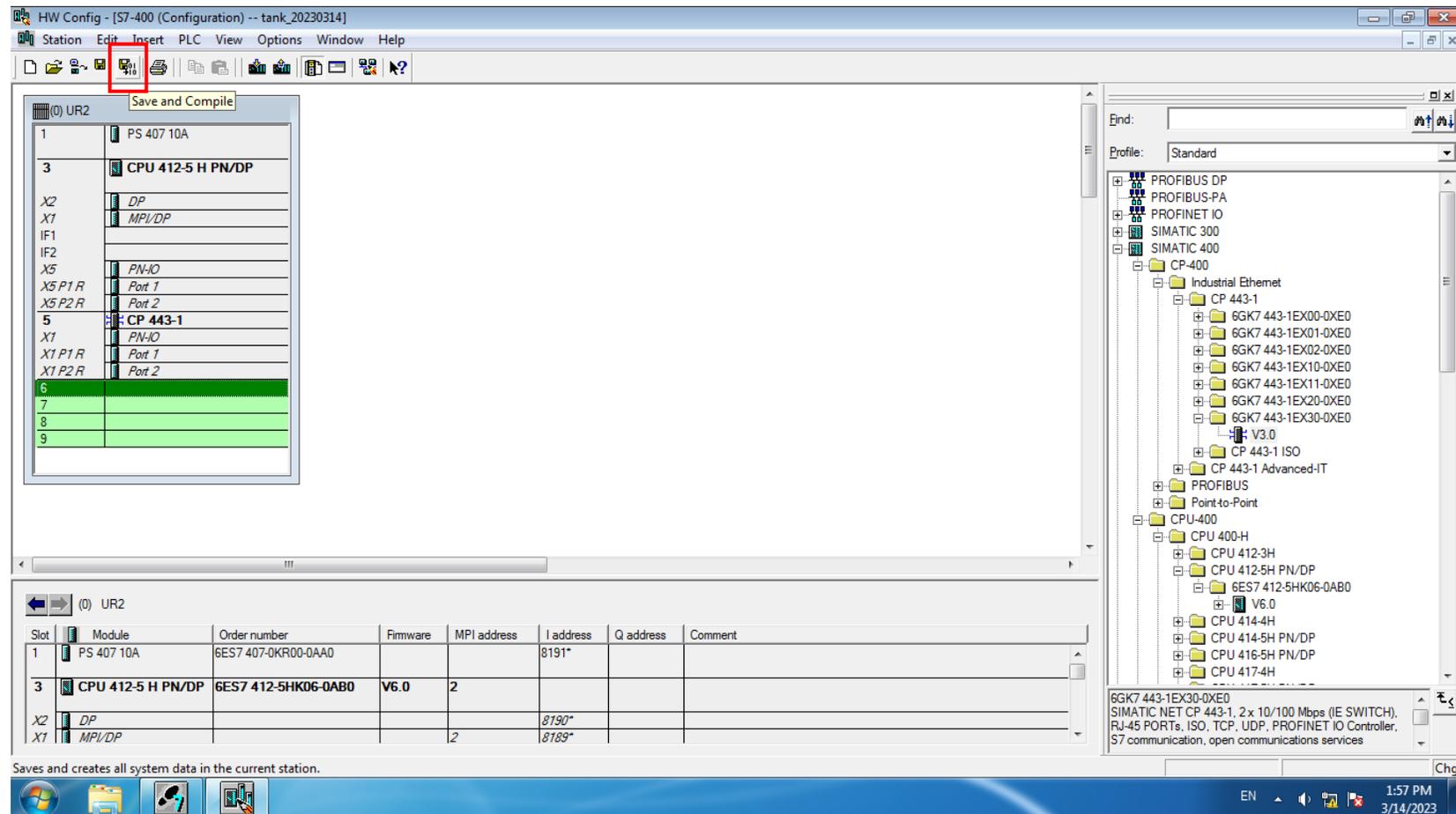
子网名称

在硬件组态下载完成后, CP的地址即是所设定的IP地址

刚刚建立的子网

AS站硬件组态

- AS站硬件组态完成，点击保存编译按钮。



HW Config - [S7-400 (Configuration) -- tank_20230314]

Station Edit Insert PLC View Options Window Help

Save and Compile

(0) UR2

Slot	Module	Order number	Firmware	MPI address	I address	Q address	Comment
1	PS 407 10A	6ES7 407-0KR00-0AA0			8191*		
3	CPU 412-5 H PN/DP	6ES7 412-5HK06-0A00	V6.0	2			
X2	DP				8190*		
X1	MPI/DP			2	8189*		

Saves and creates all system data in the current station.

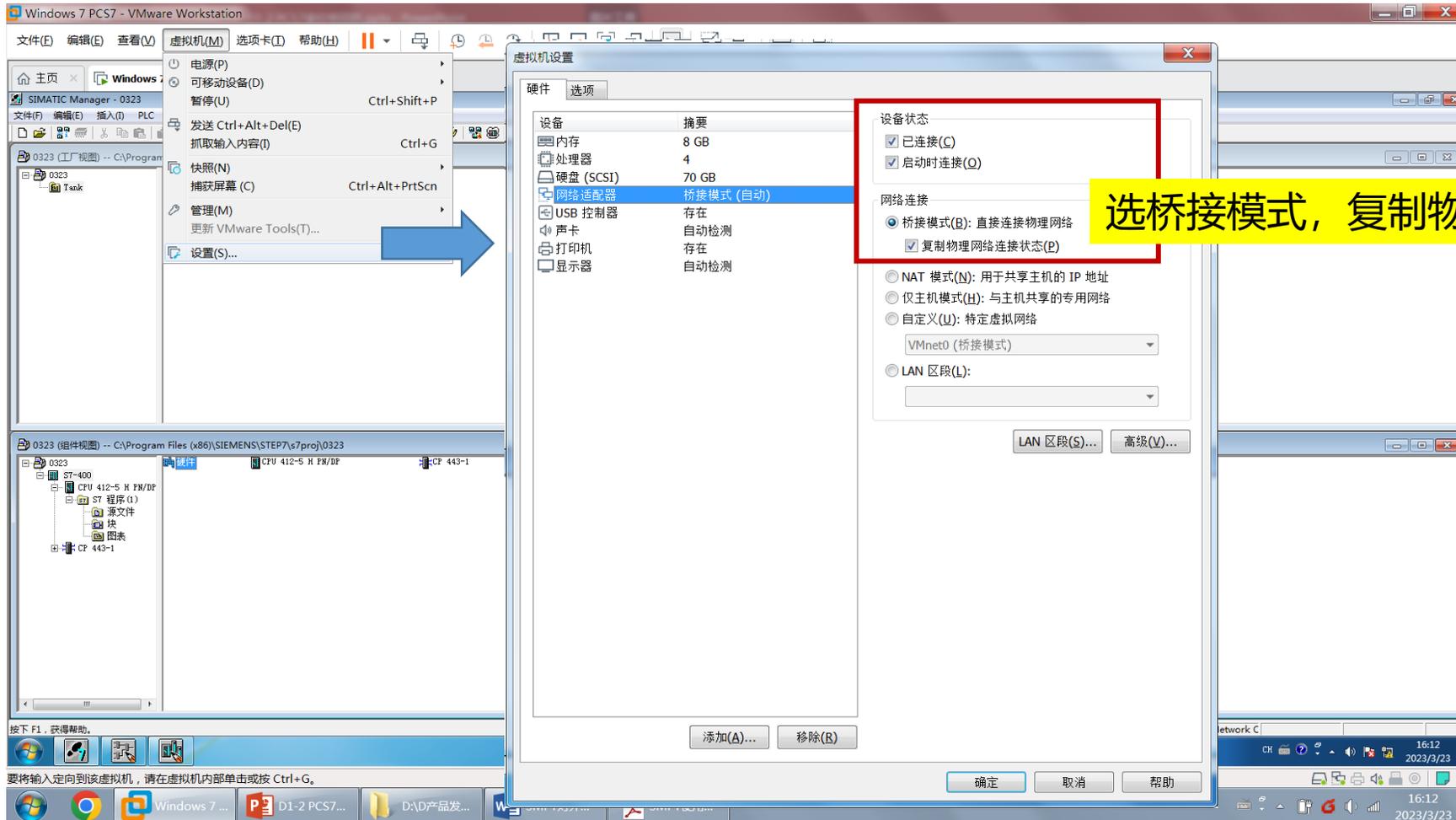
EN 1:57 PM 3/14/2023

1

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虚拟机网络设置



要将输入定向到该虚拟机，请在虚拟机内部单击或按 Ctrl+G。

虚拟机网络设置

Windows 7 PCS7 - VMware Workstation

虚拟网络编辑器

名称	类型	外部连接	主机连接	DHCP	子网地址
VMnet0	桥接模式	ASIX AX88179 USB 3.0 to Giga...	-	-	-
VMnet1	仅主机...	-	已连接	已启用	192.168.170.0
VMnet8	NAT 模式	NAT 模式	已连接	已启用	192.168.221.0

添加网络(E)... 移除网络(O) 重命名网络(W)...

