汇川 AM401- CPU1608TP 通过 EtherCat 控制 CMMT-EC 及通过 EthernetIP 控制 VTUG 阀岛



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关键词:

汇川,EtherCat,EthernetIP

摘要:

本文简要介绍了使用汇川 AM401-CPU1608TP 通过 EtherCat 通讯控制 CMMT-EC,以及通过 CTEU-EP 或 CPX-AP-I-EP 控制 VTUG 阀岛的方法。

目标群体:

本文仅针对熟悉汇川 InoProShop 环境并且希望快速上手 Festo CMMT-EC 伺服和 VTUG 阀岛控制的技术人员使用。

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。

目录

1	测试	式环境	4
2	Ethe	erCat 通讯控制 CMMT-EC	4
2	.1	创建项目文件	4
2	.2	安装 XML 设备描述文件	4
2	.3	启用 EtherCat 主站	5
2	.4	添加 Ethercat 从站	5
2	.5	添加轴对象并设置参数	6
2	.6	添加轴对象调用程序	8
2	.7	激活 PLC 并下载运行程序	9
3	通过	t EthernetIP 控制 VTUG	12
3	.1	激活 EthernetIP 接口并设置参数	12
3	.2	PLC 通过 CTEU-EP 控制 VTUG 阀岛	12
	3.2.3	1 添加 CTEU-EP 设备描述文件	12
	3.2.2	2 添加 CTEU-EP 设备	13
	3.2.3	3	13
	3.2.4	4 运行程序及信号监控	14
3	.3	PLC 通过 CPX-AP-I-EC 控制 VTUG 阀岛	14
	3.3.3	1 添加 CPX-AP-I-EP 设备描述文件	14
	3.3.2	2 添加 CPX-AP-I-EP 设备	15
	3.3.3	3 配置 CPX-AP-I-EP 通讯参数	15
	3.3.4	4 运行程序及信号监控	17

1 测试环境

本文档中测试使用的硬件及软件环境如下:

汇川 AM401-CPU1608TP	EthernetIP 地址: 192.168.1.88
InoProShop	V1.5.2
CMMT-AS-C4-3A-EC-S1	固件版本 V19.0.4.72_release
CTEU-EP	IP地址 192.168.1.2
CPX-AP-I-EP	IP地址 192.168.1.3
	固件版本 V1.2.2

2 EtherCat 通讯控制 CMMT-EC

2.1 创建项目文件



2.2 安装 XML 设备描述文件



2.3 启用 EtherCat 主站

CMMT_VTUG.project* - InoProShop(V1.5.2)

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2.4 添加 Ethercat 从站

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 Insert device
 Plug device
 Update device SoftMotion General Axis Pool HIGH_SPEED_IO (High Speed IO Module). Vendor: <All vendors> String for a fulltext search MODBUS TCP (ModbusTCP Device) 右键 Name Vendor Version Description ETHERCAT (EtherCAT M 🗉 - 詽 Fieldbusses Brown EtherCAT × Delete Bro Slave Browse 🗄 🚞 Analog IO - Analo Refactoring 3 Properties.. CMMT-AS Festo Revision=16#00000006 EtherCAT Slave imported from Slave XML: Festo-CMMT-AS-CiA402-20201111.xml Dev Add Object < Add Eolde Group by category Display all versions (for experts only) Display outdated versions Add Device 1 Name: CMMT-AS Scan For Devic ^ Vendor: Festo Disable Devices Categories: Slave Ż Version: Revision=16#0000006 Order Number: CMMT-AS 0 Append selected device as last child of ETHERCAT (You can select another target node in the navigator while this window is open.) Add Device Close

2.5 添加轴对象并设置参数

CMMT_VTUG.project* - InoProShop(V1.5.2)

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根据 Festo Automation Suite 中 Factor Group 设置比例系数

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添加轴对象调用程序 2.6

CMMT_VTUG.project* - InoProShop(V1.5.2)



功能块调用



2.7 激活 PLC 并下载运行程序

注意: AM401-CPU 默认 IP 地址为 192.168.1.88, 需把调试电脑 IP 地址设置到同一网段。

CMMT_VTUG.project* - InoProShop(V1.5.2)

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B∰ X (Auss)			4 Target ID: 10F4 0004 Target Name: Inovance-ARM- 5 QK Cancel

