TwinCAT3 环境下 EtherCAT 通讯控制 CMMT-EC

(Beckhoff Library)



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关键词:

CMMT-AS-EC, TwinCAT3, Beckhoff, TwinCAT3

摘要:

文档说明软件中控制 CMMT 驱动器,通讯协议为 EtherCAT。内容包括从站设备的连接、NC 轴的配置和调试、运动控制 库的添加以 TwinCAT3 及 Festo 寻零功能块的应用等。

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 伺服以及 TwinCAT3 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 安装 Beckhoff 软件

上 Beckhoff 官网下载新版本的 Twin CAT3 软件。 https://www.beckhoff.com/english.asp?download/tc3-downloads.htm ✓ ← C つ・ ロ 図 https://www.beckhoff.com/english.asp?download/tc3-downloads.htm



在线帮助可访问网站: <u>http://infosys.beckhoff.com</u> 集成到 twincat3 的离线帮助文件需单独下载 InfoSys 扩展包安装,链接如下: <u>https://www.beckhoff.com/english.asp?download/tc3-downloads.htm</u>



Furthermore the online version of the Beckhoff Information System may be found under http://infosys.beckhoff.com.

2 安装 XML 设备描述文件

上 Festo 官网下载 CMMT 设备描述文件,下载链接

https://www.festo.com/net/en-gb_gb/SupportPortal/Downloads/477680/525654/CMMT-AS-EC%20FW%20V018.0.5.zip

	<mark>,</mark> О смм	т				
	产品 3	支持/下载 136	主题 5			
Firmware Firmware and Ethe	erCAT XML ESI data	for the servo drive CMMT-	ASEC (EtherCAT)			
New Features:						
Homing with	out Power ON					
Fixed Bugs:						
 Master / Slav Touch-probe Dropping of Z Wrong calcula Correction of 	e jump in target po position calculatio 2-axis when enablin ation of the modul CiA402 PDO mapp	osition on error ng the drive o function ving				
 Correction of CiA402 PDO mapping Servo drive CMMT-AS-C2-3A-EC-S1 (5340819) servo drive CMMT-AS-C4-3A-EC-S1 (5340820) servo drive CMMT-AS-C2-11A-P3-EC-S1 (5340821) servo drive CMMT-AS-C3-11A-P3-EC-S1 (5340822) servo drive CMMT-AS-C5-11A-P3-EC-S1 (5340823) servo drive CMMT-AS-C7-11A-P3-EC-S1 (813354) servo drive CMMT-AS-C12-11A-P3-EC-S1 (8133355) 						
■ Vo18.0.5 (valid since 19	/06/2020)					

CMMT-AS-EC FW Vo18.0.5.zip 56 MB

-

将 XML 格式的描述文件存放在 Twincat 安装目录下指定路径,比如 C:\TwinCAT\3.1\Config\lo\EtherCAT

📙 > 此电脑 > Window	vs (C:) \rightarrow TwinCAT \rightarrow 3.1 \rightarrow Config \rightarrow Io \rightarrow	EtherCAT	~ Ū	م
^	名称	修改日期	类型	大小
	Festo-CMMT-AS-EC.xml	2018/4/26 18:01	XML 文档	3,571 KB
*	🖭 Festo-CMMT-AS-CiA402-20190627.xml	2019/6/27 19:57	XML 文档	1,826 KB
*	Festo-CMMT-AS-CiA402-20180822.xml	2018/8/22 17:01	XML 文档	1,360 KB
*	🖭 Beckhoff ILxxxx-B110.xml	2015/2/4 12:57	XML 文档	8 KB
*	Beckhoff FCxxxx.xml	2015/2/4 12:57	XML 文档	21 KB

不同日期标示的 XML 文件匹配 CMMT 不同版本的固件。建议更新 CMMT 固件并使用最新日期的 XML 文件。或者将所有版本的 XML 均放在此目录下,以确保设备扫描时匹配到正确 XML 的版本。老版本的 XML 设备描述文件可在下载包的 Archive 文件夹下找到。

注意:存放好 XML 文件后重启 Twincat 软件才生效。

3 连接 PLC

新建 XAE Project

New Project		? ×
▶ Recent	.NET Framework 4.5 🔹 Sort by: Default	🗸 🏥 🔚 Search Installed 🔎 -
⊿ Installed	TwinCAT XAE Projec TwinCAT Projects	Type: TwinCAT Projects
 Templates Other Project Types TwinCAT Measurement TwinCAT Projects Samples 		TwinCAT XAE System Manager Configuration
▷ Online		

搜索 PLC, SYSTEM→Choose Target→Search(Ethernet)



广播搜索,指定 PC 网卡

Enter Host Name / IP:				Refresh Status		Broadcast Search
Host Name	Connected	Address	AMS NetId	TwinCAT	OS Versio	n Comment
Select Adapt	ter(s)					×
VirtualBox	hernet Connecti Host-Only Ether	ion (5) I219-LM met Adapter	1 169.254.201.43 192.168.56.1 255.	255.255.0.0 255.255.0		
<u> </u>						
c						
sute N				Oł	(Cancel
soute N nsNet ansport Type:	TCP_IP		× 6	Oł Static		Cancel
c oute N msNel ansport Type: ddress Info:	TCP_IP	×		Oł Static) Temporary		Cancel
toute N nsNet ansport Type: ddress Info: Host Name O	IP Address		~ (Ot Static Temporary		Cancel) Static) Temporary
coute N msNet ansport Type: ddress Info: Host Name O onnection Timeout (s):	IP Address 5			Of Static Temporary		Cancel) Static) Temporary

若广播搜索不到,则直接输入网址来连接。Host Name 为 CX-的是嵌入控制器,为 CP-的是工控机。Connected 下方空白表示未连上,打叉表示已连接(成功添加 route 才会出现叉)。

Coute Dialog						
Enter Host Name / IP:	192.168.0	0.1		Refresh Status	Bro	adcast Search
Host Name	Connected	Address	AMS NetId	TwinCAT	OS Version	Comont
CX-3D6836	Х	192.168.0.1	5.61.104.54.1.1	3.1.4022	Windows 7	3
<						
Houte Name (Target):	LX-3D68	36	Hou	e Name (Hemote	ej: DESKI	UP-IMKBJDS
AmsNetId:	5.61.104.	54.1.1	Tar	get Route	Remot	te Route
Fransport Type:	TCP_IP	~	0	Project	⊖ No	one
Transport Type: Address Info:	TCP_IP	~	0	Project Static	◯ No ③ Sta	one atic
Transport Type: Address Info: O Host Name	TCP_IP 192.168.0 P.Address	2.1 4	0 • 0	Project Static Temporary	◯ No	one atic mporary
Transport Type: Address Info: O Host Name @ [] Connection Timeout (s):	TCP_IP 192.168.0 P Address 5	√ 0.1 4	0	Project Static Temporary	ONd ● Sta OTe	one atic mporary

Add Route 时要求输入密码,默认密码为1。

Logon Information								
* *	Enter a user name and password that is valid for the remote system.							
User name: Administrator								
	Password:							
	Encrypt Password (TwinCAT 3 only)							
	OK Cano	el						

备注:如果不知道 IP,可向倍福技术支持索要 NetScan 小软件扫描。或者将通过 DVI 口连接显示器,USB 口插入鼠标,像使用 Windows 一样在控制面板里查看网址。

Choose Target System	×		
□	OK Cancel		
	Search (Ethernet) Search (Fieldbus)		
	Set as Default		
Connection Timeout (s): 5]		
以下是连接上 PLC 的状态。			
i 🗈 🔤 💆 🌣 🛞 💽 🔯 🔚	K-3D6836	+ = PLC_Prg	- 3) = €
如果失去连接,彩色图标会变灰,目 PI	C 名 CX-**后面 ⁻	追加 error 字样。	
	-3D6836 (ERRO	R) PLC_Prg	- ∃ > = €

如果连接就绪,PLC 名会变绿,如下图 CX-3D6836 图标,选中点击 OK。

4 扫描 EtherCAT 网络

I/O 菜单下,右击 Device,点击 Scan 扫描 Ethernet 网络。



如果 scan 处于灰色状态,请查看标签1指向的配置模式图标是否激活,只有在配置模式下才能扫描在线设备。

选择括号里为 EtherCat 的项扫描



成功扫描 CMMT 会弹出关联 NC 轴的提示框,选择 NC 项,点 OK。

EtherCAT drive(s) added					
Append linked axis to:	NC - Configuration CNC - Configuration	ОК			
		Cancel			

之后 IO 列表会添加扫描到的 EtherCAT 设备, CMMT-AS 名称开头为 Drive, 版本在可在 EtherCAT 选项卡中看到。

Solution Explorer	<u>→</u> ‡ × NC_XYZ +> ×
© ⊖ ☆ 'o - i / ≠ -=	General EtherCAT DC Process Data Startup CoE - Online Diag History Online NC: Online NC: Functions
Search Solution Explorer (Ctrl+;)	
Solution 'NC' (1 project)	Type: CMMT-AS
A NC_XYZ	Dec.dust/Dec.inice. 9067722 / 2
SYSTEM	Product/Kevision: door/33/2
MOTION	Auto Inc Addr: FFFF
P W PLC	EtherCAT Adda 🗖 1002 📩 Advanced Settings
▲ I/O	
I Devices I Device 1 (EtherCAT)	Identification 0
🛟 Image	Previous Port Term 2 (FK1110) - B 'X1 OUT'
🛟 Image-Info	Flexible For Excited a street
👂 🕏 SyncUnits	
Inputs	
Outputs	
FintoData	
Drive 3 (CMMT-AS)	
Inputs	
Outputs	
WcState	
🕨 🛄 InfoData	Name Online Type Size >Add In/Out User Linked to
Drive 4 (CMMT-AS)	🚰 Statusword X UINT 2.0 71.0 Input 0 nState1, nState2
P Unive 5 (CMMT-AS)	🖬 🗺 Modes of ope SINT 1.0 73.0 Input 0
Mappings	

