RSLogix5000 环境下 EtherNetIP 控制 CMMP-M3 (2016 之前功能块)



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关键词:

AB, RSLogix5000, EthernetIP, CMMP

摘要:

本文介绍了使用 AB PLC 控制 Festo CMMP-M3 控制器的实例,通讯协议为 EthernetIP, PLC 编程软件为 RSLogix5000。 文档主要内容包括 CMMP 硬件接线,FCT 本地调试,RSLogix5000 配置,功能块 FHPP,FPC,FHPP+以及常用功能的使用等。

目标群体:

本文仅针对有一定自动化设备调试基础的工程师,需要对 Festo CMMP 伺服以及 RSLogix5000 有一定了解。

声明:

本文档为技术工程师根据官方资料和测试结果编写,旨在指导用户快速上手使用 Festo 产品,如果发现描述与官方 正式出版物冲突,请以正式出版物为准。

我们尽量罗列了实验室测试的软、硬件环境,但现场设备型号可能不同,软件/固件版本可能有差异,请务必在理 解文档内容和确保安全的前提下执行测试。

我们会持续更正和更新文档内容, 恕不另行通知。

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1 硬件安装及接线

1.1 安装

Installation clearance for motor controlle



Туре	H1 ¹⁾	L1
CMMP-AS-C2-3A CMMP-AS-C5-3A	100	71
CMMP-AS-C5-11A-P3 CMMP-AS-C10-11A-P3	100	85
CMMP-AS-C20-11A-P3	100	95

<mark>注意:为方便接线及维护,请保证 H1>150mm</mark>

1.2 硬件接线

1.2.1 供电电源 X9

单相供电电压范围:1x100...230 VAC [±10%]

三相供电电压范围: 3x 230 ... 480 VAC [± 10%]

24VDC供电电压范围:24 VDC [+6% -10%]

关于制动电阻:

<mark>若无特殊说明,使用内部制动电阻,需将BR-CH和BR-INT短接(出厂默认短接线)。</mark>(95%的应用都是使用内部制 动电阻)

如果使用外部制动电阻,将制动电阻串入 BR-CH 和 ZK+之间。

1. 单相控制器供电

单相控制器包括 CMMP-AS-C2-3A-M3 和 CMMP-AS-C5-3A-M3。



2. 三相控制器供电

三相控制器包括CMMP-AS-C5-11A-P3-M3、CMMP-AS-C10-11A-P3-M3和CMMP-AS-C20-11A-P3。



1.2.2 电机电缆接线 X6

<mark>请按如下图示颜色接线,注意</mark>:

1. U/V/W 信号线要跟线上的 U/V/W 标记对应,不能接混,否则,伺服电机无输出扭矩,不能正常工作。

2. 刹车线 BR+对应绿色线;BR-对应黄色线,不能接反,否则伺服马达无法打开抱闸。

3. 如果伺服马达不带抱闸,BR+和 BR-可以不接,同时将绿色线和黄色线用绝缘胶带包好。



1.2.3 编码器电缆接线 X2B

W---W3

使用 EMMS-AS 或 EMME-AS 系列的电机,请将编码器电缆连接 X2B 接口(15 针);

1.2.4 安全停止模块或拨码模块接线 X40

1. 安全停止模块(CAMC-G-S1)为选配模块,如果不需要 STO 功能,可选配 CAMC-G-M1 拨码模块。 如果订购了安全停止模块,且不使用 STO 功能,需要按下图所示短接。

2. 无论是安全模块 CAMC-G-S1 或拨码模块 CAMC-G-M1,使用总线控制时,请将 DIP8 拨到 ON,激活总线。



3. 如果使用安全停止功能,接线方式如下。其中 STO_A 和 STO_B 与 24VDC+导通时端子 C1 和 C2 闭合。



EtherNet/IP 总线卡必须插在右边的插槽内。



1.2.6	控制接口	□接线 X1		
	针脚	颜色 ¹⁾	接线端	
			CMMP	
	2	白	模拟量输入 0	
_	15	棕	#模拟量输入0	
	3	绿	模拟量输入1/数字量输入12	
	16	黄	模拟量输入2/数字量输入13	
	4	灰	+ 参考电压	
	1	粉	模拟地线	
	17	蓝	模拟量输出O	
	5	黑	模拟量输出1	
	14	红	模拟地线	
		紫	模拟地线	
	18	灰/粉	+ 24 VDC	
	19	红/蓝	数字量输入0	
	7	绿/白	数字量输入1	
	20	棕/绿	数字量输入2	
	8	黄/白	数字量输入3	
E_EN	21	棕/黄	数字量输入4	
C_EN	9	灰/白	数字量输入5	
SW_0	22	棕/灰	数字量输入6	
SW_1	10	白/粉	数字量输入7	
_	23	棕/粉	数字量输入8	$\sim \chi$
	11	蓝/白	数字量输入9	
	24	棕/蓝	数字量输出0	
	12	红/白	数字量输出1	
	25	棕/红	數字量输出 2 / 数字量输入 10	
	13	黑/白	数字量输出3/数字量输入11	505
GND	6	黑/棕	地线	·

- Pin22 接负向限位开关输出信号(一般是黑色线); Pin10 接正向限位开关输出信号

<mark>注意:</mark>

- 如果 PLC 和伺服驱动器 CMMP 由同一个 24V 电源供电,则 Pin6 可以不接,用绝缘胶带包起来;否则,必需将两个 24V 电源共地。
- 不用的散线需剪断,并把 Pin18、Pin24、Pin12、Pin25 和 Pin13 用绝缘胶带包起来,防止与屏蔽层 或其他针脚接触,否则可能造此成短路。
- 2 FCT 软件调试
- 2.1 软件安装
- 2.1.1 CMMP 插件下载安装

到 FESTO 官网下载 CMMP-M3 调试插件。 https://www.festo.com.cn/cn/zh/search/?text=1501325&tab=DOWNLOADS