项目编译

CMMT_VTUG.project* - InoProShop(V1.5.2) Eile Edit View Project Build Online Debug Tools Window Help (**) Build F11 🛅 🚅 🛃 🕘 🗠 🗠 🗗 🕮 👒 🥨 🕞 📲 🔏 💭 🕾 🗠 🛒 🖉 <u>R</u>ebuild Generate code - 4 X / Network Configuration Devices Generate runtime system files.. 🗏 🛅 СММТ VTUG Scan Network... Gateway - Device -Communication Settings <u>C</u>lean Device (AM401-CPL Q Device Diagnos Clean <u>a</u>ll Application 🛛 💥 Network Config Pack Boot Project . 🐌 EtherCAT Config Backup and Restore 🐠 LocalBus Config Files PLC Logic Gateway 😑 🔘 Application PLC Settings 👘 Library Manager [0301.C058] (acti \sim AxisControl (PRG) PLC Shell IP-Address Device Name: AM401-CPU1608TN DIC_PRG (PRG) localhos Users and Groups - 🗱 Task Configuration Device Address: 0301.C058 Port: 1217 ETHERCAT Log ETHERCAT.EtherCAT_Task Target ID: 10F4 0004 AxisControl System Setting Target Type: 4102 🚽 📣 MainTask Upgrade PLC_PRG a SoftMotion General Axis Pool Target Vendor: Shenzhen Inovance Technology Task Deployment HIGH_SPEED_IO (High Speed IO Module) Target Version: 3.5.11.10 MODBUS_TCP (ModbusTCP Device) Status ETHERCAT (EtherCAT Master SoftMotion) Information GMMT_AS (CMMT-AS) X (Axis) 下载项目程序 CMMT_VTUG.project* - InoProShop(V1.5.2) Elle Edit View Project Build Online Debug Tools Window 🎦 🚅 📕 | 🎒 | い つ ぶ 階 🏦 🗙 | 🛤 🎼 | 🏪 🖣 05 ¥¥. 🕞 📲 💐 🕼 🕾 🖆 👘 🖉 🛛 🛸 🛛 🧱 ogin (Alt+F8) PLC_PRG AxisControl Devices - 4 × 🛞 Network Configuration CMMT_VTUG Scan Network... | Gateway 👻 | Device 👻 Communication Settings Device (AM401-CPU1608TP/TN) Q Device Diagnosis Applications 🗏 💥 Network Configuration InoProShop(V1.5.2) × • EtherCAT Config An application 'Application' is currently on the PLC. As there is no matching compile information, this existing application needs to be replaced. LocalBus Config $(\mathbf{?})$ PLC Logic Click 'Yes' to download the latest code or 'No' to abort Gateway 🖮 🧔 Application 👘 👔 Library Manager Cate [0301.C058] (acti AxisControl (PRG) <u>Y</u>es No Details... IP-Address: localhost Device Name: AM401-CPU1608TN DI PLC PRG (PRG) Users and Groups Task Configuration Device Address 0301.C058 Port: 1217 ETHERCAT Log ETHERCAT.EtherCAT_Task Target ID: 10F4 0004 AxisControl System Setting 🖮 🍪 MainTask Target Type: 4102 Upgrade PLC_PRG Target Vendor: Shenzhen Inovance Technology SoftMotion General Axis Pool Task Deployment HIGH_SPEED_IO (High Speed IO Module) Target Version: 3.5.11.10 MODBUS_TCP (ModbusTCP Device) Status ETHERCAT (EtherCAT Master SoftMotion) Information CMMT_AS (CMMT-AS) X (Axis) 运行 PLC CMMT_VTUG.project* - InoProShop(V1.5.2) File Edit View Project Build Online Debug Tools Window Help 🎦 🚅 🔚 | 🎒 | い つ ぶ 階 🏦 🗙 | 🗛 🎼 | 🋅 • 所 | 🎬 | 🥨 📢 🌾 🕼 🖻 🎂 🏜 🖇 🛛 🗰 Start (F5) Devices **-** ₽ X Ye⊮ x ∣ X Network Configuration PLC_PRG AxisControl 💮 Device 🗙 CMMT_VTUG.project* - InoProShop(V1.5.2) <u>File Edit View Project Build Online Debug Tools Window Help</u> 🎦 🖆 🔚 | 🌰 | い つ ぶ 🗈 🗈 🗙 | 🍓 🎎 | 🏙 | 洒 • 🗗 | 🏙 | 🧐 🥰 🕨 🛑 🗮 | 🖉 | 🎽 | 🏹 | 🎫 👘 🌾 | • 4 X Devices 🛞 Network Configuration D PLC_PRG D AxisControl - **X** ₩ Device X 🖻 🎒 СММТ_VTUG • Scan Network... | Gateway - Device -Communication Settings 🖹 😳 👘 Device [connected] (AM401-CPU1608TP/TN) Q Device Diagnosis Applications 🗏 💥 Network Configuration EtherCAT Config Backup and Restore 🐠 LocalBus Config Files 🖹 🗐 PLC Logic Gateway 🖹 💮 Application [run] PLC Settings 👘 Library Manager Gateway-1 AxisControl (PRG) PLC Shell IP-Address: localhost DIC_PRG (PRG) Users and Groups Task Configuration Port: 1217 🗟 🍪 ETHERCAT Log ETHERCAT.EtherCAT_Task AxisControl System Setting 🗄 🥩 MainTask Upgrade PLC PRG 😔 🏅 SoftMotion General Axis Pool Task Deployment 😔 📕 HIGH_SPEED_IO (High Speed IO Module) - 🧐 🔳 MODBUS_TCP (ModbusTCP Device) Status STHERCAT (EtherCAT Master SoftMotion) Information GMMT_AS (CMMT-AS) 😔 🞲 X (Axis)