<mark>注意:如果没有弹出添加 NC 轴的对话框,且 CMMT 被识别为 Box,比如下图所示,可能是因为 XML 文件缺失或者 XML 文件版本与在线设备固件版本不</mark> 兼容,请查看第一步处理。

Drive 3 (CMMT-AS)

Box 4 (P007B1A95 R00000003)

Box 5 (P007B1A95 R0000003)

这一步之后 MOTION 菜单下面会自动添加 Axis,并且 Link To I/O 栏自动关联了扫描列表中的 IO 对象。这里更改了 Axis 的名字,使之与 Drive 序号相同方便辨认。

Solution Explorer 🛛 👻 🕂 🗙	NC_XYZ ⊅ X
© ⊃ ☆ `o - ē ≁ <mark></mark>	General Settings Parameter Dynamics Online Functions Coupling Compensation
Search Solution Explorer (Ctrl+;)	Link To T/O
Solution 'NC' (2 projects)	
A 📑 NC XYZ	Link To PLU
👂 🍊 SYSTEM	Axis Type: CANopen DS402/Profile MDP 742 (e.g. EtherCAT CoE Drive)
A 🖾 MOTION	
NC-Task 1 SAF	Unit: mm 🗸 Display (Only)
💼 NC-Task 1 SVB	Position: 🛄 🖛 📃 Modulo
🛟 Image	Velocity: 🔲 mm/min
III Tables	
🔠 Objects	Result
⊿ 🚔 Axes	Position: Velocity: Acceleration: Jerk:
🔺 🖶 Axis 3	mm mm/s mm/s2 mm/s3
🕨 👯 Enc	
▷ ➡ Drive	Axis Cylle Time / Access Divider
🕰 Ctrl	Diviter: 1 😴 Cycle Time (ms): 2.000
👂 🛄 Inputs	Waulo: 0 🚔
Outputs	
Axis 4	
Axis 5	
ANALYTICS	
Device I (EtherCAT)	
Sund Inite	
Term 1 (EK1200)	
Drive 3 (CMMT-AS)	
Drive 4 (CMMT-AS)	
Drive 5 (CMMT-AS)	
· · · ·	

5 配置 DC 同步

NC 轴控制 CMMT 时必须配置 DC 同步。若不配置此项,伺服可能低速运行时正常,但速度提高时会报错。

Solution Explorer	• ¶ ×	NC_XYZ ≉ × GVL									
G O 🟠 To - 🗊 🖌 🗕		General EtherCAT	DC	Process Data	Startup Co	oE - Onlin	ne Diag H	listory	Online		
Search Solution Explorer (Ctrl+;)	ρ-						_	-			
Solution 'NC' (1 project)		Operation M	,		DC for sy	nchroniz	ation		~ <	3	
🔺 🛐 NC_XYZ											
SYSTEM		-				Advance	ed Setting	s			
MOTION											
▶ UI PLC											
= Device T (EtherCAT)											
Image-Info											
♦ SyncUnits											
Inputs											
Outputs											
🕨 🛄 InfoData											
Term 1 (EK1200)											
Drive 3 (CMMT-AS)											
P	-										
InfoData		Name	Onli	ine	Type	Size	>Add	In/Out	llser	Linked to	
Drive 4 (CMMT-AS)			~ ~		цият	3.0	71.0	Involut	0301	=Ctata1 =Ctata2	
Drive 5 (CMMT-AS)			^		CINIT	2.0	71.0	Input	0	nstater, nstatez	
Mappings		Prodes of ope	v		DINT	1.0	73.0	Input	0	»Detala1 la lasuta	
NC-Task 1 SAF - Device 1 (E	therCAT)	Position actual	~		DINT	4.0	79.0	Input	0	nDataini , in , inputs	
🚟 PLC_Prg Instance - Device 1	(EtherCA1	yelocity actual	~			4.0	78.0	input	0	Datain/ . In . Inputs	
	-								-		

6 比例系数设置

Festo Automation Suite 中不支持 mm 单位,直线电缸单位只能选到 m。系数推荐保持默认值,即位置比例系数 10⁻⁶。

PARAMETERISA	ION	CONTROL	DIAGNOSIS			
X-Axis CMMT-AS-C2- Path: 192.168.0. Connected	8 A-EC-S 11	1 Disconnect			=*	I Ç
Parameter pages	<	Fieldbus				
Drive configuration						
Device settings						
Fieldbus	2	Factor grou	p			
Digital I/O		Current user	unit	Metric	[m, m/s,] (6)	
Analogue I/O		Position		0	-6	
Encoder interface		Velocity		6	-3	
→ Axis 1	11	velocity				
Motor		Acceleration		0	-3	
Gearbox		Jerk		0	-3	
Axis	10					

NC 轴中直线电缸单位通常保持默认的 mm,为了与 Festo Automation Suite 系数单位相匹配,编码器比例系数需要设置为 10⁻³mm =10⁻⁶m,即 Scaling Factornumerator 为 0.001, Scaling Factor Denominator 为 1.0。

Solution Explorer 🗸 🗸	× TwinO	AT Project2 🤹 🗙					
○ ○ ☆ 'o - @ ≠ <mark>-</mark>	Gen	eral NC-Encoder Parameter Time Compensation Online					
Search Solution Explorer (Ctrl+;)	<u>۶-</u>	Parameter	Offline Value		Online Value	т	Linit
Solution 'TwinCAT Project2' (1 project) TwinCAT Project2	-	Encoder Evaluation:					onic
A 🦉 SYSTEM		Invert Encoder Counting Direction	FALSE	•		В	
License		Scaling Factor Numerator	0.001			F	mm/INC
Tasks		Scaling Factor Denominator (default: 1.0)	1.0			F	
alle Routes		Position Bias	0.0			F	mm
Type System		Modulo Factor (e.g. 360.0°)	360.0			F	mm
		Tolerance Window for Modulo Start	0.0			F	mm
NC-Task 1 SAF		Encoder Mask (maximum encoder value)	OxFFFFFFF			D	
NC-Task 1 SVB		Encoder Sub Mask (absolute range maximum value)	0x000FFFFF			D	
i⊋ Image Tables		Reference System	'INCREMENTAL'	•		E	
Objects	-	Limit Switches:					
▲ 🚔 Axes		Soft Position Limit Minimum Monitoring	FALSE	-		В	
A Axis 1		Minimum Position	0.0			F	mm
Inputs		Soft Position Limit Maximum Monitoring	FALSE	•		В	
Outputs		Maximum Position	0.0			F	mm
▷ ➡ Drive	+	Filter:					
Inputs	+	Homing:					
Outputs	+	Other Settings:					

7 激活配置

激活配置,弹出对话框,均点确定。

NC - Microsoft Visual Studio	Microsoft Visual Studio X	Microsoft Visual Studio X
FILE EDIT VIEW PROJECT BUILD DEBUG TWINCAT T •	(Old Configuration (Old Configurations will be overwritten!)	? Restart TwinCAT System in Run Mode
Sc Activate Configuration	确定取消	確定取消

这一步如果没有报错,双击 IO 列表里的 Drive 名,右侧选项卡打开 "online", Current State 状态会显示 OP,即可操作状态。且下方 Statusword 等字段的在线值将会显示数字

Solution Explorer 🔹 부 🗙	NC_XYZ ↔ ×							
○ ○ ☆ ¹ ○ - ₱ <i>▶ -</i> =	General EtherCAT DC Process Data Startup CoE - Online Diag History Online NC: Online NC: Func	tions						
Search Solution Explorer (Ctrl+;)	Chat Marking							
Search Solution Explorer (Ctrl+;) Solution 'NC' (1 project) SVSTEM SVSTEM MOTION MOTION MOTION PIC SVC 1 (EtherCAT) SVC 1 (EtherC	State Machine Init Bootstrap Pre-Op Safe-Op Op Clear Error Op Clear Error DLL Status Port A: Carrier / Open Port B: Carrier / Open Port C: No Carrier / Closed Port D: No Carrier / Closed							
 ▷ □ Inputs ▷ ■ Outputs ▷ ■ WcState ▷ ■ InfoData 	File Access over EtherCAT Download Upload							
	Name Online Type Size >Add In/Out User Linked to							
	🚰 Statusword X 33329 UINT 2.0 71.0 Input 0 nState1, nState2							
	Modes of ope 0 SINT 1.0 73.0 Input 0							
	Position actual X 29615 DINT 4.0 74.0 Input 0 nDataIn1. In . Input	5						
	Velocity actual X U DINT 4.0 78.0 Input 0 nDataIn7. In . Input	5						
	Ten lorque actual X -3 INI 2.0 82.0 Input 0 nDataln3[0] . nDatal	n						
	BII 0.1 1522.3 Input 0 nState4, nState4							

