

2 EtherCAT Integration (Master Beckhoff TwinCAT)

2.1 In Brief

A wide variety of operating modes permit flexible configuration of drive and automation systems by using positioning, speed and current regulation. The built-in EtherCAT interface allows networking to multiple axes drives as well as online commanding by EtherCAT master units.

For fast communication with several EPOS3 70/10 EtherCAT devices, use the EtherCAT protocol. The individual devices of a network are commanded by a EtherCAT master.

2.1.1 Objective

The present Application Note explains how to integrate the EPOS3 EtherCAT positioning controller in the Master Beckhoff TwinCAT.

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2.1.2 Scope

Hardware	Order #	Firmware Version	Reference
EPOS3 EtherCAT		2200h	Firmware Specification Communication Guide
EPOS3 70/10 EtherCAT	411146	2200h or higher	Cable Starting Set Hardware Reference

Table 2-5 Master Beckhoff TwinCAT – covered Hardware and required Documents

2.1.3 Tools

Tools	Description
Software	«EPOS Studio» Version 2.00 or higher

Table 2-6 Master Beckhoff TwinCAT – recommended Tools

2.2 Functionality

SDOs are used to access the object dictionary. The corresponding interface is CoE. The EPOS3 EtherCAT is described with an XML file bearing the so called ESI (EtherCAT Slave Information).

2.3 Integrating ESI Files

To integrate an EPOS3 EtherCAT axis in the Beckhoff Master System, copy the ESI (EtherCAT Slave Information) XML file to the following folder:

- For **TwinCAT XAE** use path “C:\TwinCAT\Config\Io\EtherCAT”.
- For **TwinCAT2** use path “C:\TwinCAT\Io\EtherCAT”.

2.4 Scanning the EtherCAT Slave Device

- 1) Connect the EPOS3 EtherCAT to the EtherCAT Master and turn on power.
- 2) Open the Beckhoff System Manager and create a new project using menu **File**, then **New**.
- 3) Open menu **Options**, then select **Show Real Time Ethernet Compatible Devices**.

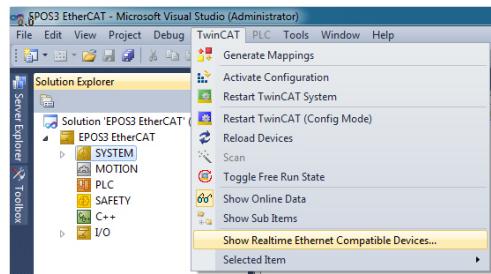


Figure 2-1 TwinCAT System Manager – Create new Project

- 4) If "Installed and ready to use devices" does not list a network card, you must install the EtherCAT driver for one of the present network cards.
 - a) Click one of the listed network cards.
 - b) Click button **Install**.

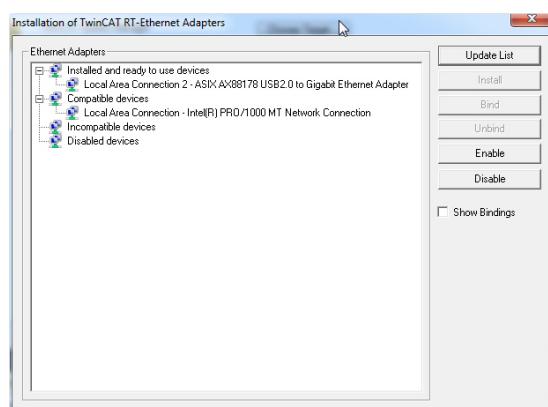


Figure 2-2 Installation of TwinCAT RT Ethernet Adapters

- 5) In the TwinCAT System Manager navigation tree, click right on **I/O Devices**, then select **Scan Devices**.

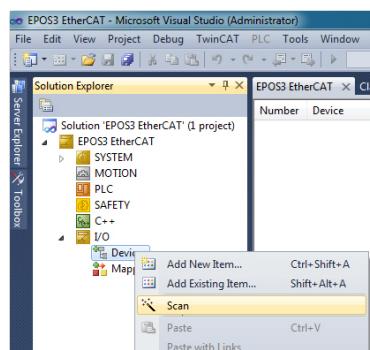


Figure 2-3 TwinCAT System Manager – Scan Devices

- 6) Click **OK** to confirm.