之后可通过程序对功能块进行控制

注意: 功能块 MC_Power 的 Enable 为激活功能块, bRegulatorOn 才是上使能; @ CMMT_VTUG.project⁻. InoProShop(V1.5.2)



3 通过 EthernetIP 控制 VTUG

3.1 激活 EthernetIP 接口并设置参数

🔞 CMMT_VTUG.project* - InoProShop(V1.5.2)

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「日本」



3.2 PLC 通过 CTEU-EP 控制 VTUG 阀岛

3.2.1 添加 CTEU-EP 设备描述文件



3.2.2 添加 CTEU-EP 设备

CMMT_VTUG.project* - InoProShop(V1.5.2) Ele Edit View Project Build Online Debug Tools Window Help 省 🖨 🔚 🖆 🗠 🐇 ங 🕼 🗙 1 🛤 🕼 1 🛍 1 🕼 - 🕤 1 🕮 1 🥵 🤴 🕟 📲 💐 1대 1일 역 역 1일 왕 1 아 1 🛒 Devices 👌 СММТ_VTUG 🚗 Refresh 🎼 Copy 🚔 Paste 🏦 Delete 为 Undo 🕜 Redo 🕼 Import EDS File 🕂 Import GSD File 🕀 Import ECT File 🔍 Zoom In Device (AM401-CPU1608TP/TN) Cevice Diagnosis 🗉 ፠ Network Configuration Ô EtherCAT Config 🐏 LocalBus Config Add Device × PLC Logic ± 🔘 Application Name: CTEU_EP_EtherNetIP_bus_node SoftMotion General Axis Pool HIGH_SPEED_IO (High Speed IO Module) Append device O Insert device O Plug device O Update device MODBUS_TCP (ModbusTCP Device) . Vendor: <All vendors> ETHERCAT (EtherCAT Master SoftMotion) String for a fulltext search CM S CMMT_AS (CMMT-AS) Name Vendor Version Description X (Axis) 右键 =- M Fieldbusses X et (Ethernet) n, 🚊 👄 EtherNet/I EtherNetIPMaster (EtherNet/IP Scanne EtherNet/IP Remote Adapter CPX-AP-I-EP Festo AG & Co. KG Major Revision = 16#1, Minor Revision = 16#1 × Delete Ethernet/IP Target imported f CTEU-EP EtherNetIP bus node EtherNetIP Adapter 35 - Smart Software Solu 3 Major Revision=16#2, Minor Revision = 16#2 Ethernet/IP Target imported f Brows 35 - Smart Software Solutions GmbH Major Revision=16#1, Minor Revision = 16#1 Ethernet/IP Target imported fi Refactoring Generic EtherNet/IP device 3S - Smart Software Solutions GmbH 3.5.8.0 EtherNet/IP Target for a gene Properties... Group by category Display all versions (for experts only) Display outdated versions Add Object Name: CTEU-EP EtherNetIP bus node Vendor: Festo AG & Co. KG Categories: EtherNet/IP Remote Adapter Version: Migor Revision = 16#2, Minor Revision = 16#2 Order Number: CTEU-EP Add Folde Add De ESTO Scan For De Disable Devices ~ Update Device.. Append selected device as last child of EtherNetIPMaster ାର୍ମ Edit Object Edit Object With.. • (You can select another target node in the navigator while this window is open.) Edit IO mapping Import mappings from CSV.. Add Device Close

