



Manual

EtherNet/IP Slave

TwinCAT 3

Version: 1.0
Date: 2016-12-27
Order No.: TF6280

BECKHOFF

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1 Foreword

1.1 Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.

It is essential that the documentation and the following notes and explanations are followed when installing and commissioning the components.

It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without prior announcement. No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

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Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents:

EP1590927, EP1789857, DE102004044764, DE102007017835

with corresponding applications or registrations in various other countries.

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1.2 Safety instructions

Safety regulations

Please note the following safety instructions and explanations!

Product-specific safety instructions can be found on following pages or in the areas mounting, wiring, commissioning etc.

Exclusion of liability






All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation and drive engineering who are familiar with the applicable national standards.

Description of symbols

In this documentation the following symbols are used with an accompanying safety instruction or note. The safety instructions must be read carefully and followed without fail!

 DANGER	Serious risk of injury! Failure to follow the safety instructions associated with this symbol directly endangers the life and health of persons.
 WARNING	Risk of injury! Failure to follow the safety instructions associated with this symbol endangers the life and health of persons.
 CAUTION	Personal injuries! Failure to follow the safety instructions associated with this symbol can lead to injuries to persons.
 Attention	Damage to the environment or devices Failure to follow the instructions associated with this symbol can lead to damage to the environment or equipment.
 Note	Tip or pointer This symbol indicates information that contributes to better understanding.

2 Overview

In combination with a network-capable Beckhoff PC, the function TF6280 TwinCAT EtherNet/IP Slave can be used to create an EtherNet/IP adapter.

Up to eight adapters can be parameterized with a physical interface. A virtual MAC address is formed, through which up to eight EtherNet/IP adapters can be operated on a PC via an Ethernet interface.

Technical data	TF6280							
Requires	TC1200 from build 4020							
Target system	Windows XP, Windows 7/8, Windows CE							
Performance class (pp)	20	30	40	50	60	70	80	90
	–	–	X	X	X	X	X	X

Ordering information	
TF6280-00pp	TC3 EtherNet/IP slave

The function TF6280 TwinCAT EtherNet/IP Slave enables data exchange with an EtherNet/IP master. Both multicast and broadcast are supported. The function TF6280 TwinCAT EtherNet/IP Slave can behave like eight EtherNet/IP adapters.

For sample, it is possible to:

- connect a master with eight slaves
- connect up to eight masters with 8 slaves

This way more data can be transported or the master can be operated with different cycle times.

In an EtherNet/IP network, the TF6280 behaves as a slave device. No further configuration via an EtherNet/IP master is required. The configurator in TwinCAT 3.1 is used for the configuration, e.g. by specifying the IP settings and the number of data. The only requirement for a connection to be established is that the data itself must be set in the same way in the EtherNet/IP master.

EtherNet/IP

EtherNet/IP (Ethernet Industrial Protocol, EIP) is a real-time Ethernet protocol, which was disclosed and standardized by the ODVA (Open DeviceNet Vendor Association). The protocol is based on TCP, UDP and IPv4.

Further information can be found at www.odva.org or <https://en.wikipedia.org/wiki/Ethernet/IP>.

3 Prerequisites

Software

TF6280 is included in **TwinCAT** version **3.1** build **4020.28**. No further installation is required.



Note

Older product versions

Older versions are beta versions. Delete any older EtherNet/IP device configurations and create a new configuration.

Hardware

For using the TF6280, the target system has to have an Intel® network chipset (see: [Verifying the hardware](#) [► 7]).



Note

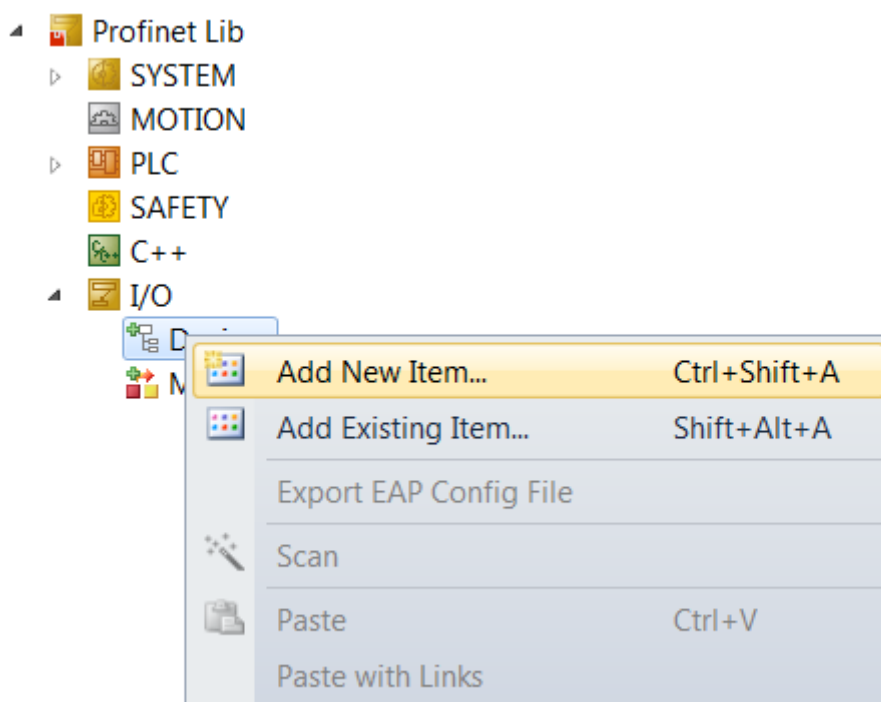
Beckhoff PC

Beckhoff PC systems are usually preconfigured for the operation of EtherNet/IP devices.

