

OPERATION MANUAL

9311 EtherCAT Integration into TwinCAT

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 Valid from:
 01.03.2024

 Applies to:
 DIGIFORCE® 9311-V0x01, V2x01

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4517-BAETHERCATEN-5799-031527



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Introduction

This quick start guide describes an approach how you can configure the 9311 via Beckhoff TwinCAT using a Beckhoff PCI-Ethernet Card. Please note that the samples here cannot be directly used in your production line because they have beed extremely simplified to reach a better understanding. Therefore, you may have to complete them by checking of status, error, length values etc.

Please also note that you will have to use the OPERATION MANUAL DIGIFORCE® Model 9311 as well as 9311 EtherCAT Manual to get futher information about input and output parameters (PDO as well as SDO data transfer)

burster

DIGIFORCE[®] 9311 EtherCAT

1. Creating new project

> Start the TwinCAT XAE Shell and click on New TwinCAT Project (a) (or via File → New Project)



Select TwinCAT XAE Project, assign a project name (b) and click OK



Go to TwinCAT (a), select Show Real Time Ethernet Compatible Devices... (b) and look for your EtherCAT Master device under Compatible devices* (c). Afterwards click the Install button (d).





*You can find information of supported nenwork controllers on:

https://infosys.beckhoff.com/english.php?content=../content/1033/tc3_overview/9309844363.html&id



2. Installation of ESI description files

Note: Please make sure that your ESI file is compatible to the field bus firmware in the 9311 when you download an ESI file from our homepage https://www.burster.com/

Copy the ESI file burster_9311.xml into directory C:\TwinCAT\3.1\Config\lo\Onboardlo and additionally into C:\TwinCAT\3.1\Config\lo\EtherCAT

Note: If you use the TwinCAT 2 The ESI directory would be C:\TwinCAT\Io\EtherCAT

3. Scan EtherCAT devices

Connect the 9311 to your EtherCAT master, right click *I/O* → *Devices* (a) in the project tree und select *Scan* (b):



> Now, you can select an EtherCAT compatible device in the new window and click OK:

2 new I/O devices found	×
Device 1 (EtherCAT Automation Protocol) [Ethernet (Realtek Gaming 2.5GbE Family] Device 3 (EtherCAT) [i210 - TwinCAT (TwinCAT-Intel PCI Ethernet Adapter]	ОК
	Cancel
	Select All
	Unselect All

At this point you have to perform a device search by confirming the Scan for boxes request or later by right-clicking on the found EtherCAT device and selecting Scan in the context menu as shown below:

Solution Explorer	₹ Ţ	×	
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Search Solution Explorer (Ctrl+ü)	ş	D -	
Solution '9311_MeasurementExam 9311_MeasurementExample SYSTEM MOTION PLC SAFETY	nple' (1 pri	
Device 3 (EtherCAT) Mappings	*1	Add New Item	Ins
- Mappings	to	Add Existing Item	Shift+Alt+A
	X	Remove	Del
	I	Rename	
	K.	Rename Change Netld	
	X.	Rename Change NetId Save Device 3 (EtherCAT) As	
	ι.	Rename Change NetId Save Device 3 (EtherCAT) As Append EtherCAT Cmd	
	ιχ	Rename Change Netld Save Device 3 (EtherCAT) As Append EtherCAT Cmd Append Dynamic Container	
	X	Rename Change Netld Save Device 3 (EtherCAT) As Append EtherCAT Cmd Append Dynamic Container Online Reset	
	X	Rename Change Netld Save Device 3 (EtherCAT) As Append EtherCAT Cmd Append Dynamic Container Online Reset Online Reload	
	X.	Rename Change Netld Save Device 3 (EtherCAT) As Append EtherCAT Cmd Append Dynamic Container Online Reset Online Reload Online Delete	

If the TwinCAT was not able to find the ESI file, confirm the question to use online description and after a while you should be able to see the 9311 device in the project tree:



> Confirm the request to activate Free Run



To see the process data, please click on the 9311 in the project tree (a) and select the Process Data tab (b):

