

操作指南 • 11月 2014/年

在SCOUT TIA中组态SIMOTION I Device通讯

I Device 、 SIMOTION

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1 概述

从 SIMOTION SCOUT V4.4 版本开始，可以通过博途软件进行 SIMOTION 的组态，通过此软件可方便地进行 SIMOTION 与其他控制器的通信。本文以西门子的新一代 PLC S7-1500 做为 IO-Controller，而 SIMOTION 做为 I Device，实现两者的 RT 通讯为例，详细介绍了通讯的实现方法。

2 SIMOTION 与 S7-1500 之间通过 I device 进行 RT 通讯的配置

2.1 硬件列表

- 1、SIMOTION D445-2PN/DP V4.4
- 2、S7-1516 V1.5

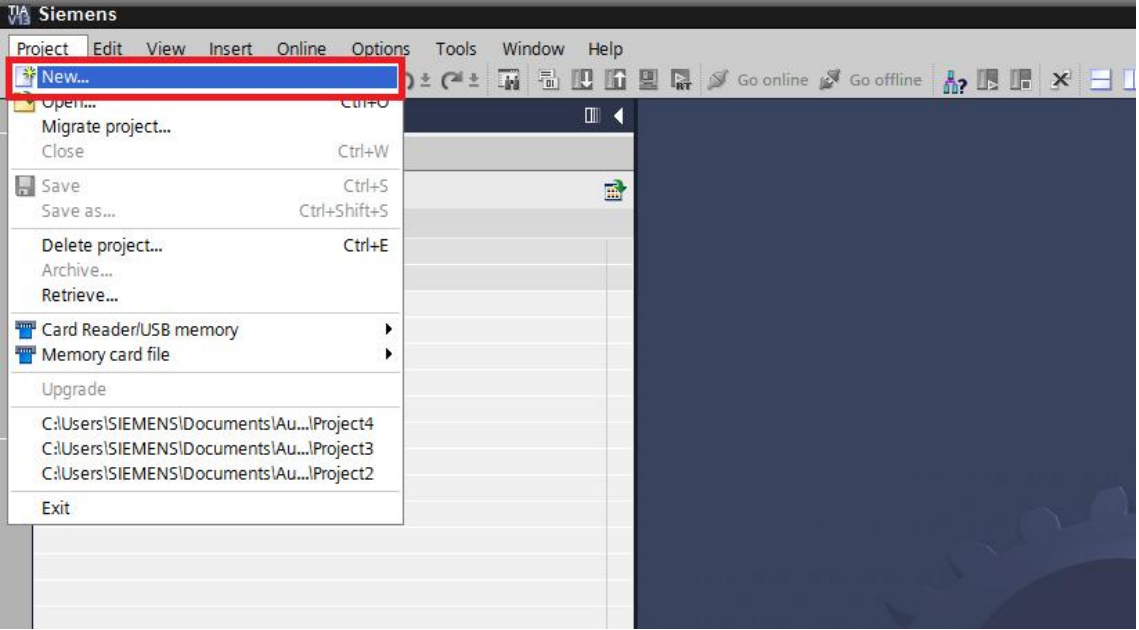
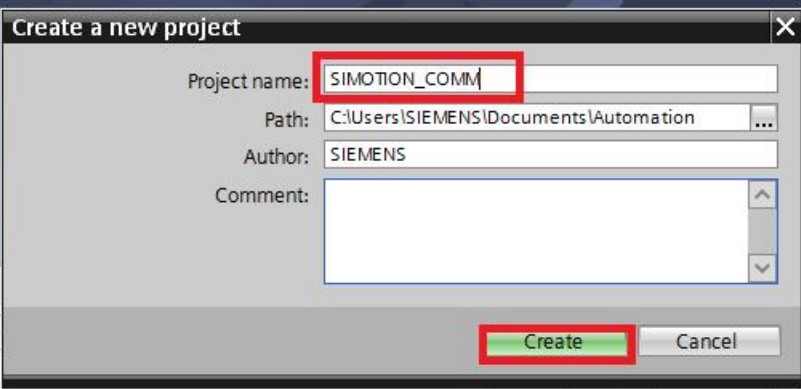
2.2 软件列表