VMnet 信息

桥接模式(将虚拟机直接连接到外部网络)(B)

已桥接至(G): ASIX AX88179 USB 3.0 to Gigabit Ethernet Adapter 自动设置(U)...

NAT 模式(与虚拟机共享主机的 IP 地址)(N) NAT 设置(S)...

仅主机模式(在专用网络内连接虚拟机)(H)

将主机虚拟适配器连接到此网络(V)
主机虚拟适配器名称: VMware 网络适配器 VMnet0

使用本地 DHCP 服务将 IP 地址分配给虚拟机(D) DHCP 设置(P)...

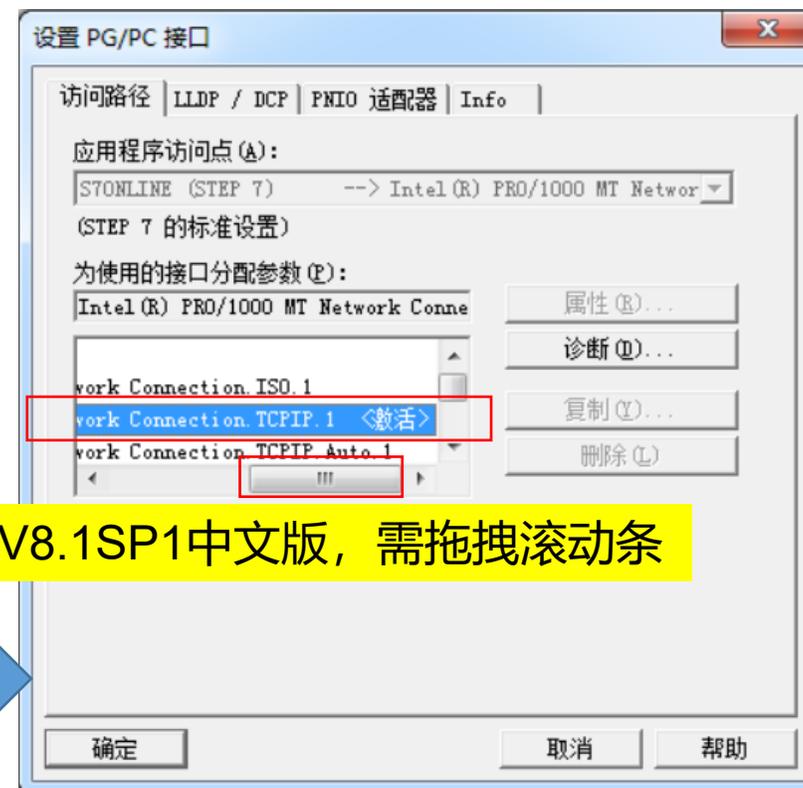
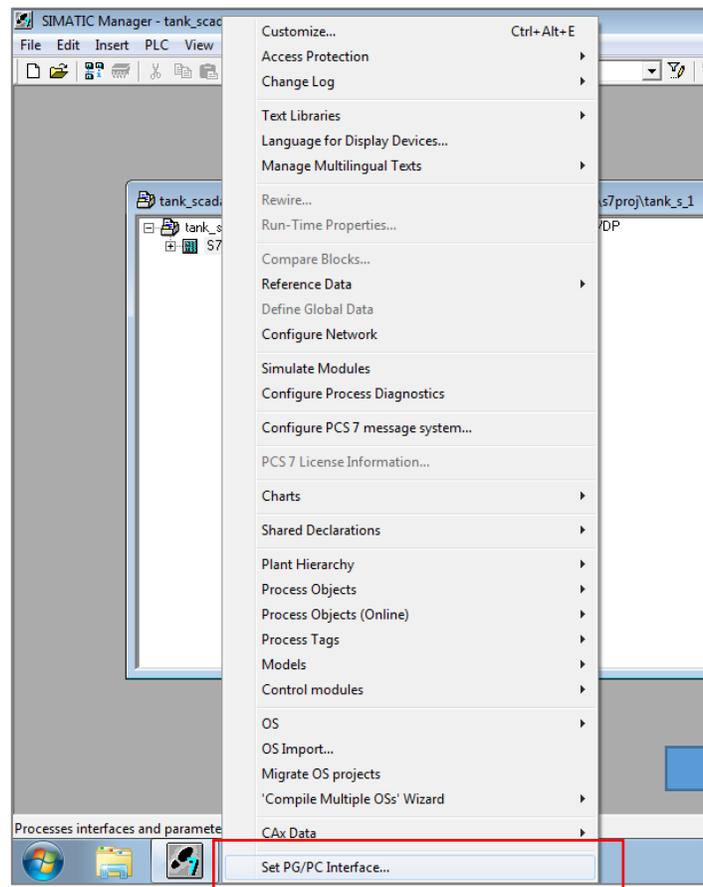
子网 IP (I): . . . 子网掩码(M): . . .

还原默认设置(R) 导入(T)... 导出(X)... 确定 取消 应用(A) 帮助

主机上网线接到了哪个口

如何建立ES站和AS站的通讯?

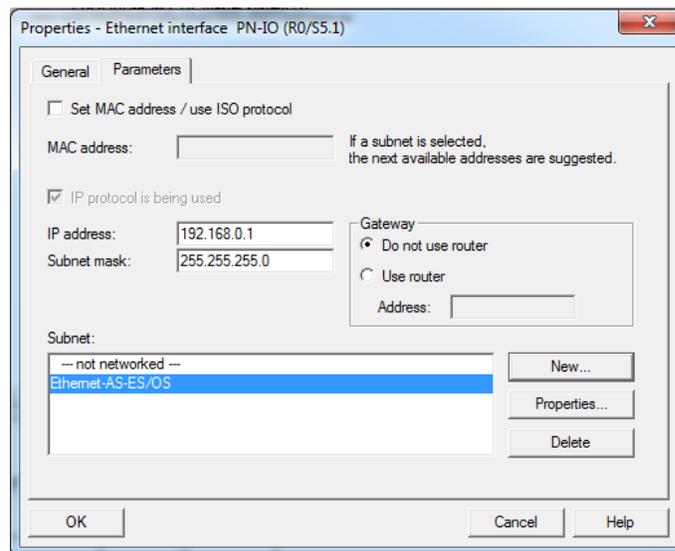
- 用网线连接PC机和CP模块
- 设置PG/PC接口
主界面菜单栏 Options > Set PG/PC Interface..., 选择TCP/IP



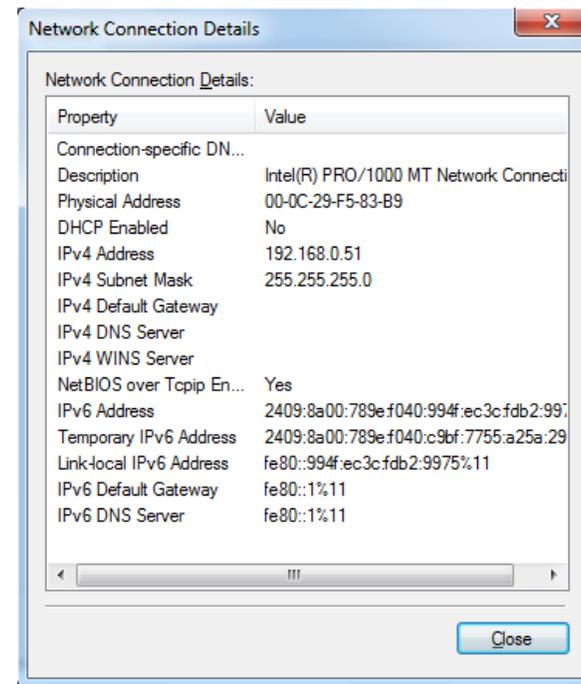
如何建立ES站和AS站的通讯?