3.2.3 配置 CTEU-EP 通讯参数

CMMT_VTUG.project* - InoProShop(V1.5.2) <u>File Edit View Project Build Online Debug Tools Window Help</u> 🎦 🖆 🔜 | 🌒 | い い よ 釉 亀 × | 桷 端 | 鶴 | 油 + 音 | 幽 | 🧐 🧐 - 🕞 📲 💐 | 眞 理 性 だ け | 悪 Devices 🗕 🕂 🗙 Network Configuration 👔 PLC_PRG 🍙 AxisControl 😔 X 🗃 Device 🦯 🗄 CTEU_EP_EtherNetIP_bus_node X 🗏 📋 СММТ VTUG 2 General Address Settings 🔍 Device Diagnosis Connections IP address 192 . 168 . 1 . 2 EtherNet/IP 🗉 쑸 Network Configuration 📲 EtherCAT Config Assemblies - EucalBus Config Flectronic Keying User-Defined Parameters 🗏 📑 PLC Logic Keying Options Application Compatibility check EtherNet/IP I/O Mapping SoftMotion General Axis Pool O Strict identity check HIGH_SPEED_IO (High Speed IO Module) Status Check device type 12 MODBUS_TCP (ModbusTCP Device) Information Check vendor ID 26 ETHERCAT (EtherCAT Master SoftMotion) 6001 GMMT_AS (CMMT-AS) Check product code X (Axis) Check major revision 2 🗄 👘 Ether hernet) 双击 ✓ Check minor revision 2 ė- 🗊 🖁 Master (EtherNet/IP Scanner) EU_EP_EtherNetIP_bus_node (CTEU-EP EtherNetIP bu Restore Default Values

注意:

- 1. 上图中设置的 IP 地址,要与 CTEU-EP 的 IP 地址相同,CTEU-EP 的 IP 地址可使用 FFT 软件查看或修改
- 2. Electronic Keying 需要设置为 Compatibility check

2									Festo Field	Device Tool					
Actio	ns Extras He	lp													
Scan Firm	ware Recovery	Favorite	Firmware	Firmware with Backup	Network Diagnosis	GG Backup	Restore Identificatio	N Versions	Bootapplication	G Reboot	Z Telnet	(D) Homepage	FST FST	FMT	
÷ .	• • General					Service	÷				Web Tools				
List view	Graphic view														
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设置10变量更新周期

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Devices 👻 🕈 🗙	🔗 Network Configuration	PLC_PRG AxisControl	I ₩ X	🕤 De	vice 🖉	CTEU_E	P_EtherNetIP_bu	s_node 🗙		•
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- Supervice Diagnosis - Supervice Diagnosis - Supervice Diagnosis	Connections	Variable 	Mapping	Channel	Address	Туре	Default Value	Unit De	escription	
EtherCAT Config LocalBus Config	Assemblies									
PLC Logic	User-Defined Parameters									
Optication SoftMotion General Axis Pool	EtherNet/IP I/O Mapping									
HIGH_SPEED_IO (High Speed IO Module)	Status									
MODBUS_ICP (ModbusICP Device) ETHERCAT (EtherCAT Master SoftMotion)	Information									
							_			
= [] Ethernet (Ethernet)					Rese	et mapping	Always upda	te variable (Enabled 2 (always in bus cycl	e task) 🗸 🗸 🗸
EtherNetIPMaster (EtherNet/IP Scanner)		IEC Objects		_						
CTEU_EP_EtherNetIP_bus_node (CTEU-EP EtherNetIP bus node)		Variable — Ø CTEU_EP_EtherNetIP	Mapping 🍫	Type RemoteAdap	oter					

3.2.4 运行程序及信号监控

1.5.2) CMMT_VTUG.project* - InoProShop(V1.5.2)