并且 NC: Online 选项卡下已经显示当前位置值(下图界面在 MOTION 菜单下对应的 Axis 里也能找到) Solution Explorer NC_XYZ ⇒ × ○ ○ ☆ · o - 司 / ≠ -= Process Data Startup CoE - Online Diag History Online NC: Online NC: Functions General EtherCAT DC Search Solution Explorer (Ctrl+;) ρ. Setpoint Position: mm] Solution 'NC' (1 project) 29.6150 0.0000 🔺 📊 NC_XYZ SYSTEM Lag Distance (min/max): mm] Actual Velocity: [mm/s] Setpoint Velocity: [mm/s] Þ A MOTION 0.0000 (0.000, 0.000) -0.0363 0.0000 ⊳ PLC Override: [%] Total / Control Output: [%] Error: 🔽 I/O 4 0.0000 % 0.00 / 0.00 % 0 (0x0) Devices = Device 1 (EtherCAT) 4 Status (log.) Status (phys.) Enabling 🚏 Image Ready NOT Moving Coupled Mode Controller Set 🚏 Image-Info Calibrated O Moving Fw In Target Pos. Feed Fw 💈 SyncUnits ⊳ Moving Bw In Pos. Range Feed Bw Has Job 😐 Inputs Þ Þ 📕 Outputs Controller Kv-Factor: [mm/s/mm] ⊳ 🔄 InfoData Reference Velocity: [mm/s] t t 1 2200 Term 1 (EK1200) Þ Drive 3 (CMMT-AS) Target Position: Target Velocity: [mm] [mm/s] Þ Inputs t . Outputs 0 0 ⊳ WcState ⊳ Þ 🖶 InfoData **+ +** F4 + F3 Ø F 6 **®** F8 F2 F9 Þ Drive 4 (CMMT-AS) F1 ⊳ h Drive 5 (CMMT-AS)

这个位置应该与 Festo Automation Suite 上显示的位置相同。

AUTOMATION SUITE CMMTconfig*	🔺 Q 🕜	X-Axis	×	Z-Axis	×			- • × FESTO
PARAMETERISATION	CONTROL DIAGNOSI	IS						
CMMT-AS-C2-3A-EC-ST Path: 192.168.0.11 Connected	Disconnect	Plug-in PLC Control	Enabled Disabled Powerstage	Stop	:=\$	2) C	
Parameter pages <	Fieldbus						> Wat	ch window
Drive configuration Device settings 1								Active motion task nactive (0)
Fieldbus 2	Factor group							Referencing status Drive referenced (200)
Digital I/O	Current user ur	nit	Metric [m, m/s,] (6)				Setpoint Position
Analogue I/O	Position		0	-6				0.00 mm
Encoder interface Axis 1 11	Velocity		0	-3				Position actual value (encoder 1) 29.6148272 mm
Operator unit	Acceleration		0	-3				Setpoint value velocity controller
Parameter list 13	Jerk		0	-3				/elocity actual value (encoder 1) 0.0001134 m/s
								Active current setpoint 0.00 Arms
								Actual active current 0.0030763 Arms
								Actual value l ² t monitoring mot 0.00 A ² s
								Actual value l ² t monitoring po
							IΞ	Select
CMMTconfig* X-Axis (Plug-in: CMMT-AS Plu	ug-in V1.2.2.4)						1	Festo Automation Suite V1.2.1.1

提示: 1.如果 NC: Online 页面数据为灰色的,则可能是未激活配置或者未处于运行模式,请重新激活下载。 2.如果当前位置数据与 Festo Automation Suite 监控数据不一致,请按照第6步设置编码器比例系数。

8 设置操作模式

直接将 IO 接口中的 Modes of operation 强制写为 8 后,即可开始后面的调试。操作模式 8 即为 Cyclic Synchronous Position 模式,定位到目标点的轨迹计算由 PLC 完成。



注意: 重新激活配置后强制值会恢复为 0。如何在 PLC 程序中添加映射变量来控制操作模式见 PLC 程序调试部分。

9 NC 轴调试

NC: Online 基本调试界面

		20.6	160	Setpoint Position:	mm]
		29.0	001		0.0000
Lag Distance (min/max): mm]	Actu	al Velocity:	[mm/s]	Setpoint Velocity:	[mm/s]
0.0000 (0.000, 0.000)			0.0420		0.0000
Override: [%] Tota	al / Control Out	out: [%]	Error:	
0.0000 %		0.00 /	0.00 %		0 (0x0)
Status (log.)		- Status (phys.)		Enabling	
Ready NOT Mov	ving	Coupled M	lode	Controller	Set
Calibrated Moving F	w	🗌 In Target P	os.	Feed Fw	
Has Job Moving B	w	🗌 In Pos. Rar	nge	Feed Bw	
Controller Kv-Factor: [m	m/s/m	m] Refe	rence Ve	ocity:	[mm/s]
1		2200	D		t
Target Position:	[m	m] Targ	et Veloci	ty:	[mm/s]
0	_	↓ 0			
+ F1 F2 F3	+ ; F			B	→+ F9
			10		19

F1~F9功能键可通过键盘上对应按键启动。

9.1 使能:

Enabling	Set Enabling	×
Controller Set	 ✓ Controller ✓ Feed Fw ✓ Feed Bw 	OK Cancel
ocity: [mm,	/s] 0verride [%]: 100	All

Controller:上使能

Feed Fw: 准许正向移动

Feed Bw: 准许负向移动

Override[%]:速度倍率,调试时建议先设置低百分比倍率试探运行。

如果伺服没有报错且已经写入了操作模式,设置使能之后可以获得 Ready 状态反馈,则可以开始运动了。

NOT Moving
Moving Fw
Moving Bw

9.2 点动



点动速度设置见下图:

Solution Explorer 👻	₽× NC	_XYZ ⊰	• X	
○ ☆ io - @ / ≠		General	Settings Parameter Dynamics Online Functions O	Coupling Compensation
Search Solution Explorer (Ctrl+;)	<i>۹</i> - ۹			
Solution 'NC' (1 project)				Offline Value
NC_XYZ		+	Maximum Dynamics:	
		+	Default Dynamics:	
 Morrora Morrora		-	Manual Motion and Homing:	
🖨 NC-Task 1 SVB			Homing Velocity (towards plc cam)	30.0
j∓ Image □ Tables			Homing Velocity (off plc cam)	30.0
Objects			Manual Velocity (Fast)	600.0
⊿ ∰a Axes	_		Manual Velocity (Slow)	100.0
Axis 3			Jog Increment (Forward)	5.0
Axis 5			Jog Increment (Backward)	5.0
PLC		+	Fast Axis Stop:	
▲ 🔄 I/O		+	Limit Switches:	
 ▲ ■ Devices ▲ ■ Device 1 (EtherCAT) 		+	Monitoring:	
≜ ∎ Image		+	Setpoint Generator:	
Surger Info		+	NCI Parameter:	
V V SyncUnits		+	Other Settings:	

9.3 绝对定位:

F5 启动, F6 停止。



9.4 故障处理



F8复位故障。

F9 寻零,用不到不要点,误点击之后实际位置显示变化了,如下图,重新激活配置或重启 CMMT 可恢复实际位置显示。

			00	00000000	0050	Setpoint Position:	mm]
			-99	-99999999999.7389			
Lag Dist	ance (m	in/max):	mm]	Actual Velocity:	[mm/s]	Setpoint Velocity:	[mm/s]
	0.2441	(0.000, 0).244)		-0.0477		0.0000
Override	:		[%]	Total / Control O	utput: [%]	Error:	
		100.00	00 %	0.00	/ 0.00 %	18000 (0x4650)

故障代码以及其他软件疑问,可查询帮助文件。下图为离线帮助查询实例:

NC - Microsoft Visual Studio (Administrator)							
FILE EDIT VIEW PROJECT BUILD DEBUG TWINCAT TWINSAFE P	LC SCOP	E TOOL	s window	HEL	P	0.1.11	
◎ • ◎ 12 • 12 • 12 • 12 • 14 • 14 • 17 • ? • ▶ Attach •		Rele	ease 2		View Help	Ctrl+F1 Ctrl+Alt+F1	╸╗┍┍╗╧╚┇┇╸╴
🕆 🔛 🚨 🖉 🥄 🐨 😡 🌄 🌠 🛛 NC_XYZ 🛛 🗸 CX-3D6836	•	PLC1	-	- 888	Add and Remove Help Content	Ctri+Alt+F1	55-
Solution Explorer 👻 👎	×				Easthack		Launch in Browser
C ⊂ ☆ 'o - fi / / -					Complete	-1	Launch in Help Viewer
Search Solution Explorer (Ctrl+;)	ρ-				Samples	-	-
Solution 'NC' (1 project)					Customer Feedback Options		
A NC_XYZ					Register Product		
				Ľ			
					Online Privacy Statement		
▶ 🔁 I/O					About Microsoft Visual Studio		-
					About Microsoft Visual Studio		
Of Microsoft Help Viewer 2.1 - Catalog VisualStudio12 (en-US)							_ = ×
○ ○ 局 決 戶 員 尊 職							
Search +	Drive Erro	rs × Ma	nage Content	II IIII aliz	auon nas not been periormeu (1. milializado	// U/ U//VC //O, 2. 1//	Illianzation of unive, J. Neset univej.
Search * 18000 *	Drive Error	rs × Ma 17985	nage Content Address	'Axis a	address' Drive does not know its axis, or the	e axis address has	not been initialized.
RFID reader hardware	2641 4642	rs × Ma 17985 17986	Address	'Axis a	adon has not been performed (1. militalizatio address' Drive does not know its axis, or the ess IO input structure' Drive has no valid IC	e axis address has D input address in t	not been initialized.
Search * 18000 X RFID reader hardware * The TwinCAT RFID library supports different RFID reader models * Version: TF6600 TC3 RFID Reader Communication *	Drive Error 4641 4642 4643	rs × Ma 17985 17986 17987	Address Address Address Address	'Axis a 'Addre	ation has the been performed (1. minualization address' Drive does not know its axis, or the ess IO input structure' Drive has no valid IC ess IO output structure' Drive has no valid	e axis address has D input address in t IO output address	Internation of one, 5. (eset one). In the process image. In the process image.
RFID reader hardware The TwinCAT RFID library supports different RFID reader models Version: TF6600 TC3 RFID Reader Communication Drive Errors	Drive Error 4641 4642 4643 4650	rs × Ma 17985 17986 17987 18000	Address Address Address Address Monitoring	'Axis a 'Addre 'Addre	attorn has not been performed (1 - initialization address' Drive does not know its axis, or the ess IO input structure' Drive has no valid IC ess IO output structure' Drive has no valid hardware not ready to operate' The drive	a axis address has D input address in t IO output address hardware is not rea	Interprocess image.
Search * 18000 × RFID reader hardware * The TwinCAT RFID library supports different RFID reader models * Version: TF6600 TC3 RFID Reader Communication * Drive Errors Drive Errors	Drive Error 4641 4642 4643 4650	rs × Ma 17985 17986 17987 18000	Address Address Address Address Monitoring	'Axis a 'Addre 'Addre 'Drive possibl	attorn has not been performed (i.e. mitualization address' Drive does not know its axis, or the ess IO input structure' Drive has no valid IC ess IO output structure' Drive has no valid hardware not ready to operate' The drive le causes: rive is in the error state (hardware error)	a axis address has D input address in t IO output address hardware is not rea	Interprocess image. In the process image. In
Search * 18000 × RFID reader hardware * The TwinCAT RFID library supports different RFID reader models * Version: TF6600 TC3 RFID Reader Communication * Drive Errors * Drive Errors * Version: TF5100 TC3 NC I *	Drive Error 4641 4642 4643 4650	rs × Ma 17985 17986 17987 18000	Address Address Address Monitoring	"Axis a "Addre "Addre "Addre "Drive possibl - the dr - the dr	attorn has not been performed (1. Initialization address' Drive does not know its axis, or the ess IO input structure' Drive has no valid IC ess IO output structure' Drive has no valid hardware not ready to operate' The drive le causes: invie ls in the error state (hardware error) rive is in the start-up phase (e.g. after an axi	a axis address has D input address in t IO output address hardware is not rea is reset that was pro-	International of one of the second of the se
Search * 18000 × RFID reader hardware * The TwinCAT RFID library supports different RFID reader models * Version: TF6600 TC3 RFID Reader Communication * Drive Errors * Version: TF5100 TC3 NC I * Drive Errors * Drive Errors *	Drive Error 4641 4642 4643 4650	rs × Ma 17985 17986 17987 18000	Address Address Address Address Monitoring	"Axis a "Addre "Addre "Addre "Drive possibl - the dr - the dr Note: 1	autor has not been performed (1 - minimization address' Drive does not know its axis, or the ess IO input structure' Drive has no valid IC ess IO output structure' Drive has no valid hardware not ready to operate' The drive le causes: rive is in the error state (hardware error) rive is in the start-up phase (e.g. after an axis rive is missing the controllier enable (CNABL The time required for "booting" a drive after a	a axis address has D input address in t IO output address hardware is not rea is reset that was pr E) a hardware fault ca	International of once, s. reset once). not been initialized. the process image. in the process image. ady for operation. The following are eceded by a hardware error) n amount to several seconds.
Search * 18000 × RFID reader hardware * The TwinCAT RFID library supports different RFID reader models * Version: TF6600 TC3 RFID Reader Communication * Drive Errors * Version: TF5100 TC3 NC I * Drive Errors * Drive Errors * Drive Errors * Drive Errors *	Drive Error 4641 4642 4643 4650	rs × Ma 17985 17986 17987 18000	Address Address Address Address Monitoring	"Addree "Addree "Addree "Drive possibl - the dr - the dr Note: 1	autor has not been performed (1. Initialization address' Drive does not know its axis, or the ess IO input structure' Drive has no valid IC ess IO output structure' Drive has no valid hardware not ready to operate' The drive le causes: rive is in the error state (hardware error) rive is in the start-up phase (e.g. after an axis rive is missing the controller enable (ENABL The time required for "booting" a drive after a in the system communication of the drive).	an or drive (x0, 2, m) a axis address has D input address in t IO output address hardware is not rea is reset that was pr E) a hardware fault ca Life Counter Rea	International of once, s. reset once). not been initialized. the process image. in the process image. ady for operation. The following are eceded by a hardware error) n amount to several seconds.
Search * 18000 × RFID reader hardware * The TwinCAT RFID library supports different RFID reader models * Version: TF6600 TC3 RFID Reader Communication * Drive Errors * Version: TF5100 TC3 NC I * Drive Errors * Version: TF5110 - TF5113 TwinCAT Kinematic Transformation *	Drive Error 4641 4642 4643 4650	rs × Ma 17985 17986 17987 18000 18001	Address Address Address Address Monitoring Monitoring	"Axis a "Addre "Addre "Addre "Drive possibl - the dr - the dr Note: T Error i fieldbus	autor has not been performed (1. Initialization address' Drive does not know its axis, or the ess IO input structure' Drive has no valid IC ess IO output structure' Drive has no valid hardware not ready to operate' The drive le causes: rive is in the error state (hardware error) rive is in the start-up phase (e.g. after an axis rive is missing the controllier enable (ENABL The time required for "booting" a drive after a in the cyclic communication of the drive (is or a drive that is in the error state.	an or drive inc, 2. In a axis address has D input address in t IO output address hardware is not rea is reset that was pri E) a hardware fault ca Life Counter).Rea	International of one of the second se
Search * 18000 × RFID reader hardware * The TwinCAT RFID library supports different RFID reader models * Version: TF6600 TC3 RFID Reader Communication * Drive Errors * Version: TF5100 TC3 NC1 * Drive Errors * Version: TF5110 - TF5113 TwinCAT Kinematic Transformation * Drive Errors * Version: TF5110 - TF5113 TwinCAT Kinematic Transformation *	Drive Error 4641 4642 4643 4650 4651 4652	rs × Ma 17985 17986 17987 18000 18001 18002	Address Address Address Address Monitoring Monitoring Monitoring	"Addree "Addree" "Addree "Addree" "Addree "Addree" "Addree "Addree" "Addree "Addree" " " " " " " " " " " " " " " " " " "	autor has not been performed (1. Initialization address' Drive does not know its axis, or the ess IO input structure' Drive has no valid IC ess IO output structure' Drive has no valid hardware not ready to operate' The drive le causes: rive is in the error state (hardware error) rive is in the start-up phase (e.g. after an axis rive is missing the controllier enable (ENABL The time required for "booting" a drive after a in the cyclic communication of the drive (is or a drive that is in the error state. ging the table ID when active controller er	an or drive inc, 2. In a axis address has D input address in t IO output address hardware is not rea is reset that was pri E) a hardware fault ca Life Counter).Rea nable is impermis	International of once, s. reset once). not been initialized. the process image. in the process image. ady for operation. The following are eceded by a hardware error) in amount to several seconds. issons for this could be an interrupted sible'.Changing (deselecting,
Search * 18000 × RFID reader hardware * The TwinCAT RFID library supports different RFID reader models * Version: TF6000 TC3 RFID Reader Communication * Drive Errors * Version: TF5100 TC3 NC1 * Drive Errors * Version: TF5110 - TF5113 TwinCAT Kinematic Transformation * Drive Errors * Version: Tess * Drive Errors *	Drive Error 4641 4642 4643 46650 4651 4652	rs × Ma 17985 17986 17987 18000 18001 18002	Address Address Address Address Monitoring Monitoring Monitoring	"Axis a "Addree "Addree "Drive possibl - the di - the di Note: T Error i fieldbu: "Chang selectin	auton has not been performed (1. Initialization address' Drive does not know its axis, or the ess IO input structure' Drive has no valid IC ess IO output structure' Drive has no valid hardware not ready to operate' The drive le causes: rive is in the error state (hardware error) rive is in the error state (hardware error) rive is in the start-up phase (e.g. after an axi rive is missing the controller enable (ENABL The time required for "booting" a drive after a in the cyclic communication of the drive (is or a drive that is in the error state. ging the table ID when active controller en rg) the characteristic curve table ID is not per	an or drive ive, 2. in a axis address has D input address in t IO output address hardware is not rea is reset that was pri E) a hardware fault ca Life Counter).Rea mable is impermis	International of once, s. reset once). not been initialized. the process image. in the process image. ady for operation. The following are eceded by a hardware error) in amount to several seconds. issons for this could be an interrupted sible'.Changing (deselecting, e controller enable for the axis is
Search * 18000 × RFID reader hardware * The TwinCAT RFID library supports different RFID reader models * Version: TF6600 TC3 RFID Reader Communication * Drive Errors * Version: TF5100 TC3 NC I * Drive Errors * Version: TF5110 - TF5113 TwinCAT Kinematic Transformation * Drive Errors * Version: TF5400 TC3 Advanced Motion Pack *	Drive Error 4641 4642 4643 4650 4651 4652	rs × Ma 17985 17986 17987 18000 18001 18002	Address Address Address Address Monitoring Monitoring Monitoring	"Addree "Addree "Addree "Addree "Drive possibl - the dr - the dr - the dr Note: 1 Error i fieldbu: "Chang selectin active.	ation has not been performed (1. Initialization address' Drive does not know its axis, or the ess IO input structure' Drive has no valid IC ess IO output structure' Drive has no valid hardware not ready to operate' The drive le causes: rive is in the error state (hardware error) rive is in the error state (hardware error) rive is in the start-up phase (e.g. after an axi rive is missing the controller enable (ENABL The time required for "booting" a drive after a in the cyclic communication of the drive (is or a drive that is in the error state. ging the table ID when active controller en ng) the characteristic curve table ID is not pe	an or drive ive, 2. In a axis address has D input address in t IO output address hardware is not rea is reset that was pri E) a hardware fault ca Life Counter).Rea mable is impermis	International of once, s. reset once). not been initialized. the process image. in the process image. ady for operation. The following are eceded by a hardware error) in amount to several seconds. issons for this could be an interrupted sible'.Changing (deselecting, a controller enable for the axis is
Search * 18000 × RFID reader hardware * The TwinCAT RFID library supports different RFID reader models * Version: TF6600 TC3 RFID Reader Communication * Drive Errors * Version: TF5100 TC3 NC I * Drive Errors * Drive Errors * Version: TF5110 - TF5113 TwinCAT Kinematic Transformation * Drive Errors * Version: TF5400 TC3 Advanced Motion Pack * Drive Errors * Version: TF5400 TC3 Advanced Motion Pack * Drive Errors *	Drive Error 4641 4642 4643 4663 4650 4651 4652 4655	rs × Ma 17985 17986 17987 18000 18001 18002 18005	Address Address Address Address Monitoring Monitoring Monitoring Monitoring	"Addree "Addree "Addree "Drive possibl - the dr - the dr Note: 1 Error i fieldbu: "Chang selectin active. "Invalid IO data	ation has not been performed (1. Initialization address' Drive does not know its axis, or the ess IO input structure' Drive has no valid IC ess IO output structure' Drive has no valid hardware not ready to operate' The drive le causes: invie is in the error state (hardware error) rive is in the start-up phase (e.g. after an axi rive is missing the controller enable (ENABL The time required for "booting" a drive after a in the cyclic communication of the drive (is or a drive that is in the error state. ging the table ID when active controller en ng) the characteristic curve table ID is not per d IO data for more than 'n' continuous NC a (e.g. n=3) for more than 'n' continuous NC	an or drive ive, 2. in a axis address has D input address in t IO output address hardware is not rea is reset that was pri E) a hardware fault ca Life Counter).Rea nable is impermis armissible when the C cycles (NC SAF ta	International of once, s. reset once). not been initialized. the process image. in the process image. ady for operation. The following are eceded by a hardware error) in amount to several seconds. asons for this could be an interrupted sible'.Changing (deselecting, a controller enable for the axis is fencoder or drive) has detected invalid sk).