- 确认PC机和CP模块当前处于同一网段

CP模块IP地址设为192.168.0.1



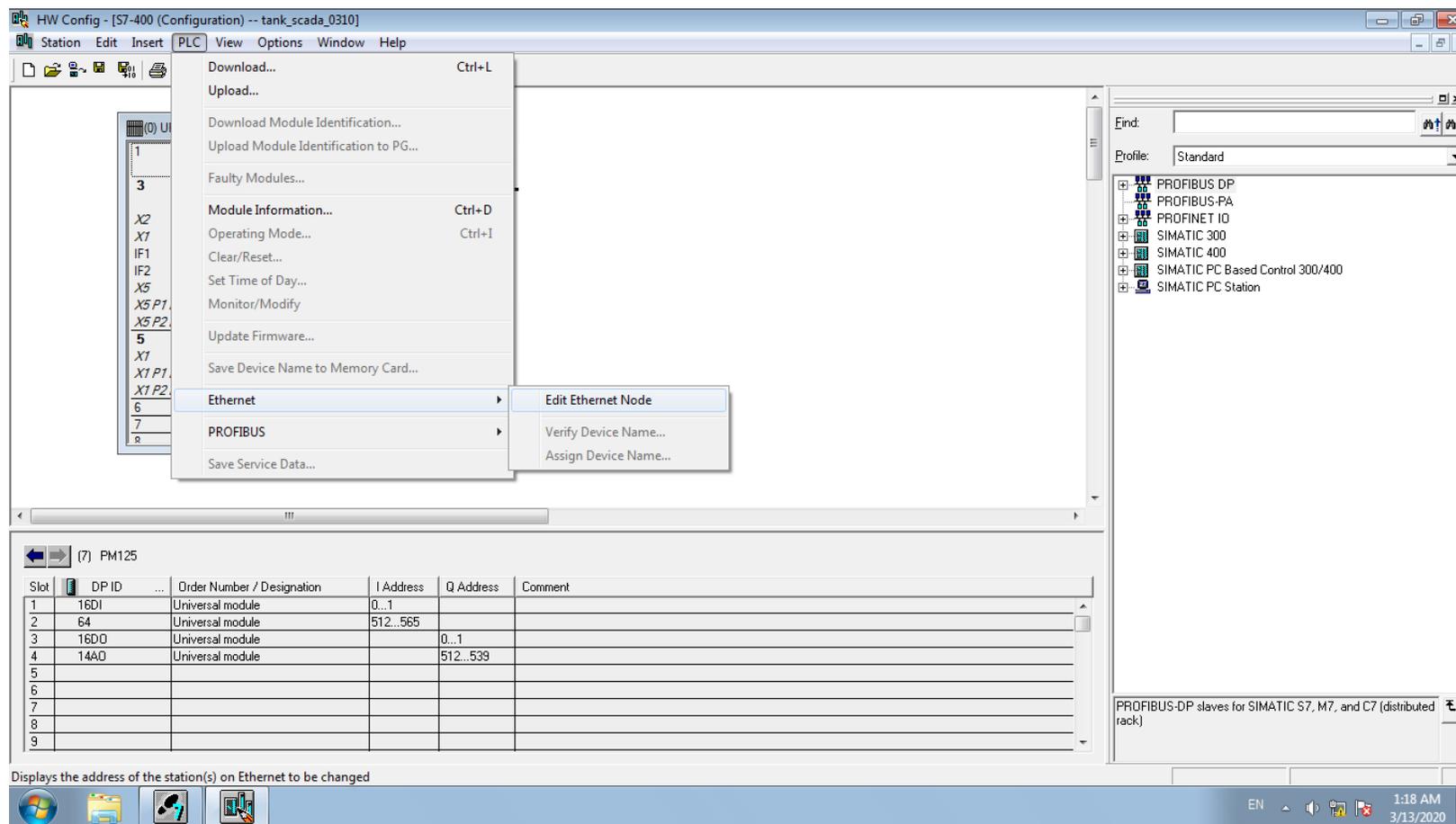
本机IP: 192.168.0.51



- 当前设置

给CP模块分配地址

- HW Config 菜单栏选择 PLC
- Ethernet > Edit Ethernet Nodes



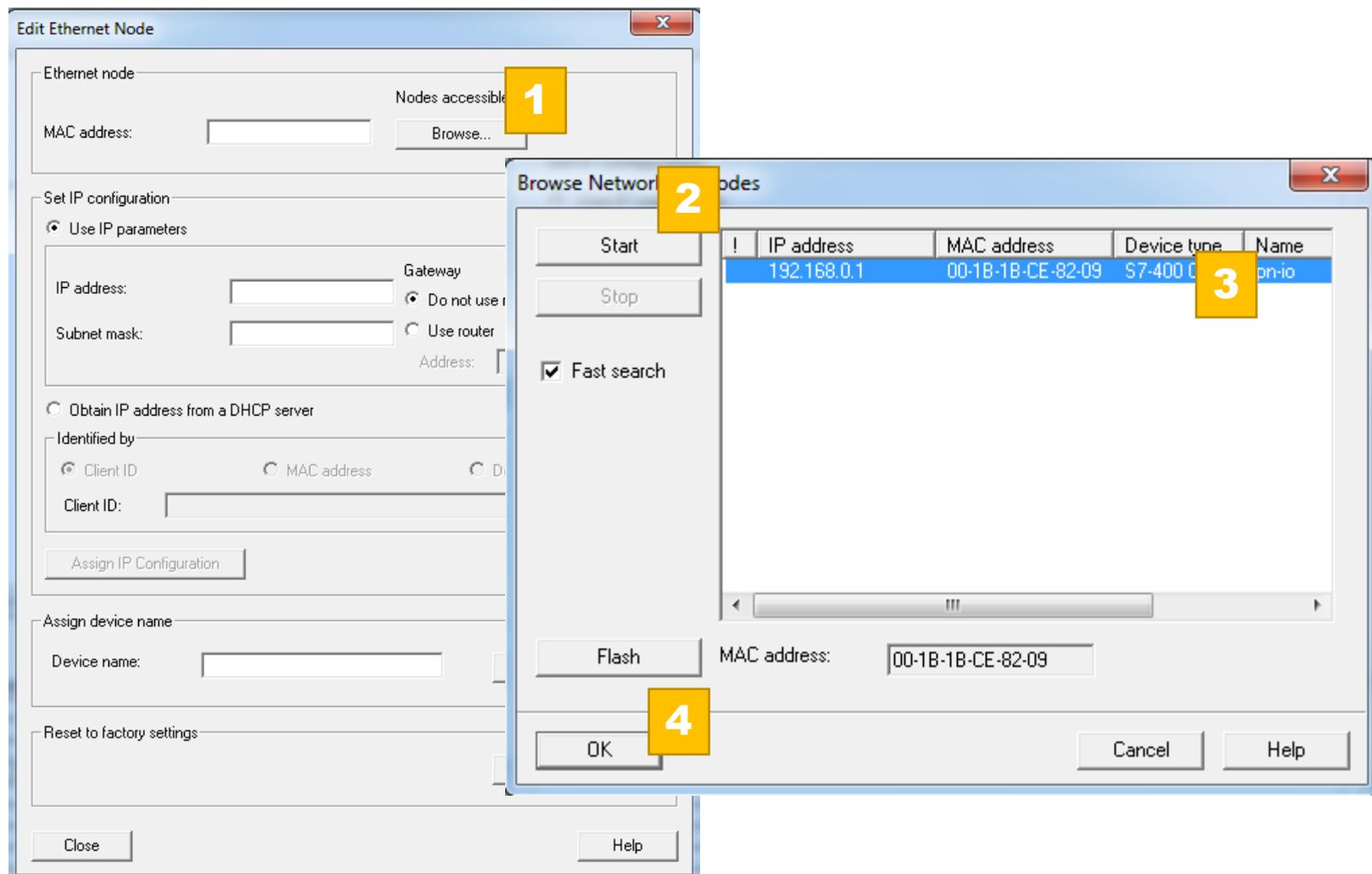
The screenshot shows the HW Config software interface. The 'PLC' menu is open, and the 'Ethernet' option is selected, which has opened a sub-menu with 'Edit Ethernet Node' highlighted. The main window displays a rack configuration with slots 1 through 9. Slot 3 is highlighted in blue. The table below shows the current rack configuration:

Slot	DP ID	Order Number / Designation	I Address	Q Address	Comment
1	16DI	Universal module	0...1		
2	64	Universal module	512...565		
3	16DO	Universal module		0...1	
4	14AO	Universal module		512...539	
5					
6					
7					
8					
9					

At the bottom of the window, a status bar reads: "Displays the address of the station(s) on Ethernet to be changed". The taskbar at the bottom shows the system time as 1:18 AM on 3/13/2020.