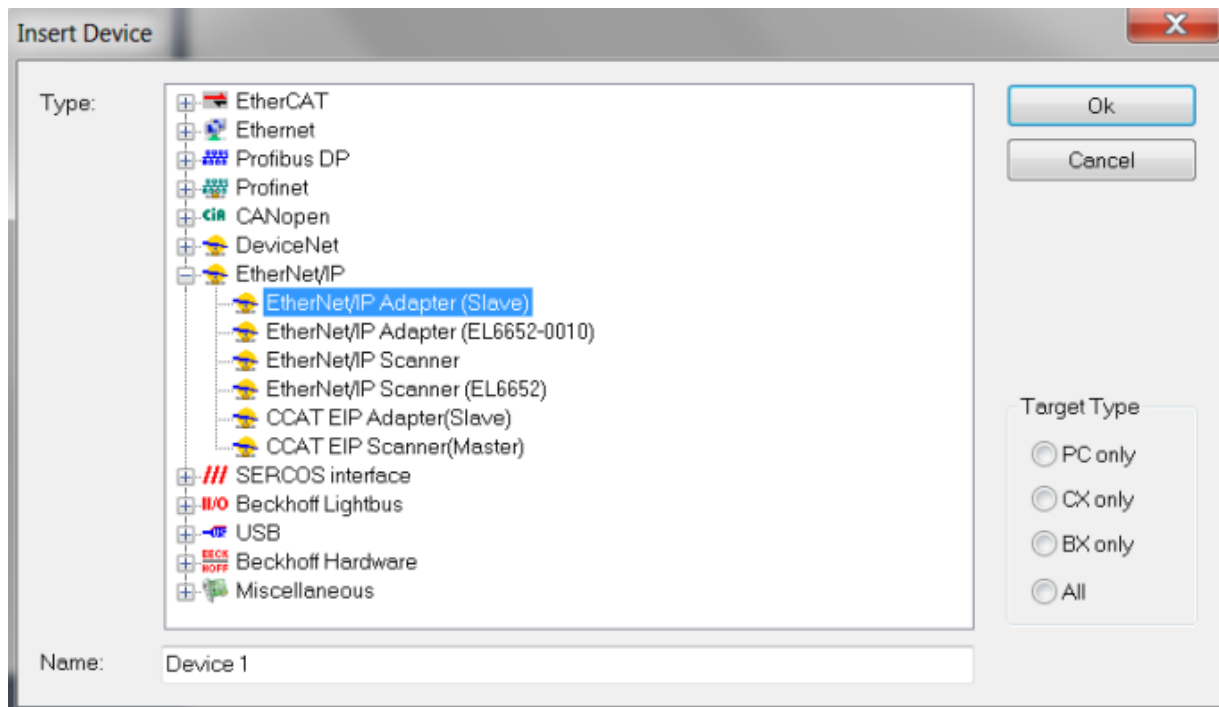
3.1 Verifying the hardware

Check whether the network interface is suitable

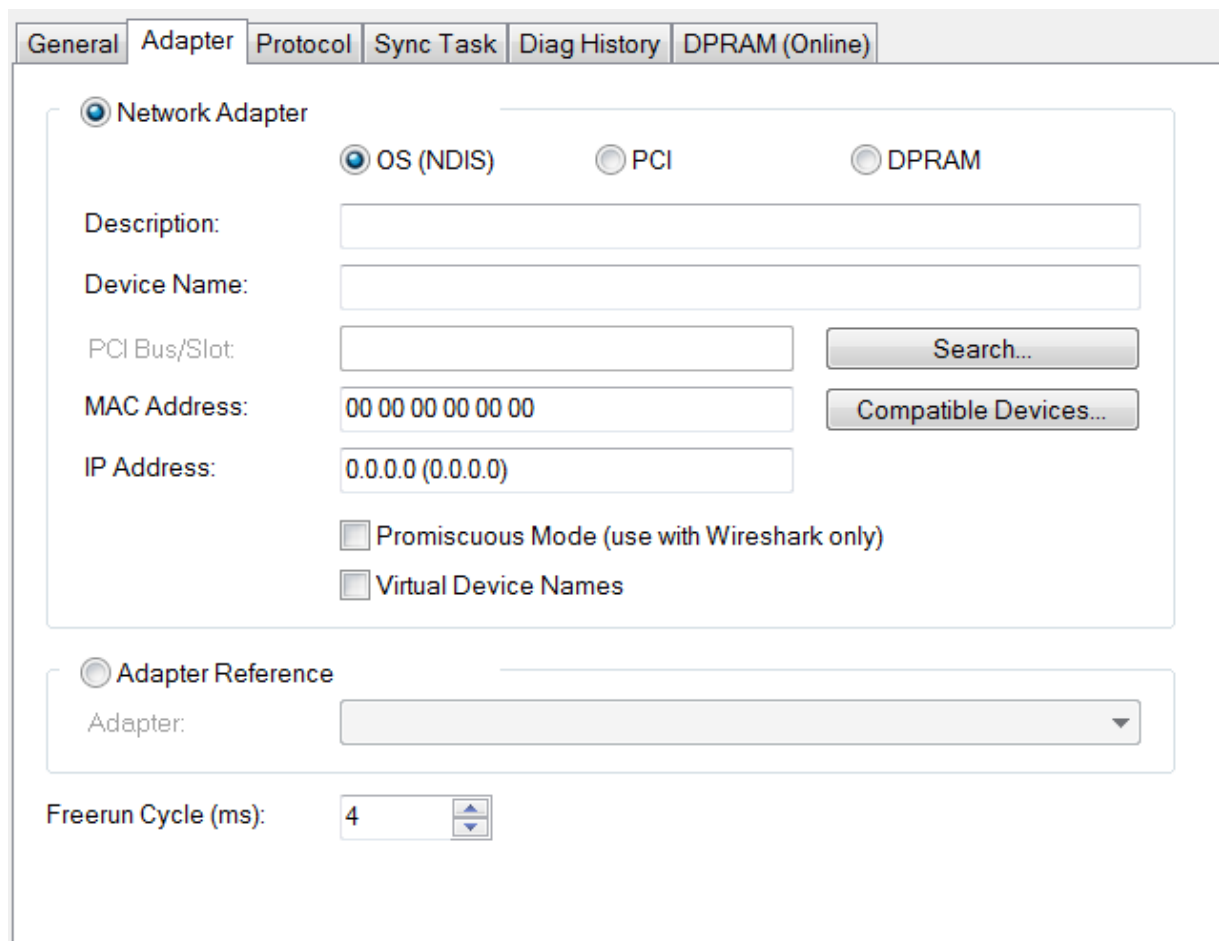
1. Create an EtherNet/IP slave. Right-click on “Devices” and add a new device (“Add New Item...”).



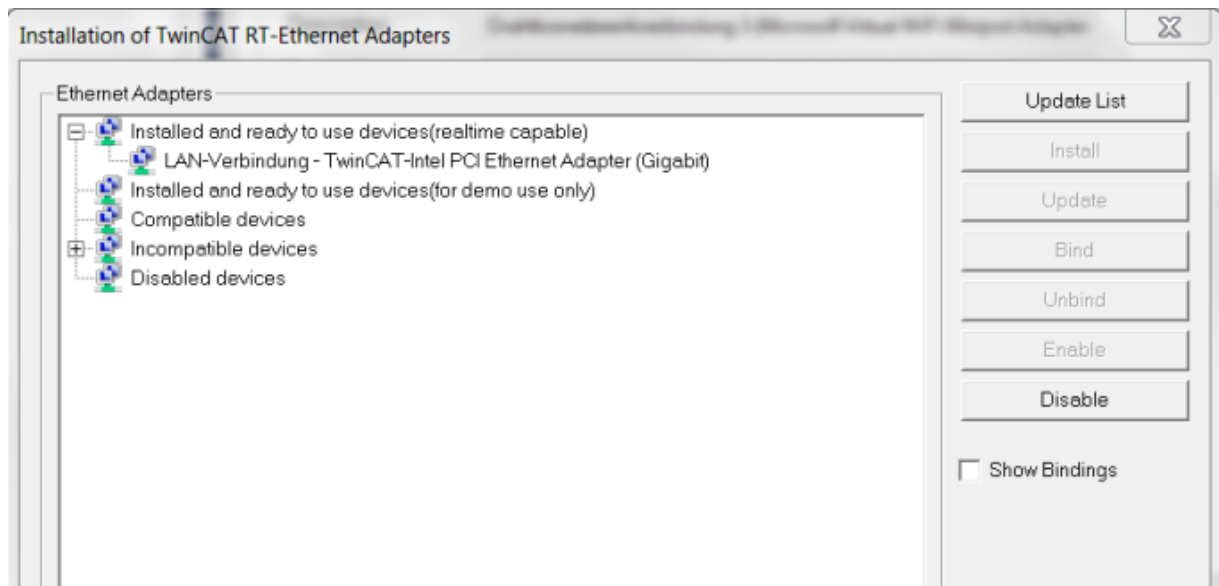
2. Select "EtherNet/IP Adapter (Slave)".



3. Now select the adapter and find the appropriate Ethernet interface (Search...).



4. Select a “real-time capable” interface under “Compatible devices”.



⇒ You can install the real-time driver.



Note

No “real-time capable” network interface available

If the list contains no network interfaces under “Compatible devices”, the TF6280 function cannot be used on the present hardware.

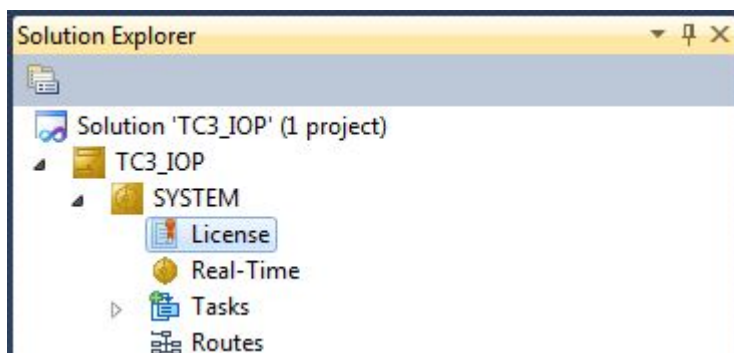
4 Licensing

The TwinCAT 3 functions are available both as a full and as a 7-Day trial version. Both license types can be activated via TwinCAT XAE. For more information about TwinCAT 3 licensing, please consult the TwinCAT 3 Help System. The following document describes both licensing scenarios for a TwinCAT 3 function on TwinCAT 3 and is divided into the following sections:

- [Licensing a 7-Day trial version \[► 10\]](#)
- [Licensing a full version \[► 11\]](#)

Licensing a 7-Day trial version

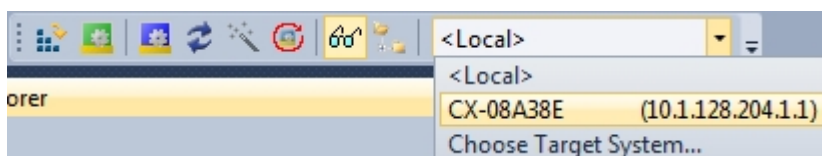
1. Start TwinCAT XAE
2. Open an existing TwinCAT 3 project or create a new project
3. In "Solution Explorer", please navigate to the entry "**System\License**"



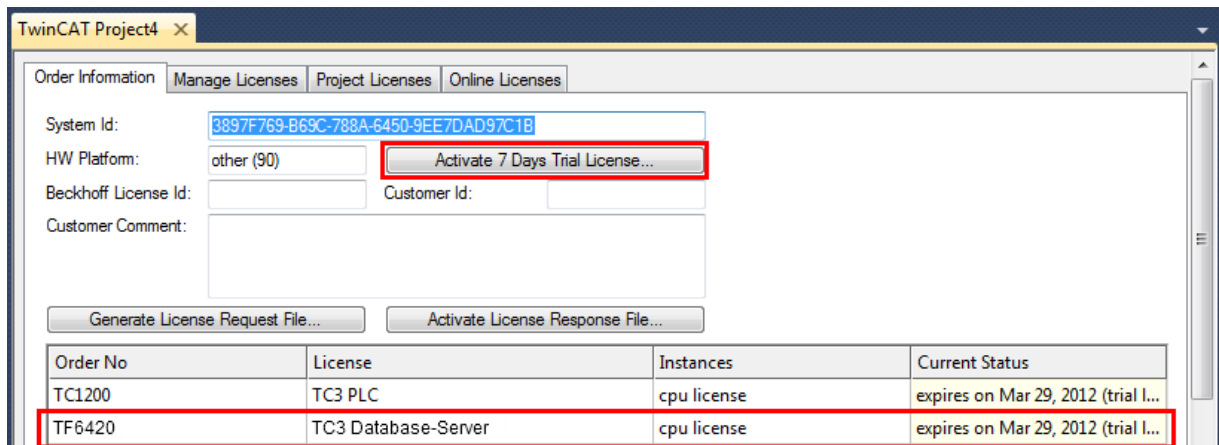
4. Open the tab "**Manage Licenses**" and add a "**Runtime License**" for your product (in this screenshot "TE1300: TC3 Scope View Professional")

TwinCAT Project5		
Order Information Manage Licenses Project Licenses Online Licenses		
Order No	License	Add Runtime License
TC1000	TC3 ADS	<input checked="" type="checkbox"/> cpu license
TC1100	TC3 IO	<input type="checkbox"/> cpu license
TC1200	TC3 PLC	<input type="checkbox"/> cpu license
TC1210	TC3 PLC / C++	<input type="checkbox"/> cpu license
TC1220	TC3 PLC / C++ / MatSim	<input type="checkbox"/> cpu license
TC1250	TC3 PLC / NC PTP 10	<input type="checkbox"/> cpu license
TC1260	TC3 PLC / NC PTP 10 / NC I	<input type="checkbox"/> cpu license
TC1270	TC3 PLC / NC PTP 10 / NC I / CNC	<input type="checkbox"/> cpu license
TC1300	TC3 C++	<input type="checkbox"/> cpu license
TC1320	TC3 C++ / MatSim	<input type="checkbox"/> cpu license
TE1300	TC3 Scope View Professional	<input checked="" type="checkbox"/> cpu license
TE1400	TC3 Target For Matlab Simulink	<input type="checkbox"/> cpu license