9.5 两点往复运动

Functions 选项卡下的 Reversing Sequence 功能可设定电缸在两个位置之间往复运动。基于此可观察电缸运行动态效果,监 控运动曲线,动态调节参数。

Solution Explorer 👻 👎	×	NC_XYZ ⇒	×					
○ ○ ☆ `o - ē ≠		General	Settings	Parameter	Dynamics On	line Funct	tions Co	upling Compensation
Search Solution Explorer (Ctrl+;)	ρ-		5		,			
Ig⊡ Solution 'NC' (1 project) I Image: Inc_XYZ					135	5.2010	Se	etpoint Position: [mm] 135.2000
SYSTEM		Extend	led Start					
 MOTION MC-Task 1 SAF 		Start I	Mode:		Reversing Se	equence 🗸		Start
📄 NC-Task 1 SVB		Targe	t Position	l:	10		[mm]	Stop
Tables		Targe	t Velocity:		100		[mm/s]	
Objects		Targe	t Position	2:	200		[mm]	
⊿ 🚔 Axes		Idle T	ime:		0		s	Last Time: [s]
Axis 3	- 1				L		_	0.74600
Axis 4								0.74000
Axis 5		-Raw D	rive Outpu	ıt				
		Outpu	ıt Mode:		Percent	~		Start
▲ ⁴ ¹		Outpu	ıt Value:		0		[%]	Stop
		Set Act	tual Positi	on				
Image-Info		Abso	lute	~	0]	Set
SyncUnits								
👂 🛄 Inputs		Set la	rget Positi	on			7	
👂 🝓 Outputs		Abso	lute	\sim	0			Set
🕨 🦳 InfoData								

9.6 NC 轴参数

根据需要设置参数。两种保存方式:

1. 激活配置可将所有更改下载并永久保存。

2. 选中某一行后 Download, 仅下载当前行, 断电后不保存。此项更快捷, 常用于在线更改。

🁔 🖾 🖉 🔨 💿 🙋 🛼 🛛 CX-3D6836 🔹 🗸 🖓 🖓	LC_Prg) ^^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	la -		
Solution Explorer - 7 × N	IC_XYZ	4 Х				-
C C ☆ To + I ≠	Ganar	al Sattings Parameter Duramics Online Euroti	and Counting Componentian			
Search Solution Explorer (Ctrl+;)	Gener	al settings reference Dynamics Online Punct	ons coupling compensation			
Solution 'NC' (1 project)		Parameter	Offline Value	Online Value	T	Unit 🔶
NC_XYZ	-	Maximum Dynamics:				
		Reference Velocity	2200.0	2200.0	F	mm/s
MC-Task 1 SAF		Maximum Velocity	500.0	500.0	F	mm/s
DC-Task 1 SVB		Maximum Acceleration	15000.0	15000.0	F	mm/s2
Tables		Maximum Deceleration	15000.0	15000.0	F	mm/s2
Objects	-	Default Dynamics:				
A 🛃 Axes		Default Acceleration	6000.0	6000.0	F	mm/s2
▶ ➡ Axis 3		Default Deceleration	6000.0	6000.0	F	mm/s2
 ▷ ➡ Axis 5 		Default Jerk	60000.0	60000.0	F	mm/s3
▶ III PLC	+	Manual Motion and Homing:				
▲ 🔄 I/O	+	Fast Axis Stop:				
▲ ➡ Devices ▲ ➡ Device 1 (EtherCAT)	-	Limit Switches:				
🚔 Image		Soft Position Limit Minimum Monitoring	TRUE	TRUE	в	
1 Image-Info		Minimum Position	0.0	0.0	F	mm
SyncUnits		Soft Position Limit Maximum Monitoring	TRUE	TRUE	в	
 Multiputs 		Maximum Position	250.0	250.0	F	mm
InfoData	+	Monitoring:				
Term 1 (EK1200)	+	Setpoint Generator:				
 Inputs 	+	NCI Parameter:				
Outputs	+	Other Settings:				
Secontrolword		-				-
Target position	6					
Profile velocity	C	ownload Upload Expand All	Collapse All Select All			
Target velocity						
Tarast torque						

10 PLC 程序调试

10.1 新建 PLC 程序

新建标准 PLC 项目



添加 POU, Type 为程序,语言为 CFC



将其拖动到 Plc Task 目录下即可进入任务周期



10.2 关联操作模式

在刚建立的 CFC 程序中声名一个 SINT 型变量,地址为:%Q*,初值为 8,这里命名为 OperateMode。

PO	U* -⊧	×							-
٩	1	X				PROGRA	AM POU		E .
	^	Scope	Name	Address	Data type	Initialization	Comment	Attributes	
	1	🖗 VAR	OperateMode	%Q*	SINT	8			
编	译 ()	(hlins	程序						

her (Dunu) 注户			
PLC			
PLC1			
🔺 🛱 PLC1 Project			
🚞 External T	⋺	Login	
👂 📴 Reference	*	Build	
🕨 🚞 DUTs		Rebuild	
POUs		Check all objects	
🚞 VISUs			
E PLC1.tmc		Clean	
👂 📑 PlcTask (F		Add •	
PLC1 Instanc		Export to ZIP	
▶ 🗾 I/O		Import from 7IP	
		Import nom 21	
	188	Export PLCopenXML	

完成编译后,PLC 的 Instance 目录下会多出来刚声名的变量



在 IO 里找到 Drive 右击 change Link,



链接到刚建立的操作模式变量



10.3 插入 MontionControl 库

添加运动控制功能库,选择 Tc2_MC2,



双击 TC2_MC2 打开库管理器可预览包含的功能块

Solution Explorer	• ₽ ×	Library Manager 🙃 👳 🗙 POU [Online]
© ⊃ ☆ lo - ⊡ ≠ <mark></mark>		🎦 Add library 🗙 Delete library 🛛 🗃 Details 🛛 💷 Placeholders 🛛 🎁 Library repository
Search Solution Explorer (Ctrl+;)	<i>-</i> م	Name Namespace Effective version
Solution 'NC' (1 project)		Festo_HomingLibrary, 3.1.20.2 (Festo AG & Co. KG) FestoHomingLib 3.1.20.2
Image: NC_XYZ		Image: Intercent and Image: I
👂 🚰 SYSTEM		Tc2_MC2 = Tc2_MC2, * (Beckhoff Automation GmbH) Tc2_MC2 3.3.31.0
MOTION		Tc2_Standard = Tc2_Standard, * (Beckhoff Automation GmbH) Tc2_Standard 3.3.2.0
PLCI PlCI Project		Tc3_Module = Tc3_Module, * (Beckhoff Automation GmbH) Tc3_Module 3.3.21.0
External Types		
 A Deferences 		TC2_MC2, 3.3.31.0 (Bedkhoff Automation GmbH) Convertation
- Festo_HomingLibrary		H- Data types
- Tc2_EtherCAT		H- 🛄 Global Variables
- Tc2_MC2		POUs
- Tc2_Standard		H - Administrative
Ic2_System		Motion
		Gearing
POUs		
USUs VISUs		MC_Home
PLC1.tmc		Manual Motion
🕨 🔓 PlcTask (PlcTask)		
PLC1 Instance		Phasing
▶ 🛃 I/O		
		D MC MoveAddition

