

# 学习/培训文档

西门子自动化教育合作项目 (SCE) | 从 V14 SP1 开始

**博途 (TIA Portal) 模块 031-410** 使用 SIMATIC S7-1200 进行 诊断的基础知识

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- SIMATIC S7-1200 AC/DC/继电器 6 套"博途 (TIA Portal)" 订货号: 6ES7214-1BE30-4AB3
- SIMATIC S7-1200 DC/DC/DC 6 套"TIA Portal" 订货号: 6ES7214-1AE30-4AB3
- SIMATIC STEP 7 BASIC V14 SP1 升级版(适用于 S7-1200) 6 套"博途 (TIA Portal)" 订货号: 6ES7822-0AA04-4YE5

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感谢德累斯顿工业大学,特别是 Leon Urbas 教授(工程博士)以及 Michael Dziallas 工程公司和所有参与 支持编纂此份 SCE 教学资料的参与人员。

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# 诊断功能的基础

# 1 目标

在本模块中,读者将了解有助于故障查找及排除的工具。

在下面的模块中将介绍诊断功能,例如可使用这种功能对模块"SCE\_EN\_031-100\_功能编程"中的 SIMATIC S7-1200 全集成自动化项目进行测试。

可以使用第3章所述的 SIMATIC S7 控制器。

# 2 前提条件

本章的基础是 SIMATIC S7 CPU1214C 硬件配置。但也可以借助其他配有数字输入和输出卡的硬 件配置方案来实现本章的学习目标。为完成本章的学习,您可能需要重新温习如下项目:

SCE\_EN\_031\_100\_功能-编程\_S7-1200\_R1504.zap14

# 3 所需的硬件和软件

- 1 工程组态站:硬件和操作系统是工程组态站的前提 (更多信息参见博途 (TIA Portal) 安装 DVD 里的自述文件)
- 2 博途 (TIA Portal) 软件平台里的 SIMATIC STEP 7 Basic 软件 V14 SP1 及以上版本
- 3 控制器 SIMATIC S7-1200,例如 CPU 1214C DC/DC/DC 带 Signalboard ANALOG OUTPUT SB1232, 1 AO 固件 V4.2.1 及以上版本 提示:数字输入端应布线至开关面板。
- 4 工程组态站和控制器之间的以太网连接



# 4 理论

#### 4.1 故障诊断和硬件故障

故障可能有不同的原因。

在切换为 RUN 模式后出现故障时,可分为两种故障类型。

1. CPU 进入或保持 STOP 模式。黄色的 STOP LED 亮起,此外,还有 CPU、电源单元、外围 设备模块或总线模块上的 LED 指示灯亮起。

在该情况下,CPU 有故障。如可能是自动化系统中的模块损坏或编程错误,或者总线系统有故障。

此时进行中断分析,可通过分析硬件诊断和通过读取 CPU 诊断缓冲区中的模块状态。

2. CPU 在错误的 RUN 模式下。绿色的 RUN LED 亮起,此外,还有 CPU、电源单元、外围设备模块或总线模块上的 LED 指示灯亮起或闪烁。

在该情况下,可能是外围设备或电源故障。 此时首先进行目视检查,以限定故障区域。分析 CPU 和外围设备上的 LED 指示灯。在硬件 诊断中读取错误外围设备和总线模块的诊断数据。此外,可以借助编程设备上的观察表进行故 障分析。

## 4.2 硬件诊断

借助 TIA Portal 在线模式下的设备视图可快速获取自动化系统的结构和系统状态概览。



oject tree	031-100	C Program	nina.≯	CPU 1214C [CPU			Gearch in projects				
Dedece		c_rrogram					- Nor-			Internal Ar	IN Design of
Devices							<b>a</b> 10	pology v	ew 👘 🕅	etwork vie	W Device view
i 📃 🖬	CPU_1	214C [CPU 12	14C]	🔊 🖽 🖭 🌆	≡Ш' ⊑	Devic	e overview				
					^	**	Module	Slot	I address	Q address	Туре
031-100_FC_Programming				210	=			103			
Add new device				as/				102			
Devices & networks			8					101			
CPU_1214C [CPU 1214C DC/DC/DC]						<b>_</b>	▼ CPU_1214C	1			CPU 1214C DC/DC/DC
Device configuration	. 1	103 102	101	1		<b>_</b>	DI 14/DQ 10_1	11	01	01	DI 14/DQ 10
V Online & diagnostics	Durk of		101			<b>~</b>	AI 2_1	12	6467		AI 2
Program blocks	Rack_0					<b>_</b>	AQ 1x12BIT_1	13		6465	AQ1 signal board
Technology objects					11723-00 -	<b>_</b>	HSC_1	1 16	100010		HSC
External source files					1 1	<b>~</b>	HSC_2	1 17	100410		HSC
Lo tags						<b>~</b>	HSC_3	1 18	100810		HSC
LC data types				10 ····	CPU shut BOBCAC	<b>~</b>	HSC_4	1 19	101210		HSC
Watch and force tables						<b>_</b>	HSC_5	1 20	101610		HSC
Online backups			_			<b>~</b>	HSC_6	1 21	102010		HSC
Traces						<b>_</b>	Pulse_1	1 32		100010	Pulse generator (PTO/P
Device proxy data	1 A					<b>~</b>	Pulse_2	1 33		100210	Pulse generator (PTO/P
22 Program info						<b>_</b>	Pulse_3	1 34		100410	Pulse generator (PTO/P
PLC alarm text lists						<b>~</b>	Pulse_4	1 35		100610	Pulse generator (PTO/P
Local modules						<b>_</b>	PROFINET interface_1	1 X1			PROFINET interface
La Ungrouped devices								2			
Common data					~			3			
Documentation settings	< 111	> 100	0%			<		Ш			>
Languages & resources							0	Propertie	s 71 Inf	la 🚯 🕅 D	iagnostics
M Online access	1	1 -		1	1			rioperat			ingrios nes
Card Reader/USB memory	General	Cross-r	eference	es Compile	Energy Suite						
	3 4 0	Show all me	ssages								
	1 Messag	e					Go to ?	Date	Time		
					10					21222	

插图 1: 设备配置的在线视图

### 4.3 程序模块的诊断

在 TIA Portal 在线模式下的项目导航窗口中,您将看到用户程序的编程块概览。可使用诊断符号显示离线和在线所用程序块之间的比较结果。



插图 2: 主程序 [OB1] 块的在线视图

# 5 任务要求

在本章中显示和测试以下诊断功能:

- TIA Portal 在线视图中的诊断符号
- 用模块状态进行设备诊断
- 离线/在线比较
- 观察和控制变量
- 变量的强制

# 6 规划

例如在一个已完成的项目上执行诊断功能。 为此要在 TIA Portal 中打开一个已装载到控制器中的项目。 在我们的例子中,启动 TIA Portal 之后将恢复已创建的项目。 并装载到所属的控制器中。 然后可以在 TIA Portal 中开始执行诊断功能。