Figure 2-4 TwinCAT System Manager – Confirmation

- 7) All detected E/A devices (network cards) will be listed.

Tick to select the network card to which the EtherCAT devices were connected to. Untick all the others and click **OK**.

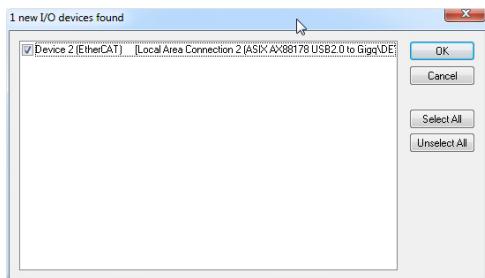


Figure 2-5 TwinCAT System Manager – New I/O Devices found

- 8) Click **Yes** to confirm.

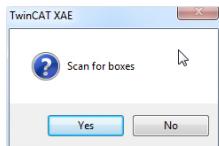


Figure 2-6 TwinCAT System Manager – Scan for Boxes Confirmation

- 9) The TwinCAT System Manager now searches for connected devices. If one or more controller were found, the following messages appears.

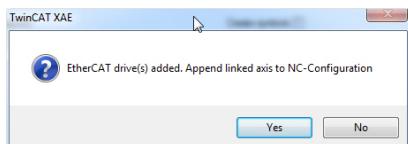


Figure 2-7 TwinCAT System Manager – Add Drives Message

- 10) Depending on the intended use:

- Click **Yes** if you plan to use the drive as a NC-Configuration.
- Click **No** if you do not plan to use the drive a NC-Configuration.

- 11) Click **Yes** to confirm.



Figure 2-8 TwinCAT System Manager – Activate Free Run Message

12) Save the project.

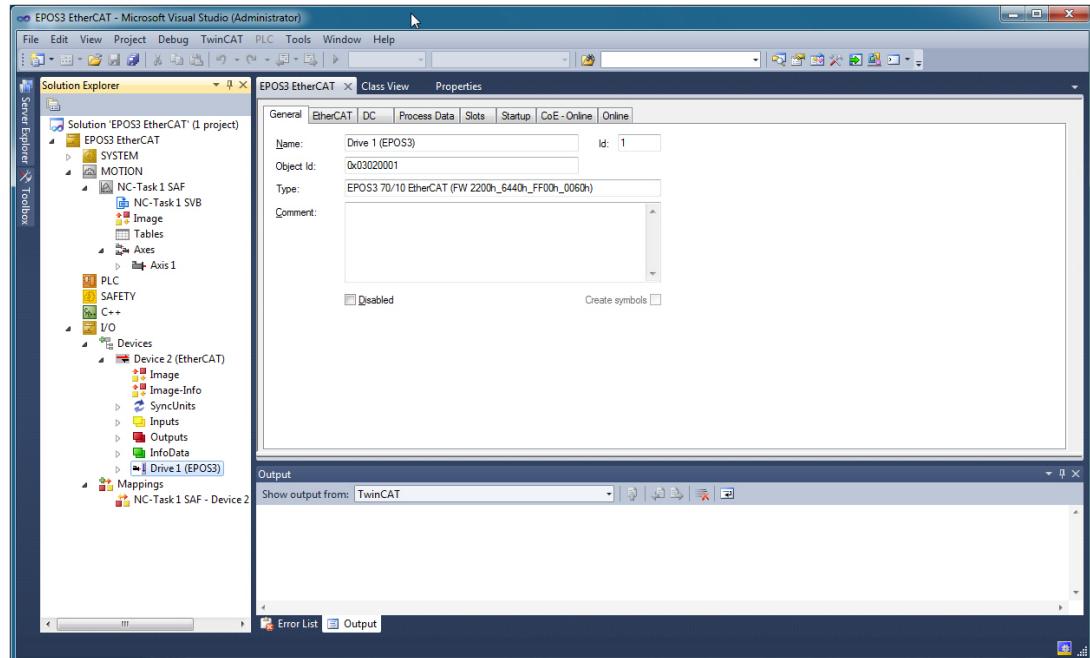


Figure 2-9 TwinCAT System Manager – Save Project

2.5 Changing Operating Modes

Via the EtherCAT interface, usually the following operating modes will be used:

- → “Cyclic Synchronous Position (CSP)” on page 6-62
- → “Cyclic Synchronous Velocity (CSV)” on page 6-63
- → “Cyclic Synchronous Torque (CST)” on page 6-64

If the controller will be operated in «Cycle Synchronous Mode», PDO Mapping must be configured accordingly by defining “Slots”.