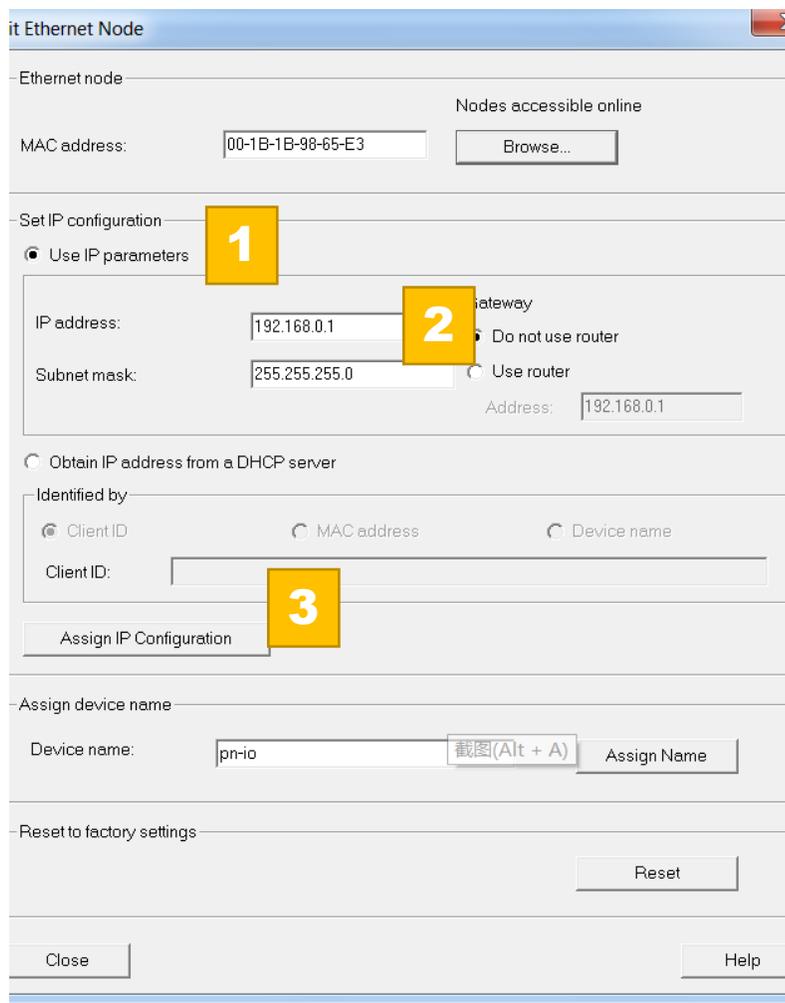
给CP模块分配地址

- 在弹出的对话框中，浏览，搜索基于MAC地址能通讯上的所有节点



给CP模块分配地址

➤ 分配IP地址及网关



Set IP configuration

Use IP parameters

IP address: 192.168.0.1

Subnet mask: 255.255.255.0

Gateway: 192.168.0.1

Do not use router

Use router

Obtain IP address from a DHCP server

Identified by

Client ID

MAC address

Device name

Client ID: pn-io

Assign IP Configuration

Assign device name

Device name: pn-io

Assign Name

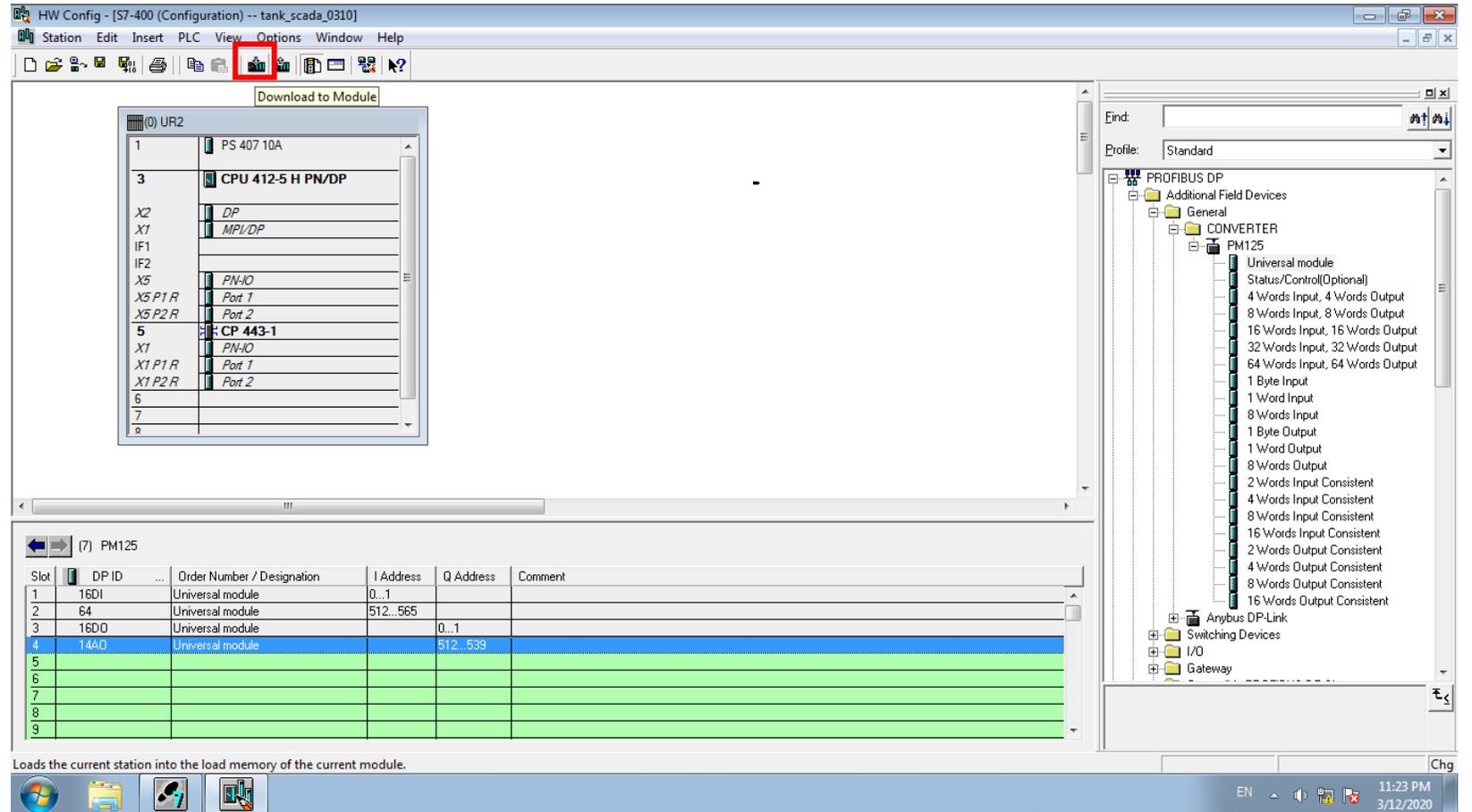
Reset to factory settings

Reset

Close Help

下载硬件配置到CPU

- 工具栏选择  , Download to Module



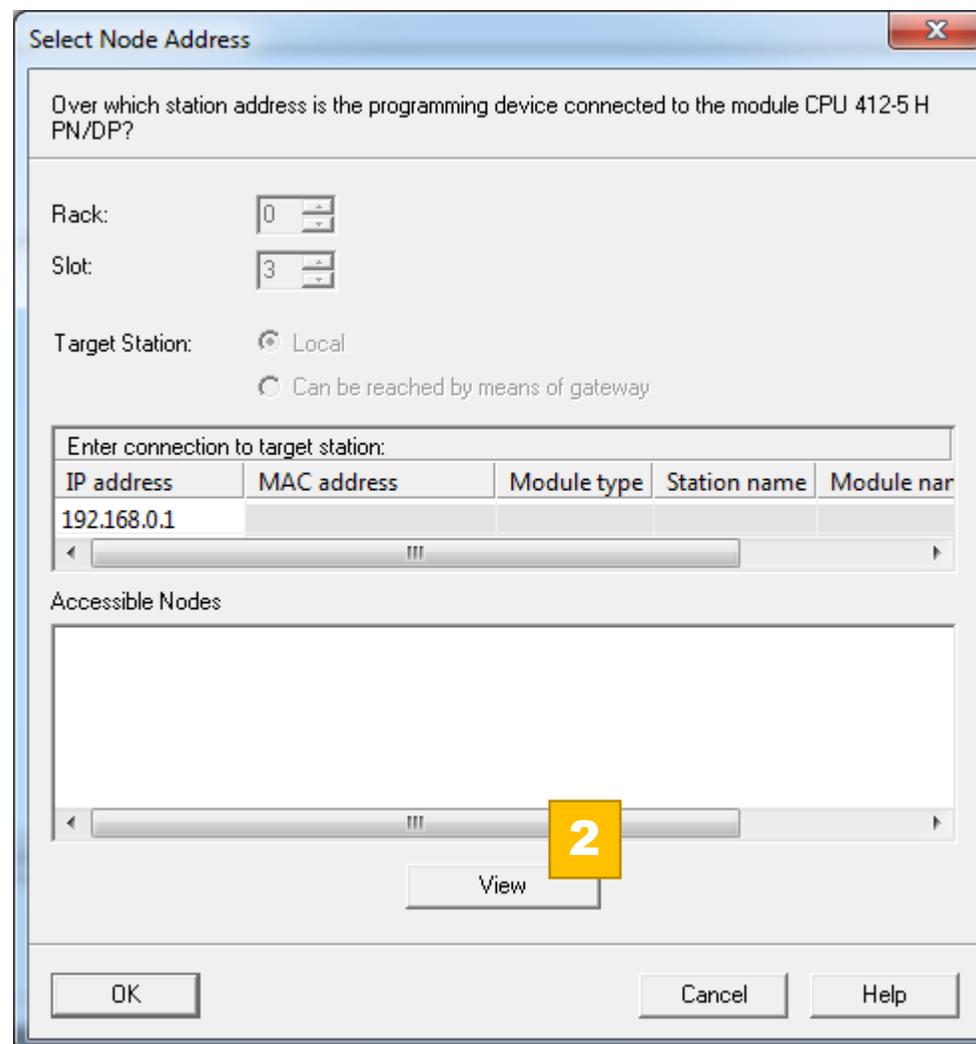
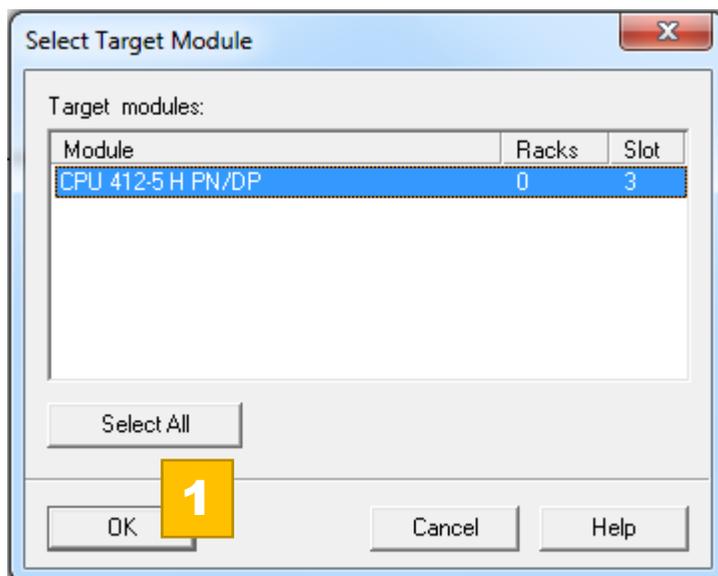
The screenshot shows the SIMATIC Manager HW Config interface. The 'Download to Module' dialog box is open, displaying the hardware rack configuration for a rack labeled '(0) UR2'. The configuration includes a power supply (PS 407 10A) in slot 1, a CPU (CPU 412-5 H PN/DP) in slot 3, and a CP module (CP 443-1) in slot 5. Below the dialog, a table shows the DP ID and address for the modules in the rack.