#### 6.1 在线接口

只有在事先正确设置了与 CPU 的通信连接时,才能执行在线诊断。此处我们通过以太网/ PROFINET 进行连接。

因此应在在线连接时设置适合于自动化系统的接口。

	Configured access	s nodes of "CPU_1214C"				
	Device	Device type	Slot Typ	e Address	Subnet	
	CPU_1214C	CPU_1214C CPU 1214C DC/D 1		IE 192.168.0.1	PN/IE_1	
		Type of the PG/PC inter	face: LPN	l/IE		•
		PG/PC inter	face: 💹 In	tel(R) Ethernet Connection (	4) I219-LM	·] 🕐 [
		Connection to interface/sul	bnet: PN/IE	_1		•] 🕐
		1st gate	way:			
	Select target devi	ce:		Show all comp	atible devices	
	Select target devi	ce: Device type	Interface type	Show all comp.	atible devices Target devi	ce
	Select target devi Device CPU_1214C	ce: Device type CPU 1214C DC/D	Interface type PN/IE	Show all comp. Address 192.168.0.1	atible devices Target devi CPU_1214	ce C
	Select target devi Device CPU_1214C 	ce: Device type CPU 1214C DC/D —	Interface type PN/IE PN/IE	Show all comp e Address 192.168.0.1 Access address	atible devices Target devi CPU_12144 —	ce C
	Select target devi Device CPU_1214C 	Ce: Device type CPU 1214C DCID —	Interface typ PN/IE PN/IE	Show all comp e Address 192.168.0.1 Access address	atible devices Target devi CPU_1214 —	ce C
Flash LED	Select target devi Device CPU_1214C -	ce: Device type CPU 1214C DC/D 	Interface typ PN/IE PN/IE	Show all comp Address 192.168.0.1 Access address	atible devices Target devi CPU_1214 -	ce C
Flash LED	Select target devi Device CPU_1214C 	ce: Device type CPU 1214C DC/D 	Interface typ PN/IE PN/IE	Show all comp e Address 192.168.0.1 Access address	atible devices Target devi CPU_1214 -	ce C
Flash LED	Select target devi Device CPU_1214C -	ce: Device type CPU 1214C DC/D 	Interface typ PN/IE PN/IE	Show all comp e Address 192.168.0.1 Access address	atible devices Target devi CPU_1214 - 	ce C
Flash LED	Select target devi Device CPU_1214C 	ce: Device type CPU 1214C DCID —	Interface typ PN/IE PN/IE	Show all comp e Address 192.168.0.1 Access address Display only:	atible devices Target devi CPU_1214 – 	ce C
Flash LED	Select target devi Device CPU_1214C 	ce: Device type CPU 1214C DCID –	Interface typ PN/IE PN/IE	Show all comp e Address 192.168.0.1 Access address Display only	atible devices Target devi CPU_1214 – 	ce C
Flash LED	Select target devi Device CPU_1214C -	ce: Device type CPU 1214C DC/D  th address 192.168.0.1. of 1 accessible devices fou	Interface type PN/IE PN/IE PN/IE	Show all comp Address 192.168.0.1 Access address Display only	atible devices Target devi CPU_1214 - 	ce C search
Flash LED	Select target devi Device CPU_1214C - - - - - - - - - - - - - - - - - - -	ce: Device type CPU 1214C DC/D  th address 192.168.0.1. of 1 accessible devices fou	Interface type PN/IE PN/IE PN/IE	Show all comp Address 192.168.0.1 Access address Display only	atible devices Target devi CPU_1214 -	ce C search

插图 3: 在线连接

# 7 结构化的步骤说明

以下对规划的实施方法进行说明。如果您对内容已经充分了解,那么只需要按照编号步骤执行。否则请遵照以下详细说明进行。

#### 7.1 恢复现有的项目

⑧ 在我们能开始诊断功能之前,首先需要一个带编程和硬件配置的项目。
(例如: SCE\_EN\_031-100\_功能\_编程\_S7-1200....zap14)。为了恢复现有项目,必须从项目视图中在 ® 项目 (Project) ⑧ 恢复 (Retrieve) 下挑选相应的存档。然后用"打开" (Open) 确认您的选择。(⑧ 项目 (Project) ⑧ 恢复 (Retrieve) ⑧ 选择 .zap 归档 (Select a .zap archive)
⑧ 打开 (Open))



⑧ 接下来可以选择要将恢复的项目保存在其中的目标目录。用"确定"(OK) 按钮确认您的选择。
 (⑧ 目标目录 (Target directory) ⑧ 确定 (OK))

### 7.2 加载程序

⑧ 成功恢复后,可以选定控制器并与所创建的程序一起加载。(⑧ 1)



 I 请选择正确的接口并单击"开始搜索"(Start search)。(⑧ "PN/IE"® 选择编程设备/个人计算机的网卡 (Selection of the network adapter of the PG/PC) ⑧ 直接插到插槽"1 X1"上 (Direct at slot '1 X1') ⑧ "开始搜索"(Start search))

在扫描和信息询问完成之后,单击"加载"(Load) (®"加载"(Load))

	Device	Device type	Slot	Type	Address	Subn	et	
	CPU_1214C	CPU 1214C DC/D		PN/IE	192.168.0.1	PN/IE	_1	
		Type of the PG/PC inter	face:	PN/IE			•	
		PG/PC inter	face:	Intel(R)	Ethernet Connection (4) I2	19-LM	•	
		Connection to interface/su	bnet:	PN/IE_1			•	
		1st gate	eway:				× 🕐	
	Select target devi	ce:			Show all compatib	le devices		
	Device	Device type	Interf	ace type	Address	Target de	wice	
···· [	CPU_1214C	CPU 1214C DC/D	PN/IE	192.168.0.1		CPU_1214C		
·	-		PN/IE		Access address	-		
Flash LED								
Flash LED						<u>S</u> ta	rt search	
Flash LED	ion:				Display only erro	<u>s</u> ta r messages	rt search	
☐ Flash LED Online status informat ♀ Connection estab	ion: lished to the device wi	th address 192.168.0.1.			Display only erro	<u>S</u> ta r messages	rt search	
Flash LED         Online status informat         우 Connection estab         Scan completed.	ion: lished to the device wi I compatible devices of	th address 192.168.0.1. of 1 accessible devices fou	nd.		Display only erro	<u>S</u> ta r messages	rt search	
☐ Flash LED Online status informat ♀ Connection estab ♀ Scan completed. ♀ Retrieving device	ion: lished to the device wi l compatible devices o information	th address 192.168.0.1. of 1 accessible devices fou	nd.		Display only erro	<u>S</u> ta	rt search	

加载之前,必要时还要设置其它的操作(粉红色标记)。然后重新单击"加载"(Load)
 (®"加载"(Load))

tatus	1	Target	Message	Action
+0	0	▼ CPU_1214C	Ready for loading.	
	0	Stop modules	The modules are stopped for downloading to device.	Stop all
	0	<ul> <li>Software</li> </ul>	Download software to device	Consistent download
<	0	Additional inform	There are differences between the settings for the project ar	nd the 🗹 Overwrite all
	0	Text libraries	Download all alarm texts and text list texts	Consistent download

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® 加载之后,首先在操作下勾选"全部开始"(Start all)。然后单击"完成"(Finish)。(® 勾选 ® "完成"(Finish))

oad re	sults			
<b>?</b> s	Status	and actions after down	loading to device	
Status	1	Target	Message	Action
1	2	▼ CPU_1214C	Downloading to device completed without error.	
	4	Start modules	Start modules after downloading to device.	🖌 Start all
2				
•			un:	
			Finish	Load Cancel

### 7.3 在线连接

B 开始使用诊断功能时,请选择控制器"CPU\_1214C"然后单击"在线连接"(Go online)。
 (® CPU\_1214C ® 在线连接 (Go online))



⑧ 在与控制器"PLC\_1"建立在线连接之后,可以用以下按钮 局动或停止 CPU。在项目导航和诊断窗口中已经显示了诊断提示符号。



#### 项目导航中的比较状态符号

® 项目导航中的诊断符号用于表示比较状态,它可显示项目结构在线/离线比较的结果。

符号	含义
0	文件夹含有其在线和离线版本不同的对象(只在项目导航中)
•	对象的在线和离线版本不同
0	对象只存在于在线
0	对象只存在于离线
	对象的在线和离线版本相同

Siemens - C:\Users\mde\DocumentsV	Automation	n\031-100_FC	_Programmi	ng\031-100_	_FC_Programn	ing	_						-
roject Edit View Insert Online O	ptions To	Cal + E III	Help	Go onlin	a 🖉 Go offlin		<b>y</b> =	Search in projects			Totally In	ntegrated Automation	n TA
Project tree		031-100_F	C_Programn	ning + CPL	J_1214C [CPU	1214C DC/DC/L	C]					- 1	1
Devices								2 To	v vpolog	iew de l	letwork vie	w IN Device view	v
		34 CPU 1	14C CRU 121	401	100 1000 Z		Davie	a and a second and a second a					
			140 [010121	ac1 .			Device	overview			2.		_
- 1021 100 FC Programming						-	<b>**</b>	Module	Slot	I address	Q address	Туре	
OSI-TOU_PC_Programming						=			103				1
Paulae & petrode		1			210				102				
- CPU 1214C CON 1214C DODOD	c1 174 0			R					101				
	9 4 •			V			<b>~</b>	<ul> <li>CPU_1214C</li> </ul>	1			CPU 1214C DC/DC/DC	
Device conliguration							<b>~</b>	DI 14/DQ 10_1	11	01	01	DI 14/DQ 10	
Contrie a diagnostics			03 102	101	1		<b>~</b>	AI 2_1	12	6467		AI 2	
Tachaology chiests	-	Deck 0					<b>~</b>	AQ 1x12BIT_1	13		6465	AQ1 signal board	
		Rack_0					<b>~</b>	HSC_1	1 16	100010		HSC	
Di Chana				SIGNO		All and a second se	<b>~</b>	HSC_2	1 17	100410		HSC	
PLC tags	-						<b>~</b>	HSC_3	1 18	100810		HSC	
Watch and force tables						E	✓	HSC_4	1 19	101210		HSC	
Opling backups				10 A		592-946 35.65.05	<b>~</b>	HSC_5	1 20	101610		HSC	
<ul> <li>Chine backups</li> <li>Traces</li> </ul>							<b>_</b>	HSC_6	1 21	102010		HSC	
							<b>~</b>	Pulse_1	1 32		100010	Pulse generator (PTO/P.	
Device proxy data								Pulse_2	1 33		100210	Pulse generator (PTO/P.	L.,
Program into					_			Pulse_3	1 34		100410	Pulse generator (PTO/P.	
E PLC alarm text lists							<b>~</b>	Pulse_4	1 35		100610	Pulse generator (PTO/P.	
Local modules	<b>×</b>						<b>~</b>	PROFINET interface_1	1 X1			PROFINET interface	
Get Ungrouped devices									2				
Common data						~			3				
Documentation settings		< 11	> 100%			<b></b>	<		III				>
Languages & resources									Propert	ies 7i lr	ofo 😵 D	liagnostics	1
Comme access			1		1	1							
Card Reader/USB memory		General	Cross-re	ferences	Compile	Energy Suit	B						
		🖸 🛦 🚯	Show all mes	sages	-								
		I Message						Go to ?	Date	Time			
		C Load	ing completer	d (errors : 0: v	varnings: 0).			0010	7/5/20	017 12:02	24 PM		
													-