Additionally, the following “normal” EPOS operating modes may be used:

- Profile Position Mode
- Profile Velocity Mode

1) Upon recognition of the involved axes, the following structure tree (example) will be displayed.

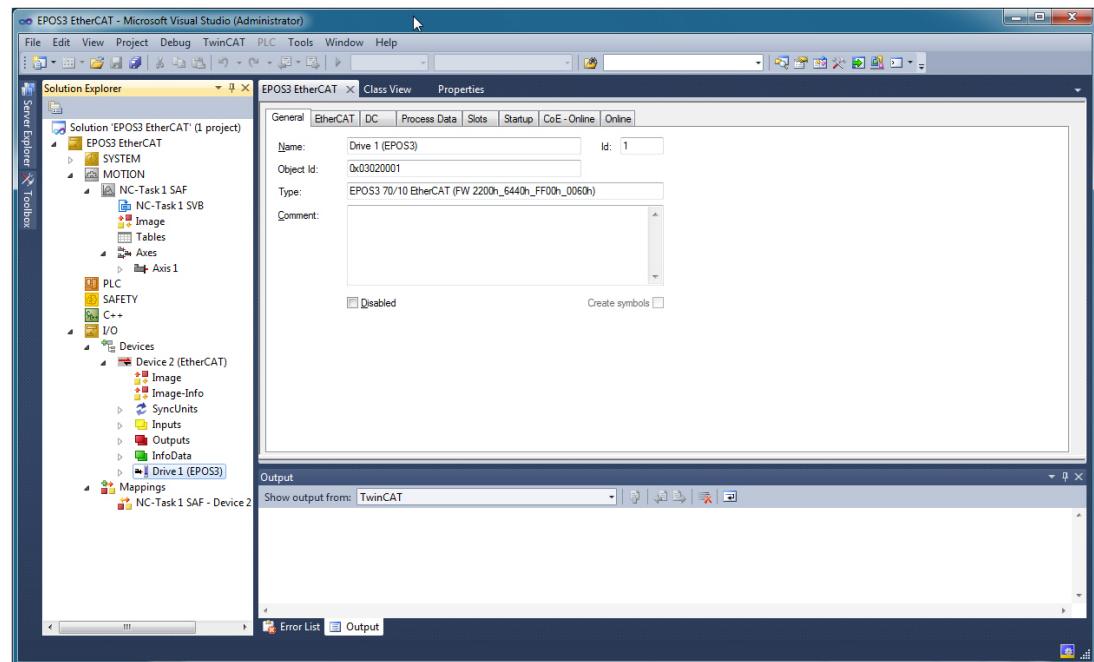


Figure 2-10 TwinCAT System Manager – Structure Tree

- 2) Use the tab «Slots» to allocate the operating mode is configured using.
 - a) Select a Slot from the left pane «Slot».
 - b) Select desired operating mode from right pane «Module».

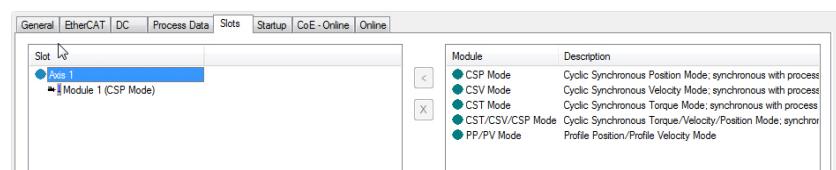


Figure 2-11 TwinCAT System Manager – Configuration of Slots

2.6 Verify CSP Settings

- 1) Enable the Distributed Clock from the EPOS3 Drive.

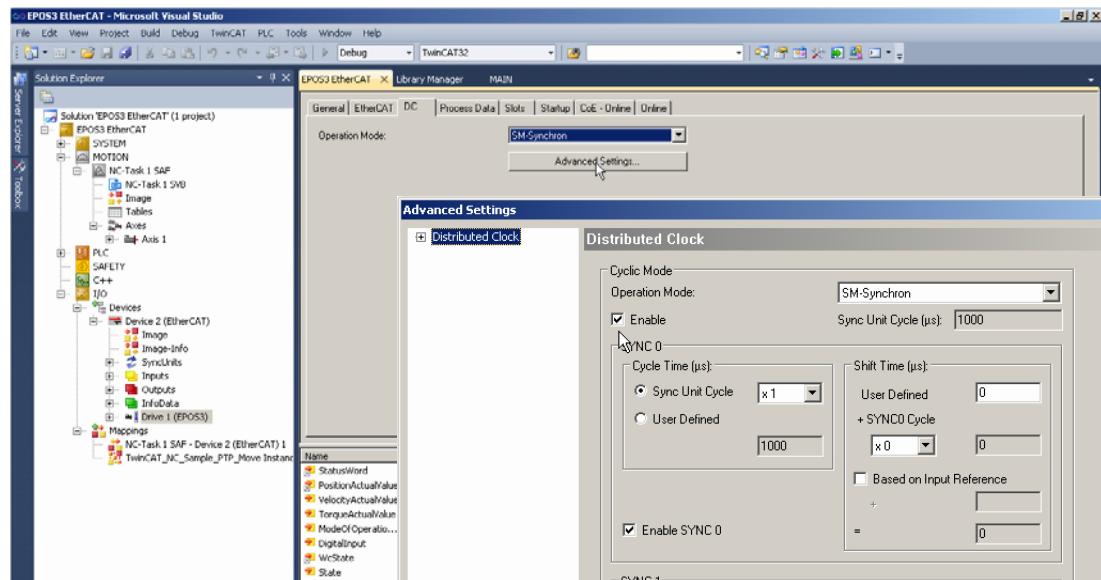


Figure 2-12 TwinCAT System Manager – Distributed Clock

- 2) Set cycle time of NC-Task 1 SAF to 1 ms.

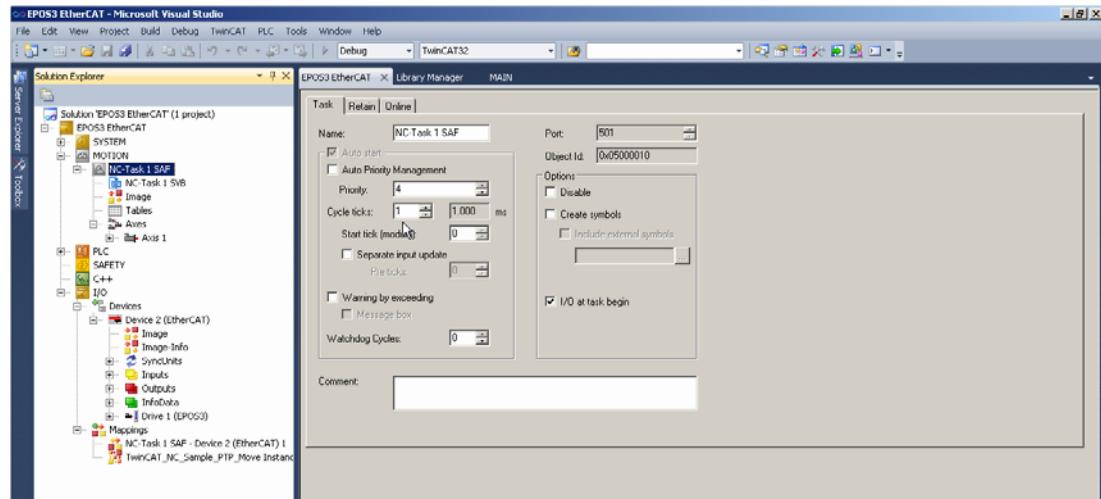


Figure 2-13 TwinCAT System Manager –Cycle Ticks