5. **Optional:** If you would like to add a license for a remote device, you first need to connect to the remote device via TwinCAT XAE toolbar



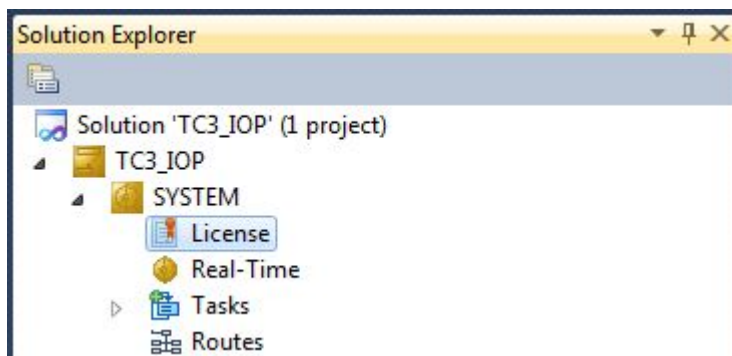
- Switch to the tab **"Order Information"** and click the button **"Activate 7 Days Trial License..."** to activate a test version



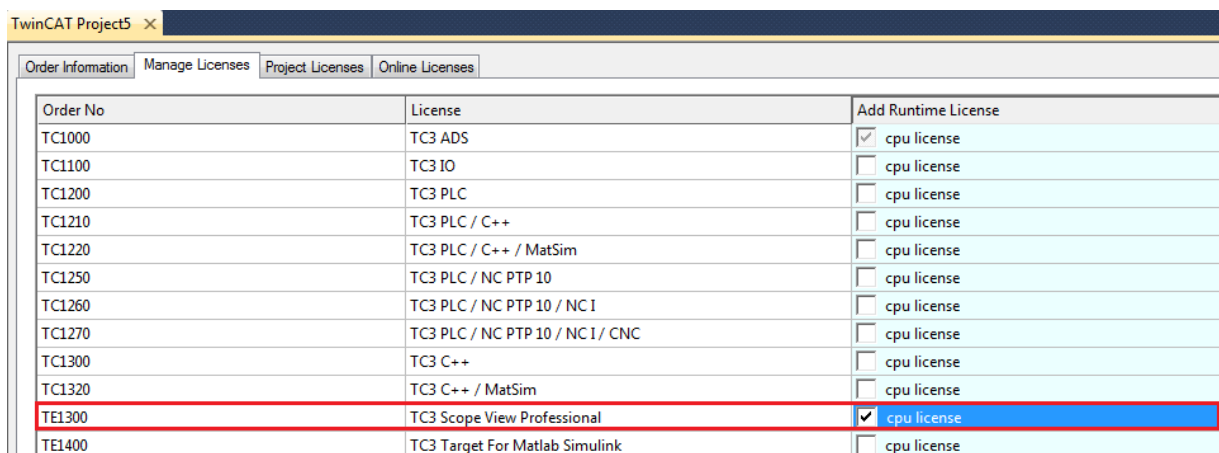
- Please restart TwinCAT 3 afterwards.

Licensing a full version

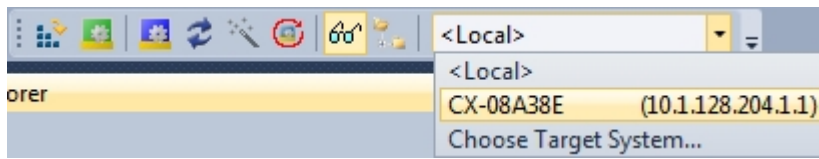
- Start TwinCAT XAE
- Open an existing TwinCAT 3 project or create a new project
- In "Solution Explorer", please navigate to the entry **"SYSTEMLicense"**



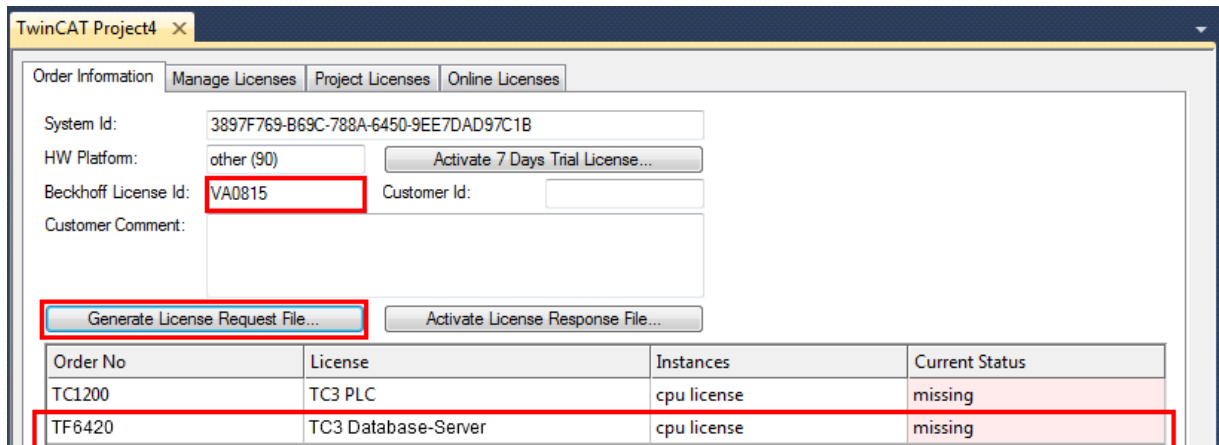
- Open the tab **"Manage Licenses"** and add a **"Runtime License"** for your product (in this screenshot "TE1300: TC3 Scope View Professional").



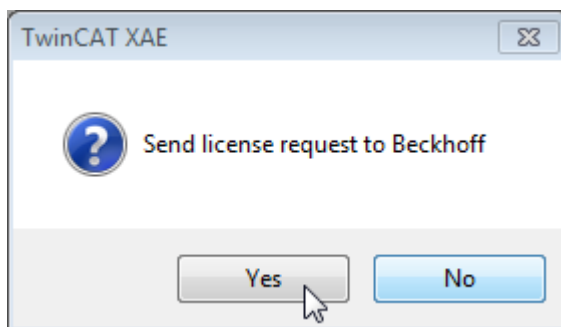
12. **Optional:** If you would like to add a license for a remote device, you first need to connect to the remote device via TwinCAT XAE toolbar



13. Navigate to the **"Order Information"** tab
 The fields "System-ID" and "HW Platform" cannot be changed and just describe the platform for the licensing process in general a TwinCAT 3 license is always bound to these two identifiers:
 the "System-ID" uniquely identifies your system.
 The "HW Platform" is an indicator for the performance of the device.
14. Optionally, you may also enter an own order number and description for your convenience

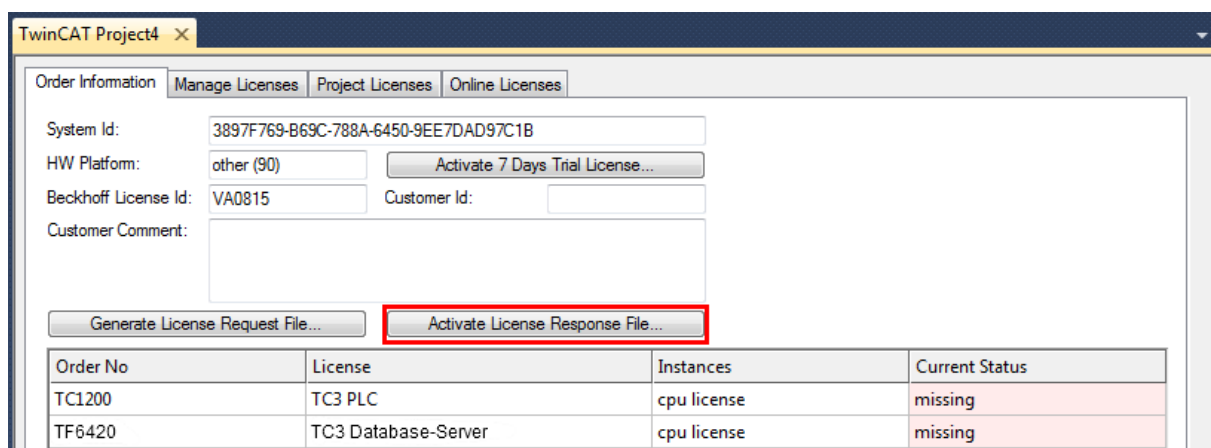


15. enter the "Beckhoff License ID" and click on **"Generate License Request File..."**. If you are not aware of your **"Beckhoff License ID"** please contact your local sales representative.
16. After the license request file has been saved, the system asks whether to send this file via E-Mail to the Beckhoff Activation Server

