通过 Tc2_EtherCat 库中的功能块读取 CMMT-EC 的报警代码



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关键词:

Twincat3, Beckhoff, EtherCAT, CMMT, 报警代码

摘要:

本文介绍了使用 Twincat3 编程软件,通过 Tc2_EtherCat 库中的 FB_EcCoESdoRead 功能块读取 CMMT-EC 的报警代码。

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 CMMT 伺服以及 Beckhoff 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 软硬件环境

该读取参数是非周期读取,需要命令触发。

名称	版本/Firmware	备注
CMMT-AS-C4-3A-EC-S1	V016. 0. 9. 10	
TwinCAT3	3. 1. 4	
Tc_EtherCAT library	3. 3. 12. 0	Twincat 自带库
CMMT-EC 的 XML 文件	Festo-CMMT-AS-CiA402- 20190627.xml	
手册	CMMT-AS-SW_2019- 02a_8104266g1	

2 添加 NC 轴

(1) 创建 Twincat 项目

Microsoft Visual Studio					
FILE EDIT VIEW DEBUG	TWINCAT TWIN	ISAFE PLC T	OOLS SCOPE WINDOW HELP		
G - O 🕆 - 🔁 🕍	₽ X ♂ ☆ ?	- 🤍 - 🕨 Att	ach • Release • Tv	vinCAT RT (x64)	
Build 4022.22 (Loaded			.ocal> ▼ Ţ 8		
Solution Explorer	New Project				? ×
	▶ Recent		.NET Framework 4.5 🔹 Sort by: Default	• # E	Search Installed Templates (Ctrl+E)
	▲ Installed		TwinCAT XAE Project (XML format)	TwinCAT Projects	Type: TwinCAT Projects
	 Templates Other Project TwinCAT Mean TwinCAT PLC TwinCAT Proj Samples 	t Types asurement jects			TwinCAT XAE System Manager Configuration
	⊅ Online		Click here to go online and find	templates.	
	Name:	TwinCAT readC	OE		
	Location:	C:\Users\CN0Y	LBBD\Documents\Visual Studio 2013\Projects	•	Browse
	Solution name:	TwinCAT readC	OE		Create directory for solution
					OK Cancel

(2) 将 XML 文件放入到 "C:\TwinCAT\3.1\Config\Io\EtherCAT"文件夹下(注:可能安装路径不一样,略有差异)

(3) 扫描设备,创建 NC 轴(读取 COE 参数的功能块,对应手动配置轴和 NC 轴都可以使用,并且使用没有差异,该文档以 NC 轴为例)

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rer (Ct	:rl+;)	- م	
「read COE	COE' (1 project)		
		点	击 sacn
g 🗂	Add New Item	Ins	
t a	Add Existing Item	Shift+Alt+A	
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ft Visual	Studio	×	
	rer (Ct i read COE	rer (Ctrl+;) readCOE' (1 project) COE Add New Item Add Existing Item Export EAP Config File Scan Paste Paste Paste with Links	<pre>rer (Ctrl+;) p - i readCOE' (1 project) COE Add New Item Add Existing Item Shift+Alt+A Export EAP Config File Scan Paste Ctrl+V Paste with Links </pre>



3 新建 PLC 程序

(1) 右键 "PLC", 然后单击 "Add New Item"



Add New Item - Twi	nCAT readCOE					?	×
▲ Installed		Sort by	Default -			Search Installed Templates (Ctrl+R) P-
Pic Templates			Standard PLC Project Empty PLC Project		Plc Templates	Search Installed Templates (Ctrl+1 Type: Plc Templates Creates a new TwinCAT PLC proj containing a task and a program	ect
Name:	Untitled1		<u>Click here to go or</u>	nline and find template	<u>5.</u>		
Location:	C:\Users\CN0YL	.BBD\Do	cuments\Visual Studio 2013\F	Projects\TwinCAT read(COE\TwinCAT I -	Browse	
		,			[Add Car	cel



(4) 搜索 "Tc2_EtherCAT",点击"OK"

Tc2_ethercat Match	• •	R
Match		٩±
	Library	
••••••••••••••••••••••••••••••••••••••		
Advanced	OK Cancel	
和成功后出现如下界面		
✓ III PLC		
✓ Untitled1		
Untitled1 Project		
External Types		
A Carl References		
Tc2_EtherCAT		
- Tc2_Standard		
- Tc2_System		
-□ Tc3_Module		
DUTs		
GVLs		

4 功能块调用

(1) 将新建的 POU 程序拖入到"Plc Task"中





(2) 打开 POU 程序,添加 "FB_EcCoESdoRead"功能块。

	FB_EcCoESdo	Read_0	
	FB_EcCoES	SdoRead 💾	
-	sNetId	bBusy-	\vdash
-	nSlaveAddr	bError	┝
-	nSubIndex	nErrld	┝
-	nIndex		
-	pDstBuf		
-	cbBufLen		
-	bExecute		
-	tTimeout		

Inputs/Outputs Gr	aphical Documer	ntation			
FUNCTION_BLOC	K FB_EcCoESdo	Read			
Name	Туре	Inherited from	Address	Initial	Comment
🐐 sNetId	T_AmsNetId				AmsNetId of the EtherCAT master device.
🍬 nSlaveAddr	UINT				Address of the slave device.
🍬 nSubIndex	BYTE				CANopen Sdo subindex.
🍬 nIndex	WORD				CANopen Sdo index.
🍬 pDstBuf	PVOID				Contains the address of the buffer for the received data.
🍫 cbBufLen	UDINT				Contains the max. number of bytes to be received.
🍬 bExecute	BOOL				Function block execution is triggered by a rising edge at this input.
🍬 tTimeout	TIME			DEFAULT_ADS_TIMEOUT	States the time before the function is cancelled.
bBusy	BOOL				
bError	BOOL				
[™] nErrId	UDINT				

(3) 添加接收错误代码地址: "CODE",单击红框内的按钮。

Librarj	y I Nanager	🗄 TwinCAT	readCOE	PO	U* ⇔ X				
۲	X + X					PROC	GRAM POU		
	Scop	e Name		Address	Data type	Initializatio	on Comment	Attributes	
Inse	ert 🔌 VA	R FB_EcCoESdoR	Read_0		FB_EcCoESdoRea	d			
(4)	填写变	量名称"CODE	",以	及 Data T	ype "Dint"				
🍫 🕁	• X				PRO	GRAM POU]]
^	Scope	Name	Address	Data type	nitializatio	on Comment A	Attributes		Ē
1	🖗 VAR	CODE		DINT					
2	🖗 VAR	FB_EcCoESdoRead_0		FB_EcCoESdo	Read				

(5) 在程序中添加 "ADR"和 "SIZEOF"函数,并关联 "FB_EcCoESdoRead"



•

5 编译下载

(1) 编译程序, 在线, 并 ⁻	下载							
COE - Microsoft Visual Studio								
I PROJECT BUILD CFC DEBUG	TWINCAT	TWINSA	E PLC	TOOLS SCOPE W	INDOW H	HELP		
白 - 🖕 🗳 📲 🍂 🗗 台 ジ - ぐ -	 Attach 	•		Release	winCAT RT (x64) 🔹 🏓		
aded 🗸 🧅 🚼 🚾 🖉 🌾 🌀 🙋	🗧 🛛 <loca< td=""><td> ></td><td>• •</td><td>Untitled1</td><td>• 1 •</td><td>→ = < <</td><td>. G & E Č</td><td></td></loca<>	>	• •	Untitled1	• 1 •	→ = < <	. G & E Č	
	- ₽ ×	Library Ma	nager 🖻	TwinCAT readCO	E PC)U + ×		
ji 🖌 🗕		🍫 🗠 🛛	X				PROGRA	M POU
lorer (Ctrl+;)	- م	Â	Scope	Name	Address	Data type	Initialization	Commen
AT readCOE' (1 project)		1	🖗 VAR	CODE		DINT		
IdCOE		2	VAR	FB_EcCoESdoRead_0		FB_EcCoESdoRead		

(2)运行程序,单击运行按钮

TWINSAFE PLC TOOLS SCOPE	WINDOW HELP TwinCAT RT (x64)	- ≱ € 6- 6	් ਅ≣ ඊ එ ස්	- , , , , , , , , , , , , , , , , , , 	፬ ± © ₩ □ · . Q Q % .		
Library Manager 🗈 🛛 POU [Online] 🚽	⊨ × TwinCAT readC	OE				MAIN [Online] 🗯	× •
TwinCAT_readCOE.Untitled1.POU							
Expression	Туре	Value	Prepared value	Address	Comment		1
Ø CODE	DINT	16#0000000					
FB_EcCoESdoRead_0	FB_EcCoESdoRead						

6 变量赋值

(1) 对功能块中的变量赋值

Expression	Туре	Value	Prepared value	Address
CODE	DINT	16#0000000		
= 🖗 FB EcCoESdoRead 0	FB_EcCoESdoRead			
≯∲ sNetId	T_AmsNetId	'0'		
🍬 nSlaveAddr	UINT	16#0000		
🍬 nSubIndex	BYTE	16#00		
🍬 nIndex	WORD	16#0000		
🍫 pDstBuf	PVOID	16#FFFFC988E2		
🍫 cbBufLen	UDINT	16#0000004		
🍬 bExecute	BOOL	FALSE		
🍫 tTimeout	TIME	T#5s		
🍫 bBusy	BOOL	FALSE		
🍫 bError	BOOL	FALSE		
🍫 nErrId	UDINT	16#00000000		
nOffset	DWORD	16#603F0000		
🗉 < fbAdsReadEx	ADSREADEX			
🗉 < RisingEdge	R_TRIG			

(2) sNetId 变量值的来源: 单击 netId,然后点击 "online"





Variable Flags	Online		
Value:	0x03e9		
New Value:	Force	Release	Write
Comment:			~
			1001

nSlaveaddr 值为 0x039e[注意:该值为 16 进制,10 进制为 1001]

(4)nIndex为16#2145[注:该值代表读取错误代码索引

NC ₱ Ⅹ Library Ma	nager 🖯	MAIN F	OUnc						
General EtherCAT	DC Pr	ocess Data Startup	CoE - Online	e Diag H	listory	Online			
Update List		🗌 Auto Update 🗹	Single Updat	e 🗹 Sho	w Offline	Data			
Advanced									
Add to Startu	D	Offline Data	Module	OD (AoE	0				
Index		N	lame					Flags	Value
<u>⊟</u> 2145:0		D	agnosisCha	nnel					
2145:01		P	0.301.0.0_sta	tus				RO P	
2145:02		P	P0.301.1.0 status					RO P	
		P	P0.302.0.0_reaction				RO P		
2145:04		P	0.302.1.0_rea	ction				RO P	
2145:09		P	P0.103401.0.0_acknowledgeCounter				RO P		
2145.04		D	0 103401 1 0	acknowl	edgeCou	inter		RO P	
2145:0B		P	P0.315.0.0_currentMostSevereError				RO P		
2145:0C		P	P0.315.1.0_currentiViostSevereError				RO P		
± 2146:0		N	likonEncoder	r					
. ⊡ 214C:0		U	lserManagm	ent					
Name	Online	Туре	Size	>Add	In/Out	User	Linked to		
📌 Statusword 🛛 🗙	(UINT	2.0	71.0	Input	0	nState1, nState2		
Modes of ope X		SINT	1.0	73.0	Input	0	nState5 . In . Inputs		
🚰 Position actual 🗴	1	DINT	4.0	74.0	Input	0	nDataIn1 . In . Inputs		
😤 Velocity actual 🗴		DINT	4.0	78.0	Input	0	nDataIn7 . In . Inputs		
😤 Torque actual 🗴	t i	INT	2.0	82.0	Input	0	nDataIn3[0] . nDataIn		
🚏 WcState 🛛 🗙		BIT	0.1	1522.3	Input	0	nState4, nState4		
📌 InputToggle 🛛 🗴	1	BIT	0.1	1524.3	Input	0	nState4, nState4		
🔁 State		UINT	2.0	1548.0	Input	0			
🔊 AdsAddr		AMSADD	R 8.0	1550.0	Input	0			
🔁 Chn0		USINT	1.0	1558.0	Input	0			
- n n i intro		DINIT	4.0	1000	$t = t_{i}$	•			

(5)nSubindex 为 16#0B

将以上值写入到变量中。填写好值后,点击红框内的写入按钮

Expression	Туре	Value	Prepared value
code	UDINT	16#0000000	
FB_EcCoESdoRead_0	FB_EcCoESdoRead	r	
₩ø sNetId	T_AmsNetId	'0'	'172.21.83.71.3.1'
🍫 nSlaveAddr	UINT	16#0000	16#03E9
🀌 nSubIndex	BYTE	16#00	16#0B
🍫 nIndex	WORD	16#0000	16#2145
🍫 pDstBuf	PVOID	16#FFFFA50F3C77141C	
🀌 cbBufLen	UDINT	16#0000004	
🀌 bExecute	BOOL	FALSE	
∛ø tTimeout	TIME	T#5s	
🐶 bBusy	BOOL	FALSE	
🍫 bError	BOOL	TRUE	
🐶 nErrId	UDINT	16#00000745	

(6) 写成功后并触发"bExecute",会出出现以下界面:

readtest POU [Online] 🌵 🗙	
readtest.NC.POU	
Expression	Type Value Prepared value
🛿 code	UDINT 301989981
FB_EcCoESdoRead_0	FB_EcCoESdoRead
¥≱ sNetId	T_AmsNetId '172.21.83.71.3.1'
¥≱ nSlaveAddr	UINT 1001
🀌 nSubIndex	BYTE 11
🏘 nIndex	WORD 8517
牧 pDstBuf	PVOID 16#FFFA50F3C77141C
牧 cbBufLen	UDINT 4
🀌 bExecute	BOOL TRUE
牧 tTimeout	TIME T#5s
🐶 bBusy	BOOL FALSE
🐶 bError	BOOL FALSE
🐶 nErrId	UDINT 0
sizeof ²	FB_EcCoESdoRead_0 FB_EcCoESdoRead_0 FB_EcCoESdoRead FB_EcCoESdoRead FALSE FALSE Nettd bBusy FALSE SNettd bBusy FALSE SNettd bBusy FALSE III nSlaveAddr bError FALSE III nSlaveAddr bError FALSE III nSlaveAddr bError FALSE III nSlaveAddr bError FALSE III nSlaveAddr bError FALSE III nSlaveAddr bError FALSE III nSlaveAddr bError FALSE III nSlaveAddr bError FALSE III nSlaveAddr bError FALSE III



Γ

pDstBuf cbBufLen bExecute

tTimeout

ID Dx.	Name	Description
18 00 00092 (301989980)	Motor change detected, commut- ation angle invalid	Motor change detected, commutation angle invalid
18 00 00093 (301989981)	Motor change detected, zero point offset invalid	Motor change detected, zero point offset invalid
18 00 00094 (301989982)	Commutation angle in encoder invalid	Commutation angle in encoder invalid
18 00 00095 (301989983)	Encoder type plate invalid	Encoder type plate invalid