Slot	DP ID	Order Number / Designation	I Address	Q Address	Comment
1	16DI	Universal module	0...1		
2	64	Universal module	512...565		
3	16DO	Universal module		0...1	
4	14AO	Universal module		512...539	
5					
6					
7					
8					
9					

At the bottom of the window, a status bar indicates: "Loads the current station into the load memory of the current module." The system tray shows the time as 11:23 PM on 3/12/2020.

下载硬件配置到CPU

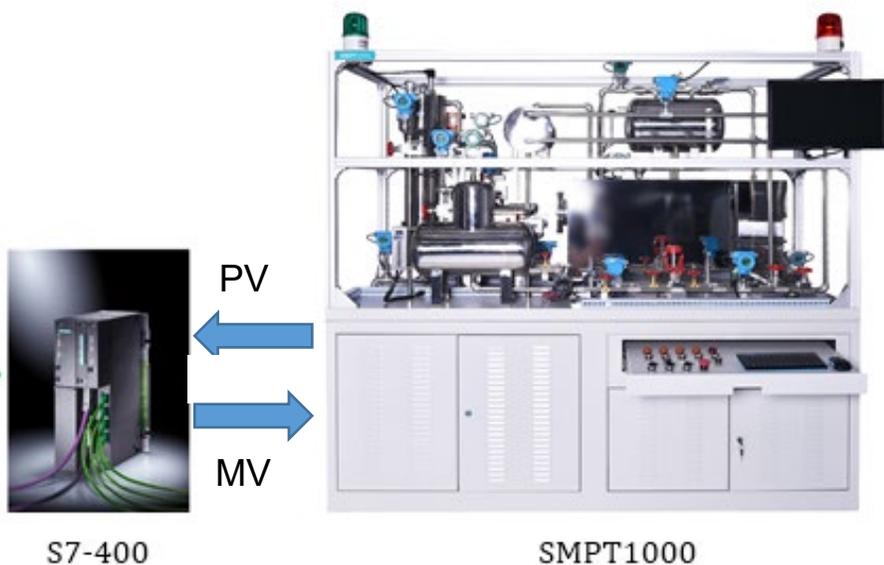
- 工具栏选择 , Download to Module



2

数据通讯

数据通讯

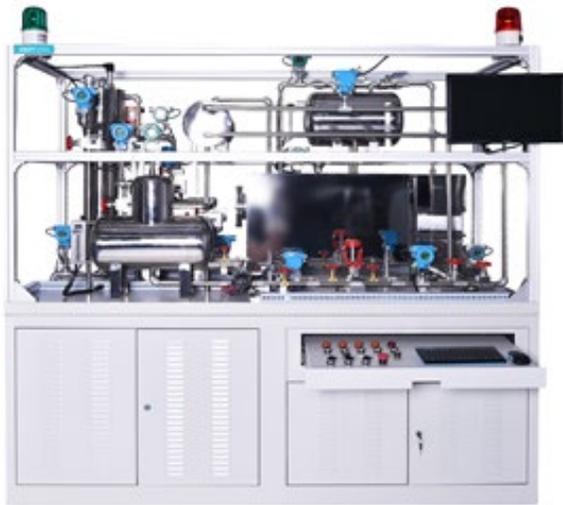
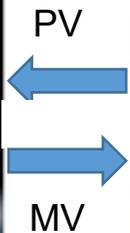


变量类型	工艺参数	变量个数
数字量输入 DI	状态指示	2
模拟量输入 AI	流量、温度、压力、液位、组分	27
数字量输出 DO	开关阀、按钮	9
模拟量输出 AO	调节阀	14

数据通讯



S7-400



SMPT1000



Launch
CEthernet.e
xe

CEthernet插件 (读写频率1s1次)

直接将仪表数据送到400站CPU里边的DB数据块 (DB1), 同时从CPU的DB数据块 (DB2) 读取控制器的输出。

Ethernet Agent

初步诊断结果:
Ethernet通讯未能正常连接 暂停
注: 1、若PLC未收到数据, 请再次点击“运行中”重新连接
2、若连接异常, 请退出该程序再重新启动

实时数据显示: From PLC by Profibus (MV)

位号	偏移地址	数据类型	数值	上限	下限
FV1105	DB2.DBW16	Word	0.00	0.00	0.00
DO1101	DB2.DBW18	Word	0.00	0.00	0.00
HV1101	DB2.DBW20	Word	0.00	0.00	0.00
HV1102	DB2.DBW22	Word	0.00	0.00	0.00
FV1201	DB2.DBW24	Word	0.00	0.00	0.00
FV1202	DB2.DBW26	Word	0.00	0.00	0.00
FV1203	DB2.DBW28	Word	0.00	0.00	0.00
XV1106	DB2.DEX0	bool	OFF	-	-
XV1101	DB2.DEX0	bool	OFF	-	-
XV1102	DB2.DEX0	bool	OFF	-	-
XV1104	DB2.DEX0	bool	OFF	-	-
XV1105	DB2.DEX0	bool	OFF	-	-
HS1101	DB2.DEX0	bool	OFF	-	-
HS1102	DB2.DEX0	bool	OFF	-	-
HS1103	DB2.DEX0	bool	OFF	-	-
HS1104	DB2.DEX1	bool	OFF	-	-

接收计数: 0
修正计数: 0
发送字节数: 30

配置

Ethernet Communication Configuration

1> Connection Settings (Client Mode):
Step1: Target PLC IP Config: 192 . 168 . 0 . 1
Step2: Detailed Config: Rack: 0 Slot: 3
Connect as: PG (Optional)
Async Mode: Callback (Optional)
Connect Test Disconnect

2> Data Transfer Settings:
Step1: Input Area (Data to PLC):
DB No.: 1 Start offset: 0
Digital Counts: 2
Analog Counts: 27
Step2: Output Area (Data from PLC):
DB No.: 2 Start offset: 0
Digital Counts: 9
Analog Counts: 14