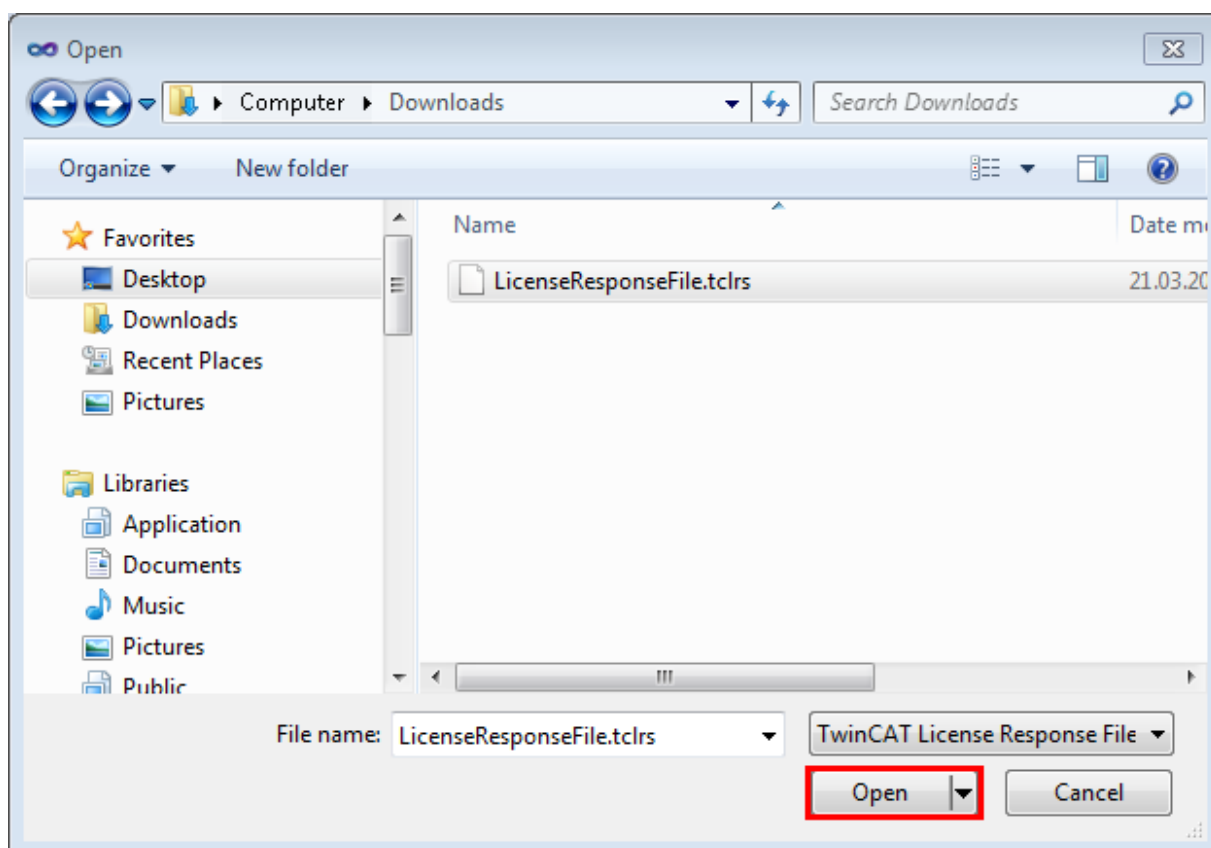


17. After clicking "Yes", the standard E-Mail client opens and creates a new E-Mail message to ["tclicense@beckhoff.com"](mailto:tclicense@beckhoff.com) which contains the "License Request File"
18. Send this Activation Request to Beckhoff
- NOTE!** The "License Response File" will be sent to the same E-Mail address used for sending out the "License Request File"

19. After receiving the activation file, please click on the button "Activate License Response File..." in the TwinCAT XAE license Interface.

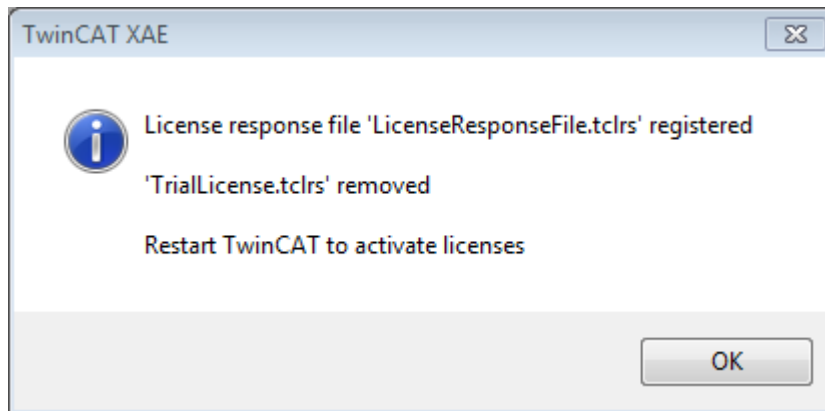


20. Select the received "License response file" and click on "Open"



21. The "License Response File" will be imported and all included licenses will be activated. If there have been any trial licenses, these will be removed accordingly.

22. Please restart TwinCAT to activate licenses..



NOTE! The license file will be automatically copied to "..\TwinCAT\3.1\Target\License" on the local device.

5 Configuration

The most important settings in order to establish a connection with an EtherNet/IP master are:

- the IP address,
- the assembly instance numbers and thus the length of the data
- and the correct cycle time.

IP address:

The IP address can be assigned freely, although it should be from the same network class as the master. Otherwise a gateway must be entered, in order to route the protocol accordingly.

Assembly instance numbers:

The assembly instance numbers are permanently assigned and must be correctly set in the master. This also always includes the number of data or the size of the process image.

Cycle time:

The task cycle time in the TF6280 may not exceed the time on the master side, although it can be a fraction of that time. If, for sample, an EtherNet/IP cycle time of 10 ms is set on the master side, the task cycle time on the slave side can be 10 ms, 5 ms, 2 ms or 1 ms.



Note

Recommended cycle time

EtherNet/IP enables cycle times of 1 ms or higher. The task can always be operated with 1 ms, as long as the system load of your [systems](#) [► 6] permits this.

5.1 Creating an EtherNet/IP slave

Once you have added an EtherNet/IP adapter, a slave is automatically added to your configuration.

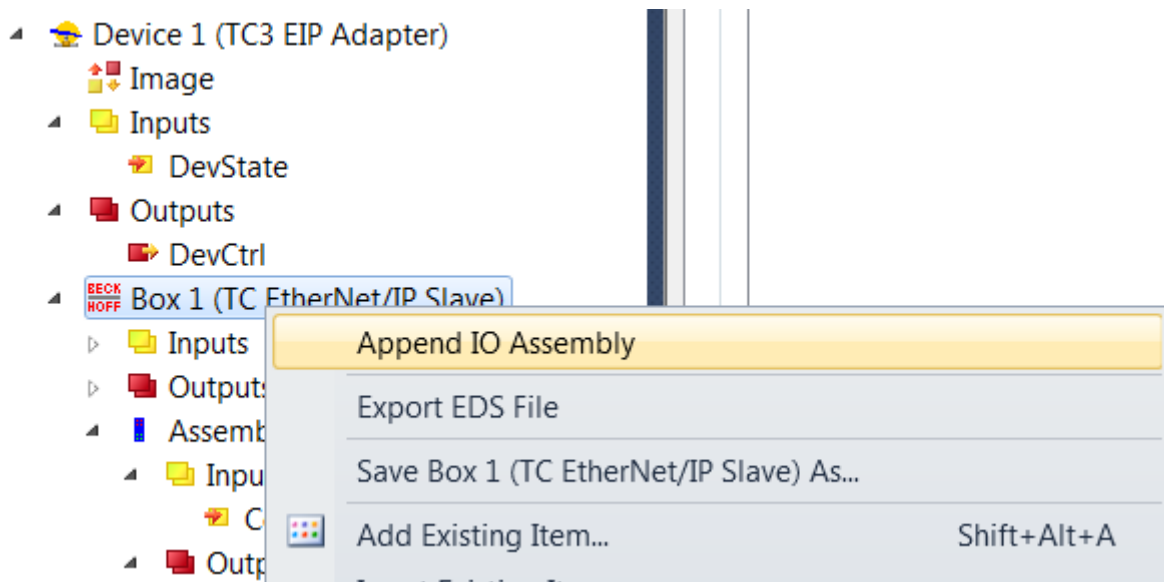
1. Set the IP address of the slave. (The IP address does not have to be the same as the IP address of the operating system.) Click on the box and switch to the Settings tab. Here you can set the IP address, the network mask and the gateway address.

General Settings					
Slave Settings					
Index	Name	Flags	Value	Unit	
8000:0	Slave Settings (Box 1)	M RO	> 43 <		
8000:01	Slave Number	M RO	0x0001 (1)		
8000:03	Product Name	M RW	Box 1 (TC EtherNet/IP Slav...		
8000:04	Device Type	M RO	0x000C (12)		
8000:05	Vendor ID	M RO	0x006C (108)		
8000:06	Product Code	M RO	0x1888 (6280)		
8000:07	Revision	M RO	3.1		
8000:08	Serial Number	M RO	0x00000000 (0)		
8000:20	MAC Address	M RO	EE 00 01 1F 7E 88		
8000:21	IP Address	M RW	0.0.0.0		
8000:22	Network Mask	M RW	0.0.0.0		
8000:23	Gateway Address	M RW	0.0.0.0		
8000:24	DHCP Max Retries	M RW	0		
8000:25	TCP/IP TTL	M RW	128		
8000:26	TCP/IP UDP Checksum	M RW	TRUE		
8000:27	TCP/IP TCP Timeout	M RW	300 Seconds		
8000:28	MultiCast TTL	M RW	1		
8000:29	MultiCast UDP Checksum	M RW	FALSE		

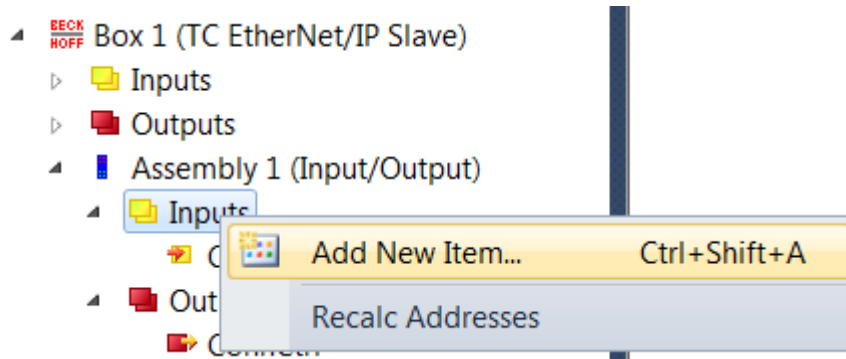
1 a) If the IP address is to be issued by a DHCP server in your network, enter the value 0.0.0.0 in the "IP address" field.