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- # X	Network Configuration	D PLC_PRG AxisContro	I Yee x	Device	1 Ethernet	20	CTEU_EP_EtherNel	tIP_bus_node 🗙				
MMT_VTUG		C 1				_						
Device [connected] (AM401-CPU1608TP/TN)	General	Find		Filter Show all			•					
- Q Device Diagnosis	Connections	Variable	Mapping	Channel	Address	Туре	Default Value	Current Value	Prepared Value	Unit	Description	
🛞 Network Configuration	connections	😑 🦳 I/O Con. Single Port										
- 🔛 EtherCAT Config	Assemblies	÷-*•		Produced Data	%IB 19	SINT		0				
- 🐌 LocalBus Config		9- %		Produced Data	%IB20	SINT		0				
PLC Logic	User-Defined Parameters	18 - Ng		Produced Data	%IB21	SINT		0				
Application [run]	EtherNet/IP I/O Manning	B- Mp		Produced Data	%IB22	SINT		0				
😔 🚡 SoftMotion General Axis Pool	calcineque yo mapping	B- 10		Produced Data	%IB23	SINT		0				
G HIGH_SPEED_IO (High Speed IO Module)	Status	÷.*		Produced Data	%IB24	SINT		0				
G MODBUS_TCP (ModbusTCP Device)		B- 10		Produced Data	%IB25	SINT		0				
C ETHERCAT (EtherCAT Master SoftMotion)	Information	<u></u>		Produced Data	%IB26	SINT		0				
😑 😏 🚮 CMMT_AS (CMMT-AS)		B- 0		Consumed Data	%Q831	SINT		-1				
SHOP X (Axis)		- 10		Bit0	%QX31.0	BOOL		TRUE				
😏 🚮 Ethernet (Ethernet)		- **		Bit1	%QX31.1	BOOL		TRUE				
😑 🚱 🔟 EtherNetIPMaster (EtherNet/IP Scanner)		- 70		Bit2	%QX31.2	BOOL		TRUE				
CTEU_EP_EtherNetIP_bus_node (CTEU-EP EtherNetIP bus not		**		Bit3	%QX31.3	BOOL		TRUE				
		- 50		Bit4	%QX31.4	BOOL		TRUE				
		50		Bit5	%QX31.5	BOOL		TRUE				
		- **		Bit6	%QX31.6	BOOL		TRUE				
				Bit7	%QX31.7	BOOL		TRUE				
		B- 🖗		Consumed Data	%Q832	SINT		0				
		B- 1 0		Consumed Data	%Q833	SINT		0				
		B- •		Consumed Data	%Q834	SINT		0				
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		B- 14		Consumed Data	%Q836	SINT		0				
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3.3 PLC 通过 CPX-AP-I-EC 控制 VTUG 阀岛

3.3.1 添加 CPX-AP-I-EP 设备描述文件



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3.3.2 添加 CPX-AP-I-EP 设备

CMMT_VTUG.project* - InoProShop(V1.5.2)



3.3.3 配置 CPX-AP-I-EP 通讯参数

🚯 CMMT_VTUG.project* - InoProShop(V1.5.2)



将 Consumed Data 的 bit length 改为 8

8 CMMT_VTUG.project* - InoProShop(V1.5.2)

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增加一个 Byte 类型的 Input Fixed SINT 16 Bytes_Param15