				7	7 🔐 Qu	lick Launc	h (Ctrl+C	D) 🔎	
File Edit View Project Build De	 bua TwinCAT Twins	SAFE PLC	Team Scope	Tools Win	idow Help	,			
	പെടി ഉംഭം	Release	TwinCAT RT (x64		Attach				. "
Ruild 4024 55 (Loaded)	🗖 🖈 🖄 🕋 🏠 🍋		MeasurementExam	z zlocals		•			· •
		(b)⁼	weasurementexam	< COCal>					
Solution Explorer 🛛 🔻 🕂 🗙	9311_MeasurementExam	p							
○ ○ ☆ ☆ · `o · ∂ ≯ <u>-</u>	General EtherCAT Pr	ocess Data 🛛	tartup CoE - Online	Online					
Search Solution Explorer (Ctrl+ü) 🛛 🔎 🕶	Sync Manager:		PDO List:						
Solution '9311_MeasurementExample'	SM Size Tupe	Flage	Index Size	Name			Flage	SM	SU
9311_MeasurementExample	0 128 Mbx(Out	0x1A00 92.0	Inputs			MF	3	0
MOTION	1 128 Mbxl	In	0x1600 3.0	Outputs			MF	2	0
PLC	2 3 Outp	uts							
8 SAFETY	3 92 input	IS							
VISION									
ANALYTICS									
⊿ 🛃 1/0									
Devices	PDO Assignment (0v10	12).	PDO Content (0v140	0).					
▲ Device 5 (EtherCAT) ▲ Image	✓ 0x1600	··).	Index Size	oj.	Name			Type	Default
timage-Info			0x2001:01 0.1	0.0	9311 OUT R	EADY		BIT	
SyncUnits			0x2001:02 0.1	0.1	9311_OUT_O	K		BIT	
P 🛄 Inputs a			0x2001:03 0.1	0.2	9311_OUT_N	OK ON		BIT	
			0x2001:04 0.1	0.3	9311_0UT_N 9311_0UT_S	OK_ONL 1		BIT	
Image: Box 1 (9311 EtherCAT)									
T Mappings	Download		Predefined PDO Ass	ignment: (none	e)				~
	PDO Assignment		Load PDO info from	device					
	PDO Configuratio	n	Sync Unit Assignme	nt					
			_						
	Name	Online		C.m.a	> Addr			Linked to	
		0	туре	5120	2Auui	in/Out	User ID		
	9311_OUT_READY 9311_OUT_OK	0	BIT	0.1	54.0	Input	0 0		
	 9311_OUT_READY 9311_OUT_OK 9311_OUT_NOK 	0 0 0	BIT BIT BIT	0.1 0.1 0.1	54.0 54.1 54.2	Input Input Input	0 0 0		
	 1000 2000 2000 2000 2000 2000 2000 2000	0 0 0 0	BIT BIT BIT BIT	0.1 0.1 0.1 0.1	54.0 54.1 54.2 54.3	Input Input Input Input Input	0 0 0 0 0		
	 20311_OUT_READY 20311_OUT_OK 20311_OUT_NOK 20311_OUT_NOK 20311_OUT_NOK 20311_OUT_S1 	0 0 0 0 0	BIT BIT BIT BIT BIT BIT	0.1 0.1 0.1 0.1 0.1	54.0 54.1 54.2 54.3 54.4	Input Input Input Input Input	0 0 0 0 0 0		
	 29311_OUT_READY 29311_OUT_OK 29311_OUT_NOK 29311_OUT_NOK 29311_OUT_S1 29311_OUT_S2 29311_OUT_S2 	0 0 0 0 0 0	BIT BIT BIT BIT BIT BIT BIT	0.1 0.1 0.1 0.1 0.1 0.1 0.1	54.0 54.1 54.2 54.3 54.4 54.5 54.6	Input Input Input Input Input Input	0 0 0 0 0 0 0 0		
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4. Create a sample program

In this section, you will learn how to create a simple PLC program to perform periodical measurements via PDO (Process Data Object). You will need to refer to section *EtherCAT data protocol* in 9311 EtherCAT operation manual to understand the meaning of input bytes.

> Right-click PLC in the project tree and select Add New Item...

Solution Explorer 🔹 👎	×	9311_MeasurementExample 🕘 🗙		
G O 🟠 🛗 - 🐻 - 🗗 🗡 🗕		General Plc Settings		
Search Solution Explorer (Ctrl+ü)) -			
 Solution '9311_MeasurementExample 9311_MeasurementExample SYSTEM MOTION 	ole' i	TwinCAT System Manager v3.1 (Build 4351) TwinCAT PLC Server		
PLC SAFETY	*כ	Add New Item	Ins	
96. C++	70	Add Existing Item	Shift+Alt+A	
	X	Rename		
		Add Project from Source Control		
Devices	â	Paste	Ctrl+V	
🔺 🗮 Device 3 (EtherCAT)		Paste with Links		
art Image art Image-Info		Hide PLC Configuration		
SyncUnits				
Inputs				
Outputs				
P 🛄 InfoData				
P III Box 1 (9311 Ether)	.AI)			
Mappings				

