

ELCO

PROFIBUS DP ENCODER

----编码器使用手册



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Version 1.0



前言

1. 本手册适用范围:

适用于 ELCO 公司 PROFIBUS-DP 协议的编码器产品。 通过手册中的信息,您可以在 PROFIBUS-DP 模式下连接控制器运行 PROFIBUS-DP 总线上的编码器产品。

2. 所需基本知识:

本手册假定您具有电气及自动化工程领域的基础知识。 本手册基于发行时的有效数据描述各组件,新组件及参数调整会在新版手册 中更新。

3. 指南:

本手册介绍了 PROFIBUS-DP 协议下编码器的硬件及使用。涵盖范围包括:

- 安装与接线
- 技术特性
- 使用实例
- 技术参数

4. 技术支持:

本手册尽可能全面的描述编码器的产品特性及使用方法,如有疑问或关于此 产品的其它问题,请联系当地 ELCO 公司办事处,或拨打服务热线 400-608-4005。 您还可以通过 ELCO 公司网站了解更多自动化产品:

http://www.elco-holding.com.cn/

5. 责任免除:

我们已对手册中所述内容与硬件和软件的一致性做过检查。 但不排除存在偏差的可能性,无法保证所述内容与硬件和软件的完全一致。 数据参数按规定已进行了相关检测,必要的修改会在新版本中完善。

6. 版权声明



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1. 产品概述

1.1 简介

PROFIBUS-DP 总线编码器符合欧洲标准 EN50170 卷 2 中所描述的 PROFIBUS-DP 标准, 遵守已经建立起的编码器设备管理文件, 编码器 PROFIBUS 设备管理文件序列号 3.062. 本手册主要详细说明 PROFIBUS-DP 总线编码器的安装 和带有 PROFIBUS-DP 接口的编码器配置。

1.2 产品介绍

PROFIBUS-DP 编码器提供了包括实时位置、方向设置、单圈分辨率设置、总圈数设定、地址拨码开关设置、终端电阻拨码等功能。

1.3 特性

- LED 及屏幕状态指示,并提供在线诊断和通道保护功能
- 显示总线设备活动情况,具有 RESET 功能
- 具备旋转方向、单圈分辨率、总圈数等可配置参数。

2. 技术特性

2.1 接口说明

此图为 PROFIBUS-DP 编码器的接线端子、拨码开关、终端电阻拨码示意图。



编码器接线盒内接线端子示意图



E1:终端设置开关—— 默认为OFF 如编码器为终端或者单机设备,将拨码 开关拨为ON,阻值120Ω

E2、E3:地址设定开关

采用十进制组合设置

如图示意默认地址为4

接线说明

V+	电源供电
GND	供电地
В	Profibus-DP入线(红)
A	Profibus-DP入线(绿)
В	Profibus-DP出线(红)
A	Profibus-DP出线(绿)

提示:接线时应首先确认电源线及电压等级,防止对编码器造成不可逆转的损坏。

2.2 硬件参数

电源输入	+24VDC
输入电压	18VDC~30DCV
工作温度	-4080°℃
存储温度	-4585℃
抗振动性	10G 102000Hz
抗冲击性	50G/11ms
轴负荷	40N 轴向 80N 径向
防护等级	IP65
轴承寿命	10 ⁹ 转数



2.3 LED 灯指示

指示灯 名称	指示灯状态	指示灯含义	可能原因
Dowor	灭	无供电	供电线缆故障
Power	绿	供电正常	
	红	通讯异常	1. 网络线缆故障
			2. 软件 DP 地址配置和编码器拨
ERR			码开关不一致
	TT.	PROFIBUS 主站和编码器通	
	×	讯正常	

3. 安装尺寸

3.1 尺寸图

PAMM58B







4. 使用实例

4.1 安装编码器 GSDML 文件

本节依 TIA Portal V14 软件为例,在软件的"选项"下拉菜单中单击"管理通用站描述文件(GSD)"打开对话框,在源路径内找到要安装的 GSDML 文件路径,在导入路径的内容选择需要安装的 GSDML 文件,单击"安装"按钮。如下图:



4.2 编码器组态

本节通过一个组态连接的实际操作流程,让用户全面了解 PROFIBUS DP 编码器实际使用。本例采用 ELCO 公司的 PROFIBUS DP 编码器作为 PROFIBUS DP 从站连接西门子 s7-1500PLC DP 通讯模块 CP1542-5,通过 PC 机上的 TIA Portal V14 软件进行组态和调试,以下我们将通过图片形式详细介绍具体的软件组态和调试流程。

1) 设备连接

通过 s7-1500 控制器加以扩展连接 PROFIBUS DP 通讯模块 CP1542-5,在装有 TIA Portal V14 软件的 PC 机网口。将编码器和 PLC 模块的电源线连接在 DC +24V 的电源输出端,连接 DP 通讯模块和编码器之间的通讯线。

2) 添加新设备

在 TIA Portal V14 软件的左侧 "项目"菜单内双击"添加新设备"选择型号和 版本相一致的 PLC,单击 "Add" 按钮。如下图:



-									
VIA S	Siemens - C:\Users\zar	ibin.gao\Desk	top\project-dp\project-dp						
				Add new device					
	Devices &		Show all devices	Device name:					
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					SIMATIC 57-1200	^	Device:		
					- CRU				
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		and a second		Controllers	6557 511-14K00-0480			8	
					6ES7 511-1AK01-0AB0				
					CPU 1511C-1 PN			CPU 1511-1 PN	
					CPU 1512C-1 PN				
					CPU 1513-1 PN		Article no.:	6ES7 511-1AK01-0AB0	
	Online &	<i>~</i>		HMI	CPU 1515-2 PN		Version:	V1.8	
		-	Configure networks		CPU 1516-3 PN/DP				
					CPU 1517-3 PN/DP	-	Description:		
					CPU 1518-4 PN/DP		CPU with disp	play; work memory 150 KB code a	ind
					CPU 1518-4 PN/DP ODK		1 MB data; 60	0 ns bit instruction time; 4-stage	
					CPU 1511F-1 PN		functions: Mo	otion Control, closed-loop control	
				PC systems	CPU 1513F-1 PN		counting&me	easuring; integrated tracing;	
					CPU 1515F-2 PN		MRP, transpo	rt protocol TCP/IP, S7	
					CPU 1516F-3 PN/DP		communicat	tion, Web server, constant bus cyc	le
					CPU 1517F-3 PN/DP		time, routing	; firmware V1.8	
					CPU 1518F-4 PN/DP				
					CPU 1518F-4 PN/DP ODK				
			💮 Help		CPU 1511T-1 PN				
					CPU 1515T-2 PN				
					CPU 1517T-3 PN/DP				
					CPU 1511TF-1 PN				

在 TIA Portal V14 软件的右侧 "硬件目录" 菜单内 "通信模块"内找到需要添加的通信模块名称,拖拽到网络视图内。

本手册选择 PROFIBUS 通讯模块 CP1542-5 如下图:

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PLC tags																		0
PLC data types					_													0
Watch and force table:	s																	0
Online backups		1								-								0
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PLC alarm text lists		General	IO tag	s Sys	tem cons	stants	Texts	5										
Local modules		- General		[pport													
Ungrouped devices		Project in	nformation		PROFIL	BUS addre	ess											
Common data		Catalog	information		Inte	rface net	tworked	with										
Documentation settings		Identifica	ation & Main	tenance														
Languages & resources		- Module par	ameters					Subnet	: Not	netwo	orked	_						
Online access		General								Add	new	ruhne						
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		General			Dava	mators												
		PROFIBU	S address		Para	meters												

3) 组态设置

选择"网络视图"在 TIA Portal V14 软件的右侧菜单内"其它现场设备"内找 到子菜单 PROFIBUS DP 选择相应的编码器,拖拽到网络视图内。如下图:



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Common data					Name: GSD devic	:e_1			1
Documentation settings					Author: zanbin.ga	0			1
Languages & resources				Con	ment:				
Online access			-	Con					1
Card Reader/USB memory			•						
								~	

双击 PROFIBUS 通讯模块 CP1542-5,在弹出的对话框内单击"属性",选中"add new subnet",建立 DP 通讯网络,设置 DP 地址。如下图:

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Devices & networks	PLC_1		SI	ave_1			CP 1542-5 1	CP 1542-5	Fil
PLC_1 [CPU 1511-1 PN]	CPU 1511-1 PI		En	coder EICO	DP-NORM	1	▼ GSD device 1	GSD device	- P 🚺
Device configuration			N	Select master:			Slave 1	Encoder El	- I • 🗖
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External source files) + 🛅
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Watch and force tables	PROFIBUS int					Properties	📜 Info 🔒 📱 Diac	nostics	🛛 🕨 🛅
Online backups	Consul	10 +=== 6		Tauta					- 🐚
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PLC supervisions & alarms	Operating mo	ode	Interface r	etworked with					
PLC alarm text lists	Time synchro	nization							
Local modules	SYNC/FREEZE			Subnet:	PROFIBUS_1			-	
La Ungrouped devices	Hardware ide	entifier			Add ne	wsubnet			
Unassigned devices									
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点击"Not Assigned"选中 PLC_1.CP1542-5_1.PROFIBUS interface。CP1542-5 模块与编码器自动连接。如下图:



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h Devices & networks	PLC_1	Slave_1			CPU 15111			
PLC_1 [CPU 1511-1 PN]	CPU 1511-1 PN	Encoder EICO DP-NORM		▼ GSD device 1	GSD device			
Device configuration		<u>CP 1542-5_1</u>		Slave 1	Encoder El			
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PLC supervisions & alarms	General							
PLC alarm text lists	PROFIBUS address	PROFIBUS address						
Local modules	General DP parameters	Interface networked with						
Distributed I/O	Watchdog							
Res of the second se	SYNC/FREEZE	Subnet: PROFIBUS_1						
Ungrouped devices	Hardware identifier							
Giff Common data			new subnet					
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Hard Ungrouped devices Gommon data E Documentation settings G Languages & resources		A00						
Gommon data Gommon data Documentation settings Canguages & resources Online access		Parameters						

双击编码器设备,进入设备视图界面,如下图所示,单击软件右侧硬件目录 内的模块下拉箭头,然后选择需要的模块,并拖拽到设备概览区。

本手册以 Class 2 Multiturn-4096 turns 为例说明,如下图:

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Device configuration			•				1
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External source files							
PLC tags							
PLC data types							
Watch and force tables			~				
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Traces	Class 2 Multiturn - 4096 turn	s 1 [Module]	Prop	sties Diago	ostics		1
Device proxy data		is_i [module]			osues	-	
Program info	General IO tags St	ystem constants Texts					
PLC supervisions & alarms	 General 					^	1
PLC alarm text lists	Device-specific parameters	I/O addresses				- =	
Local modules	Hex parameter assignment						
Distributed I/O	I/O addresses	Input/output typ	e: Input/output			2	
Ungrouped devices	Hardware identifier	Manufacturer specific dat	a. [6	
Common data		monorecurer speeme out					
Documentation settings			(max. 14 byte nexadecima or space)	i, separated by comma			
Languages & resources							
Online access		Input addresses					
Card Reader/USB memory							
		Start addres	s: 0				

双击 CP1542-5 模块、编码器设备块,在常规对话框内设置增加 PROFIBUS DP 总线和设置 DP 地址, CP1542-5 做为主站、编码器做为从站,编码器软件设置 DP 地址要和编码器拨码开关保持一致。

CP1542-5 模块的 DP 地址设置为 2, 如下图:



Siemens - C:\Users\zanbin.gao\Deskto	p\project-dp\project-dp									
Project Edit View Insert Online Op	tions Tools Window Help									
📑 🎦 🔚 Save project 📇 🐰 🗐 👔	K 🎝 ± (러 ± 🗄 🗉 🖬 🖫 🖓	💋 Go online 📓 Go offlir	ne 🎝 🖪	- × -	🚽 🛄 🔜 Searc	h in proje	ect> 🙀			
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Devices & networks	0 1 2	3 4 5 6	7 15	23 31			▼ PLC_1	0	1	_ 🖌 F
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Device configuration	Rail_0						• CP 1542-5_1	0	2	C
Online & diagnostics					-		FROFIBUS Intenace	0		C
Program blocks			8	16 24	•			0	2	C
Technology objects								0	4	► 1
External source files			15	23 31				0	2	► 1
PLC tags								0	7	- I - D
PLC data types								0	,	- I + [
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PLC supervisions & alarms	▼ General	1								~
PLC alarm text lists	Project information	DDOCIDUIC address								
Local modules	Catalog information	FROFIDUS address							_	
Ungrouped devices	Identification & Maintenance	Interface network	ed with							
Unassigned devices	▼ Module parameters									•
Common data	General		Subnet:	PROFIBUS	1				•	- •
Documentation settings				Add	new subnet					
Languages & resources	General									
Online access	PROFIBUS address	Parameters								
Card Reader/USB memory	Operating mode									
	Time synchronization	•	Address	2					-	

编码器的 DP 地址设置 4, 如下图:

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	Network Connection V 2 4 1 1 4 4	
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Add new device	PLC_1 CPU 1511-	
Devices & networks	CPU 1511-1 PN Encoder EICO PR. UNBAL	
▼ U PLC_1 [CPU 1511-1 PN]	Not assigned	
Device configuration	Slave_1 Encoder El	
Soline & diagnostics		
Program blocks	PROFIBUS_1	
Technology objects		
External source files		
PLC tags		
PLC data types		
Watch and force tables		
Online backups	< III > 100% •	
Traces	Slave 1 [Module]	1
Device proxy data		•
Program info	General IO tags System constants Texts	•
PLC supervisions & alarms	> General DBOTINUS - Here	
PLC alarm text lists	PROFIBUS address	
Local modules	General DP parameters Interface networked with	
La Ungrouped devices	Watchdog	
Unassigned devices	SYNC/FREEZE Subnet: PROFIBUS_1	
Common data	Add new subpet	
Documentation settings		
Languages & resources	Parameter	
Online access	- relative et s	
Card Reader/USB memory	Address A	
	Address: 4	

4.3 编码器设置项的使用

编码器提供包括旋转方向、单圈分辨率、总圈数设置在内的多个可设置项。

1) 旋转方向设置:

在编码器设备概览视图中单击 "Class 2 Multiturn-4096 turns_1",在弹出的对 话框中单击 "模块参数",进入参数设置界面。如下图:



Project tree		project-dp → Ungrouped devi	ices → Slave_1				
Devices				2	Topology view	h Netwo	ork view 🚺 D
<u></u>	💷 🖻	Slave_1 [Encoder EICO]	💌 🖽 🖾 🖌 🖬 🛄 🔍 ±		Device	e overview	
- Et ensiet de					<u>^</u> <u>*</u>	Module	
project-op	^				-	Slave_1	
Add new device		- Per				Class 2 M	Aultiturn - 4096 turn
		Slo					
Device configuration					-		
Chine & diagnostics					1		
Tachpalagy abjects					-		
Enternal source fler			DP-NORM				
PIC tags	-						
PIC data types							
Watch and force tables							
Online backups		Z [3 100%				
Traces		× m	2 100%				1 mil
Device proxy data		Class 2 Multiturn - 4096 turns	s_1 [Module]		Q Properties	L Info	B Diagnostics
Program info		General IO tags Sy	stem constants Texts				
PLC supervisions & alarms		• General	N				
PLC alarm text lists		Device-specific parameters	Device-specific parameters				
Local modules		Hex parameter assignment					
Ungrouped devices		I/O addresses	Count direction:	Increasing clockwis	0		
Unassigned devices			count direction.	increasing clockin			
🕨 🥁 Common data			Class 2 functionality:	Enable			
Documentation settings			Scaling function control:	Enable			
Languages & resources			Singleturn resolution:	8192			
🔻 🔚 Online access			 Total resolution (high): 	512			
Y Display/hide interfaces			Tatal analytics (law):	0			
	1 mm		ID(a) resolution (IOW):	0			

在 Count direction 的下拉菜单中选择编码器的正反转, Increasing clockwise: 正转, Increasing counter clockwise: 反转。如下图:

Na Siemens - C:\Users\zanbin.gao\Desktop\project-d	p\project-d	p					
Project Edit View Insert Online Options Too	ls Window	/ Help					
Save project = V = + × ++++	ai + [195, 1]	🛛 🗔 🖳 🚿 Go online 🚿 🖉	io offline 🎝 🌆 🖪 🗶 🛏 🔲 🗖	Search in project	Ba		
				General projecto			
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F93	🔲 🐋	Slave_1 [Encoder ElCO]	▼ ☶ 뿐 🖌 ☷ 🔳 @.±		Device	overview]
2							
To project-dp	~				T	Module	
Add new device		1				Slave_1	
Devices & networks		1342				Class 2 Mul	ltiturn - 4096 turns
PLC 1 [CPU 1511-1 PN]				_			
Device configuration							
Online & diagnostics					E		
Program blocks		_			•		
Technology objects			DP. NOPM		T		
External source files	_						
PLC tags							
PLC data types							
Watch and force tables							
Online backups		Z	3 100%		<u> </u>		
Traces							(22)
Device proxy data		Class 2 Multiturn - 4096 turn	is_1 [Module]		Properties	1 Info	C Diagnostics
Program info		General IO tags S	ystem constants Texts				
PLC supervisions & alarms		▶ General					
PLC alarm text lists		Device-specific parameters	Device-specific parameters				
Local modules		Hexparameter assignment					
Ungrouped devices		I/O addresses	Count direction:	Increasing clockwise			
Unassigned devices				Increasing clockwise			
Common data			Class 2 functionality:	Increasing counter cl	lockwise		
Documentation settings			Scaling function control:	Enable			
Languages & resources			Singleturn resolution:	8192			
 Gonline access 			 Total resolution (high): 	512			
Y Display/hide interfaces							
 Intel(R) Ethernet Connection (4) I219-LM 	1		 Iotal resolution (low): 	U			

2) 单圈分辨率和总圈数设置:

在 singleturn resolution 窗口内设置单圈分辨率,因选择通用模块是 Class 2 Multiturn-4096 turns_1,总圈数是固定 4096,根据总的分辨率来设定单圈分辨率。比如总的分辨率是 25 位,则单圈分辨率是 25 位(总分辨率)除总圈数 12 位(4096),单圈分辨率是 8192 (2¹³)。若总的分辨率是 24 位,则单圈分辨率是 24 位(总分辨率)除总圈数 12 位,单圈分辨率是 4096 (2¹²)。

在 Total resolution 窗口内设置分辨率,比如编码器总分辨率是 25 位 (4096/8192),则高位是 25 位减去 16 位,是 9 位,则是 512 (2⁹)。比如编码器 总分辨率是 24 位(4096/4096),则高位是 24 位减去 16 位,是 8 位,则是 256(2⁸)。



若总分辨低于 16 位,则是 Total resolution (高位)填写数值 0, Total resolution (低位)填写数值总分辨率实际值,比如 15 位,则是数值 32768,单圈分辨率根据单圈分辨率设置规定输入数值。

举例:如单圈分辨率是 8192,则总分辨率(高)是 512。 如单圈分辨率是 4096,则总分辨率(高)是 256。

数据设置如下图:

Kiemens - C:\Users\zanbin.gao\Desktop\project-dp\p	oroject-d	p					
Project Edit View Insert Online Options Tools	Window	Help					
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िश्रे		Slave 1 [Encoder ElCO]	- = # 4 = 1 • •		Device	overview]
s z							
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Add new device						Slave_1	
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PLC 1 [CPU 1511-1 PN]		9		_			
Device configuration							
Conline & diagnostics					-		
Program blocks					•		
Technology objects			DP-NORM		_		
External source files	=						
PLC tags							
PLC data types							
Watch and force tables				_	~		
Online backups		<	> 100%		- • <		
🕨 🔀 Traces		Class 2 Multiturn - 4096 tu	urps 1 [Module]		Dreparties	2 Info	Discussion
Device proxy data					roperties	<u> </u>	Diagnostics
Program info		General IO tags	System constants Texts				
Sector PLC supervisions & alarms		▶ General					
PLC alarm text lists		Device-specific parameters	Device-specific parameters _				
Local modules		Hex parameter assignment					
La Ungrouped devices		I/O addresses	Count direction:	Increasing clockwis	se .		
Unassigned devices			Class 2 functionality	Enable			
Common data							
Documentation settings			Scaling function control:	Enable			
Languages & resources			Singleturn resolution:	8192			
Inine access			Total resolution (high):	512			
Display/hide interfaces			Total resolution (low):	0			
 Intel(R) Ethernet Connection (4) I219-LM 	Page 1						

3) 编译下载:

单击菜单上"下载至设备"按钮,对当前的组态配置进行编译,将编译完的 程序下载到对应的 PLC 内,如下图:

Save project = ¥ = T × 5 + (el e 🐘 🖪 🖬 🖪 🖪 💋	Go online 🦪 Go off	ine 🎝 🌆 🖪 🗙		Search in proj	ects de				
Project two					o concini proj					
	Extended download	d to device		_	_			×		
Devices								iew		
F93		Configured acces	s nodes of "PLC_1"							
		Device	Device type	Slot	Туре	Address	Subnet			
D project dp		PLC_1	CPU 1511-1 PN	1 X1	PN/IE	192.168.0.1				
Add new device		CP 1542-5_1	CP 1542-5	2 X1	PROFIBUS	2	PROFIBUS_1			
Bevices & petworks										
▼ ■ PLC 1 [CPU 1511-1 PN]								nterf		
Device configuration										
V. Online & diagnostics			Time of the PC/PC in	torfacos	DAL/UT		-	nter		
Program blocks			type of the Fair Cill	tenace.	- FINIE			_		
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External source files		Connection to interface/subnet: Direct at slot '1 X1'								
PLC tags				ateway:						
C PLC data types										
Watch and force tables						-		_		
🕨 📴 Online backups		Select target dev	ice:			Show all compatib	le devices	-		
🕨 🔀 Traces		Device	Device type	Interfac	ce type 🛛 A	ddress	Target device			
Device proxy data		PLC_1	CPU 1511-1 PN	PN/IE	1	92.168.0.1	PLC_1			
Program info		-	-	PN/IE	1	Access address	-			
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4.4 监控表的使用

在 TIA Portal V14 软件左侧的"监控与强制表"的下拉菜单内双击"添加新监 控表",在弹出的窗口内设置编码器数据输入和输出地址。

实时位置数据输入地址为 ID0,预设值设置位为 Q0.7,预设值设置 QD0 实时位置数据如下图:

P	roject Edit View Insert Online	Options	Tools V	índow Help								
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	PLC supervisions & alarms											
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	~										10/10/0010 11.10.07 444	

通过修改设置位 Q0.7 状态,对编码器进行置位 0.

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Save project Edit View insert Online	v D		Si Co online	Co offline				
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Device configuration								Monitor now 71
Q Online & diagnostics								⇒ Insert row 20
Program blocks								Add row
Technology objects	-							A second
External source files								uter insert comment line
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 Watch and force tables 								Paste Ctrl+V
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可将预设值数据通过 QD0 修改。



通过修改设置位 Q0.7 状态 1,显示 TURE 时, ID0 数据为 10000

Project tree				PU 1511-1 PN] 🕨				able				- •
Devices												
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