1 b) If the IP address of the operating system is to be used, enter the value 255.255.255.255 in the "IP address" field. The subnet mask and the gateway address can be used unchanged. When TwinCAT starts, the EtherNet/IP driver then uses the IP address of the system.

2. Click on the box and select "Append IO Assembly".



3. To create data under Inputs, right-click on "Add New Item..."



4. Now select the data format and the number of data to be transferred. The number of bytes will be important later. It can be read in the object tree. e.g.: Enter 4 words, i.e. 8 bytes of process data:

Insert Variable

General

Name: Var 7 Multiple: 4

Start Address: Byte: 6 Bit: 0

☐ Show All

Data Type	Size	Name Space
ST_AX5000_S_0085	2	AX5000
ST_AX5000_S_0169	2	AX5000
TcEventArgumentType	2	
TcEventConfirmationState	2	
TcEventSeverity	2	
UINT	2	
WORD	2	
BOOL32	4	
BX_KBUS_STATE	4	IO
DATE	4	

In addition there are 4 bytes for the ConnState. The ConnState currently has no function. It can be used for additional information in the future.

5. Therefore, 12 bytes of process data must be created. Navigate to the box and select the Settings tab.

General Settings				
Slave Settings				
Index	Name	Flags	Value	Unit
8000:0	Slave Settings (Box 1)	M RO	> 43 <	
8001:0	IO Assembly 1 Settings	M RO	> 12 <	
8001:01	Assembly Number	M RO	0x0001 (1)	
8001:02	Configuration Instance	M RO	128	
8001:03	Configuration Size	M RO	0 Byte	
8001:04	Input Instance (T->O)	M RO	129	
8001:05	Input Size (T->O)	M RO	4 Byte	
8001:06	Output Instance (O->T)	M RO	130	
8001:07	Output Size (O->T)	M RO	12 Byte	
8001:08	Heartbeat Instance (Listen Onl...	M RO	136	
8001:09	Heartbeat Size (Listen Only)	M RO	0 Byte	
8001:...	Heartbeat Instance (Input Only)	M RO	137	
8001:...	Heartbeat Size (Input Only)	M RO	0 Byte	
8001:...	Advanced Assembly Options	M RW	0x0000 (0)	
9000:0	Slave Info (Box 1)	R O	> 43 <	
9001:0	IO Assembly 1 Info	R O	> 12 <	

⇒ The length can be found in index field 0x8001:07. The length is displayed from the master perspective. TwinCAT inputs are outputs in the master, hence the reference to output size here.

6. Now do the same with the outputs of the EtherNet/IP slave.

⇒ Data creation is now complete. Now link the data with the PLC.

5.2 Setting the cycle time

The cycle time of the EtherNet/IP adapter (slave) is specified by the master. The task on the TwinCAT system must operate with at least the same speed.

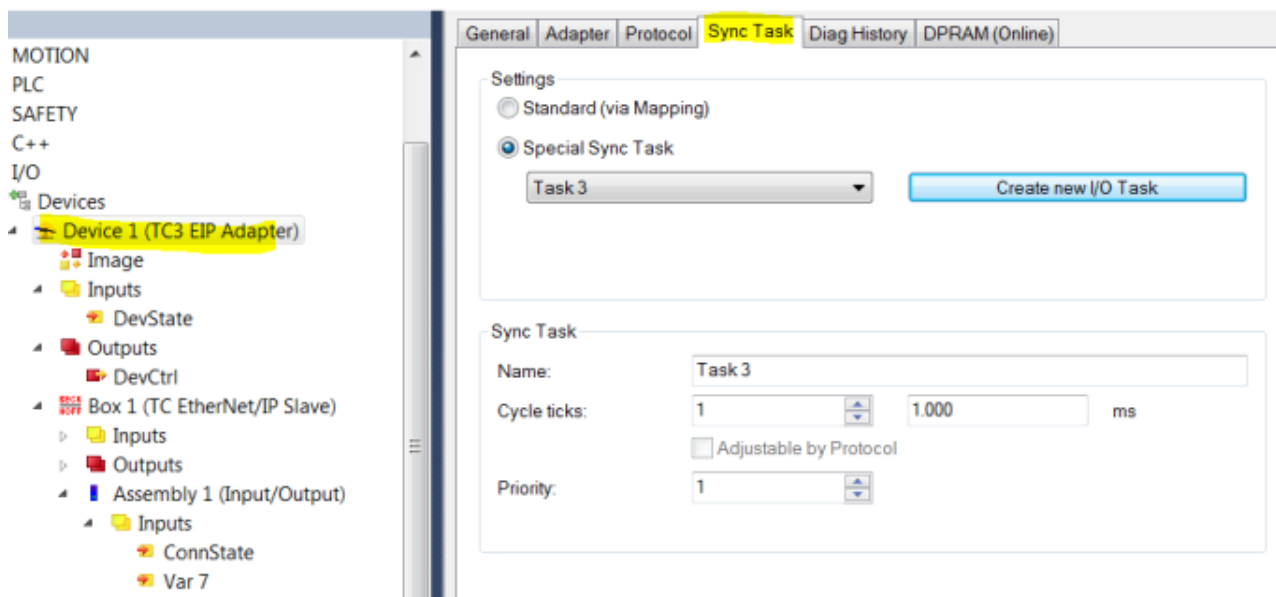


Note

Recommended cycle time

EtherNet/IP enables cycle times of 1 ms or higher. The task can always be operated with 1 ms, as long as the system load of your systems [► 6] permits this.

To set the task cycle time navigate to the EIP Adapter device, then to the “Sync Task” tab and set the time.

**Note****Use a dedicated Sync Task**

Use a dedicated Sync Task, since mapping via the PLC can result in the task being stopped, e.g. if a breakpoint is encountered, with the result that the EtherNet/IP connection is interrupted.

Also see about this

Overview [▶ 6]

5.3 Changing EtherNet/IP settings

For the setting, the [Store Category](#) [▶ 21] must be specified in the TwinCAT system configuration. This is entered in the object F8000:2B "Advanced Options" in all EtherNet/IP devices.

If the corresponding bit is set, the IP address from the memory is used. If no value is entered, the bit is ignored, and the parameters of the TwinCAT system are used.

In the following sample bit 8 (0x0100) is set, which means that Store Category 1 is selected, which affects the IP settings (index 0x8000: 21...23).

Slave Settings				
Index	Name	Flags	Value	
8000:0	Slave Settings (Box 2)	M RO	> 43 <	
8000:01	Slave Number	M RO	0x0002 (2)	
8000:03	Product Name	M RW	Box 2 (TC EtherNet/IP Slave)	
8000:04	Device Type	M RO	0x000C (12)	
8000:05	Vendor ID	M RO	0x006C (108)	
8000:06	Product Code	M RO	0x1888 (6280)	
8000:07	Revision	M RO	3.1	
8000:08	Serial Number	M RO	0x00000000 (0)	
8000:20	MAC Address	M RO	02 00 02 12 47 D6	
8000:21	IP Address	M RW	10.1.1.2	
8000:22	Network Mask	M RW	255.0.0.0	
8000:23	Gateway Address	M RW	0.0.0.0	
8000:24	DHCP Max Retries	M RW	0	
8000:25	TCP/IP TTL	M RW	128	
8000:26	TCP/IP UDP Checksum	M RW	TRUE	
8000:27	TCP/IP TCP Timeout	M RW	300 Seconds	
8000:28	MultiCast TTL	M RW	1	
8000:29	MultiCast UDP Checksum	M RW	FALSE	
8000:2A	Forward Class3 to PLC	M RW	FALSE	
8000:2B	Advanced Slave Options	M RW	0x0100 (256)	
8001:0	IO Assembly 5 Settings	M RO	> 12 <	
9000:0	Slave Info (Box 2)	RO	> 43 <	
9001:0	IO Assembly 5 Info	RO	> 12 <	

To use Store Category 1 and 2, 0x0300 should be entered in object 8000:2B. Only bits 8 and 9 should be used. All other bits are reserved and must not be used.

ADS function blocks are used for reading or writing the settings from/to the PLC.

5.3.1 Object description

Offset	Name	Data Type	SubIndex	Store Category	
				1	2
0x00..0x01	ID	UINT16	1		
0x02..0x03	Reserved	UINT16	-		
0x04..0x23	Product Name	BYTE[32], STRING(31)	3		X
0x24..0x27	Device Type	UINT32	4		
0x28..0x2B	Vendor ID	UINT32	5		
0x2C..0x2F	Product Code	UINT32	6		X
0x30..0x33	Revision	UINT32	7		
0x34..0x37	Serial Number	UINT32	8		
0x38..0x7D	Reserved	BYTE[70]	-		
0x7E..0x83	MAC Address	BYTE[6]	32		
0x84..0x87	IP Address	UINT32	33	X	
0x88..0x8B	Network Mask	UINT32	34	X	
0x8C..0x8F	Gateway Address	UINT32	35	X	
0x90..0x91	DHCP Max Retries	UINT16	36		
0x92..0x93	TCP/IP TTL	UINT16	37		
0x94..0x95	TCP/IP UDP Checksum	UINT16	38		
0x96..0x97	TCP/IP TCP Timeout	UINT16	39		
0x98..0x99	Multicast TTL	UINT16	40		
0x9A..0x9B	Multicast Checksum	UINT16	41		
0x9C..0x9D	Forward Class3 to PLC	UINT16	42		
0x9E..0x9F	Flags	UINT16	43		
0xA0..0xFF	Reserved	Byte[96]	-		

Store Category

The “Store Category” determines which settings are overwritten with the values from the non-volatile memory. Bits 9 - 8 have to be set accordingly in the project under “Flags”. In order to modify both, both bits must be set.