Select Standard PLC Project (a) in the Add New Item dialog, enter RunMeasurement as project name (b) and click Add

Add New Item - 9311_MeasurementExar	nple			?	×
Installed	Sort by: Default	• # E	a trl+E)		۶-
Plc Templates	Standard PLC Project	Plc Templates	Type: Plc Templates		
	Empty PLC Project	Plc Templates	Creates a new TwinCAT PLC containing a task and a prog	project gram.	
Name: RunMeasuremen	t				
Location: D:\TwinCAT_Exam	nples\9311_MeasurementExample\93	11_Measureme *	<u>B</u> rowse		
			<u>A</u> dd	Canc	el





> Next, open the MAIN (PRG) file from $PLC \rightarrow RunMeasurement \rightarrow POUs$ with double click on it:



Example 1: Reading and Writing of PDOs

> Type in the following text in the **MAIN** block





➢ Goto Build → Build Solution



Assign the input and output variables to the corresponded PDOs with the right-click on a variable and select Change Link...(a) from the context menu, select a corresponded PDO (b)

Assignment:

 $\begin{array}{l} \textit{MAIN.ready} \rightarrow 9311_\textit{OUT_READY} \\ \textit{MAIN.measStart} \rightarrow 9311_\textit{IN_START} \end{array}$

Solution Explorer 🔹	Attach Variable MAIN.ready (Input)
	Search:
Search Solution Explorer (Ctrl+ü)	
Solution '9311_MeasurementExample' (1 project)	Devices
SYSTEM	Device 3 (Eurocan)
MOTION	default>
A RunMessurement	₩ WcState > IX 1526.0. BIT [0.1]
A PunMeasurement Project	Box 1 (9311 EtherCAT)
Evternal Type:	
External types	3311_001_0K > IX 94.1, BIT [0.1]
	b) → 🔁 9311_OUT_NOK → IX 54.2, BIT [0.1]
	9311_OUT_NOK_ONL > IX 54.3, BIT [0.
GVLs	9311_OUT_S1 > IX 54.4, BIT [0.1]
A 🔄 POUs	9311_OUT_S2 > IX 54.5, BIT [0.1]
MAIN (PRG)	9311_OUT_ADJ1 > IX 54.6, BIT [0.1]
🛅 VISUs	9311_OUT_ADJ6 > IX 54.7, BIT [0.1]
PIcTask (PIcTask)	9311_UUT_ADJ2 > IX 55.0, BIT [0.1]
📲 RunMeasurement.tmc	→ 9311_001_ADJ3 > 1X 55.1, BH [0.1]
RunMeasurement Instance	→ 9311_0U1_ADJ4 > IX 55.2, BH [0.1]
🔺 🛄 PicTask Inputs 🛛 🔪 🦉 a	
🐔 MAIN.ready	9311 OUT_Cloba_NOK > 1X 56.0, BTT
🔺 🛄 PicTask Outputs 🛛 📮 Change Link	9311 OUT Window 1 NOK → 1X 56.2 F
MAIN.measSta	
SAFETY	



> Right-click *Mappings* → *Generate Mapping*:



> Goto $Build \rightarrow Build Soution$ to build the project:

9311_MeasurementExample - TcXaeShell							
File Edit View Project	Build Debug TwinCAT TwinSAFE PLC Team Sco	ope Tools Window					
0 - 0 🏠 - 🖆 - 😩	Build Solution Ctrl+Shift+B	T (x64) 🔹 🕨					
Build 4024.55 (Loaded) 🔹	Rebuild Solution	kam 🝷 <local></local>					
Solution Explorer	Clean Solution						
ⓒ ◯ 🏠 🛗 ▾ 🐻 ▾ 🗗	Rebuild RunMeasurement						
Search Solution Explorer (Ctrl+ü	Clean RunMeasurement						
Solution '9311_Measureme Solution '9311_MeasurementExat SYSTEM	Batch Build Configuration Manager						
	Check all objects [RunMeasurement]						

> Activate configuration via *TwinCAT* -> Activate Configuration



Activate Configuration						
Project:	9311_MeasurementExample					
Target:	arget: <local></local>					
	Autostart PLC Boot Project(s)					
	OK Cancel					

> Confirm starting in **Run Mode**:



> Goto PLC → Login and if asked, confirm that program should be downloaded into the controller

PLC	Team	Scope	Tools	Window	Help
	Windows				•
	Core Dum	р			•
-	Visualizati	on Style R	epository	/	
ø	Library Re	pository			
	Generate o	disassemb	ly file		
	Download				
	Online Ch	ange			
Ð	Login	5			
-D	Login				×
TwinCA	Login TPLC Control Application changed sir	nce last download. W	/hat do you want t	o do?	×
TwinCAT	Login T PLC Control Application changed sir	nce last download. W	íhat do you want t	o do?	×
TwinCAT	Login TPLC Control Application changed sir Options O Login with online ch	nce last download. W	fhat do you want t	o do?	×
TwinCA	Login I PLC Control Application changed sir Options O Login with online ch O Login with download	nce last download. W Hange, d.	ihat do you want t	o do?	×
TwinCA'	Login PLC Control Application changed sir Options Login with online ch Login with downloas Login with downloas Login without any co	nce last download. W Iange. d. thange.	íhat do you want t	o do?	×
TwinCA'	Login PLC Control Application changed sir Options Login with online ch Login with downloar Login without any c Update boot project	nce last download. W hange. d. hange. :t	fhat do you want t	o do?	×

> Press the **F5** key or click on the green start symbol to start the program execution

9311_MeasurementExam •	<local></local>	🔹 🛫 🖁 RunMeasurement	- 1 → 2 >	- 🗧 🔁 🕴 🎝 🛟 👘 🔁 🗮 🔁 🗮
------------------------	-----------------	----------------------	-----------	-----------------------

To perform a one-second measurement we use a TON (Time on-delay) function block. When one second is over (*ton*.*Q* is set) the program goes over from case 0 to case 1 (*nStep := 1*). In step 1 we check if the *ready* bit is set and if so, we start a new measurement, otherweise we stop it. After that, we restart the timer, go to step 0 again and so on.

Note: If measurement does not start: please make sure that **Control via EtherCAT** is selected in the deviceEtherCAT menu: **Basic setpup** \rightarrow **EtherCAT**.



5. Further examples

In this chapter, we will perform read & write operations on SDO (Service Data Objects). These are described in section SDO – Service Data Objects of the 9311 EtherCAT operation manual.

5.1 Read and Write of 'real' data types

Example 2: Set and get the limits of an evaluation window (Index 0x2039, Subindices 11-15)

This example shows you how to write and read the limits of evaluation window 1

Add the Tc2_EtherCAT library to your project to be able to use FB_EcCoESdoRead and FB_EcCoESdoWrite function blocks via References

Add library



Add Library	×
String for a fulltext search	
Library	Company
Application	
BuildingAutomation	
Controller	
DataAccess	
Intern	
Drive	
Tc2_Coupler	Beckhoff Automation GmbH
	Beckhoff Automation GmbH
Tc2_IoFunctions	Beckhoff Automation GmbH
Tc2_KL85xx	Beckhoff Automation GmbH
•••• •• Tc2_SUPS	Beckhoff Automation GmbH
•100 Tc3_EtherCATExtSync	Beckhoff Automation GmbH
Hath	
Heasurement	
💼 📲 Packaninn	
Advanced	OK Cancel



- > Add a new **POU** (Program Organization Unit)
 - Solution '9311_MeasurementExample' (1 project) 9311_MeasurementExample SYSTEM ⊳ A MOTION PLC . RunMeasurement A 📰 RunMeasurement Project 🚞 External Types References Þ DUTs 📄 🚞 GVLs 🔺 ┢ POUs Add ۲ 🔄 MA æ POU... 🚞 VISUs POU for implicit checks... Export to ZIP PicTasi * DUT... Import from 7IP
- > Rename it to *WriteReadWindowLimits* and click *Open*:

ł	Create a new	POU (Program Organization	Unit)
<u>N</u> an Writ	ne: teReadWindowLimi	ts	
Ty	pe		
	<u>P</u> rogram		
() Function <u>B</u> lock	k	
	E <u>x</u> tends:		
	Implements:		
	Final	Abstract	
	Access specifier:	:	
			~
	Method impleme	ntation language:	
		(31)	
() <u>F</u> unction		
	<u>R</u> eturn type:		
Imp	lementation langua	age:	
Stru	uctured Text (ST)		~



> Insert the call of the *WriteReadWindowLimits* in the *MAIN* POU:



> Type in the following code into the created WriteReadWindowLimits POU

Source code:

PROGRAM Writ	eReadWindowLimits	
VAR		
fbSdoWrite	: FB_EcCoESdoWrite;	
fbSdoRead	: FB_EcCoESdoRead;	
sNetId	: T_AmsNetId := '192.168.19.1.4.1';	// see note 1 below
nSlaveAddr	: UINT := 1001;	// see note 2 below
bExecute	: BOOL $:=$ TRUE;	
bError	: BOOL;	
nErrId	: UDINT;	
xMin	: REAL;	// Xmin coorrdinate of window 1
xMax	: REAL;	// Xmax coorrdinate of window 1
yMin	: REAL;	// Ymin coorrdinate of window 1
yMax	: REAL;	// Ymax coorrdinate of window 1
xMinRead	: REAL;	// Xmin coorrdinate has beed read
xMaxRead	: REAL;	// Xmax coorrdinate has beed read
yMinRead	: REAL;	// Ymin coorrdinate has beed read
yMaxRead	: REAL;	// Ymax coorrdinate has beed read
event	: BYTE;	// Acknowledgement for indices 11, 12, 13, 14
nStep	: INT := 0;	
END_VAR		
xMin := 5.53;		
xMax := 6.24;		
yMin := 7.35;		
yMax := 8.89;		
~ ~ ~ ~ ~ ~ ~ ~ ~		
CASE nStep OF		
0:		
tbSdoWrite(
sNetId	:= sNetId,	
nSlaveAddr	:= nSlaveAddr, // see note 2 in the previ	ious section
nIndex	:= 16#2039,	
nSubIndex	:= 11,	



```
pSrcBuf
                := ADR(xMin),
    cbBufLen := SIZEOF(xMin),
bExecute := bExecute
);
bError := fbSdoWrite.bError:
nErrId := fbSdoWrite.nErrId;
nStep := 1;
1:
fbSdoWrite(bExecute := FALSE);
IF NOT fbSdoWrite.bBusy THEN
fbSdoWrite(
    sNetId
                := sNetId,
    nSlaveAddr := nSlaveAddr,
    nIndex
              := 16 \# 2039,
    nSubIndex := 12,
    pSrcBuf := ADR(xMax),
    cbBufLen := SIZEOF(xMax),
    bExecute := bExecute
);
bError := fbSdoWrite.bError;
nErrId := fbSdoWrite.nErrId;
nStep := 2;
END IF;
2:
fbSdoWrite(bExecute := FALSE);
IF NOT fbSdoWrite.bBusy THEN
fbSdoWrite(
    sNetId
                := sNetId,
    nSlaveAddr := nSlaveAddr,
    nIndex
              := 16\#2039,
    nSubIndex := 13,
    pSrcBuf := ADR(yMin),
    cbBufLen := SIZEOF(yMin),
    bExecute := bExecute
);
bError := fbSdoWrite.bError;
nErrId := fbSdoWrite.nErrId;
nStep := 3;
END IF
3:
fbSdoWrite(bExecute := FALSE);
IF NOT fbSdoWrite.bBusy THEN
fbSdoWrite(
    sNetId
                := sNetId,
    nSlaveAddr := nSlaveAddr,
            := 16#2039,
    nIndex
    nSubIndex := 14,
    pSrcBuf := ADR(yMax),
    cbBufLen := SIZEOF(yMax),
    bExecute
                := bExecute
);
bError := fbSdoWrite.bError;
nErrId := fbSdoWrite.nErrId;
nStep := 4;
END IF
4:
fbSdoWrite(bExecute := FALSE);
IF NOT fbSdoWrite.bBusy THEN
```