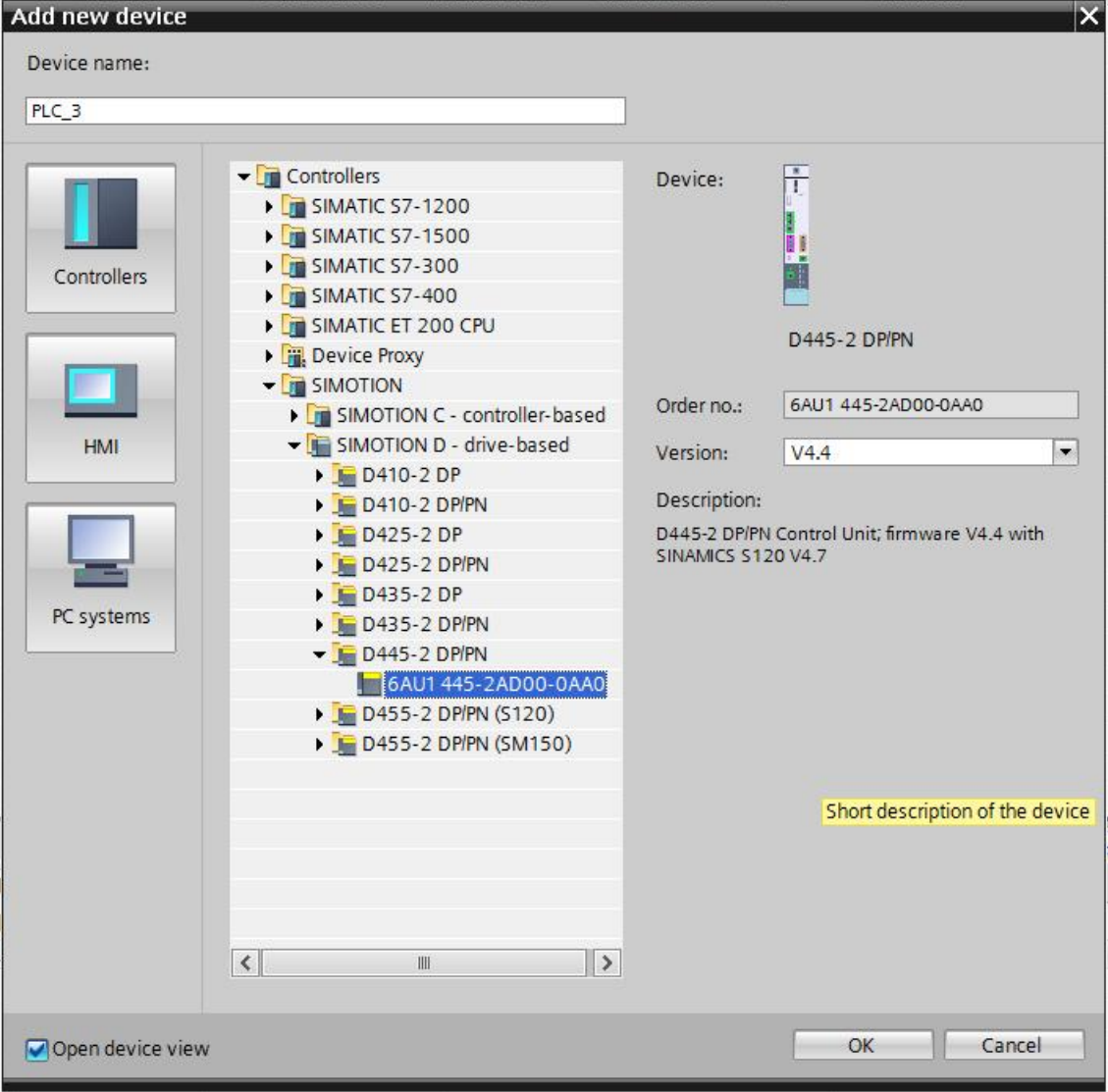

- 1、TIA PORTAL V13 Update4
- 2、SIMOTION SCOUT TIA V4.4 Update2

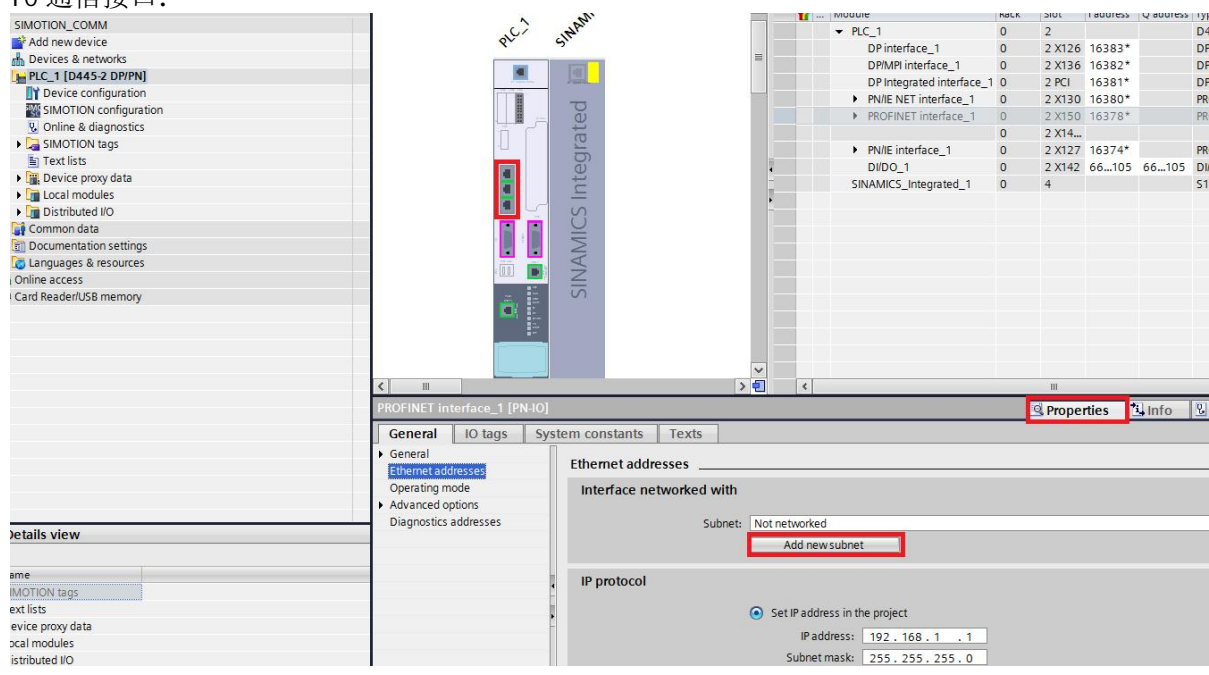
2.3 基本配置步骤

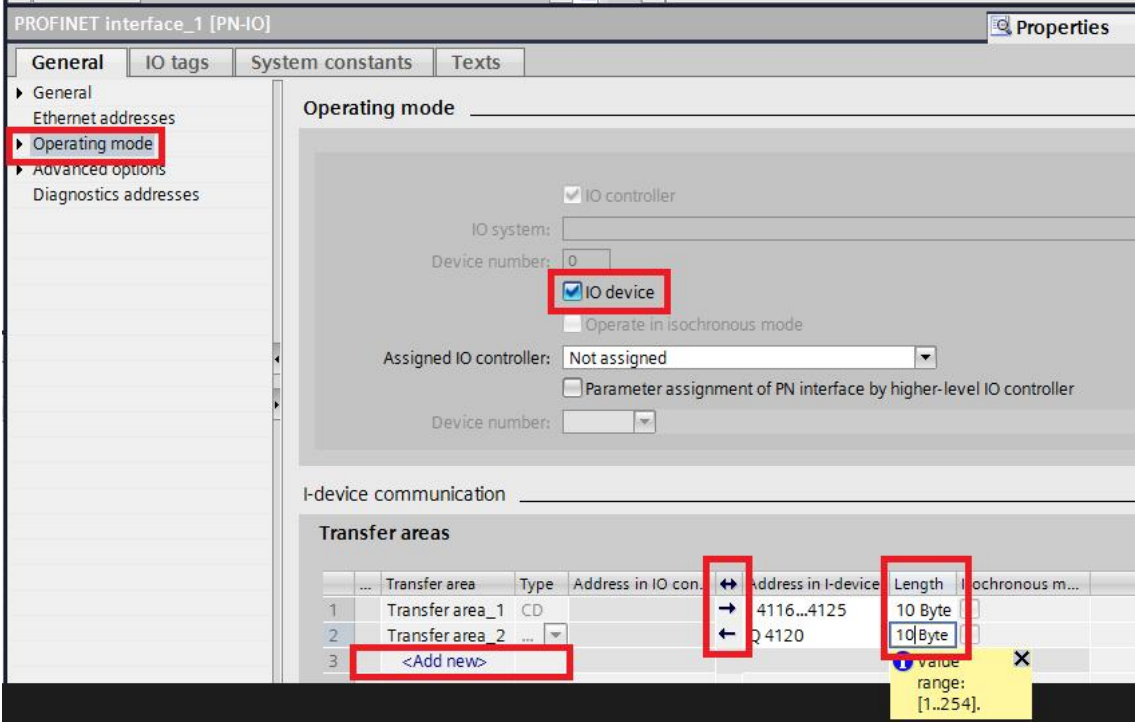
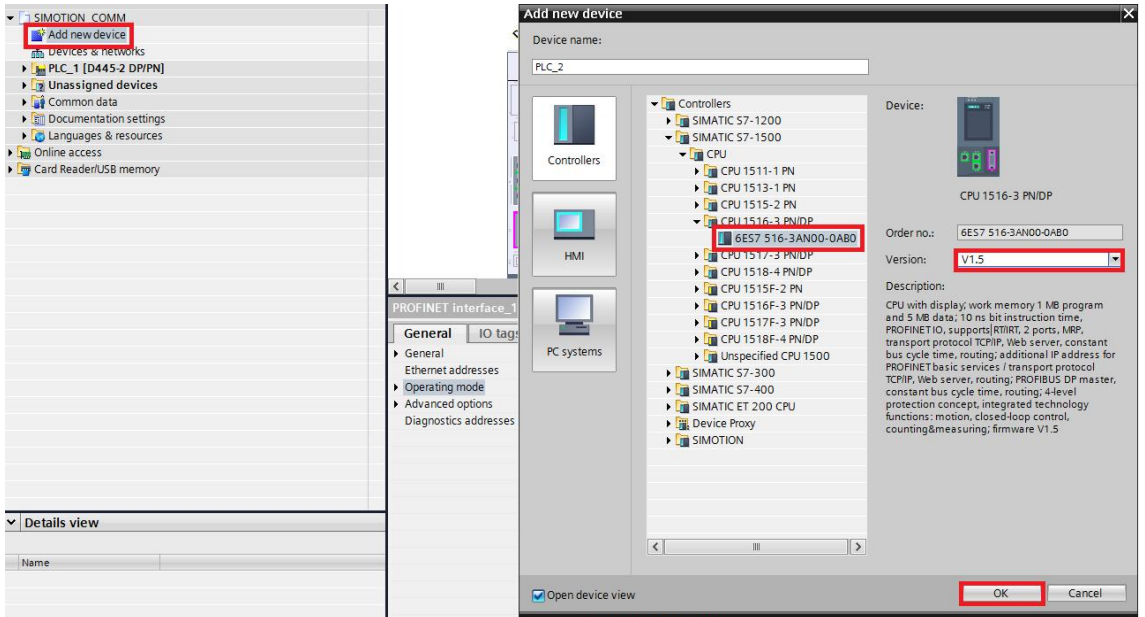
- 1、创建博途项目，并且配置 SIMOTION 为 I device
- 2、增加 S7-1500 CPU 并且在网络视图下进行通信的组态和配置
- 3、测试连接

配置步骤如表 1-1 所示：

序号	图示与说明
1.	<p>新建一个博途项目：</p>  <p>The screenshot shows the Siemens software interface with the 'Project' menu open. The 'New...' option is highlighted with a red box. The menu items include: Open..., Migrate project..., Close, Save, Save as..., Delete project..., Archive..., Retrieve..., Card Reader/USB memory, Memory card file, Upgrade, and a list of existing projects: C:\Users\SIEMENS\Documents\Au...Project4, C:\Users\SIEMENS\Documents\Au...Project3, and C:\Users\SIEMENS\Documents\Au...Project2. The 'Exit' option is at the bottom.</p>
2.	<p>设置项目名称并点击“ Create” 按钮：</p>  <p>The screenshot shows the 'Create a new project' dialog box. The 'Project name' field contains 'SIMOTION_COMM' and is highlighted with a red box. The 'Path' field contains 'C:\Users\SIEMENS\Documents\Automation'. The 'Author' field contains 'SIEMENS'. The 'Comment' field is empty. The 'Create' button is highlighted with a red box.</p>