® 双击"设备配置"(Device configuration)。(图 设备配置 (Device configuration))

#### CPU 和 CP 的运行状态符号

® 在图形表示和设备信息窗口中显示了 CPU 或通信处理器 (CP) 不同的运行状态。

符号	运行状态
	运行
	停止
	启动
un and a state of the state of	暂停
8 ×	故障
Dr.	未知运行状态
10	已配置的模块不支持运行状态的显示

#### 设备概览中模块和设备的诊断符号

⑧ 在图形表示和设备概览窗口中通过以下符号表示不同模块、CPU 或通信处理器 (CP) 的运行状态。

符号	含义
<b>4</b> 5	正在建立与 CPU 的连接。
8	CPU 无法访问所设置的地址。
-	下游组件中有故障: 在至少一个下游硬件组件中有故障。
a <b>2</b>	己配置的模块不支持诊断状态的显示。
$\checkmark$	连接已建立,但是目前还没有确定模块的状态。
Ŷ	己配置的模块不支持诊断状态的显示(对 CPU 下的模块有效)。
2	已配置的模块或设备与实际现有的模块或设备不兼容 (对 CPU 下的模块或设备有效)。
Ŷ	无可用的诊断数据,因为当前的在线配置数据与离线配置数据不同。
۵	CPU 无法访问模块或设备(对 CPU 下面的模块和设备有效)。
La	模块或设备已禁用。
<b>I</b> !	故障
J	维护请求
<b>!</b> ?	需要维护
?	无故障
Ø	在与受保护的 CPU 建立在线连接时,在没有输入正确密码的情况下中断了密码对话。
0	己配置的 CPU 与实际现有的 CPU 在类型方面不兼容。

#### 端口和以太网电缆的颜色代码

- ® 在网络或拓扑结构中可以诊断端口和以太网电缆的状态。
- ® 下表指出了可能存在的颜色及其含义。

颜色	含义
•	无故障或需要维护
-	维护请求
	通信被干扰

### 7.4 使用 SIMATIC S7 控制器时的在线和诊断

- ® 在项目导航中双击"在线和诊断"(Online & diagnostics)。(® 在线和诊断 (Online & diagnostics))
- ® 在右侧的在线工具上显示 CPU 操作面板、循环时间和存储器的使用情况。在此将 CPU 切换为 RUN 模式。(® RUN)

출 📑 🔚 Save project 📑 🐰 🏥 👔 🗙 🏷 ±	🧭 ± 🗄 🛄 🖬 🖳 🖓 Go or	nline 🖉 Go offline 🛔 🖪 🖪 🤰	< 📃 📋 < earch in project> 🕌		rouny meg	POR	TAL
Project tree 🛛 🕮 📢	031-100_FC_Programming > C			. 🕫 🖬 🗙	Online tools		1 🕨
Devices					Options		
	Online access Diagnostics General	General		=	✓ CPU operator	panel	
Add new device Devices & networks CU_1214C (CPU 1214C DC/DC/DC) Device configuration U Online & diagnostics Device The Device Configuration Device Configuration Device Configuration Device Configuration Device Configuration Device Device Configura	Diagnostic status Diagnostic suffer Cycle time Memory PROFINET interface [X1] Functions	Short designation: Article number: Hardware: Firmware: Version of the TIA Portal project:	CPU 1214C DCIDCIDC 6E57 214-1AG40-0X80 2 V 4.2.1 V14 SP1		CPU_1214C [CPU RUN / STOP ERROR MAINT	I214C DC/DC/DC] RUN STOP MRES	= >
Gange External source files     Gange C tags     Gange PLC data types     Gange PLC data types     Gange PLC data types     Gange C tags		Rack: Slot:	0		▼ Cycle time	ms	
Bevice proxy data      Bevice proxy data      Bevice proxy data      Device proxy data      Device proxy data      Common data      Device proxy data		Module information Module name: Plant designation: Location ID: Installation date:	CPU_1214C		3 Shortest: Current/last: Longest:	150 1.000 ms 3.000 ms 3.000 ms	
Gard Reader/USB memory		Additional information:			Load memory	Free:99.71 %	< III
		Manufacturer description: Serial number:	SIEMENS AG S CF35H7589 perties Info Diagnostics		Work memory Retain memory	Free:99.89 %	_
> Details view	General Cross-references	s Compile Energy Suite				Free:100 %	~

® 在工作区窗口中显示 CPU 的整体信息。(® 整体信息 (General))

Online access	General	
Diagnostics	Module	
General		
Diagnostic status	Short designation:	CPU 1214C DC/DC/DC
Orcle time	Article number:	6ES7 214-1AG40-0XB0
Memory	Hardware:	2
PROFINET interface [X1]	Eirmus re :	V421
Functions	rinnware.	V 4.2.1
	Rack:	0
	Slat	1
	Module information	
	 Module name:	CPU_1214C
	Plant designation:	
	Location ID:	
	Installation date:	Monday, July 03, 2017 12:41
	additional information:	
	Autional mormation.	
	Manufacturer information	
	Manufacturer description:	SIEMENS AG
	Serial number:	S C-F3SH7589
	Profile:	16#0000
	Dep 61 - dep - 1	1040001

#### ® 如果有诊断信息,将在诊断状态中显示。(® 诊断状态 (Diagnostic status))。

031_100_FC-Programming	CPU_1214C [CPU 1214C DC/DC/DC]	_ 7 T ×
<ul> <li>Diagnostics</li> </ul>	Diagnostic status	
General		
Diagnostic status	Module exists	
Diagnostics buffer	ОК	
Cycle time		
Memory		
<ul> <li>PROFINET interface [X1]</li> </ul>		
<ul> <li>Functions</li> </ul>		

® 单个事件的详细信息显示在诊断缓冲区中。(® 诊断缓冲区 (Diagnostics buffer))。

O dia mandri di dia mandri di dia dia dia dia dia dia dia dia dia		
Online access	Diagnostics buffer	
Conoral	Events	
Diagnostic status	Events	
Diagnostics buffer	Diselsu CPU Time Stamps in PC/PC level time	
Cycle time	Jispiay Crollime stamps in reirciocal time	
Memory	No. Date and time Event	
PROFINET interface [X1]	1 1/3/2012 8:27:35.621 PM New startup information - Current CPU operating mode: STOP 🏹 🚺	^
Functions	2 1/3/2012 8:27:35.521 PM Communication initiated request: STOP - CPU changes from RUN to STO 🗹 🚺	=
	3 1/3/2012 8:25:16.968 PM Follow-on operating mode change - CPU changes from STARTUP to RUN 🗹 🚺	
	4 1/3/2012 8:25:16.864 PM Communication initiated request: WARM RESTART - CPU changes from S 🗹 🚺	
	5 1/3/2012 8:25:16.864 PM New startup information - Current CPU operating mode: STOP 🗹 🚺	
	6 1/3/2012 8:25:06.164 PM New startup information - Current CPU operating mode: STOP 🗹 🚺	
	7 1/3/2012 8:25:04.656 PM New startup information - Current CPU operating mode: STOP 🗹 🚺	
	8 1/3/2012 8:25:01.949 PM New startup information - Current CPU operating mode: STOP 🗹 🚺	
	🔸 📃 9 1/3/2012 8:25:00.945 PM Follow-on operating mode change - CPU changes from STOP to STOP m 🗹 🚺	~
	Preeze display Details on event:	
	Details on event: 1 of 50 Event ID: 16# 02:4000	
	Module: CPU_1214C	
	Rack/slot: Rack 0 / Slot 1	
	Description: CPU info: New startup information Pending startup inhibit(5): - Menual restart required	^

® 接下显示程序处理循环时间的信息。(® 循环时间 (Cycle time))