General	Connections						
Connections	Connection Name O>	Size (Bytes) T>O Size (Byte	es) Proxy Config Size (Bytes)	Target Config Size (Bytes)			
	1. I/O Con. Fixed SINT 16 16	15					
Assemblies							
User-Defined Parameters							
EtherNet/IP I/O Mapping							
Status	Output Assembly "Output Fixed SINT 16 B	rtes" (0>T)		Input Assembly "Input Fixed SINT 16 Bytes	s" (T>0)		
	Add 🗙 Delete 🕸 Move Up	Move Down		Add Delete & Move Up	Move Down	n	
Information	Name	Data Type Bit Length	Help String	Name	Data Type	Bit Length He	elp String
	Consumed Data	SINT 8		Produced Data	SINT	8	
	Output Fixed SINT 16 Bytes_Param1	BYTE 8		Input Fixed SINT 16 Bytes_Param1	BYTE	8	
	 Output Fixed SINT 16 Bytes_Param2 	BYTE 8		- Input Fixed SINT 16 Bytes_Param2	BYTE	8	
	 Output Fixed SINT 16 Bytes_Param3 	BYTE 8		Input Fixed SINT 16 Bytes_Param3	BYTE	8	
	Output Fixed SINT 16 Bytes_Param4	BYTE 8		Input Fixed SINT 16 Bytes_Param4	BYTE	8	
	Output Fixed SINT 16 Bytes_Param5	BYTE 8		Input Fixed SINT 16 Bytes_Param5	BYIE	8	
	Output Fixed SINT 16 Bytes_Param6	BYTE 8		Input Fixed SINT 16 Bytes_Parame	BTIE	8	
	Output Fixed SINT 16 Bytes_Param7	BYTE 8		Input Pixed SINT 16 Bytes_Param?	BITE	8	
	Output Fixed SINT 16 Bytes_Param8	BYTE 8		- Toput Fixed SINT 16 Putes Darage	EVTE		
	Output Fixed SINT 16 Bytes_Param9	BYTE 8		Toput Fixed SINT 16 Bytes_Param10	BYTE	8	
	Output Fixed SINT 16 Bytes_Param10	BYIE 8		Input Fixed SINT 16 Bytes Param11	BYTE	8	
	Output Fixed SINT 16 Bytes_Param11	BTIE 8		Input Fixed SINT 16 Bytes Param 12	BYTE	8	
	Output Fixed SINT 16 Bytes_Param12	DITE 0		Input Fixed SINT 16 Bytes Param 13	BYTE	8	
	Output Pixed SINT 16 Bytes_Param15	DITE 8		Input Fixed SINT 16 Bytes Param 14	BYTE	8	
	Output Fixed SINT 16 Bytes_Param15	BYTE 8					
	Calgari Aca san 10 Syles_ alams	UNE 0					
		Select Parameters					×
		Name Class In	stance Attribute Type	Minimum Maximum Default Unit			
		2 Nam Input Fixed S Class Instance	INT 16 Bytes_Param15	8;			OK Cancel
			* * * * * * * * * * * * * * * * * * *				

设置10变量更新周期

CMMT_VTUG.project* - InoProShop(V1.5.2)

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运行程序及信号监控 3.3.4

编译、下载、在线运行之后,可以监控并强制输出信号

CMMT_VTUG.proj hop(V1.5.2)

Be Eat New Busice Dela Calve Devos Does Warken Neta

🔹 🕈 🗙 🖉 Network Configuration 👔 PLC_PRG 👔 AssControl 😚 X 🧃 Device 🗃 Ethernet 🌾 CTEU_EP_EtherNetP_bus_mode 🗃 EtherNetPMaster 🖉 (PX_AP_1_EP_X) notes CMFL/TAC General Find Filter Show all Variable Mapping Channel Address Туре Default Value Current Value Prepared Value Unit Description Channel Input Fixed SINT 16 Bytes, Parana Connections 4
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 SoftMotion General Axis Pool
 HIGH_SPEED_IO (High Speed IO Module)
 MODBUS_TCP (ModbusTCP Device)
 DETERCAT (EtherCAT Master SoftMotion) Status Information Input Fixed SINT 16 Bytes_Param1 E 🚱 🛐 CMMT_AS (CMMT-AS) Input Fixed SINT 16 Bytes_Param11 %IB38 %IB39 BYTE BYTE 😏 🞲 X (Axis) Input Fixed SINT 16 Bytes_Param12 G
 Ethernet (Ethernet)
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 EtherNet/IP Scar Input Fixed SINT 16 Bytes_Param13 %IB40 BYTE BYTE Input Fixed SINT 16 Bytes Param14 %IB41 %IB42 %Q839 %QX39.0 %QX39.1 %QX39.2 %QX39.3 %QX39.4 CTEU_EP_EtherNetIP_bus_node (CTEU-EP EtherNetIP bus
 GPX_AP_I_EP (CPX-AP-I-EP) Input Fixed SINT 16 Bytes_Param15 BYTE Consumed Data Bit0 BOOL BOOL BOOL BOOL 10 10 10 %QX39. BOO 10 Bit6 %QX39.6 BOOL Bit7 %QX39.7 %QB40 BOOL BYTE 8-59 8-59 8-59 8-59 8-59 Output Fixed SINT 16 Bytes_Param1 Output Fixed SINT 16 Bytes_Param2 %QB41 BYTE Output Fixed SINT 16 Bytes_Param3 %QB42 BYTE Output Fixed SINT 16 Bytes_Param4 %QB43 BYTE Output Fixed SINT 16 Bytes Param5 %QB44 BYTE Reset mapping Always update variables: Enabled 2 (always in bus cycle task) IEC Objects Mapping Type Variable @ CPX_AP_I_EP

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