10.4 使用功能块



ut Assistant			
ext search Categories			
Functionblocks	▲ Name	Туре	Origin ^
Module Calls	🖶 🛅 POUs		
Keywords	🖮 🚞 [Internal]		
Conversion Operators	🗐 - 🚞 Administrative		
	🖨 🔂 Axis Functions		
	MC_Power	FUNCTION_BLOCK	Tc2_MC2, 3.3.18
	MC_Reset	FUNCTION_BLOCK	Tc2_MC2, 3.3.18
	MC_SetPosition	FUNCTION_BLOCK	Tc2_MC2, 3.3.18
	🗷 🚞 Extensions		
	🖶 🚞 External Set Point Generator		
	🖃 🚞 Status and Parameter		
	MC_ReadActualPosition	FUNCTION_BLOCK	Tc2_MC2, 3.3.18
	MC_ReadActualVelocity	FUNCTION_BLOCK	Tc2_MC2, 3.3.18
	MC_ReadAxisComponents	FUNCTION_BLOCK	Tc2_MC2, 3.3.18
	MC ReadAxisError	FUNCTION BLOCK	Tc2 MC2, 3.3.18 ♥

Axis 输入自定义轴对象名回车(本例中命名为 CMMT3),自动声明为 AXIS_REF

	Auto Declare	_	×
MC_ReadActualPosition_0 MC_ReadActualPosition_0 MC_ReadActualPosition_0 MC_ReadActualPosition_0 MC_ReadActualPosition_0 The second s	Scope: VAR \checkmark Object: POU [PLC1] \checkmark	Name: CMMT3 Initialization:	Type: AXIS_REF > Address:
ErroriD – Position –	Flags: CONSTANT PERSISTENT	Comment:	Ŷ
			OK Cancel

重新编译 PLC

 PLC PLC1 	
✓ 🛱 PLC1 ···· ▶ 🛅 Ex → 1	Login
4 🗁 Re 🏭	Build
	Check all objects
-	Clean
D	Add
∠ _ PC	Export to ZIP

之后在 Plc Instance 下会多出一些 NcToPlc 和 PlcToNc 的信息。

PLC1
PLC1 Project
PLC1 Instance
🔺 🛄 PlcTask Inputs
🕴 🌮. POU.CMMT3.NcToPlc
PlcTask Outputs
POU.OperateMode
POU.CMMT3.PlcToNc
SAFETY
‰ C++
ANALYTICS
▷ 🔽 I/O

打开 Motion 菜单下的相应 Axis 轴 setting 选	项卡,链接到 PLC 中的 Axis 对象 CMMT3,将 NC 轴对象和 PLC 轴对象关联起	来
Solution Explorer 🛛 🝷 🕂 🗙	POU MAIN <mark>NC_XYZ ≄ ×</mark>	
© ○ ☆ [™] o - ฮ <i>⊁ -</i> -	General Settings Parameter Dynamics Online Functions Coupling Compensation	n
Search Solution Explorer (Ctrl+;)		
Solution 'NC' (1 project)	Link To I/O Drive 3 (CMMT-AS)	
NC_XYZ SYSTEM MOTION	Link To PLC POU.CMMT3 (PLC1)	
▲ MC-Task 1 SAF	Axis Type: CANopen DS402/Profile MDP 742 (e.g. EtherCAT CoE Drive)	\sim
1mage □ Tables	Unit: Display (Only)	
∐ Objects ◢ ᡱᢩᡈ Axes	Position: $\Box \mu m$ \Box Modulo	
Axis 3	velocity: mm/min	
Axis 4	Result	

10.5 运行程序

激活配置,登陆 PLC 并运行程序。

) i i 🕅 🚺	I 🖪 🖉 🔨 🎯	🔌 🐜 🔏 🛛 NC_XYZ	▼ CX-3D6836	PLC1	- 1	- J)	🗧 6. G G) 🖻 也 🎽	â 🕽
Solution	olorer		- ₽ ×	NC_XYZ	POLL (Online) -t	Object Browse			
GO	激活配罟	-		NC_XYZ.PLC1.F	oo 登陆PLC		运行PLC	写入准备值	
Search		Ctrl+;)	- م						

功能块运行结果如下,与NC调试面板中显示的实际位置相同。



更多的功能块按照需求添加,注意控制同一台 CMMT 驱动器的功能块,需要使用同一个 Axis 对象。

在顶部菜单中选择 PLC-windows-watch1,调出观察窗口,可以快捷监控和改写功能块 IO 变量。鼠标指向 IO 变量名并拖动 到 watch1 窗口即可快捷将其添加到列表。



11 读写 CMMT 驱动器参数

通过 EtherCAT 总线读写 CMMT 驱动器参数,需要用到 FB_EcCoeSdoRead 和 FB_EcCoeSdoWrite 功能块,用以访问 EtherCAT 从站设备的 SDO 对象(Service Data Object)。

11.1 导入功能库



在程序中插入

ext search Categories			
Functionblocks	Name	Туре	0
Module Calls	🗉 {} FestoHomingLib	Library	Festo_Hor
Keywords	🖲 🔘 PLC1	Application	
Conversion Operators	Tc2_EtherCAT	Library	Tc2_Ether
	🖻 🚞 POUs		
	🖙 🚞 CoE Interface		
	FB_CoERead_ByDriveRef	FUNCTION_BLOCK	Tc2_Ether
	FB_CoEWrite_ByDriveRef	FUNCTION_BLOCK	Tc2_Ether
	FB_EcCoESdoAbortCode	FUNCTION_BLOCK	Tc2_Ether
	FB_EcCoESdoRead	FUNCTION_BLOCK	Tc2_Ether
	FB_EcCoESdoReadEx	FUNCTION_BLOCK	Tc2_Ether
	FB_EcCoESdoWrite	FUNCTION_BLOCK	Tc2_Ether
	FB_EcCoESdoWriteEx	FUNCTION_BLOCK	Tc2_Ether
	🗷 - 🚞 Distributed Clocks		
	EtherCAT Commands		

11.2 读写参数

先看一个实例:



sNetId 和 nSlaveAddr 为 EtherCAT 地址,在 IO 列表中选中设备查看 AdsAddr 在线值

	-							
👂 🔚 PlcTask Outputs	Name		Online	Туре	Size	>Add	In/Out	User.
	📌 Statusword	х	37431	UINT	2.0	71.0	Input	0
▲ He Devices ▲ ➡ Device 1 (EtherCAT)	Modes of operation display	х	8	SINT	1.0	73.0	Input	0
	🚰 Position actual value	х	5	DINT	4.0	74.0	Input	0
📜 Image-Info	📌 Velocity actual value	х	0	DINT	4.0	78.0	Input	0
SyncUnits	🚏 Torque actual value	х	37	INT	2.0	82.0	Input	0
🕨 🖵 Inputs	🚰 WcState	Х	0	BIT	0.1	1522.3	Input	0
Outputs	🚏 InputToggle	Х	0	BIT	0.1	1524.3	Input	0
InfoData	👻 State		8	UINT	2.0	1550.0	Input	0
P [] Ferm 1 (EK1200)	🔁 🔁 AdsAddr		5.61.104.54.2.1: <mark>1002</mark>	AMSADDR	8.0	1552.0	Input	0
Drive 3 (CMIMI-AS)	🔁 netId		5.61.104.54.2.1	AMSNETID	6.0	1552.0	Input	0
Mappings Mappings	🔁 port		0x03ea	WORD	2.0	1558.0	Input	0
PLC1 Instance - Device 1 (EtherCAT) 1	🔁 🔁 Chn0		0	USINT	1.0	1560.0	Input	0
NC-Task 1 SAF - PLC1 Instance	🕫 🔁 DcOutputShift		613900	DINT	4.0	1561.0	Input	0
	👻 DcInputShift		3386100	DINT	4.0	1565.0	Input	0
	P Controlword	Х	31	UINT	2.0	71.0	Outp	0
	Modes of operation	Х	8	SINT	1.0	73.0	Outp	0
	Target position	х	6	DINT	4.0	74.0	Outp	0
	-							

nIndex 和 nSubIndex 为访问参数的索引和子索引,可到 CMMT 的手册中查找 EtherCAT 下的参数列表。

CMMT-AS-SW_description_2019-05b_8112091g1.pdf - Adobe Acrobat Reader DC

<u>F</u> ile <u>E</u>	jie <u>£</u> dit View <u>Wi</u> ndow <u>H</u> elp										
Hom	Home Tools CMMT-AS-SW_des ×										
B	🕁 🕈 🖶 🖂 🗨	٢		767 / 986	k 🖑 🤇		Ţ .	l d'u			J o Share
¢	Bookmarks	×			0x2184.05	Mileage warning threshold	SINT64	rw	Find (1/2)	×	^
					0x2184.06	Diagnostic category	UINT16	rw	Previous	Next	
	> 🔲 About this document				0x2184.07	Storage option in error log	UINT8	rw			
O	CMMT-AS Plug-in				0x2184.08	Mileage error threshold	SINT64	rw	Rx	P1.14111.0.0	
	>				0x2184.09	Diagnostic category	UINT16	rw	Rx	P1.14113.0.0	
	> 🔲 Motion control				0x2184.0A	Storage option in error log	UINT8	rw	Rx	P1.14114.0.0	
	> 🔲 Motion monitoring				0x2184.0B	Mileage 2	SINT64	rw	Rx	P1.1414.0.0	
	> 🔲 Control				0x2185.01	Load change counter 1	SINT64	rw	Rx	P1.1421.0.0	
	 Technology functions Safety signals 				0x2185.05	Warning threshold load change counter	SINT64	rw	Rx	P1.1427.0.0	
	 Diagnostics and fault clearance 				0x2185.06	Diagnostic category	UINT16	rw	Rx	P1.1429.0.0	
	CDSB operator unit		4		0x2185.07	Storage option in error log	UINT8	rw	Rx	P1.14210.0.0	
	✓ ☐ EtherCAT				0x2185.08	Error threshold load	SINT64	rw	Rx	P1.14211.0.0	
	General				0x2185.09	Diagnostic category	UINT16	rw	Rx	P1.14213.0.0	
	 EtherCAT communication 				0x2185.0A	Storage option in error log	UINT8	rw	Rx	P1.14214.0.0	
	EtherCAT final state machine				0x2185.0B	Load change counter 2	SINT64	rw	Rx	P1.1424.0.0	
	> 🔲 Sync Manager				0x2186.01	Jog duration 1 movement	FLOAT32	rw	Rx	P1.1510.0.0	
	Distributed clocks DC (Distributed				0x2186.02	Slow jog 1 velocity	FLOAT32	rw	Rx	P1.1511.0.0	
	 CLOCKS) Process data communication 				0x2186.03	Slow jog 1 acceleration	FLOAT32	rw	Rx	P1.1512.0.0	
	> 🔲 Mailbox communication										
	Objects reference list PROFINET				Festo — CMM1	ſ-AS-SW — 2019-05b				76	57