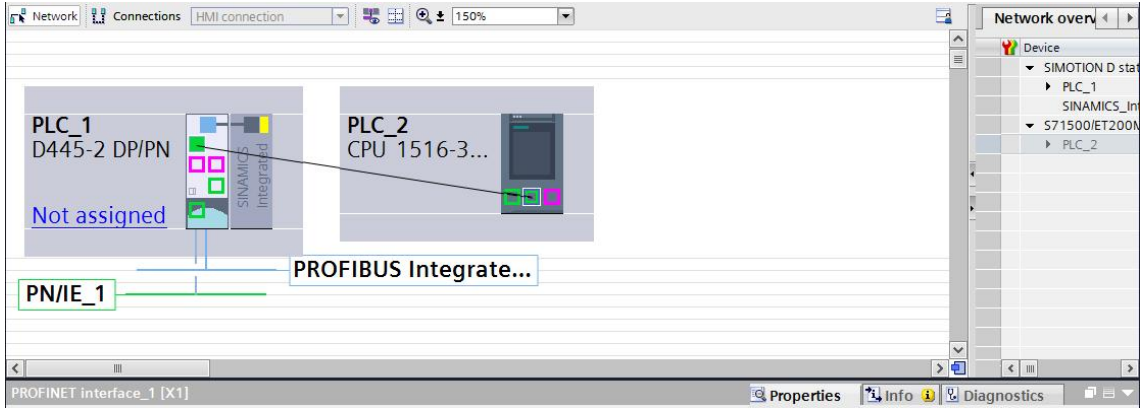
序号	图示与说明
3.	<p>通过  Add new device 按钮添加 SIMOTION 到项目中：</p>  <p>Add new device</p> <p>Device name: <input type="text" value="PLC_3"/></p> <p>Controllers</p> <p>HMI</p> <p>PC systems</p> <ul style="list-style-type: none">Controllers<ul style="list-style-type: none">SIMATIC S7-1200SIMATIC S7-1500SIMATIC S7-300SIMATIC S7-400SIMATIC ET 200 CPUDevice ProxySIMOTION<ul style="list-style-type: none">SIMOTION C - controller-basedSIMOTION D - drive-based<ul style="list-style-type: none">D410-2 DPD410-2 DP/PND425-2 DPD425-2 DP/PND435-2 DPD435-2 DP/PND445-2 DP/PN<ul style="list-style-type: none">6AU1 445-2AD00-0AA0D455-2 DP/PN (S120)D455-2 DP/PN (SM150) <p>Device:  D445-2 DP/PN</p> <p>Order no.: <input type="text" value="6AU1 445-2AD00-0AA0"/></p> <p>Version: <input type="text" value="V4.4"/></p> <p>Description: D445-2 DP/PN Control Unit; firmware V4.4 with SINAMICS S120 V4.7</p> <p>Short description of the device</p> <p><input checked="" type="checkbox"/> Open device view</p> <p>OK Cancel</p>