	▶ CPU_1214C [CPU 1214C DC/DC/DC]	- *
Online access	Curlo timo	
<sup>r</sup> Diagnostics	Cycle ume	
General	Cycle time diagram	
Diagnostic status		
Diagnostics buffer		
Cycle time		
Memory		
PROFINET interface [X1]		
Functions		
	13	150 ms
	- 13	150
	, Cycle time set	
	Cycle time set	ms
	Cycle time set	ms
	Cycle time set Minimum cycle time: Cycle monitoring time: 150	ms ms
	Cycle time set  Minimum cycle time:  Cycle monitoring time:  Cycle times measured	ms ms
	Cycle time set  Minimum cycle time:  Cycle monitoring time:  Cycle times measured  Shortest cycle time:  1.000	ms ms ms
	Cycle time set  Minimum cycle time:  Cycle monitoring time:  T50  Cycle times measured  Shortest cycle time:  1.000  Current/last cycle time:  3.000	ms ms ms ms

® 此处可看见存储器使用情况的详细信息。(®存储器 (Memory))

031_100_FC-Programming	• CPU_1214C [CPU 1214	IC DC/DC/DC]			_ II 🛛 🗙
Online access					
<ul> <li>Diagnostics</li> </ul>	Memory				
General					
Diagnostic status					
Diagnostics buffer					
Cycle time					
Memory		0.22%	0.17%	0.%	
PROFINET interface [X1]		0.25 %	0.17 %	0.40	
Functions	Sizes in bytes	Load memory	Work memory	Retain memory	
	Free:	4184632	102229	10240	
	In use:	9672	171	0	
	Total:	4194304	102400	10240	

 。同时还显示网络设置和 PROFINET 接口 [X1] 的状态。(图 PROFINET 接口 [X1] (PROFINET interface [X1]))

nline access	PROFINET interface [V1]					
iagnostics	FROFINET Intenace [X1]	÷				-
General	> Ethemet address					
Diagnostic status						_
Diagnostics buffer	> > Network connection	n				
Cycle time						
Memory	1107	20 (2 2 (0 0 )	- DA			1
PROFINET Interface [X1]	1/14/C 1	100/ess: 20-00-00-0	DA			
nctions	IP parameters					
	IP (	ddress: 192.168.0.1				1
	Subn	et mask: 255,255,255,0	)			1
	Defeu	t router: 0.0.0.0				
		Croater: 0.0.0.0				
-		ettings: [				
•	IP setti	ng time:				
nline access agnostics General	Ports Ports					
nline access agnostics General Diagnostic status	Ports Ports					
nline access agnostics General Diagnostic status Diagnostics buffer	Ports Ports					
nline access agnostics General Diagnostic status Diagnostics buffer Cycle time	Ports Ports Name Report VIDE	Status	Settings	Mode		
nline access agnostics General Diagnostic status Diagnostics buffer Cycle time Memory DDDDDUtimented on V11	Ports Ports Name Port 1 (X1P1	Status ) OK	Settings Automatically	Mode TP 100 Mbps full duplex		
line access ggnostics General Diagnostic status Diagnostic sbuffer Cycle time Memory PROFINET interface [X1] pricines	Ports Ports Name Port 1 (X1P1	Status ) OK	Settings Automatically	Mode TP 100 Mbps full duplex	-	
Iline access agnostics General Diagnostic status Diagnostics buffer Cycle time Memory PROFINET interface [X1] nctions	Ports Ports Name Port 1 (X1P1	Status ) OK	Settings Automatically	Mode TP 100 Mbps full duplex	-	
line access ggnostics General Diagnostic status Diagnostics buffer Cycle time Memory PROFINET interface [X1] nctions	Ports Ports Name Port 1 (X1P1	Status ) OK	Settings Automatically	Mode TP 100 Mbps full duplex	-	
Iline access agnostics General Diagnostic status Diagnostic stuffer Cycle time Memory PROFINET interface [X1] nctions	Ports Ports Name Port 1 (X1P1	Status ) OK	Settings Automatically	Mode TP 100 Mbps full duplex		
Iline access agnostics General Diagnostic status Diagnostic status Diagnostic buffer Cycle time Memory PROFINET interface [X1] nctions	Ports     Ports     Name     Port 1 (X1P1	Status ) OK	Settings Automatically	Mode TP 100 Mbps full duplex		
Iline access agnostics General Diagnostic status Diagnostics buffer Cycle time Memory PROFINET interface [X1] nctions	Ports Ports Name     Port 1 (X1P1     Details:	Status ) OK	Settings Automatically	Mode TP 100 Mbps full duplex		
Iline access agnostics General Diagnostic status Diagnostics buffer Cycle time Memory PROFINET interface [X1] nctions	Ports Ports Name Port 1 (X1P1 Details: MAC address of the	Status ) OK	Settings Automatically	Mode TP 100 Mbps full duplex		
nline access agnostics General Diagnostic status Diagnostics buffer Cycle time Memory PROFINET interface [X1] nctions	> Ports	Status ) OK	Settings Automatically	Mode TP 100 Mbps full duplex		
nline access agnostics General Diagnostic status Diagnostics buffer Cycle time Memory PROFINET interface [X1] nctions	> Ports	Status ) OK interface: 28-63-36-88-FF d59nt0r.Port 1	Settings Automatically	Mode TP 100 Mbps full duplex		
nline access agnostics General Diagnostic status Diagnostics buffer Cycle time Memory PROFINET interface [X1] nctions	> Ports	Status ) OK interface: 28-63-36-88-Ff d59nt0r.Port 1 • interface: D4-81-07-8D-	Settings Automatically -DA EB-91	Mode TP 100 Mbps full duplex		
nline access agnostics General Diagnostic status Diagnostics buffer Cycle time Memory PROFINET interface [X1] nctions	> Ports	Status ) OK interface: 28-63-36-88-FF d59nt0r.Port 1 interface: D4-81-D7-BD-	Settings Automatically FDA EB-91	Mode TP 100 Mbps full duplex		
nline access ggnostics General Diagnostic status Diagnostics buffer Cycle time Memory PROFINET interface [X1] Inctions	> Ports	Status ) OK interface: 28-63-36-88-FF d59nt0r.Port 1 interface: D4-81-D7-BD-	Settings Automatically -DA EB-91	Mode TP 100 Mbps full duplex		
nline access agnostics General Diagnostic status Diagnostics buffer Cycle time Memory PROFINET interface [X1] inctions	> Ports	Status ) OK interface: 28-63-36-88-FF d59nt0r.Port 1 interface: D4-81-D7-8D-	Settings Automatically -DA EB-91	Mode TP 100 Mbps full duplex		
nline access agnostics General Diagnostic status Diagnostics buffer Cycle time Memory PROFINET interface [X1] Inctions	> Ports	Status ) OK interface: 28-63-36-88-FF d59nt0r.Port 1 interface: D4-81-D7-BD-	Settings Automatically =DA EB-91	Mode TP 100 Mbps full duplex		

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 e"分配 IP 地址"(Assign IP address) 功能下可为控制器分配 IP 地址。但是只在还没有将硬件 装载到 CPU 中时进行。(⑧ 功能 (Functions) ⑧ 分配 IP 地址 (Assign IP address))

	m					
Online access	Assign IP address					
<ul> <li>Diagnostics</li> </ul>						
General						
Diagnostic status	Assign IP address to the device					
Diagnostics buffer	Devicer connected to	an enterprise network or directly to the internet must be appropriately				
Cycle time	protected against unau	uthorized access, e.g. by use of firewalls and network segmentation.				
Memory	For more information a	bout industrial security, please visit				
PROFINET interface [X1]	http://www.siemens.co	m/industrialsecurity				
▼ Functions						
Assign IP address						
Set time						
Firmware update						
Assign PROFINET devic	MAC address:	28 - 63 - 36 - 88 - FF - DA Accessible devices				
Reset to factory settings						
Format memory card	IP address:	192.168.0.1				
	Subnet mask:	255 . 255 . 255 . 0				
	7					
	-	Use router				
	Router address:	192.168.0.1				
		Assign IP address				

⑧ 在"时间设置"(Set time) 下可以设置 CPU 的时间。(⑧ 功能 (Functions) ⑧ 时间设置 (Set time))

Online access	Cat Maria	
<ul> <li>Diagnostics</li> </ul>	Set time	
General		
Diagnostic status		
Diagnostics buffer		
Cycle time	PG/PC time:	
Memory	(UTC+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna	
PROFINET interface [X1]		
<ul> <li>Functions</li> </ul>	July 05 , 2017 💌 12 : 24 : 52 PM 🖨	
Assign IP address		
Set time	Module time	
Firmware update		
Assign PROFINET devic	January 03 , 2012	
Reset to factory settings	Take from PG/PC Apply	
Format memory card		

e 在"固件升级"(Firmware update)下可以升级 PLC 的固件。(® 功能 (Functions) ® 固件升级 (Firmware update))

CPU_1214C [CPU 1214C DC/D	PC/DC]	_ = = :
Firmware update		
Online data		
Online data		
Article number:	6F57 214-1AG40-0XB0	
Firmware	NAD4	
	V 4.2.1	
Name:	CPU_1214C	
Rack:	0	
Slot:	1	
Firmware loader		
Firmware file:	✓ Brow:	se
Firmware version:		
Suitable for modules with:	Article number Einstructe vertice and biology	
	Andere number	
Carbon		
Status:		
	Run firmware after update	
	Run update	
	CPU_1214C [CPU 1214C DCD Firmware update Online data Article number: Firmware: Name: Name: Name: Rack: Slot: Firmware loader Firmware file: Firmware version: Suitable for modules with: Status:	CPU_1214C [CPU 1214C DCDCDC]  Firmware update Article number: EE57 214-1A640-0XB0 Firmware: V4.2.1 Name: (CPU_1214C Rack: 0 Slot: 1  Firmware loader Firmware loader Firmware file: Firmware version: Suitable for modules with: Article number Firmware version and higher Status: W Run firmware after update Run update Run update

® 在"分配名称"(Assign name)下可以为已配置的 PROFINET 现场设备分配 PROFINET 设备名称。此时无法更改 CPU 上的设备名称,只能通过装载已更改的硬件配置进行更改。(® 功能 (Functions) ® 分配名称 (Assign name))

	m					
Online access	Assign PROFINET dev	vice name				-
<ul> <li>Diagnostics</li> </ul>						
General						
Diagnostic status						
Diagnostics buffer		Configured P	ROFINET de	vice		
Cycle time		PROFINET	vice name:	cpu 1214c		
Memory			Device times			
PROFINET interface [X1]			Device type.	CPU 1214C DCDCDC		
<ul> <li>Functions</li> </ul>		Online access	5			
Assign IP address		Type of the PG/I	PC interface:	Please select		
Set time		pre la	DC interference			
Firmware update			re intenace:			
Assign PROFINET devic						
Reset to factory settings		Device filter				
Format memory card		C Onlysh	and and so and	****		
	1	M Only Sh	ow devices of	the same type		
		Only sh	ow devices wi	th bad parameter settings		
		Onlysh	ow devices wi	thout names		
	Accessible de	vices in the network:				
	IP address	MAC address	Device	PROFINET device name	Status	

® 在"恢复为出厂设置"下可以将 CPU 恢复为出厂设置。(® 功能 (Functions) ® 恢复为出厂设置 (Reset to factory settings) ® 保留或删除 IP 地址 (Retain or delete IP address) ® 恢复 (Reset))

Online access	Π	
<ul> <li>Diagnostics</li> </ul>	Reset to factory settings	
General		
Diagnostic status		
Diagnostics buffer		
Cycle time	IP address:	192.168.0.1
Memory	PPOEINET device pamer	rou 1214r
PROFINET interface [X1]	PROFINE I DEVICE name:	cpu_1214c
<ul> <li>Functions</li> </ul>		0
Assign IP address		e Retain IP address
Set time		O Delete IP address
Firmware update		Reset
Assign PROFINET devic		
Reset to factory settings		
Format memory card		

e 在"格式化存储卡"(Format memory card)下,可格式化已插入 CPU 的可选存储卡。(®功能 (Functions) ®格式化存储卡 (Format memory card) ®格式化 (Format)

031-100_FC_Programming	CPU_1214C [CPU 1214C DC/DC/DC]	_# # ×
Online access • Diagnostics	Format memory card	
General		
Diagnostic status		
Diagnostics buffer		
Cycle time	IP address:	192.168.0.1
Memory		cou 1214c
PROFINET interface [X1]	PROFINE I device name:	cha_1214c
✓ Functions		
Assign IP address		Format
Set time		
Firmware update		
Assign PROFINET devic		
Reset to factory settings		
Format memory card		

⑧ 在进行下一个章节之前要重新断开在线连接。(⑧ 在线访问 (Online access) ⑧ 断开在线连接 (Go offline))

Online access	Online access		
Diagnostics			
General	Status		
Diagnostic status			
Diagnostics buffer	Online		
Cycle time	Online	····	
Memory			
PROFINET interface [X1]			
Functions			
Assign IP address		Flash LED	
Set time			
Firmware update		and the second	_
Assign PROFINET devic			
Reset to factory settings			
Reset to factory settings Format memory card	Online access		
Reset to factory settings Format memory card	Online access Type of the PG/PC interface:	PN/IE	<b>v</b>
Reset to factory settings Format memory card	Online access Type of the PG/PC interface: PG/PC interface:	PN/IE Intel(R) Ethernet Connection (4) I219-LM	- - • •
Reset to factory settings Format memory card	Online access Type of the PG/PC interface : PG/PC interface : Connection to interface/subnet:	PNIE Intel(R) Ethernet Connection (4) I219-LM PNIE_1	- - - - -
Reset to factory settings Format memory card	Online access Type of the PG/PC interface: PG/PC interface: Connection to interface/subnet:	PN/IE Intel(R) Ethernet Connection (4) I219-LM PN/IE_1	
Reset to factory settings Format memory card	Online access Type of the PG/PC interface: PG/PC interface: Connection to interface/subnet: 1st gateway:	PN/IE Intel(R) Ethernet Connection (4) I219-LM PN/IE_1	
Reset to factory settings Format memory card	Online access Type of the PGIPC interface: PGIPC interface: Connection to interface/subnet: 1st gateway: Device address:	PN/IE Intel(R) Ethernet Connection (4) I219-LM PN/IE_1 I92.168.0.1	
Reset to factory settings Format memory card	Online access Type of the PG/PC interface: PG/PC interface: Connection to interface/subnet: 1st gateway: Device address:	PN/IE Intel(R) Ethernet Connection (4) I219-LM PN/IE_1 [ 192.168.0.1 ]	

® 然后,TIA Portal 将重新处于离线模式,不再显示橙色的条框和诊断符号。

#### 7.5 在线/离线比较

⑧ 一般情况下保存的数据与在控制器中加载的数据的一致性尤为重要。首先在模块"电机\_手动 [FC1]"(MOTOR\_MANUAL [FC1]) 中的与功能中删除变量"保护关闭\_激 活"(Safety\_shutoff\_active)的"非"运算。

然后,保存模块"电机\_手动 [FC1]"(MOTOR\_MANUAL [FC1]),但是不装载到控制器中。然后重新 关闭模块"电机\_手动 [FC1]"(MOTOR\_MANUAL [FC1])。

B 为了进行比较,用鼠标右键单击控制器 "PLC\_1",然后选择"比较"(Compare)"在线/离线"(Offline/online)。(® 压力机控制器 (Select controller) ® 比较 (Compare) ® 离线/在线 (Offline/online))



® 在线比较编辑器打开。

•	8 ± 🕫 🛙	e 0 3	t 🖍 🗄										
							50	-					
031-100	_FC_Programmin	g: CPU_1214	.C*		_			-	*Online PLC*	_	_		_
Name	-	Address	Type	Time stamp	Time s	Status	Action		Name	Address	Type	Time stamp	Time s
- CP	U 1214C					0	11	-	CPU 1214C				
- 🕞	Program blocks	1				0		-		1			
-	- Main [OB1]	OB1	OB	7/21/2008	7/4/20				- Main [OB1]	OB1	OB	7/21/2008	7/4/20.
	MOTOR_MA	FC1	FC	7/3/2017	7/5/20	0	11		MOTOR_MANUAL [FC1]	FC1	FC	7/3/2017	7/4/20.
-	Technology obj					•							
	PLC tags					•							
1	PLC data types					•							
<					>				<	I	1		)
Comparis	on result: No det	ailed proper	ty comparisor	n available.									
					2								
				c	PU 1214	-			0		PU 1214C		

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● 如果现在显示模块区别 ●,则首先选定涉及的模块。然后可以通过单击按钮 ● "开始细节比较"(Start detailed comparison)。(⑧ 电机\_手动 (MOTOR\_MANUAL) ⑧ 开始细节比较 (Start detailed comparison))。

Compare editor onlin												∎ = ×
<b>● ● ♂</b> ± ■ 8	e 0	2 <b>01 ±</b>										
	Start d	etailed comp	arison		-	50						
*031-100_FC_Programmin	g: CPU_1214	C*		_	-			*Online PLC*	_	_		_
Name	Address	Туре	Time stamp	Time s	Status	Action		Name	Address	Туре	Time stamp	Time s
- CPU_1214C					0	11		CPU_1214C				
- Rrogram blocks					0							
Hain [OB1]	OB1	OB	7/21/2008	7/4/20	•			🚰 Main [OB1]	OB1	OB	7/21/2008	7/4/20
MOTOR_MA	FC1	FC	7/3/2017	7/5/20	•	11	-	MOTOR_MANUAL [FC1]	FC1	FC	7/3/2017	7/4/20
Technology obj												
PLC tags					•							
PLC data types					•							
<	10	Y.		>				<		1		>
Comparison result: Object	s are differer	nt.										
			MOTOR		. [FC1]			•	мото		[1]	

® 逻辑块比较功能将对比选中的离线/在线模块。比较结果中将显示详细的区别说明。

								-		×
CPU_1214C > MOTOR_MANUAL -	Offline			N	ιοτο	DR_MANUAL - Online				
a a 🤿 🔮 🚍 🚍 🙋 🐓 🖕	<b>€</b> 🗄 😅									
MOTOR_MANUAL					M	TOR_MANUAL				
Name	Data type	Default value	C			Name	Data type	Default value	C	
🛛 🕣 🔻 Input				^ 1	-0	▼ Input				1
2 - Manual_mode_active	Bool		M	✓ 2		Manual_mode_active	Bool			-
<			>		<				>	
Annual_mode_     #Manual_mode_     #Pushbutton_     #Enable_OK     #Safety_shutoff_     active +	#Conveyor motor_manu motor_manu mode	ual mode		=		Network 1: Control of the control of	#Conveyo motor_man mode	ual mode rual_		
Network 2:				1	•	Network 2:				
Comment				~	0	Comment				1
	100%	· · · · · · · · · · · · · · · · · · ·		<	_		100%	· · · · · · · · · · · · · · · · · · ·		
						Q Properties	i Info V	Diagnostics	1.1	

® 关闭逻辑块比较的窗口。

® 在比较编辑器中可以在所涉及的模块上选择一个动作。

从编程设备中将模块"电机\_手动"(MOTOR\_MANUAL) 装载到控制器中并覆盖原有模块,或者 从控制器中读取模块"电机\_手动"(MOTOR\_MANUAL) 并覆盖 TIA 项目中的模块。

选择"装载设备"(Upload from device) 操作。 (← 装载设备 (Upload from device))

Compare editor online	9									-	
🌢 🛛 🌮 ± 🖪 🛯	8 D :	± 🖒 🗄									
					-	50					
*031-100_FC_Programming	g: CPU_1214	IC*					*Online PLC*				
Name	Address	Туре	Time stamp	Time s	Status	Action	Name	Address	Туре	Time stamp	Time s
▼ CPU_1214C					0	Ш	T CPU_1214C				
🔻 🛃 Program blocks					0	Ш					
🆀 Main [OB1]	OB1	OB	7/21/2008	7/4/20	•		Main [OB1]	OB1	OB	7/21/2008	7/4/20
MOTOR_MA	FC1	FC	7/3/2017	7/5/20	•	11	MOTOR_MANUAL [FC1]	FC1	FC	7/3/2017	7/4/20
🙀 Technology obj					•	II No act	ion				
PLC tags					•	+ Uploa	d from device				
PLC data types					•	-> Down	oad to device				

● 单击按钮 建 执行动作。(● 执行动作)

Compare editor online											
9 0 8 ± 1 1	e 8	± to 1									
	1	Execute a	ctions		-	50					
"031-100_FC_Programming	g: CPU_1214	C*		_			*Online PLC*				_
Name	Address	Туре	Time stamp 1	Time s	Status	Action	Name	Address	Туре	Time stamp	Time s
▼ []] CPU_1214C					0	+	CPU_1214C				
<ul> <li>Program blocks</li> </ul>					0	+					
Main [OB1]	OB1	OB	7/21/2008	7/4/20	•		Main [OB1]	OB1	OB	7/21/2008	7/4/20
MOTOR_MA	FC1	FC	7/3/2017	7/5/20	•	¢	MOTOR_MANUAL [FC1]	FC1	FC	7/3/2017	7/4/20
🙀 Technology obj					•						
PLC tags					•						
PLC data types					•						

® 确认"装载设备"(Upload from device)。(图 装载设备 (Upload from device))

Upload	previ	ew		
30	heck (	preconditions for uploa	ad from device	
Status	1	Target	Message	Action
t]	2	▼ CPU_1214C	Ready for loading.	
	4	<ul> <li>Conflicts</li> </ul>	Conflicts occurred during loading.	Overwrite
<			11	>
				Refresh
				Upload from device Cancel

® 进行装载后将不再有差别。然后重新保存项目并断开在线连接。

### 7.6 观察和控制变量

® 观察表可对变量进行观察和控制。在项目导航中双击"添加新的观察表"(Add new watch table)
 (® 添加新的观察表 (Add new watch table))



® 通过双击鼠标打开新建的"观察表\_1"(Watch table\_1)。(®"观察表\_1"(Watch table\_1))

可以将单个变量记录到表格中或者在选择"变量表\_分拣装置"(Tag\_table\_sorting\_station) 后选中要观察的变量并从详细视图中将其拖至观察表中。(®变量表\_分拣装置(Tag\_table\_sorting\_station))

TIA Siemens - C:\Users\mde\Doct	uments\Autom	ation\0	31-100_FC_	Programming	031-100_FC_I	Programming					_ 🗆 🗙
Project Edit View Insert Or	nline Options	Tools	Window	Help	Go online 🦼	Go offline 🛔 🚺	× =	≪earch in proje	ct>	Totally Integrated Automation POR	TAL
Project tree	0	۰ 🕨	31-100_FC	_Programmin	g → CPU_12	14C [CPU 1214C DC/[	)C/DC] → Wate	h and force tal	oles 🕨 Watch tab	e_1 🖬 🖬	i× 4
Devices											8
	111	-	Ø. Ø≘ Ø	13 10 9. 5	3, <u>1</u> 70, 00h 04	2					Te
		-	i Na	me	Address	Display format	Monitor value	Modify value	Comment	Tag comment	- Stin
TO 031-100 EC Programming		A 1		A1*	%0.0	Bool	inonitor toroc	mouny rolac y		return signal emergency stop ok (nc)	9
Add new device		2		K0*	%0.1	Bool				main switch _ON" (no)	
Devices & networks		3	1	50*	%10.2	Bool				mode selector manual(0) / automatic(1)	2
CPU 1214C [CPU 1214C	DC/DC/DC]	= 4		53*	%11.4	Bool				pushbutton manual mode conveyor -M1 forwar	ds 8
P Device configuration	n	5	14	B1*	%10.5	Bool				sensor cylinder -M4 retracted (no)	s
😵 Online & diagnostic	s	6	1	54*	%11.5	Bool				pushbutton manual mode conveyor -M1 backw	ar
Program blocks		7	14	Q1"	%Q0.0	Bool				conveyor motor -M1 forwards fixed speed	<u> </u>
Add new block		8		1	<add new=""></add>						Libr
Hain [OB1]											ari
MOTOR_MANUAL	[FC1]										es
Technology objects											
<ul> <li>External source files</li> </ul>											
The PLC tags											
Show all tags											
Add new tag tab	le										
Default tag table	[29]										
Tag table_sorting	g_station [28]	~									
✓ Details view											
Name	Data type										
-A1	Bool	<u>^</u>									
-81	Bool	=									
-82	Bool										
-63	B001		1								15
	Bool								100		
	Bool								Q Properti	es Linfo Liagnostics	
-B7	Bool		General	Cross-refe	rences (	Compile Energy S	Suite				
		ľ (	3 . 6	Show all message	es						
	2	(111)		1							
Portal view	Jverview	oo, Wa	tcn table_1							Connection to CPU_1214C terminated.	

® 可以显示以下列用于选择所有观察和控制功能:

I "所有控制列"(All modify columns) 和 III "扩展模式的所有列"(All expanded mode columns)。

现在选择观察的触发时间。(® 永久 (Permanent))

031-	100_	_FC_Pro	gra	mming )	CPU_1214C [	CPL	J 1214C DC/D	C/DC] • Watch	a	nd force tables	•	Watch tal	ble	_1		_∎≡×
																6
<b>1</b>	st 1	ž 😼	L	9,90		_										7
i		Name		Address	Display format		Monitor value	Monitor with trig	1	Modify with trigge		Modify value	9		Comment	Tag comment
1		"-A1"		%10.0	Bool			Permanent		Permanent						return signal emergency sto
2		*-K0*		%IO.1	Bool			Permanent		Permanent						main switch "ON" (no)
3		*-S0*		%10.2	Bool			Permanent		Permanent						mode selector manual(0) / a
4		"-53"		%11.4	Bool			Permanent		Permanent						pushbutton manual mode c
5		"-B1"		%10.5	Bool			Permanent		Permanent						sensor cylinder -M4 retracte
6		*-S4*		%11.5	Bool			Permanent		Permanent						pushbutton manual mode c
7		"-Q1"		%Q0.0	Bool	-		Permanent	-	Permanent 🗸	-					conveyor motor -M1 forwar
8										Permanent Permanently, at st Once only, at start Permanently, at er Once only, at tra Once only, at trans	an of an	t of scan cycle f scan cycle of scan cycle scan cycle sition to STOP ion to STOP	e P			

#### 有以下观察和控制模式可用:

- 永久(在该模式下,在循环开始时观察或控制输入端,在循环结束时观察或控制输出端。)
- 循环开始时一次
- 循环结束时一次
- 循环开始时永久
- 循环结束时永久
- 从 RUN 模式到 STOP 模式的过度时一次
- 从 RUN 模式到 STOP 模式的过度时永久



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SCE\_ZH\_031-410 Basics Diagnostics S7-1200\_R1709.docx

现在单击 "一次性并立即观察所有数值"(Monitor all values once and now) 或单击 21 "根据
 据触发设置观察所有数值"(Monitor all values according to trigger settings)。(⑧ 21 观察全部 (Monitor all))。

<b>*</b>	1. 11 La	9 9 %	200 00							
i	Name	Address	Display format	Monitor value	Monitor with trig	Modify with trigge	Modify value	9	C	Tag comment
	"-A1"	%10.0	Bool	TRUE	Permanent	Permanent				return signal emergency stop ok (nc)
	"-K0"	%I0.1	Bool	TRUE	Permanent	Permanent				main switch "ON" (no)
	*-S0*	%10.2	Bool	FALSE	Permanent	Permanent				mode selector manual(0) / automatic
	"-S3"	%11.4	Bool	FALSE	Permanent	Permanent				pushbutton manual mode conveyor
	"-81"	%10.5	Bool	TRUE	Permanent	Permanent				sensor cylinder -M4 retracted (no)
	"-S4"	%11.5	Bool	FALSE	Permanent	Permanent				pushbutton manual mode conveyor
	"-Q1"	%Q0.0	Bool	FALSE	Permanent	Permanent				conveyor motor -M1 forwards fixed s
Г Г						-	1			

即控制所有已激活的数值"(Modify all activated values once and now),或者单击 <sup>23</sup>,以"通 过控制触发条件控制所有已激活的数值"(All active values will be modified by modify with trigger)。

(® TRUE (真) ® 通过控制触发条件控制所有已激活的数值"(All active values will be modified by modify with trigger))

031-1	00_FC_Progra	mming	CPU_1214C [CP	U 1214C DC/D	C/DC] + Watch	and force tables	<ul> <li>Watch tab</li> </ul>	ole_1		_#=×
<b>₽</b> €	<i>II</i>	9, %	27 00° 00° 1							
i	Name	Address	Display format	Monitor value	Monitor with tria	Modify with trigge	Modify value	9	C	Tag comment
1	*-A1*	%IO. All	active values will be	modified by*m	odify with trigger".	Permanent				return signal emergency stop ok (nc)
2	*-K0*	%10.1	Bool	TRUE	Permanent	Permanent				main switch "ON" (no)
3	*-S0*	%10.2	Bool	FALSE	Permanent	Permanent				mode selector manual(0) / automatic
4	*-53*	%11.4	Bool	FALSE	Permanent	Permanent				pushbutton manual mode conveyor
5	"-B1"	%10.5	Bool	TRUE	Permanent	Permanent				sensor cylinder -M4 retracted (no)
6	*-\$4*	%11.5	Bool	FALSE	Permanent	Permanent				pushbutton manual mode conveyor
7	"-Q1"	%Q0.0	Bool	FALSE	Permanent	Permanent	TRUE		1	conveyor motor -M1 forwards fixed s

® 用"是"(Yes) 确认警告。(® 是 (Yes))



#### ⑧ 该输入端已激活,尽管编程设定的条件未满足。

03	1-100	_FC_Progra	imming	CPU_1214C [C	PU 1214C DC/D	C/DC] • Watch	and force tables	<ul> <li>Watch tab</li> </ul>	ole_1		_ 🖬 🖬 🗙
ý	2	11 1 <b>1</b> 9 110	9, %								
	i	Name	Address	Display format	Monitor value	Monitor with trig	Modify with trigge	Modify value	9	C	Tag comment
1		"-A1"	%10.0	Bool	TRUE	Permanent	Permanent				return signal emergency stop ok (nc)
2		*-K0*	%IO.1	Bool	TRUE	Permanent	Permanent				main switch "ON" (no)
З		"-SO"	%10.2	Bool	FALSE	Permanent	Permanent				mode selector manual(0) / automatic.
4		"-53"	%11.4	Bool	FALSE	Permanent	Permanent				pushbutton manual mode conveyor
5		"-B1"	%10.5	Bool	TRUE	Permanent	Permanent				sensor cylinder -M4 retracted (no)
6		*- <u>5</u> 4*	%11.5	Bool	FALSE	Permanent	Permanent				pushbutton manual mode conveyor
7	-	"-Q1"	%Q0.0	Bool		Permanent 💌	Permanent 💌	TRUE			conveyor motor -M1 forwards fixed s
8											

**提示**:如果观察表关闭或者失去了与可编程逻辑控制的连接,则所有控制指令将无效。

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#### 7.7 变量的强制

⑧ 使用"强制"(强制控制)(Force)功能可以赋予变量一个固定的值。与"控制变量"(Modify tags)时类似,要对强制值进行预设,但与其不同的是,在关闭或停止 CPU 后,它们的值保持不变。"控制变量"(Modify tags)和"强制"(Force)功能之间的区别主要是:

与"控制变量"(Modify tags) 相比,在"强制"(Force) 功能中,不为数据模块、定时器、计数器和标记赋值。

不能控制外围设备输入端(例如 IWxx:P),但是可以通过"强制"(Force)预赋值。

与"控制"(Modify)相比,通过"强制"固定预设的数值不能被用户程序覆盖。

与"控制"(Modify)时不同,如果关闭强制表,则强制值保持不变。

如果中断与 CPU 的在线连接,则保留使用"强制"(Force) 给变量的赋值。

ct Edit View Insert Online Options Tool 强 🔒 Save project 进 💥 💷 🗊 🗙 🏷 🛨 🤆	t tindow	Help	ine 💋 Go offline	å? 🖪 🖪 🗶	a 🔛 <	ch in project>	-	То	tally Integrated Au	tomation PORTA
roject tree 🛛 🗍 📢										
Devices										
4 m										
D 031-100 EC Programming										
Add new device										
Bevices & networks										
▼ 🚰 CPU_1214C [CPU 1214C DC/DC/ 🔽 🔵 😑										
Y Device configuration										
😨 Online & diagnostics										
🕨 🙀 Program blocks										
Technology objects										
External source files										
PLC tags										
Lee PLC data types										
▼ Watch and force tables										
Fill Forme table										
White table 1										
Online backups										
Details view										
Name										
							<b>Q</b> Properties	1 Info	Diagnostics	16
	Conoral	Cross-references	Comnile	Energy Suite	7					
	General	Closs-lefelices	compile							

要进行强制必须首先双击打开强制表。(® 强制表 (Force table))

® 从列表中选择带有地址 %Q0.0 的运算数"Q1"。(® Q1)

1		F. 00 00								
i	Name	Address	Display format		Monitor value	Force value		F	Comment	Tag commen
		<add new=""></add>								
	*-P5*		Bool	%Q1	.1 disp	olay_autom	^			
	-P6*		Bool	%Q1	.2 disp	olay cylinder				
	-P7*		Bool	%Q1	.3 disp	olay cylinder				
	-Q1"		Bool	%Q0	0.0 con	veyor moto				
	-Q2*		Bool	%Q0	0.1 con	veyor moto				
	4 *-Q3*		Bool	%Q0	0.2 con	veyor moto	-			
	*-S0*		Bool	%10.	2 mo	de selector				
	*-S1*		Bool	%10.	3 pus	hbutton aut	~			

® 强制时通过外围设备的直接访问输入运算数 (%A0.0:P)

	FC_Pro		CPU_1214C [CPU	1214C DC/DC/DC]	Watch and for			_ # # X
-	1	🯥 🗓 FA F						
	i	Name	Address	Display format	Monitor value	Force value	F	Comment
1		"-Q1":P	🔳 %Q0.0:P	Bool	- 8			
2								

⑧ 输入所需的强制值并将其激活 ☑。

单击 开始或替换强制"(Start or replace forcing)并将新的强制任务传输给 CPU。

(⑧ %A0.0:P ⑧ TRUE (真) ⑧ ☑ Ⅳ ⑧ ▲ 开始替换或强制 (Start or replace forcing))