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对于 FestoAutomationSuite 展示的参数,鼠标悬停在参数右侧小方块上可查看提示信息,在 CMMT 手册中查询 P*可获得对 应的索引和自索引。以点动模式下 1 阶段速度为例,0x2186.02 中 2186 为索引,02 为子索引,注意两者都为 16 进制。

AUTOMATION SUITE New Project*	A Q 🕜 X-Axis	×			- • × FESTO
PARAMETERISATION	CONTROL DIAGNOSIS				
CMMT-AS-C2-3A-EC- Path: 192.168.0.12 Connected	S1 Disconnect Plug-in PLC Control	Enabled Disabled Powerstage	C Stop	Acknow	Image: Store on device Image: Reinitialize wledge all Image: Load factory settings Image: Restart device
Parameter pages <	Jog mode				Image: Watch window
Digital I/O Analogue I/O Encoder interface	Movement parameters				Active motion task Synchronous mode (13) Referencing status
✓ Axis 1 11	Class matting times		2.00		Drive referenced (200)
Motor	Slow motion time		2.00	s	Setpoint Position
Gearbox	Velocity (slow)		0.02	m/s	Ox3CA3D70A (FLOAT32) P1.1511.0.0 Maximum velocity during phase 1 Decision actual velocity (consider 1)
Axis 10	Acceleration (slow)		1.00	m/s²	O.0053257 mm
Record list	Jerk (slow)		100.00	m/s³	Setpoint value velocity controller 0.02 m/s
Monitoring functions 1	Velocity		0.04	m/s	Recomm. maximum 1.49989 m/s
Closed loop	Acceleration		1.00	m/s ²	velocity actual value (encoder 1) -0.0004269 m/s
Auto tuning					Active current setpoint
Notch filter	Jerk		100.00	m/s*	0.0652715 Arms
Feed forward control					Actual active current 0.0797433 Arms
Cam controller Touch probe					Actual value I ² t monitoring mot 0.00 A ² s
Jog mode					Actual value I ² t monitoring po
Operator unit					Select
New Project* X-Axis (Plug-in: CMMT-AS P	ug-in V1.2.2.4)				Festo Automation Suite V1.2.1.10

pDstBuf接收缓冲区地址指针,pSrcBuf发送缓冲区地址指针,cbBufLen为缓冲区长度(byte为单位)。 本例中将实现对 CMMT 点动速度的读和写。其类型为 FLOAT32, rw 表示可读可写。

	_				L .
0x2186.02	Slow jog 1 velocity	FLOAT32	rw	Rx	
					—

TwinCAT3 中无 FLOAT32 数据类型,对应的 32 位浮点数为 REAL 类型,于是声明了 Data_Read 用来存放读回来的值,声明 Data_Write 存放将要写入的值。

VAR Data_Write

REAL

VAR Data_Read

REAL

再使用 ADR 函数取其地址指针, SIZE 函数取其数据长度。

tTimeout 默认值为 5s,通常够用,不赋值即采用默认值。

tExecute 上升沿执行读写,执行读写效果如下图

Watch 1			* 🗆 ×	×
Expression	Туре	Value	Prepared value	iue FB_EcCoESdoRead_0
POU.MC_ReadActualPosition_0.Position	LREAL	0.006		5.61.104.54.2.1' FB_ECLOESdoRead
> POU.MC_Power_0.Enable	BOOL	TRUE		1002 From SlaveAddr bError
> POU.MC_Jog_0.JogForward	BOOL	FALSE		Data_Read USS Sublex Read USSS Installed Sublex nErrld
POU.MC_Jog_0.JogBackwards	BOOL	FALSE		SIZEOF 8 INDEX_read ISENSION
POU.Festo_MC_Home_0.Execute	BOOL	FALSE		1840000004 cbBufLen
POU.MC_MoveAbsolute_0.Execute	BOOL	FALSE		ReadSDO T#5s tTimoret
POU.MC_MoveAbsolute_0.Position	LREAL	0		-timeout
POU.MC_MoveAbsolute_0.Velocity	LREAL	0		
SDO				FB_EccbESdoWrite_0
POU.ReadSDO	BOOL	TRUE		1561 104 54 2 1' 361 104 5 + SNettd
POU.Index_Read	WORD	16#2186		1002 IEROSEA STARAGE BERTOT
POU.SubIndex_Read	BYTE	16#02		Data_Write 0.3 SubIndex_Write 19802 [19802] SubIndex_ nErrld 1980
POU.Data_Read	REAL	0.3		AUR index_Write IGE#23C6FEC psc Buf
POU.WriteSDO	BOOL	TRUE		CBECCT CBBufLen
POU.Index_Write	WORD	16#2186		WriteSDO T#50 bExecute
POU.SubIndex_Write	BYTE	16#02		-tTimeout
POU.Data_Write	REAL	0.3		

11.3 永久保存参数更改

通过以上方式修改的 CMMT 驱动器的参数,掉电后不会保存。如需要永久保存,需要调用 CMMT 内部方法。以写参数的方式,索引设为 0x2005,子索引为 1 写入值为 1。这时候 pSrcBuf 需要指向布尔型变量。

3.1.5.6 Save parameter set

CiA402

Method	Object	Function	Description
Save parameter set	0x2005.01	Controlling method	Value = 1: execute method
	0x2005.02	Method status	Status
	0x2005.03	Method transfer value	Value = 1
	0x2005.04	Method return value	Return code
	0x2005.05	Method return value	Value = 1

Tab. 108 Save parameter set

注意:第一次置1反馈成功后,再重复执行写入值1,功能块会报语法错误(0x70D)。这时可将0x2005.01值写为0,之后再写为1,报错可清除。

要验证保存参数是否生效,需要重启 CMMT 驱动器。可以调用以下重启指令。

3.1.5.1 Reset device

CiA402

Method	Object	Function	Description
Reset Device	0x2000.01	Controlling method	Value = 1: execute method

注意:执行这个指令后 CMMT 重启,功能块会报超时错误为正常现象。

11.4 故障处理

这两个功能块没有 done 信号,根据 beckhoff 的功能块使用示例,bBusy 被置低电平后,bError 不被置 1 即执行读/写成功。 而执行读/写失败时 Error 置 1,nErrld 不为 0。 Errld 含义可查询 beckhoff ADS 报错代码,链接如下:

https://infosys.beckhoff.com/content/1033/tcadscommon/html/ads_returncodes.htm

12 CMMT 控制寻零

推荐用户使用 Beckhoff TC2_MC2 库中的 MC_Home 功能块,这是由 Beckhoff 开发的基于 PLCopen 的寻零方式。寻零开关接 到 PLC,由 PLC 控制寻零。

如果用户需要使用更多样化的寻零方式,可以调用 CMMT 自带的寻零。这时需要将寻零开关接到 CMMT,且额外使用 Festo 提供寻零的功能块。

12.1 设置寻零参数

首先在 Festo Automation Suite 中设置好寻零方式、寻零速度等参数。

AUTOMATION SUITE New Project* = Q 0 4 X-Axis × PARAMETERISATION CONTROL DIAGNOSIS X-Axis CMMT-AS-C2-3A-EC-S1 Path: 192.168.0.12 Plug-in PLC :=* \bigcirc 0 2 ei. A (= Disconnect Powerstage Control Stor Acknowledge all Store on device Load factory settings Reinitialize Restart device Start first set ected < Parameter pages Axis Drive configuration Device settings Fieldbus 2 Digital I/O Analogue I/O Encoder interface 200 210 220 230 240 250 260 270 280 Axis 1 Motor Gearbox Axis Record list Homing method Homing parameters Monitoring functions Accel. [m/s²] Jerk [m/s³] Velocity [m/s] Closed loop Crawl 0.005 1.00 100.00 Auto tuning Method Current position (37) 1.00 Search 0.01 100.00 Notch filter Feed forward contro 0.05 1.00 100.00 Running Move to axis zero point after homing Active Cam controller Touch probe Jog mode Limit position detection time monitoring wi Operator unit Homing timeout 60.00 s Parameter list 12