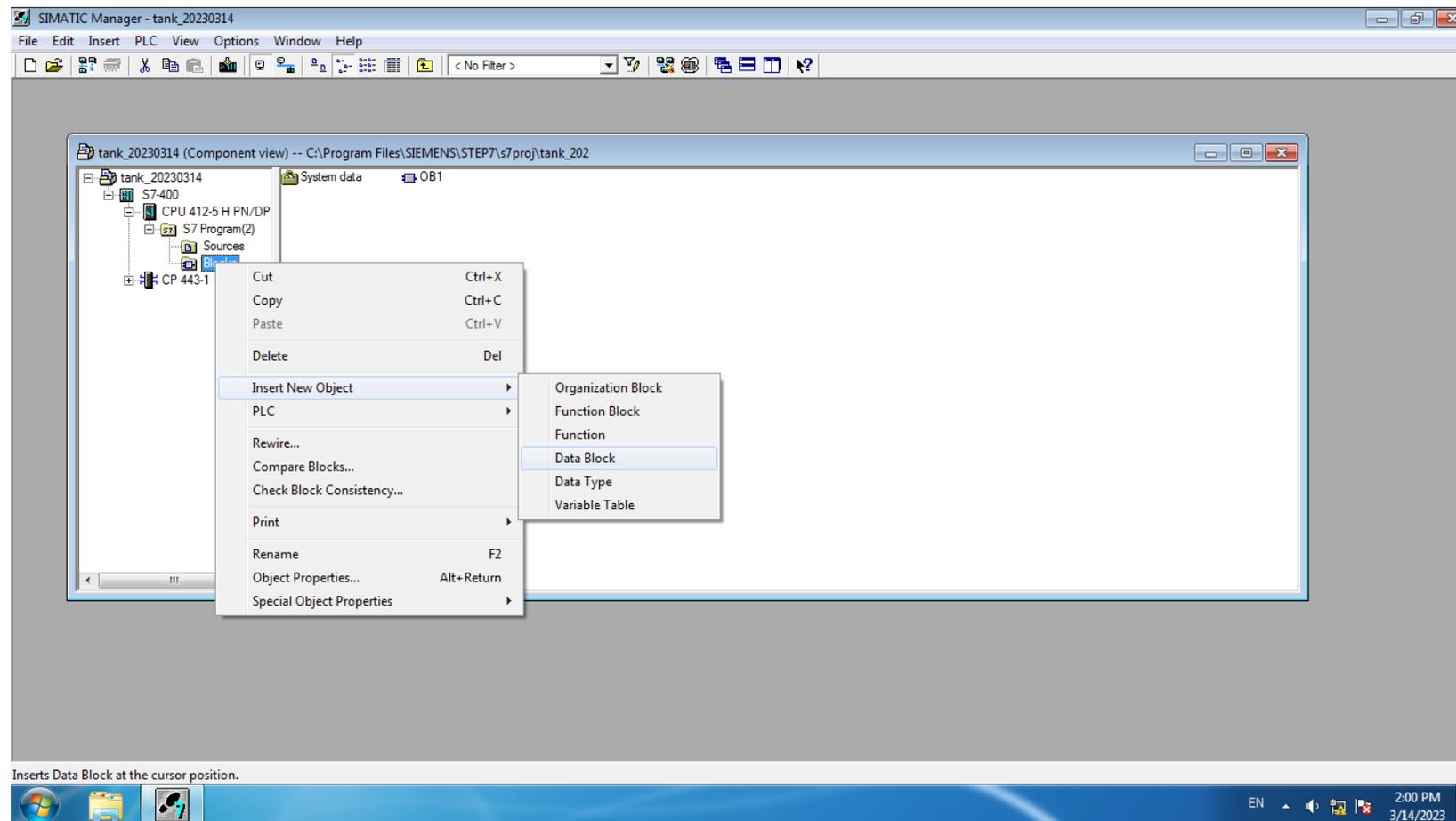
3> Data Transfer Mode:
 using 2 bytes(WORD) for Analog
 using 4 bytes(Real) for Analog