J	C_Pro	gramming	CPU_1214C [CPU	1214C DC/DC	7DC] 🕨 Watch an	d force tables → Fo	orce table	_ • • ×
ý	🥐 I	Allo F.	F F	orcing of the visib	le addresses in the f	Force table		Comment
1		"-Q1":P	🗐 %Q0.0:P	Bool	<b>~</b> "%	TRUE		Comment

⑧ 用"是"(Yes) 确认警告。(⑧ 是 (Yes))

Force all	(0710:001)		?	X
	Force all			
	CAUTION: Forcing with " !			
	Do you want to start "forcing" now?			
		Yes N	lo	

® 该强制被激活并且 CPU 上的黄色 MAINT-LED 亮起。此外,在 S7-1200 显示器的右上方将显 示一个红色背景色的 F。

	FC_Pro	ogramming 🕨	CPU_	1214C [CPU	1214C DC/DC/DC]	<ul> <li>Watch and for</li> </ul>	rce tables 🔸 For	ce table	_ # # X
<b>1</b>	1	🥂 🌆 FJ I	F., <b>F.</b> ,	000 000 1					
	i	Name	1	Address	Display format	Monitor value	Force value	F	Comment
1	F	*-Q1*:P		%Q0.0:P	Bool	- 8	TRUE		
2									

提示:如果关闭观察表或者失去与可编程逻辑控制的连接,则强制保持激活状态并且 CPU 上黄色 的 FORCE LED 继续亮。

- ® 如果要"强制退出"(Stop forcing),请单击: " F 强制退出"(Stop forcing)并用"是"(Yes)确认 后续的提示。

  - (® **L**出强制 (Stop forcing)) "是"(Yes)。(® 是 (Yes))

	FC_Pro		CPU_12	14C [CPU	1214C DC/DC	/DC] 🕨	Watch and fo	rce tables 🔸 For	rce table	
-	1	12 Io Fi	F. <b>F.</b> °	on oon 1						
	i	Name	Stop	os forcing o	f the selected ad	dresses.	Monitor value	Force value	F	Comment
1	F	*-Q1*:P	1 %Q	0.0:P	Bool	- C	8	TRUE		
2										

退出强制并且 CPU 上的黄色 MAINT-LED 熄灭。

如果在控制器中已存在一个强制任务,则通过观察表中的符号 🛅 显示。如果接着用鼠标选择 (R) 🕒,则显示更多信息。(® 🖣)

	Progr	amming 🕨	CPU_1214	IC [CPU 1214C D	()DC/DC] 🕨 V	Natch and force t	ables 🕨 Watch t	able_1 🗕	
1	1	1. 1 <b>9</b> 16	91 90 ×	70 00h 00h ▶ 1					
	i	Name	Address	Display format	Monitor value	Monitor with trig	Modify with trigge	Modify value	9
1		"-A1"	%10.0	Bool		Permanent 💌	Permanent		
2		*-K0*	%10.1	Bool		Permanent	Permanent		
3		*-S0*	%10.2	Bool		Permanent	Permanent		
4		*-53*	%11.4	Bool		Permanent	Permanent		
5		"-B1"	%10.5	Bool		Permanent	Permanent		
6		*-S4*	%11.5	Bool		Permanent	Permanent		
7	E	"-Q1"	%Q0.0	Bool		Permanent	Permanent	TRUE	M 1
8			<add new:<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td></add>						

® 如果在控制器中已存在一个强制任务,则可以通过在线设备视图显示和退出该任务。为此,必须在设备视图的在线模式下用鼠标右键单击 CPU 并选择"更新和显示已强制的运算数"(Update and display forced operands)。

(⑧ 用鼠标右键单击 CPU ⑧ 更新和显示已强制的运算数 (Update and display forced operands))



® 现在将显示带有当前强制任务的强制表并且可以退出该表格。(® 型 退出强制 (Stop forcing))

VIA	Siemens - C:\Users\mde\Documents\A	utomati	on\031	-100_FC	C_Programmi	ing\031-100_FC_f	Programming						_ ¤ ×
Project Edit View Insert Online Options Tools Window Help 🕆 🔁 🔜 Save project 📑 💥 🖄 🗟 🗙 K 🗳 C4 ± 🖏 🖸 😭 🔛 😭 🖉 Go online 🚀 Go offline 🎄 🕞 🕼 K* 🖃 🛄 Gearch in projects 🖓										Totally Integrated A	Automation PORTAL		
			J								_ • • • ×	Testing	<b>a</b> u 🕨
	Devices											Options	8
	13		-	1	📙 🖬 F	F. 00 00	_						I es
2				i	Name	Stops force	ng of the selected	addresses. litor value	Force value	F	Comment	✓ CPU operator panel	ting
1	<ul> <li>031-100_FC_Programming</li> </ul>	00	1	F	*-Q1*:P	3 %Q0.0:P	Bool	· · · · · · · · · · · · · · · · · · ·	TRUE			CRU 12140 [CRU 12140]	ncincinci
ā.	Add new device		2										
5	Devices & networks											RUN/STOP	RUN
Ξ.	▼ Fi CPU_1214C [CPU 1214C DC/DC/											ERROR	STOP
ž	Device configuration												0
	🚱 Online & diagnostics												ARES .

## 7.8 检查清单

编号	说明	已检查
1	项目"031-100_功能编程"已成功恢复。	
2	项目"031-100_功能编程…"中的 CPU 1214C 已成功加载。	
3	CPU 1214C 已在线连接。	
4	用在线和诊断检查 CPU 1214C 的状态。	
5	CPU 1214C 中的模块的离线/在线比较已进行。	
6	观察表_1 已创建。	
7	变量 (-S0 / -S3 / -K0 / -B1 / - S4 / -A1 / -Q1) 己输入到观察 表中。	
8	通过控制观察表中的输出端 (-Q1 = 1) 接通传动带电机向前 运行。	
9	通过控制观察表中的输出端 (-Q1 = 0) 关闭传动带电机向前 运行。	
10	打开强制表	
11	变量 (-Q1:P) 已输入到强制表中。	
12	通过在强制表中强制输出端 (-Q1 = 1) 接通传动带电机向前 运行。	
13	重新关闭输出端 –Q1 的强制。	

# 8 练习

### 8.1 任务分配 - 练习

本练习将对"SCE\_EN\_031-200\_功能快"编程一章中的功能模块"电机\_自动 [FB1]"进行测试。 练习的挑战在于,柱体位于前终端位置,因此无法批准接通传送带。 应借助柱体观察表使其移到后终端位置,以能够在模块"电机\_自动 [FB1]"中批准接通传送带。

#### 8.2 规划

请按照逐步说明独立进行分配的任务。

### 8.3 检查清单 – 练习

编号	说明	已检查
1	项目"031-200_功能块编程"已成功恢复。	
2	项目"031-200_功能块编程"中的 CPU 1214C 已成功加载。	
3	观察表已创建并已在"观察表_柱体"中重命名。	
4	变量 (-B1 / -B2 / -M2) 已输入到观察表中。	
5	通过控制观察表中的输出端 (-M2 = 1) 驶入柱体。	
6	柱体己驶入 (-B1 = 1)	
7	在观察表中重置驶入柱体的输出端 (-M2 = 0)。	

# 9 更多相关信息

可将其他说明指导资料作为辅助学习手段,以帮助您进行入门学习或深化学习,例如:入门指南、视频、辅导材料、APP、手册、编程指南或试用版软件/固件等,请单击链接获取相关资料:

www.siemens.com/sce/s7-1200

预览"其它信息"

- Getting Started, Videos, Tutorials, Apps, Manuals, Trial-SW/Firmware
  - ↗ TIA Portal Videos
  - TIA Portal Tutorial Center
  - > Getting Started
  - ↗ Programming Guideline
  - ↗ Easy Entry in SIMATIC S7-1200
  - > Download Trial Software/Firmware
  - ↗ Technical Documentation SIMATIC Controller
  - ↗ Industry Online Support App
  - TIA Portal, SIMATIC S7-1200/1500 Overview
  - ↗ TIA Portal Website
  - ↗ SIMATIC S7-1200 Website
  - ↗ SIMATIC S7-1500 Website

### 其它信息

西门子自动化教育合作项目 siemens.com/sce

SCE 学习/培训文档 siemens.com/sce/documents

SCE 培训包 siemens.com/sce/tp

SCE 联系伙伴 siemens.com/sce/contact

数字企业 siemens.com/digital-enterprise

行业 4.0 siemens.com/future-of-manufacturing

全集成自动化 (TIA) siemens.com/tia

TIA Portal siemens.com/tia-portal

SIMATIC 控制器 siemens.com/controller

SIMATIC 技术文档 siemens.com/simatic-docu

工业在线支持 support.industry.siemens.com

产品目录和在线订购系统网上商城 mall.industry.siemens.com

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