也可以通过 EtherCAT 总线写 SDO 参数来设置,寻零相关参数主索引为 0x2172

Parameters	Index.Subindex	Name	Data type
8411	0x2172.0C	Search for move to axis zero point setpoint jerk	FLOAT32
8412	0x2172.0D	Maximum search stroke in positive direction	SINT64
8413	0x2172.0E	Maximum search stroke in negative direction	SINT64
8414	0x2172.0F	Nominal current limit value scaling factor	FLOAT32
8415	0x2172.10	Limit position detection time monitoring win- dow	FLOAT32
8416	0x2172.11	Axis zero point offset	SINT64
8417	0x2172.12	Referencing method	SINT32
8418	0x2172.13	Status state machine homing	UINT32
8421	0x2172.16	Deactivate encoder emulation during homing	BOOL
840	0x2172.01	Referencing status	UINT32
841	0x2172.02	Move to axis zero point after homing	BOOL
842	0x2172.03	Homing timeout	FLOAT32
843	0x2172.04	Search for reference mark setpoint velocity	FLOAT32
844	0x2172.05	Search for reference mark setpoint accelera- tion	FLOAT32
845	0x2172.06	Search for reference mark setpoint jerk	FLOAT32
846	0x2172.07	Setpoint reference mark creeping velocity	FLOAT32
847	0x2172.08	Setpoint reference mark creeping acceleration	FLOAT32
848	0x2172.09	Setpoint reference mark creeping jerk	FLOAT32
849	0x2172.0A	Move to axis zero point setpoint velocity	FLOAT32
8410	0x2172.0B	Move to axis zero point setpoint acceleration	FLOAT32

12.2 安装寻零功能库

到 Festo 支持与下载专区下载寻零功能块。

https://www.festo.com.cn/net/zh-cn_cn/SupportPortal/default.aspx?cat=5619&q=CMMT-AS&tab=4&type=74#result

3.1.20.2

Function blocks Beckhoff TwinCAT

CiA 402 HomingLibrary for motor controller - TwinCAT V3 and V2 2019/5/7

导入 Festo 寻零功能库

- → 功能块
- → 文件和语言版本
 - ★★★★★ (27)



12.3 设置操作模式

使用功能块并初始化,输入引脚 SetModesOfOperation 值直接赋予常数 8,即 Cyclic Synchronous Position 模式。



输出引脚 ModeOfOperation 地址在功能块内部被声明为%Q*,编译 PLC 程序后即可在硬件 IO 列表中找到相应 CMMT,将 outputs 的 Modes of operation 字段链接到 PLC 编译出的这个变量。



CMMT 状态就绪后,Execute 上升沿触发寻零。寻零成功后当前位置归 0,Done 输出高电平。NC 轴的寻零标志位 Calibrated 会同步更新。

Solution Explorer 👻 🤻 🛪	NC_XYZ ≉ × POU [Online]
○ ○ ☆ [™] o - 司 ≠ <mark></mark>	General Settings Parameter Dynamics Online Functions Coupling Compensation
Search Solution Explorer (Ctrl+;)	Setvoint [mm]
Solution 'NC' (1 project) SVSTEM MOTION MOTION MOCTask 1 SAF Tables	O.00010 0.0080 Lag Distance [mm] Actual Velocity: [mm/s] Setpoint [mm/s] 0.0000 (-0.003, 0.004) 0.0103 0.0000 Override: [%] Total / Control [%] Error: 0.0000 % 0.00 / 0.00 % 0 (0x0) Status (log.) Status (phys.) Enabling Calibrated Moving Fw In Target Pos. Mas Job Moving Bw In Pos. Range Feed Fw
☑ Objects	Controller Kv-Factor: [mm/s/mm] Reference Velocity: [mm/s]
▲ WARES ▲ Axis 1 ▲ ▲ Enc ▶ ➡ Outputs ▶ ➡ Outputs ▲ ■ □ Drive ▶ ➡ Outputs ▲ □ □ Drive ▶ ➡ Outputs □ □ □ Drives ▶ ➡ Outputs	Image: Position:Image: Position:Image: Position:Image: Position:Image: Position:-108Image: Position:Image: Position:Image: Position:Image: Position:

PLC 编程时可从轴对象的 NCToPlc 状态字中取 Homed 这个状态位,与 Calibrated 相对应。

Solution Explorer	- ¶ ×	Library Manager 🗃 NC_XYZ P	OU [Online] + ×				MA	IN [Online] 🛎 🗙	× •
○ ○ ☆ 'o - @ ₽ <u>-</u>		NC_XYZ.PLC1.POU							
Search Solution Explorer (Ctrl+;)	ρ-	Expression	Туре	Value	Prepared value	Address	Comment		1
SYSTEM		MC_ReadActualPosition_0	MC_ReadActualPosition						
MOTION		😑 🚸 СММТЗ	AXIS_REF						
A PLC		🗉 🏘 PicToNc	PLCTONC_AXIS_REF			%Q*			
PLC1		🗏 🍫 NcToPic	NCTOPLC_AXIS_REF			%I*			
🔺 📰 PLC1 Project		StateDWord	NCTOPLC_AXIS_REF_STATE	16#02000084		%IB*			
External Types		ErrorCode	UDINT	16#0000000		%IB*			
References		AxisState	UDINT	16#00000000		%IB*	Present State Of The Movem	ient (continu	
DUTs		AxisModeConfirmation	UDINT	16#0000000		%IB*			
A DOUS		HomingState	UDINT	16#00000000		%IB*	Axis Homing Status:	Ę.	
MAIN (PRG)		Ø CoupleState	UDINT	16#00000000		%IB*	Axis Coupling Status:	ل ة	
POU (PRG)		SvbEntries	UDINT	16#0000000		%IB*			
VISUS		SafEntries	UDINT	16#00000000		%IB*			
Pictask (Pictask)		AxisId	UDINT	16#0000001		%IB*			
▲ 9 PLC1 Instance		ØpModeDWord	NCTOPLC AXIS REF OPMODE	16#CC211003		%IB*			
PlcTask Inputs		ActPos	LREAL	0.004		%IB*			
POU.CMMT3.NcToPlc		ModuloActPos	LREAL	0.004		%IB*			
🔺 🔊 StateDWord		ActiveControlLoopIndex	UINT	16#0000		%IB*			
Coperational		ControlLoopIndex	UINT	16#0000		%IB*			
Homed		ModuloActTurns	DINT	16#00000000		%IB*			
* NotMoving		ActVelo	IRFAI	0.005974585851		%IB*			
InPositionArea		PosDiff	IREAL	0		%IB*			
In argetPosition		SetPos	IREAL	0.005		%TB*			
Frotected Frotected		Ø SetVelo	IREAL	0		%IB*			
HasBeenStopped		SetAcc	IRFAI	0		%IB*			
≁ HasJob		TargetPos	LREAL	0		%IB*			
🔁 PositiveDirection				A 7					
🔁 NegativeDirection				Fe	sto MC Home 0			۳.	- 1
🔁 HomingBusy				F	esto_MC_Home	16			
ConstantVelocity				Axis		Done 16#08			
Compensating			8	Execute SetModesOfOperati	Modes	DitUperation FALSE			
 ExtSetPointGenEnabled 			0	Sethousonoperut	Comm	andAborted FALSE			
PhasingActive						Error	201		
LiternaiLatchvalid						ErrorID			
ContinuousMotion						Enorstring			
									-

12.4 保存零点

对于 Festo 绝对值多圈编码器电机(尾缀带 M),寻零后永久记忆位置,无需重复寻零。配置 NC 轴时需要将 Reference System 参数改为 ABSOLUTE,否则 PLC 重启后,NC 轴寻零标志位会丢失。

Solution Explorer 🔹 👎 🗙	NC_	C_XYZ → × POU [Online]			
· · · · · · · · · · · · · · · · · · ·	G	General NC-Encoder Parameter Time Compensation Online			
Search Solution Explorer (Ctrl+;)			(
J Solution 'NC' (1 project)		Parameter	Offline Value		Online Value
A 🛃 NC_XYZ		- Encoder Evaluation:			
SYSTEM		Invert Encoder Counting Direction	FALSE	-	FALSE
		Scaling Factor Numerator	0.001		0.001
NC-Task I SAF		Scaling Factor Denominator (default: 1.0)	1.0		1.0
<mark>≜</mark> ∎ Image		Position Bias	0.0		0.0
Tables		Modulo Factor (e.g. 360.0°)	360.0		360.0
I Dijects I ∰a Axes		Tolerance Window for Modulo Start	0.0		0.0
A 🖶 Axis 1		Encoder Mask (maximum encoder value)	0xFFFFFFF		0xFFFFFFF
A 👯 Enc		Encoder Sub Mask (absolute range maximum value)	0x000FFFFF		0x000FFFFF
P		Reference System	'ABSOLUTE'	-	'INCREMENTAL'
⊿ ⊶∐ Drive		- Limit Switches:			
🕨 🖵 Inputs		Soft Position Limit Minimum Monitoring	FALSE	-	FALSE
Outputs		Minimum Position	0.0		0.0
Example Ctrl		Soft Position Limit Maximum Monitoring	FALSE	-	FALSE
Outputs		Maximum Position	0.0		0.0

同时还要保存电机编码器零点偏移,否则电机重启后位置不能记忆。EtherCat总线控制可使用写 SDO 的方式,给 0x2002.01 一个上升沿来完成。写参数方法见读写 CMMT 驱动器参数。

3.1.5.3 Saving zero point offset

CiA402

Method	Object	Function	Description
Save zero point offset 0x2002.0		Controlling method	Value = 1: execute method
	0x2002.02	Method status	Status
	0x2002.03	Method return value	Return code

注意:第一次置1反馈成功后,再重复执行写入值1,功能块会报语法错误(0x70D)。这时可将0x2002.01值写为0,之后再写为1,报错可清除。