burster

DIGIFORCE® 9311 EtherCAT

fbSdoWrite(sNetId := sNetId, nSlaveAddr := nSlaveAddr,nIndex := 16#2039, nSubIndex := 15,pSrcBuf := ADR(event), cbBufLen := SIZEOF(event), bExecute := bExecute); nStep := 5; END IF 5: fbSdoRead(bExecute := FALSE); IF NOT fbSdoRead.bBusy THEN fbSdoRead(sNetId:= sNetId, nSlaveAddr :=nSlaveAddr, nIndex:=16#2039, nSubIndex := 11,pDstBuf:= ADR(xMinRead), cbBufLen:=SIZEOF(xMinRead), bExecute:=bExecute); bError:=fbSdoRead.bError; nErrId:=fbSdoRead.nErrId; nStep := 6;END IF; 6: fbSdoRead(bExecute := FALSE); IF NOT fbSdoRead.bBusy THEN fbSdoRead(sNetId:= sNetId, nSlaveAddr :=nSlaveAddr, nIndex:=16#2039, nSubIndex := 12,pDstBuf:= ADR(xMaxRead), cbBufLen:=SIZEOF(xMaxRead), bExecute:=bExecute); bError:=fbSdoRead.bError; nErrId:=fbSdoRead.nErrId; nStep := 7; END IF; 7: fbSdoRead(bExecute := FALSE); IF NOT fbSdoRead.bBusy THEN fbSdoRead(sNetId:= sNetId, nSlaveAddr :=nSlaveAddr, nIndex:=16#2039, nSubIndex := 13, pDstBuf:= ADR(yMinRead), cbBufLen:=SIZEOF(yMinRead), bExecute:=bExecute); bError:=fbSdoRead.bError; nErrId:=fbSdoRead.nErrId; nStep := 8;END IF; 8: fbSdoRead(bExecute := FALSE); IF NOT fbSdoRead.bBusy THEN

fbSdoRead(sNetId:= sNetId, nSlaveAddr :=nSlaveAddr, nIndex:=16#2039, nSubIndex := 14,pDstBuf:= ADR(yMaxRead), cbBufLen:=SIZEOF(yMaxRead), bExecute:=bExecute); bError:=fbSdoRead.bError; nErrId:=fbSdoRead.nErrId; nStep := 9; END_IF; 9: fbSdoRead(bExecute := FALSE); RETURN; END_CASE

Note 1: You will find the *NetId* if you click your EtherCAT master device in the project tree and select the tab EtherCAT:

Solution Explorer	- ₽×	9311_Measurer	nentExample	+ × N	/IAIN				
© ⊃ ☆ 🛱 - ™ - ₱ 🔑 💻		General Ada	pter EtherCA	T Online	CoE - C	nline			
Search Solution Explorer (Ctrl+ü)	<i>-</i> ۹		100 100 1		_			-	
Solution '9311_MeasurementExample' (1 project)		NetId:	192.168.1	9.1.4.1			Advanced	Settings	
9311_MeasurementExample		Datarate:	100 MBit/	3			Export Configu	uration File	
▷ W SYSTEM							Curra Lina As		
MOTION							Sync Unit As	ssignment	
▶ 🛄 PLC							Topolo	NUN	
SAFETY SAFETY							Topon	.97	
\$ ₆₊ C++									
VISION		Frame C	md Addr		Len	WC	Sync Unit	Cycle (ms)	Utiliza
ANALYTICS			BD 0x090	00000	1			4 000	
🔺 🛃 I/O			WB 0x030	00000	3	1	<default></default>	4.000	
▲ [⊕] _{la} Devices			RD 0x010	00800	92	1	<default></default>	4 000	
▲ ➡ Device 3 (EtherCAT)		0 E	RD 0x000	0 0x0130	2	1	- duity	4.000	0.37

Note 2: You will find the EtheCAT slave address if you click the 9311 device in the project tree and select the tab **EtherCAT**:

9311_MeasurementExa	ample 🕆 🗙 MAIN
General EtherCAT	Process Data Startup CoE - Online Online
Type:	burster Digiforce 9311
Product/Revision:	37649 / 1
Auto Inc Addr:	0
EtherCAT Addr:	1001 Advanced Settings
Identification Value:	0
Previous Port:	Master ~
ESI:	C:\TwinCAT\3.1\Config\lo\EtherCAT\burster_9311.xml





> Build the project via $Build \rightarrow Build Solution$, click on the Login 2 symbol and set a break point (F9) in the last RETURN code line:

128		8:
129		<pre>fbSdoRead(bExecute FALSE := FALSE);</pre>
130		IF NOT fbSdoRead.bBusy TRUE THEN
131		fbSdoRead(sNetId '192.168.19) := sNetId '192.168.19),
132		nSlaveAddr 1001 :=nSlaveAddr 1001 ,
133		nIndex 8249 :=16#2039,
134		nSubIndex 14 := 14,
135		pDstBuf 18446603358358153180 := ADR(yMaxRead 8.89),
136		cbBufLen 4 :=SIZEOF(yMaxRead 8.89),
137		bExecute FALSE :=bExecute TRUE
138);
139		bError FALSE :=fbSdoRead.bError FALSE ;
140		nErrId 0 :=fbSdoRead.nErrId 0 ;
141		nStep 9 := 9;
142		END_IF;
143		9:
144		<pre>fbSdoRead(bExecute FALSE := FALSE);</pre>
145	٥	RETURN;
146	•	END CASERETURN