4> PLC Type:
 S7-1200 / 1500 serial
 S7-300 / 400 serial

OK Cancel

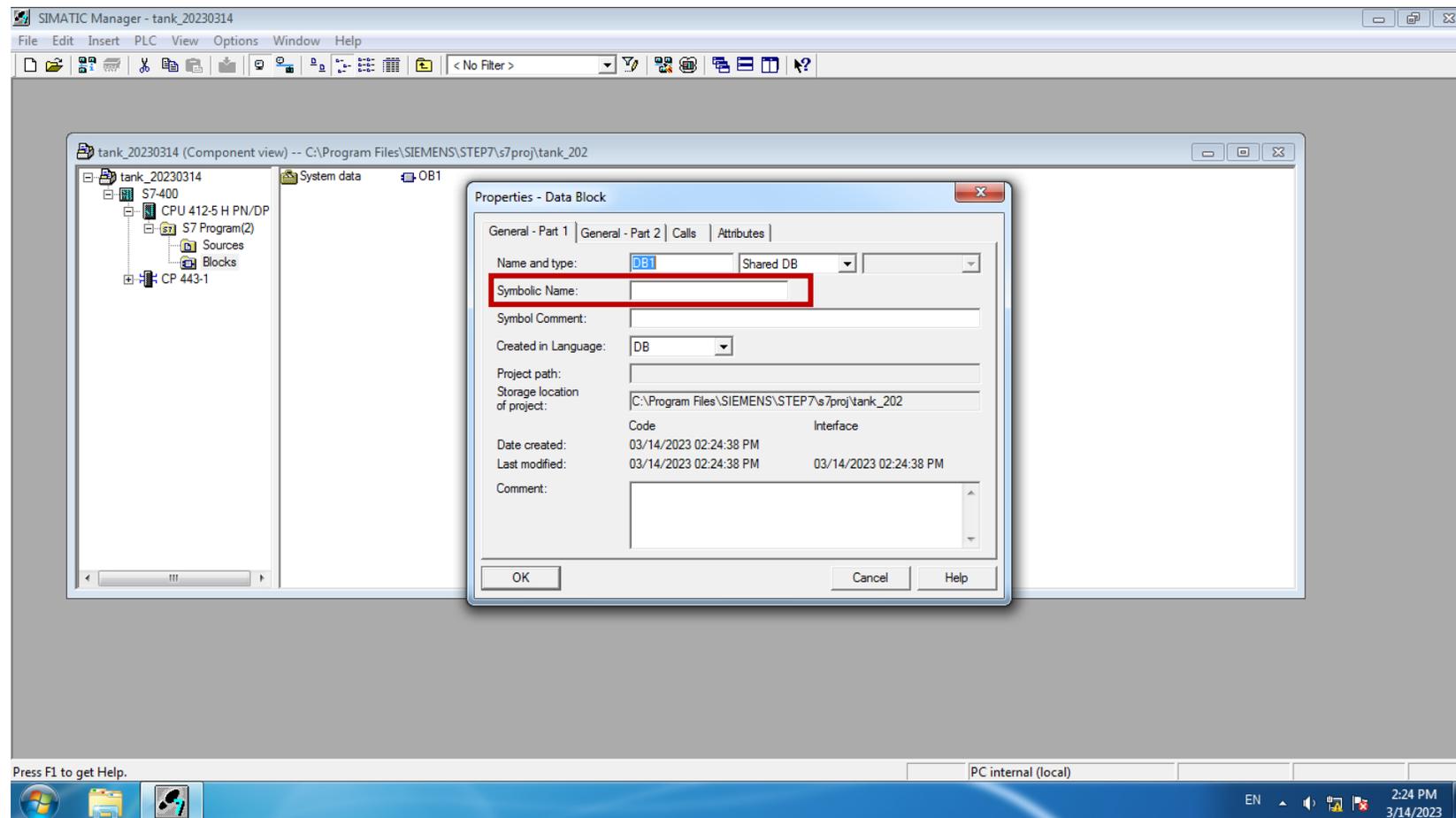
设置DB数据块

- 组件视图左侧目录中，CPU > S7 Program > Blocks，右键 Insert New Object > Data Block



设置DB数据块

- ▶ 弹出属性对话框，Symbolic Name 输入 PV_IN，点击OK



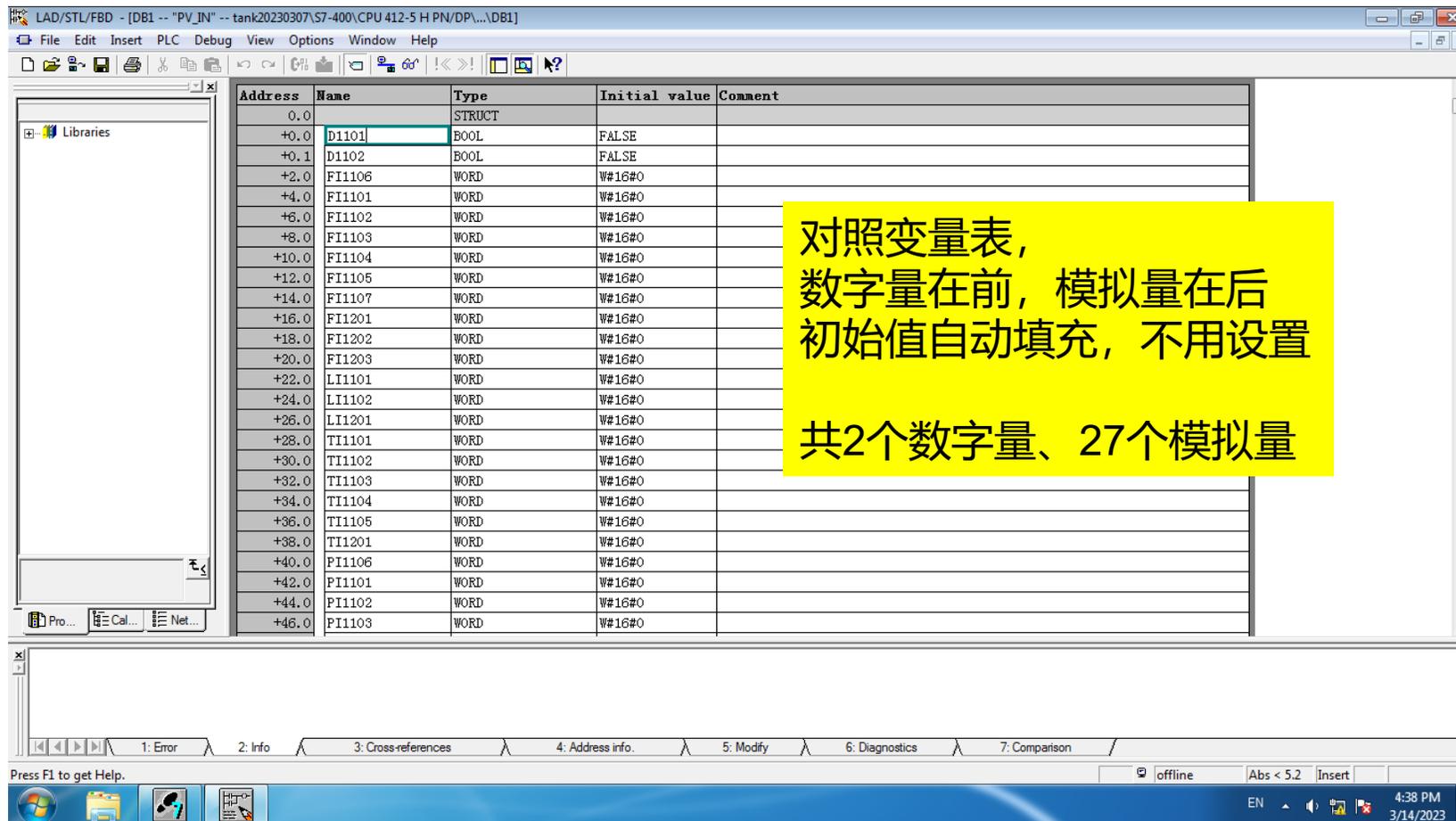
设置DB数据块

- 组件视图左侧目录中，CPU > S7 Program > Blocks，Blocks 目录下，双击DB1



设置DB数据块

- 在弹出页面中，编辑DB1数据块的变量列表



The screenshot shows the SIMATIC Manager interface with the DB1 data block configuration table. The table lists variables with their addresses, names, types, and initial values. A yellow callout box provides instructions on how to fill the initial values based on the variable type.

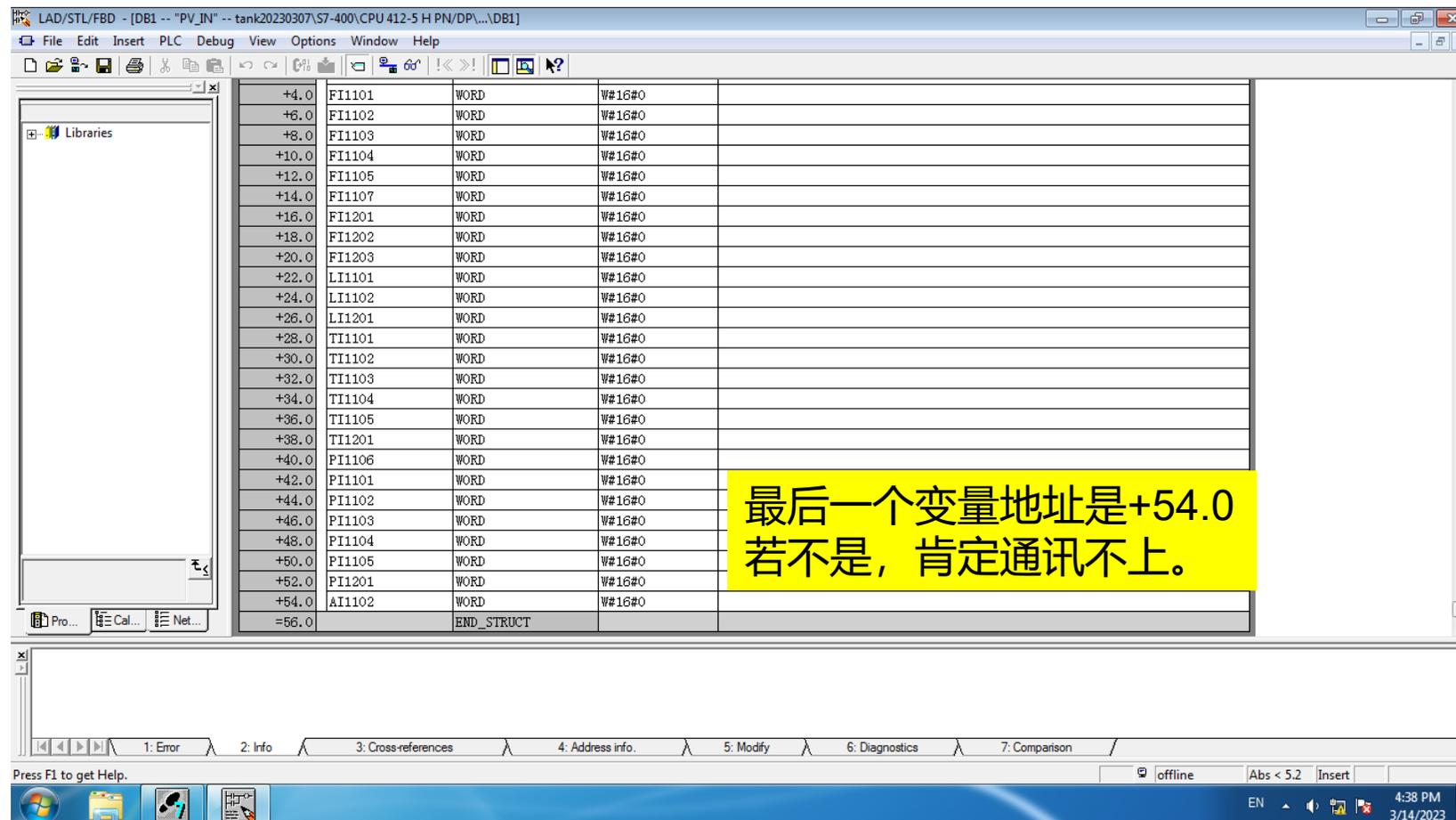
Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.1	D1101	BOOL	FALSE	
+0.1	D1102	BOOL	FALSE	
+2.0	FI1106	WORD	W#16#0	
+4.0	FI1101	WORD	W#16#0	
+6.0	FI1102	WORD	W#16#0	
+8.0	FI1103	WORD	W#16#0	
+10.0	FI1104	WORD	W#16#0	
+12.0	FI1105	WORD	W#16#0	
+14.0	FI1107	WORD	W#16#0	
+16.0	FI1201	WORD	W#16#0	
+18.0	FI1202	WORD	W#16#0	
+20.0	FI1203	WORD	W#16#0	
+22.0	LI1101	WORD	W#16#0	
+24.0	LI1102	WORD	W#16#0	
+26.0	LI1201	WORD	W#16#0	
+28.0	TI1101	WORD	W#16#0	
+30.0	TI1102	WORD	W#16#0	
+32.0	TI1103	WORD	W#16#0	
+34.0	TI1104	WORD	W#16#0	
+36.0	TI1105	WORD	W#16#0	
+38.0	TI1201	WORD	W#16#0	
+40.0	PI1106	WORD	W#16#0	
+42.0	PI1101	WORD	W#16#0	
+44.0	PI1102	WORD	W#16#0	
+46.0	PI1103	WORD	W#16#0	

对照变量表，
数字量在前，模拟量在后
初始值自动填充，不用设置

共2个数字量、27个模拟量

设置DB数据块

- 组件视图左侧目录中，CPU > S7 Program > Blocks，右键 Insert New Object > Data Block
- 弹出属性对话框，Symbolic Name 输入 PV_IN，点击OK
- Blocks目录下，双击DB1
- 在弹出页面中，编辑DB1数据块的变量列表