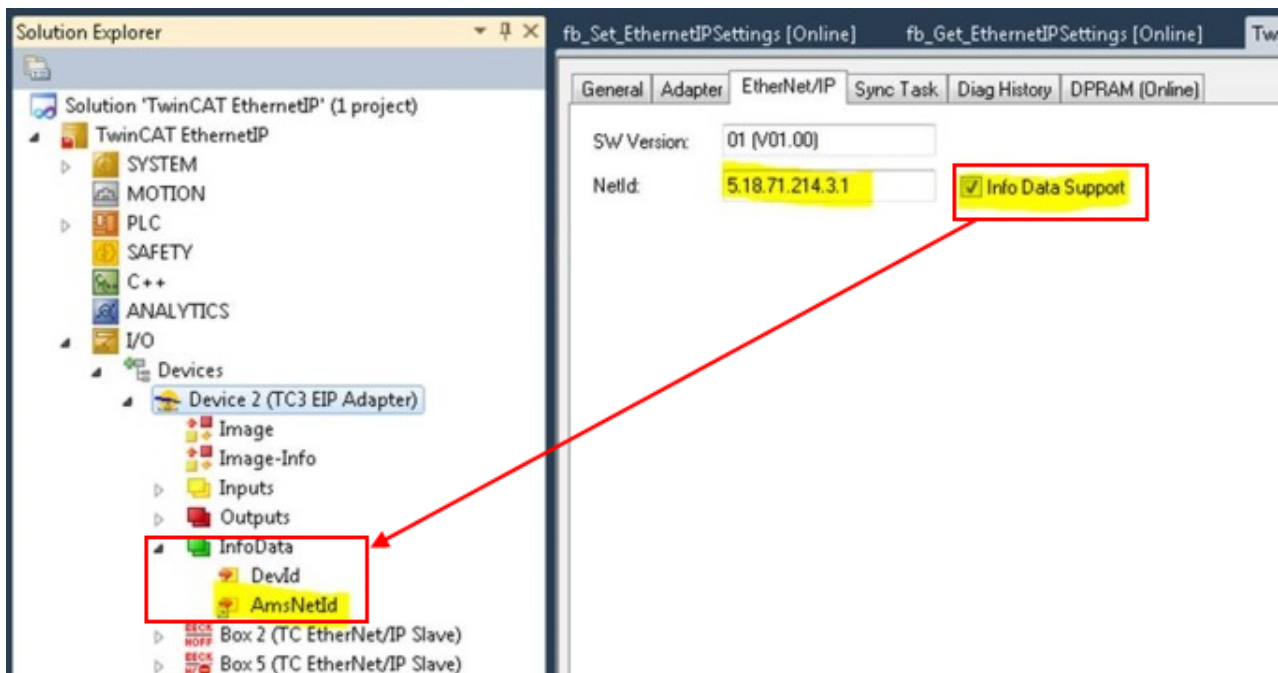
(Bit9=Cat2, Bit8=Cat1)

5.3.2 ADS-Write command

AmsNetId

The AMSNetId can be found under the “EtherNet/IP” tab in the “NetID” field. When you select the option “Info Data Support” it is linked directly.

The advantage of a direct link is that it always retrieves the current AMSNETID, even if controllers are used that use different AMSNETIDs. The AMSNETID of the EtherNet/IP adapter therefore does not have to be read manually.



ADS port number

For the function “EtherNet/IP Adapter” set the ADS port number to a fixed value of 0xFFFF.

Slave

IDXGRP: 0x0001F480

IDXOFFS: 0x00000000

Setting for setting (4 bytes + object size (256 bytes))

Byte Offset 0: 0x45

Byte Offset 1: 0x23

Byte Offset 2: ObjIndex LoByte (e.g. 0x8000 for **slave 1** and 0x8010 for **slave 2**)

Byte Offset 3: ObjIndex HiByte

Byte Offset 4-260: Data of the object (see object description below)

Setting for resetting (4 bytes)

Byte Offset 0: 0x00

Byte Offset 1: 0x00

Byte Offset 2: ObjIndex LoByte (e.g. 0x8000 for **slave 1** and 0x8010 for **slave 2**)

Byte Offset 3: ObjIndex HiByte



Note

Accept changes

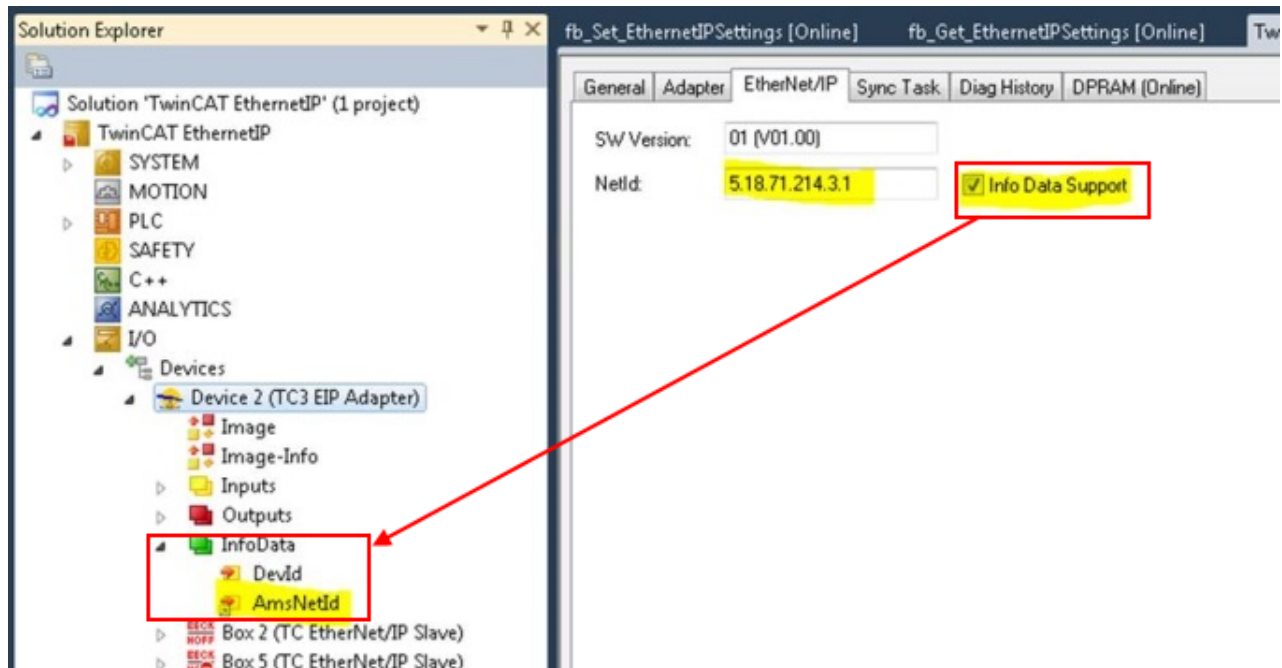
After setting the properties restart TwinCAT for the TF6280, after which the new settings are applied and valid. The settings remain stored and don't have to be loaded again, unless there are changes.

5.3.3 ADS-Read command

AmsNetId

The AMSNetId can be found under the “EtherNet/IP” tab in the “NetID” field. When you select the option “Info Data Support” it is linked directly.

The advantage of a direct link is that it always retrieves the current AMSNETID, even if controllers are used that use different AMSNETIDs. The AMSNETID of the EtherNet/IP adapter therefore does not have to be read manually.



ADS port number

For the function “EtherNet/IP Adapter” set the ADS port number to a fixed value of 0xFFFF.

Slave

IDXGRP: 0x1F480

IDXOFFS: 0x8000 for the **first slave**

IDXOFFS: 0x8010 for the **second slave**

IDXOFFS: 0x8020 for the **third slave**

...

IDXOFFS: 0x8070 for the **eights slave**

LEN: 256

The data are stored in the data array, as described above -> see [Object description](#) [► 21].