⁻ Pin21 和 Pin9 接 PLC 输出端子, Pin6 接 OV。

主页 自动化 教学与培训 案例 关于费斯托 职业发展	▲登录	₩ 购物车	China ZH
✓ 1501325			
产品1 支持/下载99 主题0			
Application to convert FCT components for the device family CMMP-AS from version 1.x or 2.x to the latest version 2.x अंग्रिट			
USB driver Installer Driver			
USB driver Zip file without installer Driver			
FCT - Festo Configuration Tool - PlugIn Configuration and commissioning software for the motor controller CMMP-AS 해있고			

注意:安装过程出现下面画面,需要选择需要安装的插件版本。

B FCT Setup	授 FCT Setup
Select Features Select features FCT setup will install. Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select or deselect the features you want to install. Image: Select the features you want to install.	Select Features Select features FCT setup will install. Select or deselect the features you want to install. Image: Plugins Image: Plugins
211GB available 32KB required 211GB remaining on drive C:	211GB available 32KB required 211GB remaining on drive C:
Next > Cancel	Next > Cancel

2.2 修改 CMMP 控制器 IP 地址

0. 检查硬件连接

再次确认

- X9 端子 24V 电源及负载电源(单相 220VAC 或三相 380VAC)线接线是否正确
- X6 端子 U/V/W 端子接线与线上标记是否一致
- Ext3 是否已插入拨码模块或安全模块
- Ext1/2 是否已插入对应的总线卡

确认无误后,给控制器上电。初次上电时,控制器前面板上 LED 会有报错代码,属于正常现象,因为控制器内部还没有下载配置文件,且拨码模块或安全模块未被识别。

1. 新建项目文件,添加元件 CMMP-AS,命名元件。



2. 扫描网络,修改 IP,并将本地电脑 IP 修改到同一网段,然后将控制器 IP 地址修改为需要的 IP,一般与 PLC 处于同一网段。



- 3. 点击确定之后依次跳出如下对话框,确定,之后控制器会自动重启(5秒钟左右),新IP生效。
- 4. 选中新设置的 IP 地址



2.3 配置项目文件

1. 配置硬件信息(伺服驱动器型号、安全卡、总线卡、伺服马达型号、电缸型号等)



Create Drive Configuration		×
1. Configure Controller	Please select a Drive System:	
2. Select Drive System	O □= ● Festo Motor with Axis	
	Esto Direct Drive	
	●● C Festo Special Drive eg.FHA	
	(a) 📑 C User Defined Motor with Axis	
24.5.0.24 (2016/2/12)	Help < Back Next >	Cancel





eate Drive Configuration				
1. Configure Controller	Linear Festo Axis —			号
	Axis Type:	EGC	-	
2. Select Drive System	Technology:	Ball screw	-	
3. Configure Festo Motor	Axis Size:	80 💌		
4. Select Axis Type	Guidance:	GuideBall		
5. Configure Linear Festo Axis	Variant:	BS-10P-KF-0H-ML-GK	•	
6. Configuration Result	Working Stroke:	500 - 女	I果Working Stroke	里面没有我们
	Feed Constant:	10.00	要的数值,请把Var	iant选择不带
	Integrated Gearbox:	Not Present	0H的类型	
	Result:	EGC-80-500-BS-10P-KF-0)H-ML-GK	
	Options	Variant:	BS-10P-KF-GK	
	External Gearbox:	Present Working Str	oke: Custom	▼ <u>50</u> m
	Mechanical Structure:	Single Axis		
	Mounting kit			
	Mounting kit:	EAMM-A-S48-55A	- 洗择 ≸	由向组件类型
				表轴向安装
			-U代:	表平行安装
	Determine configuration	from Type Code / Part Number		
	Type Code / Part Numbe	r:		Search
		,		
24.5.0.24 (2016/2/12)	Help		< Back Next :	Cancel
ate Drive Configuration				

1. Configure Controller	Controller		
2. Select Drive System	Option Slot Ext 1:	CMMP-AS-C2-3A-M3 Empty	
3. Configure Festo Motor	Option Slot Ext 2:	CAMC-F-EP: EtherNet/IP	
4. Select Axis Type	Option Slot Ext 3:	CAMC-G-S1: Safety Module	
5. Configure Linear Festo Axis			
6. Configuration Result	Motor Type:	EMMS-AS-40-M-TM	27
	Gear:	None	•
	Brake:	No	5.5
	Cable Length:	5.00 m	1. a
	Axis		
	Axis Type:	EGC-80-50-BS-10P-KF-GK	
	Gearbox:	None	
	Mechanical Structure:	Single Axis	
	Mounting kit:	EAMM-A-S48-55A	0
24.5.0.24 (2016/2/12)	Help		< Back Finish Cancel

2. 设置控制方式

Festo Configuration Tool - CMMP_Control		And Description of the Road of
<u>Project</u> <u>Component</u> <u>View</u> <u>Extra</u> <u>H</u> elp		
(기 금 🕼 🙈) 🎕 🛒 🎼 Offline - 192.168.1.1		
Project Tree #	Projects 🖉 X •	
Project: CMMP_Control	Operating Mode Settings Environment Messages	
🖻 📸 Components	Controller Motor Axis	
E CMMP-AS: X	CMMP-AS-C2-3A-M3 EMMS-AS-40-M-TM EGC-80-50-BS	-10P-KF-GK
Configuration	Control Interface: EtherNet/IP	
- O Application Data	Lead Operation Modes	Lieed Functions
- E- Motor		
E eter Axis	Profile Position Mode	Record Sequence
Homing	✓ Homing Mode	Positioning with analogue Setpoint
Measuring Systems	Interpolated Position Mode	Synchronisation (X10 / Slave)
Controller	Profile Velocity Mode	Flying Saw
Closed Loop	Profile Force Mode	Encoder Emulation (X11 / Master)
		Flying Measure
	Modulo Positioning	External Measuring System
Analogue Inputs	Mode: Inactive 💌	Cam Disc
Analogue Outputs	Range Limit Positive: mm	Position Trigger
Fieldbus	Range Limit Negative: mm	Store Permanent Position
Record Table		
Error Management	Changing the store permanent position function requires:	
E - Frace	2. Store	
	4. Homing	

3. 配置应用参数,自动计算闭环控制参数



设置寻零方式 5. 绝大部分情况使用默认设置:负向限位开关寻零方式,零点偏移 3mm。 Festo Configuration Tool - CMMP_Control 寻零方式洗择 Project Component View Extra Help Limit Switch:限位开关 Reference Switch:参考开关,是指除限位开关之外的第三个开关,专门用来寻零 Block:利用电缸内部挡块寻零;一般用在没有配限位开关的应用中 Current Position:当前位置寻零,即把当前位置设置为零点,不常用 🗊 🗟 🕼 🎒 🎒 🏹 Dffline - 192.168.1.1 Project Tree Projects 🖉 д Project: CMMP_Contro Methe Components -AS-C2-3A-M3 EMMS-AS-40-M-TM EGC-80-50-BS-10P-KF-GK CMM Configuration ming Method Device Information 是否使用零位脉冲 Destination Limit switch F 🔲 Zero pulse 优点。限位开关位置有小范围变化的话,不影响零 Direction • Negative C Positive 🚎 Axis 点位置 ۰ No reversion when blocking Extras 缺点:损失一部分工作行程 Method Description -Switch 17: Limit switch negative Controller Parameters Smooth [%] Vel. [mm/s] Accel. [m/s²] □ 🚛 I/O Configuration → Digital Inputs Search 8.00 0 300 Negative: 寻零时先往负方向运动,寻零成功之后,工作行程内 < Digital Outputs 4.00 0.300 的位置都是正值 Crawl: ---->⊡ Analogue Inputs ----€ Analogue Outputs Positive: 寻零时先往正方向运动, 寻零成功之后, 工作行程内 16.00 0.300 0 Running: 的位置都是负值 🛶 Fieldbus 3.00 mm Axis Zero Point: 建议使用Negative Direct Mode 若发现期望的零点和寻出的零点不在同一个方向,可以勾选 Jog Mode 零点偏移量,找到限位开关或Block之后, 反向走3mm,作为真正的零点 Application Data—Environment里面的"Inverse Rotation Polarity" Record Table Record Table - Trace 🗔 Diagrams 切换寻零方式时,会跳出如下对话框,选择 OK。 2 Attention: Change component / setting Values on following pages can be out of their Please choose one of these actions. 1 Actions C Reset all pages to their default values (except position table) Reset affected pages to their default values (see list) Limits Homing Measure Delete position table Help... ОК Cancel 设置总线相关参数 6. 注意: CMMP-M3 正面板安全卡或拨码卡上的 DIP 开关设置: DIP8=ON,其他全为 OFF Festo Configuration Tool - CMMP_Cont Project Component View Extra Help 🗊 ቭ 🕼 🎒 📸 🌠 🏹 💦 Offline - 192.168.1.1 Project Tree Projects X * Project: CMMP Control Operation Parameters | Port Configuration | Factor Group | FHPP+ Editor | Components CMMP-AS-C2-3A-M3 EMMS-AS-40-M-TM EGC-80-50-BS-10P-KF-GK Configuration Control Interface: EtherNet/IP Base Module: FCT调试口为控制器正面板上X18口 Auxiliary Module: FCT调试口为EtherNet/IP卡上的网口 Application Data Interface Parar Parameterisation via: Base Module 🗄 👼 Axis —<u>↓0</u> Homing ⊣⊷ Measure Parameterisation via C Use automatically assigned IP address Measuring Systems Use custom IP address Controlle MAC Address Controller (fi) Closed Loop (fi) Closed 192.168.0.10 IP Address: IP Address 255.255.255.0 Subnet Mask: Subnet Mask 0.0.0.0 Default Gateway Addresstype Fieldbus 设置总线控制方式下控制器的IP地址 Jog Mode Record Table ⊡ ∰ Trace ng the settings requi ▲ ne start Con The DIP switch 8 must be set to "ON" to activate the control interface A

设置端口工作方式



总线控制方式,一般选用直接位置模式,度设定值是百分比 0%~100%,其基准值为 Base Velocity。 置 Festo Configuration Tool - CMMP_Control

<u>P</u> roject <u>C</u> omponent <u>V</u> iew <u>E</u> xtra <u>H</u> elp	
[]	基准速度, PLC发出的目标速度必须是0 ^{~1} 100之间的数,代表百分比,此处设置的是基 准值;比如,PLC发出的目标速度为50,则电缸实际运行速度为50% * 16 = 8
Project Tree Project: CMMP_Control Components Configuration Components Configuration Components Configuration Components Configuration Components Configuration Components Configuration Controller Configuration Concoller Configuration Concoller Digital Inputs Concoller Digital Outputs Fieldbus Circet Mode Direct Mode Error Management Corr Management Circet Mode Diagrams Diagrams	Projects ▼x* Efficiency of the set of the
 8. 点动速度设置	

默认参数中,点动过程分为低速段和高速段,其中低速段默认时间为2秒,之后变为高速段。 如果只需要一种点动速度,低速段和高速段速度设置相同值。

get Festo Configuration Tool - CMIMP_Control	Construction Property Construction of the Cons
<u>P</u> roject <u>C</u> omponent <u>V</u> iew <u>E</u> xtra <u>H</u> elp	低速段速度和持续时间
Project Tree 4	Projects 🖉 X • 高速段速度及加减速度
Project: CMMP_Control	Projects #X* Extraction Controller Actin EGC 40-50-BS-10P-KF-GK Jog Mode Positive Negative Crawling Velocity: 4.00 4.00 Slow Motion Time: 2000 2000 Max Velocity: 16.00 16.00 Acceleration: 0.300 0.300 Deceleration: 0.300 0.300 Smoothing: 0 0 V Use same parameters Multickter Multickter Multickter Multickter Multickter 0 0 10 V Use same parameters Multickter Multickter Multickter Multickter Multickter Multickter Multickter Multickter Multickter Multickter Multickter 0 0 10 10 V Use same parameters Multickter Multickter Multickter Multickter Multickter Multickter Multickter Multickter Multickter Multickter Multickter Multickter Mu

9. 位置列表

如果使用 RecordSelect 模式,需要在记录表中设置好位置,存储在控制器中。 ■ Fets Configuration Tool - CMMP_Control



10. 下载并保存项目

进入 Online 状态,选择 Download,然后 Store。



执行 Download 和 Store。

- resto comgutation roor - commis_control			
<u>Project</u> <u>Component</u> <u>View</u> <u>Extra</u> <u>H</u> elp			FESTO
🗇 🗟 🕼 🎒 🎆 💐 Online - 192.168.0.82			
Project Tree 🛛	Projects 🖉 X •		4 ⊳ ×
B-# Project: CMMP_Control	Controller	Motor Axis	分 拖拽上传 1
E S Components	CMMP-AS-C2-3A-M3	EMMS-AS-40-M-TM EGC-80-50-85-10P-KF-GK	
E 🖂 CMMP-AS: X	Controller		< Previous
Configuration	Controller Type:	CNUD.45(72,24,11)	
- Condition Data	Controller Type.		Upload
- Application bata	Hardware Version:	6.3	Download
- time Axis	Firmware Version:	4.0.1501.2.2	
<u>+0</u> Homing			Sync
Heasure	Serial Number:	103/5	Store
Measuring Systems	Ontion Slot Ext 1		
- Fill Closed Loop	Medule Trees		
	module Type.	cmay	STUP
-→E Digital Inputs	Option Slot Ext 2		Stop
	Module Type:	CAMC-F-EP: BherNet/IP	
Analogue Inputs			(married)
Fieldbus	Revision:		11 (763)
Direct Mode	Serial Number:	1502873924 Store Project Permanently in Device	Start
teter Jog Mode			
	Uption Slot Ext 3	Do you want to store the project in device now?	Hale 1
	Module Type:	CAMCG-S1: Safety Module	
- Jag Diagrams	Revision:		
	Version	FCT Device Control	
	version.		
	Serial Number:	1439 The write actions like download, sync and store are only allowed when	
		U FCT Device Control has been set.	
		Would you like to set FCT Device Control now?	
		Yes No	
Manual Move			# ×
Device Status	Movement Data	Test Mode 🛛	*
Enable Operation Mode: Profile Positioning Mode	Increment:	1.00 mm Delay time: 0.00 s	
Stop Override: 100 %	Velocity:	80.00 mm/a	
() Reads			
() HC	Current position:	5.53 mm 🗡	
		as	E
O Error			
O Warning	manual Control		
Device Control	Single Step:		
FCT Enable Acknowledge Error!	Jog:	K N Squence	*
Output Operate Safety Functions Homing Manual Move Op	timise Memory Card Dia	anosis FHPP Monitor FHPP+	
Ready		- FCT V1.22.41	CMMP-AS V2.7.0.154

2.4 刷新固件

检查 CMMP-M3 控制器固件版本,如下图 <mark>如果不是最新版本 4.0.1501.2.3,请将控制器固件升级到最新,否则导入 EDS 文件后总线可能无法正常通讯。</mark>

Festo Configuration Tool - CMMP_Control		Prophetic Conversion of the later
<u>P</u> roject <u>C</u> omponent <u>V</u> iew <u>E</u> xtra <u>H</u> elp		
🗊 📸 🕼 🎒 🎬 📉 🌇 Online - 192.168.0.82		
Project Tree 🛛	Projects 🖉 🗴	
Project: CMMP_Control Gomponents	Controller CMMP-AS-C2-3A-M3	Motor Axis EMMS-AS-40-M-TM EGC-80-50-BS-10P-KF-GK
⊡-⊖ CMMP-AS: X	Controller	
Burger Configuration	Controller Type:	CMMP-AS-C2-3A-M3
	Hardware Version:	6.3
	Firmware Version:	4.0.1501.2.2
Measure	Serial Number:	10375
Measuring Systems Ontroller	Option Slot Ext 1	
	Module Type:	Empty
→ Setpoint Selector	Option Slot Ext 2	
·····································	Module Type:	CAMC-F-EP: EtherNet/IP
→ Analogue Inputs	Revision:	2.0
	Serial Number:	1502873924
	Option Slot Ext 3	
Record Table	Module Type:	CAMC-G-S1: Safety Module
Error Management ⊡-⊛ Trace	Revision:	01
Jiagrams	Version:	0
	Serial Number:	1439820421

升级固件方法:

注意:升级固件之后,控制器内的项目文件以及 IP 都会丢失,需要重新修改 IP 之后,下载,保存项目文件。



升级完固件之后,重新修改 IP 地址:



2.5 FCT 调试

1. 通过 View-Default 切换到默认界面,然后选择软件下方的 Operate 选项卡。

Finite Conferentian Table Childen Control		
Policity Compared View Education		EFETO
Project Component View Extra Help		PESTU
Project Tree 1 Distance 4	Projects 🛷 x ·	4 F X
E Project: Co Detault	Controller Motor Avis	応徳上传
Components	CMMP-AS-C2-3A-H3 EMMS-AS-40-M-TM EGC-80-50-85-10P40-GK	
E Configuration	Controller	< Previous
- B Device Information	Controller Type: CMMP-AS-C2-3A-M3	
- (5: Application Data		Upload
- E Motor	Harunare veranut. 0.3	Download
🕒 dies Axis	Firmware Version: 4.0.1501.2.2	Sync
-40 Homing	Serial Number: 10375	
Measuring Systems		Store
🖻 🕎 Controller	Option Stot Ext 1	
	Module Type: Empty	STOP
E Gigital Ioputs		Stop
- ef Digital Outputs		Motion
- J Analogue Inputs	Module Type: CAMC++EP: EtherNet/IP	
	Revision: 2.0	
	Serial Number: 1502873924	Start
Jog Mode		Trace
Record Table	Option Slot Ext 3	
Error Management	Module Type: CAMC-G-S1: Safety Module	Help
E A Irace	Revision: 01	
- W california		
	Version: 0	
	Serial Number: 1439820421	
Operate		₽ ×.
Device Status	Dynamic Data Digital I/O DIP Switch	*
O Enable Operation Mode: Profile Positioning Mode	No.: 0 Homing Valid 2010 7 4 3 0	
Stop Override: 100 %	Target Position: 5.53 mm Homing Switch Dive 13 0000 0000 DN	
@ Ready	Actual Position: 554 mm Q Paras Street Action DUILTO 3 QQQQ 2	
Ow		_
	Make Count 000 A Current 200 A	
© Error	- The Content of Conte	
Warning	temp, rover: 30.13 C Ext. Resistor	
Device Control	UL bis vortige 360.2 V	
FCT Enable Acknowledge Errori		
2 Operate Safety Functions Homing Manual Move Op	ptimise Memory Card Diagnosis FHPP Monitor FHPP+	
Rowy		FCT V1.2.2.41 CMMP-AS V2.7.0.154

2. 控制器上使能

首先确保如下信号存在:

- DC Bus Voltage 为 380V 左右
- DIN4 和 DIN5 的 LED 指示灯为绿色
- **Error** 栏中无错误信息
- 如果 DC Bus Votage 只有 13.8V 左右,
- 检查动力电 220VAC 是否给到控制器 CMMP 的 X9 端
- 检查安全模块的 STO-A 和 STO-B 没有与 24V 导通
- 如果 DIN4 和 DIN5 的 LED 指示灯没有亮
- 检查 X1 端子上 Pin21(棕/黄)和 Pin9(灰/白)有没有接到 PLC 输出端子或直接与 24VDC 相连
- PLC 输出端子有没有置位 Pin21 和 Pin9
- 关于 DIN6 和 DIN7 的 LED 指示灯

- 如果限位开关为 NC(常闭),则 Din6 和 Din7 指示灯应为绿色;如果为 NO(常开),则 Din6 和 Din7 应该灰色 如果上述信号都正常,如下图:

Operate		• 加宁亚林头去去
Device Status		Dynamic Data Additional States 门 Digital I/O 1. 休证此处为次巴
C Enable	Operation Mode: Profile Positioning Mode	No.: 0 O Homing Valid DIN 0.7 7 4 3 0
Stop	Override: 100 %	Target Position: 5.53 mm Homing Switch DIN 8.13: 00 0000 ON
Ready		Actual Position: 5.54 mm O Power Stage Active DOUT 0.3: 0000 2
🔘 мс		Velocity: 0.00 mm/s Limit Switch Low
C Error		Motor Current: 0.00 A Limit Switch High 2. 保证此处为灰色 5
Warning		Temp. Power: 30.56 °C 6
Device Control	*	DC Bus Voltage: 379.7 V 3. 保证此处380V左右 8
FCT E	Acknowledge Error!	
Output Operation	e Safety Functions Homing Manual Move	Optimise Memory Card Diagnosis FHPP Monitor FHPP+
Ready		
Safety Functions		
Device Status		CAMC-G-S1: State
Enable (Operation Mode: Profile Positioning Mode	STO State: Normal Operation
Stop (Override: 100 %	
Ready		● Input X40.STO-A 保证此外为绿色.
🔘 мс		Input X40.STO-B
Error	L	
Warning 🗌		O uppar value incz
Device Control		
FCT Ena	Acknowledge Error!	
Output Operate	Safety Functions Homing Manual Move Optim	ise Memory Card Diagnosis FHPP Monitor FHPP+

勾选 Enable 之前的单选框,之后左侧的 Enable/Stop 状态灯为绿色, Ready 和 MC 为黄色。如下图中红框内所示。

Operate									
- Device Status -			Dynamic Data	.	Additional States	Digital I/O	"	DIP Switch	
Enable	Operation Mode:	Profile Positioning Mode	No.:	0	Homing Valid	DIN 0.7	7 4 3 0		
🙆 Stop	Override:	100 %	Target Position:	5.54 mm	Homing Switch	DIN 07. DIN 813:	0000000	ON 1	
📿 Ready			Actual Position:	5.54 mm	O Power Stage Active	DOUT 03:	0000	2	
🕗 мс			Velocity:	0.00 mm/s	C Limit Switch Low			3	
C Error			Motor Current:	0.00 A	C Limit Switch High			5	
Warning			Temp. Power:	31.00 °C	Ext. Resistor			6	
Device Control			DC Bus Voltage:	379.3 V	Ī			8	
FCT 🔽	Enable	Acknowledge Error!		R					
Output Opera	ate Safety Functions	Homing Manual Move Opt	imise Memory Card	Diagnosis FHPP Monitor	FHPP+				

Ready 3. 寻零

寻零过程电缸会发生移动,请确保电缸移动过程中不会对设备上其他工件造成损害。 切换到 Homing-Method 页面,点击黄色感叹号按钮,开始寻零。 寻零过程:

滑块向负方向移动,触发负向限位开关之后,回撤 3mm 停止,此时位置为电缸零点。

Festo Configuration Tool - CMMP_Control			
Project Component View Extra Help			FESTO
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Project Tree #	ojects ØX*		4 ▶ 🗙
Project: CMMP_Control	Aethod Settings		施掘上後
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Configuration Bevice Information	Homing Method		
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E Motor	Direction: Negative	C Positive	Download
-10 Homing	Extras: No reversion when bl	ocking 🖉	Sync
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Controller	Parameters	Save Offset To Encoder	
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Comparison of the second	Crawl: 4.00 0.3	0 000	
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		Homing successful	
		U Homing run has been completed successfully.	
Homing			4 ×
Device Status	Homing Mathed Description		
Constant Profile Positioning Mode	-17: Block negative		
Stop Override: 100 %	Homing Valid		
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	Limit Switch Low		
U Error	Astual Desition: 42.62 mm		
Chu :	Actual Position. 43.62 min		
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Owning Device Control FCT Fnable Acknowledge Error!	Actual Postuon. 43.62 mm Actual Velocity: 0.00 mm/s Start Homing		
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4. 点动测试

切换到 Manual Move 标签,向左的双箭头表示负方向点动;向右的双箭头表示正方向点动。如需更改点动速度,请把软件左侧菜单切换到 Jog Mode。

			_								
Manual Move											
Device Status			7	Movement Data				Test Mode -			- D
Enable	Operation Mode:	Profile Positioning Mode	1	Increment:		1.00	mm	Delay time:		0.00 s	
Stop	Override:	100 %		Velocity:		80.00	mm/s	+			—
Ready											
🔘 мс				Current position:		2.25	mm	<u>×</u>			
C Error					Apply as			-			
Warning	, [Manual Control							
Device Control	,			Single Step:	<	>		V			
FCT FCT F	Enable	Acknowledge Error!		Jog:	«	»		C cyclic	¢ ۴	Run Seque	nce
Output Operat	e Safety Function	s Homing Manual Move Op	otin	nise Memory Car	d Diagnosis	FHPP	Monitor	FHPP+			

_{Ready} 5. 定位测试

把软件左侧菜单切换到 Positon Set Table,电机记录号之前的黄色感叹号按钮,即可实现定位。软件下方 Actual Positon 可实时显示滑块位置。

Resto Configuration Tool - CMMP Control						-	_					-				- 0 X
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E CMMP-AS: X									1						が、施規上传	< Previous
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->E Digital Inputs		10 4							-							motion
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		11 A							-							11 17 AL
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		13 A							-							Trace
-4 Direct Mode		14 A														
Record Table		15 A														Help
Error Management		16 A														
Trace		17 A														
Diagrams		18 A														
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O Ready	Actual F	Position:	40.00 r	mm	O Power S	tage Active	DO	UT 03:	000	õ	2					
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ECT E Facto Actional Const	1	-	,	12												
				OK I		1										-
Output Operate Safety Functions Homing Manual Move F	Force Control	Optimise	Memory Card D	liagnosis	FHPP Monito	or FHPP+										
Heady															FCT V1.2.2.41 CN	IMP-AS V2.7.0.154

2.6 备份文件

在 Online 状态下执行如下操作:

Project—Archive(归档)--Archiving of the project in a special folder,然后选择保存路径,归档后的文件为 zip 文件格式。 **注意:** 不要用 Save As 保存项目,否则无法用 FCT 打开。

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- K Analogue Outputs	Delete the project after archiving?	111763
	▶ 🔽 Archiving of the project in a special folder. 选择保存路径	Start
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Output Operate Safety Functions Homing Manual Move Fo	rce Control Optimise Memory Card Diagnosis FHPP Monitor FHPP+	
Ready	FCT V1.22.41	CMMP-AS V2.7.0.154

如果需要在别的电脑上打开项目,需要用 Project-Extract,然后找到 zip 项目文件。

Festo Configuration Tool		
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Exit		
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Ready		FCT V1.2.1.3

3 PLC 控制(2016之前功能块)

3.1 准备 EDS 文件及功能块

1. 下载 EDS 文件

https://www.festo.com.cn/cn/zh/search/?text=cmmp%2520eds&tab=DOWNLOADS

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CANopen EDS EDS files for CMM 设备描述文件	IP-ASMo CA	N (CIA 402 and FHPP)					
Ethernet/IP EDS EDS files for CMM 设备描述文件	IP-AS M3 with C	CAMC-F-EP					
DeviceNet EDS EDS files for CMM 设备描述文件	IP-AS M3 with C	CAMC-DN					

2. 下载 CMMP 控制器 EtherNetIP 功能块文件

目前老版的 RSLogix5000 功能块在官网上已经找不到了,可以联系 FESTO 技术支持团队获得。

3.2 RSLogix5000 项目配置

通过 RSLinx Classic 激活总线调试接口,

🗞 RSLinx Classic Lite - [RSWho - 2]		
💑 File View Communications Station DDE/OPC Security	Window Help	_ & ×
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新建项目文件

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	5 testDataSize.ACD 6 ZJ.ACD				说明(P)	*	
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定义接口模块

需要把通讯数据修改成 DINT 格式,才能与老版功能块匹配



导入功能块文件



在主程序中添加功能块编程



把钥匙开关拨到 PROG 模式,下载项目程序



3.3 基本控制功能块使用

主要用到的功能: 控制器使能; 控制器寻零; 位置控制

3.3.1 控制器使能

先保证控制器X1插槽的DIN4和DIN5为高电平,然后按照下面的逻辑时序图进行控制,得到使能。 为简单起见,也可以同时置位 Halt、Stop、EnableDrive 也可以完成控制器使能,之后这三个信号要以及 DIN4、DIN5 必须一直保持高电平信号。



I

3.3.2 控制器寻零

注意:

a. 只有 OPM=0 或 OPM=1 的情况下才可以通过 StartHoming 执行寻零动作

b. OPM=0的情况下,直接触发 StartTask,也是寻零动作(请避免此种情况发生)

<mark>时序:</mark>使能成功之后,StartHoming 置高电平,待状态信号 ACKStart 变为高电平时,把 StartHoming 复位,寻零成功之 后,状态量 DriveReferenced 会变为高电平。



3.3.3 点动模式

控制器寻零成功之后,可以通过置位 JoggingPos 实现正方向点动,复位 JoggingPos 停止运动;置位 JoggingNeg 实现负方向点动,复位 JoggingNeg 停止运动

3.3.4 直接定位模式

时序:

- a. 确认使能和寻零都已成功
- b. 设置 OPM=1,设置 SetValuePosition 和 SetValueVelocity
- c. StartTask 置位高电平
- d. 待状态信号 ACKStart 变为高电平,可以把 StartTask 复位为低电平,电缸开始运动,状态量 MC 变为低电平
- e. 待运动完成,MC 会变为高电平,ActualPosition 等于 SetValuePosition,通过 PLC 判断时,建议给一个误差区间 <mark>注意:</mark>

SetValuePosition 的单位是 FCT 中 Factor Group 中定义的单位,SetValueVelocity 的基准值是 FCT-Direct Mode 中的 Base Velocity



3.3.5 记录表模式

时序:

- a. 确认使能和寻零都已成功
- b. 设置 OPM=0,设置 RecordNo
- c. StartTask 置位高电平
- d. 待状态信号 ACKStart 变为高电平,此时可以把 StartTask 复位为低电平。电缸开始运动,状态量 MC 变为低电平,ActualRecordNo=RecordNo
- e. 待运动完成,MC会变为高电平,ActualPosition等于 SetValuePosition,通过 PLC 判断时,建议给一个误差区间



3.3.6 扭矩控制模式/力控制模式

使用扭矩模式时,为保证安全,一般会限制最大速度值,可以通过 FCT 实现,如下:



<mark>时序</mark>:

- a. 确认使能和寻零都已成功
- b. 设置 OPM=5, 设置 SetValueForce 和 SetValueForceRamp
- c. StartTask 置位高电平
- d. 待状态信号 ACKStart 变为高电平,此时可以把 StartTask 复位为低电平。电缸开始去找目标力,状态量 MC 变为低电 平, StateOPM=5。
- e. 待达到目标扭矩或力,MC 会变为高电平,ActualForce 等于 SetValueForce,通过 PLC 判断时,建议给一个误差区间 <mark>注意:</mark>
- 1. SetValueForce 是-100~100 之间的数值,代表电机额定输出扭矩的百分比;SetValueForceRamp 代表力变化的速度, 值越小,冲击越小。
- 2. 扭矩模式时,功能块可以反馈实际位置,但只控制扭矩,位置值可能是变化的
- 3. 扭矩模式下,控制的是马达电流,并不考虑缸本身的重力,摩擦力之类



3.3.7 速度控制模式

使用速度模式时,为保证安全,一般会限制电机最大输出扭矩,可以通过 FCT 实现,如下:



- a. 确认使能和寻零都已成功
- b. 设置 OPM=9, 设置 SetValueRotSpeed 和 SetValueRotRamp

- c. StartTask 置位高电平
- d. 待状态信号 ACKStart 变为高电平,此时可以把 StartTask 复位为低电平。电缸开始去找目标速度,状态量 MC 变为低 电平, StateOPM=5
- e. 待达到目标速度,MC仍保持低电平,ActualRotSpeed 等于 SetValueRotSpeed,通过 PLC 判断时,建议给一个误差 区间

注意:

- **1.** SetValueRotSpeed 单位为 FCT 的 FactorGroup 里面设置的单位
- 2. 速度模式下,基本功能块无法反馈出实际位置值,如果需要的话,可以使用后面介绍的 FHPP+功能

另外,在位置、扭矩、速度模式之间进行切换时,请把 Halt、Stop、EnableDrive 全复位为低电平,然后修改 OPM,再 置位 Halt、Stop、EnableDrive。

以上功能基本能满足 80%的应用场合,如果需要更高级的 FPC 功能和 FHPP+功能,请参考后面的部分。

3.4 参数通道 FPC 功能

3.4.1 FCT 配置 FPC 功能

参数通道功能是通过 PNU.SubIndex 方式修改控制器内部寄存器数据,需要单独的功能块来实现。

Testo comgaration roor - civim _m5_control		
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🖻 💾 CMMP-AS: X	CMMP-AS-C2-3A-M3 EMMS-AS-40-M-TM EGSL-BS-35-50-8P	
	Message from PLC Answer to PLC	
- E- Motor	Message Options	
Axis		
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Direct Mode		
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Record Table		
Error Management		
Trace	PLC Configuration:	
Diagrams		
	Changing the settings requires:	
2		
	2. Store 7次11 P\$% 7休行、里后在前裔 3. Restart Controller 7次11 P\$% 7休行、里后在前裔	

3.4.2 PLC 配置修改

组态数据长度修改





添加功能块实例



编译一下程序,然后为功能块添加变量

RELOCIX 5000 - CMMR Control Via EtherNetIR (1769-	22E 20.121*, MainPeneram, MainPenetical		
B なけの 総場(E) 寄客(A) 地索(C) 法場(I) 通信(C)	Sac 2012) - [mainFoglain - maintodune] Tern @FinAn ##Krin		
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Controller 管理器 👻 平 🗙			
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🗄 😽 MainTask		Function Block for	^
🗄 🚭 MainProgram		EestoAOL CMMP AS CTRI	
 ·		- Function Block for CMMP-AS	
MainRoutine		FestoAOL_CMMP_AS_CTRL A1 - ControFC	T_HMI>
- 🗀 未规划的程序/相位		IData2 CMMP1:LData[1] -(SuplyVolt	agePresent)-
由-合 运动组		OData1 CMMP1:O.Data[0]	
- 😑 未归类输		OData2 CMMP1:0.Data[1] -(Fault)-	
由-合 Add-on 自定义指令		Brake 0 ← -{Warning}	-
E - C FestoAOI_CMMP_AS_CTRL		ResetFault 0 +	- (bal)
- 🌶 參数和本地 Tag		Stop 0+	~~ _
- An Logic		EnableDrive 0 + -(Ready)-	·
GI FestoAOI PRM FPC1 INIT		Starthoming 0 € StartTask 0 €	~
- 📝 参数和本地 Tag		OPM 0 €	·
-An Logic		AbsoluteRelative 0	-
E - FestoAOI PRM FPC1 SINGLE		JoggingPos 0+ -(AckTeach	o_
→ 参数和本地 Tag		JoggingNeg 0+	
- dD Logic		RecordNo 0+	
□		SetValueVelocity 0 + -(RC1)	
		SetValuePosition 0+ SetValueForceRamo 0+	
		SetValueForce 0 +	
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□ m 首板 . CompactLogix 系统	正在验证 Module"LocalENB"		
1769-L32E CMMP Control Via EtherNetii	正在验证 Module"CHMP1"		
E # 1769-L32E Ethernet Port LocalENB	IERENE Module"Local"		
☆ 品 以大网	We add-on instruction 'FestoAOI FEM FPC1 INT 'F routine 'Logic'		
- # 1769-L32E Ethernet Port LocalENB	New add-on instruction 'FestoAOI_PRM_FFC1_SINGLE' 的 routine 'Logic'		E
CMMP-45-C2-34-M3 CMMP1	Heig program (HainFrogram) (#) routine (HainRoutine)		
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添加变量

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FestoAOLP DATA_REF Execute Write Subindex DatatypeWP ParamValue DatatypeRD ParamValue	toAOL_PRM_FPC1_S RM_FPC1_SL A1 A WWR X SRD	SINGLE 	-(Done)

3.4.3 典型 PNU 操作说明

注意,下面写的数据都是指十进制
1)如何读取控制器报错代码
通过PNU操作,可以利用功能块读取当前报错代码(如下操作在报错控制器报错状态下)
第一步:
FestoAOI_PRM_FPC1_SINGLE.Execute=False
FestoAOI_PRM_FPC1_SINGLE.Write=False
FestoAOI_PRM_FPC1_SINGLE.PNU=201
FestoAOI_PRM_FPC1_SINGLE.Subindex=1
第二步:
FestoAOI_PRM_FPC1_SINGLE.Execute=True,待 FestoAOI_PRM_FPC1_SINGLE.Done=True 时,读取

FestoAOI_PRM_FPC1_SINGLE.Execute=True,待 FestoAOI_PRM_FPC1_SINGLE.Done=True时,读取 FestoAOI_PRM_FPC1_SINGLE.ParamValueRD的数值即为当前故障代码

FestoAOI_PRM	I_FPC1_SINGLE
FestoAOI_PRM_FPC1_	SI A1_FPC_Single 🛄 (Done)
DATA_REF	A1_Data_Ref
Execute	1 • -(Err)
Write	0 ←
PNU	201 🗲
Subindex	1+
DatatypeWR	0 ←
ParamValueWR	0 ←
ActPNU	201 🗲
ActSubindex	1+
DatatypeRD	4 €
ParamValueRD	682 🗲

2) 如何利用PNU操作保存示教位置

问题说明:总线控制方式,如果使用记录表模式(OPM=0),利用功能块示教好位置,控制器断电后,之前记录的位置 会丢失,可以利用PNU操作解决 第一步: FestoAOI_PRM_FPC1_SINGLE.Execute=False FestoAOI_PRM_FPC1_SINGLE.Write=True FestoAOI_PRM_FPC1_SINGLE.PNU=127 FestoAOI_PRM_FPC1_SINGLE.Subindex=2 FestoAOI_PRM_FPC1_SINGLE.DatatypeWR=4 FestoAOI_PRM_FPC1_SINGLE.ParamValueWR=1 第二步:

FestoAOI_PRM_FPC1_SINGLE.Execute=True,待FestoAOI_PRM_FPC1_SINGLE.Done=True时,将 FestoAOI_PRM_FPC1_SINGLE.Execute=False.

FestoAOI_PRM_FP	C1_SINGLE	
FestoAOLPRM_FPC1_SL DATA_REF Execute Write PNU Subindex DatatypeWR ParamValueWR ActBNU ActSubindex DatatypeRD ParamValueRD	A1_FPC_Single A1_Data_Ref 1 + 1 + 127 + 2 + 4 + 127 + 2 + 4 + 0 +	CDone)

3) 如何利用PNU操作实现多圈绝对值编码器位置保存

利用FCT操作时,寻零成功之后,取消使能,点击Save offset to encoder,然后再点击Store就可以实现绝对零点的断电保存,但使用FB10寻零功能,无法实现断电保存,可以利用PUN操作实现

第一步:利用功能块FestoAOI_CMMP_AS_CTRL寻零成功

第二步: FestoAOI_CMMP_AS_CTRL.EnableDrive=False

第三步:确认状态量FestoAOI_CMMP_AS_CTRL.DriveENabled=False

第四步: FestoAOI_PRM_FPC1_SINGLE.Execute=False

FestoAOI_PRM_FPC1_SINGLE.Write=True

FestoAOI_PRM_FPC1_SINGLE.PNU=127

FestoAOI_PRM_FPC1_SINGLE.Subindex=6

FestoAOI_PRM_FPC1_SINGLE.DatatypeWR=4

FestoAOI_PRM_FPC1_SINGLE.ParamValueWR=3

第五步: FestoAOI_PRM_FPC1_SINGLE.Execute=True

第六步: 等待2s

7) FestoAOI_CMMP_AS_CTRL.EnableDrive=True,之后正常操作

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3.5 FHPP+功能

FHPP+功能也是利用 PNU.Indext 对控制器内部数据进行读写,与 FPC 不同的是,FHPP+的数据是实时更新的,不需要用功能块触发,使用也比较方便。

比较常用的FHPP+控制量(PNU.SubIndex)

580.1 激活直接位置模式下的扭矩保护功能 581.1 直接位置模式下扭矩保护限制值(mNm) 1082.1 速度系数(0~100 代表百分比) 比较常用的 FHPP+状态量 (PNU.SubIndex) 300.1 实际位置

301.1 实际扭矩(mNm) 201.1 故障代码

3.5.1 FCT 配置修改

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Device X (192.168.0.82): 2016/7/29 17:14:28 Connect	ion closed! Help OK Cancel Apply	
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Device X (192.168.0.82): 2016/7/29 17:26:18 Connect	in to device	
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3.5.2 PLC 配置修改

根据 FCT 配置的数据长度,共 32 个字节,即 8 个 DINT,所以 PLC 中应该如下配置



3.5.3 如何使用 FHPP+变量

通过在 PLC 中定义变量,对 FHPP+进行索引