序号	图示与说明																																																																		
4.	<p>在 SIMOTION 的硬件组态中配置 X150 接口的网络，点击“ Add new subnet” 添加一条网络到 PN IO 通信接口：</p>  <p>The screenshot displays the SIMATIC Manager interface. On the left, the 'SIMOTION_COMM' project tree shows the hardware configuration for 'PLC_1 [D445-2 DP/PN]'. The 'X150' interface is highlighted with a red box. In the center, a 3D rack view shows the physical hardware with the X150 interface also highlighted. On the right, a table lists the modules and their addresses:</p> <table border="1" data-bbox="1037 436 1500 806"> <thead> <tr> <th>MODULE</th> <th>RESK</th> <th>slot</th> <th>IP address</th> <th>Q address</th> <th>IP</th> </tr> </thead> <tbody> <tr> <td>PLC_1</td> <td>0</td> <td>2</td> <td></td> <td></td> <td>D4</td> </tr> <tr> <td>DP interface_1</td> <td>0</td> <td>2</td> <td>X126</td> <td>16383*</td> <td>DF</td> </tr> <tr> <td>DP/PMPI interface_1</td> <td>0</td> <td>2</td> <td>X136</td> <td>16382*</td> <td>DF</td> </tr> <tr> <td>DP Integrated interface_1</td> <td>0</td> <td>2</td> <td>PCI</td> <td>16381*</td> <td>DF</td> </tr> <tr> <td>PN/IE NET interface_1</td> <td>0</td> <td>2</td> <td>X130</td> <td>16380*</td> <td>PR</td> </tr> <tr> <td>PROFINET interface_1</td> <td>0</td> <td>2</td> <td>X150</td> <td>16378*</td> <td>PR</td> </tr> <tr> <td></td> <td>0</td> <td>2</td> <td>X14...</td> <td></td> <td></td> </tr> <tr> <td>PN/IE interface_1</td> <td>0</td> <td>2</td> <td>X127</td> <td>16374*</td> <td>PR</td> </tr> <tr> <td>D/DO_1</td> <td>0</td> <td>2</td> <td>X142</td> <td>66...105</td> <td>DI</td> </tr> <tr> <td>SINAMICS_Integrated_1</td> <td>0</td> <td>4</td> <td></td> <td></td> <td>S1</td> </tr> </tbody> </table> <p>Below the table, the 'PROFINET interface_1 [PN-IO]' properties window is open, showing the 'Add new subnet' button highlighted in red.</p>	MODULE	RESK	slot	IP address	Q address	IP	PLC_1	0	2			D4	DP interface_1	0	2	X126	16383*	DF	DP/PMPI interface_1	0	2	X136	16382*	DF	DP Integrated interface_1	0	2	PCI	16381*	DF	PN/IE NET interface_1	0	2	X130	16380*	PR	PROFINET interface_1	0	2	X150	16378*	PR		0	2	X14...			PN/IE interface_1	0	2	X127	16374*	PR	D/DO_1	0	2	X142	66...105	DI	SINAMICS_Integrated_1	0	4			S1
MODULE	RESK	slot	IP address	Q address	IP																																																														
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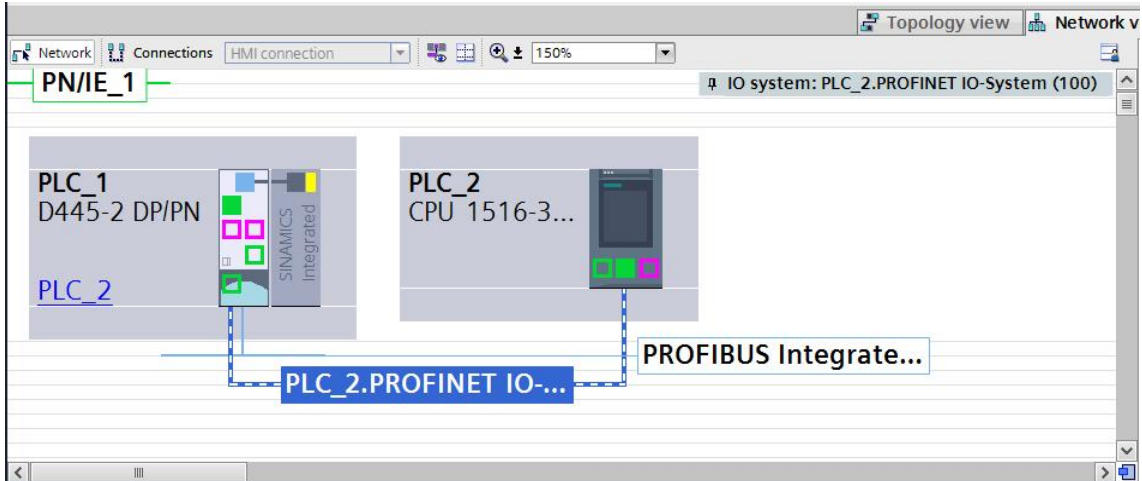
序号	图示与说明																								
5.	<p>勾选“ IO device” 配置接口为“ I device” 模式，并且通过“ Add new” 配置 10 个字节输入和 10 个字节的输出：</p>  <p>The screenshot shows the 'PROFINET interface_1 [PN-IO]' configuration window. The 'Operating mode' tab is active, and the 'IO device' checkbox is checked. Below, the 'Transfer areas' table is visible:</p> <table border="1" data-bbox="614 1030 1380 1153"> <thead> <tr> <th>Transfer area</th> <th>Type</th> <th>Address in IO con.</th> <th>Address in I-device</th> <th>Length</th> <th>ochronous m...</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Transfer area_1</td> <td>CD</td> <td>→ 4116...4125</td> <td>10 Byte</td> <td></td> </tr> <tr> <td>2</td> <td>Transfer area_2</td> <td>...</td> <td>← Q 4120</td> <td>10 Byte</td> <td></td> </tr> <tr> <td>3</td> <td><Add new></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Transfer area	Type	Address in IO con.	Address in I-device	Length	ochronous m...	1	Transfer area_1	CD	→ 4116...4125	10 Byte		2	Transfer area_2	...	← Q 4120	10 Byte		3	<Add new>				
Transfer area	Type	Address in IO con.	Address in I-device	Length	ochronous m...																				
1	Transfer area_1	CD	→ 4116...4125	10 Byte																					
2	Transfer area_2	...	← Q 4120	10 Byte																					
3	<Add new>																								
6.	<p>增加 CPU S7-1500 到项目中，本例使用的 S7-1516 v1.5:</p>  <p>The screenshot shows the 'Add new device' dialog box. The 'CPU 1516-3 PN/DP' is selected, and the version is set to 'V1.5'.</p>																								

序号	图示与说明
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7. 在网络视图进行通信组态, 即从 PLC 接口 x1 连接到 SIMOTION x150 接口:



结果如下图所示:



注意: 在配置过程中需要仔细的核对 SIMOTION 和 PLC 使用的 PN 接口 (SIMOTION 有多个以太网口) ! 并且需要仔细核对使用接口的 IP 地址!

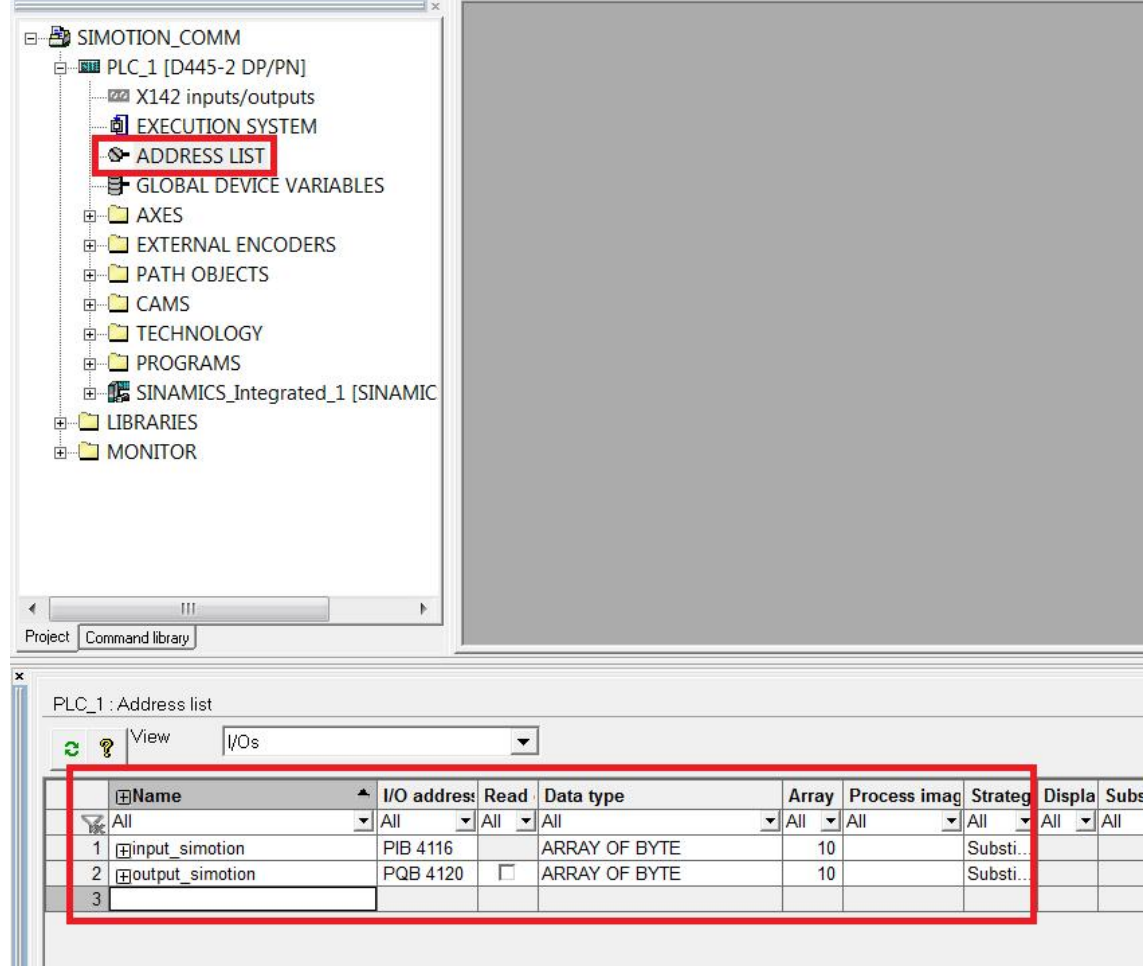
序号	图示与说明
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8. 配置后的通信结果如下图所示：

Transfer area	Type	Address in IO con...	Address in I-device	Length	isochronous m...
1	CD	Q 0...9	→ I 4116...4125	10 Byte	
2	CD	I 0...9	← Q 4120...4129	10 Byte	
3	<Add new>				

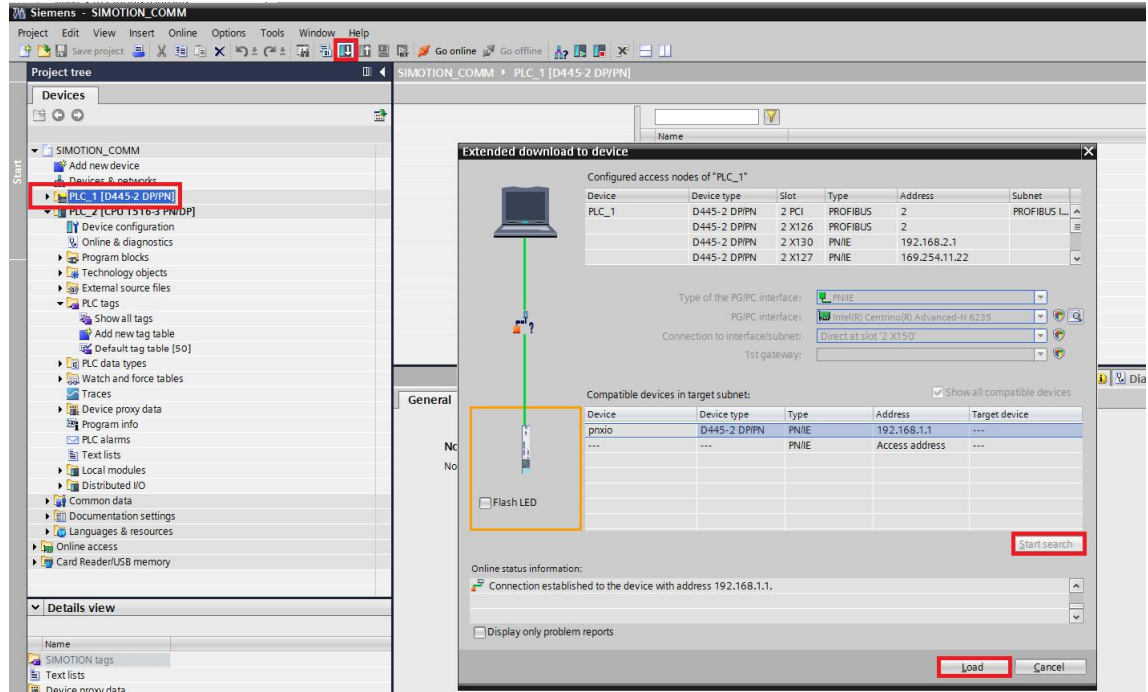
9. 打开 SCOUT TIA 软件：

点击“ OK” 按钮确认打开。

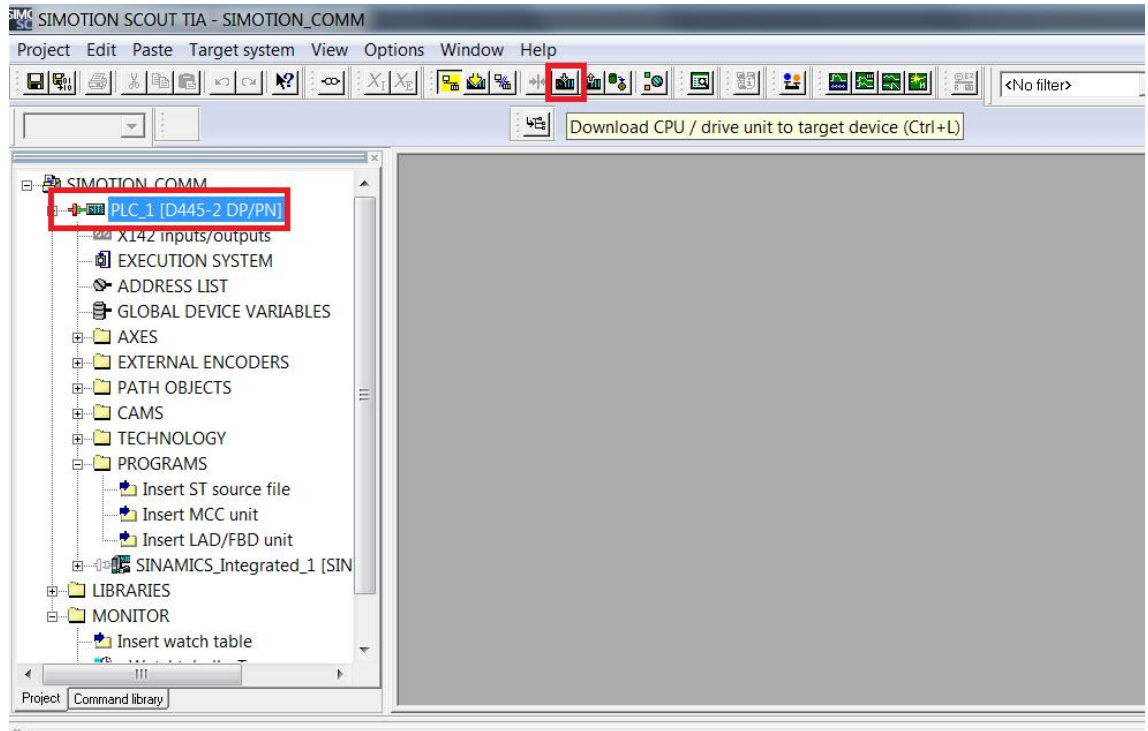
序号	图示与说明																																													
10.	<p>在软件中配置 I/O 地址，并保存编译：</p>  <p>The screenshot shows the SIMATIC Manager interface. The project tree on the left highlights the 'ADDRESS LIST' folder under 'EXECUTION SYSTEM'. The main window displays the 'PLC_1 : Address list' configuration table.</p> <table border="1" data-bbox="319 1164 1436 1321"> <thead> <tr> <th>Name</th> <th>I/O address</th> <th>Read</th> <th>Data type</th> <th>Array</th> <th>Process imag</th> <th>Strateg</th> <th>Displa</th> <th>Subs</th> </tr> </thead> <tbody> <tr> <td>All</td> <td>All</td> <td>All</td> <td>All</td> <td>All</td> <td>All</td> <td>All</td> <td>All</td> <td>All</td> </tr> <tr> <td>1 input_simotion</td> <td>PIB 4116</td> <td></td> <td>ARRAY OF BYTE</td> <td>10</td> <td></td> <td>Substi...</td> <td></td> <td></td> </tr> <tr> <td>2 output_simotion</td> <td>PQB 4120</td> <td><input type="checkbox"/></td> <td>ARRAY OF BYTE</td> <td>10</td> <td></td> <td>Substi...</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Name	I/O address	Read	Data type	Array	Process imag	Strateg	Displa	Subs	All	All	All	All	All	All	All	All	All	1 input_simotion	PIB 4116		ARRAY OF BYTE	10		Substi...			2 output_simotion	PQB 4120	<input type="checkbox"/>	ARRAY OF BYTE	10		Substi...			3								
Name	I/O address	Read	Data type	Array	Process imag	Strateg	Displa	Subs																																						
All	All	All	All	All	All	All	All	All																																						
1 input_simotion	PIB 4116		ARRAY OF BYTE	10		Substi...																																								
2 output_simotion	PQB 4120	<input type="checkbox"/>	ARRAY OF BYTE	10		Substi...																																								
3																																														

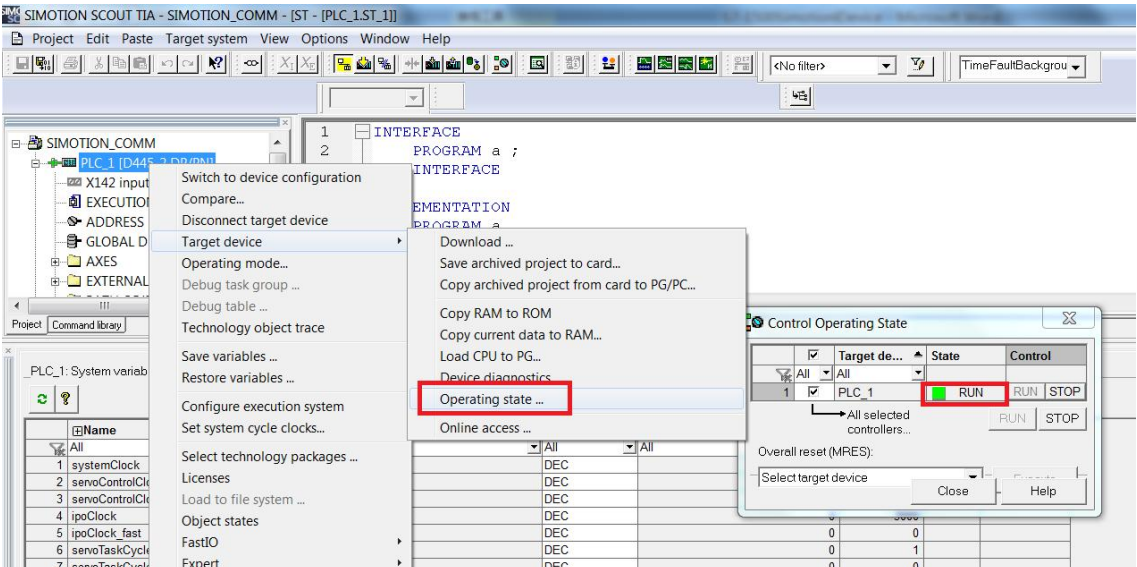
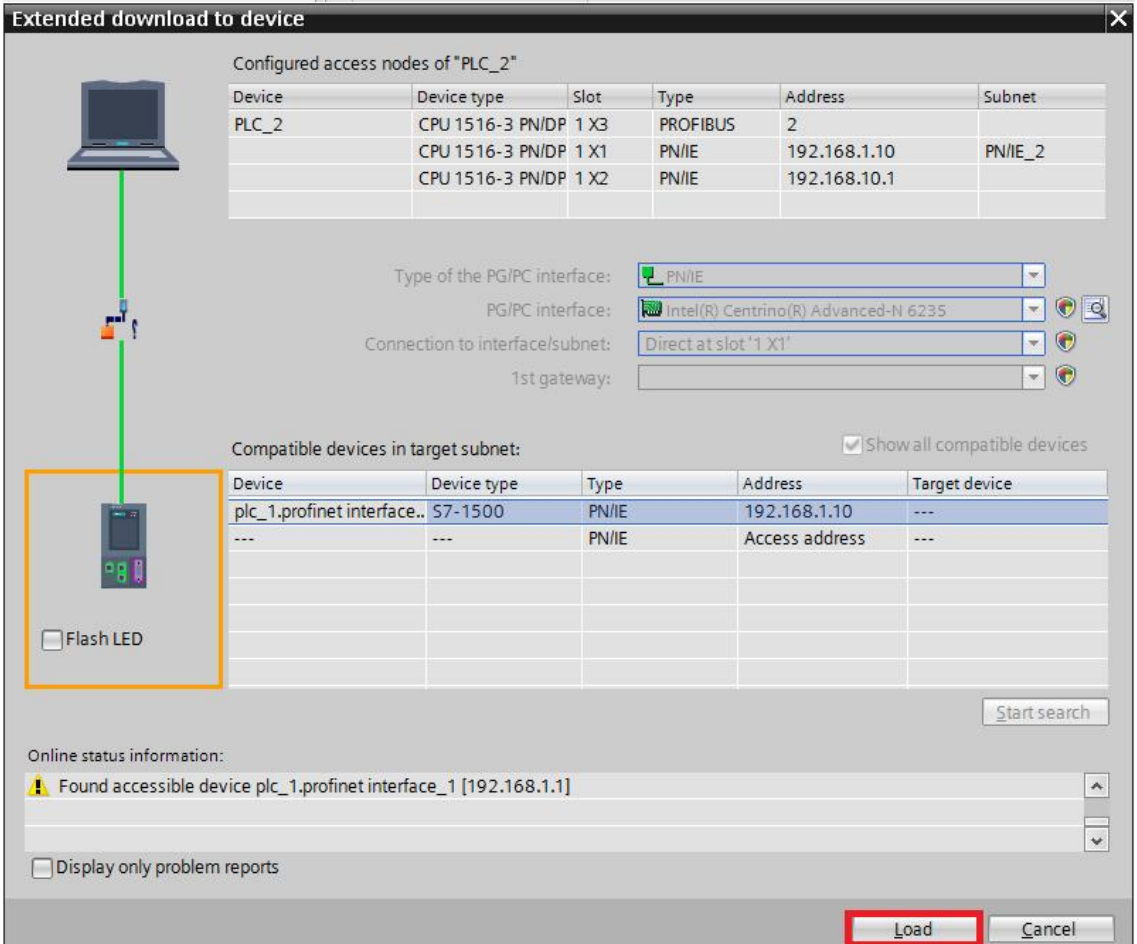
序号 图示与说明

11. 下载程序到 SIMOTION 中:



在 SCOUT TIA 中下载 SIMOTION 程序（在测试阶段需要在 SIMOTION 的执行系统中系统中断任务中分配空程序，用于确保 SIMOTION 的运行）：



序号	图示与说明																																							
12.	<p>切换 SIMOTION 到运行状态:</p>  <p>The screenshot shows the SIMATIC Manager interface. A context menu is open over the 'PLC_1' object in the project tree. The 'Operating state...' option is highlighted with a red box. In the foreground, the 'Control Operating State' dialog box is displayed, showing a table with columns for 'Target device', 'State', and 'Control'. The 'State' column for 'PLC_1' is set to 'RUN', which is also highlighted with a red box.</p> <table border="1" data-bbox="1037 705 1404 907"> <thead> <tr> <th>Target de...</th> <th>State</th> <th>Control</th> </tr> </thead> <tbody> <tr> <td>1 All</td> <td>All</td> <td></td> </tr> <tr> <td>1 PLC_1</td> <td>RUN</td> <td>RUN STOP</td> </tr> </tbody> </table>	Target de...	State	Control	1 All	All		1 PLC_1	RUN	RUN STOP																														
Target de...	State	Control																																						
1 All	All																																							
1 PLC_1	RUN	RUN STOP																																						
13.	<p>下载程序到 S7-1500 中，并运行 S7-1500 PLC :</p>  <p>The screenshot shows the 'Extended download to device' dialog box. It displays the configured access nodes for 'PLC_2' and the search results for compatible devices in the target subnet. The 'Load' button at the bottom is highlighted with a red box.</p> <table border="1" data-bbox="518 1086 1404 1220"> <thead> <tr> <th>Device</th> <th>Device type</th> <th>Slot</th> <th>Type</th> <th>Address</th> <th>Subnet</th> </tr> </thead> <tbody> <tr> <td>PLC_2</td> <td>CPU 1516-3 PN/DP</td> <td>1 X3</td> <td>PROFIBUS</td> <td>2</td> <td></td> </tr> <tr> <td></td> <td>CPU 1516-3 PN/DP</td> <td>1 X1</td> <td>PN/IE</td> <td>192.168.1.10</td> <td>PN/IE_2</td> </tr> <tr> <td></td> <td>CPU 1516-3 PN/DP</td> <td>1 X2</td> <td>PN/IE</td> <td>192.168.10.1</td> <td></td> </tr> </tbody> </table> <table border="1" data-bbox="518 1467 1404 1691"> <thead> <tr> <th>Device</th> <th>Device type</th> <th>Type</th> <th>Address</th> <th>Target device</th> </tr> </thead> <tbody> <tr> <td>plc_1.profinet interface..</td> <td>S7-1500</td> <td>PN/IE</td> <td>192.168.1.10</td> <td>---</td> </tr> <tr> <td>---</td> <td>---</td> <td>PN/IE</td> <td>Access address</td> <td>---</td> </tr> </tbody> </table>	Device	Device type	Slot	Type	Address	Subnet	PLC_2	CPU 1516-3 PN/DP	1 X3	PROFIBUS	2			CPU 1516-3 PN/DP	1 X1	PN/IE	192.168.1.10	PN/IE_2		CPU 1516-3 PN/DP	1 X2	PN/IE	192.168.10.1		Device	Device type	Type	Address	Target device	plc_1.profinet interface..	S7-1500	PN/IE	192.168.1.10	---	---	---	PN/IE	Access address	---
Device	Device type	Slot	Type	Address	Subnet																																			
PLC_2	CPU 1516-3 PN/DP	1 X3	PROFIBUS	2																																				
	CPU 1516-3 PN/DP	1 X1	PN/IE	192.168.1.10	PN/IE_2																																			
	CPU 1516-3 PN/DP	1 X2	PN/IE	192.168.10.1																																				
Device	Device type	Type	Address	Target device																																				
plc_1.profinet interface..	S7-1500	PN/IE	192.168.1.10	---																																				
---	---	PN/IE	Access address	---																																				

序号 图示与说明

14. 通过 watch table 测试结果如下图所示:

The screenshot shows the SIMATIC Manager interface. On the left is the Project tree with 'Watch table_1' selected. The main window displays a table of monitored variables:

Index	Name	Address	Display format	Monitor value	Modify value	Comment
1	%IB0		Hex	16#01		
2	%IB1		Hex	16#02		
3	%IB2		Hex	16#03		
4	%IB3		Hex	16#04		
5	%IB4		Hex	16#05		
6	%IB5		Hex	16#06		
7	%IB6		Hex	16#07		
8	%IB7		Hex	16#08		
9	%IB8		Hex	16#09		
10	%IB9		Hex	16#10		
11	%Q80		Hex	16#11	16#11	<input checked="" type="checkbox"/>
12	%Q81		Hex	16#22	16#22	<input checked="" type="checkbox"/>
13	%Q82		Hex	16#33	16#33	<input checked="" type="checkbox"/>
14	%Q83		Hex	16#44	16#44	<input checked="" type="checkbox"/>
15	%Q84		Hex	16#55	16#55	<input checked="" type="checkbox"/>
16	%Q85		Hex	16#66	16#66	<input checked="" type="checkbox"/>
17	%Q86		Hex	16#77	16#77	<input checked="" type="checkbox"/>
18	%Q87		Hex	16#88	16#88	<input checked="" type="checkbox"/>
19	%Q88		Hex	16#99	16#99	<input checked="" type="checkbox"/>
20	%Q89		Hex	16#00	16#00	<input checked="" type="checkbox"/>
21						
22	<< Add new >>					

Name	Information	I/O address	Display form	Status val	Control value	Unit	Data type
1	PLC_1.input_simotion	PIB 4116					'ARRAY [...
2	_input_simotion[0]		HEX	16#11			BYTE
3	_input_simotion[1]		HEX	16#22			BYTE
4	_input_simotion[2]		HEX	16#33			BYTE
5	_input_simotion[3]		HEX	16#44			BYTE
6	_input_simotion[4]		HEX	16#55			BYTE
7	_input_simotion[5]		HEX	16#66			BYTE
8	_input_simotion[6]		HEX	16#77			BYTE
9	_input_simotion[7]		HEX	16#88			BYTE
10	_input_simotion[8]		HEX	16#99			BYTE
11	_input_simotion[9]		HEX	16#00			BYTE
12	PLC_1.output_simotion	PQB 4120			<input checked="" type="checkbox"/>		'ARRAY [...
13	_output_simotion[0]		HEX	16#01	<input checked="" type="checkbox"/>	16#01	BYTE
14	_output_simotion[1]		HEX	16#02	<input checked="" type="checkbox"/>	16#02	BYTE
15	_output_simotion[2]		HEX	16#03	<input checked="" type="checkbox"/>	16#03	BYTE
16	_output_simotion[3]		HEX	16#04	<input checked="" type="checkbox"/>	16#04	BYTE
17	_output_simotion[4]		HEX	16#05	<input checked="" type="checkbox"/>	16#05	BYTE
18	_output_simotion[5]		HEX	16#06	<input checked="" type="checkbox"/>	16#06	BYTE
19	_output_simotion[6]		HEX	16#07	<input checked="" type="checkbox"/>	16#07	BYTE
20	_output_simotion[7]		HEX	16#08	<input checked="" type="checkbox"/>	16#08	BYTE
21	_output_simotion[8]		HEX	16#09	<input checked="" type="checkbox"/>	16#09	BYTE
22	_output_simotion[9]		HEX	16#10	<input checked="" type="checkbox"/>	16#10	BYTE

表 1-1 配置说明