5.3.4 Sample

A sample program can be downloaded: http://infosys.beckhoff.com/content/1033/TF6280_Tc3_EthernetIPSlave/Resources/tszip/3105211403.tszip

5.4 Creating the EtherNet/IP slave in other EtherNet/IP masters

All the information you need is provided in the “Settings” dialog:

General

Settings

Slave Settings

Index	Name	Flags	Value	Unit
8000:0	Slave Settings (Box 1)	MRO	> 43 <	
8001:0	IO Assembly 1 Settings	MRO	> 12 <	
8001:01	Assembly Number	MRO	0x0001 (1)	
8001:02	Configuration Instance	MRO	128	
8001:03	Configuration Size	MRO	0 Byte	
8001:04	Input Instance (T->O)	MRO	129	
8001:05	Input Size (T->O)	MRO	12 Byte	
8001:06	Output Instance (O->T)	MRO	130	
8001:07	Output Size (O->T)	MRO	12 Byte	
8001:08	Heartbeat Instance (Listen Onl...	MRO	136	
8001:09	Heartbeat Size (Listen Only)	MRO	0 Byte	
8001:...	Heartbeat Instance (Input Only)	MRO	137	
8001:...	Heartbeat Size (Input Only)	MRO	0 Byte	
8001:...	Advanced Assembly Options	MRO	0x0000 (0)	
9000:0	Slave Info (Box 1)	RO	> 43 <	
9001:0	IO Assembly 1 Info	RO	> 12 <	

You need

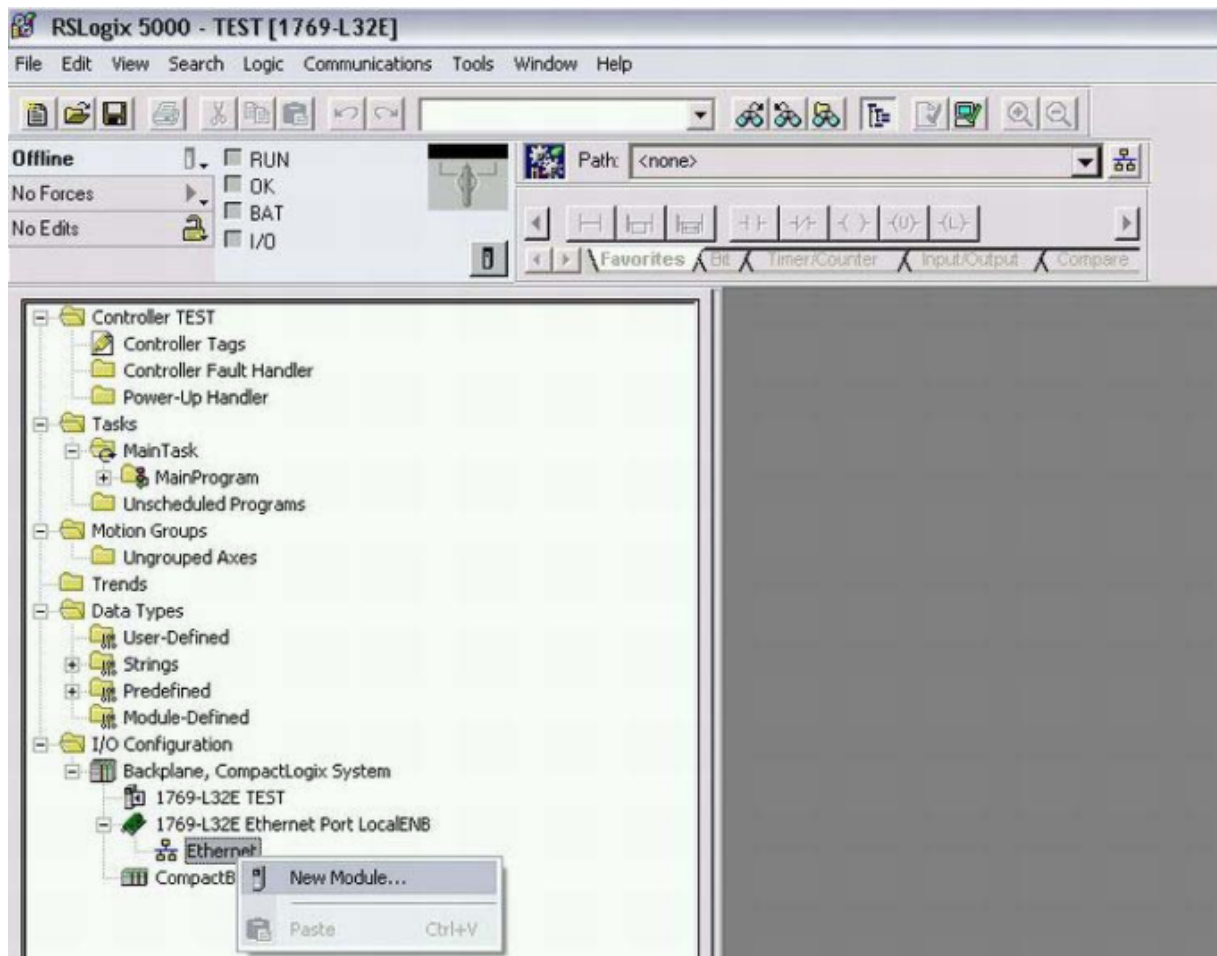
- the IP address of the slave (see [Creating an EtherNet/IP slave](#) [► 15])
- the “Assembly Instance” numbers (see Settings tab)
- the number of data (see Settings tab)
- the “Configuration Instance” number 128 length 0
- the “Input Instance” number 129 length 12
- the “Output Instance”-number 130 length 12

The instance numbers are always the same. An export of the EDS file only contains the instance numbers. The number of data still has to be entered.

The EtherNet/IP device (slave) can be integrated via a “generic node” structure or via the EDS file.

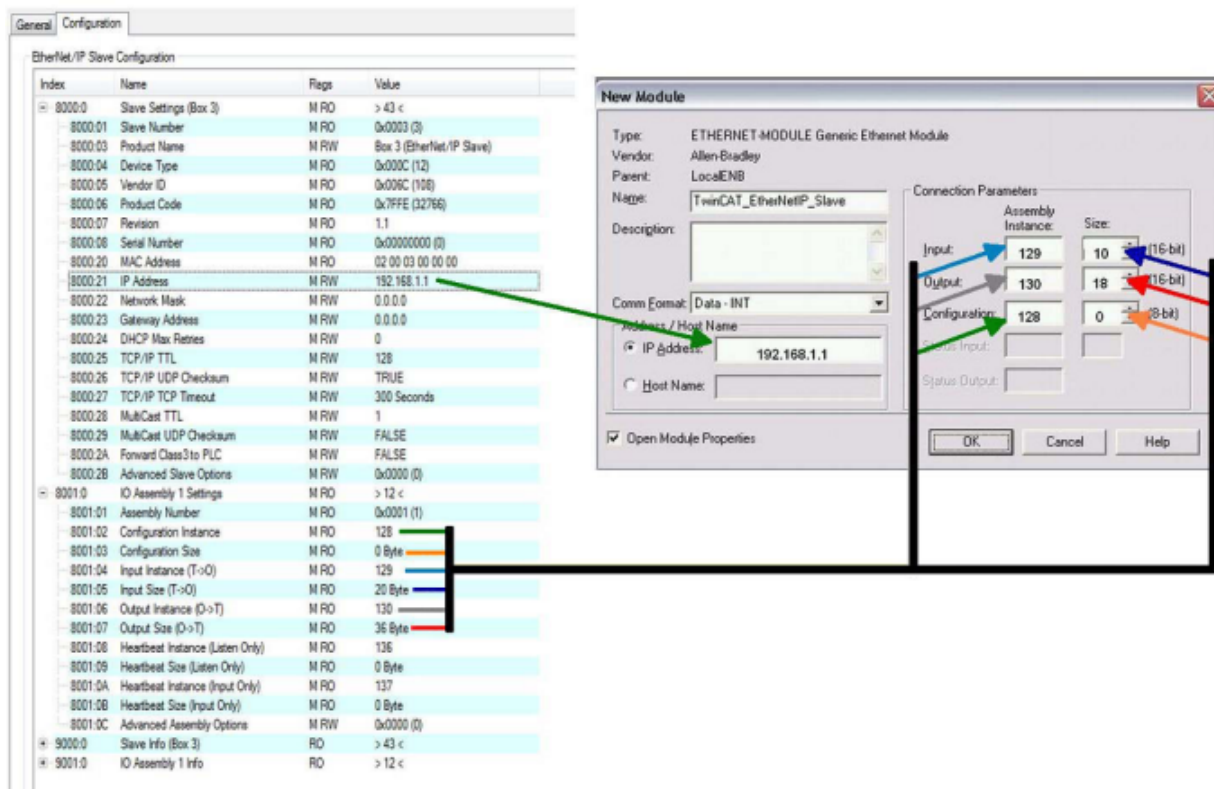
5.4.1 Sample for Rockwell CPUs

1. Under “Ethernet”, “New Module...”, select “Generic Ethernet Module”.



2. Enter the IP address from object 0x8000:21.
3. Enter 129_{dec} for Input Instance.
4. Enter 130_{dec} for Output Instance and
5. 128_{dec} for Config Instance.

⇒ The data length is dependent on the Comm format.



Note the properties of the selected Comm format

In the above sample the Comm format *INT* was selected, which means the number of data from objects 0x8001:05 and 0x8001:07 have to be divided by 2, since in TwinCAT they are specified in bytes and in the RSLogix in word length (INT).

An odd number of bytes must be rounded up. This also applies even if the Comm format is set to DINT, in which case you must round up to the next whole number.



Note

System limitations

In the case of Multicast, pay attention to the high network loads that this causes, especially in systems with many or short cycle times. A high network load may possibly impair communication.

6 Properties

6.1 Virtual slave

Using the TF6280, up to eight slaves can be parameterized with a physical interface. In this case a virtual MAC address is formed for each virtual slave device, so that up to eight EtherNet/IP slaves can be operated on a PC via an Ethernet interface.

The advantage is that this option enables convenient connection of eight EtherNet/IP controllers and limitations in the bus communication with the slave can be bypassed without using additional hardware.

This feature can be used, for sample, for exchanging large data quantities with an EtherNet/IP master or for connecting with several EtherNet/IP masters in different subnets.

Create an additional box in the TwinCAT system configuration and proceed in the same way as for the configuration of a real slave.

**Note****Unique MAC address**

If the virtual MAC address is assigned manually, ensure that it is truly unique in your network.