Start the program execution with the F5 key or via PLC → Start and check if the witten und read values are identical:

WriteReadWindowLimits [Online] 😐 🗙 MAIN [Online]						
_9311_MeasurementExample.RunMeasu	_9311_MeasurementExample.RunMeasurement.WriteReadWindowLimits					
Expression	Туре	Value	Comment			
xMin	REAL	5.53	Xmin coorrdinate of window 1			
🖗 xMax	REAL	6.24	Xmax coorrdinate of window 1			
🖗 yMin	REAL	7.35	Ymin coorrdinate of window 1			
🕸 yMax	REAL	8.89	Ymax coorrdinate of window 1			
🖗 xMinRead	REAL	5.53	Xmin coorrdinate has beed read			
🕸 xMaxRead	REAL	6.24	Xmax coorrdinate has beed read			
🖗 yMinRead	REAL	7.35	Ymin coorrdinate has beed read			
🕸 yMaxRead	REAL	8.89	Ymax coorrdinate has beed read			

5.2 Write and Read of 'string' data types

Example 3: Write a serial number into order sheet, read it back and compare (Index 0x2030, Subindex 65):

> Create a new POU as described above and name it *WriteOrderSheetSN1*:

Add POU	×
Create a new POU (Program Organization Unit)	
Name: WriteOrderSheetSN1 Type O Program	

> Write or copy the following source code into the new POU:

```
PROGRAM WriteOrderSheetSN1
VAR
orderSheetSN1 : STRING := 'B1234567890';
fbSdoWrite : FB_EcCoESdoWrite;
              : FB EcCoESdoRead;
fbSdoRead
              : T AmsNetId := '192.168.19.1.4.1';
sNetId
nSlaveAddr
              : UINT := 1001;
bExecute
              : BOOL := TRUE;
bError
              : BOOL;
nErrId
              : UDINT;
END_VAR
fbSdoWrite(
    sNetId
                := sNetId,
                                   // see note 1 in the previous sections
    nSlaveAddr := nSlaveAddr,
                                   // see note 2 in the previous sections
                := 16\#2030,
    nIndex
    nSubIndex := 65,
    nSuolii
pSrcBuf
                := ADR(orderSheetSN1),
    cbBufLen
                := INT_TO_UDINT(LEN(orderSheetSN1)),
    bExecute
                := bExecute
);
IF NOT fbSdoWrite.bBusy THEN
  bExecute := FALSE;
IF NOT fbSdoWrite.bError THEN // write successful
    bError := FALSE;
    nErrId := 0;
  ELSE
                               // write failed
    bError := fbSdoWrite.bError;
    nErrId := fbSdoWrite.nErrId;
  END IF
  fbSdoWrite(bExecute := FALSE);
END IF
fbSdoWrite(bExecute := FALSE);
orderSheetSN1 := ";
```



nErrId:=fbSdoRead.nErrId;

> Instert a call for the POU in the **MAIN** block:



> Build the project via $Build \rightarrow Build$ Solution:

Build	Debug	TwinCAT	TwinSAFE	PLC	Tea
Å 1	Build Solutio	on	Ctrl+	Shift+B	i

Log in PLC → Login, set a break point in front of fbSdoRead line and click PLC -> Start (F5) to run the program

24	•	orderSheetSN1 := '';
25		
26	0	fbSdoRead <mark>(sNetId:=_sNetId192.168.19 >>,</mark>
27		nSlaveAddr 0 :=nSlaveAddr 1001 ,
28		nIndex 0 :=16#2030,
29		nSubIndex 0 := 65,
30		<pre>pDstBuf 0 := ADR(orderSheetSN1 "),</pre>
31		cbBufLen 0 :=SIZEOF(orderSheetSN1 "),
32		bExecute FALSE :=bExecute TRUE
33);
34	•	bError FALSE :=fbSdoRead.bError FALSE ;
35	0	hErrId 0 :=fbSdoRead.nErrId 0 ;RETURN

Make sure that the string orderSheetSN1 is empty and press the key F10 to execute fbSdoRead function:

26	٠	fbSdoRead(sNetId '192.168.19) := sNetId '192.168.19),
27		nSlaveAddr 1001 :=nSlaveAddr 1001 ,
28		nIndex 8240 :=16#2030,
29		nSubIndex 65 := 65,
30		pDstBuf 18446603358358136152 := ADR(orderSheetSN1 'B123456789 ▶),
31		cbBufLen 81 :=SIZEOF(orderSheetSN1 'B123456789 ▶),
32		bExecute TRUE :=bExecute TRUE
33);



> Check if the written serial number has been read correctly (variable orderSheetSN1)

Expression	Туре	Value	Comment
< orderSheetSN1	STRING	'B1234567890'	

Note: you can also control the serial number, you wrote into the order sheet in device menu $Basic \ setup \rightarrow Order \ Sheet$ or via our PC-Software DigiControl

5.3 Read of X-Coordinates

Example 3: Read-out X-coordinates of current measurement curve (Index 0x2083, Subindex 10, 11)

> Create a new POU as described above and name it *ReadXCoordinates*:

Add POU	
Create a new POU (Program Organization Unit)	
<u>N</u> ame: ReadXCoordinates	
Type O Program	

> Write or copy the following source code into the new POU:

PROGRAM ReadXCoordinates								
VAR								
	fbSdoRead	: FB_EcCoESdoRead;						
	sNetId	: T_AmsNetId := '192.168.19.1.4.1'	; // see note 1 in previous sections					
	nSlaveAddr	: UINT := 1001;	// see note 2 in previous sections					
	bExecute	: BOOL := TRUE;						
	bError	: BOOL;						
	nErrId	: UDINT;						
	nStep	: INT := 0;						
	indexLastCoord	: UDINT := 0;	// Index of the last coordinate					
xCoordinates : ARRAY [05000] OF REAL;								
END_VAR								
CASE nStep OF								
0:								
fbSdoRead(sNetId:= sNetId,								
	nSlaveAddr :=nSlaveAddr,							
nIndex:=16#2083,								
	nSubIndex := 10,							
	pDstBuf:= ADR(indexLastCoord),							
	cbBufL	en:=SIZEOF(indexLastCoord),						



```
bExecute:=bExecute
);
bError:=fbSdoRead.bError;
nErrId:=fbSdoRead.nErrId;
nStep := 1;
1:
fbSdoRead(bExecute := FALSE);
IF NOT fbSdoRead.bBusy AND indexLastCoord > 0 THEN // if 0, there is no curve
fbSdoRead(sNetId:= sNetId,
               nSlaveAddr :=nSlaveAddr,
               nIndex:=16#2083,
               nSubIndex := 11,
               pDstBuf:= ADR(xCoordinates),
               cbBufLen:=(indexLastCoord + 1) * 4,
               bExecute:=bExecute
);
bError:=fbSdoRead.bError;
nErrId:=fbSdoRead.nErrId;
nStep := 2;
END_IF;
2:
fbSdoRead(bExecute := FALSE);
RETURN;
END CASE
```

> Instert a call for the POU in the **MAIN** block:



> Build the Project via $Build \rightarrow Build Solution$:

Build	Debug	TwinCAT	TwinSAFE	PLC	Tea
*	Build Solutio	on	Ctrl+Shift+B		

> Set a break point on the **RETURN** line, and start the program execution by pressing **F5**:



- _9311_MeasurementExample.RunMeasurement.ReadXCoordinates Expression Туре Value Comment wCoordinates ARRAY [0..5000] O... xCoordinates[0] 0 REAL xCoordinates[1] 0.01 REAL xCoordinates[2] 0.02 REAL xCoordinates[3] REAL 0.03 xCoordinates[4] 0.04 REAL xCoordinates[5] 0.05 REAL 0.00 17
 fbSdoRead(bExecuteFALSE := FALSE); 18 IF NOT fbSdoRead.bBusy TRUE AND indexLastCoord 220 > 0 THEN // if 0, there is no curve 19 ● fbSdoRead(sNetId '192.168.19) := sNetId '192.168.19), 20 nSlaveAddr 1001 :=nSlaveAddr 1001 , 21 nIndex 8323 :=16#2083, 22 nSubIndex 11 := 11, pDstBuf 18446603359767499552 := ADR(xCoordinates), 23 24 25 bExecute FALSE :=bExecute TRUE 26); 27 bError FALSE := fbSdoRead.bError FALSE ; 28 nErrId 0 :=fbSdoRead.nErrId ; 0 29 30 nStep 2 := 2; 31 END IF; 32 2: 33 fbSdoRead(bExecute FALSE := FALSE); 34 🗢 RETURN;
- \geq Check the read index of the last curve coordinate and the curve x-values: