

EtherCAT SoE Profile Interface

Manual



Documentation of the EtherCAT SoE Interface of the following Drives:

- **C1150-SE-XC-0S/1S**
- **C1250-SE-XC-0S/1S**
- **C1450-SE-VS-0S/1S**
- **E1450-SE-QN-0S/1S**
- **E1250-SE-UC**

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Note

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1 System overview

EtherCAT is the open real-time Ethernet network originally developed by Beckhoff. The LinMot act as Slave in this network and is implemented with the standard ASIC ET1100 from Beckhoff. With the SoE (Sercos over EtherCAT) Protocol it is possible to use the Sercos functionality over the EtherCAT bus, the drive behaves as a Sercos drive.

For further information on the EtherCAT fieldbus please visit:
<http://www.ethercat.org/>

1.1 References

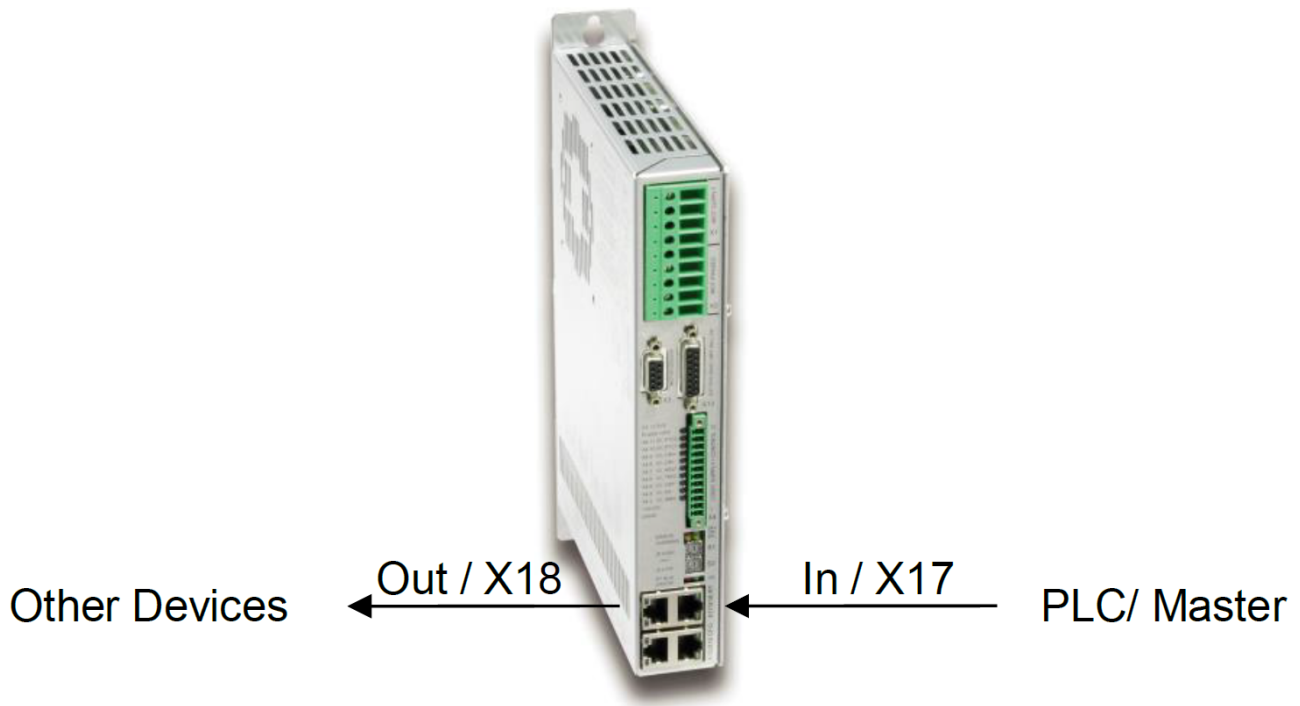
All user manuals are distributed with the LinMot-Talk software the newest versions can be downloaded from the LinMot homepage in the download section.

Ref	Title	Source
1	User Manual Motion Control SW	www.linmot.com
2	LinMot Drive Configuration over Fieldbus Interfaces SG5	www.linmot.com

1.2 Connecting In and Out



In the EtherCAT the cabling is directed due topology support, so In and Out is different! The real time Ethernet RJ45 connector X17 is the input and the real time RJ45 connector X18 is the output.



2 Setup in the PLC

In the following steps the integration of a LinMot EtherCAT Sercos Servo Drive in the PLC is described. In the example a Beckhoff master PLC is used. The easiest way is the online configuration when the device is connected to the EtherCAT network.

2.1 Copy Device Description File

The LinMot Servo Drive is described with *.xml device description file distributed with the LinMot-Talk software. This file is only used when offline configuration is desired.

Copy this file to PLC so it can access it.

Example Source path of EtherCAT Device description file:

C:\Programme\LinMot\LinMot-Talk 6.5 Build 20160205\Firmware\Interfaces\EtherCAT\XML\NTIL_SoE_Servos_V1_3.xml

Example Destination path of EtherCAT Device description file:

TwinCAT 2:

C:\TwinCAT\Io\EtherCAT\NTIL_SoE_Servos_V1_3.xml

TwinCAT 3:

C:\TwinCAT\3.1\Config\Io\EtherCAT\NTIL_SoE_Servos_V1_3.xml

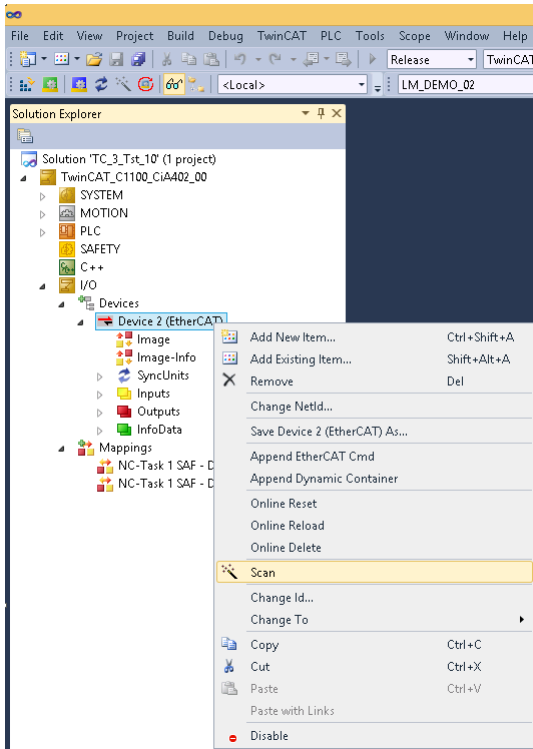
Omron:

C:\OMRON\Sysmac Studio\IODeviceProfiles\EsiFiles\UserEsiFiles NTIL_SoE_Servos_V1_3.xml

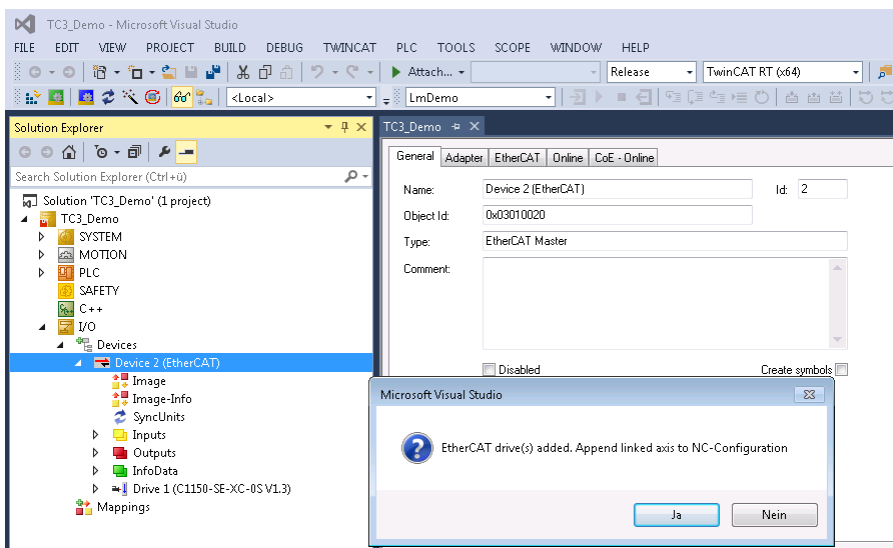
If this is done the PLC should recognize the corresponding LinMot drives on the EtherCAT fieldbus automatically.

2.2 Scan the EtherCAT slave devices

Connect the EtherCAT LinMot SoE Servo Drive to the EtherCAT-Master and power on the signal supply. Then scan for the connected devices in the System Manager:



Scan for EtherCAT slave devices.



With the question Add drives to NC-configuration select yes.

The screenshot shows the TC3_Demo project in Microsoft Visual Studio. The Solution Explorer on the left displays the project structure, including the NC-Task 1 SAF, NC-Task 1 SVB, and NC-Task 1 SAF - Device 2 (EtherCAT) 1. The EtherCAT configuration window on the right shows the Sync Manager, PDO List, and PDO Assignment (SM 2) sections. The PDO List table is as follows:

Index	Size	Name	Flags	SM	SU
0	128	MbxOut		3	0
1	128	MbxIn		2	0
2	6	Outputs			
3	6	Inputs			

The PDO Assignment (SM 2) section shows the S-0-0024 assignment. The PDO Content (S-0-0016) section shows the following data:

Index	Size	Offs	Name	Type	Default (hex)
S-0-0135	2.0	0.0	Drive status word	UINT	
S-0-0051	4.0	2.0	Position feedback value 1	DINT	
	6.0				

The Error List at the bottom shows 0 Errors, 0 Warnings, and 0 Messages.

These steps add the servo drive and its NC-axis to the project.

The screenshot shows the TC3_Demo project in Microsoft Visual Studio. The EtherCAT configuration window on the right shows the Sync Manager, PDO List, and PDO Assignment (SM 2) sections. The PDO List table is as follows:

Index	Size	Name	Flags	SM	SU
0	128	MbxOut		3	0
1	128	MbxIn		2	0
2	6	Outputs			
3	6	Inputs			

The PDO Assignment (SM 2) section shows the S-0-0024 assignment. The PDO Content (S-0-0024) section shows the following data:

Index	Size	Offs	Name	Type	Default (hex)
S-0-0134	2.0	0.0	Master control word	UINT	
S-0-0047	4.0	2.0	Position command value	DINT	
	6.0				

A context menu is open over the PDO Content table, showing options: Insert..., Delete..., Edit..., Move Up, and Move Down.

If the master also supports also the mapping Velocity command value it is strongly recommended to add this to MDT1 data.

The screenshot shows the LinMot software interface with the 'Edit Pdo Entry' dialog box open. The dialog is configured with the following values:

- Name: (empty)
- Index (hex): 0
- Sub Index: 0
- Data Type: (none)
- Bit Length: 1
- From Dictionary: S-0-0036 - Velocity command value

The background shows the 'PDO List' and 'PDO Content' tables. The 'PDO List' table has the following data:

Index	Size	Name	Flags	SM	SU
S-0-0016	6.0	AT 1	M	3	0
S-0-0024	6.0	MDT 1	M	2	0

The 'PDO Content' table for S-0-0024 has the following data:

Index	Size	Offs	Name
S-0-0134	2.0	0.0	Master control word
S-0-0047	4.0	2.0	Position command value
		6.0	

Add the Velocity command value by selecting it from the dictionary

The screenshot shows the LinMot software interface with the 'Microsoft Visual Studio' dialog box open. The dialog displays a message: "Process data of 'Drive 1 (C1150-SE-XC-0S V1.3)' may be changed. Relink with axis 'Axis 1'". The 'Ja' button is highlighted.

The background shows the 'PDO List' and 'PDO Content' tables. The 'PDO List' table has the following data:

Index	Size	Name	Flags	SM	SU
S-0-0016	6.0	AT 1	M	3	0
S-0-0024	6.0	MDT 1	M	2	0

The 'PDO Content' table for S-0-0024 has the following data:

Index	Size	Offs	Name	Type	Default (hex)
S-0-0134	2.0	0.0	Master control word	UINT	
S-0-0047	4.0	2.0	Position command value	DINT	
		6.0			

Click Yes to relink the new process data.

Solution Explorer

Search Solution Explorer (Ctrl+U)

- Solution 'TC3_Demo' (1 project)
 - TC3_Demo
 - SYSTEM
 - MOTION
 - NC-Task 1 SAF
 - NC-Task 1 SVB
 - Image
 - Tables
 - Objects
 - Axes
 - Axis 1
 - Enc
 - Drive
 - Ctrl
 - Inputs
 - Outputs
 - PLC
 - SAFETY
 - C++
 - I/O
 - Devices
 - Device 2 (EtherCAT)
 - Image
 - Image-Info
 - SyncUnits
 - Inputs
 - Outputs
 - InfoData
 - Drive 1 (C1150-SE-XC-0S-V1.3)
 - AT 1
 - Drive status word
 - Position feedback value 1
 - MDT 1
 - Master control word
 - Position command value
 - Velocity command value
 - WcState
 - InfoData

TC3_Demo

General | EtherCAT | DC | Process Data | Startup | SoE | Online | Online

Sync Manager:

| SM | Size | Type | Flags |
|----|------|---------|-------|
| 0 | 128 | MbxOut | |
| 1 | 128 | MbxIn | |
| 2 | 10 | Outputs | |
| 3 | 6 | Inputs | |

PDO List:

| Index | Size | Name | Flags | SM | SU |
|----------|------|-------|-------|----|----|
| S-0-0016 | 6.0 | AT 1 | M | 3 | 0 |
| S-0-0024 | 10.0 | MDT 1 | M | 2 | 0 |

PDO Assignment (SM 2):

☒ S-0-0024

PDO Content (S-0-0024):

| Index | Size | Offs | Name | Type | Default (hex) |
|----------|------|------|------------------------|------|---------------|
| S-0-0134 | 2.0 | 0.0 | Master control word | UINT | |
| S-0-0047 | 4.0 | 2.0 | Position command value | DINT | |
| S-0-0036 | 4.0 | 6.0 | Velocity command value | DINT | |
| | | 10.0 | | | |

Download

☐ PDO Assignment

☒ PDO Configuration

Predifined PDO Assignment: (none)

Load PDO info from device

Sync Unit Assignment...

| Name | Online | Type | Size | >Addr... | In/Out | UserID | Linked to | |
|----------------------|--------|---------------------|----------|----------|--------|--------|-----------|---|
| Drive status word | X | 0 | UINT | 2.0 | 58.0 | Input | 0 | nState1, nState2 |
| Position feedback... | X | 0 | DINT | 4.0 | 60.0 | Input | 0 | nDataIn1, In, Inputs, Enc, Axis 1, Axis 1, Axes, NC-Task 1 SAF |
| WcState | X | 1 | BIT | 0.1 | 1522.2 | Input | 0 | nState4, nState4 |
| InputToggle | X | 0 | BIT | 0.1 | 1524.2 | Input | 0 | nState4, nState4 |
| State | | 2 | UINT | 2.0 | 1548.0 | Input | 0 | |
| AdsAddr | | 10.3.10.98.3.1:1001 | AMSADDR | 8.0 | 1550.0 | Input | 0 | |
| AoeNetId | | 10.3.10.98.3.2 | AMSNETID | 6.0 | 1558.0 | Input | 0 | |
| ChnId | | 0 | USINT | 1.0 | 1564.0 | Input | 0 | |
| DcOutputShift | X | 159300 | DINT | 4.0 | 1565.0 | Input | 0 | nDcOutputTime, In, Inputs, Drive, Axis 1, Axis 1, Axes, NC-Task 1 SAF |
| DcInputShift | X | 840700 | DINT | 4.0 | 1569.0 | Input | 0 | nDcInputTime, In, Inputs, Enc, Axis 1, Axis 1, Axes, NC-Task 1 SAF |
| Master control ... | X | | UINT | 2.0 | 58.0 | Output | 0 | nCtrl1, Out, Outputs, Drive, Axis 1, Axis 1, Axes, NC-Task 1 SAF |
| Position comma... | X | | DINT | 4.0 | 60.0 | Output | 0 | nDataOut1, Out, Outputs, Drive, Axis 1, Axis 1, Axes, NC-Task 1 SAF |

MDT1 telegram with added Velocity command value.

Solution Explorer

Search Solution Explorer (Ctrl+U)

- Solution 'TC3_Demo' (1 project)
 - TC3_Demo
 - SYSTEM
 - MOTION
 - NC-Task 1 SAF
 - NC-Task 1 SVB
 - Image
 - Tables
 - Objects
 - Axes
 - Axis 1
 - Enc
 - Drive
 - Ctrl
 - Inputs
 - Outputs

TC3_Demo

General | NC-Encoder | Parameter | Sercos | Time Compensation | Online

Modulo Scale: 3599999

Calculate

Download Upload

(HINT: Calculation only suitable if SERCOS is in phase 3 or 4)

Now the NC encoder has to be set to the correct value push the calculate button for this.

Solution Explorer

Search Solution Explorer (Ctrl+U)

- Solution 'TC3_Demo' (1 project)
 - TC3_Demo
 - SYSTEM
 - MOTION
 - NC-Task 1 SAF
 - NC-Task 1 SVB
 - Image
 - Tables
 - Objects
 - Axes
 - Axis 1
 - Enc
 - Drive
 - Ctrl
 - Inputs
 - Outputs

TC3_Demo

General | NC-Encoder | Parameter | Sercos | Time Compensation | Online

Modulo Scale: 4294967295

Calculate

Download Upload

(HINT: Calculation only suitable if SERCOS is in phase 3 or 4)

After this action the value should stand at this value (2^{32}).

Then the velocity output scale factor has to be set to 0.1 for correct operation.

Though the position controlling is done in the drive the controller output has to be set to 0. If this is forgotten, the behaviour could be noisy. To set these NC parameters they have to be downloaded.

| Name | Online | Type | Size | >Addr... | In/Out | User ID | Linked to |
|----------------------|--------|----------|------|----------|--------|---------|---|
| Drive status word | X | UINT | 2.0 | 58.0 | Input | 0 | nState1, nState2 |
| Position feedback... | X | DINT | 4.0 | 60.0 | Input | 0 | nDataIn1, In, Inputs, Enc, Axis 1, Axis 1, Axes, NC-Task 1 SAF |
| WcState | X | BIT | 0.1 | 1522.2 | Input | 0 | nState4, nState4 |
| InputToggle | X | BIT | 0.1 | 1524.2 | Input | 0 | nState4, nState4 |
| State | X | UINT | 2.0 | 1548.0 | Input | 0 | |
| AdsAddr | X | AMSADDR | 8.0 | 1550.0 | Input | 0 | |
| AoeNetId | X | AMSNETID | 6.0 | 1558.0 | Input | 0 | |
| ChnId | X | USINT | 1.0 | 1564.0 | Input | 0 | |
| DcOutputShift | X | DINT | 4.0 | 1565.0 | Input | 0 | nDcOutputTime, In, Inputs, Drive, Axis 1, Axis 1, Axes, NC-Task 1 SAF |
| DcInputShift | X | DINT | 4.0 | 1569.0 | Input | 0 | nDcInputTime, In, Inputs, Enc, Axis 1, Axis 1, Axes, NC-Task 1 SAF |
| Master control ... | X | UINT | 2.0 | 58.0 | Output | 0 | nCtrl1, Out, Outputs, Drive, Axis 1, Axis 1, Axes, NC-Task 1 SAF |
| Position comma... | X | DINT | 4.0 | 60.0 | Output | 0 | nDataOut1, Out, Outputs, Drive, Axis 1, Axis 1, Axes, NC-Task 1 SAF |
| Velocity comma... | X | DINT | 4.0 | 64.0 | Output | 0 | nDataOut2, Out, Outputs, Drive, Axis 1, Axis 1, Axes, NC-Task 1 SAF |

Now the servo drive can be used with system manager NC functionality when started.

3 Process Data Object (PDO) Configuration

The cyclic process data is configured in the master and transmitted to the slave during startup. The default mapping is documented in the tables below. The inputs and outputs correspond to the PLC point of view. For a detailed description of the exchanged data and its meaning refer to [1].

For a detailed description of the PDO data refer to [1] or have a look at the TwinCAT demo program, which is included with the LinMot-Talk software.

3.1 Input PDO Modules

3.1.1 Default Inputs: AT 1

| Index | Size [Byte] | Byte Offset | Name | Data Type |
|-----------------|-------------|-------------|---------------------------|---------------|
| S-0-0016 | 6 | - | Variables | RECORD |
| S-0-0135 | 2 | 0 | Sdrive status word | Uint16 |
| S-0-0051 | 4 | 2 | Position feedback value 1 | Int32 |

Default input PDO mapping of 6 Bytes.

3.1.2 Input: Following distance S-0-0189

| Index | Size [Byte] | Byte Offset | Name | Data Type |
|----------|-------------|-------------|--------------------|-----------|
| S-0-0189 | 4 | 0 | Following distance | Int32 |

3.1.3 Input: DC bus voltage S-0-0380

| Index | Size [Byte] | Byte Offset | Name | Data Type |
|----------|-------------|-------------|----------------|-----------|
| S-0-0380 | 4 | 0 | DC bus Voltage | Int32 |

3.1.4 Input: State Var P-1-2914

| Index | Size [Byte] | Byte Offset | Name | Data Type |
|----------|-------------|-------------|-----------|-----------|
| P-1-2914 | 2 | 0 | State Var | Uint16 |

3.1.5 Input: X4 Inputs P-1-3205

| Index | Size [Byte] | Byte Offset | Name | Data Type |
|----------|-------------|-------------|-----------|-----------|
| P-1-3205 | 2 | 0 | X4 inputs | Uint16 |

3.2 Output PDO Modules

3.2.1 Default Outputs: MDT 1

| Index | Size [Byte] | Byte Offset | Name | Data Type |
|-----------------|-------------|-------------|------------------------|---------------|
| S-0-0024 | 6 | - | Variables | RECORD |
| S-0-0134 | 2 | 0 | Master control word | Uint16 |
| S-0-0047 | 4 | 2 | Position command value | Int32 |

Default output PDO mapping of 6 Bytes.
The default mapping could be extended with the following value.

If the master also supports also the mapping Velocity command value it is strongly recommended to add this to MDT1 data.

| Index | Size [Byte] | Byte Offset | Name | Data Type |
|-----------------|-------------|-------------|------------------------|---------------|
| S-0-0024 | 10 | - | Variables | RECORD |
| S-0-0134 | 2 | 0 | Master control word | Uint16 |
| S-0-0047 | 4 | 2 | Position command value | Int32 |
| S-0-0036 | 4 | 6 | Velocity command value | Int32 |

Extended default input PDO mapping of 10 Bytes.

3.2.2 Output: Velocity command value S-0-0036

| Index | Size [Byte] | Byte Offset | Name | Data Type |
|----------|-------------|-------------|------------------------|-----------|
| S-0-0036 | 4 | 0 | Velocity command value | Int32 |

If the master supports also the Velocity command value, it is strongly recommended to add this part to the MDT 1 telegram. With this a much better dynamic could be reached.

3.3 Typical Startup Telegrams

| General EtherCAT DC Process Data Startup SoE - Online Online NC: Online NC: Functions | | | | | |
|---|----------|----------|-------------------------|-------------------------------|--|
| Transition | Protocol | Index | Data | Comment | |
| A <IP, PS> | AoE | 1/3 | 0A 03 0A 62 03 02 | AoE Init Cmd (download NetId) | |
| S <PS> | SoE | S-0-0015 | 0x0007 (7) | Telegram type | |
| S <PS> | SoE | S-0-0016 | 02 00 02 00 33 00 | AT list | |
| S <PS> | SoE | S-0-0024 | 04 00 04 00 2F 00 24 00 | MDT list | |
| S PS | SoE | S-0-0001 | 0x01F4 (500) | Tncyc - NC cycle time | |
| S PS | SoE | S-0-0002 | 0x01F4 (500) | Tscyc - Comm cycle time | |
| S PS | SoE | S-0-0032 | 0x0003 (3) | Operation mode | |

This figure shows the startup telegram list of LinMot EtherCAT servo drive

3.4 Adding Parameters or Variables to the PDO data by UPID

Sometimes it is needed to have access to other process data object at runtime, for this additional data object could be added to the existing data objects by UPID.

| Index | Size | Offs | Name | Type | Default (hex) |
|----------|------|------|---------------------------|------|---------------|
| S-0-0135 | 2.0 | 0.0 | Drive status word | UINT | |
| S-0-0051 | 4.0 | 2.0 | Position feedback value 1 | DINT | |

Right Click to Insert new data in the Process Data Tab

Fill Out the PDO Entry Editor name the Object as Index use the UPID number and chose the corresponding data type (the size 2 bytes or 4 bytes has to be the same as the defined with the UPID) then click OK.

| General | EtherCAT | DC | Process Data | Startup | SoE - Online | Online | NC: Online | NC: Functions |
|-------------------|----------|----------|-------------------------|-----------------------------|--------------|--------|------------|---------------|
| Transition | Protocol | Index | Data | Comment | | | | |
| A <IP, PS> | AoE | 1/3 | 0A 03 0A 62 03 02 | AoE Init Cmd (download N... | | | | |
| S <PS> | SoE | S-0-0015 | 0x0007 (7) | Telegram type | | | | |
| S <PS> | SoE | S-0-0016 | 04 00 04 00 33 00 93 1B | AT list | | | | |
| S <PS> | SoE | S-0-0024 | 04 00 04 00 2F 00 24 00 | MDT list | | | | |
| S PS | SoE | S-0-0001 | 0x01F4 (500) | Tncyc - NC cycle time | | | | |
| S PS | SoE | S-0-0002 | 0x01F4 (500) | Tscyc - Comm cycle time | | | | |
| S PS | SoE | S-0-0032 | 0x0003 (3) | Operation mode | | | | |

Modified Startup list with Demand Current (UPID 0x1B93) added to the AT list (S-0-0016)

Solution Explorer

Search Solution Explorer (Ctrl+G)

Solution 'TC3_Demo' (1 project)

TC3_Demo

SYSTEM

MOTION

NC-Task 1 SAF

NC-Task 1 SVB

Image

Tables

Objects

Axes

Axis 1

Enc

Drive

Ctrl

Inputs

Outputs

PLC

SAFETY

C++

I/O

Devices

Device 2 (EtherCAT)

Image

Image-Info

SyncUnits

Inputs

Outputs

InfoData

Drive 1 (C1150-SE-XC-0SV1.3)

AT 1

Drive status word

Position feedback value 1

Demand Current

MDT 1

Master control word

Position command value

Velocity command value

WcState

InfoData

TC3_Demo

General

EtherCAT

DC

Process Data

Startup

SoE - Online

Online

NC: Online

NC: Functions

Sync Manager:

| SM | Size | Type | Flags |
|----|------|---------|-------|
| 0 | 128 | MbxOut | |
| 1 | 128 | MbxIn | |
| 2 | 10 | Outputs | |
| 3 | 10 | Inputs | |

PDO Assignment (SM 3):

☒ S-0-0016

Download

☐ PDO Assignment
 ☒ PDO Configuration

PDO List:

| Index | Size | Name | Flags | SM | SU |
|----------|------|-------|-------|----|----|
| S-0-0016 | 10.0 | AT 1 | M | 3 | 0 |
| S-0-0024 | 10.0 | MDT 1 | M | 2 | 0 |

PDO Content (S-0-0016):

| Index | Size | Offs | Name | Type | Default (hex) |
|----------|------|------|---------------------------|------|---------------|
| S-0-0135 | 2.0 | 0.0 | Drive status word | UINT | |
| S-0-0051 | 4.0 | 2.0 | Position feedback value 1 | DINT | |
| S-1-2963 | 4.0 | 6.0 | Demand Current | DINT | |
| | | 10.0 | | | |

Predefined PDO Assignment: (none)

Load PDO info from device

Sync Unit Assignment...

| Name | Online | Type | Size | >Addr... | In/Out | User ID | Linked to |
|---------------------------|---------------------|----------|------|----------|--------|---------|--|
| Drive status word | X | UINT | 2.0 | 58.0 | Input | 0 | nState1, nState2 |
| Position feedback value 1 | X | DINT | 4.0 | 60.0 | Input | 0 | nDataIn1, In, Inputs, Enc, Axis 1, Axis 1, Axes, NC-Task 1 SAF |
| Demand Current | | DINT | 4.0 | 64.0 | Input | 0 | |
| WcState | X | BIT | 0.1 | 1522.2 | Input | 0 | nState4, nState4 |
| InputToggle | X | BIT | 0.1 | 1524.2 | Input | 0 | nState4, nState4 |
| State | 8 | UINT | 2.0 | 1548.0 | Input | 0 | |
| AdsAddr | 10.3.10.98.3.1:1001 | AMSADDR | 8.0 | 1550.0 | Input | 0 | |
| AoeNetId | 10.3.10.98.3.2 | AMSNETID | 6.0 | 1558.0 | Input | 0 | |
| Chn0 | 0 | USINT | 1.0 | 1564.0 | Input | 0 | |

Now the new data could be linked to a PLC data object.

4 Asynchronous Configuration Protocol SoE

For configuration purpose (Parameter Handling) the standard Sercos over EtherCAT SoE-Protocol is used.

4.1 Communication SoE Profile Area

| General | EtherCAT | DC | Process Data | Startup | SoE - Online | Online | NC: Online | NC: Functions |
|--|----------------------------------|------|-----------------------|---------|--------------|--------|------------|---------------|
| <div> <div>Diagnosis (Id.95)</div> <div>No Errors or Warnings</div> </div> | | | | | | | | |
| <div> <div>Reset (Id.99)</div> <div>Update List</div> <div><input type="checkbox"/> Auto Update</div> </div> | | | | | | | | |
| IDN | Name | Unit | Value | | | | | |
| S-0-0001 | NC cycle time (TNcyc) | us | 500 | | | | | |
| S-0-0002 | Communication cycle time (TScyc) | us | 500 | | | | | |
| S-0-0011 | Class 1 diagnostic | | 00000000 00000000 | | | | | |
| S-0-0012 | Class 2 diagnostic | | 00000000 00000000 | | | | | |
| S-0-0015 | Telegram Type Parameter | | 00000000 00000111 | | | | | |
| S-0-0016 | AT List | | (list) | | | | | |
| S-0-0017 | Operation Data List | | (list) | | | | | |
| S-0-0024 | MDT List | | (list) | | | | | |
| S-0-0032 | Primary Operation Mode | | 00000000 00000011 | | | | | |
| S-0-0036 | Velocity command value | m/s | 0.000000 | | | | | |
| S-0-0041 | Homing velocity | m/s | 0.010000 | | | | | |
| S-0-0043 | Velocity polarity parameter | | 00000000 00000000 | | | | | |
| S-0-0044 | Velocity scaling type | | 00000000 00101001 | | | | | |
| S-0-0045 | Velocity scaling type | | 1 | | | | | |
| S-0-0046 | velocity scaling exponent | | -6 | | | | | |
| S-0-0047 | Position command value | mm | 50.2903 | | | | | |
| S-0-0049 | Positive Position Limit | mm | 100.0000 | | | | | |
| S-0-0050 | Negative Position Limit | mm | -100.0000 | | | | | |
| S-0-0051 | Position feedback value 1 | mm | 0.0226 | | | | | |
| S-0-0055 | Position polarity parameter | | 00000000 00000000 | | | | | |
| S-0-0076 | Position Data Scaling Type | | 00000000 00000010 | | | | | |
| S-0-0095 | Diagnose Message | | No Errors or Warnings | | | | | |
| S-0-0099 | Reset class 1 diagnostic | | 00000000 00000000 | | | | | |
| S-0-0134 | Master Control Word | | 0x6400 | | | | | |
| S-0-0135 | Drive Status Word | | 0x8020 | | | | | |
| S-0-0148 | Drive Controlled Homing | | 00000000 00000000 | | | | | |
| S-0-0187 | IDN-list of IDNs in AT | | (list) | | | | | |
| S-0-0188 | IDN-list of IDNs in MDT | | (list) | | | | | |
| S-0-0189 | Following distance | mm | -0.0226 | | | | | |
| S-0-0380 | DC bus Voltage | V | 75.00 | | | | | |
| S-0-0403 | Position feedback status | | 0x0003 | | | | | |
| P-1-2914 | State Var | | 0x0200 | | | | | |
| P-1-0964 | Homing Mode | | 0x0011 | | | | | |
| P-1-0967 | Home Position | mm | -10.0000 | | | | | |
| P-1-0970 | Slider Home Position | mm | 10.0000 | | | | | |
| P-1-3205 | X4 inputs | | 0x0030 | | | | | |

LinMot SoE Object Dictionary

4.2 Generic LinMot SoE Parameter Mapping

Apart from the above described parameters with the LinMot servo drives, there exists a generic parameter mapping of the LinMot parameters by UPID to the SoE parameter index by adding the UPID to 0x8000h. Reading and writing the value accesses the RAM value of the UPID. Writing to the default value accesses the ROM value of the UPID.

5 EtherCAT SoE Parameters

5.1 Parameters



Attention: The EtherCAT SoE Interface has an additional parameter tree branch (Parameters → EtherCAT SoE), which can be configured with the distributed LinMot-Talk software.

With these parameters, the EtherCAT interface can be enabled or disabled. The LinMot-Talk software can be downloaded from <http://www.linmot.com> under the section Download, Software, LinMot Talk.

5.1.1 EtherCAT/Dis-/Enable

With the Dis-/Enable parameter the LinMot Servo Drive can be run without the Ethernet EtherCAT Interface going online. So in a first step the system can be configured and run without any bus connection.

ETHERCAT/Dis-/Enable

| | |
|---------|--|
| Disable | Servo Drive runs without ETHERCAT. |
| Enable | Servo Drive runs with ETHERCAT connection. |



Attention: If the ETHERCAT Interface is disabled, the integrated ETHERCAT-ASIC rests in reset state! No messages will be sent to other devices connected to the ETHERCAT-Network via the servo drive.

5.1.2 EtherCAT/Station Alias/Alias Address Source

With this parameter the station alias address source is defined.



Attention: If a station alias address is defined in the ET1100 Eeprom (could be programmed from the master over the Network), this alias address is taken.

ETHERCAT/Station Alias/Alias Address Source

| | |
|------------------------------------|--|
| None | No station alias address is generated |
| ID Switches | The ID switches defines the station alias address |
| ID Switches + Parameter | The station alias address is build out of the ID-Switch value added with the parameter value (typ. Offset) |
| RT MAC | The lowest 2 bytes of the device MAC address are used as station alias address |
| Parameter | The Station alias address parameter value defines the Alias Address |
| Masked RT MAC and Parameter | The station alias address is defined by the masked parameter ored with the RT MAC masked with the inverse mask |

5.1.3 EtherCAT/Station Alias/Alias Address Parameter

Parameter value of the station alias address.

5.1.4 EtherCAT/Station Alias/Alias Address Parameter Mask

Mask value for the parameter value of the station alias address.

5.1.5 EtherCAT/NC Configuration/Velocity Scale Numerator /Denominator

This two parameters are taken to Scale the PDO Value of "Target velocity" (Index 0x60FF) to the Drive Resolution which is [1um/s]. The Scaling factor is Velocity Scale Numerator divided by Velocity Scale Denominator.

For the Beckoff this factor could be set to 1 (as the default value is 1/1), if adapted as described chapter 2.2 in the master.

For Omron PLC's this factor is typically 0.1 → Velocity Scale Numerator = 1 and Velocity Scale Denominator = 10.

5.1.6 EtherCAT/Connection Timeout/Timeout Behavior


With this parameter the drive behavior on a Connection timeout could be set. This parameter is also represented in the profile parameter with index 0x6007.

| ETHERCAT/Conection Timeout/Timeout Behavior | |
|---|---|
| Ignore | Nothing happens if an IO timeout occurs. |
| Error with Disable Voltage | Drive goes to Error State and the Voltage is disabled immediately when the IO timeout occurs. |
| Error with Quick Stop | Drive goes to Error State before the Voltage is disabled a Quick Stop is performed, when the IO timeout occurs. |
| Error with Go To Pos | Drive goes to Error State before the Voltage is disabled a Go To Position is performed, when the IO timeout occurs. |

6 Connecting to the EtherCAT Network

6.1 Pin Assignment of the Connectors X17-X18

The ETHERCAT connector is a standard RJ45 female connector with a pin assignment as defined by EIA/TIA T568B:

| X17 – X18 | ETHERCAT Connector | | |
|---|--|-----------------|-----------------------|
| | Pin | Wire color code | Assignment 100BASE-TX |
|  | 1 | WHT/ORG | Rx+ |
| | 2 | ORG | Rx- |
| | 3 | WHT/GRN | Tx+ |
| | 4 | BLU | - |
| | 5 | WHT/BLU | - |
| | 6 | GRN | Tx- |
| | 7 | WHT/BRN | - |
| | 8 | BRN | - |
| | case | - | - |
| RJ-45 | Use standard patch cables (twisted pair, S/UTP, AWG26) for wiring. This type of cable is usually referred to as a “Cat5e-Cable”. | | |

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