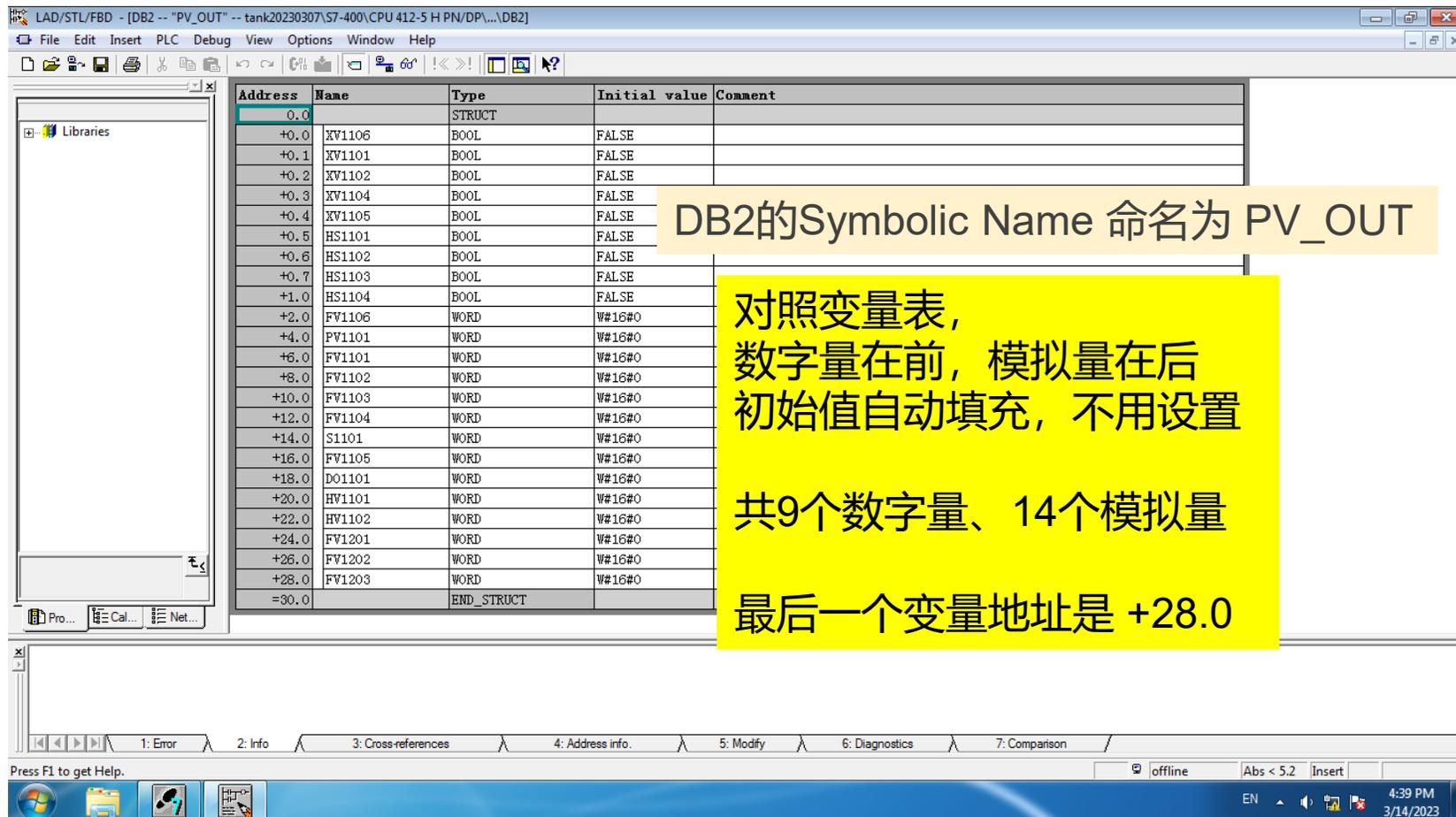


+4.0	FI1101	WORD	W#16#0
+6.0	FI1102	WORD	W#16#0
+8.0	FI1103	WORD	W#16#0
+10.0	FI1104	WORD	W#16#0
+12.0	FI1105	WORD	W#16#0
+14.0	FI1107	WORD	W#16#0
+16.0	FI1201	WORD	W#16#0
+18.0	FI1202	WORD	W#16#0
+20.0	FI1203	WORD	W#16#0
+22.0	LI1101	WORD	W#16#0
+24.0	LI1102	WORD	W#16#0
+26.0	LI1201	WORD	W#16#0
+28.0	TI1101	WORD	W#16#0
+30.0	TI1102	WORD	W#16#0
+32.0	TI1103	WORD	W#16#0
+34.0	TI1104	WORD	W#16#0
+36.0	TI1105	WORD	W#16#0
+38.0	TI1201	WORD	W#16#0
+40.0	PI1106	WORD	W#16#0
+42.0	PI1101	WORD	W#16#0
+44.0	PI1102	WORD	W#16#0
+46.0	PI1103	WORD	W#16#0
+48.0	PI1104	WORD	W#16#0
+50.0	PI1105	WORD	W#16#0
+52.0	PI1201	WORD	W#16#0
+54.0	AI1102	WORD	W#16#0
+56.0		END_STRUCT	

最后一个变量地址是+54.0
若不是，肯定通讯不上。

设置DB数据块

- 组件视图左侧目录中，CPU > S7 Program > Blocks，右键 Insert New Object > Data Block
- 弹出属性对话框，Symbolic Name 输入 PV_OUT，点击OK
- Blocks目录下，双击DB2
- 在弹出页面中，编辑DB2数据块的变量列表
- 同DB1的操作步骤，添加并编辑DB2数据块的变量列表



LAD/STL/FBD - [DB2 -- "PV_OUT" -- tank20230307\S7-400\CPU 412-5 H PN\DP\...\DB2]

Address	Name	Type	Initial value	Comment
0.0		STRUCT		
+0.0	XV1106	BOOL	FALSE	
+0.1	XV1101	BOOL	FALSE	
+0.2	XV1102	BOOL	FALSE	
+0.3	XV1104	BOOL	FALSE	
+0.4	XV1105	BOOL	FALSE	
+0.5	HS1101	BOOL	FALSE	
+0.6	HS1102	BOOL	FALSE	
+0.7	HS1103	BOOL	FALSE	
+1.0	HS1104	BOOL	FALSE	
+2.0	FV1106	WORD	W#16#0	
+4.0	PV1101	WORD	W#16#0	
+6.0	FV1101	WORD	W#16#0	
+8.0	FV1102	WORD	W#16#0	
+10.0	FV1103	WORD	W#16#0	
+12.0	FV1104	WORD	W#16#0	
+14.0	S1101	WORD	W#16#0	
+16.0	FV1105	WORD	W#16#0	
+18.0	DO1101	WORD	W#16#0	
+20.0	HV1101	WORD	W#16#0	
+22.0	HV1102	WORD	W#16#0	
+24.0	FV1201	WORD	W#16#0	
+26.0	FV1202	WORD	W#16#0	
+28.0	FV1203	WORD	W#16#0	
=30.0		END_STRUCT		

DB2的Symbolic Name 命名为 PV_OUT

对照变量表，
数字量在前，模拟量在后
初始值自动填充，不用设置

共9个数字量、14个模拟量

最后一个变量地址是 +28.0

SMTP通讯相关的设置



Ethernet Agent

初步诊断结果:

Ethernet通信自检情况良好 ● ● 暂停

注: 1、若PLC未收到数据, 请再次点击“运行中”重新连接
2、若连接异常, 请退出该程序再重新启动

实时数据显示: To PLC by Profibus(PV)

位号	偏移地址	数据类型	数值	上限	下限
FI1106	DB1.DBW2	Word	0.00	0.00	0.00
FI1101	DB1.DBW4	Word	0.00	0.00	0.00
FI1102	DB1.DBW6	Word	0.00	0.00	0.00
FI1103	DB1.DBW8	Word	0.00	0.00	0.00
FI1104	DB1.DBW10	Word	0.00	0.00	0.00
FI1105	DB1.DBW12	Word	0.00	0.00	0.00
FI1107	DB1.DBW14	Word	0.00	0.00	0.00
FI1201	DB1.DBW16	Word	0.00	0.00	0.00
FI1202	DB1.DBW18	Word	0.00	0.00	0.00
FI1203	DB1.DBW20	Word	0.00	0.00	0.00
LI1101	DB1.DBW22	Word	0.00	0.00	0.00
LI1102	DB1.DBW24	Word	0.00	0.00	0.00
LI1201	DB1.DBW26	Word	0.00	0.00	0.00
TI1101	DB1.DBW28	Word	0.00	0.00	0.00
TI1102	DB1.DBW30	Word	0.00	0.00	0.00
TI1103	DB1.DBW32	Word	0.00	0.00	0.00

From PLC by Ethernet(MV)

接收计数

修正计数

发送字节数

配置 →

Target PLC IP地址, 即是CP模块的IP地址
SMTP软件所在机器的IP地址要和CP模块的在同一网段

Ethernet Communication Configuration

1> Connection Settings (Client Mode):

Step1: Target PLC IP Config

Step2: Detailed Config
 Rack: Slot:
 Connect as: PG (Optional)
 Async Mode: Callback (Optional)

2> Data Transfer Settings:

Step1: Input Area (Data to PLC):
 DB No.: Start offset:
 Digital Counts:
 Analog Counts:

Step2: Output Area (Data from PLC):
 DB No.: Start offset:
 Digital Counts:
 Analog Counts:

3> Data Transfer Mode:
 using 2 bytes
 using 4 bytes

4> PLC Type:

Connect Test Disconnect

点击测试一下, 是否通讯成功

OK Cancel

3

PCS 7工程归档

PCS 7工程归档

先关闭当前工程的所有文档，
再进行归档