6.2 TF6280 - Configuration parameters

6.2.1 Index 0x8000 Slave Settings

Index	Name	Meaning
8000:0	Slave Settings	
8000:1	Slave Number	Slave Box ID
8000:3	Product Name	Name of the device
8000:4	Device Type	Device type
8000:5	Vendor ID	Vendor number
8000:6	Product Code	Product code
8000:7	Revision	Version
8000:8	Serial Number	Serial number (see object 0x9000)
8000:20	MAC Address	MAC address (see object 0x9000)
8000:21	IP Address	IP address <ul style="list-style-type: none"> • 0.0.0.0: Will be assigned dynamically by the DHCP service • 255.255.255.255: The operating system address is used Otherwise: statically assigned IP address
8000:22	Network Mask	Subnet mask <ul style="list-style-type: none"> • 0.0.0.0: Will be assigned dynamically by the DHCP service Otherwise: statically assigned subnet mask
8000:23	Gateway address	Gateway address <ul style="list-style-type: none"> • 0.0.0.0: Will be assigned dynamically by the DHCP service Otherwise: statically assigned gateway address
8000:24	DHCP Max Retries	0: Continuous repetition of the DHCP addressing attempts. (Currently only this mode is implemented, as of: 10-2016)
8000:25	TCP/IP TTL	"Time to live" – value for unicast TCP/UDP communication
8000:26	TCP/IP UDP Checksum	Checksum function (Unicast): <ul style="list-style-type: none"> • 0: UDP checksum disabled. • 1: UDP checksum enabled
8000:27	TCP/IP TCP Timeout	Time switch for inactive TCP connection in seconds <ul style="list-style-type: none"> • 0: Time switch disabled
8000:28	Multicast TTL	"Time to live" value for multicast UDP communication
8000:29	Multicast UDP checksum	Checksum function (Multicast): <ul style="list-style-type: none"> • 0: UDP checksum disabled • 1: UDP checksum enabled
8000:2A	Forward Class3 to PLC	Message forwarding to the PLC (Currently not implemented, as of: 10-2016)
8000:2B	Advanced slave options	"Store Category" parameter <ul style="list-style-type: none"> • Bit9=Cat2, • Bit8=Cat1 see Writing the IP address from the PLC [► 19]

6.2.2 Index 0x8001 IO Assembly Settings

Index	Name	Meaning
8001:0	IO Assembly Settings	
8001:1	Assembly Number	Assembly Id
8001:1	Configuration Instance	Configuration instance
8001:3	Configuration Size	Configuration size (always 0)
8001:4	Input Instance (T->O)	Link point for input values (T->O: Target->Originator)
8001:5	Input Size (T->O)	Size of the input values (in bytes)
8001:6	Output Instance (O->T)	Link point for output values (O->T, Originator->Target)
8001:7	Output Size (O-T)	Size of the output values (in bytes)
8001:8	Heartbeat Instance (Listen Only)*	Heartbeat link point (only for monitoring connections)
8001:9	Heartbeat Size (Listen Only)*	always 0
8001:A	Heartbeat Instance (Input Only)**	Heartbeat link point (only for input connections)
8001:B	Heartbeat Size (Input Only)**	always 0
8001:C	Advanced Assembly Options	Bit 14: 0x4000 hex <ul style="list-style-type: none"> • 0 = default • 1 = disables the link between "ConnCtrl" and "ConnState" for the EtherNet/IP IO connection The other bits are always set to 0 (reserved)

* Heartbeat Instance (Listen Only): Enables monitoring of the input data (output data for TF6280) if a connection exists. The "Listen Only" connection is also terminated when the normal connection is terminated.

** Heartbeat Instance (Input Only): Enables reading of the input data (output data for TF6280). This connection is independent of the actual communication.

The heartbeat is necessary for the monitoring of both connection types (Listen Only and Input Only).

6.2.3 Index 0x9000 Slave Info

The current valid settings are displayed here; these can differ from the object 0x8000. The object 0x9000 displays the active parameters.

6.2.4 Index 0x9001 IO Assembly Info

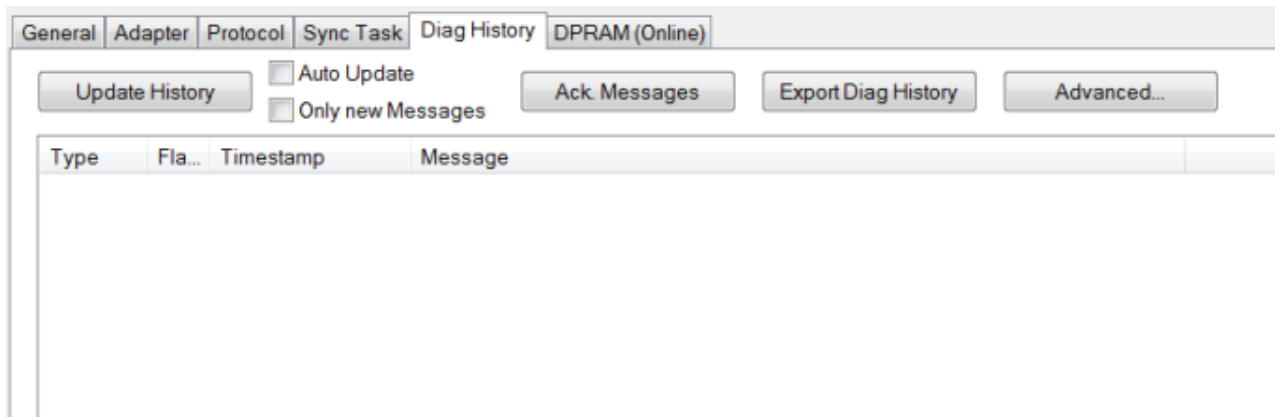
The current valid assembly settings are displayed here; these can differ from the object 0x8001. The object 0x9001 displays the active parameters.

7 Diagnostic history

The diagnostics history is a tool for monitoring the status of the EtherNet/IP interface and displaying the diagnostic messages with timestamps in plain text.

In addition, information / errors that occurred in the past are logged, in order to enable precise troubleshooting at a later stage. This also applies for errors that only occurred for such a short time that any corresponding messages were not visible.

The diagnostic history is part of the TwinCAT system, where it can be found under Devices, EtherNet/IP in the “Diag History” tab.



7.1 Error codes TF6280

Error	Code hex / (decimal)	Description	Remedy/meaning
CN_ORC_ALREADY_USED	0x100 / (256)	Connection already in use	The connection is already established; use another connection or close this one
CN_ORC_BAD_TRANSPORT	0x103 / (259)	Transport type not supported	The transport type is not supported
CN_ORC_OWNER_CONFLICT	0x106 / (262)	More than one guy configuring	A connection already exists; a further connection cannot be established
CN_ORC_BAD_CONNECTION	0x107 / (263)	Trying to close inactive conn	Faulty connection
CN_ORC_BAD_CONN_TYPE	0x108 / (264)	Unsupported connection type	The Connection type is not supported, check your settings.
CN_ORC_BAD_CONN_SIZE	0x109 / (265)	Connection size mismatch	The connection size does not match, check your settings.
CN_ORC_CONN_UNCONFIGURED	0x110 / (272)	Connection unconfigured	Connection was not configured
CN_ORC_BAD_RPI	0x111 / (273)	Unsupportable RPI	The task time usually doesn't match; make sure that the EL6652 operates internally with 1 ms and that you can adjust this with the Cycle Time Multiplier. Otherwise adjust the task time.
CN_ORC_NO_CM_RESOURCES	0x113 / (275)	Conn Mgr out of connections	No further resources are available
CN_ORC_BAD_VENDOR_PRODUCT	0x114 / (276)	Mismatch in electronic key	Wrong vendor number
CN_ORC_BAD_DEVICE_TYPE	0x115 / (277)	Mismatch in electronic key	Wrong device type
CN_ORC_BAD_REVISION	0x116 / (278)	Mismatch in electronic key	Wrong revision number
CN_ORC_BAD_CONN_POINT	0x117 / (279)	Non-existent instance number	Wrong connection number
CN_ORC_BAD_CONFIGURATION	0x118 / (280)	Bad config instance number	Faulty configuration
CN_ORC_CONN_REQ_FAILS	0x119 / (281)	No controlling connection open	Connection could not be established
CN_ORC_NO_APP_RESOURCES	0x11A / (282)	App out of connections	No more free connections available.

If you cannot fix this error yourself, Support will require the following information:

- TwinCAT version and build number and a
- Wireshark recording

Prepare Wireshark recording

The Wireshark recording can be created with a network hub, a network switch with port mirroring, e.g. the Beckhoff ET2000, or with the "Promiscuous Mode" of the TwinCAT system.

General	Adapter	Protocol	Sync Task	Diag History	DPRAM (Online)
<div><input checked="" type="radio"/> Network Adapter</div> <div><input checked="" type="radio"/> OS (NDIS) <input type="radio"/> PCI <input type="radio"/> DPRAM</div> <div><div>Description:</div><div>LAN-Verbindung (Intel(R) Ethernet Connection I218-LM - VirtualBox Br</div></div> <div><div>Device Name:</div><div>\\DEVICE\\{C706CD25-DCCF-42A7-B4B7-81D7E66BD979}</div></div> <div><div>PCI Bus/Slot:</div><div><input type="text"/></div><div>Search...</div></div> <div><div>MAC Address:</div><div>ec f4 bb 1f 7e 88</div><div>Compatible Devices...</div></div> <div><div>IP Address:</div><div>169.254.254.51 (255.255.0.0)</div></div> <div><input checked="" type="checkbox"/> Promiscuous Mode (use with Wireshark only)</div> <div><input type="checkbox"/> Virtual Device Names</div>					
<div><input type="radio"/> Adapter Reference</div> <div><div>Adapter:</div><div><input type="text"/></div></div>					
<div>Freerun Cycle (ms):</div> <div><div>4</div><div><div></div><div></div></div></div>					