



**acontis technologies GmbH**

**SOFTWARE**

**EC-Engineer**

**User Manual**

**Version 4.1**

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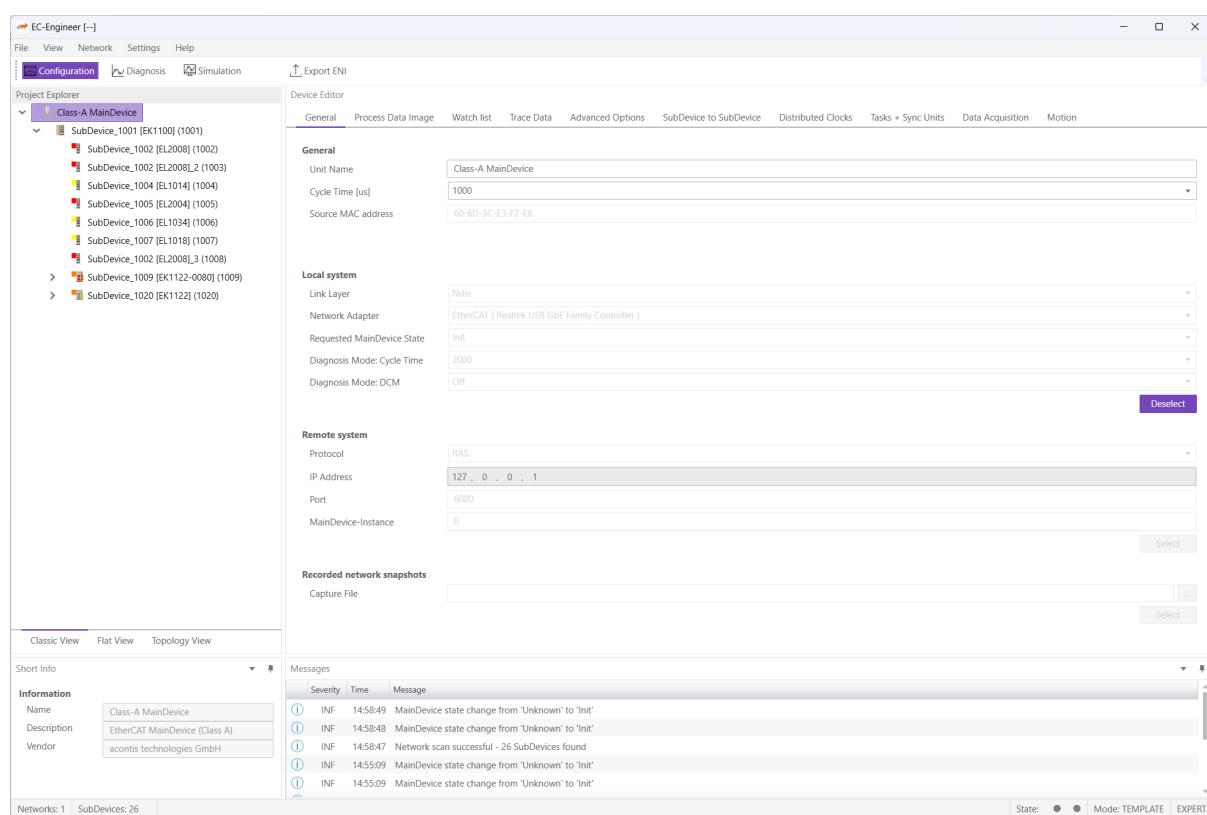
# 1 Introduction

Since this software is not intended to offend any sensibilities, the term MainDevice (abbreviated MainDevice) replaces “master” and SubordinateDevice (abbreviated SubDevice) replaces “slave”.

## 1.1 Overview

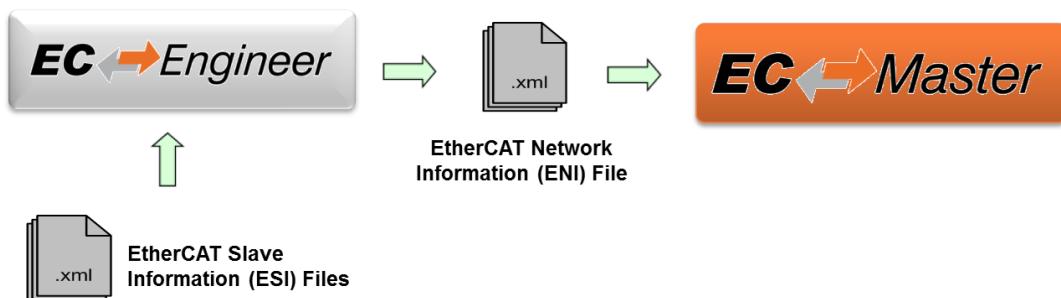
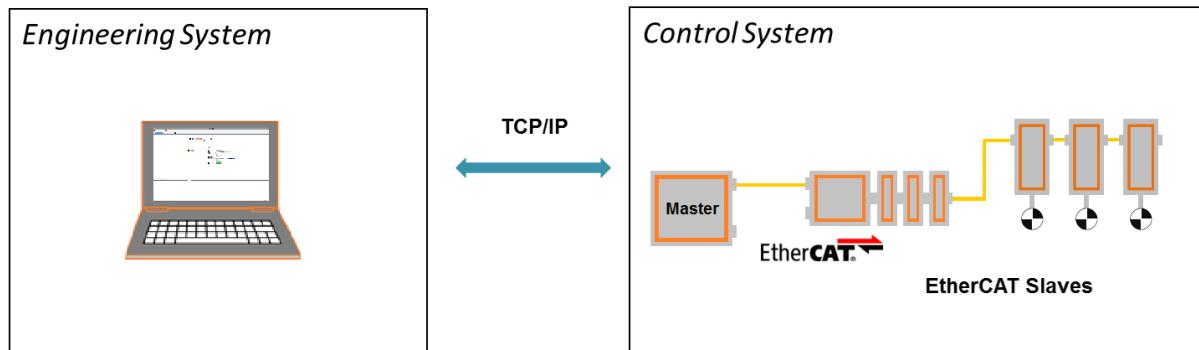
EC-Engineer is a configuration and diagnosis tool for EtherCAT networks that are controlled by the EC-Master.

**The following screenshot shows the EC-Engineer:**



It runs on the Engineering System where the engineer can configure the EtherCAT network. All SubDevices default to settings that match the SubDevice’s typical use case. Complex networks or installations with special requirements need adjustments to the default settings. Using the Configuration Mode, the user can configure his EtherCAT network according to the project’s needs.

**As the result of his work the user can export the EtherCAT Network Information (ENI) file, which is necessary to run the EC-Master on the Control System:**



If he has the possibility to connect his Engineering System to the Control System, he can also scan his existing EtherCAT network. The EC-Engineer will then read the network configuration and add all SubDevices to the project explorer. Now the user can fine tune the network or directly export the ENI file.

If the control system is now running, he can connect to it by using the remote diagnosis functionality and verify that everything is fine by accessing the states, variables, object dictionaries, ESC registers EEPROM data.

## 1.2 Features

The following table shows the features of the EC-Engineer:

General features	Feature ID	Free	Standard	Plus
Classic view	100	✓	✓	✓
Flat view	101	✓	✓	✓
Topology view	102	✓	✓	✓
Multiple Instances	103	✓	✓	✓
Different themes	104	✓	✓	✓
Different Languages	105	✓	✓	✓
Command line interface	106	✓	✓	✓
EMI Manager	107	✓	✓	✓
ESI Manager	108	✓	✓	✓
Expert Mode	109	✓	✓	✓
Edit topology view	110	✓	✓	✓
Offline Diagnosis	111	✗	✓	✓
Unlimited SubDevice Count	112	✗	✓	✓

Configuration features	Feature ID	Free	Standard	Plus
Set up distributed clocks	200	✓	✓	✓
Configure MDP SubDevices	201	✓	✓	✓
Custom PDO mapping	202	✓	✓	✓
Changing name of variables	203	✓	✓	✓
Group support / Hot Connect / Pinned Group	204	✓	✓	✓
EoE Support	205	✓	✓	✓
Startup Commands	206	✓	✓	✓
CoE Object-Dictionary (offline)	207	✓	✓	✓
Enable / disable SubDevice	208	✓	✓	✓
SubDevice to SubDevice	209	✓	✓	✓
Support gateway SubDevices (EL6692, EL6631-0010, ...)	210	✓	✓	✓
Export ENI-File	211	✗	✓	✓
Export Process variables	212	✓	✓	✓
Multiple Cyclic Tasks	213	✗	✓	✓
Import SubDevices from ENI	214	✓	✓	✓
SoE Object-Dictionary (offline)	215	✓	✓	✓
Change revision of SubDevice	216	✓	✓	✓
Scan topology of local system	217	✓	✓	✓
Scan topology of remote system	218	✗	✓	✓
Scan PDO configuration from SubDevice	219	✓	✓	✓
Scan MDP configuration from SubDevice	220	✓	✓	✓
Define project templates	221	✗	✓	✓
Support gateway MainDevices (EL6751, EL6731, ...)	222	✗	✗	✓
EtherCAT P support	223	✓	✓	✓
SubDevice to SubDevice in Cycle	224	✗	✓	✓

Diagnosis features	Feature ID	Free	Standard	Plus
Watch list with export	300	✓	✓	✓
ESC Register	301	✓	✓	✓
FoE support	302	✗	✓	✓
DC Diagnosis	303	✓	✓	✓
Extended Diagnosis	304	✓	✓	✓
Trace Data Variables	305	✓	✓	✓
EoE endpoint support	306	✗	✓	✓
Export CoE Object-Dictionary	307	✓	✓	✓
Local System with Windows MainDevice	308	✓	✓	✓
Remote System via RAS-Client	309	✗	✓	✓
Reading count of SubDevices or frames	310	✓	✓	✓
Compare configured and found SubDevices	311	✓	✓	✓
See value of variables in a list view or chart view	312	✓	✓	✓
Changing value of a variable	313	✓	✓	✓
Reading/Writing values (CoE OD)	314	✓	✓	✓
EEPROM Reading/Writing values	315	✗	✓	✓
Reading error or frame counters	316	✓	✓	✓
Diagnosis History of MainDevice or SubDevice	317	✓	✓	✓
Reading/Writing values (SoE OD)	318	✓	✓	✓

## 1.3 Supported SubDevices of Beckhoff EL6xxx

The following table shows the supported SubDevices of Beckhoff EL6xxx in the EC-Engineer:

Name	Free	Standard	Plus
EL6001 Interface (RS232)	✓	✓	✓
EL6002 Interface 2Ch. (RS232)	✓	✓	✓
EL6021 Interface (RS422/485)	✓	✓	✓
EL6021-0021 Interface (RS422/485 line device)	✓	✓	✓
EL6022 Interface 2Ch. (RS422/485)	✓	✓	✓
EL6080 EtherCAT Memory Terminal (128kB)	✓	✓	✓
EL6224 / EP6224 IO-Link Gateway	✓	✓	✓
EP6228 / EPP6228 IO-Link Gateway	✓	✓	✓
EL6601 1 Port Switch (Ethernet, CoE)	✓	✓	✓
EL6614 4 Port Switch (Ethernet, CoE)	✓	✓	✓
EL6631-0010 PROFINET IO Device	✓	✓	✓
EL6633-0010 PROFINET IO Device	✓	✓	✓
EL6690 EtherCAT Bridge terminal (Primary)	✓	✓	✓
EL6690 EtherCAT Bridge terminal (Secondary)	✓	✓	✓
EL6692 EtherCAT Bridge terminal (Primary)	✓	✓	✓
EL6692 EtherCAT Bridge terminal (Secondary)	✓	✓	✓
EL6695 EtherCAT Bridge terminal (Primary)	✓	✓	✓
EL6695 EtherCAT Bridge terminal (Secondary)	✓	✓	✓
EL6731 PROFIBUS DP MainDevice	✗	✗	✓
EL6731-0010 PROFIBUS DP SubDevice	✓	✓	✓
EL6751 CANopen MainDevice	✗	✗	✓
EL6751-0010 CANopen SubDevice	✗	✗	✓
EL6752 DeviceNet MainDevice	✗	✗	✓
EL6752-0010 DeviceNet SubDevice	✗	✗	✓

Not listed devices are not supported.

## 1.4 Requirements

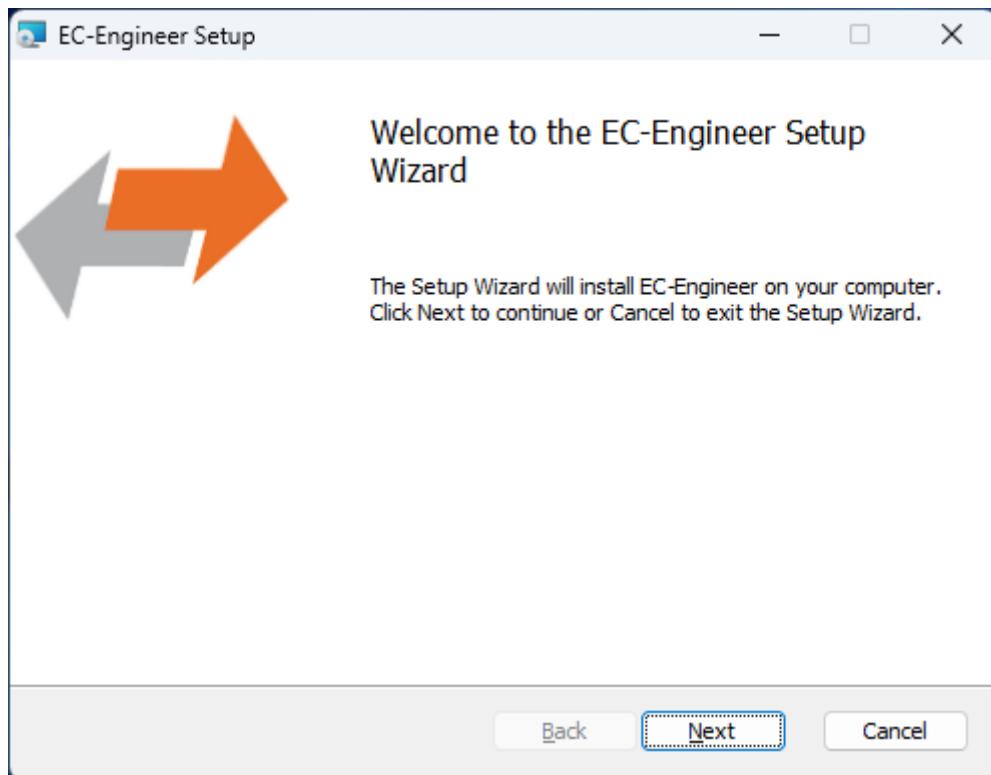
- Microsoft Windows 10 and above
- Microsoft .NET Framework 4 Client Profile
- Screen resolution at least 1024x768 pixel
- Memory as recommended for operating system
- Disk space approximately 80 MB (depend on number of ESI files)

## 2 Installation

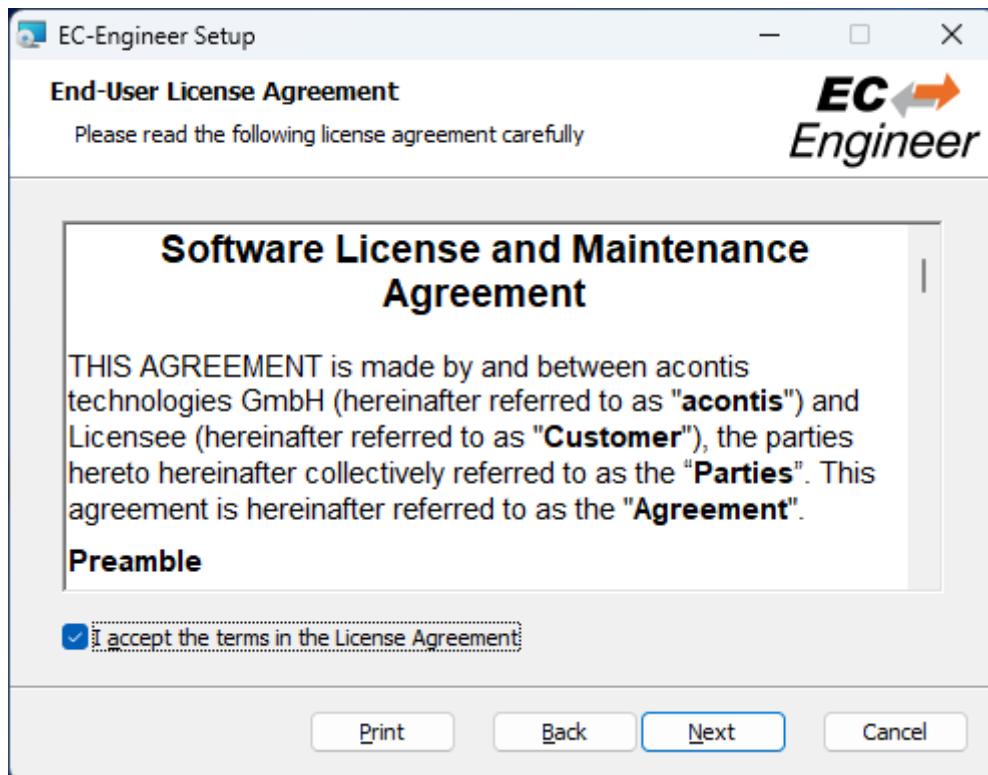
### 2.1 Setup Process

The EC-Engineer can be installed by executing the `setup.exe` (requires administrator privileges) and follow the screen instructions:

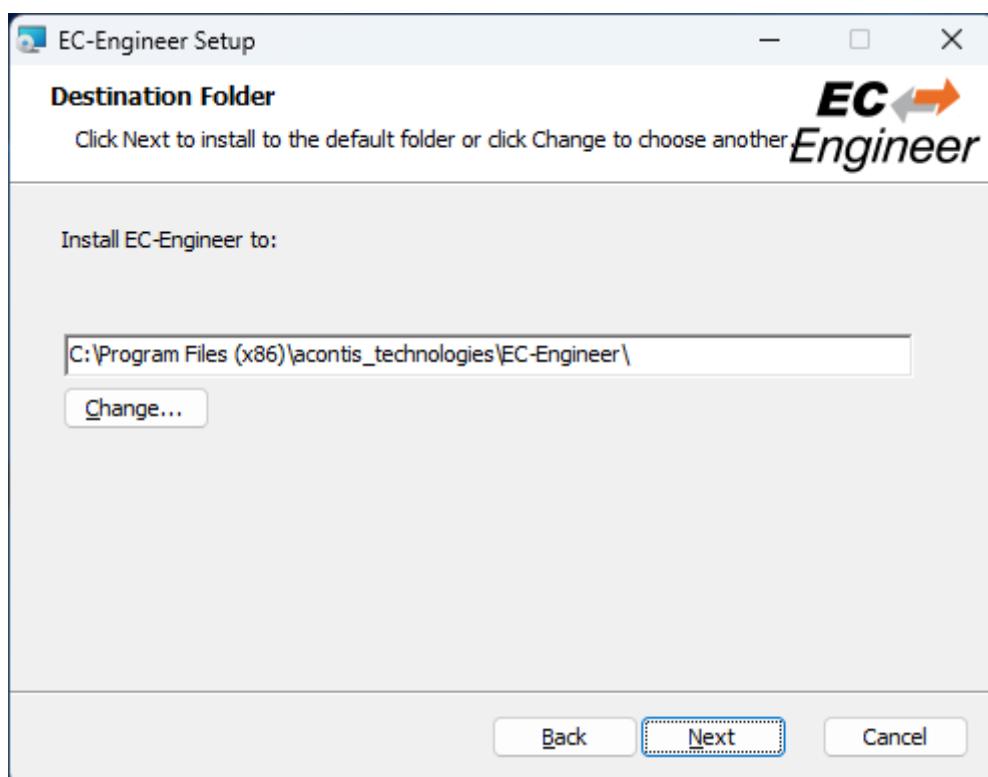
Welcome page:



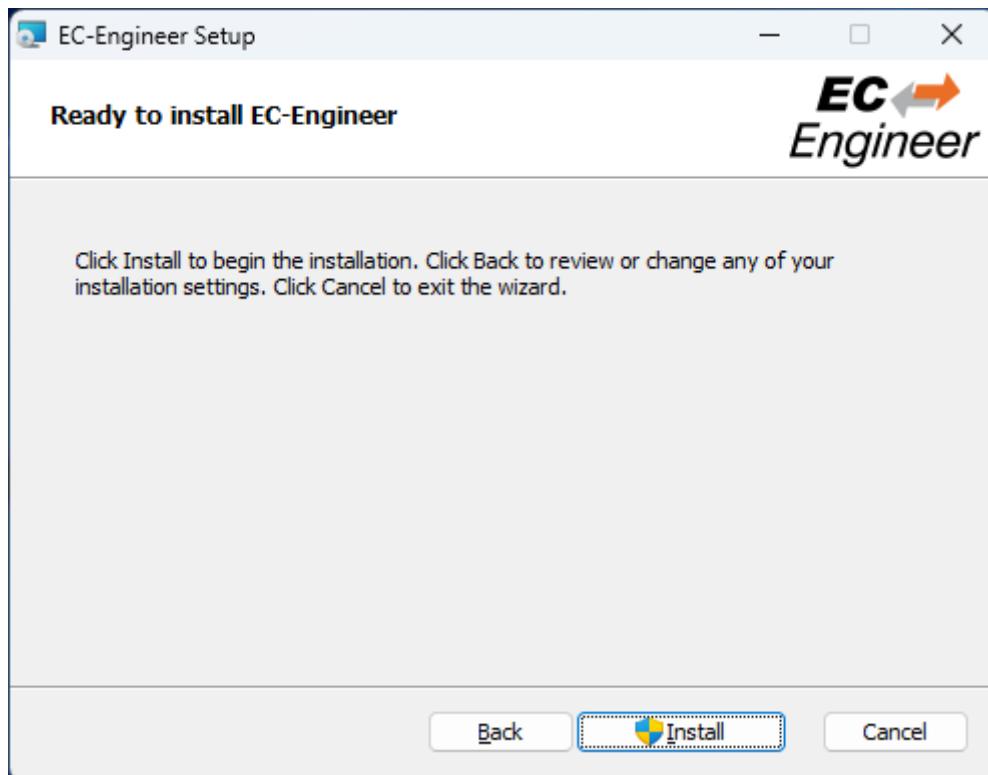
License Agreement:



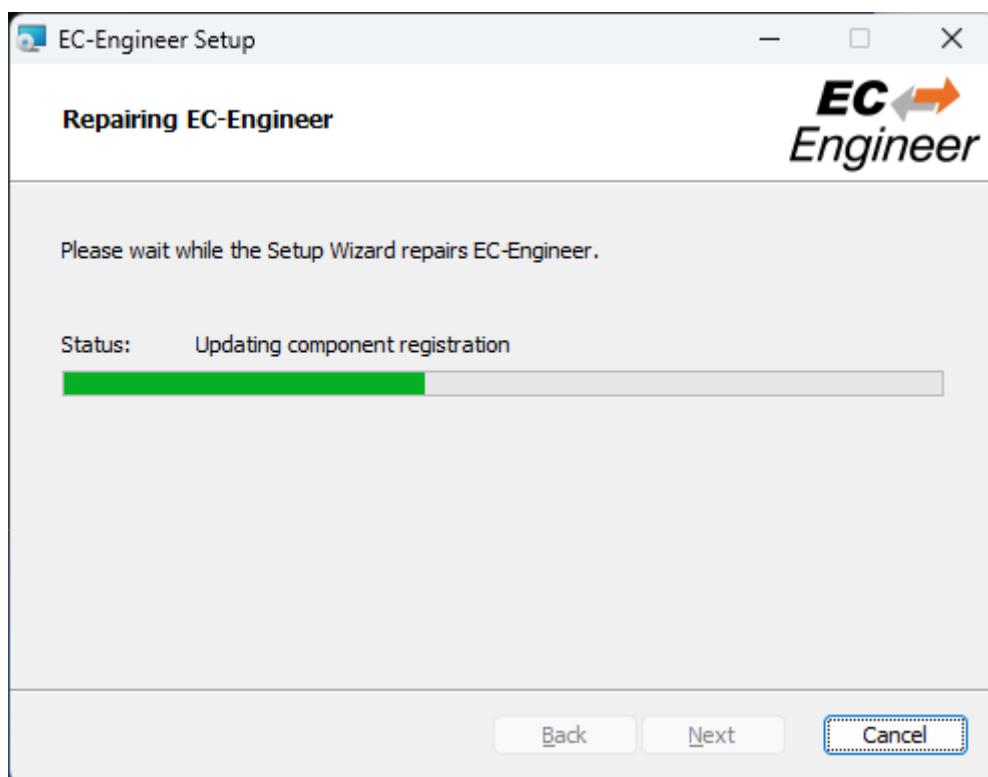
Select Installation Folder:



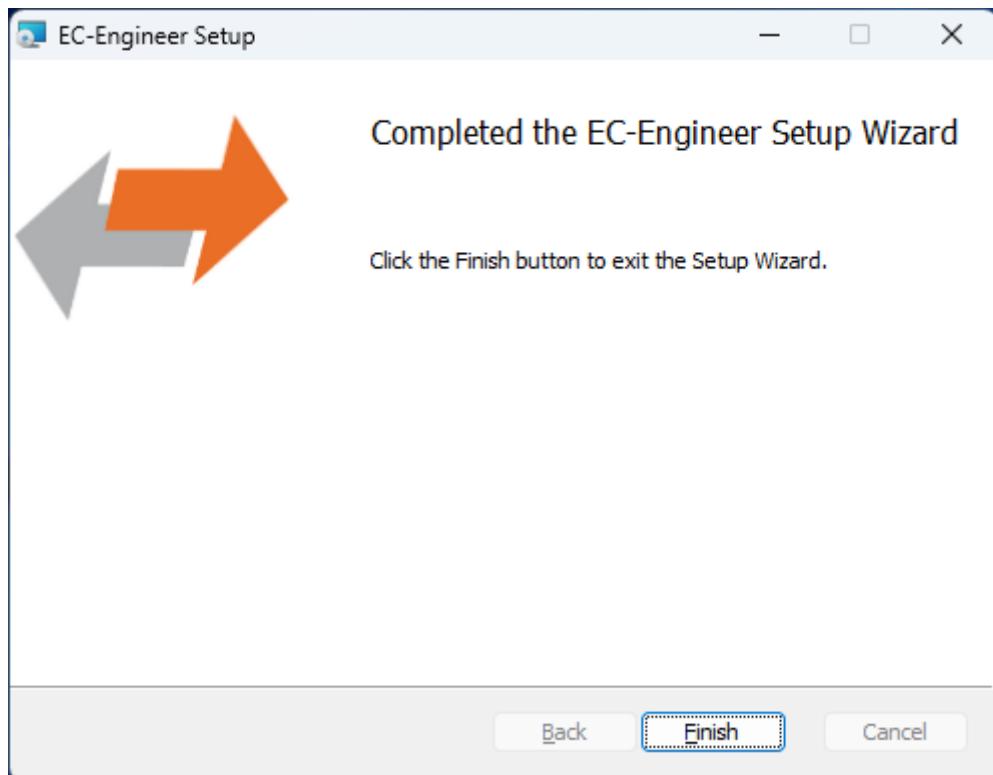
Confirm Installation:



Installing:



Installation Complete:



## 2.2 Silent Installation (optional)

The EC-Engineer can be also installed in silent mode by using the command line parameters of `msiexec`.

Sample 1: Installs EC-Engineer into default installation folder

```
PS C:
  > msiexec /i c:/temp/ECEngineerSetup.msi /quiet /qn /norestart /log
  ↵ c:/temp/install.log
```

Sample 2: Installs EC-Engineer into “C:/EC-Engineer”

```
PS C:
  > msiexec /i c:/temp/ECEngineerSetup.msi /quiet /qn /norestart /log
  ↵ c:/temp/install.log INSTALLLOCATION="C:/EC-Engineer"
```

For more information please refer command line parameters of `msiexec`.

---

**Note:** The system requirements (see section “1.3”) will be not checked!

---

## 2.3 File and Folder Structure

The setup process will copy all necessary files into the following folder:

**Installation directory:**

```

/Doc
    Release notes and the user manual

/EEC
    Files for mapping emergency error codes

/Languages
    Lanugage specific files

/
    • EC-Engineer.exe
    • EcWrapper.dll
    • ...

```

**All users directory:** ( %ALLUSERSPROFILE%/EC-Engineer, like C:/ProgramData/EC-Engineer)

```

/CAPTURE
    Capture files which can be analysed in offline diagnosis mode (see Capture File)

/EMI
    EtherCAT MainDevice Information files

/EtherCAT
    EtherCAT SubDevice Information (ESI) Files. Can be modified via ESI-Manager

/
    • ESICache.xml (ESI-File-Cache for faster access of ESI files)

        – EC-Engineer.log (Log File)
        – User.myusername.xml (User specific settings)

```

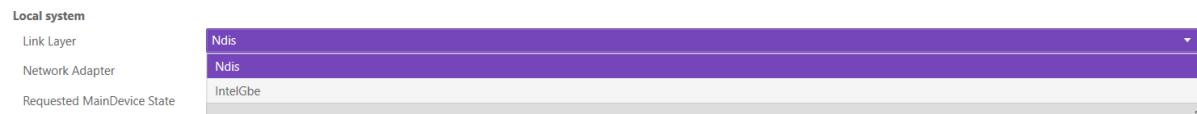
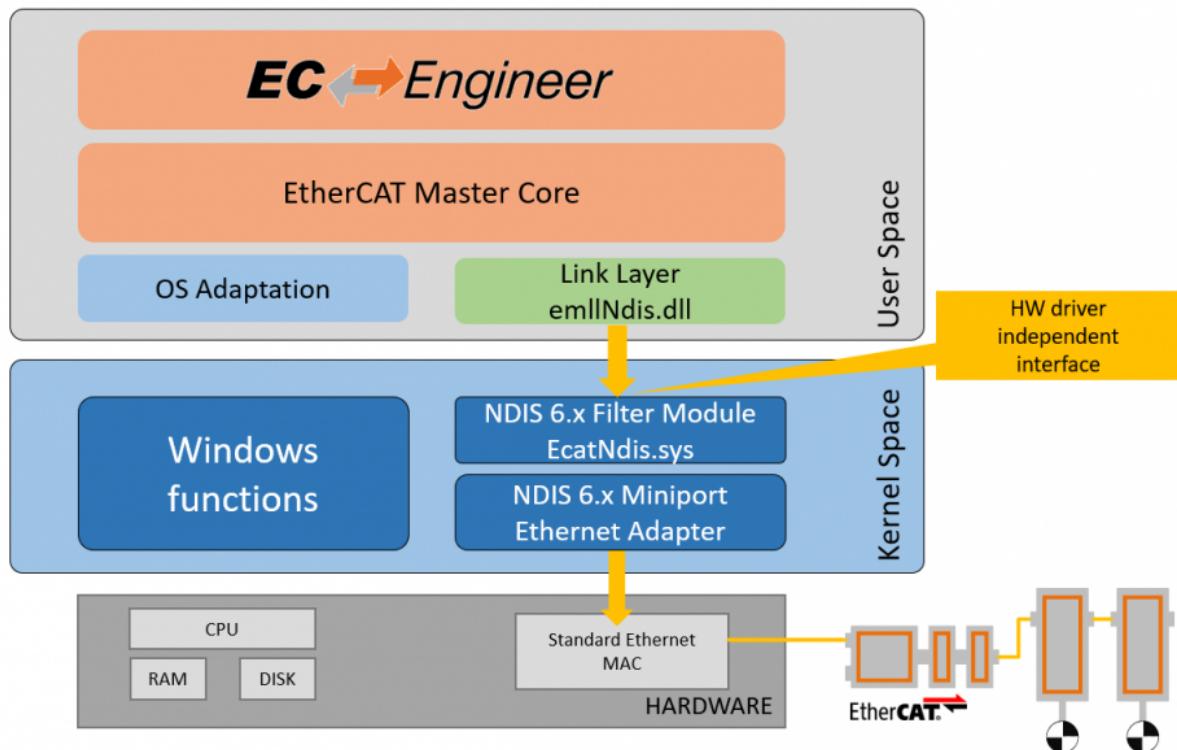
## 2.4 NDIS Driver

The Network Driver Interface Specification (NDIS) is the specification for a network driver architecture that allows transport protocols like TCP/IP to communicate with an underlying physical network adapter. For sending and receiving EtherCAT frames in Windows, EC-Engineer makes use of the well-known Windows packet capture library, WinPcap. However, WinPcap was based on the NDIS 5.x driver model, and development has ceased. The latest versions of Windows 10 do not support this old NDIS 5.x version anymore, so now EC-Engineer (V3.2 and higher) includes an installation package in the install directory of EC-Engineer to install the acontis NDIS 6.x Filter Module `EcatNdis.sys`. With this new Filter Module and the new NDIS Link Layer `em11Ndis.dll`, it is now possible for EC-Engineer to work without WinPcap on all Windows 10 versions.

---

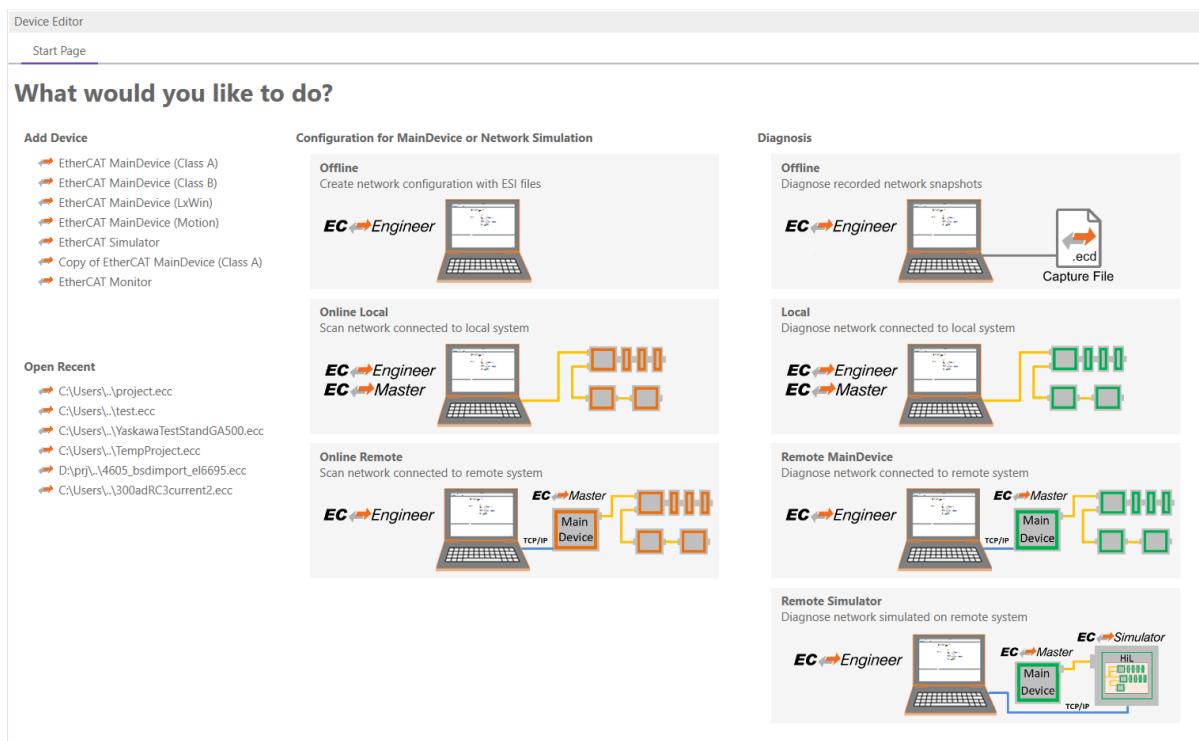
**Note:** Please restart EC-Engineer after the NDIS installation.

---



## 3 Getting Started

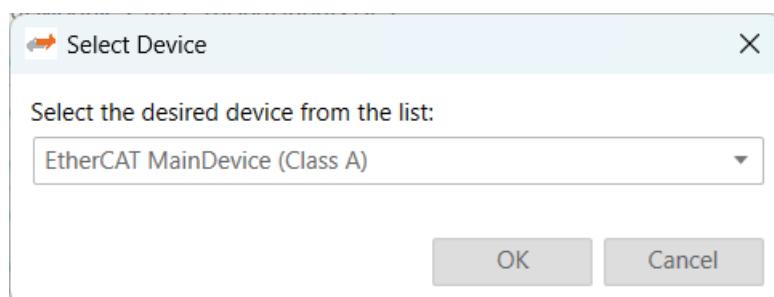
For a better usability, the product comes up with a start page, where the user can choose what he wants to do:



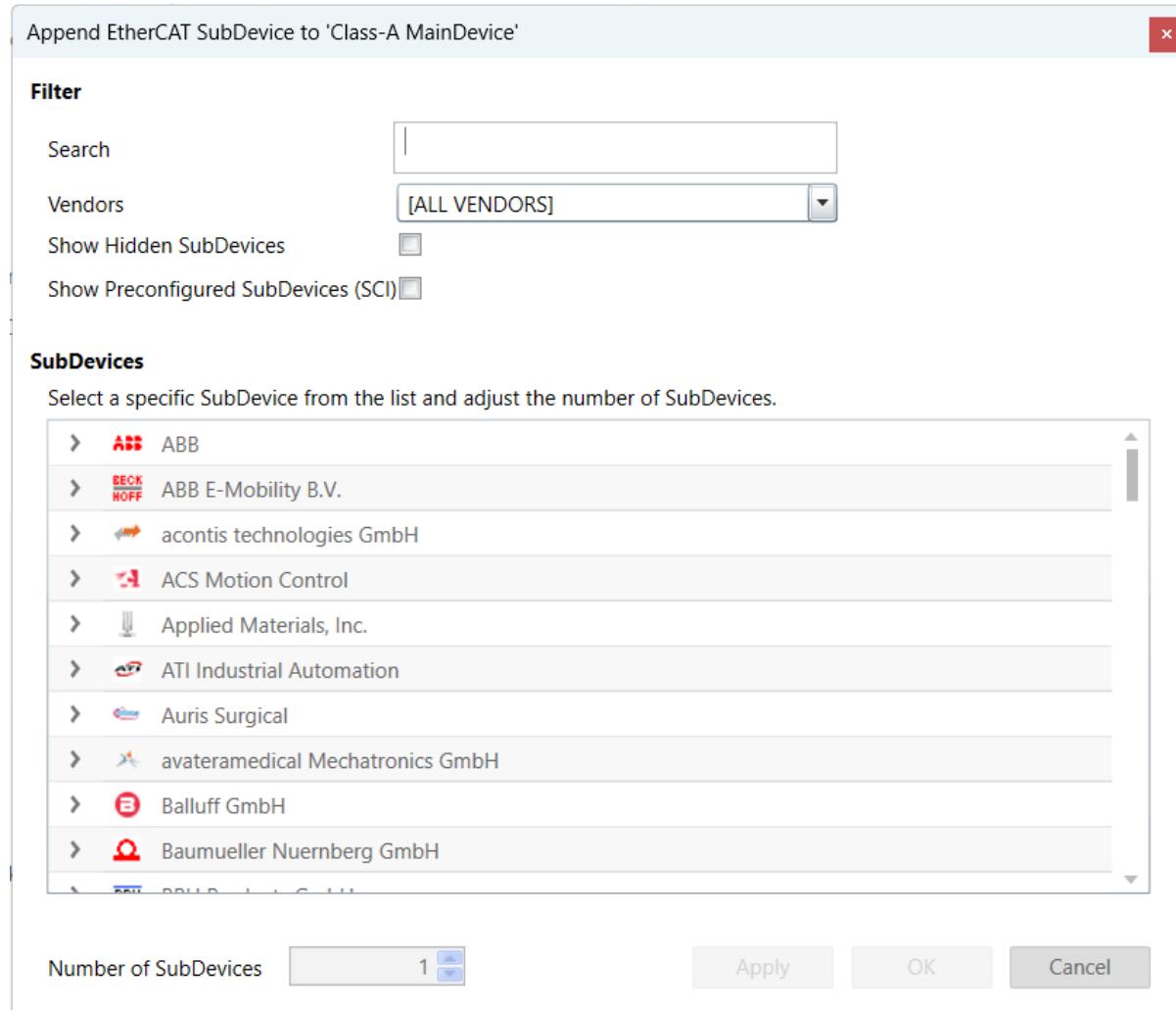
### 3.1 Offline (Configuration)

This mode is for configuring the EtherCAT network in the office by manually adding SubDevices to the network.

If the user clicks on this link he will see first the **Select MainDevice Dialog** for choosing the desired MainDevice (at the moment he can choose between Class A and Class B MainDevice):



Afterwards he will see the **SubDevice Select Dialog**, where he can configure his EtherCAT network:

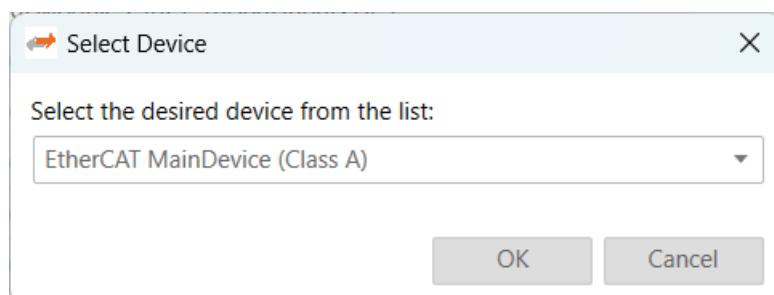


If you can not find your SubDevice or if you want to use your own ESI file, you can edit this list by using the *ESI-Manager*. After configuring the network you can select the *network* node and use the *Export ENI* button for generating an ENI file.

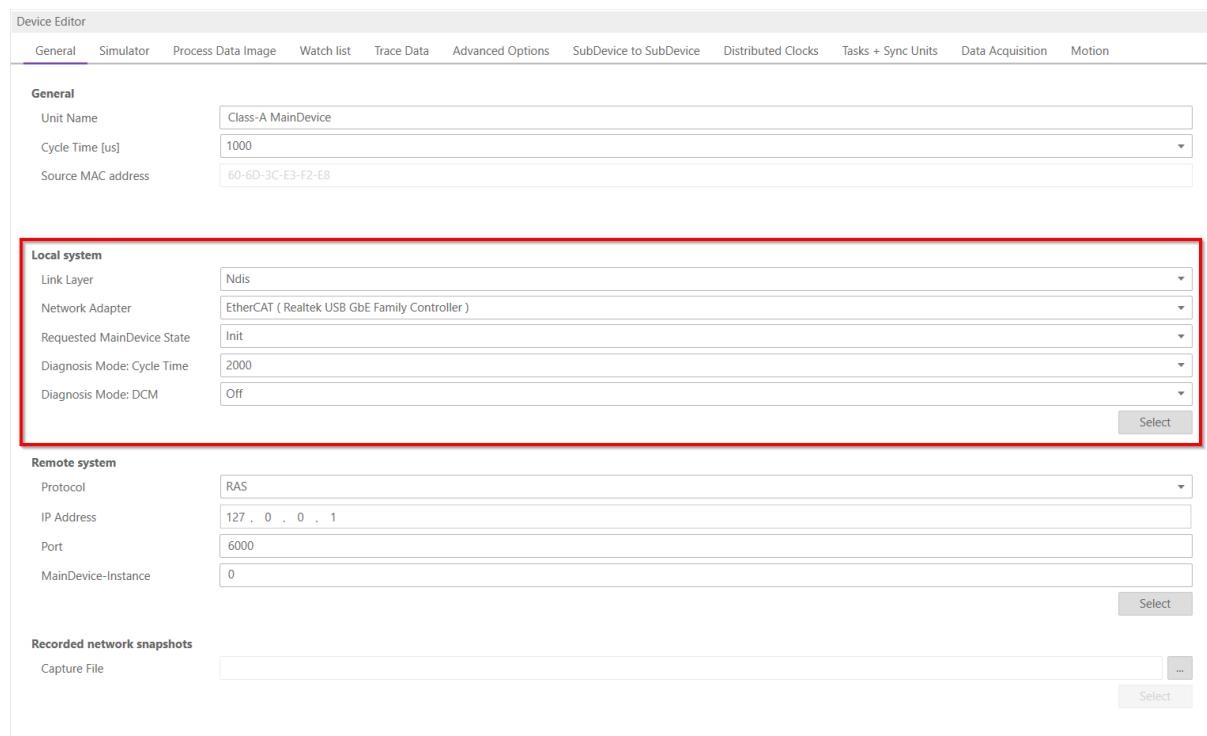
## 3.2 Online Local

This mode can be used if SubDevices are connected to the Engineering System by scanning the EtherCAT network configuration.

**If user clicks on this link he will see first the *Select MainDevice Dialog* for choosing the desired MainDevice (at the moment he can choose between Class A and Class B MainDevice):**



Afterwards he will see the **General-Tab**, where he can choose the network adapter which is connected to the control system:



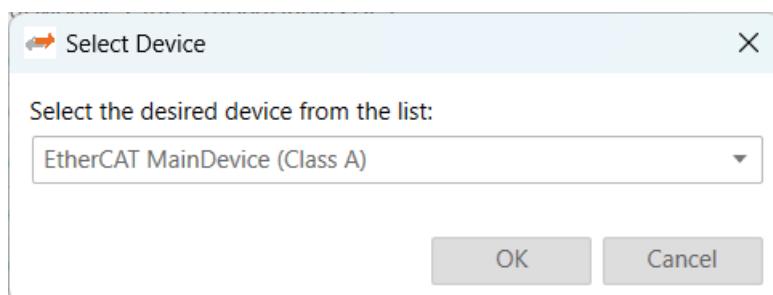
After selecting the network adapter, the EC-Engineer scans the control system and adds the network configuration to the project explorer. Here the user can adjust the configuration or use the *Export ENI* button for generating directly an ENI file.

**Note:** Please make sure that the selected network adapter is connected to the EtherCAT SubDevices.

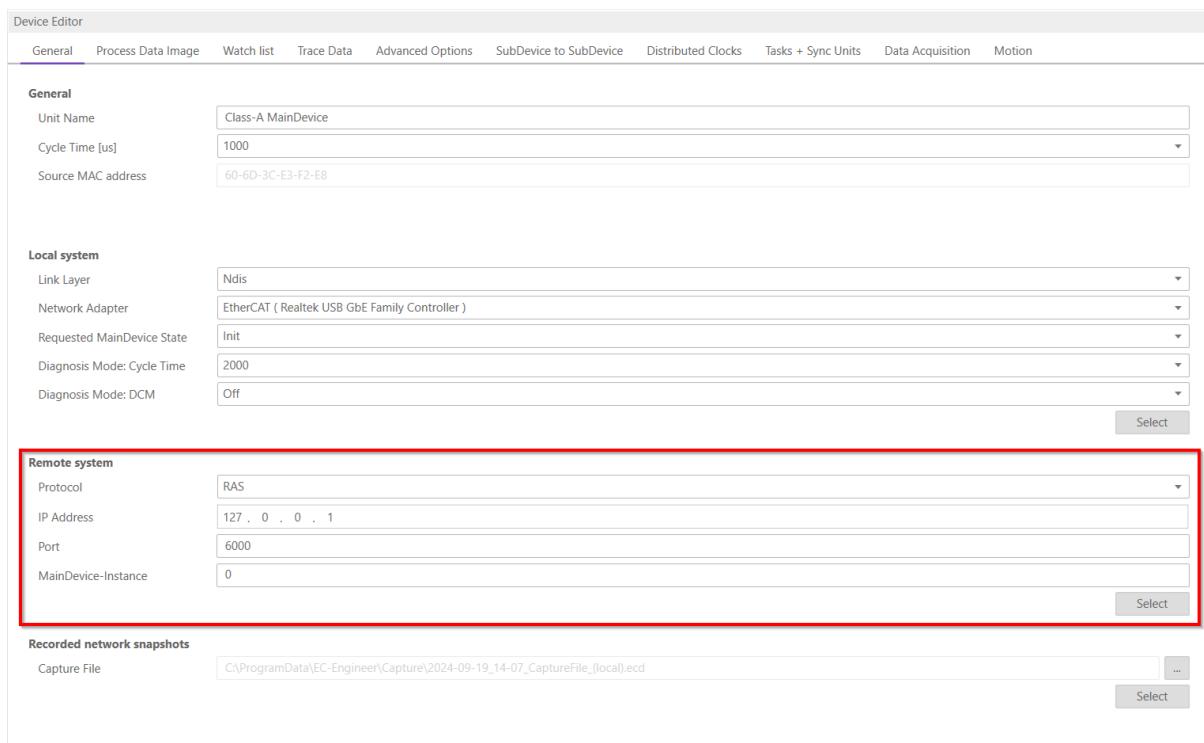
### 3.3 Online Remote

This mode can be used if SubDevices are connected to the control system. Means user can connect via TCP/IP to the control system if EC-Master RAS (remote access service) server is running and scan the EtherCAT network configuration.

If user clicks on this link he will see first the **Select MainDevice Dialog** for choosing the desired MainDevice (at the moment he can choose between Class A and Class B MainDevice):



Afterwards he will see the **General-Tab**, where he can enter the IP address of the remote system (and if necessary change the port and the MainDevice-instance, but normally this should not be necessary):

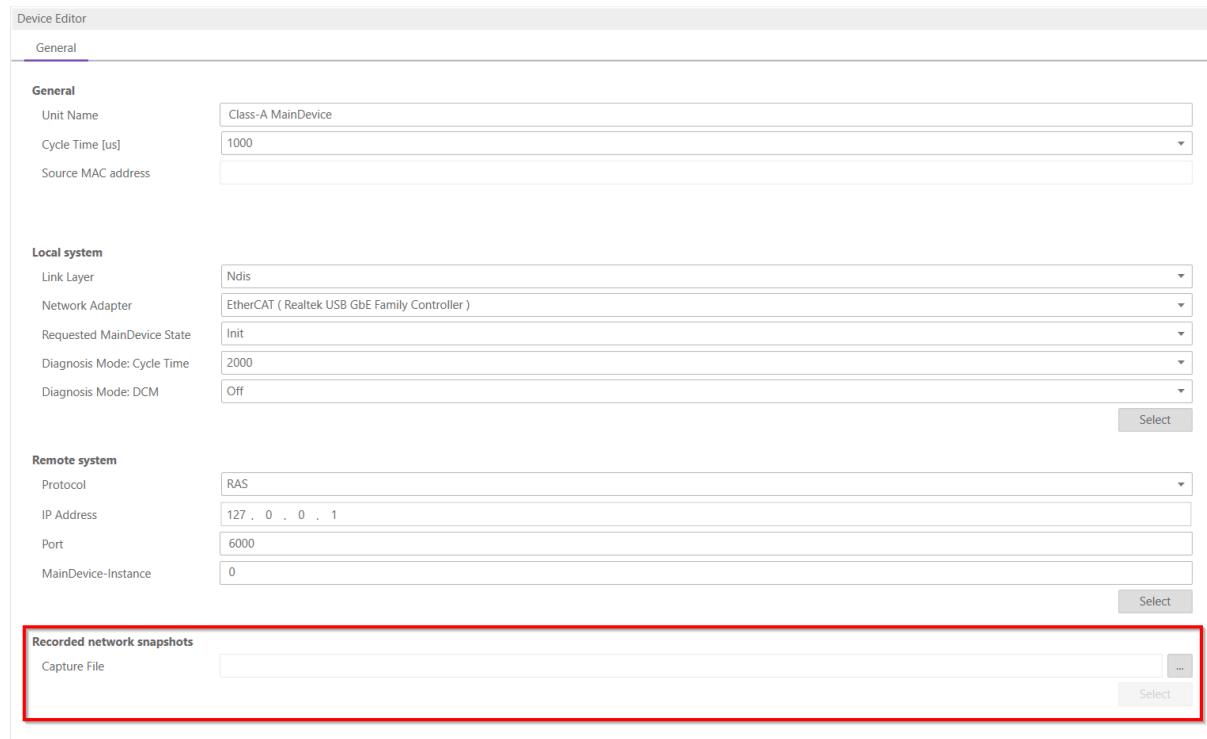


After entering the IP address, a click to *Select* tells the EC-Engineer to connect to and scan the remote system. The EC-Engineer adds all SubDevices of the network configuration to the project explorer. Here the user can adjust the configuration or use the *Export ENI* button for generating directly an ENI file.

## 3.4 Offline Diagnosis

This mode should be used if the user wants to analyse a previously created capture file. This can be done offline, which means that the “real system” no not necessary.

If user clicks on this link he will see the **General-Tab**, where he can enter the path to the capture, which contains one or more previously taken snapshots:

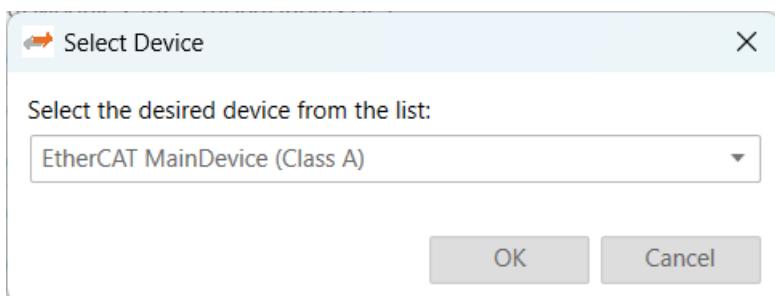


After choosing the path to the capture file, a click to *Select* switches the EC-Engineer into Diagnosis Mode. Now, the user can analyse the previously taken snapshots of a EtherCAT system.

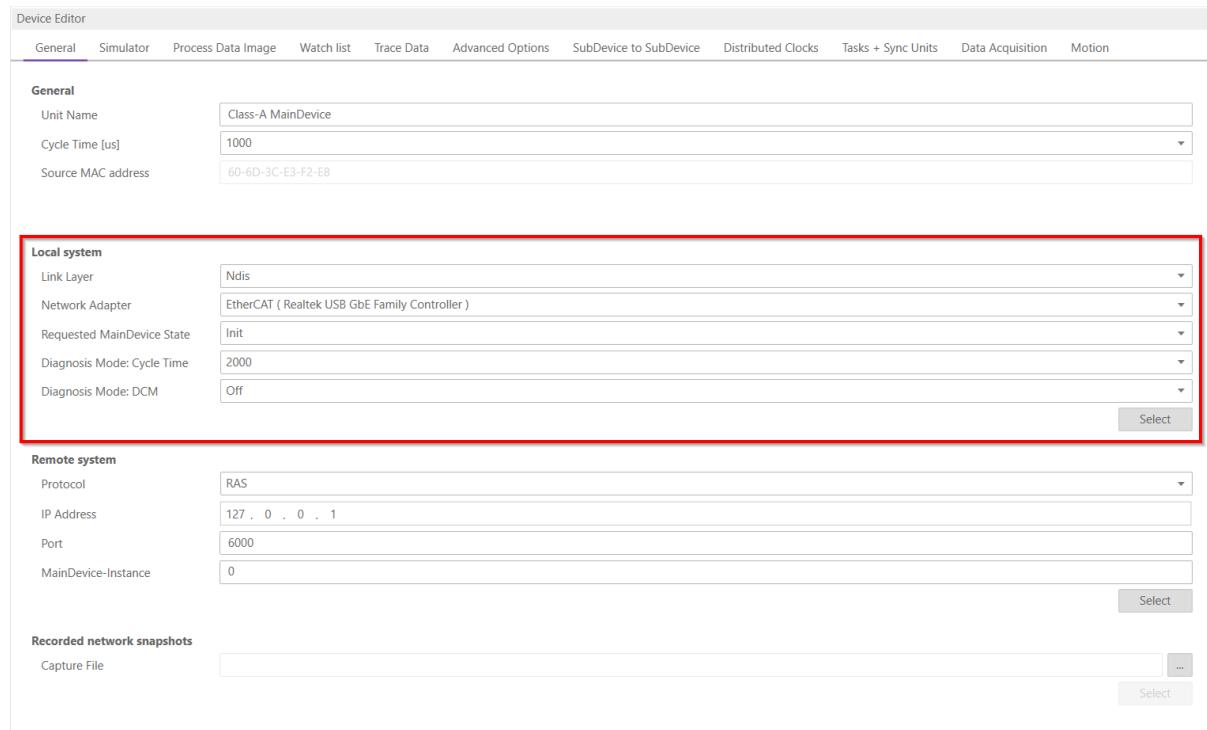
### 3.5 Local

This mode should be used to diagnose the network, connected to the local system.

**If user clicks on this link he will see first the *Select MainDevice Dialog* for choosing the desired MainDevice (at the moment he can choose between Class A and Class B MainDevice):**



Afterwards he will see the *General-Tab*, where he can choose the network adapter which is connected to the control system:



After selecting the network adapter, the EC-Engineer scans the control system and is starting the diagnosis mode.

## 3.6 Remote MainDevice

This mode can be used if SubDevices are connected to the control system. Means user can connect via TCP/IP to the control system if EC-Master RAS (remote access service) server is running and diagnose the remote EtherCAT network.

**If user clicks on this link he will see the *General-Tab*, where he can enter the IP address of the remote system (and if necessary change the port and the MainDevice-instance, but normally this should not be necessary):**

Device Editor

General   Process Data Image   Watch list   Trace Data   Advanced Options   SubDevice to SubDevice   Distributed Clocks   Tasks + Sync Units   Data Acquisition   Motion

**General**

Unit Name	Class-A MainDevice
Cycle Time [us]	1000
Source MAC address	60-6D-3C-E3-F2-E8

**Local system**

Link Layer	Ndis
Network Adapter	EtherCAT ( Realtek USB GbE Family Controller )
Requested MainDevice State	Init
Diagnosis Mode: Cycle Time	2000
Diagnosis Mode: DCM	Off

**Remote system**

Protocol	RAS
IP Address	127 . 0 . 0 . 1
Port	6000
MainDevice-Instance	0

**Recorded network snapshots**

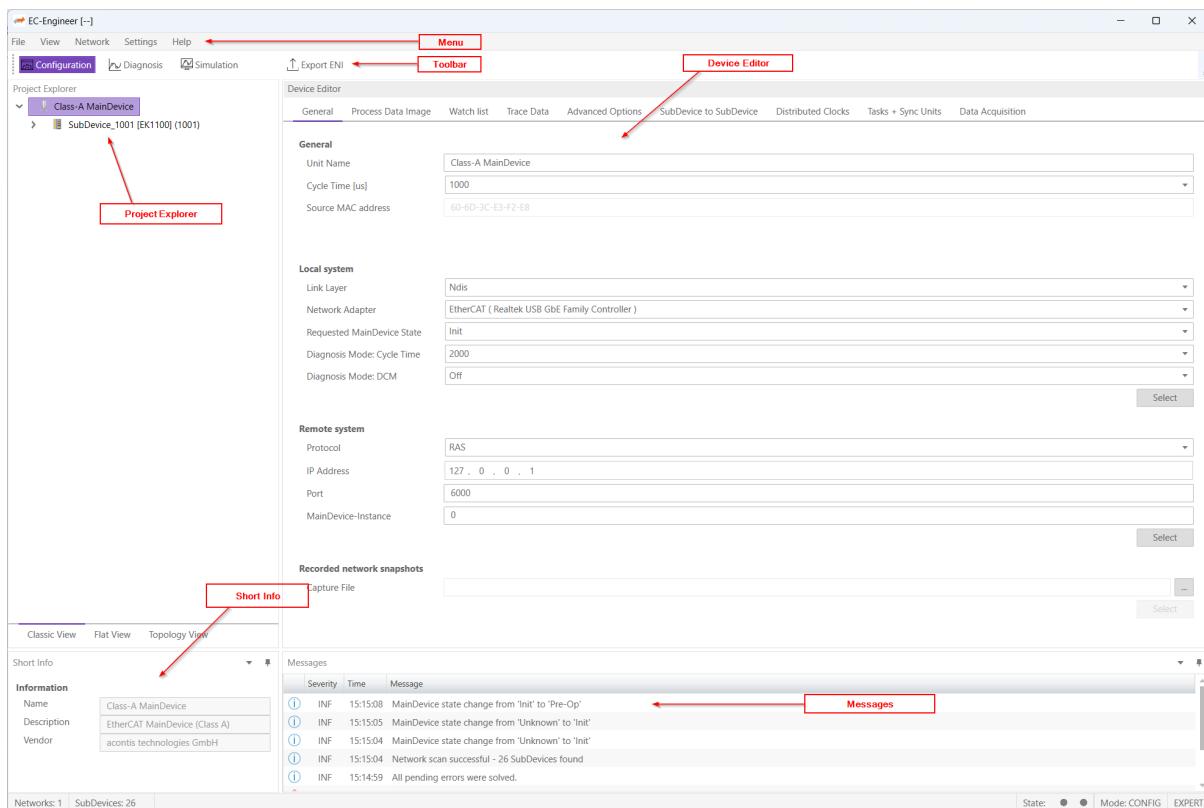
Capture File	C:\ProgramData\EC-Engineer\Capture\2024-09-19_14-07_CaptureFile_(local).ecd
--------------	---

**Select**

## 4 Graphical user interface

### 4.1 Overview

This section gives an overview about the graphical user interface:



The graphical user interface is divided into five parts:

#### Menu/Tool/Status bar:

Shows current status or mode of the EC-Engineer and allows the user to change it.

#### Project Explorer:

Shows different views of the current network configuration

#### Device Editor:

Show information about the selected device, like process variables.

#### Short Info:

Show short information about selected device, like name, description or vendor.

#### Messages:

Shows notifications which occur e.g. when the EtherCAT Device has changed its operation state or a SubDevice has been removed from (or added to) the EtherCAT network.

## 4.2 Menu/Tool/Status bar

### 4.2.1 File

**New / Open / Save / Save As / Print:**

Start new configuration or open/save/print existing configuration

**Add MainDevice:**

**Add a new MainDevice-Unit to the configuration. At the moment we have five MainDevice:**

- EtherCAT MainDevice (Class A)
- EtherCAT MainDevice (Class B)
- EtherCAT MainDevice (LxWin)
- EtherCAT MainDevice (Motion)
- EtherCAT Simulator

**ESI-Manager:**

Add, delete or export ESI and SCI files (see: [ESI-Manager](#))

**EMI-Manager:**

Add, delete or modify EMI files (see: [EMI-Manager](#))

**Recent Projects:**

Open recent project

**Exit:**

Closes the EC-Engineer

### 4.2.2 View

**Message Window:**

Shows/Hides the message window

**Short-Info Window:**

Shows/Hides the short-info window

**Expert Tabs:**

(De-)Activates expert mode

**Simulator Tabs:**

(De-)Activates simulator mode

**Motion Tabs:**

(De-)Activates motion mode

**Refresh:**

Updates the current view

### 4.2.3 Network

**Scan EtherCAT Network:**

Scans the connected network for SubDevices

**Edit Topology:**

Opens a dialog to change the current topology of the project and a bus merge is possible (for more information see [EoE Endpoint Configuration](#))

**Export ENI File / Export ENI Variants / Import ENI File / Export EXI File / Process Variables / EEPROM File**

Creates an ENI file, or ENI variants (see [Export ENI Variants](#)) / imports an ENI file or export the process variables or the eeprom to a file

**Network Mismatch Analyzer (active only in diagnosis mode):**

Compares the configured SubDevices with the connected SubDevices. See [Network Mismatch Analyzer](#)

**Line Crossed Analyzer (active only after scan):**

Shows wrong connected SubDevices. See [Line Crossed Analyzer](#)

**Inspection Report (active only in diagnosis mode):**

Opens a statistic about the state of the network. Collects some useful data like error counters and so on. Possibility to print a PDF. See [Inspection Report](#)

**Hardware Diagnostics:**

Enables or disables the additional hardware diagnostics and warnings in project explorer.

**Acknowledge all warnings (active only in diagnosis mode):**

Clears the yellow warning icon of all SubDevices

**Clear Error Counters (active only in diagnosis mode):**

Clears the error counters of all connected SubDevices (for more information about the extended diagnosis, see [Extended Diagnosis](#))

**Self Test Scan:**

Executes a self test routine for EC-Master and the network (for more information about the Self Test Scan, see [Self Test Scan](#))

**Rescue Scan:**

Executes the rescue scan. Can help if frames get lost with a switch for example

**Take Snapshot:**

Takes a snapshot from the current diagnosis state and saves it into a capture file (for more information about the snapshots and capture files, see [Capture File](#))

**Automatic Snapshot Mode:**

Activates the automatic snapshot mode to take snapshots based on the configured rules

**Snapshot:**

Changes the active snapshot

**EoE Endpoint Configuration (active only for local or remote system):**

Activates EoE Endpoint support in diagnosis mode

## 4.2.4 Settings

**Message Level:**

Change the current message level

**Project Template:**

Shows project template settings dialog

**Settings:**

Shows more settings in the dialog *Settings*

## 4.2.5 Help

**Show User Manual:**

Shows this user manual

**Show Log File:**

Shows the log file

**Check for updates:**

Enable / disable automatic update check (once per month). Also a manual update check is performed on activation.

**About ...:**

Show the about dialog

## 4.3 Project Explorer

### 4.3.1 Drag and Drop

It is possible to drag and drop files here to import/open them

**Project file**

Opens the configuration stored in the ECC, only one project file can be imported at a time.

**ESI files**

Adds the files to the ESI-Manager, it only allows ESI, SCI and ZIP files, multiple files are allowed.

**The context menu of one or more selected SubDevices has the following entries:**

**Append SubDevices:**

Appends a new SubDevices

**Remove SubDevices:**

Deletes the selected SubDevices

**Cut/Copy/Paste:**

Extended clipboard operations, which should help the user to move or multiply existing SubDevice definitions.

**Enable SubDevices:**

Appends disabled SubDevices to the process image at the previous position. If this is not possible, the SubDevice will be marked as “not connected” and the user can append the SubDevice by using “cut” & “paste”.

**Disable SubDevices:**

Removes the SubDevices from process image and from the exported ENI file, but keeps the SubDevice as “disabled” in the project.

**Reload ESI data:**

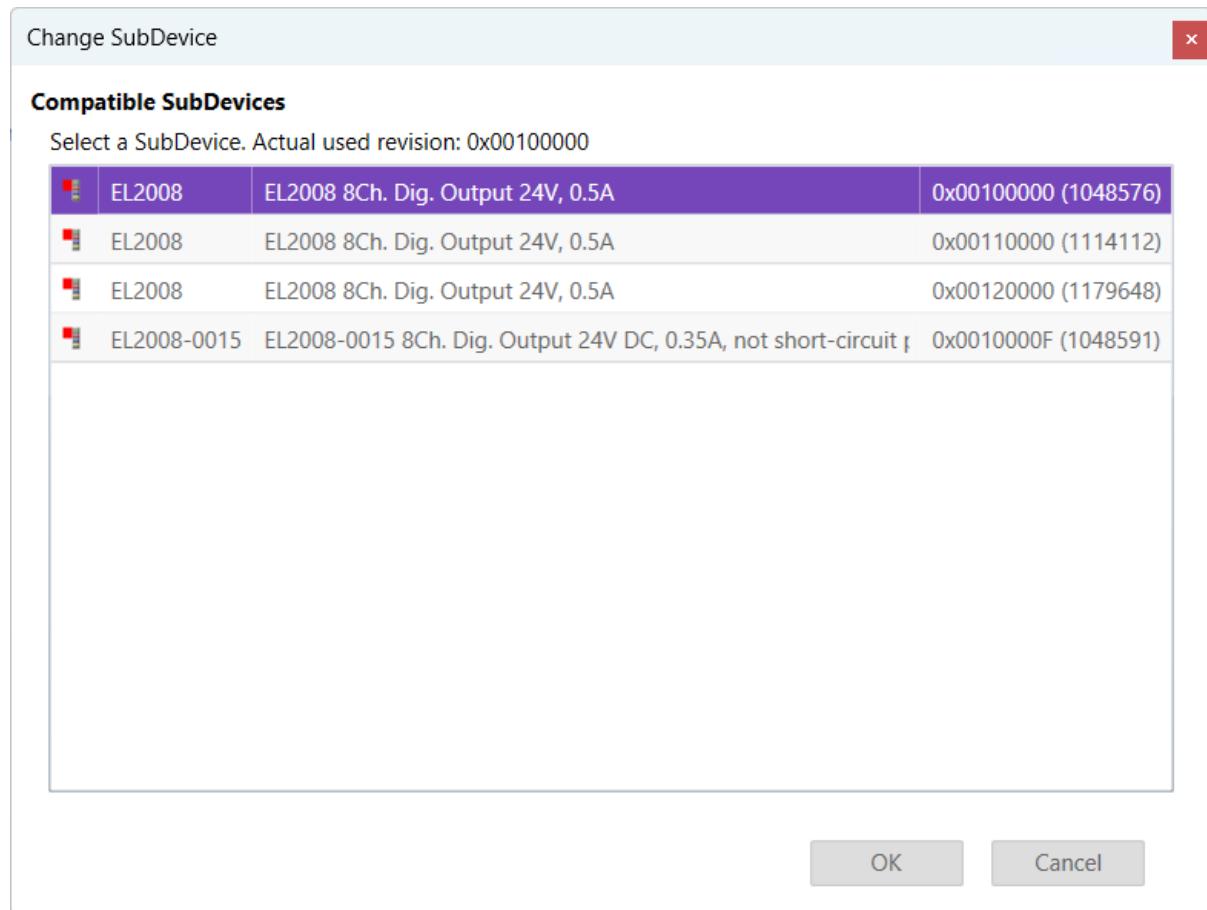
Reloads ESI data which are stored in the project file from global ESI cache (after adding a SubDevice to the project the ESI data will be stored in the project file).

**Export SCI:**

Exports a SCI file. A SCI file is like an ESI file but preconfigured. So it is possible to create a fixed SubDevice which can be added to the configuration and is working out of the box.

**Change SubDevice:**

Opens the following dialog, where the user can select a compatible SubDevice (this is helpful, if the user wants to update the SubDevice to a new revision and keeps his configuration). This is also used to change from an ESI to a SCI file.

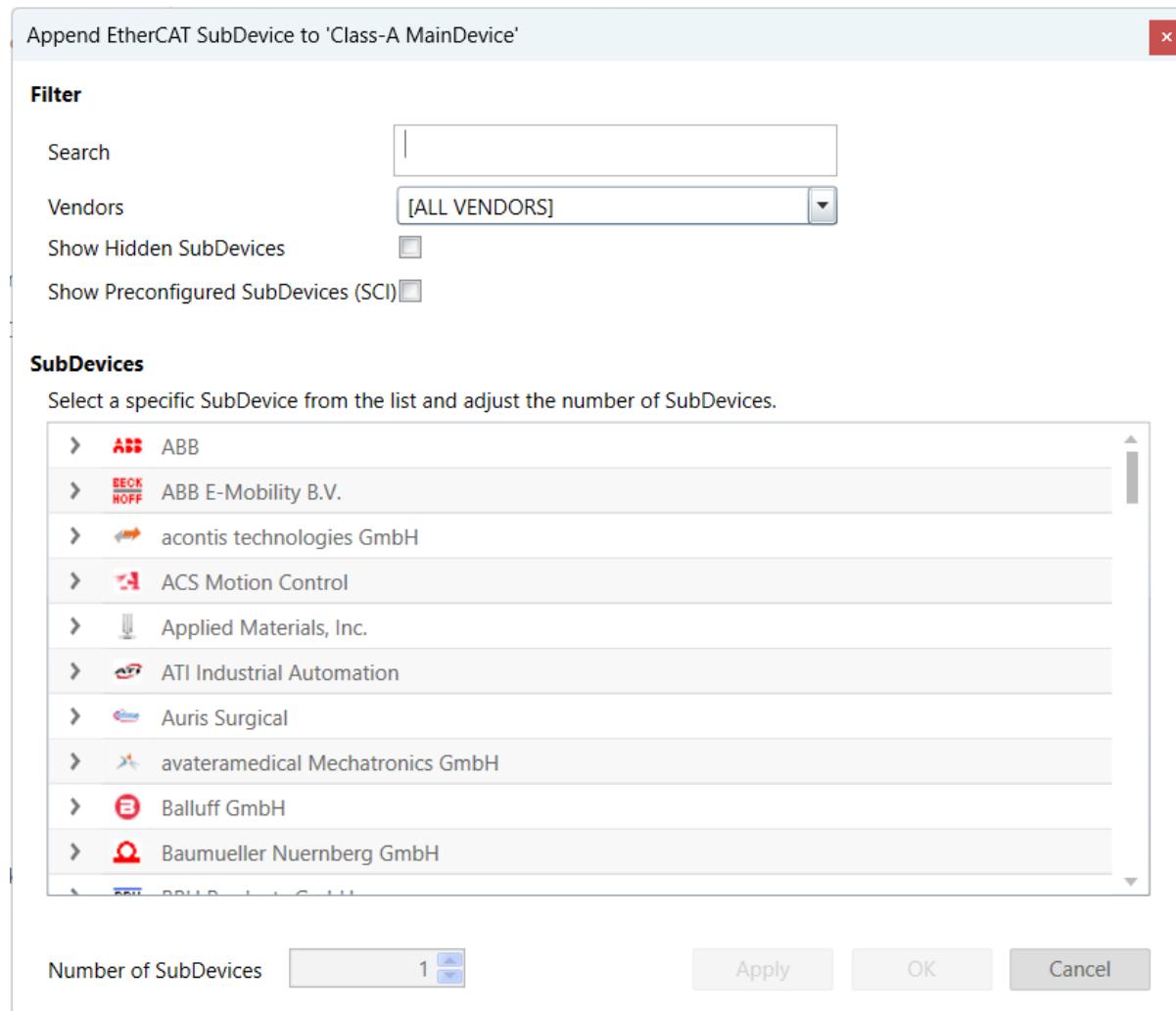
**Import Beckhoff SubDevice Description, to import SubDevice settings from TwinCAT (or ET9000)****Import SubDevice settings from “Beckhoff SubDevice Description” files**

- Open project in TwinCAT
- Select SubDevice to export
- Main menu “TwinCAT”
- Selected Item
- Export XML Description
- Import the exported file (imported will be MDP configuration, PDOs, DC settings, ...)

**Import init commands of SubDevice from “Beckhoff Init Command Description” files**

- Open project in TwinCAT
- Select SubDevice to export
- Open tab “Startup”
- Context menu: “Export to XML”
- Import the exported file (imported will be the exported init commands)

If user tries to append SubDevice he will see the following dialog:



### Filter

Search: Keyword to filter the SubDevices by type name. Vendors: List of all available vendors. User can filter all SubDevices by selecting the desired vendor from the list. If it makes sense, the recommended vendor is already preselected, e.g. if you try to append a SubDevice to an E-Bus. Show Hidden SubDevices: Shows also hidden SubDevices (e.g. with older revisions, if newer SubDevices are available) Show Preconfigure SubDevices: Shows also SubDevices from SCI files

### List of available SubDevices

User can select the SubDevice which should be added, be expanding the three levels: vendors, groups and the SubDevices themselves. The 3<sup>rd</sup> level consists of three parts: Type name, description and the revision number.

### Number of SubDevices

User can change this value to add more than one SubDevice of the same type.

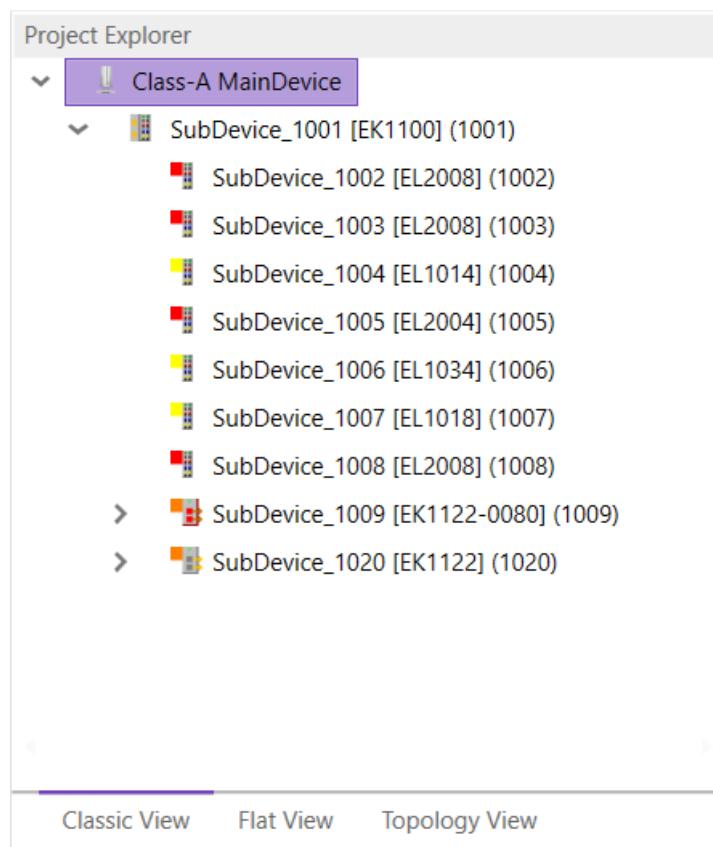
**Apply**

Add SubDevices of the same and different type, the dialog will automatically reopen after appending the previous SubDevice. The number of SubDevices must be set at “1” to use this function.

**Ok** Add SubDevices of the same type, based of the “Number of SubDevices” selected.

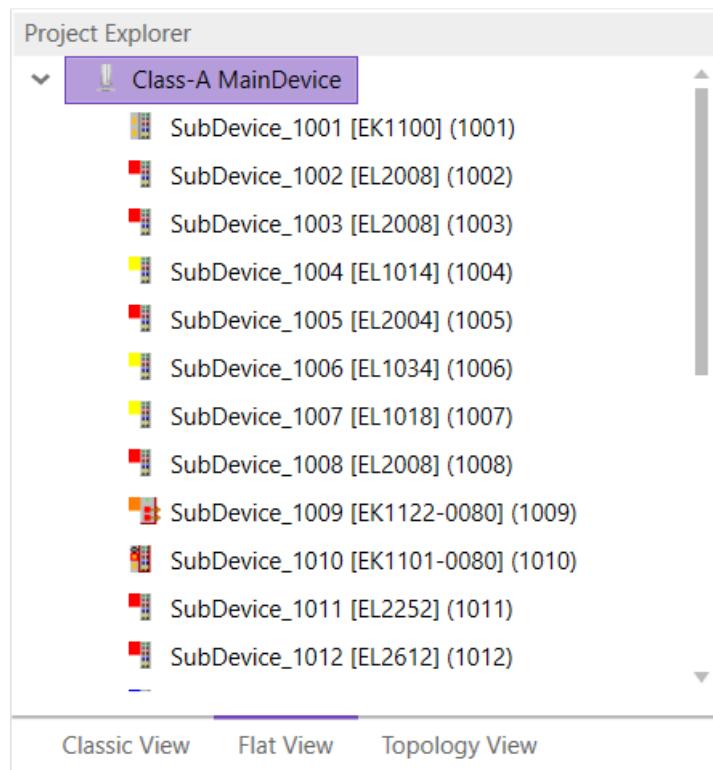
### 4.3.2 Configuration Mode

There are three topology visualisation views:

**Classic View**

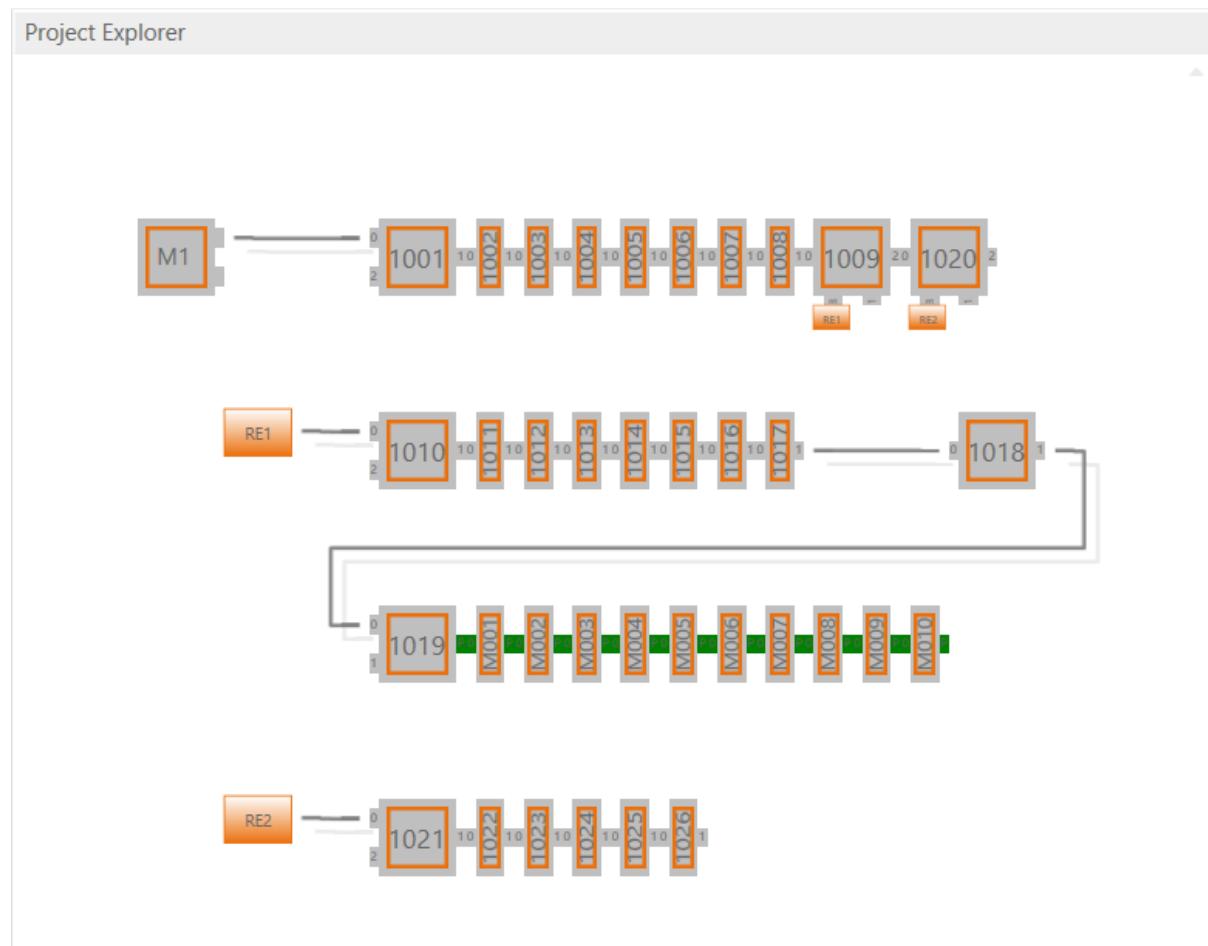
This is a tree view with multiple levels.

**Flat View**



This view shows all SubDevices in a flat list, as they are connected in the EtherCAT network.

#### Topology View

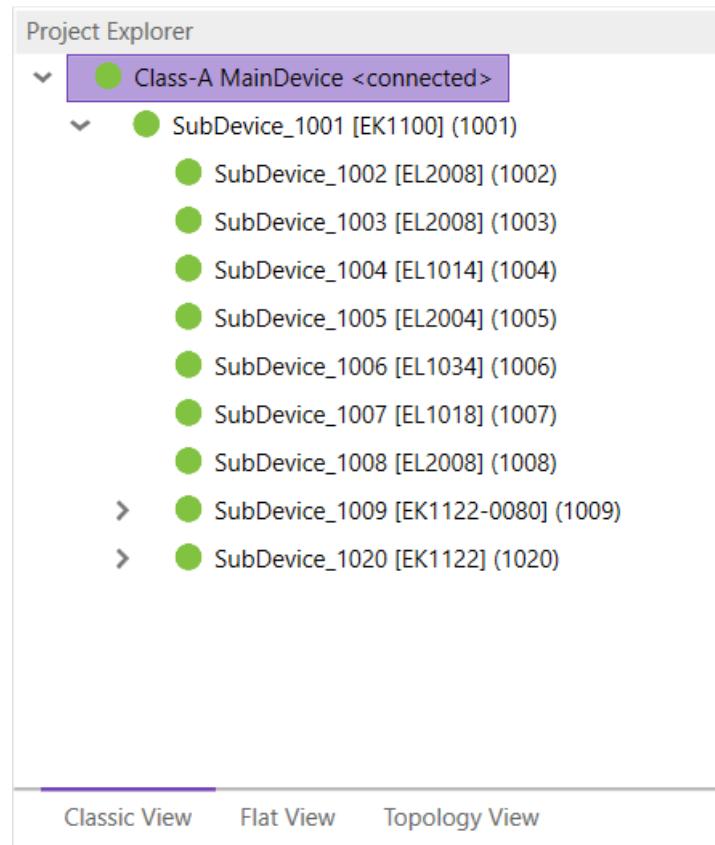


This view shows a graphical tree of all SubDevices, as they are connected in the EtherCAT network.

#### 4.3.3 Diagnosis Mode

There are three topology visualisation views:

##### Classic View

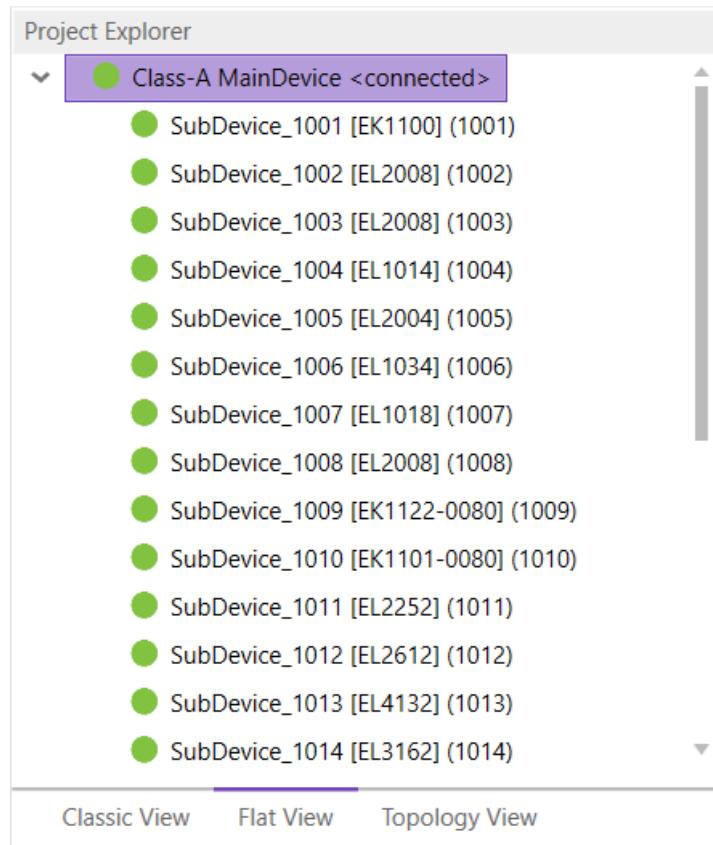


This is a tree view with multiple levels.

**Possible device states:**

- Init Bootstrap
- Pre-Op
- Safe-Op
- Op

**Flat View**

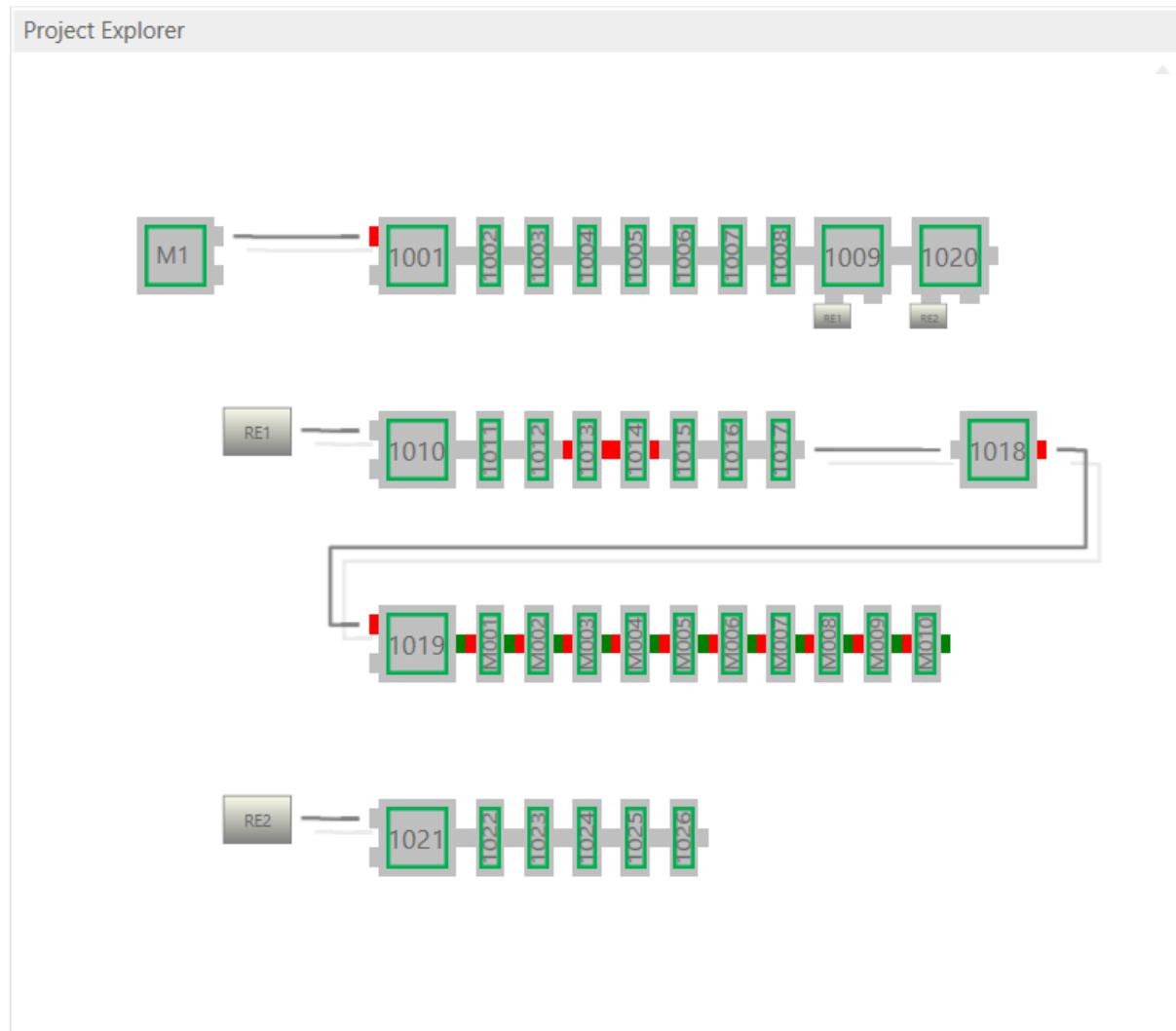


This view shows all SubDevices in a flat list, as they are connected in the EtherCAT network.

**Possible device states:**

- Init Bootstrap
- Pre-Op
- Safe-Op
- Op

**Topology View**



This view shows a graphical tree of all SubDevices, as they are connected in the EtherCAT network.

**Possible device states:**

- Init Bootstrap
- Pre-Op
- Safe-Op
- Op

**Possible port states:**

- Bad Cable Quality
- Constricted Cable Quality
- Good Cable Quality

If cable quality is constricted or bad, please check the error counters of the SubDevice (for more information about the extended diagnosis, see [Extended Diagnosis](#)).

**The context menu of the MainDevice has the following entries:**

**Network Mismatch Analyzer:**

Compares the configured SubDevices with the connected SubDevices.

**Write all Station Aliases:**

Write the current physical address of each SubDevice to the configured station alias in EEPROM.

**Acknowledge all warnings:**

Clears the yellow warning icon of all SubDevices.

**Clear Error Counters:**

Clears the error counters of all connected SubDevices.

**Hardware Diagnostics:**

Enables or disables the additional hardware diagnostics and warnings.

**Take Snapshot:**

Takes a snapshot from the current diagnosis state and saves it into a capture file (for more information about the snapshots and capture files, see [Capture File](#)).

**Automatic Snapshot Mode:**

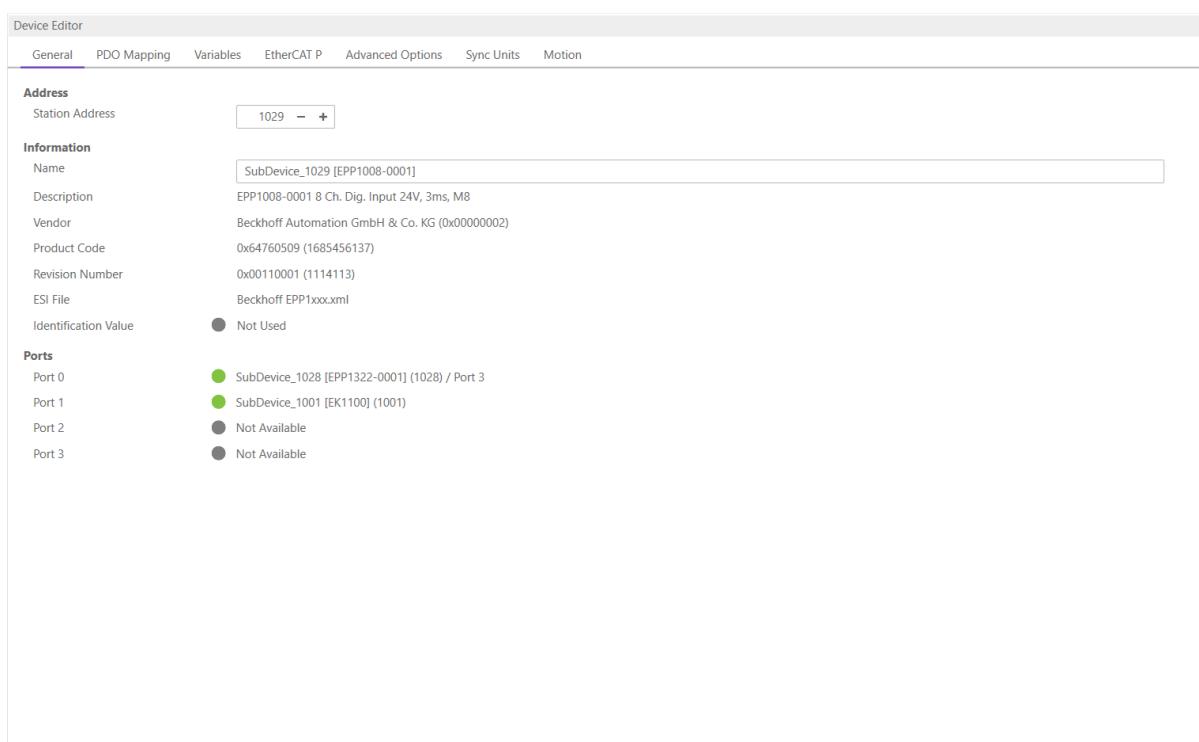
Activates the automatic snapshot mode to take snapshots based on the configured rules.

**Enable Performance Monitoring:**

Activates the Performance Monitoring.

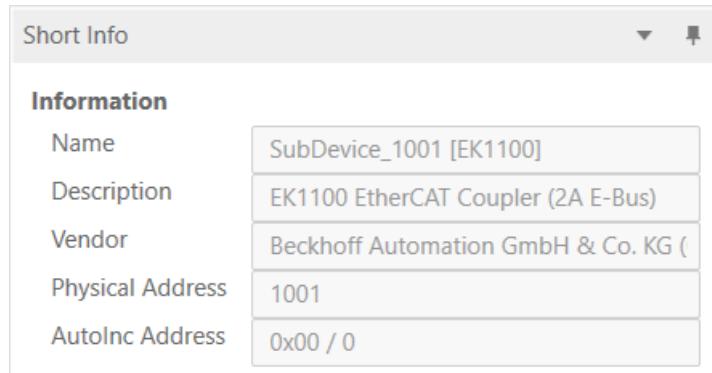
## 4.4 Device Editor

**This Editor gives the user the possibility to read and write information of the selected device or SubDevice:**



## 4.5 Short Info

This window shows short information about selected device, like name, description or vendor:



## 4.6 Message Window

Shows notifications which occur e.g. when the EtherCAT MainDevice has changed its operation state or a SubDevice has been removed from (or added to) the EtherCAT network:

Messages		
	Severity	Time
①	INF	14:24:55
①	INF	14:24:51
①	INF	14:24:51
①	INF	14:24:49
①	INF	14:21:03

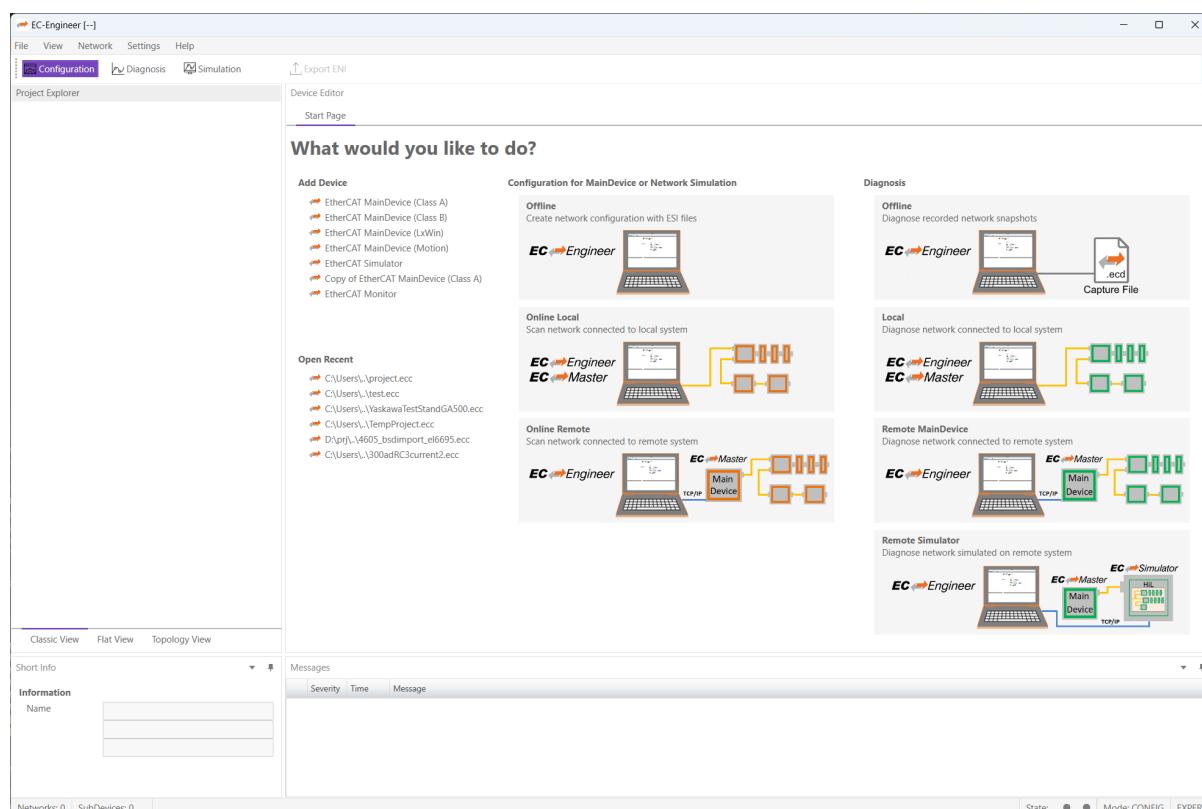
Message details:

- ① INF 14:24:55 MainDevice state change from 'Init' to 'Pre-Op'
- ① INF 14:24:51 MainDevice state change from 'Unknown' to 'Init'
- ① INF 14:24:51 MainDevice state change from 'Unknown' to 'Init'
- ① INF 14:24:49 Network scan successful - 26 SubDevices found
- ① INF 14:21:03 MainDevice state change from 'Unknown' to 'Init'

## 5 Configuration Mode

### 5.1 Overview

At startup of EC-Engineer, the user will see this page:



## 5.2 Device Settings

### 5.2.1 General

In this tab, the user can configure the name of the MainDevice and the cycle time. If he wants to connect to a control system, this can be also configured:

Device Editor

General

Unit Name	Class-A MainDevice
Cycle Time [us]	1000
Source MAC address	
Project Information	Some Project Information <input checked="" type="checkbox"/>

Local system

Link Layer	Ndis
Network Adapter	EtherCAT ( Intel(R) Ethernet Connection (13) i219-LM )
Requested MainDevice State	Init
Diagnosis Mode: Cycle Time	2000
Diagnosis Mode: DCM	Off

Remote system

Protocol	RAS
IP Address	127 . 0 . 0 . 1
Port	6000
Instance	0

Recorded network snapshots

Capture File	<input type="button" value="..."/>
--------------	------------------------------------

## General

### Unit Name:

Name of the MainDevice

### Cycle Time:

Interval in microseconds in which all EtherCAT commands will be sent from the MainDevice. The user can choose between the following values: 125, 250, 500, 1000, 2000 and 4000. This value is used in the ENI.

### Source MAC address:

MAC address of the connected system (will be filled during bus scan)

### Project Information:

Information about the project (enable the CheckBox will also include this information as a comment in the exported ENI file)

## SubDevices connected to local system

### Link Layer:

Select the EtherCAT driver which is used.

### Network Adapter:

Network adapter which is connected to the control system.

### Requested MainDevice State:

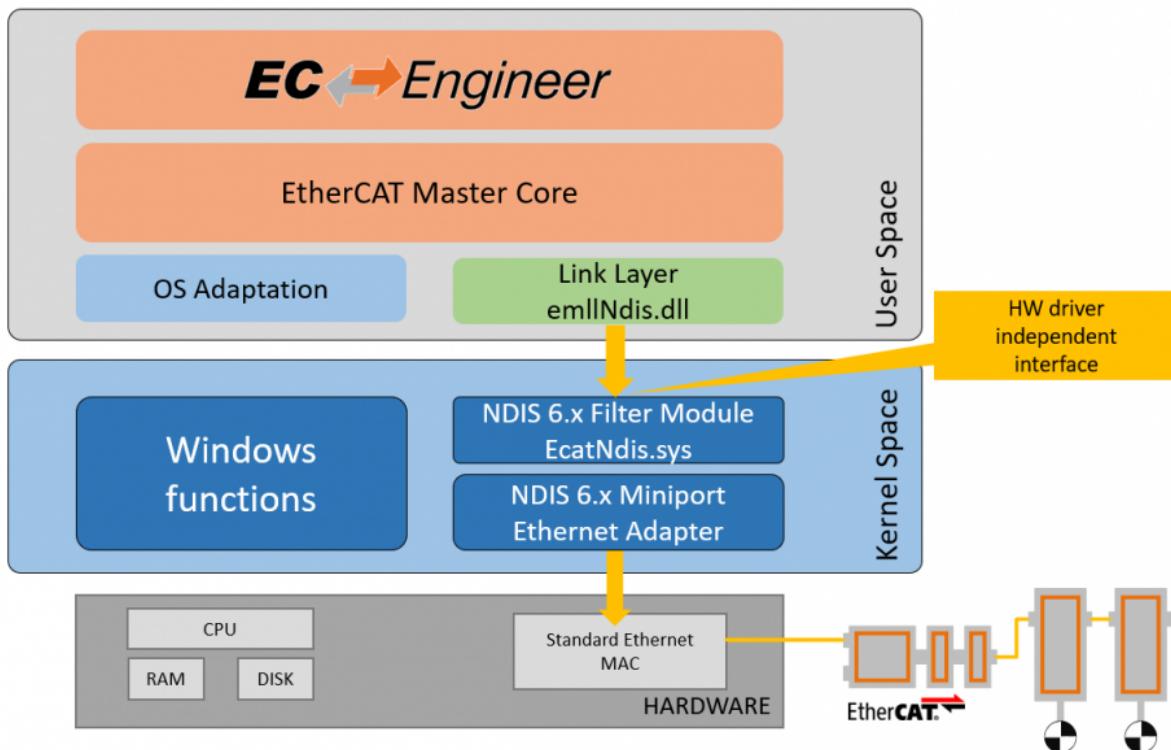
EC-Engineer is trying to put the master to this state after connecting.

### Diagnosis Mode: Cycle Time:

This Cycle Time is only used for local diagnosis, but not for the ENI.

### Diagnosis Mode: DCM:

Select the DCM Mode for local diagnosis.



### SubDevices connected to remote system

#### Protocol:

##### Protocol of the remote system

- RAS (Default port is 6000)
- **Mailbox Gateway (Default port is 34980)**
  - EC-Master V3.0.1.22 and above
  - TwinCAT 3.1.4024 or TwinCAT 3.1.4022.30 and above

#### IP Address:

IP address of the remote system, which is connected to the control system

#### Port:

Port of the remote system, which is connected to the control system

#### MainDevice-Instance:

Used to determine which MainDevice instance should be used in the remote system (MainDevice supports up to 10 instances).

#### Data to load from capture file

##### Capture File:

Path to the capture file, which contains one or more snapshots

## 5.2.2 Process Data Image

**In this tab, the user can see all variables of the process data image. It can also be exported.**

Device Editor

General Process Data Image Watch list Trace Data Advanced Options SubDevice to SubDevice Distributed Clocks Tasks + Sync Units Data Acquisition

Variables

Export

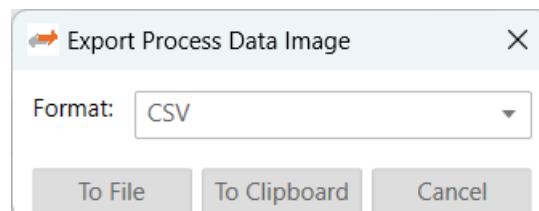
Name	Datatype	MainDevice	Sync Unit	Offset	Size
SubDevice_1018 [BK1120].Status PDO.CouplerState	UINT	Id 0: Default 0		IN : 0.0	2.0
SubDevice_1018 [BK1120].TxPDO Mapping Terminal 003.Channel 1	BOOL	Id 0: Default 0		IN : 2.0	0.1
SubDevice_1018 [BK1120].TxPDO Mapping Terminal 003.Channel 2	BOOL	Id 0: Default 0		IN : 2.1	0.1
SubDevice_1019 [VIPA 053-1EC00].Inputs.Hardware Interrupt Counter	UDINT	Id 0: Default 0		IN : 4.0	4.0
SubDevice_1019 [VIPA 053-1EC00].Inputs.Diagnostic Interrupt Counter	UDINT	Id 0: Default 0		IN : 8.0	4.0
SubDevice_1019 [VIPA 053-1EC00].Module 2 (021-1BD00).Inputs.DI 0	BOOL	Id 0: Default 0		IN : 12.0	0.1
SubDevice_1019 [VIPA 053-1EC00].Module 2 (021-1BD00).Inputs.DI 1	BOOL	Id 0: Default 0		IN : 12.1	0.1
SubDevice_1019 [VIPA 053-1EC00].Module 2 (021-1BD00).Inputs.DI 2	BOOL	Id 0: Default 0		IN : 12.2	0.1
SubDevice_1019 [VIPA 053-1EC00].Module 2 (021-1BD00).Inputs.DI 3	BOOL	Id 0: Default 0		IN : 12.3	0.1
SubDevice_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Status byte	USINT	Id 0: Default 0		IN : 13.0	1.0
SubDevice_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 1	USINT	Id 0: Default 0		IN : 14.0	1.0
SubDevice_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 2	USINT	Id 0: Default 0		IN : 15.0	1.0
SubDevice_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 3	USINT	Id 0: Default 0		IN : 16.0	1.0
SubDevice_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 4	USINT	Id 0: Default 0		IN : 17.0	1.0
SubDevice_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 5	USINT	Id 0: Default 0		IN : 18.0	1.0
SubDevice_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 6	USINT	Id 0: Default 0		IN : 19.0	1.0
SubDevice_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 7	USINT	Id 0: Default 0		IN : 20.0	1.0
SubDevice_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 8	USINT	Id 0: Default 0		IN : 21.0	1.0
SubDevice_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 9	USINT	Id 0: Default 0		IN : 22.0	1.0

Add to watch list

Edit Variable

Move Up Move Down New Edit Delete

If the variables should be exported, the following dialog appears:



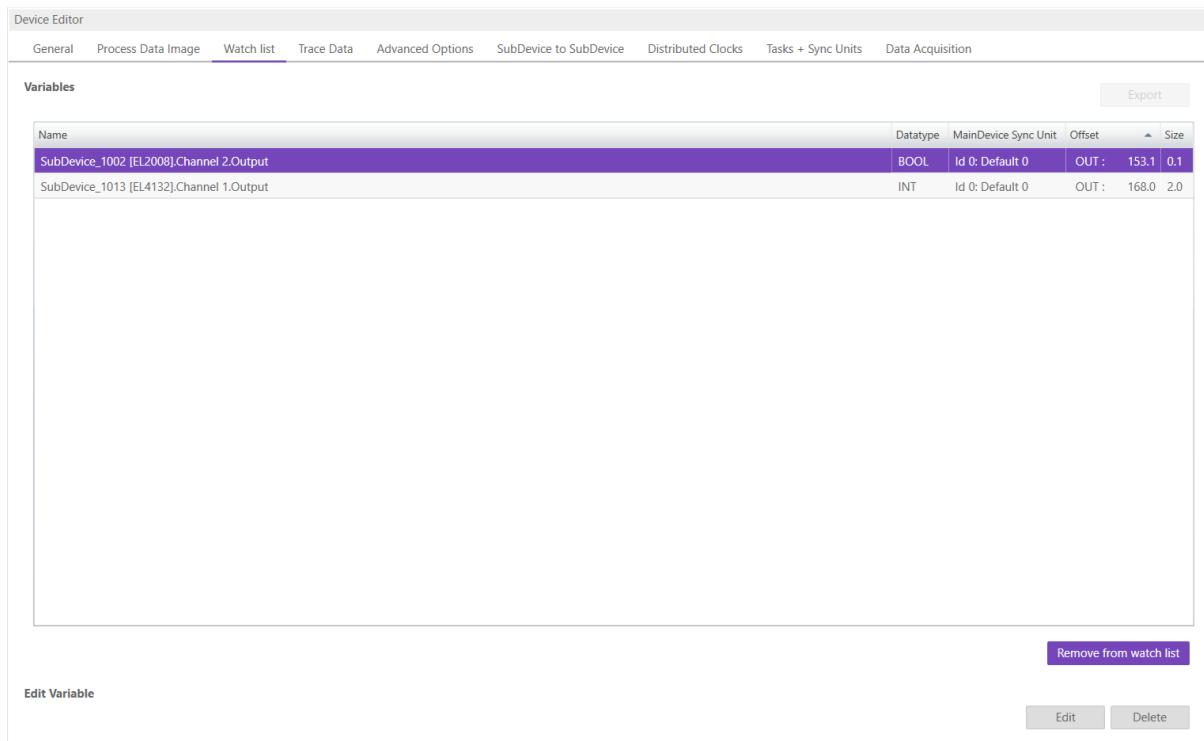
### Export Formats:

- CSV File (Semicolon separated text file)
- CSV PLC File (Semicolon separated text file, where offsets are in PLC format)
- PD Layout File (C-Header file which can be used from EC-Master-Demo application)
- XML File (Like ProcessImage in ENI)

The variables can also be added to the watchlist, to have a better overview in diagnosis mode.

### 5.2.3 Watchlist

In this tab, the user can see all variables which were added to the watchlist in config mode:



Name	Datatype	MainDevice Sync Unit	Offset	Size
SubDevice_1002 [EL2008].Channel 2.Output	BOOL	Id 0: Default 0	OUT: 153.1	0.1
SubDevice_1013 [EL4132].Channel 1.Output	INT	Id 0: Default 0	OUT: 168.0	2.0

Buttons at the bottom:

- Remove from watch list
- Edit Variable
- Edit
- Delete

The variables can be edited and removed from the watchlist.

### 5.2.4 EtherCAT P Overview

In this tab, the user can check the EtherCAT P system, if there are EtherCAT P SubDevices in the configuration. For those EtherCAT P SubDevices, he can calculate and check the power consumptions in the EtherCAT P segments based on cables and loads:

	Ndis
	EtherCAT ( Realtek USB GbE Family Controller )
ice State	Init
cle Time	2000
IM	Off

	RAS
	127 . 0 . 0 . 1
	6000
e	0

In the ComboBox the user can switch between all Power Sourcing Devices (PSD) in the configuration. In the grid are shown all the supplied SubDevices from the selected PSD, with the calculated voltages and currents and the selected loads. The values which are to high or to low are marked red.

**Hint:** These values are not relevant for the ENI-File. They are just a help for the user what might not work. The ENI File can be exported anyway.

On the *Validate* Button, the user can check the whole configuration. If there is an error somewhere, the corresponding PSD is selected. If there are no errors the user will get a message box.

### 5.2.5 Trace Data (Expert)

**In this tab, the user can add trace variables:**

Device Editor

General Script Automation Process Data Image Watch list **Trace Data** Advanced Options SubDevice to SubDevice Distributed Clocks Tasks + Sync Units Data Acquisition

**Variables**

Name	Datatype	Offset	Size
Variable 0	BOOL	OUT:	8.0 0.1
Variable 1	BOOL	OUT:	8.1 0.1
Variable 2	BYTE	OUT:	9.0 1.0

**Edit Variable** **New** **Edit** **Delete**

**Move Up** **Move Down**

### Trace Data

Trace variables which can be added from the user.

### Buttons

#### New/ Edit/Delete:

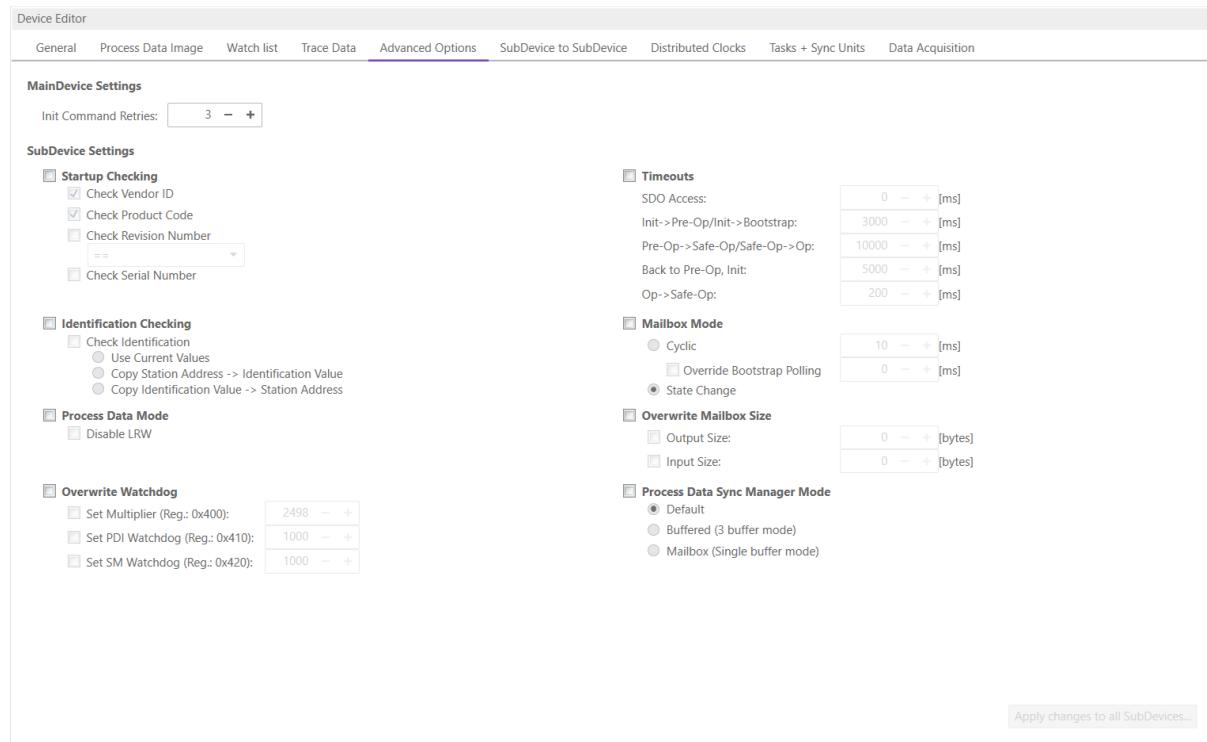
Used for changing the list.

#### Up/Down:

Moving the selected variable up or down

## 5.2.6 Advanced Options

**In this tab, the user can change MainDevice specific settings or he can change SubDevice specific settings which will be applied to all SubDevices:**



Device Editor

General Process Data Image Watch list Trace Data Advanced Options SubDevice to SubDevice Distributed Clocks Tasks + Sync Units Data Acquisition

**MainDevice Settings**

Init Command Retries: 3 - +

**SubDevice Settings**

**Startup Checking**

- Check Vendor ID
- Check Product Code
- Check Revision Number
- ==
- Check Serial Number

**Identification Checking**

- Check Identification
- Use Current Values
- Copy Station Address -> Identification Value
- Copy Identification Value -> Station Address

**Process Data Mode**

- Disable LRW

**Overwrite Watchdog**

<input type="checkbox"/> Set Multiplier (Reg.: 0x400):	2498 - +
<input type="checkbox"/> Set PDI Watchdog (Reg.: 0x410):	1000 - +
<input type="checkbox"/> Set SM Watchdog (Reg.: 0x420):	1000 - +

**Timeouts**

SDO Access: 0 - + [ms]  
Init->Pre-Op/Init->Bootstrap: 3000 - + [ms]  
Pre-Op->Safe-Op/Safe-Op->Op: 10000 - + [ms]  
Back to Pre-Op, Init: 5000 - + [ms]  
Op->Safe-Op: 200 - + [ms]

**Mailbox Mode**

- Cyclic
- Override Bootstrap Polling
- State Change

**Overwrite Mailbox Size**

- Output Size: 0 - + [bytes]
- Input Size: 0 - + [bytes]

**Process Data Sync Manager Mode**

- Default
- Buffered (3 buffer mode)
- Mailbox (Single buffer mode)

Apply changes to all SubDevices...

## MainDevice Settings

Init Command Retries: Number of retries, to handle transmission errors.

### SubDevice Settings

- SubDevice settings can be applied to all SubDevices with one click on the button *Apply changes to all SubDevices*. For a detailed description of the Advanced SubDevice Options see SubDevice chapter.

#### Identification Checking

Use Current Values Identification Checking will be activated for all SubDevices with the current values

**Important:** If current is 0, the Identification is not activated!

Copy Station Address -> Identification Checking will be activated for all SubDevices with the station address as identification value

Copy Identification Value -> Identification Checking will be activated for all SubDevices and the identification value is also used as station address

## 5.2.7 SubDevice to SubDevice

In this tab, the user can configure the SubDevice to SubDevice communication by connecting 2 variables or PDOs.

This tab consists of 2 views:

#### Default view

In this view, the user can configure the SubDevice to SubDevice communication by using copy infos in ENI file. This is the default way.

Device Editor

General Script Automation Process Data Image Watch list Trace Data Advanced Options SubDevice to SubDevice Distributed Clocks Tasks + Sync Units Data Acquisition

Default In Cycle

**SubDevice to SubDevice**  
With active S2S connections it is not possible to change PDOs and some other settings.

Inputs

- SubDevice\_1004 [EL1014]
- SubDevice\_1005 [EL1014]
  - Channel 1 [1 Bits]
  - Channel 2 [1 Bits]
  - Channel 3 [1 Bits]
  - Channel 4 [1 Bits]
- SubDevice\_1006 [EL1014]
- SubDevice\_1007 [EL1014]
- SubDevice\_1008 [EL1018]
- SubDevice\_1009 [EL1018]
- SubDevice\_1010 [EL1018]
- SubDevice\_1011 [EL1018]

Outputs

- SubDevice\_1012 [EL2008]
- SubDevice\_1013 [EL2008]
  - Channel 1 [1 Bits]
  - Channel 2 [1 Bits]
  - Channel 3 [1 Bits]
  - Channel 4 [1 Bits]
  - Channel 5 [1 Bits]
  - Channel 6 [1 Bits]
  - Channel 7 [1 Bits]
  - Channel 8 [1 Bits]
- SubDevice\_1014 [EL2008]
- SubDevice\_1015 [EL2008]

**Connections**

Input	Offset	Output	Offset	BitSize
SubDevice_1005 [EL1014].Channel 1	0.4	>>	SubDevice_1013 [EL2008].Channel 1	1.0 1

### In cycle view (Expert)

In this view, the user can configure the on cycle SubDevice to SubDevice communication by setup the process image and the FMMU in a way that inputs of the source SubDevice will be directly written into the outputs of the destination SubDevice during one cycle.

Device Editor

General Script Automation Process Data Image Watch list Trace Data Advanced Options SubDevice to SubDevice Distributed Clocks Tasks + Sync Units Data Acquisition

Default In Cycle

**SubDevice to SubDevice**  
With active S2S connections it is not possible to change PDOs and some other settings.

Inputs

- SubDevice\_1004 [EL1014]
- SubDevice\_1005 [EL1014]
- SubDevice\_1006 [EL1014]
- SubDevice\_1007 [EL1014]
- SubDevice\_1008 [EL1018]
  - Channel 1 [1 Bits]
  - Channel 2 [1 Bits]
  - Channel 3 [1 Bits]
  - Channel 4 [1 Bits]
  - Channel 5 [1 Bits]
  - Channel 6 [1 Bits]
  - Channel 7 [1 Bits]
  - Channel 8 [1 Bits]
- SubDevice\_1009 [EL1018]
- SubDevice\_1010 [EL1018]
- SubDevice\_1011 [EL1018]

Outputs

- SubDevice\_1012 [EL2008]
  - Channel 1 [1 Bits]
  - Channel 2 [1 Bits]
  - Channel 3 [1 Bits]
  - Channel 4 [1 Bits]
  - Channel 5 [1 Bits]
  - Channel 6 [1 Bits]
  - Channel 7 [1 Bits]
  - Channel 8 [1 Bits]
- SubDevice\_1013 [EL2008]
- SubDevice\_1014 [EL2008]
- SubDevice\_1015 [EL2008]

**Connections**

Input	Offset	Output	Offset	BitSize
SubDevice_1008 [EL1018].Channel 1.Input	2.0	>>	SubDevice_1012 [EL2008].Channel 1.Output	3.0 1
SubDevice_1008 [EL1018].Channel 2.Input	2.1	>>	SubDevice_1012 [EL2008].Channel 2.Output	3.1 1
SubDevice_1008 [EL1018].Channel 3.Input	2.2	>>	SubDevice_1012 [EL2008].Channel 3.Output	3.2 1
SubDevice_1008 [EL1018].Channel 4.Input	2.3	>>	SubDevice_1012 [EL2008].Channel 4.Output	3.3 1
SubDevice_1008 [EL1018].Channel 5.Input	2.4	>>	SubDevice_1012 [EL2008].Channel 5.Output	3.4 1

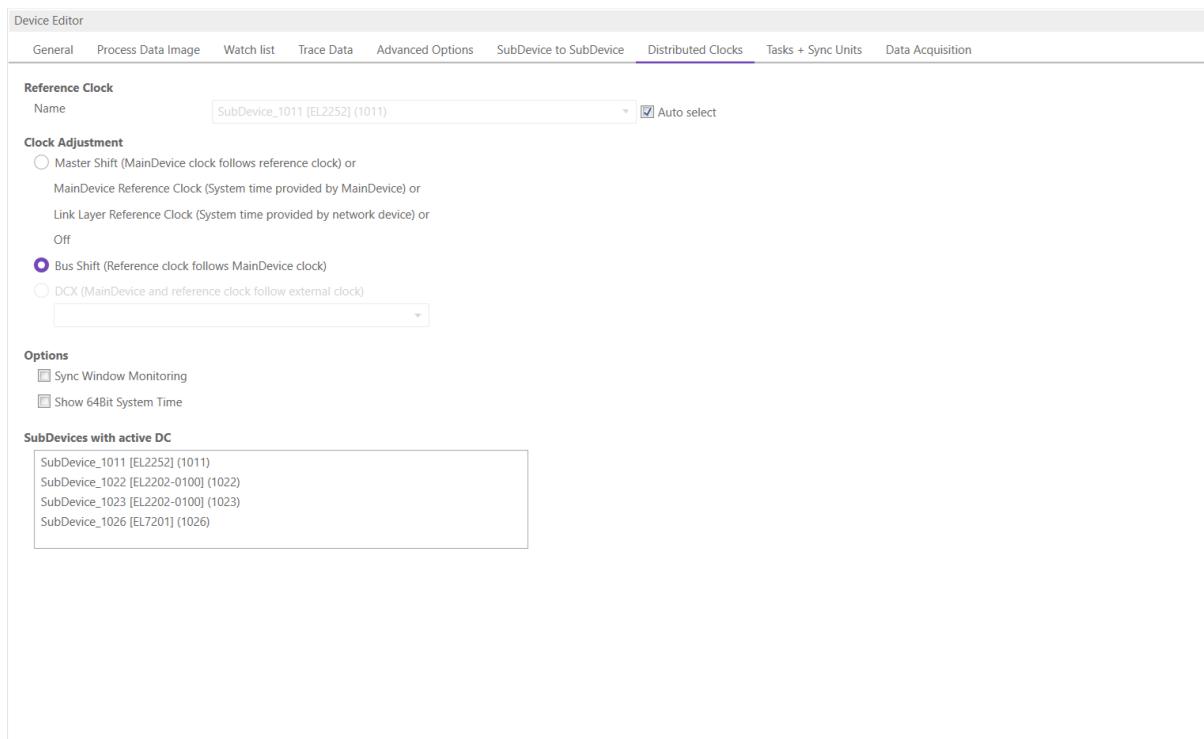
### Limitations of one cycle SubDevice to SubDevice communication:

- Input SubDevice must be located before output SubDevice

- Complete sync unit of the SubDevice must be connected (this means all PDOs of a sync unit must be connected and not only one variable)

## 5.2.8 Distributed Clocks

In this tab, the user can change distributed clock related settings:



### Reference Clock

#### Name:

Name of the reference clock. By default, this is the first SubDevice with DC support.

### Clock Adjustment

#### Master Shift:

The reference clock controls the MainDevice time

#### Bus Shift:

The MainDevice time controls the reference clock

#### External Mode:

The reference clock is controlled by an external sync device

### Options

#### Sync Window Monitoring:

A command (datagram) will be inserted in the cyclic frame to read the ESC registers 0x092C. If this is selected the MainDevice will throw a notification.

#### Show 64Bit System Time:

MainDevice supports SubDevices with 32bit and 64bit system time register (0x0910). If this is selected he will interpret it as 64bit system time.

## SubDevices with active DC

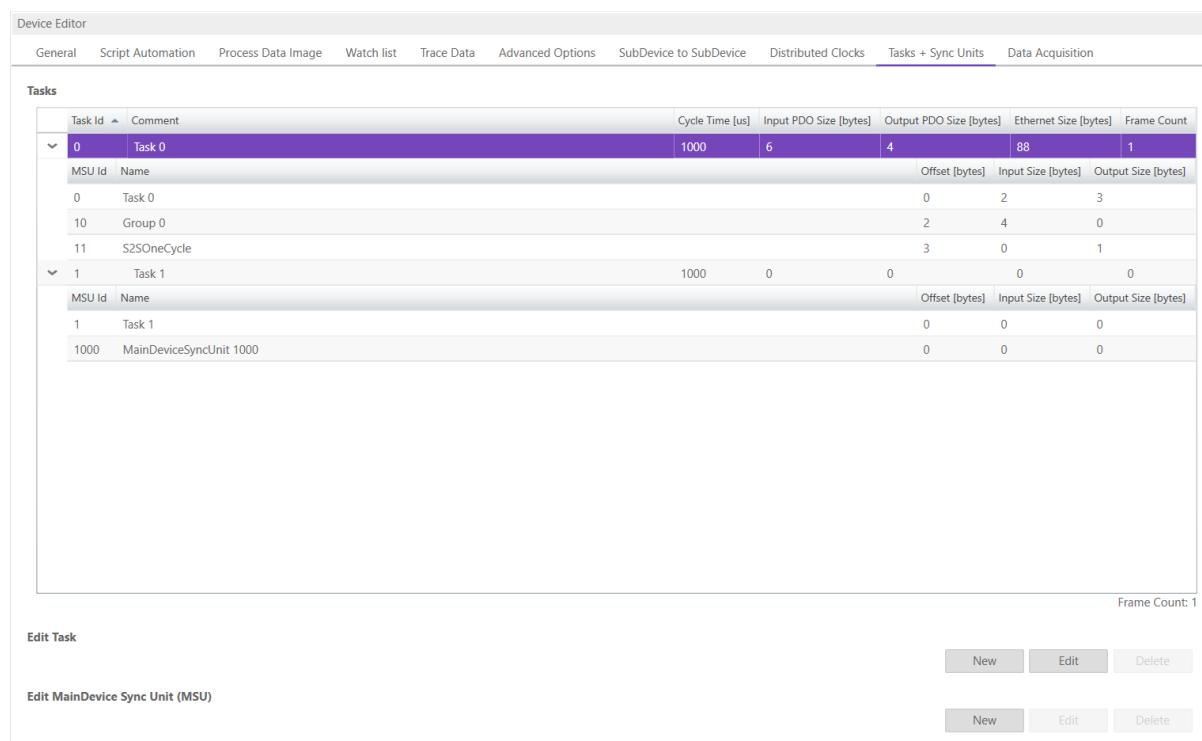
Shows a list of all SubDevices with active DC.

### 5.2.9 Tasks + Sync Units (Expert)

This tab consists of two views:

#### Tasks

**In this view, the user can define additional cyclic tasks and MainDevice sync units. After adding a new MainDevice sync unit, the user can assign one or more SubDevice sync units on tab *SubDevice Sync ▶ Units* to this MainDevice sync unit:**



Task Id	Comment	Cycle Time [us]	Input PDO Size [bytes]	Output PDO Size [bytes]	Ethernet Size [bytes]	Frame Count
0	Task 0	1000	6	4	88	1
MSU Id Name						
0	Task 0			0	2	3
10	Group 0			2	4	0
11	S25OneCycle			3	0	1
1	Task 1	1000	0	0	0	0
MSU Id Name						
1	Task 1			0	0	0
1000	MainDeviceSyncUnit 1000			0	0	0

Frame Count: 1

**Edit Task**

**Edit MainDevice Sync Unit (MSU)**

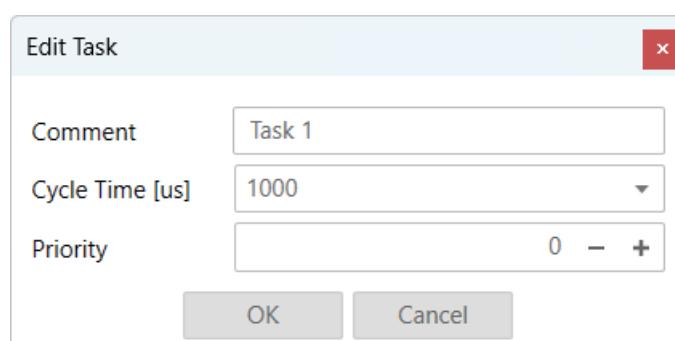
#### Tasks:

List of cyclic tasks and MainDevice sync units.

#### Buttons:

New/Edit/Delete: Used for changing the list.

If the user wants to edit a task, the following dialog will appear:



**Comment:**

Comment of this task (will be written to ENI file)

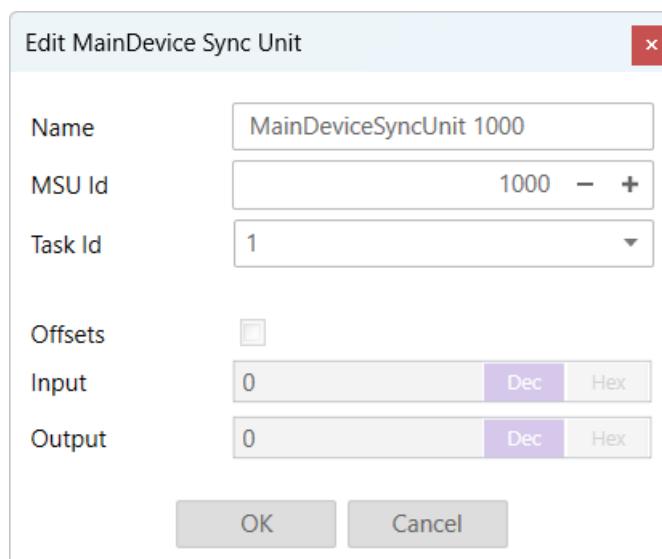
**Cycle Time:**

Cycle time of this task

**Priority:**

Priority of the task sending the frames. The lower the value, the higher the priority of the task. Every priority value shall only be used once. Allowed values: 1 ... 62 (O). 0 is the default and means no priority is set.

If user wants to edit a MainDevice sync unit, he will see the following dialog:

**Name:**

Name of this MainDevice sync unit (will be written to ENI file)

**Sync Unit Id:**

**Id of this MainDevice sync unit (will be written to ENI file).**

- ID 0 .. 9: Generated / internal MainDevice sync unit
- ID 10 .. 999: Generated / internal MainDevice sync unit for groups
- ID 1000 .. 1999: User defined MainDevice sync unit

**Task Id:**

Task Id to which is this MainDevice sync unit assigned

**Offsets:**

Activate to pin this MainDevice sync unit to a specific offset

**Input:**

Input offset of pinned MainDevice sync unit

**Output:**

Output offset of pinned MainDevice sync unit

**Frames**

**In this view, the user can see the frames information, as well as the information of each of their commands.**

Device Editor

General Process Data Image Watch list Variables Advanced Options SubDevice to SubDevice Distributed Clocks Tasks + Sync Units **Data Acquisition** Tasks Frames

**Frames**

Frame ID	Task ID	Number of Commands	Frame Size							
Frame 0	0	7	76							
Command ID	Command	Adp	Ado	Address	Data	Data Length	Counter	Input Offset	Output Offset	
Command 0	PREOP; SAFEOP; OP	MISC; BRD; AL	Status Register	BRD	0	304	2	5	30	30
Command 1	PREOP; SAFEOP; OP	DC; NOP; Receive Time	Port 1 Register	NOP	0	2304	4	32	32	32
Command 2	PREOP; SAFEOP; OP	DC; ARMW; System Time	Register	ARMW	0	2320	4	36	36	36
Command 3	PREOP; SAFEOP; OP	DC; APWR; System Time	Register (Bus-Shift)	APWR	0	2320	4	40	40	40
Command 4	PREOP; SAFEOP; OP	MISC; LRD; Poll Mailbox	State	LRD		150994944	2	44	44	44
Command 5	SAFEOP; OP	PD; LWR;		LWR		268435456	30	5	0	0
Command 6	SAFEOP; OP	PD; LRD;		LRD		268437504	30	5	0	0

## 5.2.10 Data Acquisition

In this tab, the user can configure our Data Acquisition (DAQ) library. This library can be used from EC-Master to record process data in realtime.

**After adding a new recorder, the user can select the variables which should be recorded and specify some triggers:**

Device Editor

General Simulator Process Data Image Watch list Trace Data Advanced Options SubDevice to SubDevice Distributed Clocks Tasks + Sync Units **Data Acquisition** Motion

**Variables**

Name	Datatype	Offset	Size	Recorded
SubDevice_1002 [EL3314].TC Inputs Channel 1.Status_Underrange	BOOL	IN:	0.0 0.1	<input checked="" type="checkbox"/>
SubDevice_1002 [EL3314].TC Inputs Channel 1.Status_OVERRANGE	BOOL	IN:	0.1 0.1	<input type="checkbox"/>
SubDevice_1002 [EL3314].TC Inputs Channel 1.Status_Limit 1	BIT2	IN:	0.2 0.2	<input type="checkbox"/>
SubDevice_1002 [EL3314].TC Inputs Channel 1.Status_Limit 2	BIT2	IN:	0.4 0.2	<input type="checkbox"/>
SubDevice_1002 [EL3314].TC Inputs Channel 1.Status_Error	BOOL	IN:	0.6 0.1	<input type="checkbox"/>
SubDevice_1002 [EL3314].TC Inputs Channel 1.Status_TxPDO State	BOOL	IN:	1.6 0.1	<input type="checkbox"/>
SubDevice_1002 [EL3314].TC Inputs Channel 1.Status_TxPDO Toggle	BOOL	IN:	1.7 0.1	<input type="checkbox"/>
SubDevice_1002 [EL3314].TC Inputs Channel 1.Value	INT	IN:	2.0 2.0	<input type="checkbox"/>
SubDevice_1002 [EL3314].TC Inputs Channel 2.Status_Underrange	BOOL	IN:	4.0 0.1	<input type="checkbox"/>

**Triggers**

Left Operand	Operator	Right Operand	Enable	Start	Duration	Count
SubDevice_1002 [EL3314].TC Inputs Channel 1.Status_Underrange	=	1	True	True	0	0

**Edit Trigger**

New Edit Delete

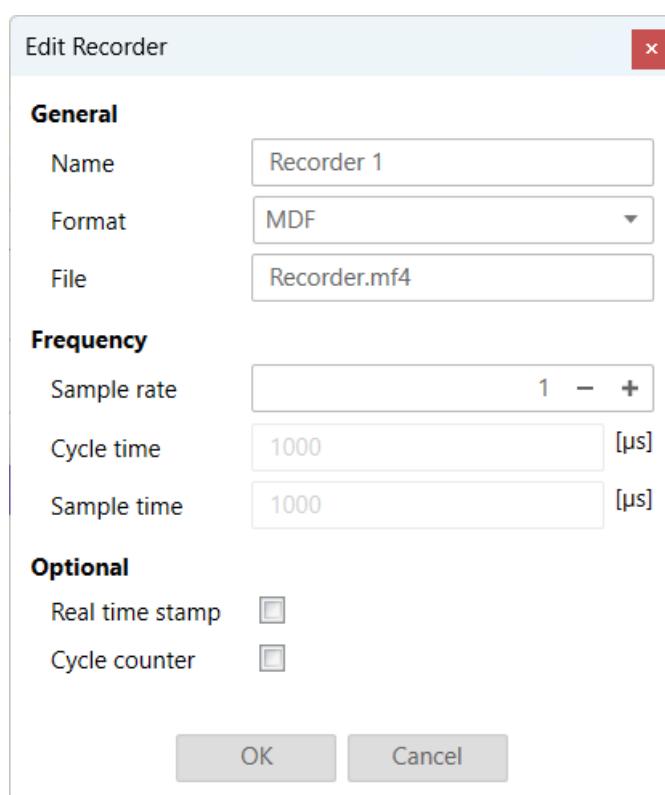
**Variables:****Add/Remove:**

Used for adding or removing the selected variable to the recording.

**Triggers:****New/Edit/Delete:**

Used for changing the trigger list.

If user wants to edit a recorder, he will see the following dialog:

**Name:**

Name of the recorder

**File:**

Absolute path of the recorder file on the MainDevice system

**Format:****Format of the recorder file, e.g.**

- MDF (Measurement Data Format)
- CSV (Comma Separated Values)

**Sample Rate:**

Sample rate of the recorded data e.g. every cycle or every second cycle, ...

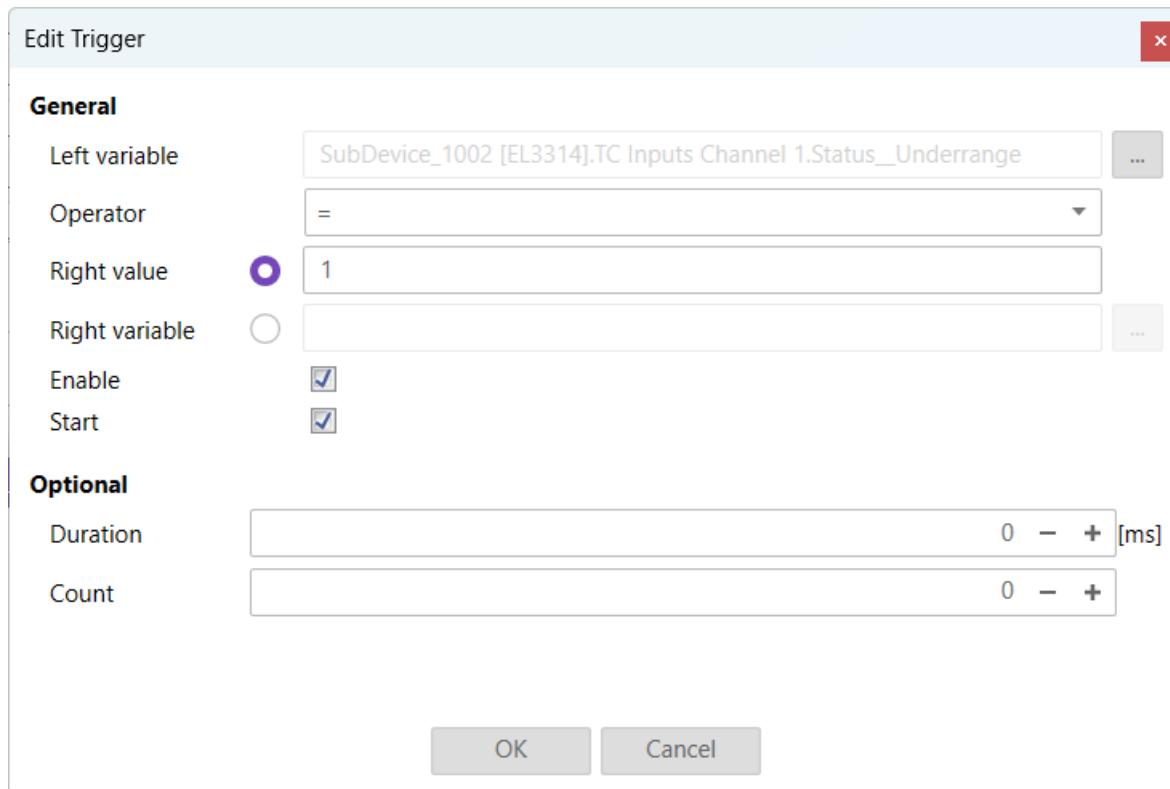
**Real time stamp:**

Adds a real time stamp to the recorded data

**Cycle counter:**

Adds a cycle counter to the recorded data

If user wants to edit a trigger, he will see the following dialog:



## General

### Left variable:

Name of the left variable

### Operator:

Operator of the trigger (e.g. =, >, >=, <, <=, !=)

### Right value:

Value of the right operand to compare the left variable against a static value e.g. trigger, if variable is greater than 5

### Right variable:

Name of the right variable to compare the left variable against the value of another variable e.g. trigger, if variable 1 is smaller than variable 2

### Enable:

Enabled or disabled trigger (can be enabled from application later)

### Start:

Start or stop trigger

## Optional

### Duration:

Duration in ms (0 = infinite) e.g. trigger should start recording for 500 ms

### Count:

Trigger count (0 = infinite) e.g. trigger should hit only for 5 times

For more information please refer the manual of the EC-Master-Data-Acquisition-Library.

### 5.2.11 Motion Settings (Motion Tabs only)

**In this tab, the user change settings for the EcMasterDemoMotion Configuration. It is also possible to export the DemoMotionConfig.xml file:**

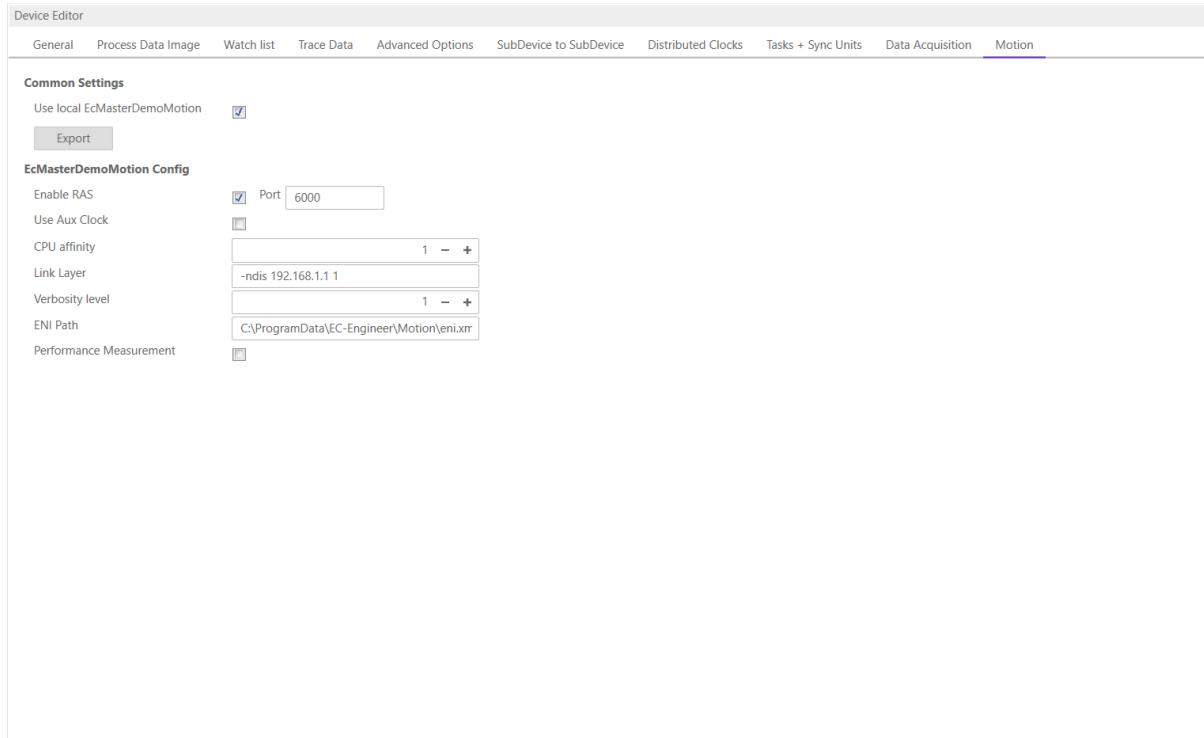
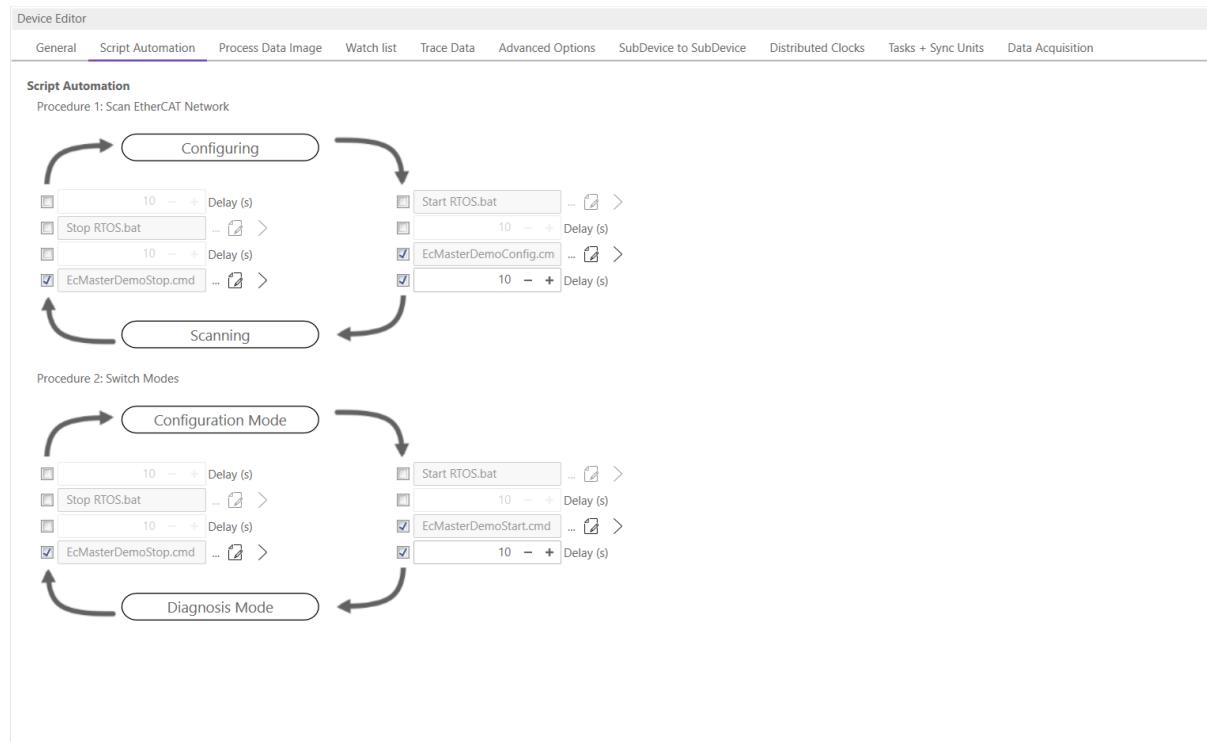


Fig. 1: When “Use local EcMasterDemoMotion” is selected, the ENI and the config files are automatically exported to the EC-Engineer Motion folder in ProgramData when switching to diagnosis mode. With the Motion EMI, the script automation is activated. Per default when switching to diagnosis mode the EcMasterDemoMotion.exe is started and EC-Engineer connects with RAS. So it is very simple to start with Motion directly in EC-Engineer.

### 5.2.12 Scripts

**In this tab, the user can select scripts that are executed in the different modes. The tab is only visible when the script mode is activated in the EMI file:**



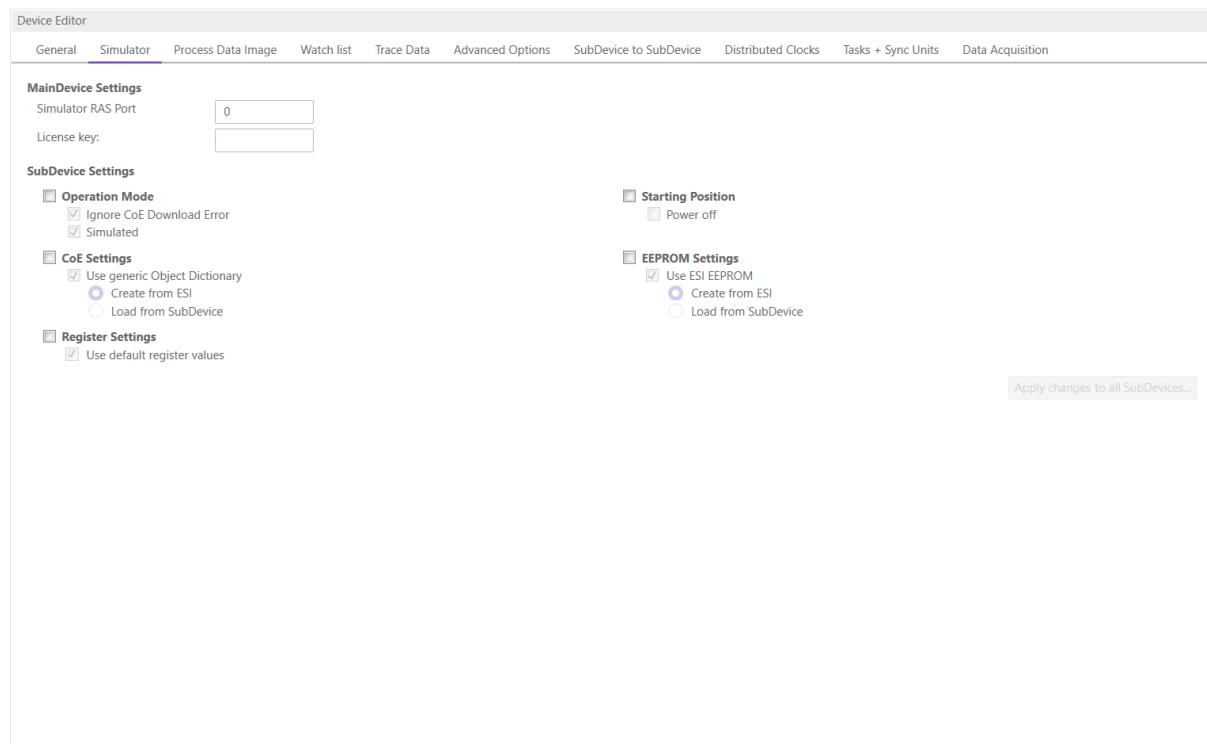
The first procedure is for scanning the network. There is the possibility of starting two scripts before the scan, and two scripts after the scan. It is also possible to set a delay between them. A usecase for this could be to start e.g. LxWin → then start the MainDevice on the real-time system → scan the network → stop the MainDevice → stop LxWin.

The second procedure is for switching the modes (configuration and diagnosis). The user can e.g. start LxWin → start the MainDevice → switch to diagnosis. On switching back the user can stop the MainDevice and stop LxWin. Or it is also possible not to stop the LxWin for example.

The *Configuration* and *Configuration Mode* circles are the starting points. Then the scripts are called clockwise following the arrows and the red numbers.

### 5.2.13 Simulator Settings (Simulator Tabs only)

**In this tab, the user can change the settings for the simulator. The tab is only visible when the user uses EC-Simulator EMT or when the MainDevice has an linked simulator unit. The linked simulator unit can be created through the context menu of the MainDevice, or when the simulator link layer is selected:**



### Simulator RAS Port:

The port which is opened through the simulator link layer

### License key:

The license key for the simulator

### SubDevice Settings:

#### Operation Mode:

Ignore Download Error

#### CoE Settings:

Select which CoE should be used in EXI

#### Register Settings:

Select if register should be in EXI

#### Starting Position:

Select if SubDevice shall be powered on or off on start

#### EEPROM Settings:

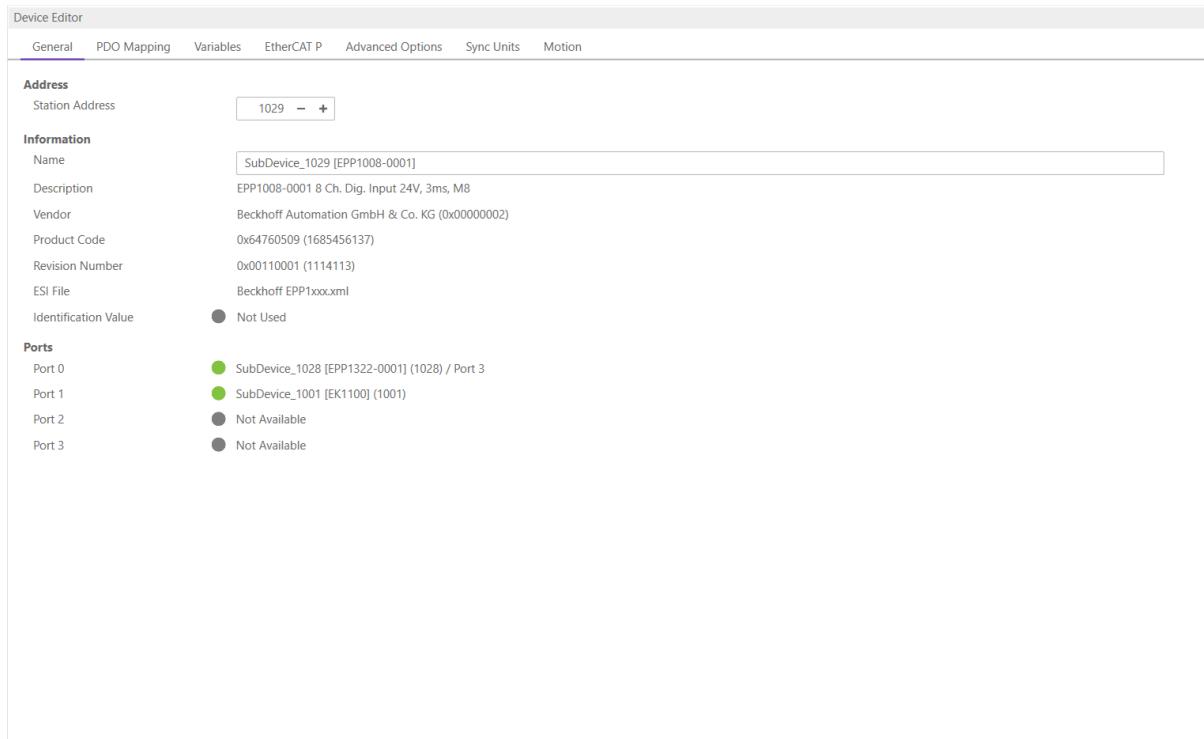
Select which EEPROM values should be used

The EXI file can be exported through the *Export EXI* button right from the *Export ENI* Button or through the context menu.

## 5.3 SubDevice Settings

### 5.3.1 General (SubDevice)

In this tab, the user can see general SubDevice settings like station address or the name of the SubDevice.  
Also the connected ports can be seen.



Device Editor

General PDO Mapping Variables EtherCAT P Advanced Options Sync Units Motion

**Address**

Station Address: 1029

**Information**

Name: SubDevice\_1029 [EPP1008-0001]  
 Description: EPP1008-0001 8 Ch. Dig. Input 24V, 3ms, M8  
 Vendor: Beckhoff Automation GmbH & Co. KG (0x00000002)  
 Product Code: 0x64760509 (1685456137)  
 Revision Number: 0x00110001 (1114113)  
 ESI File: Beckhoff EPP1xxx.xml  
 Identification Value:  Not Used

**Ports**

Port 0	<input checked="" type="radio"/> SubDevice_1028 [EPP1322-0001] (1028) / Port 3
Port 1	<input checked="" type="radio"/> SubDevice_1001 [EK1100] (1001)
Port 2	<input type="radio"/> Not Available
Port 3	<input type="radio"/> Not Available

#### Address

##### Station Address:

Station address of the SubDevice. By default, the first station address is 1001.

#### Information

##### Name:

Name of the SubDevice. By default the following format is used "SubDevice\_N [TYPE]"

##### Description:

Description of the SubDevice (Read from ESI file)

##### Vendor:

Name of the vendor the SubDevice

##### Product Code:

Product Code of the SubDevice

##### Revision Number:

Revision Number of the SubDevice

##### ESI File:

Name of the ESI file where the description of the SubDevice is stored.  
 :file: ESI files can be managed by using the [ESI-Manager](#)

**Identification Value:**

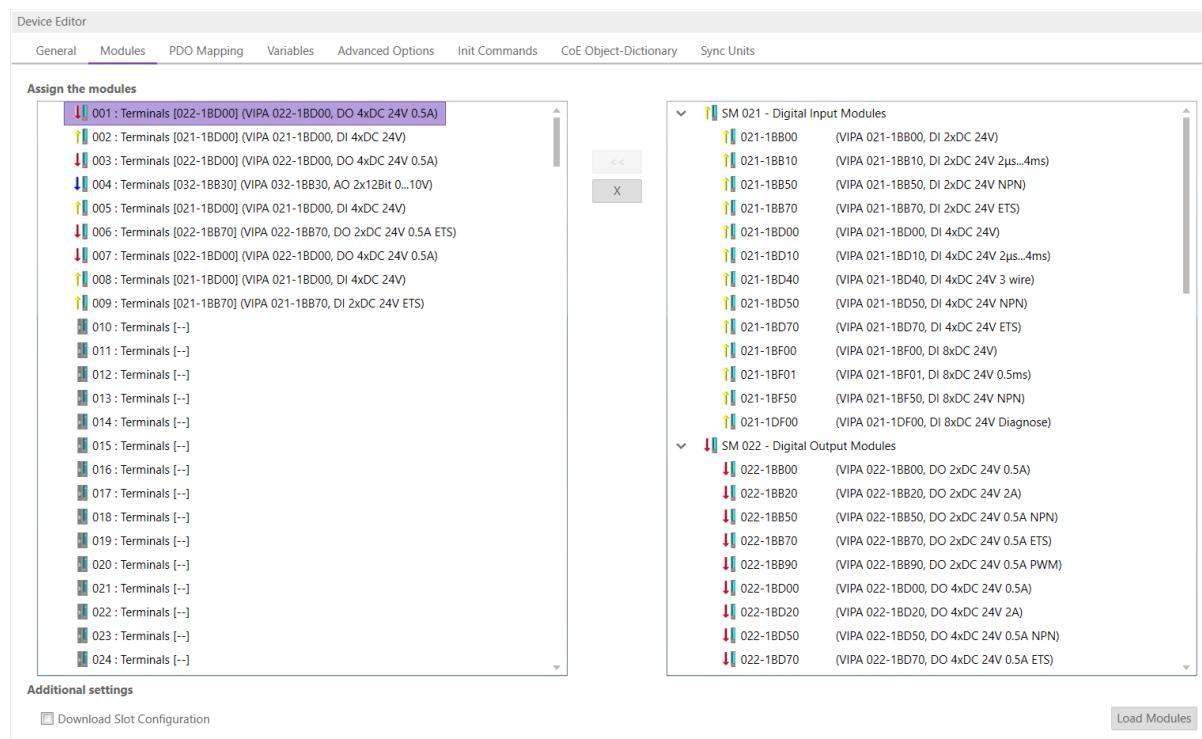
Identification Value of the SubDevice

**Ports****Connected Devices:**

List of connected devices

**5.3.2 Modules**

**In this tab, the user has can assign modules into the specific slots. He can also change the setting for downloading the slot configuration to the SubDevice:**

**Connect module to slot (“<<”)**

Used for connecting the selected module (from the right list) to the selected slot (from the left list). If the slot is already connected, the module will be inserted and the subsequent modules will be moved (if this is supported from the SubDevice)

**Disconnect module from slot (“X”)**

Used for disconnecting the selected slot (left list)

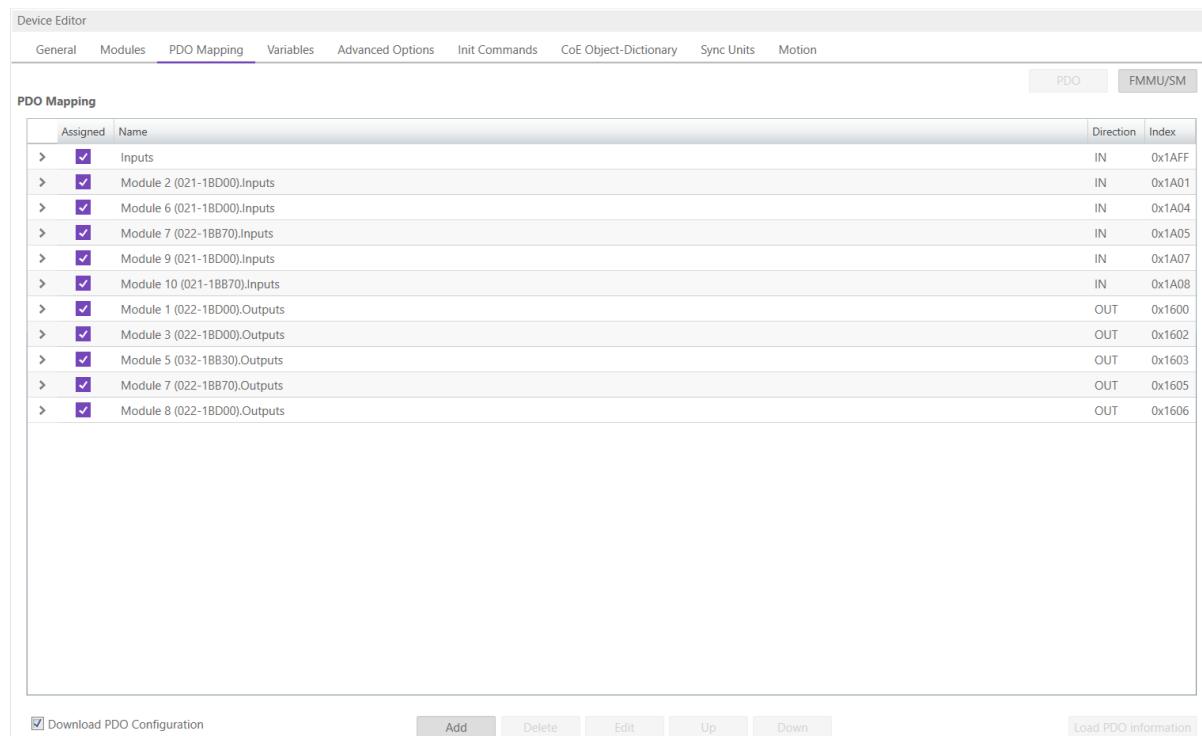
**Note:** The modules can be also connected and disconnected by using the context menu in the project explorer.

### 5.3.3 PDO Mapping

This tab consists of 2 views:

#### PDO

**In this tab, the user can see the current PDO mappings. For some SubDevice types the user can activate or deactivate some PDO configurations:**



Assigned	Name	Direction	Index
> <input checked="" type="checkbox"/>	Inputs	IN	0x1AFF
> <input checked="" type="checkbox"/>	Module 2 (021-1BD00).Inputs	IN	0x1A01
> <input checked="" type="checkbox"/>	Module 6 (021-1BD00).Inputs	IN	0x1A04
> <input checked="" type="checkbox"/>	Module 7 (022-1BB70).Inputs	IN	0x1A05
> <input checked="" type="checkbox"/>	Module 9 (021-1BD00).Inputs	IN	0x1A07
> <input checked="" type="checkbox"/>	Module 10 (021-1BB70).Inputs	IN	0x1A08
> <input checked="" type="checkbox"/>	Module 1 (022-1BD00).Outputs	OUT	0x1600
> <input checked="" type="checkbox"/>	Module 3 (022-1BD00).Outputs	OUT	0x1602
> <input checked="" type="checkbox"/>	Module 5 (032-1BB30).Outputs	OUT	0x1603
> <input checked="" type="checkbox"/>	Module 7 (022-1BB70).Outputs	OUT	0x1605
> <input checked="" type="checkbox"/>	Module 8 (022-1BD00).Outputs	OUT	0x1606

#### Lists of inputs or outputs

##### Checkbox:

Signals if PDO will be used for the current configuration or not.

#### Buttons

##### Add/Delete/Edit:

Used for changing the lists, if it is allowed by the ESI. First the list which should be changed must be selected.

##### Up/Down:

Moving the selected PDO in the selected list up or down

##### Load PDO information:

If EC-Engineer is connected to the control system, the user can load the PDO information directly from the SubDevice

#### Context Menu

##### Both lists provide a context menu:

Device Editor

General Modules PDO Mapping Variables Advanced Options Init Commands CoE Object-Dictionary Sync Units Motion

PDO FMMU/SM

**PDO Mapping**

Assigned	Name	Direction	Index
> ✓	Inputs	IN	0x1AFF
> ✓	Module 2 (021-1BD00).Inputs	IN	0x1A01
> ✓	Module 6 (021-1BD00).Inputs	IN	0x1A04
> ✓	Module 7 (022-1BB70).Inputs	IN	0x1A05
> ✓	Module 9 (021-1BD00).Inputs	IN	0x1A07
> ✓	Module 10 (021-1BB70).Inputs	IN	0x1A08
> ✓	Module 1 (022-1BD00).Outputs	OUT	0x1600
> ✓	Module 3 (032-1BB30).Outputs	OUT	0x1602
> ✓	Module 5 (032-1BB30).Outputs	OUT	0x1603
> ✓	Module 7 (022-1BB70).Outputs	OUT	0x1605
> ✓	Module 8 (022-1BD00).Outputs	OUT	0x1606

Expand All  
Collapse All  
Select All  
Unselect All

Download PDO Configuration

Add Delete Edit Up Down Load PDO information

If user wants to add or edit a PDO, he will see the following dialog:

**Edit PDO**

**General**

Name	Inputs
Index	0x1AFF
	Dec Hex

**Flags**

Mandatory  
 Fixed Content  
 Virtual PDO

**Direction**

TxPdo  
 RxPdo

**Optional**

Exclude:

- 1A01
- 1A04
- 1A05
- 1A07
- 1A08

**Entries**

Name	Index	Bit Length	Comment
Hardware Interrupt Counter	0xF100:01	32	When Auto-/ process alarm
			Write on obj the alarm res
			When Auto-/ diagnostic al:

Add Delete Edit Up Down OK Cancel

**General:****Name:**

Name of the PDO

**Index:**

Index of the PDO (can be entered in hexadecimal or decimal)

**Flags:****Mandatory:**

PDO cannot be deleted

**Fixed Content:**

Content of PDO cannot be changed

**Virtual PDO:**

PDO has no entries

**Direction:****TxPdo:**

Input PDO

**RxPdo:**

Output PDO

**Sync Manager:**

Selected the Sync Manager, which should be used (only visible if more than one can be used)

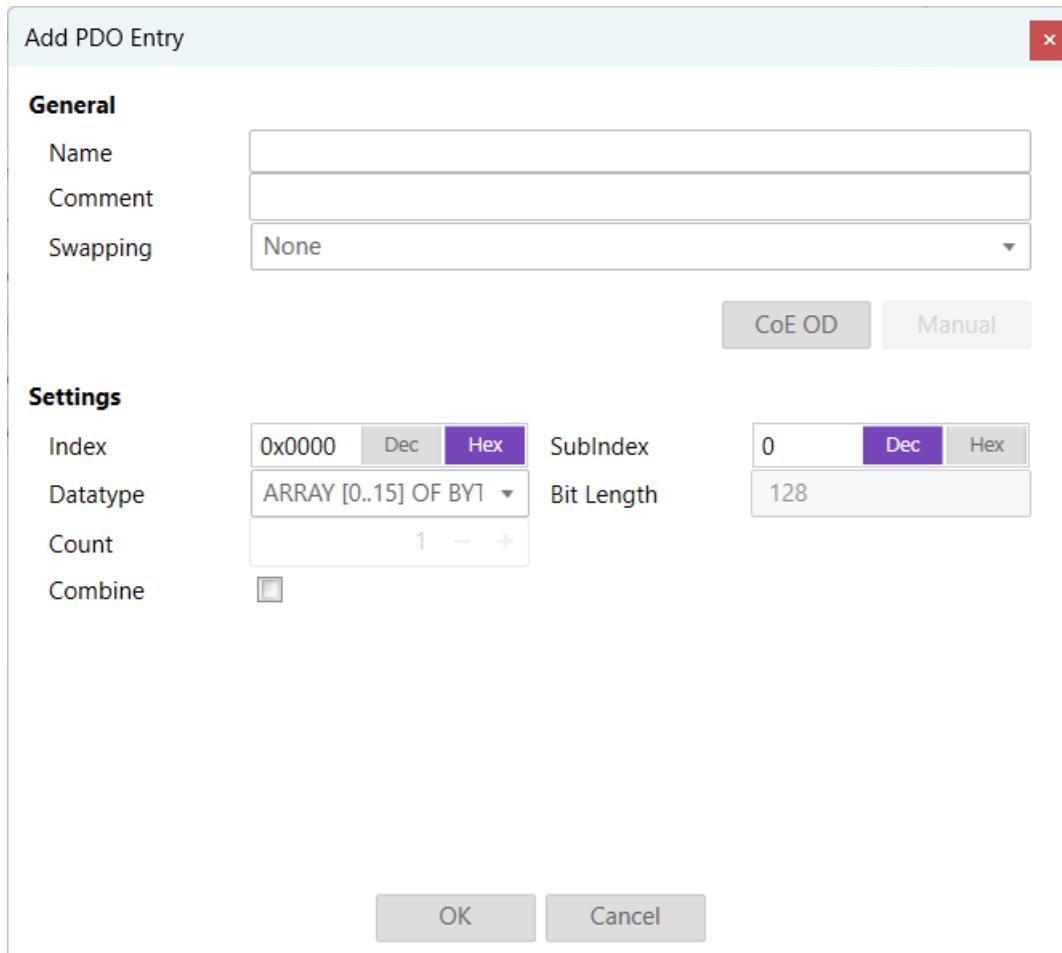
**Exclude:**

Select the PDOs which cannot be activated if this PDO is activated

**Entries:**

List of configured PDO entries

**If user wants to add or edit a PDO entry, he will see the following dialog:**



## General

### Name:

Name of the PDO entry

### Comment:

Comment of the PDO entry

### Swapping:

Swapping mode of the PDO entry

The user can either add the entry from the CoE Object-Dictionary or manually input it.

## Modes

### CoE OD:

If the Object-Dictionary is supported by the SubDevice, the user can choose an object from it.

### Manual:

The user can manually enter the information of the entry in this mode.

## Settings

### Index:

Index of the PDO entry (can be entered in hexadecimal or decimal)

### Subindex:

Subindex of the PDO entry (hexadecimal)

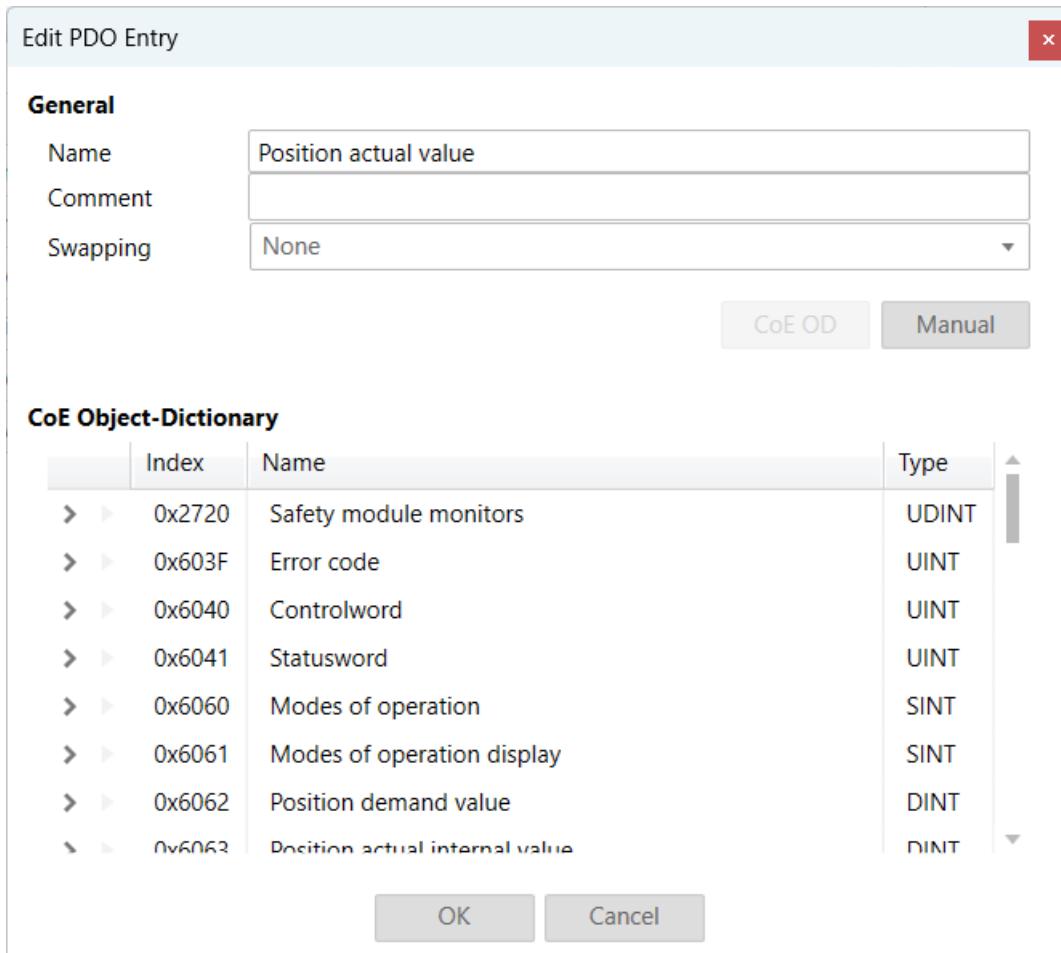
**Datatype:**

List of available datatypes

**Bit Length:**

Length of the PDO entry in bits

CoE Object-Dictionary (loaded only if Object-Dictionary is supported by SubDevice)

**General****Name:**

Name of the PDO entry

**Comment:**

Comment of the PDO entry

**Swapping:**

Swapping mode of the PDO entry

## FMMU/SM (Expert)

In this tab, the user can see some information about FMMU and SyncManager:

Device Editor																																									
General	PDO Mapping	Variables	Ethernet	Advanced Options	Distributed Clocks	Init Commands	Sync Units																																		
PDO						FMMU/SM																																			
<b>FMMU</b>																																									
<table border="1"> <thead> <tr> <th>No</th><th>Type</th><th>Logical Start Address</th><th>Length</th><th>Logical End Bit</th><th>Physical Address</th><th>Sm</th><th>Su</th></tr> </thead> <tbody> <tr> <td>0</td><td>Mailbox State</td><td>0x09000000.5</td><td>1</td><td>5</td><td>0x080D</td><td>-</td><td>-</td></tr> <tr> <td>1</td><td>Outputs</td><td>0x1000008B.0</td><td>6</td><td>7</td><td>0x1000</td><td>-</td><td>-</td></tr> <tr> <td>2</td><td>Inputs</td><td>0x1000008B.0</td><td>6</td><td>7</td><td>0x1400</td><td>-</td><td>-</td></tr> </tbody> </table>							No	Type	Logical Start Address	Length	Logical End Bit	Physical Address	Sm	Su	0	Mailbox State	0x09000000.5	1	5	0x080D	-	-	1	Outputs	0x1000008B.0	6	7	0x1000	-	-	2	Inputs	0x1000008B.0	6	7	0x1400	-	-			
No	Type	Logical Start Address	Length	Logical End Bit	Physical Address	Sm	Su																																		
0	Mailbox State	0x09000000.5	1	5	0x080D	-	-																																		
1	Outputs	0x1000008B.0	6	7	0x1000	-	-																																		
2	Inputs	0x1000008B.0	6	7	0x1400	-	-																																		
<b>SM</b>																																									
<table border="1"> <thead> <tr> <th>No</th><th>Type</th><th>Start Address</th><th>Length</th><th>Buffer Mode</th><th>Enable</th><th>Virtual</th></tr> </thead> <tbody> <tr> <td>0</td><td>Mailbox Outputs</td><td>0x1800</td><td>234</td><td>1</td><td>1</td><td>0</td></tr> <tr> <td>1</td><td>Mailbox Inputs</td><td>0x1A00</td><td>234</td><td>1</td><td>1</td><td>0</td></tr> <tr> <td>2</td><td>Outputs</td><td>0x1000</td><td>6</td><td>3</td><td>1</td><td>0</td></tr> <tr> <td>3</td><td>Inputs</td><td>0x1400</td><td>6</td><td>1</td><td>1</td><td>0</td></tr> </tbody> </table>							No	Type	Start Address	Length	Buffer Mode	Enable	Virtual	0	Mailbox Outputs	0x1800	234	1	1	0	1	Mailbox Inputs	0x1A00	234	1	1	0	2	Outputs	0x1000	6	3	1	0	3	Inputs	0x1400	6	1	1	0
No	Type	Start Address	Length	Buffer Mode	Enable	Virtual																																			
0	Mailbox Outputs	0x1800	234	1	1	0																																			
1	Mailbox Inputs	0x1A00	234	1	1	0																																			
2	Outputs	0x1000	6	3	1	0																																			
3	Inputs	0x1400	6	1	1	0																																			

### Lists of FMMUs

Available FMMUs comes from the ESI file.

### Lists of SyncManagers

Available SyncManagers comes from the ESI file.

### 5.3.4 Variables

In this tab, the user can see the variables of the SubDevice and if it is allowed he can also add/edit/delete/move variables. Also “Add to watchlist” is possible:

Device Editor

General Modules PDO Mapping Variables Ethernet Advanced Options Distributed Clocks Init Commands CoE Object-Dictionary Sync Units

**Variables**

Name	Datatype	MainDevice Sync Unit	Offset	Size
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis A.Status word	UINT	Id 1000: MainDeviceSyncUnit 1000	IN : 57.0	2.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis A.Actual motor position	DINT	Id 1000: MainDeviceSyncUnit 1000	IN : 59.0	4.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis A.Position loop error	DINT	Id 1000: MainDeviceSyncUnit 1000	IN : 63.0	4.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis A.Actual motor velocity	DINT	Id 1000: MainDeviceSyncUnit 1000	IN : 67.0	4.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis A.Torque actual value	INT	Id 1000: MainDeviceSyncUnit 1000	IN : 71.0	2.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis B.Status word	UINT	Id 1000: MainDeviceSyncUnit 1000	IN : 73.0	2.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis B.Actual motor position	DINT	Id 1000: MainDeviceSyncUnit 1000	IN : 75.0	4.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis B.Position loop error	DINT	Id 1000: MainDeviceSyncUnit 1000	IN : 79.0	4.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis B.Actual motor velocity	DINT	Id 1000: MainDeviceSyncUnit 1000	IN : 83.0	4.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis B.Torque actual value	INT	Id 1000: MainDeviceSyncUnit 1000	IN : 87.0	2.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis A.Status word	UINT	Id 1000: MainDeviceSyncUnit 1000	IN : 89.0	2.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis A.Actual motor position	DINT	Id 1000: MainDeviceSyncUnit 1000	IN : 91.0	4.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis A.Position loop error	DINT	Id 1000: MainDeviceSyncUnit 1000	IN : 95.0	4.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis A.Torque actual value	DINT	Id 1000: MainDeviceSyncUnit 1000	IN : 99.0	4.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis B.Status word	UINT	Id 1000: MainDeviceSyncUnit 1000	IN : 103.0	2.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis B.Actual motor position	DINT	Id 1000: MainDeviceSyncUnit 1000	IN : 105.0	2.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis B.Position loop error	DINT	Id 1000: MainDeviceSyncUnit 1000	IN : 107.0	4.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis B.Actual motor velocity	DINT	Id 1000: MainDeviceSyncUnit 1000	IN : 111.0	4.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis B.Torque actual value	DINT	Id 1000: MainDeviceSyncUnit 1000	IN : 115.0	4.0

Add to watch list

Edit Variable

Move Up Move Down

New Alias Edit Alias Delete Alias

New Edit Delete

## Lists of Variables

Variables comes from the ESI file or will be generated from the configurator.

## Buttons

### New/Edit/Delete:

Used for changing the list.

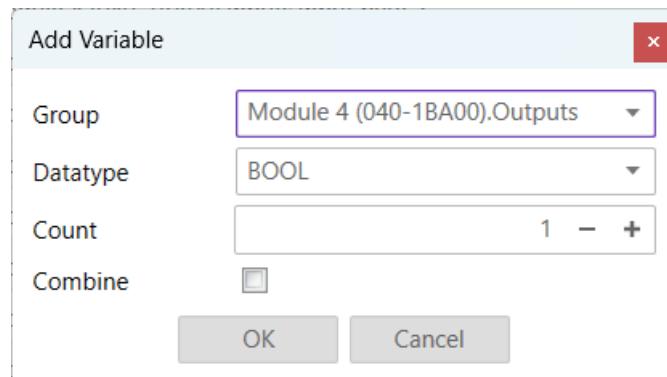
### Up/Down:

Moving the selected variable up or down

### New/Edit/Delete Alias:

Used for changing alias variables

If user wants to add a variable, he will see the following dialog:



## Options

### Group:

List of possible groups, where the new variable should be added

**Datatype:**

List of possible datatypes of the new variable

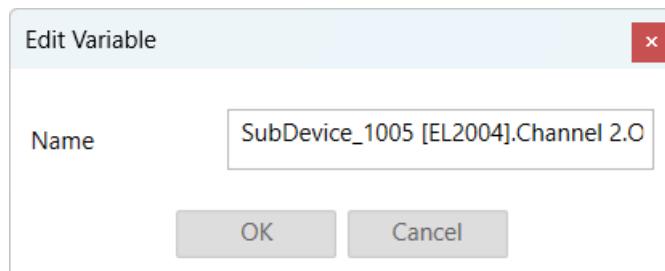
**Count:**

Number of variables, which should be added

**Combie:**

Combines all variables to an array

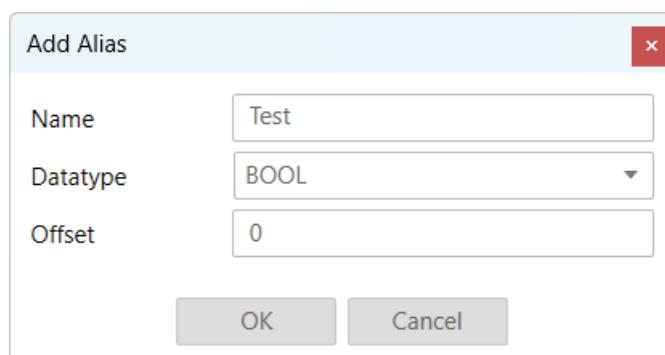
If user wants to edit a variable, he will see the following dialog:

**Options****Name:**

Name of the variable, which can be changed from the user

If user wants split a variable into multiple parts to build e.g. a structure, he can add an alias to a variable.

In that case he will see the following dialog:

**Options****Name:**

Name of the alias

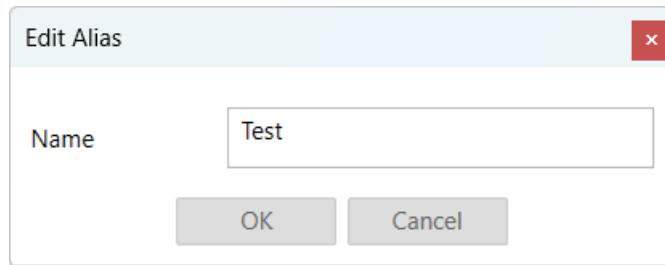
**Datatype:**

List of possible datatypes of the new alias

**Offset:**

Bit offset of the alias

If user wants to edit a alias, he will see the following dialog:



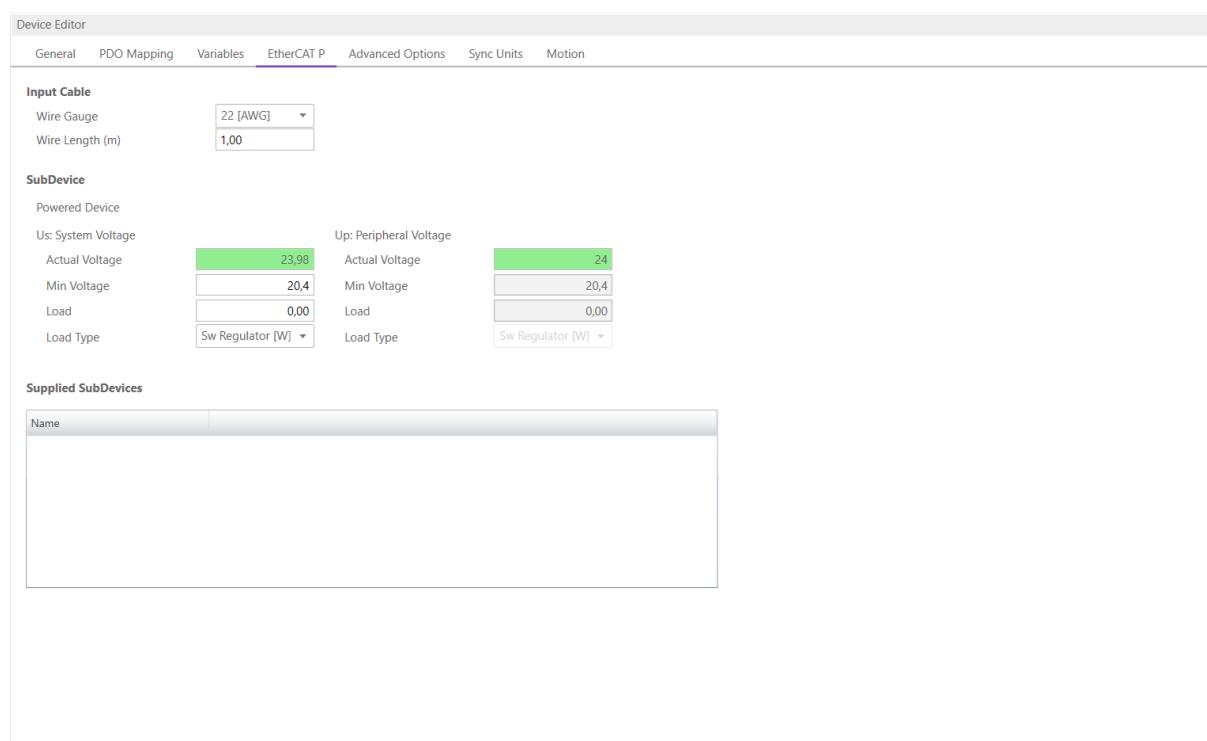
## Options

### Name:

Name of the alias, which can be changed from the user

## 5.3.5 EtherCAT P

**In this tab, the user can configure the selected EtherCAT P SubDevice. The Tab is only visible when the selected SubDevice is an EtherCAT P SubDevice:**



### Wire Gauge:

The wire type of the input cable

### Wire Length:

The wire length of the input cable

### Us:

#### System Voltage

**The system voltage shall supply all internal and externally connected types of sensors and inputs.  
All bus system relevant parts of the device shall completely be powered by the Us.**

**Actual Voltage:**

The actual voltage at the SubDevice

**Min Voltage:**

The min Voltage the SubDevice needs. Value is from ESI but also editable.

**Load:**

The Load which is externally needed.

**Load Type:**

The Load Type of the externally needed load

**Up:****Peripheral Voltage:**

**Up is used to supply internal and externally connected actuators and outputs.**

**Actual Voltage:**

The actual voltage for the outputs

**Min Voltage:**

The min Voltage the SubDevice needs. Value is from ESI but also editable.

**Load:**

The Load which is externally needed.

**Load Type:**

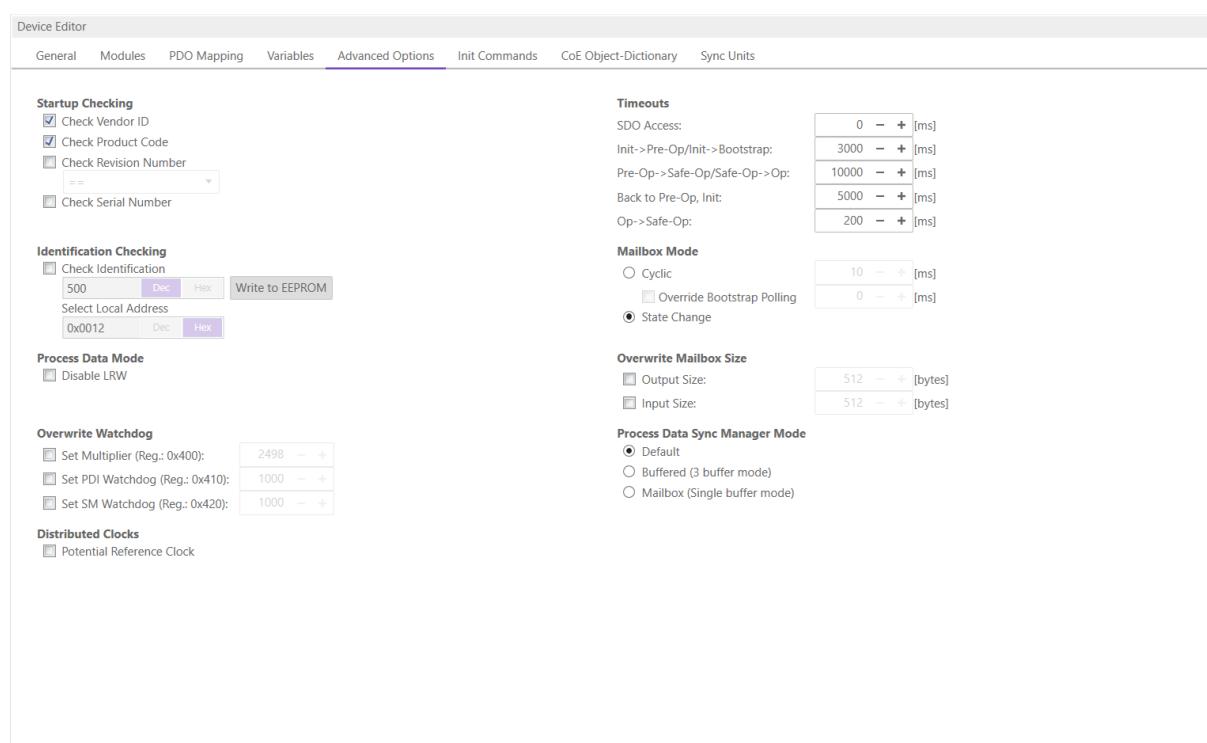
The Load Type of the externally needed load

**Load Types:**

Sw Regulator in Watt LDO in Ampere Resistor in Ohm

### 5.3.6 Advanced SubDevice Options

**In this tab, the user can change advanced options of the SubDevice:**



**Advanced Options Tab Content:**

- Startup Checking:**
  - Check Vendor ID
  - Check Product Code
  - Check Revision Number
    - ==
    - !=
  - Check Serial Number
- Identification Checking:**
  - Check Identification
    - 500
    - Dec
    - Hex
  - Write to EEPROM
  - Select Local Address
    - 0x0012
    - Dec
    - Hex
- Process Data Mode:**
  - Disable LRW
- Overwrite Watchdog:**
  - Set Multiplier (Reg.: 0x400): 2498
  - Set PDI Watchdog (Reg.: 0x410): 1000
  - Set SM Watchdog (Reg.: 0x420): 1000
- Distributed Clocks:**
  - Potential Reference Clock
- Timeouts:**

SDO Access:	0	+	[ms]
Init->Pre-Op/Init->Bootstrap:	3000	+	[ms]
Pre-Op->Safe-Op/Safe-Op->Op:	10000	+	[ms]
Back to Pre-Op, Init:	5000	+	[ms]
Op->Safe-Op:	200	+	[ms]
- Mailbox Mode:**
  - Cyclic
  - Override Bootstrap Polling
  - State Change
- Overwrite Mailbox Size:**
  - Output Size: 512
  - Input Size: 512
- Process Data Sync Manager Mode:**
  - Default
  - Buffered (3 buffer mode)
  - Mailbox (Single buffer mode)

## Startup Checking

**MainDevice will check the Vendor ID, Product code, Revision number if the state machine changes from INIT to PREOP of the SubDevice. Revision number can be verified by six ways:**

- “==” → HI word is equal, LO word is equal
- “>=” → HI word is equal or greater, LO word is equal or greater
- “LW ==” → HI word is equal
- “LW ==, HW >=” → LO word is equal, HI word is equal or greater
- “HW ==” → LO word is equal
- “HW ==, LW >=” → HI word is equal, LO word is equal or greater

## Identification Checking

If ‘Check Identification is selected, the Identification Value of the SubDevice is checked. In the ‘Select Local Address’ Box is the register of the Identification Value.

## Process Data Mode

Disable LRW: Determines whether LRD/LWR command or the LRW command is used for accessing process data. Cable redundancy needs LRD/LWR, SubDevice-to-SubDevice-copy needs LRW.

## Watchdog

### Set Multiplier:

Writes the configured value to the corresponding SubDevice register: 0x0400

### Set PDI Watchdog:

Writes the configured value to the corresponding SubDevice register: 0x0410 (0 = Watchdog is disabled)

### Set SM Watchdog:

Writes the configured value to the corresponding SubDevice register: 0x0420 (0 = Watchdog is disabled)

## Distributed Clocks

### Potential Reference Clock: Set to use SubDevice as a potential reference clock

- This might be useful, if e.g. a hot connect SubDevice, which is used as reference clock, was disconnected from the network
- In that case the EC-Master searches for the first potential reference clock
- If no potential reference clock SubDevice was found, the first DC SubDevice will be used

## Timeouts

### SDO Access:

Internal MainDevice timeout which is used for accessing the SDO (0 = Use internal default value of the MainDevice)

### Init → PreOp:

Internal MainDevice timeout with is used for changing SubDevice state

### Pre-Op → Save-Op or Safe-Op → Op:

Internal MainDevice timeout with is used for changing SubDevice state

### Back to Pre-Op, Init:

Internal MainDevice timeout with is used for changing SubDevice state

### Op → Safe-Op:

Internal MainDevice timeout with is used for changing SubDevice state

## Mailbox Mode

**Cyclic:**

Interval in milliseconds within the input mailbox will be read (polling mode)

**Override Bootstrap Polling**

Interval in milliseconds within the bootstrap will be read (when activated, it uses the polling time from the mailbox by default)

**State Change:**

The input mailbox will be read only if the status bit is set

## Overwrite Mailbox Size

**Output Size:**

Overwrites mailbox output size

**Input Size:**

Overwrites mailbox input size

## Process Data Sync Manager Mode

**Default:**

Uses sync manager mode from ESI file

**Buffered (3 buffer mode):**

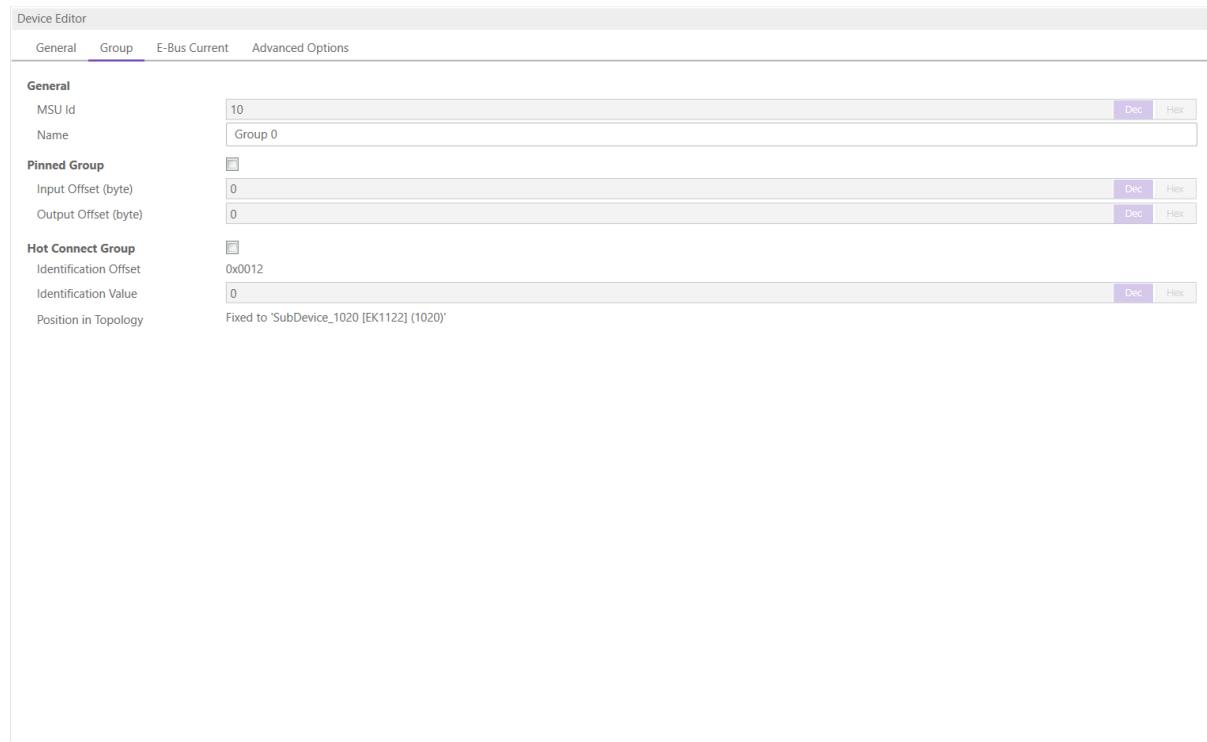
Enables 3 buffer mode

**Mailbox (Single buffer mode):**

Enables single buffer mode

## 5.3.7 (Hot Connect) Groups

In this tab, the user can choose if this group has a fixed offset in the process data image or if this group is a hot connect group:



**Note:** Tab is only visible if SubDevice is the first member of a group.

## General

### MSU Id:

Generated MainDevice Sync Unit Id

### Name:

Name of the group

## Pinned Group

### Input Offset:

Fixed input offset of the group in the process data image in bytes

### Output Offset:

Fixed output offset of the group in the process data image in bytes

## Hot Connect Group

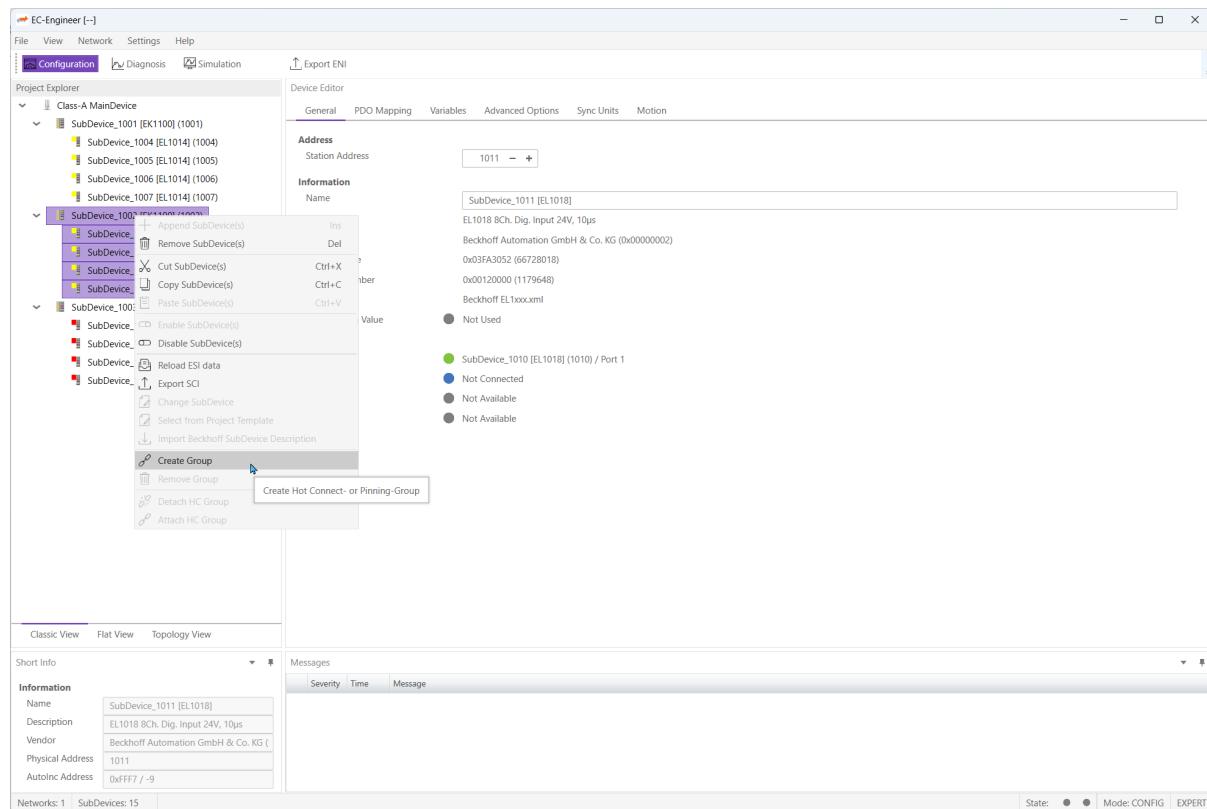
### Identification Offset:

Register offset where the identification can be read from the SubDevice

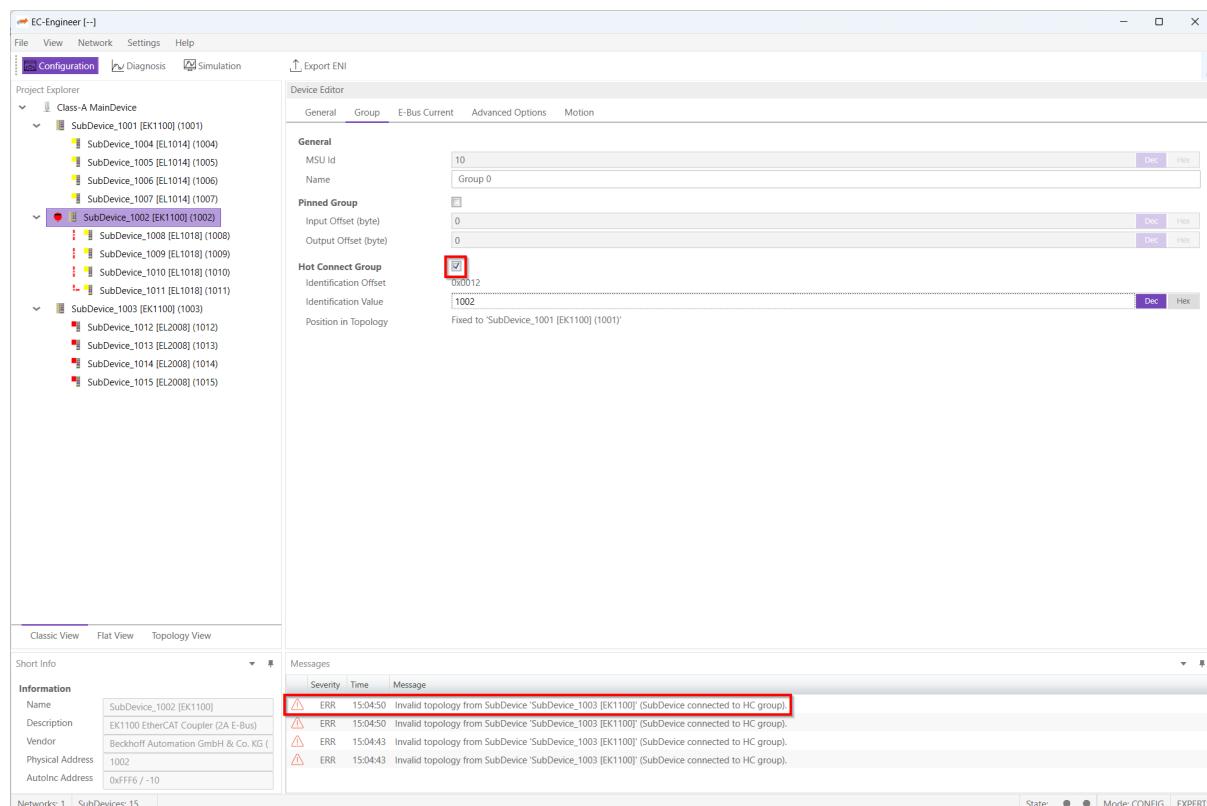
### Identification Value:

Hardware identification value or configured station alias address can be used. For more information about the configured station alias address, see [EEPROM](#)

**A new group can be created by selecting all SubDevices (by using the SHIFT key or the CTRL key), open the context menu and select *Create Group* in the project explorer:**



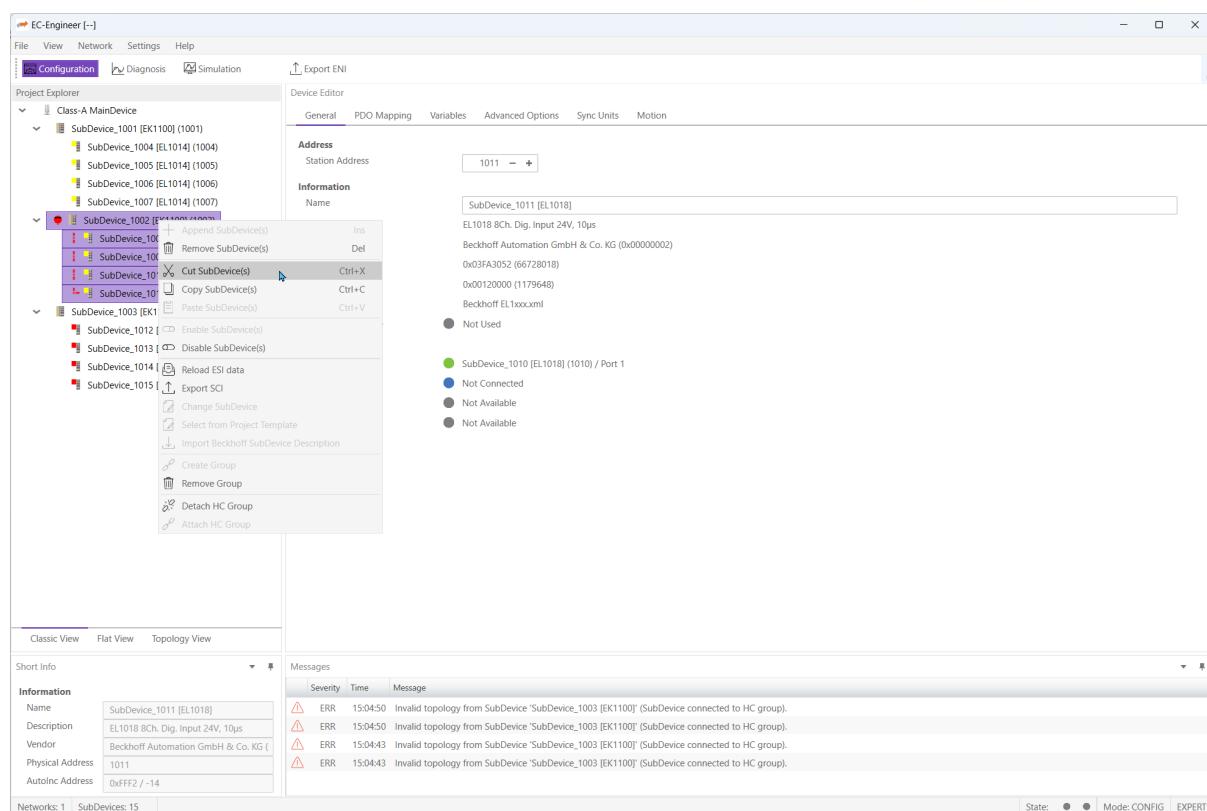
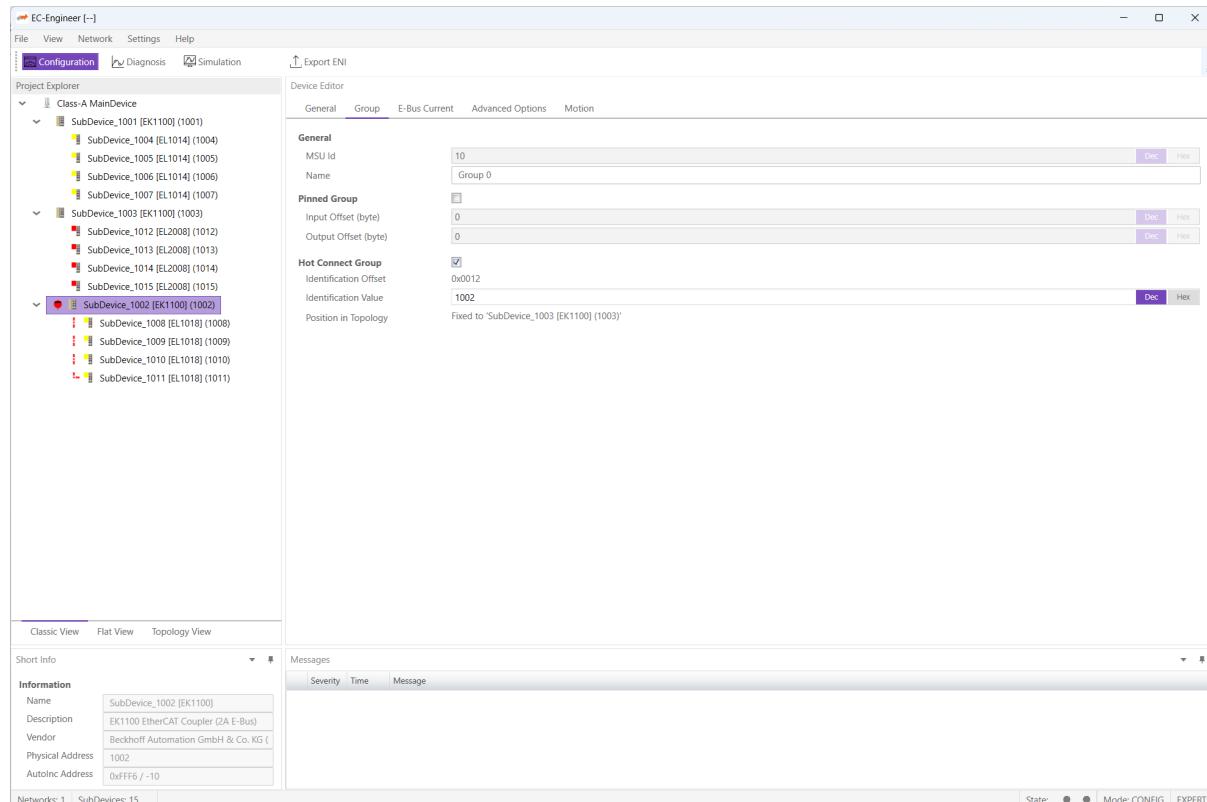
The new group can be modified by selecting the head SubDevice of this group and open tag **Group**:



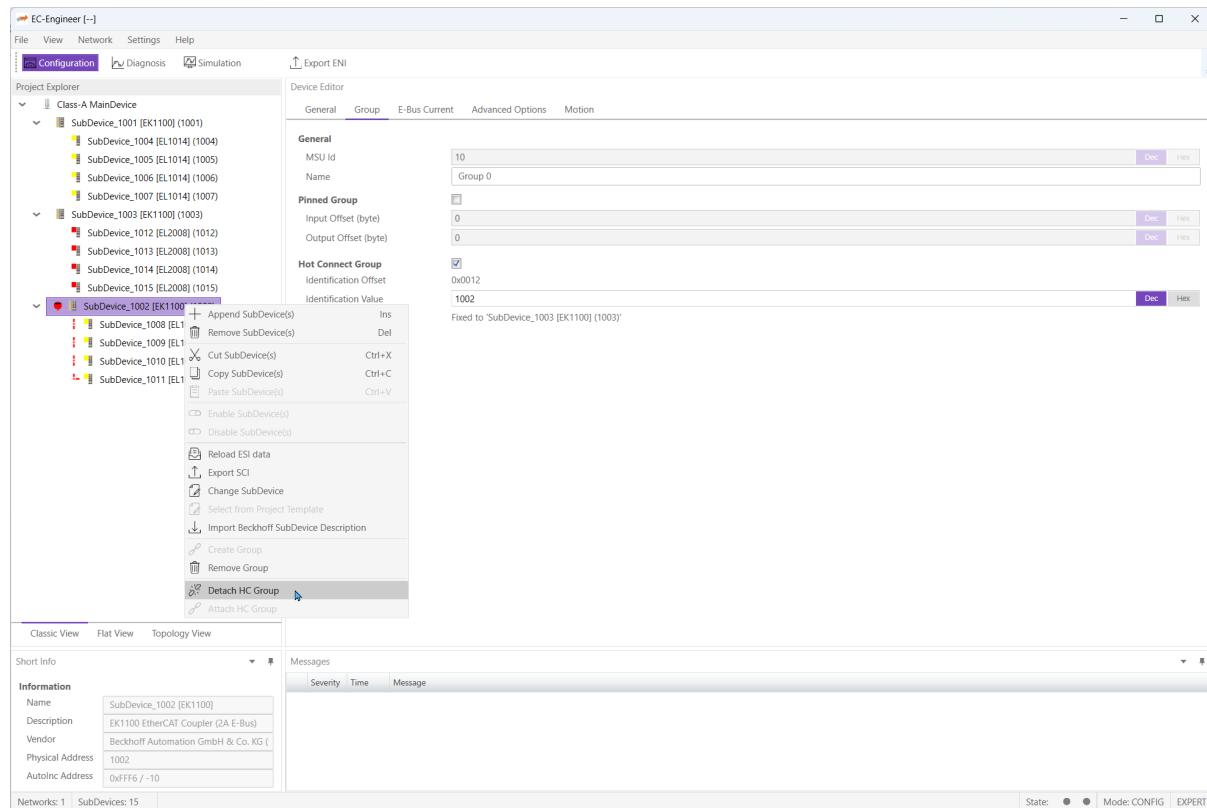
On this tab, the user can pin this group of SubDevices to a specific offset in the process image and / or build a hot connect group. If we do this, in that case this will generate an invalid topology error, because a normal SubDevice is

still connected to this hot connected, which is not allowed.

**In that case we can use “cut & paste” to solve this issue by connecting this hot connect group to the end of the SubDevices:**



**Now, we have a hot connect group which is connectable only to SubDevice 1011. If we want to connect this group to any SubDevice on the network, we have to detach the group:**



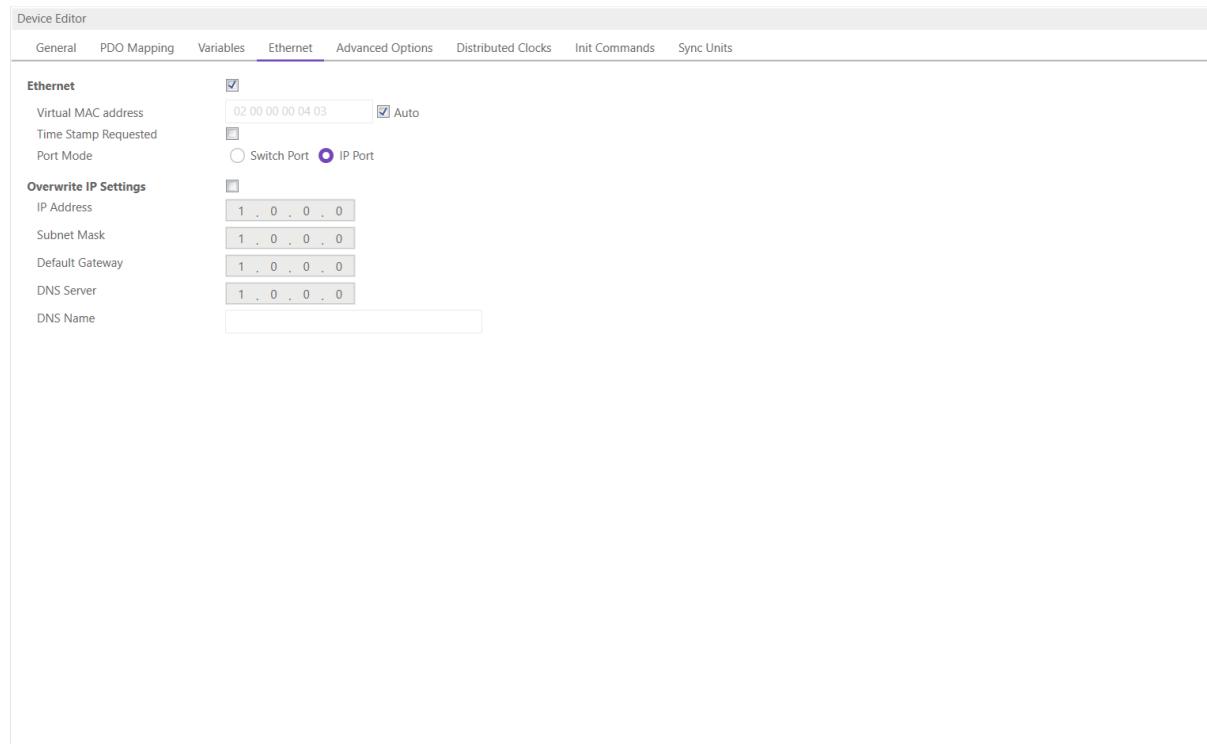
A group can be deleted by selecting the head SubDevice of this group, open the context menu and select “Remove Group” in the project explorer (only attached HC groups can be deleted).

#### Possible group related error messages:

- Detached group can not be attached to the old position in the tree (e.g. previous SubDevices was deleted or disabled) the head SubDevice of the group will be reported as “not connected”. In that case the user can connect the head SubDevice by using “cut” and “paste”.
- Invalid topology from SubDevice (fixed HC group on MainDevice) was displayed: this means that the first HC group which is connected to the MainDevice should be detached, because this is not valid in the ENI file
- Invalid topology from SubDevice (SubDevice connected to HC group) was displayed: this means that a normal SubDevice is connected to a hot connect group and should be also moved also into a hot connect group or moved to another position in the tree

### 5.3.8 Ethernet (EoE)

In this tab, the user can activate EoE support and change the settings:



### **Ethernet (activates EoE support):**

#### **Virtual MAC address:**

Virtual MAC address. If “Auto” is checked, the Virtual MAC address will be generated from the Station Address, e.g. Station Address is “1010” (= 0x03F2), will generate the Virtual MAC address: “01 00 00 00 03 F2”

#### **Time Stamp Requested:**

SubDevice will response with the exact send time and the same Frame Number and he should response as soon as possible

#### **Port Mode:**

SubDevice can run in “Switch Port” or in “IP Port” mode

#### **Override IP Settings:**

All IP settings will be overwritten from MainDevice like IP Address, Subnet Mask, Default Gateway, DNS Server and DNS Name.

### 5.3.9 EEPROM (Expert)

This tab consists of two views:

#### Smart View

In this view, the user can see the values of the EEPROM from the ESI file.

EEPROM Values			
Index	Name	Value	Type
0x0000	PDI Control	1029 (0x405)	UINT
0x0001	PDI Configuration	3 (0x0003)	UINT
0x0002	Pulse Length of SYNC Signals	0 (0x0000)	UINT
0x0003	Extended PDI Configuration	0 (0x0000)	UINT
0x0004	Configured Station Alias	0 (0x0000)	UINT
0x0005	Reserved	0 (0x00000000)	UDINT
0x0007	Checksum	241 (0x00F1)	UINT
0x0008	Vendor ID	2 (0x00000002)	UDINT
0x000A	Product Code	407908434 (0x18503052)	UDINT
0x000C	Revision Number	1376256 (0x00150000)	UDINT
0x000E	Serial Number	0 (0x00000000)	UDINT
0x0010	Execution Delay	0 (0x0000)	UINT
0x0011	Port0 Delay	0 (0x0000)	UINT
0x0012	Port1 Delay	0 (0x0000)	UINT
0x0013	Reserved	0 (0x0000)	UINT
0x0014	Bootstrap Receive Mailbox Offset	4096 (0x1000)	UINT
0x0015	Bootstrap Receive Mailbox Size	244 (0x00F4)	UINT
0x0016	Bootstrap Send Mailbox Offset	4340 (0x10F4)	UINT
0x0017	Bootstrap Send Mailbox Size	244 (0x00F4)	UINT
0x0018	Standard Receive Mailbox Offset	4096 (0x1000)	UINT
0x0019	Standard Receive Mailbox Size	256 (0x0100)	UINT
0x001A	Standard Send Mailbox Offset	4352 (0x1100)	UINT
0x001B	Standard Send Mailbox Size	256 (0x0100)	UINT
0x001C	Mailbox Protocol	13 (AoE; CoE; FoE)	UINT
0x001D	Reserved	0 (0x00000000)	UDINT

#### Hex View

In this view, the user can create an EEPROM from an ESI file and save the EEPROM to disk.

EEPROM			
0000: 05 04 03 00 00 00 00 00 00 00 00 00 00 00 00 00 F1 00	.....	.....	.....
0010: 02 00 00 00 52 30 50 18 00 00 15 00 00 00 00 F1 00	.....ROP	.....	.....
0020: 00 00 00 00 00 00 00 00 00 10 F4 00 F4 10 F4 00	.....	.....	.....
0030: 00 10 00 01 11 00 01 01 0D 00 00 00 00 00 00 00	.....	.....	.....
0040: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.....	.....	.....
0050: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.....	.....	.....
0060: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.....	.....	.....
0070: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.....	.....	.....
0080: 04 00 B6 00 16 00 45 4C 36 32 32 34 0D 43 6F 6D	.....EL 6224.Com	.....	.....
0090: 6D 70 6E 60 63 60 74 69 69 6E 20 43 6F 6D 6D 75	.....municat ion,Commu	.....	.....
00A0: 6C 69 6D 61 61 69 6D 60 20 72 69 65 6B 61 6C 62	.....nication, .Termina	.....	.....
00B0: 6D 73 20 48 4C 36 70 78 29 7 45 5C 5C 52 6C 62	.....l, (EL624 and EL62	.....	.....
00C0: 32 34 20 28 49 4F 20 4C 69 6E 6B 20 4D 61 73 74	.....24, (IO_Link,Mast	.....	.....
00D0: 65 72 29 07 46 72 65 65 52 75 6B 02 44 43 19 44	.....er),Free Run,DC,D	.....	.....
00E0: 65 76 69 63 65 53 74 61 74 65 20 49 6B 70 75 74	.....erviceState,Input	.....	.....
00F0: 73 20 44 65 76 69 63 65 0B 44 65 76 69 63 65 20	.....s,Device ,Device	.....	.....
0100: 44 69 61 67 0C 44 65 76 69 63 65 20 53 74 61 74	.....Diag,Dev ice,Stat	.....	.....
0110: 65 12 44 65 76 69 63 65 53 74 61 74 65 20 49 6E	.....e,Device State,In	.....	.....
0120: 70 75 74 73 09 53 74 61 74 65 20 43 68 31 09 53	.....puts,State,Ch1,S	.....	.....
0130: 74 61 74 65 20 43 68 32 09 53 74 61 74 65 20 43	.....tate,Ch2 ,State,C	.....	.....
0140: 68 33 09 53 74 61 74 65 20 43 68 34 13 49 4F 20	.....h3,State ,Ch4,IO,	.....	.....
0150: 49 68 70 75 74 73 20 43 68 61 6E 6B 65 6C 20 31	.....Inputs,C hannel,1	.....	.....
0160: 13 49 4F 20 49 6B 70 75 74 20 43 68 61 6E 6B	.....IO,Input ts,Chann	.....	.....
0170: 65 60 20 32 13 49 4F 20 49 6E 70 75 74 73 20 43	.....el,2,IO, Inputs,C	.....	.....
0180: 68 61 6E 6B 65 60 20 33 13 49 4F 20 49 6E 70 75	.....hannel,3 ,IO,Inpu	.....	.....
0190: 74 73 20 43 68 61 6E 6E 65 6C 20 34 14 49 4F 20	.....ts,Chann el,4,IO,	.....	.....
01A0: 4F 73 74 70 75 74 73 20 43 68 61 6E 6B 65 6C 20	.....Outputs, Channel,	.....	.....
01B0: 31 14 49 4F 20 47 75 74 70 75 74 73 20 43 68 61	.....1,IO,Out puts,Ch	.....	.....
01C0: 6E 66 65 6C 20 32 14 49 4F 20 4F 75 74 70 75 74	.....hannel,2,I O,Output	.....	.....
01D0: 73 20 43 68 61 6E 65 65 60 20 33 14 49 4F 20 47	.....s,Channe 1,3,IO,O	.....	.....
01E0: 75 74 70 75 74 73 20 43 68 61 6E 6B 60 6C 20 47	.....utputs,C hannel,4	.....	.....
01F0: 1E 00 10 00 02 00 01 04 0C 2F 01 00 00 00 00 04	.....	.....	.....
0200: 78 00 03 00 33 00 00 00 00 00 00 00 00 00 00 00	.....x...3.....	.....	.....
0210: 00 00 00 00 28 00 02 00 01 02 03 FF 29 00 10 00	.....(....)....	.....	.....

#### EEPROM Operations

Timeout (ms)

60000 - +

Data Size (byte)

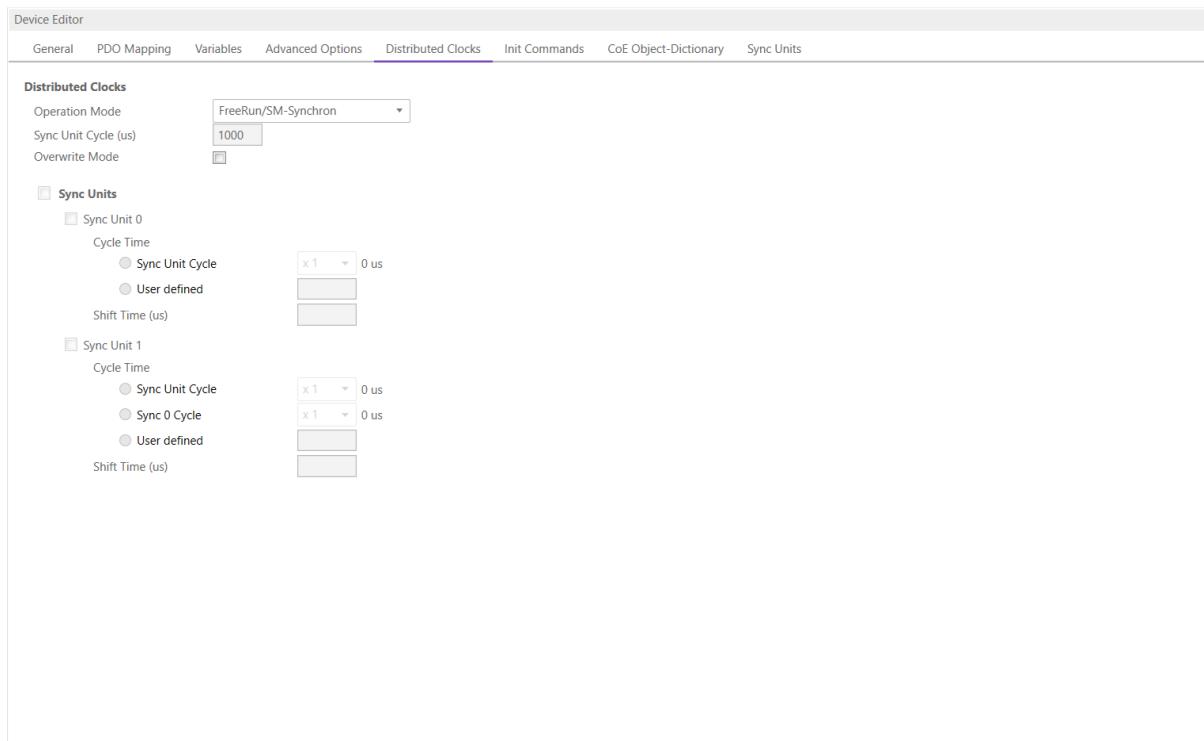
2048 - +

Create from ESI

Save to File

### 5.3.10 Distributed Clock

In this tab, the user can change distributed clock related settings:



#### Reference Clock

##### Operation Mode:

Selectable DC operation modes. The modes cannot be edited.

##### Sync Unit Cycle:

Base interval in microseconds which will be used from MainDevice (see [General](#))

##### Overwrite Mode:

Overwrites the settings of the selected operation mode (might be necessary, if the SubDevice doesn't offer the right operation mode)

#### Sync Units

##### Sync Unit 0

###### Cycle Time

###### Sync Unit Cycle:

Unit is synchronized relative to the Unit Cycle

###### User defined:

Unit has its own interval

###### Shift Time

Unit is adjusted by the shift time

##### Sync Unit 1

## Cycle Time

## Sync Unit Cycle:

Unit is synchronized relative to the Unit Cycle

## Sync 0 Cycle:

Unit is synchronized relative to the first Sync Unit

### User defined:

Unit has its own interval

## Shift Time

Unit is adjusted by the shift time

### 5.3.11 Init Commands (Expert)

In this tab, the user can view the current configured init commands and if it is allowed he can also add/edit/delete init commands:

## Lists of Init Commands

Init Commands comes from the ESI file or will be generated from the configurator. The “Access” column tells the user if this Init Command can be edited (RW = Read/Write) or not (RO = Read-Only).

## Buttons

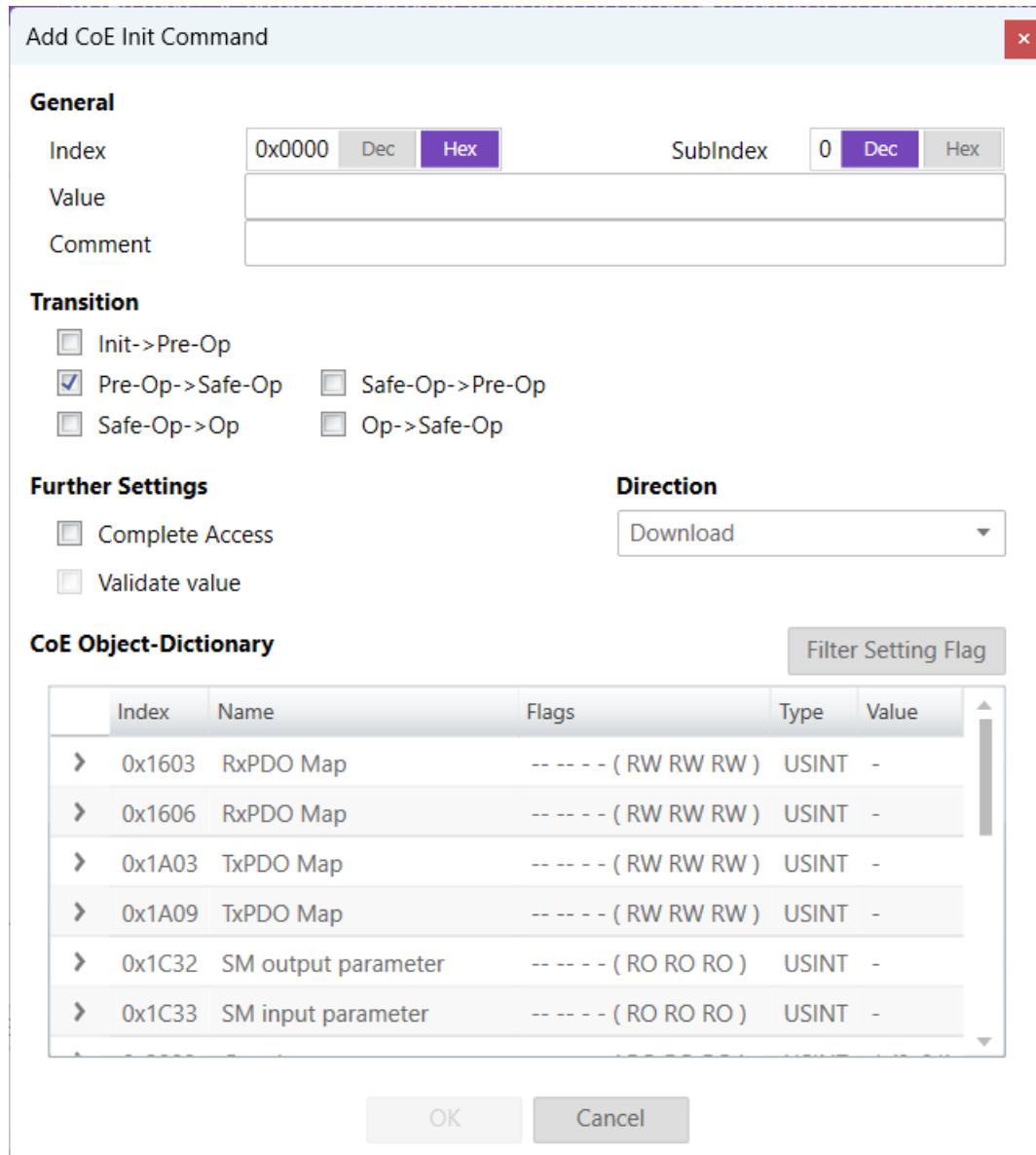
### New/Copy/Edit/Delete:

**Copy/Edit/Delete.** Used for changing the list.

Up/Down:

Moving the selected Init Command up or down

**At the moment only Init Commands of the CoE- and SoE- Protocol can be added or changed. If the user wants to do this he will see the following dialog (CoE):**



## General

### Index:

CoE-Index of the Init Command

### SubIndex:

CoE-SubIndex of the Init Command

### Value:

Value of the Init Command, which should be written in the chose transition (only available if direction is set to "Download"). If type of value is unknown, the hex format must be used like "00 11 22 33 ...".

### Comment:

Comment of the Init Command

## Transition

Determines in which transition the Init Command will be executed

## Further Settings

Determines if the complete SDO object should be written/read

## Direction

**Determines the direction of the Init Command**

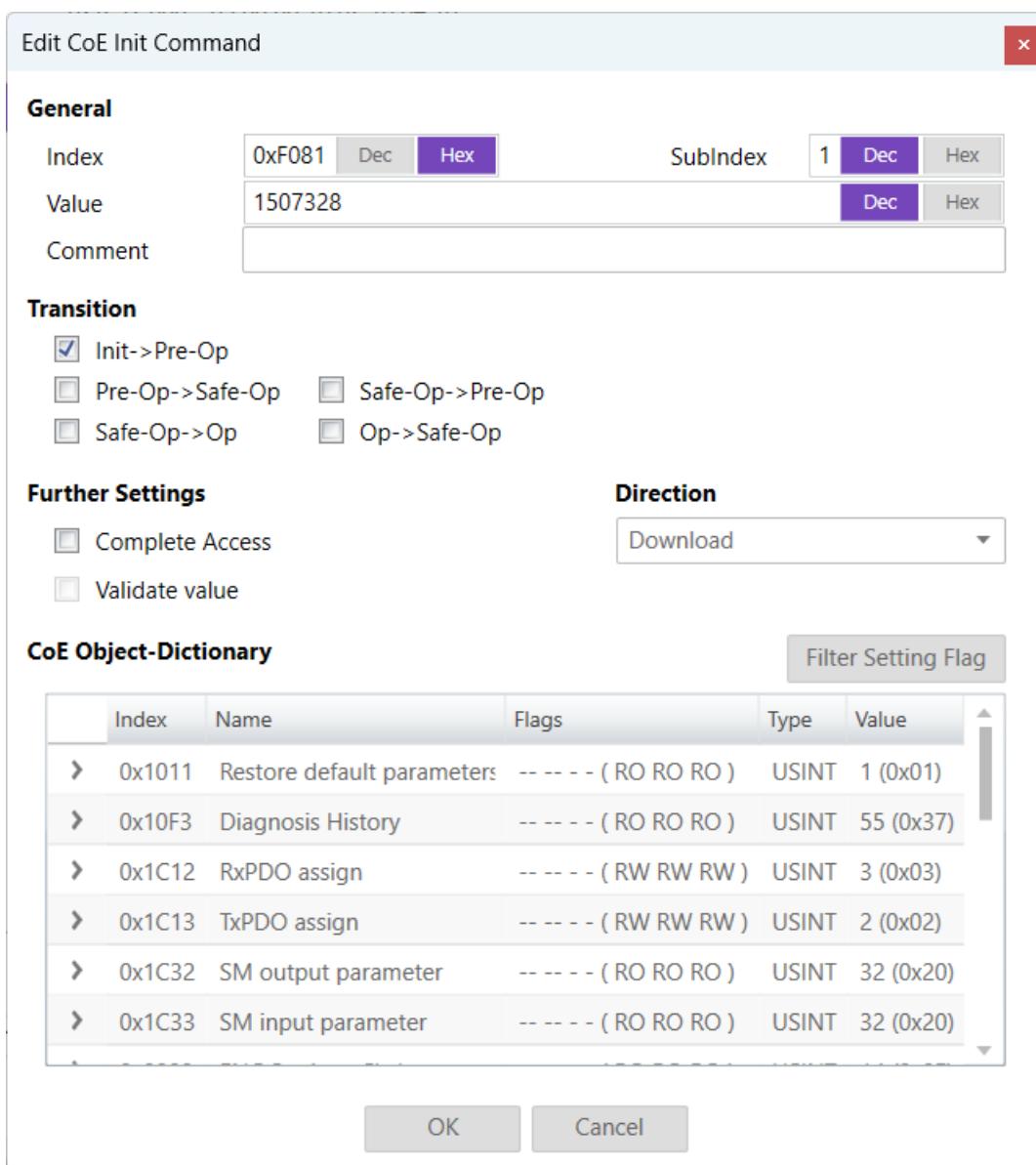
**Download:**

Writes value to SubDevice

**Upload:**

Reads value from SubDevice (e.g. necessary if value must be confirmed)

For SoE the user will see the following dialog:



## General

**Index:**

SoE Idn of the Init Command

**Channel:**

The channel of the Init Command

**Value:**

Value of the Init Command

**Comment:**

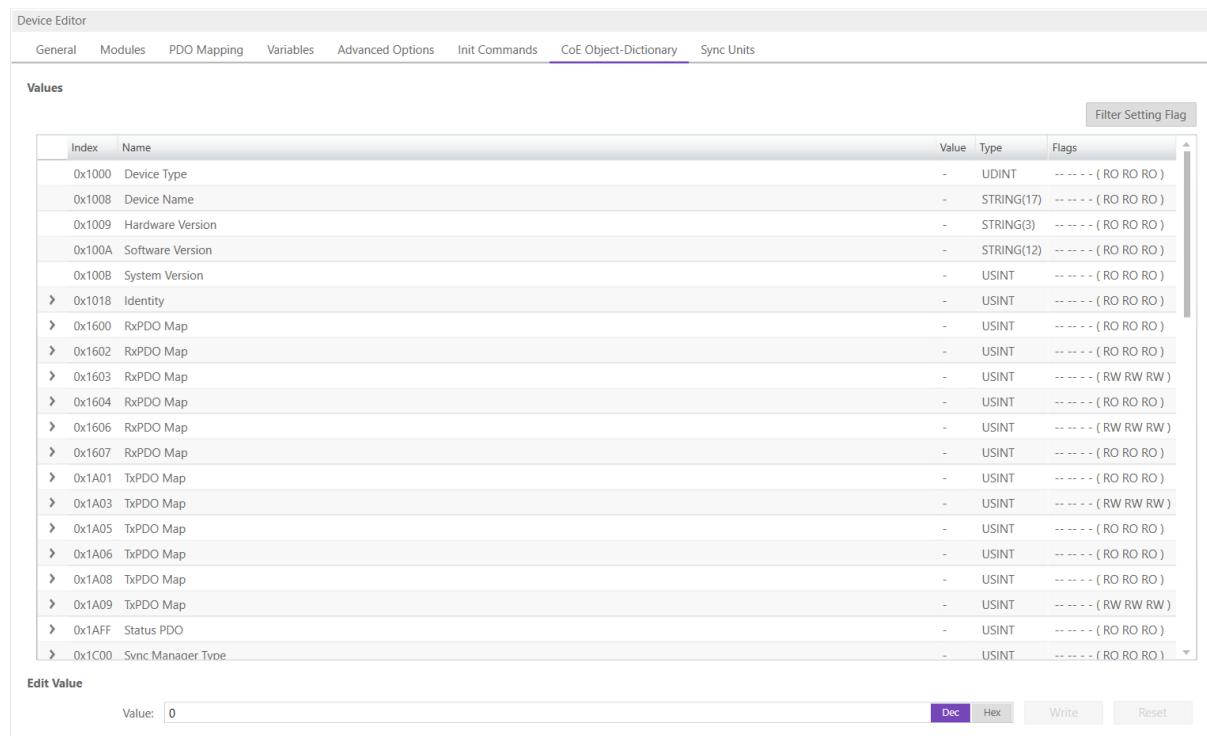
Comment of the Init Command

**Transition**

Determines in which transition the Init Command will be executed

### 5.3.12 CoE Object-Dictionary

**In this tab, the user can see and edit the offline CoE object dictionary.**



Index	Name	Value	Type	Flags
0x1000	Device Type	-	UDINT	----- ( RO RO RO )
0x1008	Device Name	-	STRING(17)	----- ( RO RO RO )
0x1009	Hardware Version	-	STRING(3)	----- ( RO RO RO )
0x100A	Software Version	-	STRING(12)	----- ( RO RO RO )
0x100B	System Version	-	USINT	----- ( RO RO RO )
0x1018	Identity	-	USINT	----- ( RO RO RO )
0x1600	RxPDO Map	-	USINT	----- ( RO RO RO )
0x1602	RxPDO Map	-	USINT	----- ( RO RO RO )
0x1603	RxPDO Map	-	USINT	----- ( RW RW RW )
0x1604	RxPDO Map	-	USINT	----- ( RO RO RO )
0x1606	RxPDO Map	-	USINT	----- ( RW RW RW )
0x1607	RxPDO Map	-	USINT	----- ( RO RO RO )
0x1A01	TxPDO Map	-	USINT	----- ( RO RO RO )
0x1A03	TxPDO Map	-	USINT	----- ( RW RW RW )
0x1A05	TxPDO Map	-	USINT	----- ( RO RO RO )
0x1A06	TxPDO Map	-	USINT	----- ( RO RO RO )
0x1A08	TxPDO Map	-	USINT	----- ( RO RO RO )
0x1A09	TxPDO Map	-	USINT	----- ( RW RW RW )
0x1AFF	Status PDO	-	USINT	----- ( RO RO RO )
0x1C00	Sync Manager Type	-	USINT	----- ( RO RO RO )

**Edit Value**

Value:  Dec Hex Write Reset

#### Lists of CoE Object-Dictionary entries

- Entries comes from the ESI file or will be generated from the configurator.
- The “Flags” column tells the user if this entry is an PDO entry and if it can be edited**
  - “AA BB C D (EE FF GG)”
    - AA = Mapping as RX PDO or not
    - BB = Mapping as TX PDO or not
    - C = Backup Flag
    - D = Settings Flag
  - EE = Access rights for PreOp (RO, WO, RW)
  - FF = Access rights for SafeOp (RO, WO, RW)
  - GG = Access rights for Op (RO, WO, RW)

## Buttons

### Update:

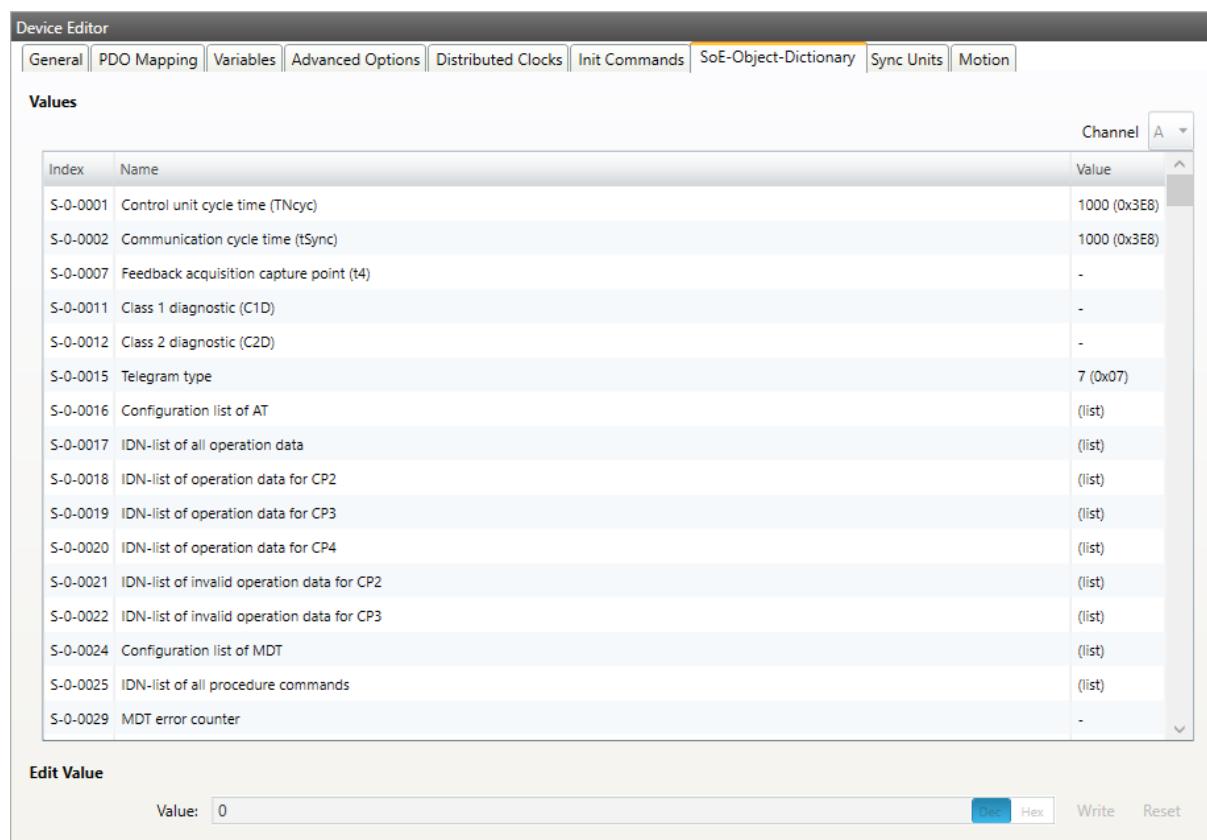
Changes the selected entry

### Reset:

Resets the selected entry to ESI default

## 5.3.13 SoE Object-Dictionary

In this tab, the user can see and edit the offline SoE object dictionary.



Index	Name	Value
S-0-0001	Control unit cycle time (TNcyc)	1000 (0x3E8)
S-0-0002	Communication cycle time (tSync)	1000 (0x3E8)
S-0-0007	Feedback acquisition capture point (t4)	-
S-0-0011	Class 1 diagnostic (C1D)	-
S-0-0012	Class 2 diagnostic (C2D)	-
S-0-0015	Telegram type	7 (0x07)
S-0-0016	Configuration list of AT	(list)
S-0-0017	IDN-list of all operation data	(list)
S-0-0018	IDN-list of operation data for CP2	(list)
S-0-0019	IDN-list of operation data for CP3	(list)
S-0-0020	IDN-list of operation data for CP4	(list)
S-0-0021	IDN-list of invalid operation data for CP2	(list)
S-0-0022	IDN-list of invalid operation data for CP3	(list)
S-0-0024	Configuration list of MDT	(list)
S-0-0025	IDN-list of all procedure commands	(list)
S-0-0029	MDT error counter	-

**Edit Value**

Value:  Dec Hex Write Reset

### Lists of SoE Object-Dictionary entries

Entries comes from the ESI file

## Buttons

### Update:

Changes the selected entry

### Reset:

Resets the selected entry to ESI default

### 5.3.14 Sync Units (Expert)

In this tab, the user can assign a SubDevice sync unit to a specific MainDevice sync unit by using the combobox column “MainDevice Sync Unit” (only visible if user has defined additional MainDevice sync units).

Device Editor			
General	Simulator	Modules	PDO Mapping
Variables	Ethernet	Advanced Options	Distributed Clocks
Init Commands CoE Object-Dictionary Sync Units Motion			
<b>SubDevice Sync Units</b>			
Name	Input Size [bytes]	Output Size [bytes]	MainDevice Sync Unit
SyncUnit 0	64.0	48.0	Id 1000: MainDeviceSyncUnit 1
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis A.Status word			UINT IN : 57.0 2.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis A.Actual motor position			DINT IN : 59.0 4.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis A.Position loop error			DINT IN : 63.0 4.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis A.Actual motor velocity			DINT IN : 67.0 4.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis A.Torque actual value			INT IN : 71.0 2.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis B.Status word			UINT IN : 73.0 2.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis B.Actual motor position			DINT IN : 75.0 4.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis B.Position loop error			DINT IN : 79.0 4.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis B.Actual motor velocity			DINT IN : 83.0 4.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Inputs Axis B.Torque actual value			INT IN : 87.0 2.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis A.Status word			UINT IN : 89.0 2.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis A.Actual motor position			DINT IN : 91.0 4.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis A.Position loop error			DINT IN : 95.0 4.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis A.Actual motor velocity			DINT IN : 99.0 4.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis A.Torque actual value			INT IN : 103.0 2.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis B.Status word			UINT IN : 105.0 2.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis B.Actual motor position			DINT IN : 107.0 4.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis B.Position loop error			DINT IN : 111.0 4.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis B.Actual motor velocity			DINT IN : 115.0 4.0
SubDevice_1002 [BE2].Module 2 (Cyclic position Mode).Cyclic position Inputs Axis B.Torque actual value			INT IN : 119.0 2.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Outputs Axis A.Control word			UINT OUT : 57.0 2.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Outputs Axis A.Profile target position			DINT OUT : 59.0 4.0
SubDevice_1002 [BE2].Module 1 (Cyclic position Mode).Cyclic position Outputs Axis A.Velocity offset			DINT OUT : 63.0 4.0

### 5.3.15 Profinet IO Device

In this tab, the user can configure the Profinet IO Device.

#### General

Device Editor

General Simulator PDO Mapping Variables Advanced Options Init Commands CoE Object-Dictionary Sync Units Motion **EL6631-0010**

General Modules

**Values**

Name	Value	Type	Access
General	1	INT32	RW
Name			
Activate			
IO Device Parameter Set			
Name			
Module DAP Version	0	UINT32	RW
Station Name		STRING	RW
IP Address		STRING	RW
Subnet		STRING	RW
Gateway		STRING	RW

**Edit Value**

Value:  Write

## General

### Activate:

Activates the automatism for generating PDOs and Init Commands

## IO Device Parameter Set

### Module DAP Version:

Module DAP version of the DP SubDevice (0 = Auto, 1 = V2.0, 2 = V2.25, 3 = V2.3, at least FW 02, 4 = V2.31, at least FW 03, 5 = V2.32, at least FW 08, 6 = V2.33, at least FW 10, 7 = V2.33, at least FW 14, 8 = V2.41, at least FW 17, 9 = V2.44)

### Station Name:

Station name of the DP SubDevice (max: 240 chars)

### IP Address:

IP Address of the DP SubDevice

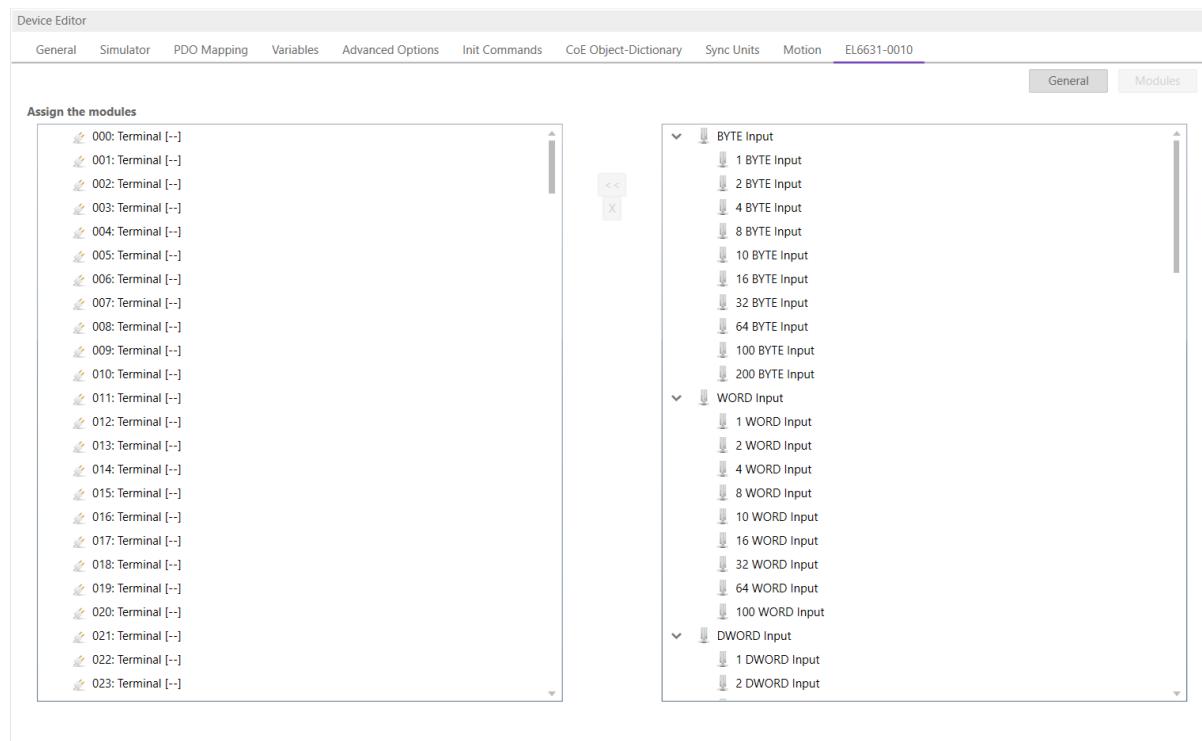
### Subnet:

Subnet of the DP SubDevice

### Gateway:

Gateway of the DP SubDevice

## Modules



### Connect module to slot (“<<”)

Used for connecting the selected module (from the right list) to the selected slot (from the left list).

### Disconnect module from slot (“X”)

Used for disconnecting the selected slot (left list)

## Supported devices

### Profinet IO device

- EL6631-0010
- EL6633-0010

## 5.3.16 K-bus Coupler

In this tab, the user can configure the K-bus Coupler or IP Link Coupler.

### General

Device Editor

General Simulator PDO Mapping Variables Advanced Options Init Commands Sync Units Motion **BK1120**

General Modules

**Values**

Name	Value	Type	Access
General			
Name	1	INT32	RW
Activate	0	INT32	RW
Check Terminals at Startup			

**Edit Value**

Value:  Write

## General

### Activate:

Activates the automatism for generating PDOs and Init Commands

### Check Terminals at Startup:

Activates the automatism for checking terminals at startup

## Modules

Device Editor

General Simulator PDO Mapping Variables Advanced Options Init Commands Sync Units Motion **BK1120**

General Modules

**Assign the modules**

- 000: Terminal [-]
- 001: Terminal [-]
- 002: Terminal [-]
- 003: Terminal [-]
- 004: Terminal [-]
- 005: Terminal [-]
- 006: Terminal [-]
- 007: Terminal [-]
- 008: Terminal [-]
- 009: Terminal [-]
- 010: Terminal [-]
- 011: Terminal [-]
- 012: Terminal [-]
- 013: Terminal [-]
- 014: Terminal [-]
- 015: Terminal [-]
- 016: Terminal [-]
- 017: Terminal [-]
- 018: Terminal [-]
- 019: Terminal [-]
- 020: Terminal [-]
- 021: Terminal [-]
- 022: Terminal [-]
- 023: Terminal [-]

- Virtual Terminals (CP1xxx)
  - CP9940-0001 40 Ch. Input
  - CPx9xx-4 LEDs/Buttons
  - CPx9xx-8 LEDs/Buttons
  - CPx9xx-12 LEDs/Buttons
  - CPx9xx-16 LEDs/Buttons
  - CPx9xx-20 LEDs/Buttons
  - CPx9xx-24 LEDs/Buttons
  - CPx9xx-28 LEDs/Buttons
  - CPx9xx-3-2 LEDs/Buttons/Inputs
  - CPx9xx-4-2 LEDs/Buttons/Inputs
  - CPx9xx-E-Stop
- Digital Input Terminals (KL1xxx)
  - KL 1002, 2 Ch. Input (24V, 3.0ms)
  - KL 1012, 2 Ch. Input (24V, 0.2ms)
  - KL 1032, 2 Ch. Input (48V, 3.0ms)
  - KL 1052, 2 Ch. Input +/- (24V, 3.0ms)
  - KL 1104, 4 Ch. Input (24V, 3.0ms)
  - KL 1114, 4 Ch. Input (24V, 0.2ms)
  - KL 1124, 4 Ch. Input (5V, 0.2ms)
  - KL 1154, 4 Ch. Input +/- (24V, 3.0ms)
  - KL 1164, 4 Ch. Input +/- (24V, 0.2ms)
  - KL 1184, 4 Ch. Input neg. (24V, 3.0ms)
  - KL 1194, 4 Ch. Input neg. (24V, 0.2ms)

Scan 'KBUS' Modules

### Connect module to slot (“<<”)

Used for connecting the selected module (from the right list) to the selected slot (from the left list).

### Disconnect module from slot (“X”)

Used for disconnecting the selected slot (left list)

## Supported devices

### K-bus Coupler

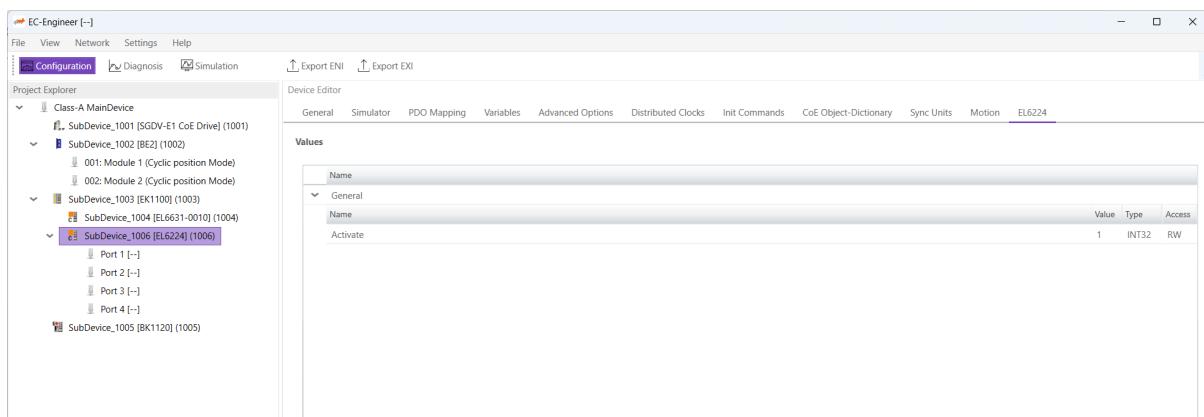
- BK1120
- BK1150
- BK1250

### IP Link Coupler

- IL2300-B110
- IL2301-B110
- IL2302-B110

## 5.3.17 IO-Link (EL6224)

In this tab, the user can configure the IO-Link MainDevice EL6224. He can activate the MainDevice to activate the ports. The user can see 4 or 8 ports. Depends on the configured SubDevice.

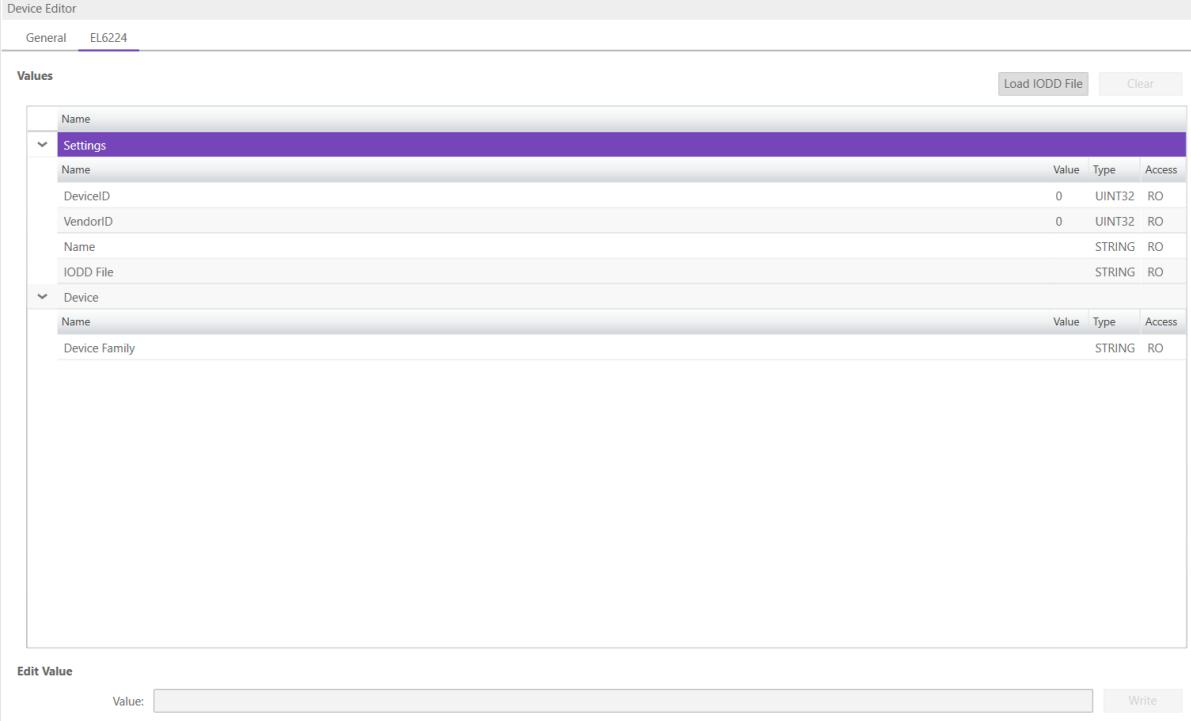


## Supported devices

- EL6224
- EP6224-2022
- EP6224-3022
- EP6228-0022
- EPP6228-0022

**Note:** Please be careful when using the EP(P)6228 that there are no double assignments through the Modules-Tab.

**The user can load an IODD file on any of the ports. By clicking on clear, the port will be cleared again.**



Device Editor

General EL6224

Values

Load IODD File Clear

Name	Value	Type	Access	
DeviceID	0	UINT32	RO	
VendorID	0	UINT32	RO	
Name		STRING	RO	
IODD File		STRING	RO	
Device		Value	Type	Access
Name		STRING	RO	
Device Family		STRING	RO	

Edit Value

Value:  Write

**Note:** If the user wants to load a new IODD file, there is no need to clear the port first, they can directly load it.

### 5.3.18 Profibus DP MainDevice (EL6731)

In this tab, the user can configure the Profibus DP MainDevice EL6731.

Device Editor

PDO Mapping   Variables   Advanced Options   EEPROM   Distributed Clocks   Init Commands   CoE Object-Dictionary   Sync Units   **EL6731**    

Values

Name	Value	Type	Access
<b>General</b>			
Name	1	BOOL	RW
Activate			
<b>DP Slave Parameter Set</b>			
Name			
Station Address	1	UINT32	RW
Baudrate	9	UINT32	RW
Slot Time	1000	UINT32	RW
Min. TSDR	11	UINT32	RW
Max. TSDR	800	UINT32	RW
Quiet Time	9	UINT32	RW
Setup Time	16	UINT32	RW
Target Token Rotation Time	34617	UINT32	RW
GAP Update Factor	100	UINT32	RW
HSA	126	UINT32	RW
Max Retry Limit	4	UINT32	RW
Min. Slave Interval	10	UINT32	RW
Data Control Time	4	UINT32	RW

Edit Value

Value:    

## General

### Activate:

Activates the automatism for generating PDOs and Init Commands

### DP Slave Parameter Set

#### Station Address:

Station Address of the Profibus DP MainDevice (permitted values: 0-255)

#### Baudrate:

Baudrate of the Profibus DP MainDevice (0 = 9.6 kBaud, 1 = 19.2 kBaud, 2 = 93.75 kBaud, 3 = 187.5 kBaud, 4 = 500 kBaud, 6 = 1.5 MBaud, 7 = 3 MBaud, 8 = 6 MBaud, 9 = 12 MBaud)

#### Slot Time:

Slot Time of the Profibus DP MainDevice

#### Min. TSDR:

Min. TSDR of the Profibus DP MainDevice

#### Max. TSDR:

Max. TSDR of the Profibus DP MainDevice

#### Quiet Time:

Quiet Time of the Profibus DP MainDevice

#### Setup Time:

Setup Time of the Profibus DP MainDevice

#### Target Token Rotation Time:

Target Token Rotation Time of the Profibus DP MainDevice

**GAP Update Factor:**

GAP Update Factor of the Profibus DP MainDevice

**HSA:**

HSA of the Profibus DP MainDevice

**Max Retry Limit:**

Max Retry Limit of the Profibus DP MainDevice

**Min. Slave Interval:**

Min. Slave Interval of the Profibus DP MainDevice

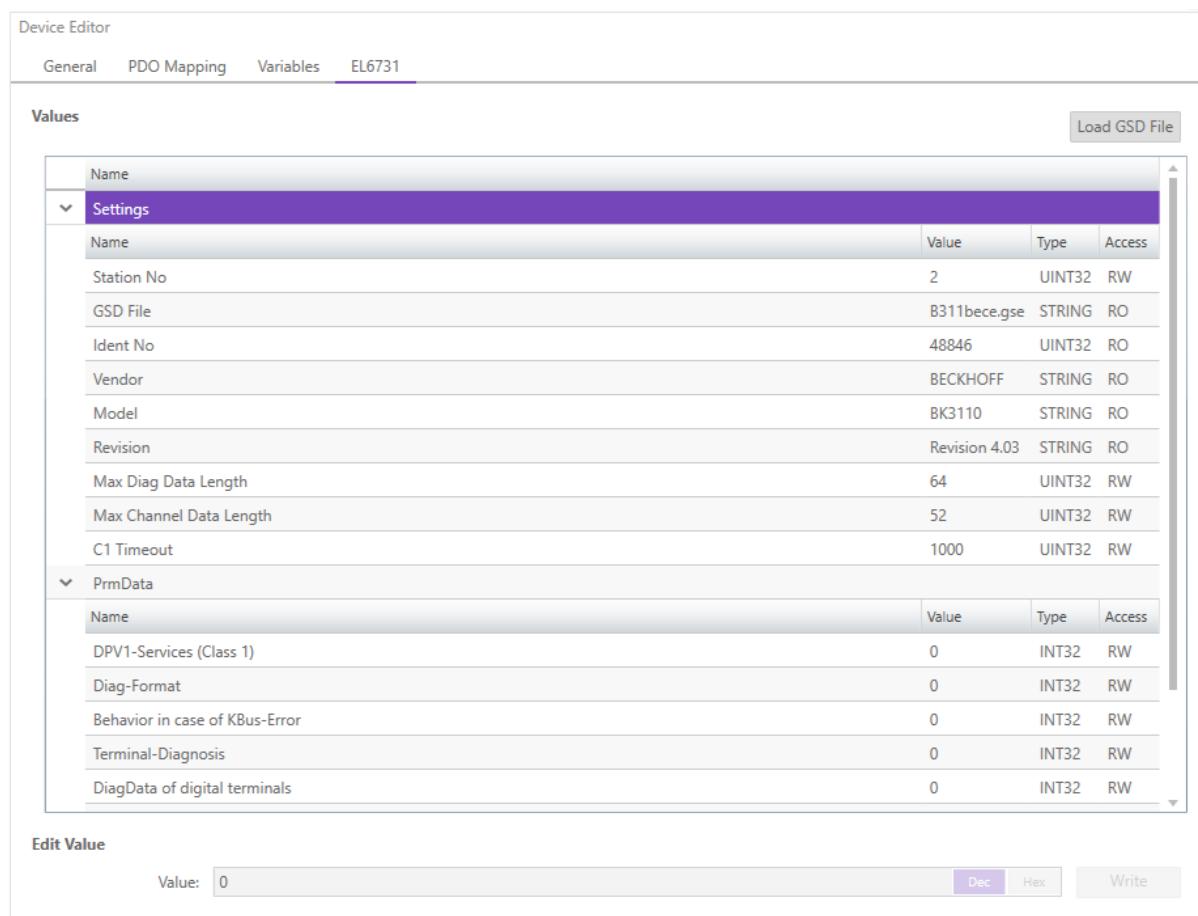
**Operate Delay (in 100 ms):**

Operate Delay of the Profibus DP MainDevice

**Cycle Time (ns):**

Cycle Time of the Profibus DP MainDevice

**The Profibus DP MainDevice supports up to 126 Profibus DP SubDevices. They can be added in the tree by clicking 'Append Module'.**



Name	Value	Type	Access
Station No	2	UINT32	RW
GSD File	B311bece.gse	STRING	RO
Ident No	48846	UINT32	RO
Vendor	BECKHOFF	STRING	RO
Model	BK3110	STRING	RO
Revision	Revision 4.03	STRING	RO
Max Diag Data Length	64	UINT32	RW
Max Channel Data Length	52	UINT32	RW
C1 Timeout	1000	UINT32	RW
DPV1-Services (Class 1)	0	INT32	RW
Diag-Format	0	INT32	RW
Behavior in case of KBus-Error	0	INT32	RW
Terminal-Diagnosis	0	INT32	RW
DiagData of digital terminals	0	INT32	RW

**Settings****Station No:**

Station No of the Profibus DP SubDevice

**GSD File:**

GSD File of the Profibus DP SubDevice, which can be loaded with button "Load GSD File"

**Ident No:**

Ident No of the Profibus DP SubDevice

**Vendor:**

Vendor of the Profibus DP SubDevice

**Model:**

Model of the Profibus DP SubDevice

**Revision:**

Revision of the Profibus DP SubDevice

**Max Diag Data Length:**

Max Diag Data Length of the Profibus DP SubDevice

**Max Channel Data Length:**

Max Channel Data Length of the Profibus DP SubDevice

**C1 Timeout:**

C1 Timeout of the Profibus DP SubDevice

**The IO configuration of the Profibus DP SubDevice can be done by adding specific Profibus DP Modules to the Profibus DP SubDevice. They can be added in the tree by clicking 'Append Sub Module'.**

Append Module to 'SubDevice\_1002 [EL6731] (1002)'

**Filter**

Search

  
 Vendors 
**Connection**

Connect at

**Modules**

Select Module for Slot Assignment

 Beckhoff Automation GmbH & Co. KG	
 Profibus Slave 1	
 8 Bit digital inputs	 8 Bit digital inputs
 16 Bit digital inputs	 16 Bit digital inputs
 24 Bit digital inputs	 24 Bit digital inputs
 32 Bit digital inputs	 32 Bit digital inputs
 40 Bit digital inputs	 40 Bit digital inputs
 48 Bit digital inputs	 48 Bit digital inputs
 56 Bit digital inputs	 56 Bit digital inputs

Number of SubDevices

1

Apply

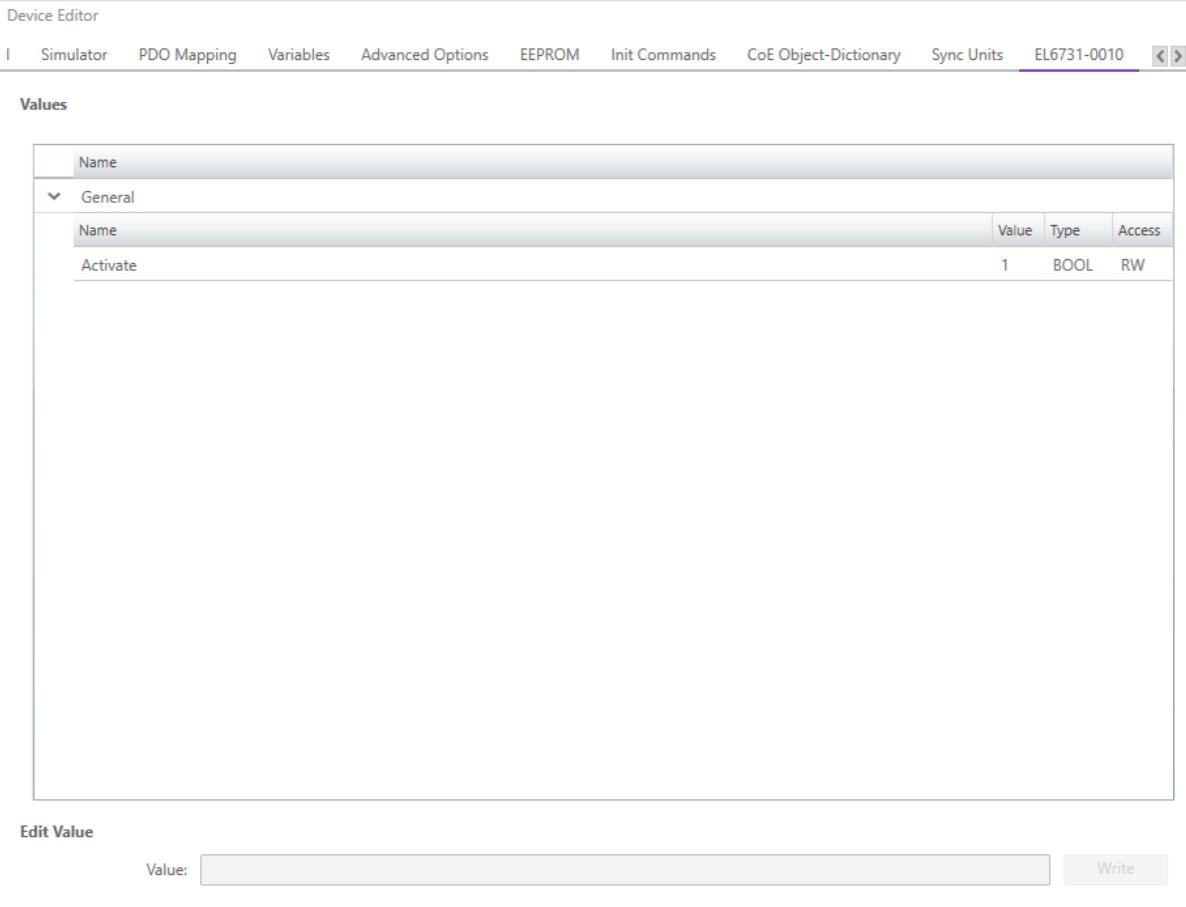
OK

Cancel

**Note:** DP PrmData can be also configured, if the specific Profibus DP SubDevice supports them in the GSD file.

### 5.3.19 Profibus DP SubDevice (EL6731-0010)

In this tab, the user can configure the Profibus DP SubDevice EL6731-0010.



Name	Value	Type	Access
Activate	1	BOOL	RW

**Note:** It can be configured similar like the Profibus DP MainDevice, except it has not all settings and supports only one Profibus DP SubDevice. It also supports a special Profibus DP SubDevice which can be used without GSD file and has a fixed set of Profibus DP Modules.

### 5.3.20 CANopen MainDevice (EL6751)

In this tab, the user can configure the CANopen MainDevice EL6751. He can add Modules, PDOs, SDOs and variables by clicking the right mouse button. To activate the MainDevice, the user have to go to the general settings of the EL6751 entry, and set activated to '1'. If activated is '1' all init commands and PDOs will be activated automatically.

Also the user can rename and delete modules, PDOs, SDOs, and variables:

Device Editor

General Simulator Modules PDO Mapping Variables Advanced Options Distributed Clocks Init Commands CoE Object-Dictionary Sync Units Motion **EL6751**

**Filter**

EL6751	Settings		
CANopen Module 1			
CANopen Module 2			

**Settings**

Name	Value	Type
General		
CAN Bus Parameter Set		
Name	17	UINT32
CAN Bus Parameter Set	127	UINT32
MainDevice Node Address	2	UINT32
Baudrate	128	UINT32
COB ID SYNC	1	UINT32
SYNC cycle multiplier	0	UINT32
Bustiming registers	0	BOOL
PDO Align 8 Bytes	0	BOOL
TxDPO Delay	30	UINT32

**Edit Value**

Value:  Write

### 5.3.21 CANopen SubDevice (EL6751-0010)

In this tab, the user can configure the CANopen SubDevice EL6751-0010. He can add PDOs and variables by clicking the right mouse button. To activate the gateway, the user have to go to the general settings of the EL6751-0010 entry, and set activated to '1'. If activated is '1' all init commands and PDOs will be activated automatically.

**Also the user can rename and delete PDOs and variables:**

Device Editor

General Simulator Modules PDO Mapping Variables Advanced Options Distributed Clocks Init Commands CoE Object-Dictionary Sync Units Motion **EL6751**

**Filter**

EL6751	Settings		
CANopen Module 1			
CANopen Module 2			

**Settings**

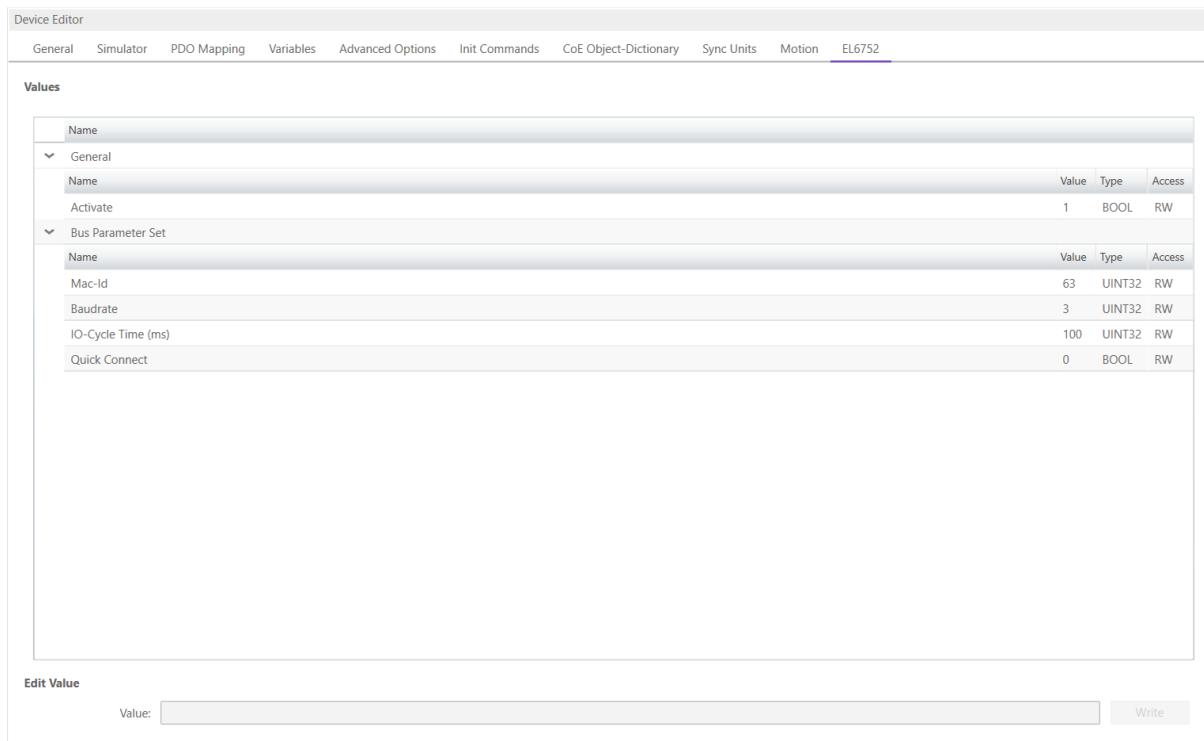
Name	Value	Type
General		
Activate	1	BOOL
Control	0	BOOL
CAN Bus Parameter Set		
Name	Value	Type
CAN Bus Parameter Set	17	UINT32
MainDevice Node Address	127	UINT32
Baudrate	2	UINT32
COB ID SYNC	128	UINT32
SYNC cycle multiplier	1	UINT32

**Edit Value**

Value:  True Write

### 5.3.22 DeviceNet MainDevice (EL6752)

In this tab, the user can configure the DeviceNet MainDevice EL6752.



Name	Value	Type	Access
General	1	BOOL	RW
Name			
Activate	1	BOOL	RW
Bus Parameter Set			
Name			
Mac-Id	63	UINT32	RW
Baudrate	3	UINT32	RW
IO-Cycle Time (ms)	100	UINT32	RW
Quick Connect	0	BOOL	RW

#### General

##### Activate:

Activates the automatism for generating PDOs and Init Commands

#### Bus Parameter Set

##### Mac-Id:

Mac-Id of the DeviceNet MainDevice (permitted values: 0-63)

##### Baudrate:

Baudrate of the DeviceNet MainDevice (3 = 125 kBaud, 2 = 250 kBaud, 1 = 500 kBaud)

##### IO-Cycle Time:

IO-Cycle Time of the DeviceNet MainDevice

##### Quick Connect:

Enables Quick Connect of the DeviceNet MainDevice

**The DeviceNet MainDevice supports up to 63 DeviceNet SubDevices. They can be added in the tree by clicking 'Append Module'.**

Device Editor

General PDO Mapping Variables EL6752

Values

Name

Settings

Name	Value	Type	Access
MAC ID	1	UINT32	RW
Check Vendor-ID	0	BOOL	RW
Vendor-ID	0	UINT32	RW
Check Device Type	0	BOOL	RW
Device Type	0	UINT32	RW
Check Product Code	0	BOOL	RW
Product Code	0	UINT32	RW
Check Revision	0	BOOL	RW
Revision	0	UINT32	RW
Polled Produced	0	BOOL	RW
Polled Consumed	0	BOOL	RW
Polled Expected Packet Rate (ms)	100	UINT32	RW
Bit-Strobed Produced	0	BOOL	RW
Bit-Strobed Consumed	0	BOOL	RW
Bit-Strobed Expected Packet Rate (ms)	100	UINT32	RW
State Produced	0	BOOL	RW
State Consumed	0	BOOL	RW
State Use Cyclic	0	BOOL	RW

Edit Value

Value:  Write

## Settings

### MAC ID:

MAC ID of the DeviceNet SubDevice

### Check Vendor-ID:

Enable to check Vendor-ID

### Vendor-ID:

Vendor-ID of the DeviceNet SubDevice

### Check Device Type:

Enable to check Device Type

### Device Type:

Device Type of the DeviceNet SubDevice

### Check Product Code:

Enable to check Product Code

### Product Code:

Product Code of the DeviceNet SubDevice

### Check Revision:

Enable to check Revision

### Revision:

Revision of the DeviceNet SubDevice

### Polled Produced:

Enable if DeviceNet SubDevice has produced data in Polled DeviceNet mode

### Polled Consumed:

Enable if DeviceNet SubDevice has consumed data in Polled DeviceNet mode

### Polled Expected Packet Rate:

Expected packet rate in Polled DeviceNet mode

**Bit-Strobed Produced:**

Enable if DeviceNet SubDevice has produced data in Bit-Strobed DeviceNet mode

**Bit-Strobed Consumed:**

Enable if DeviceNet SubDevice has consumed data in Bit-Strobed DeviceNet mode

**Bit-Strobed Expected Packet Rate:**

Expected packet rate in Bit-Strobed DeviceNet mode

**State Produced:**

Enable if DeviceNet SubDevice has produced data in Change of State or Cyclic DeviceNet mode

**State Consumed:**

Enable if DeviceNet SubDevice has consumed data in Change of State or Cyclic DeviceNet mode

**State Use Cyclic:**

Enable to activate Cyclic DeviceNet mode or disable to activate Change of State DeviceNet mode

**State Send-Rate:**

Send rate in Change of State or Cyclic DeviceNet mode

**State Inhibit-Time:**

Inhibit time in Change of State or Cyclic DeviceNet mode

**State Acknowledge:**

Enable acknowledge in Change of State or Cyclic DeviceNet mode

**State Acknowledge-Timeout:**

Acknowledge timeout in Change of State or Cyclic DeviceNet mode

**State Acknowledge-Retry-Limit:**

Acknowledge retry limit in Change of State or Cyclic DeviceNet mode

**Max Startups:**

Maximum amount of supported startups (permitted values: 0-99)

**Coupler State:**

Enable if DeviceNet SubDevice provides CouplerState (information is available e.g. for Beckhoff Bus Couplers like BK52x0, IPxxxx-B520, ...)

**Startup****Class ID:**

Class ID of the startup

**Instance ID:**

Instance ID of the startup

**Attribute ID:**

Attribute ID of the startup

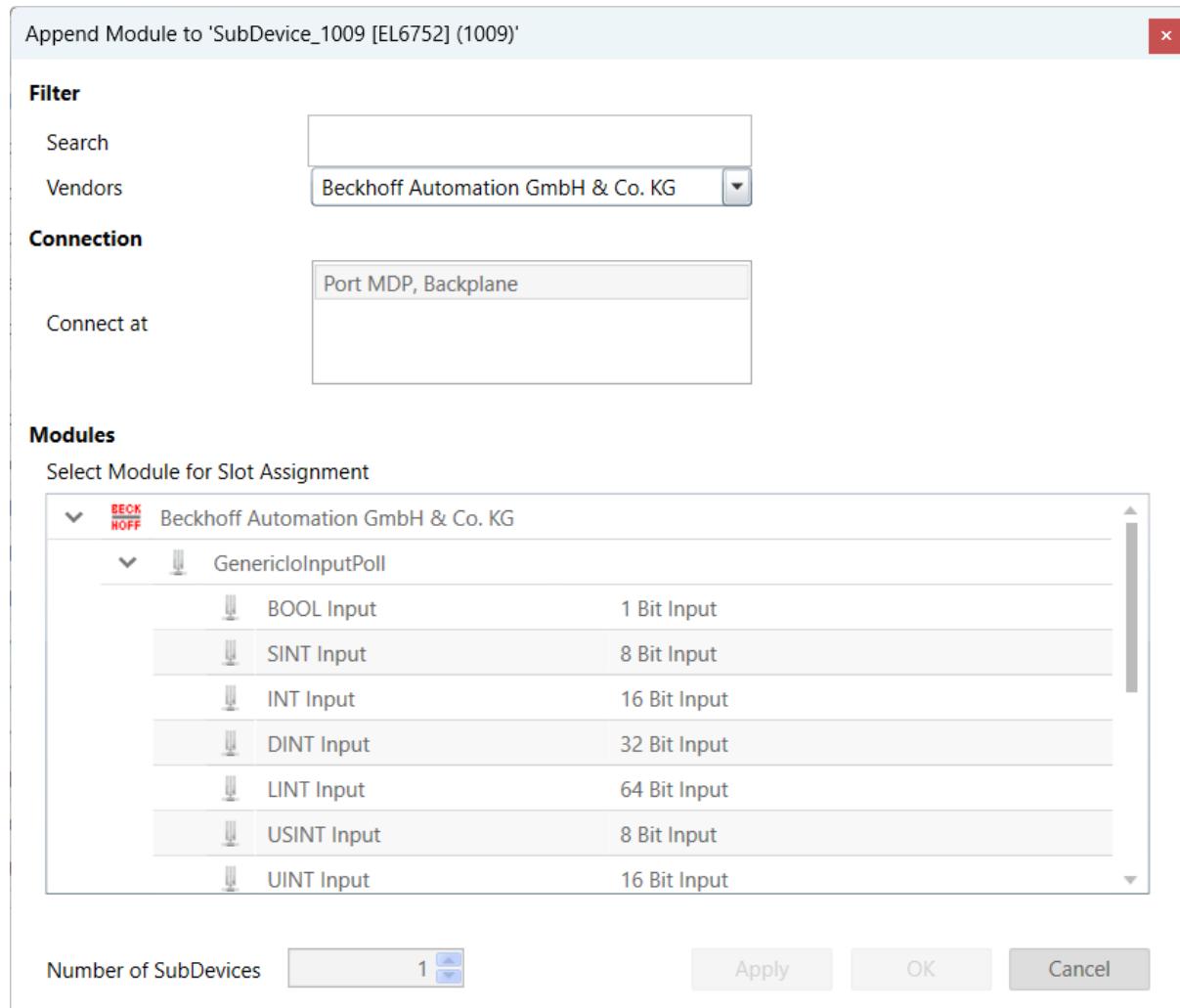
**Value:**

Value of the startup in bytes like "00 11 22"

**Name:**

Name of the startup

**The IO configuration of the DeviceNet SubDevice can be done by adding specific DeviceNet Modules to the DeviceNet SubDevice. They can be added in the tree by clicking 'Append Sub Module'.**



---

**Note:** The modules must be choosed from the specific group, depending on the selected DeviceNet mode (Polled, Bit-Strobed, State).

---

### 5.3.23 DeviceNet SubDevice (EL6752-0010)

In this tab, the user can configure the DeviceNet SubDevice EL6752-0010.

Device Editor

General Simulator PDO Mapping Variables Advanced Options Init Commands CoE Object-Dictionary Sync Units Motion **EL6752-0010**

**Values**

Name	Value	Type	Access
General			
Name	1	BOOL	RW
Activate			
Bus Parameter Set			
Name	1	UINT32	RW
Mac-Id	3	UINT32	RW
Baudrate	100	UINT32	RW
IO-Cycle Time [ms]	0	BOOL	RW
Quick Connect			

**Edit Value**

Value:  Write

**Note:** It can be configured similar like the DeviceNet MainDevice, except it has not all settings and supports only one DeviceNet SubDevice.

### 5.3.24 Motion (Motion Mode only)

On this tab the user can change the and activate the axis for the motion. The settings are used in the **xml** file which can be exported from the MainDevice motion tab, to configure the Demo Motion:

Device Editor

General Modules PDO Mapping Variables Advanced Options Init Commands CoE Object-Dictionary Sync Units **Motion**

**EcMasterDemoMotion Config SubDevice Settings**

Axis 1 Axis 2

Mode of Operation	8 <input type="checkbox"/> <input checked="" type="checkbox"/> +	8 <input type="checkbox"/> <input checked="" type="checkbox"/> +
Increments per mm	1000 <input type="checkbox"/> <input checked="" type="checkbox"/> +	1000 <input type="checkbox"/> <input checked="" type="checkbox"/> +
Increment Factor	0 <input type="checkbox"/> <input checked="" type="checkbox"/> +	0 <input type="checkbox"/> <input checked="" type="checkbox"/> +
Controlword Object	0x6040 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Dec 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex	0x6840 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Dec 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex
Statusword Object	0x6041 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Dec 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex	0x6841 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Dec 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex
Position Actual Value Object	0x6064 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Dec 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex	0x6864 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Dec 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex
Target Position Object	0x607A <input type="checkbox"/> <input checked="" type="checkbox"/> Hex 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Dec 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex	0x687A <input type="checkbox"/> <input checked="" type="checkbox"/> Hex 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Dec 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex
Target Velocity Object	0x60FF <input type="checkbox"/> <input checked="" type="checkbox"/> Hex 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Dec 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex	0x68FF <input type="checkbox"/> <input checked="" type="checkbox"/> Hex 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Dec 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex
Modes of operation Object	0x6060 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Dec 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex	0x6860 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Dec 0x00 <input type="checkbox"/> <input checked="" type="checkbox"/> Hex

### 5.3.25 Simulation Settings

On this tab the user can change the simulator settings for the SubDevice:

Device Editor

General Simulator PDO Mapping Variables Advanced Options Distributed Clocks Init Commands CoE Object-Dictionary Sync Units Motion

**General** **CoE** **EEPROM** **Register**

**Operation Mode**

Application Name:  Name:

Ignore CoE Download Error  
 Simulated

**Starting Position**

Power off  
 Custom previous port B Address: 0   +

#### Application Name:

The application name for the EXI file

### Ignore Download Error:

Ignores errors on download

### Starting Position

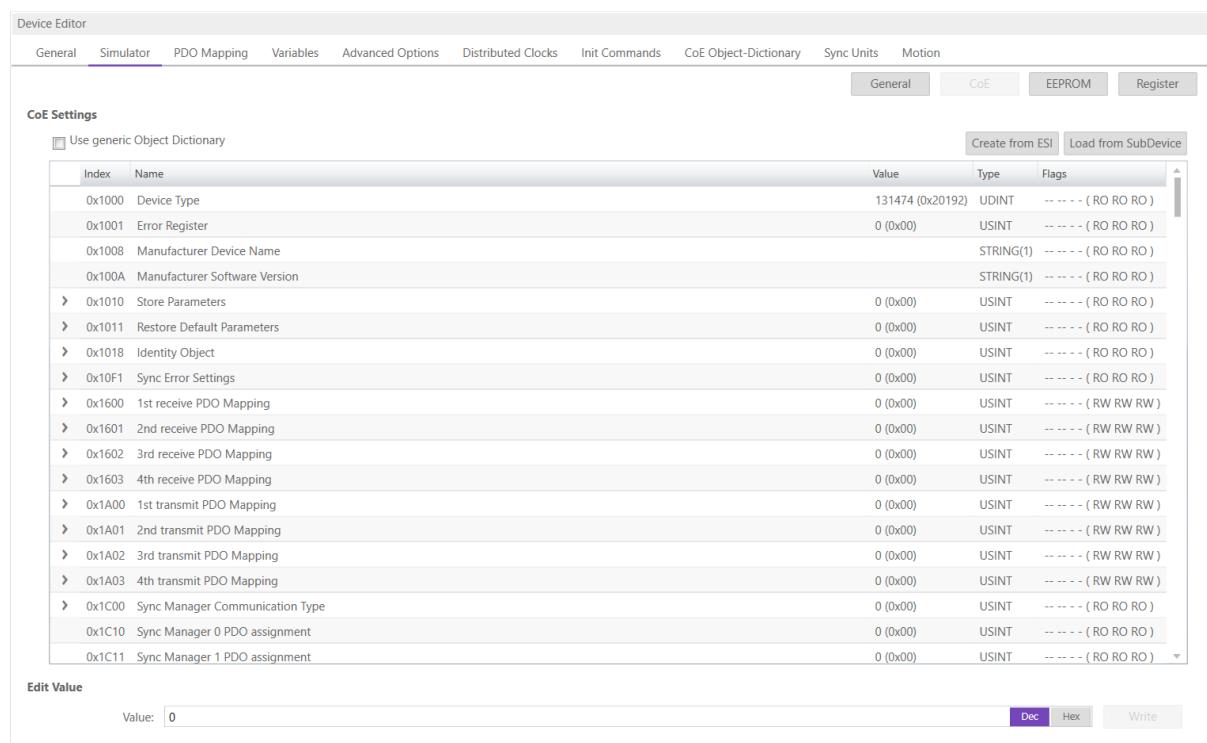
#### Power Off:

Select if SubDevice should be powered on or off on start

#### Custom previous port:

manipulate the topology

### CoE Tab



Index	Name	Value	Type	Flags
0x1000	Device Type	131474 (0x20192)	UDINT	----- ( RO RO RO )
0x1001	Error Register	0 (0x00)	USINT	----- ( RO RO RO )
0x1008	Manufacturer Device Name		STRING(1)	----- ( RO RO RO )
0x100A	Manufacturer Software Version		STRING(1)	----- ( RO RO RO )
0x1010	Store Parameters	0 (0x00)	USINT	----- ( RO RO RO )
0x1011	Restore Default Parameters	0 (0x00)	USINT	----- ( RO RO RO )
0x1018	Identity Object	0 (0x00)	USINT	----- ( RO RO RO )
0x10F1	Sync Error Settings	0 (0x00)	USINT	----- ( RO RO RO )
0x1600	1st receive PDO Mapping	0 (0x00)	USINT	----- ( RW RW RW )
0x1601	2nd receive PDO Mapping	0 (0x00)	USINT	----- ( RW RW RW )
0x1602	3rd receive PDO Mapping	0 (0x00)	USINT	----- ( RW RW RW )
0x1603	4th receive PDO Mapping	0 (0x00)	USINT	----- ( RW RW RW )
0x1A00	1st transmit PDO Mapping	0 (0x00)	USINT	----- ( RW RW RW )
0x1A01	2nd transmit PDO Mapping	0 (0x00)	USINT	----- ( RW RW RW )
0x1A02	3rd transmit PDO Mapping	0 (0x00)	USINT	----- ( RW RW RW )
0x1A03	4th transmit PDO Mapping	0 (0x00)	USINT	----- ( RW RW RW )
0x1C00	Sync Manager Communication Type	0 (0x00)	USINT	----- ( RO RO RO )
0x1C10	Sync Manager 0 PDO assignment	0 (0x00)	USINT	----- ( RO RO RO )
0x1C11	Sync Manager 1 PDO assignment	0 (0x00)	USINT	----- ( RO RO RO )

**Edit Value**

Value:  Dec Hex Write

The simulated CoE can be changed here.

### EEPROM Tab

Device Editor

General Simulator PDO Mapping Variables Advanced Options Distributed Clocks Init Commands CoE Object-Dictionary Sync Units Motion

General CoE EEPROM Register

**EEPROM Settings**

Use ESI EEPROM

[Create from ESI](#) [Load from SubDevice](#)

Index	Name	Value	Type
0x0000	PDI Control	6 (0x0006)	UINT
0x0001	PDI Configuration	60929 (0xEE01)	UINT
0x0002	Pulse Length of SYNC Signals	1000 (0x03E8)	UINT
0x0003	Extended PDI Configuration	0 (0x0000)	UINT
0x0004	Configured Station Alias	0 (0x0000)	UINT
0x0005	Reserved	0 (0x00000000)	UDINT
0x0007	Checksum	61 (0x003D)	UINT
0x0008	Vendor ID	1337 (0x00000539)	UDINT
0x000A	Product Code	35651585 (0x02200001)	UDINT
0x000C	Revision Number	196613 (0x00030005)	UDINT
0x000E	Serial Number	0 (0x00000000)	UDINT
0x0010	Execution Delay	0 (0x0000)	UINT
0x0011	Port0 Delay	0 (0x0000)	UINT
0x0012	Port1 Delay	0 (0x0000)	UINT
0x0013	Reserved	0 (0x0000)	UINT
0x0014	Bootstrap Receive Mailbox Offset	0 (0x0000)	UINT
0x0015	Bootstrap Receive Mailbox Size	0 (0x0000)	UINT
0x0016	Bootstrap Send Mailbox Offset	0 (0x0000)	UINT
0x0017	Bootstrap Send Mailbox Size	0 (0x0000)	UINT

**Edit EEPROM Value**

Value:  [Dec](#) [Hex](#) [Write](#)

The simulated EEPROM can be changed here.

## Register Tab

Device Editor

General Simulator PDO Mapping Variables Advanced Options Distributed Clocks Init Commands CoE Object-Dictionary Sync Units Motion

General CoE EEPROM Register

**Register Settings**

Use default register values

[Load from SubDevice](#)

Index	Name	Value	Type
-------	------	-------	------

**Edit Register**

Value:  [Dec](#) [Hex](#) [Write](#)

The simulated Registers can be changed here.

## 5.4 Export ENI

To run the EC-Master you basically need an EtherCAT-Network-Information (ENI) file to initialize and control an EtherCAT network. After configuring the EtherCAT network with EC-Engineer, you can export this ENI file and copy it on the control system to run the EC-Master.

---

**Note:** The EtherCAT-Network-Information (ENI) File will be generated according to ETG.2100 standard V1.0.1

---

## 5.5 Export EXI

To run the EC-Simulator you basically need an ENI or better an EXI file to simulate an EtherCAT network. After configuring the EtherCAT network with EC-Engineer, you can export this EXI file and use it to start the EC-Simulator. The EXI and Simulator functions has to be activated in the Menu View -> Simulator Tabs.

## 6 Diagnosis

### 6.1 Overview

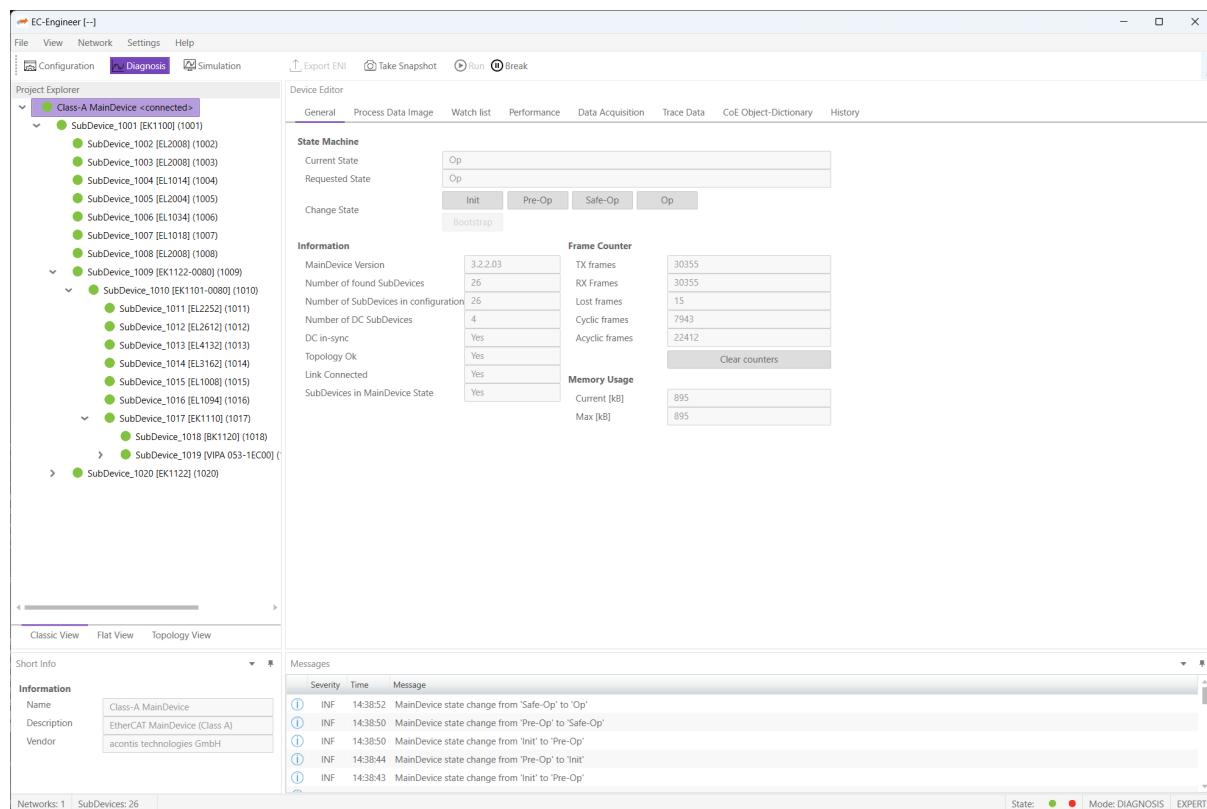
EC-Engineer is a diagnosis application specifically developed to analyze EtherCAT networks that are controlled by an EtherCAT MainDevice. Automated control systems usually require high availability of the whole system. Due to the rough industrial environment this is often hardly to achieve.

If high availability shall be guaranteed for an automated control system it is important to verify and maintain the field bus. Using EC-Engineer it is possible to take a look into the “health” of the EtherCAT system. Detection of signs of system degradation prior to running into a system failure will be of great benefit. In that case it is possible to exchange the problematic components (cables, SubDevice devices).

**Many aspects of diagnosis are covered by the EC-Engineer:**

- System analysis and maintenance
- Error detection
- Documentation

After switching into diagnosis mode of EC-Engineer, the user will see this page:

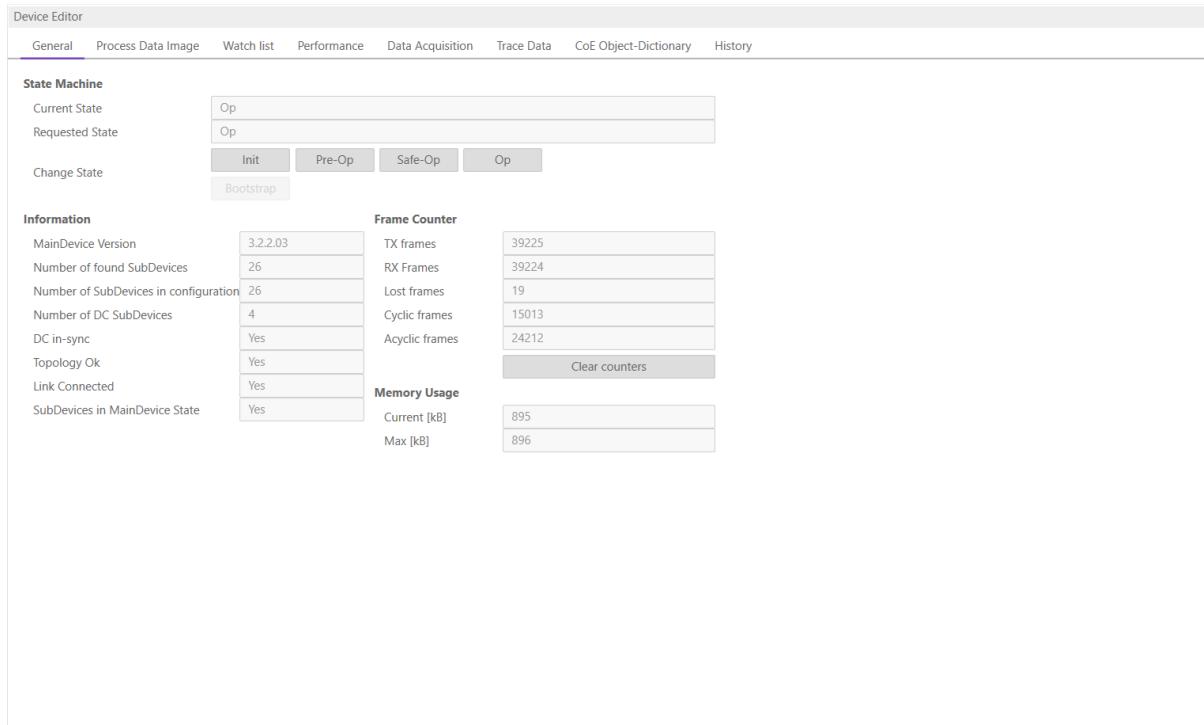


## 6.2 Device

This section shows the current “health” state of the MainDevice and helps the user to analyze MainDevice related problems.

### 6.2.1 General

In this tab, the user can see the current state of the state machine of the MainDevice. He has also an overview over the current “health” state of his EtherCAT network:



#### State Machine

##### Current State:

Current state of the MainDevice

##### Requested State:

Requested state of the MainDevice

##### Change State:

MainDevice can reach the states INIT, PRE-OP, SAFE-OP and OP.

#### Information

##### Device version:

Version number of the running MainDevice

##### Number of found SubDevices:

Number of SubDevices, which were found from device on the network

##### Number of SubDevices in configuration:

Number of SubDevices, which are configured in the ENI file

**Number of DC SubDevices:**

Number of SubDevices with DC support, which were found from MainDevice on the network

**DC in-sync:**

Signals that all SubDevices with DC support are correctly synchronized or not. If not all SubDevices are correctly synchronized, please refer the [Message Window](#) for more information.

**Topology OK:**

Signals that topology is “okay” or not. If topology is not “okay”, you have a mismatch between the configured bus and the currently connected bus. Please open the ‘Network Mismatch Analyzer’ (Menu Network Network Mismatch Analyzer) to solve the problem.

**Link Connected:**

Signals the link is connected.

**SubDevices in MainDevice State:**

Signals that all SubDevices are in MainDevice state.

**Frame Counter****TX frames:**

Number of sent frames

**RX frames:**

Number of received frames

**Lost frames:**

Number of lost frames

**Cyclic frames:**

Number of cyclic frames

**Acyclic frames:**

Number of acyclic frames

**Memory Usage****Current:**

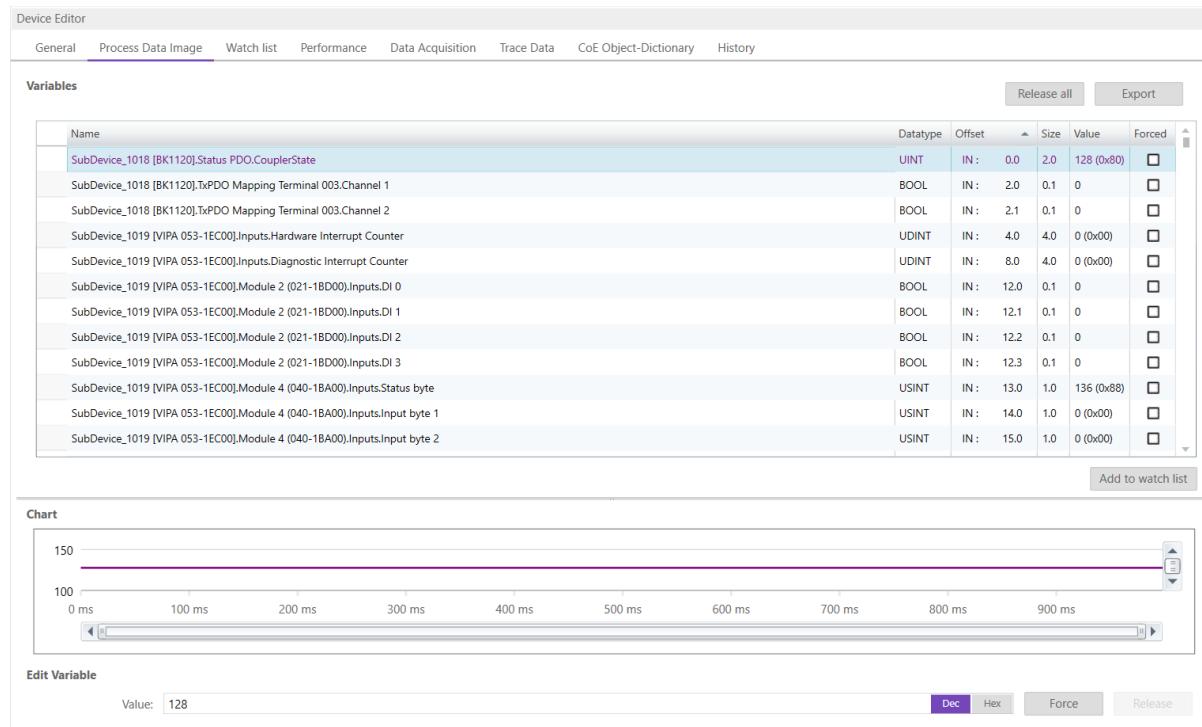
Current memory usage in bytes

**Max:**

Maximum memory usage in bytes

## 6.2.2 Process Data Image

In this tab, the user can see and change the values of the process variables. The variables will be forced to the value the user entered. The user can press release to release the variable. If one or two variables are selected, a chart of the values is shown. Also resize and zoom is possible to see more details. The chart will be updated every 250 milliseconds:



Name	Datatype	Offset	Size	Value	Forced
SubDevice_1018 [BK1120].Status PDO.CouplerState	UINT	IN : 0.0	2.0	128 (0x80)	<input type="checkbox"/>
SubDevice_1018 [BK1120].TxPDO Mapping Terminal 003.Channel 1	BOOL	IN : 2.0	0.1	0	<input type="checkbox"/>
SubDevice_1018 [BK1120].TxPDO Mapping Terminal 003.Channel 2	BOOL	IN : 2.1	0.1	0	<input type="checkbox"/>
SubDevice_1019 [VIPA 053-1EC00].Inputs.Hardware Interrupt Counter	UDINT	IN : 4.0	4.0	0 (0x00)	<input type="checkbox"/>
SubDevice_1019 [VIPA 053-1EC00].Inputs.Diagnostic Interrupt Counter	UDINT	IN : 8.0	4.0	0 (0x00)	<input type="checkbox"/>
SubDevice_1019 [VIPA 053-1EC00].Module 2 (021-1BD00).Inputs.DI 0	BOOL	IN : 12.0	0.1	0	<input type="checkbox"/>
SubDevice_1019 [VIPA 053-1EC00].Module 2 (021-1BD00).Inputs.DI 1	BOOL	IN : 12.1	0.1	0	<input type="checkbox"/>
SubDevice_1019 [VIPA 053-1EC00].Module 2 (021-1BD00).Inputs.DI 2	BOOL	IN : 12.2	0.1	0	<input type="checkbox"/>
SubDevice_1019 [VIPA 053-1EC00].Module 2 (021-1BD00).Inputs.DI 3	BOOL	IN : 12.3	0.1	0	<input type="checkbox"/>
SubDevice_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Status byte	USINT	IN : 13.0	1.0	136 (0x88)	<input type="checkbox"/>
SubDevice_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 1	USINT	IN : 14.0	1.0	0 (0x00)	<input type="checkbox"/>
SubDevice_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 2	USINT	IN : 15.0	1.0	0 (0x00)	<input type="checkbox"/>

It is also possible to add the variables to a watch list (next chapter).

## 6.2.3 Watch list

In this tab, the user can monitor selected variables. He can go through the SubDevices and add variables to the watch list to monitor them. The user can also export or import the watch list, so changes can be saved:

Device Editor

General Process Data Image Watch list Performance Data Acquisition Trace Data CoE Object-Dictionary History

Variables

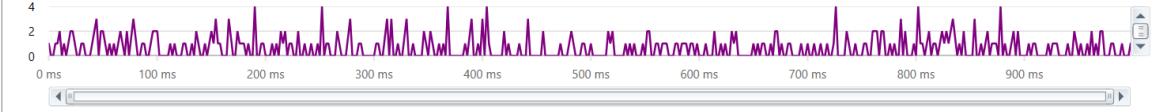
Name Datatype Offset ▲ Size Value Forced

SubDevice_1014 [EL3162].Channel 1.Value	INT	IN:	158.0	2.0	1	<input type="checkbox"/>
SubDevice_1011 [EL2252].Channel 1.TriState	BOOL	OUT:	166.1	0.1	0	<input type="checkbox"/>

Release all Export

Save watch list Load watch list Remove from watch list

Chart



Value: 1 Force Release

## 6.2.4 Performance

This tab is split into two sub tabs. On one the user can see the busload per cycle and per second:

Device Editor

General Process Data Image Watch list Performance Data Acquisition Trace Data CoE Object-Dictionary History

CPU Load Busload

Busload

CycleTime [us] Bytes per cycle Bytes per second

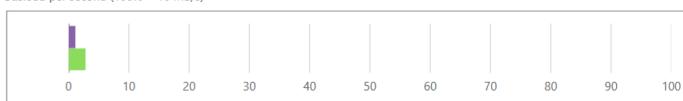
2000	Average 313	Average 113205
	Max 2025	Max 284228

Reset

Busload per cycle (100% = 20000 B/Cycle)

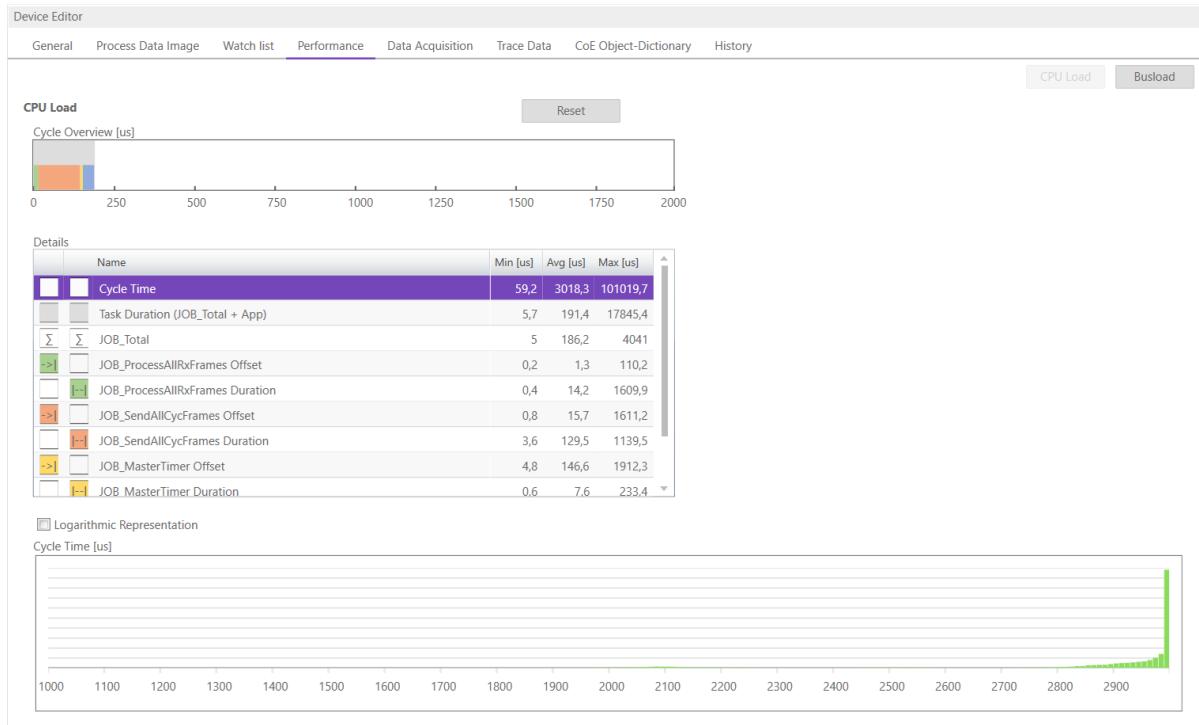


Busload per second (100% = 10 MB/s)



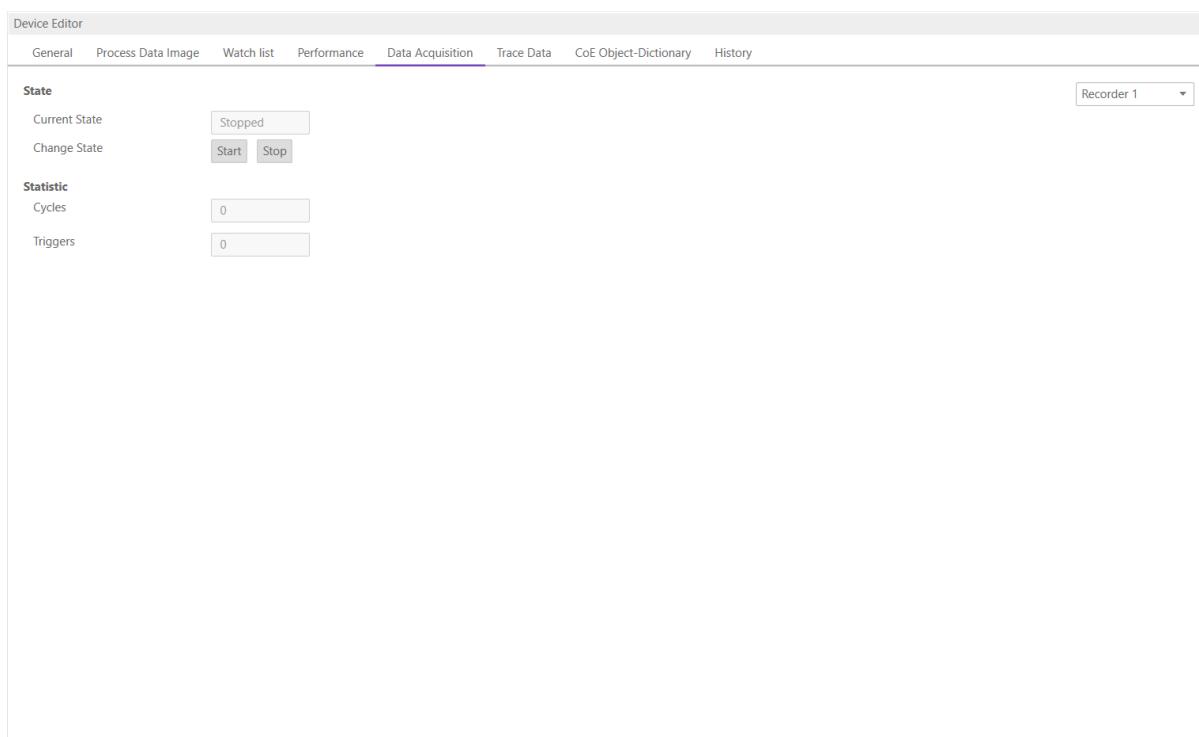
On the other tab the user can see the CPU load. In the grid is a list of all running jobs and how long they take. In the diagram above is a summary of all jobs. When a job is selected, the chart shows how many

**times a job has taken how long to complete.**



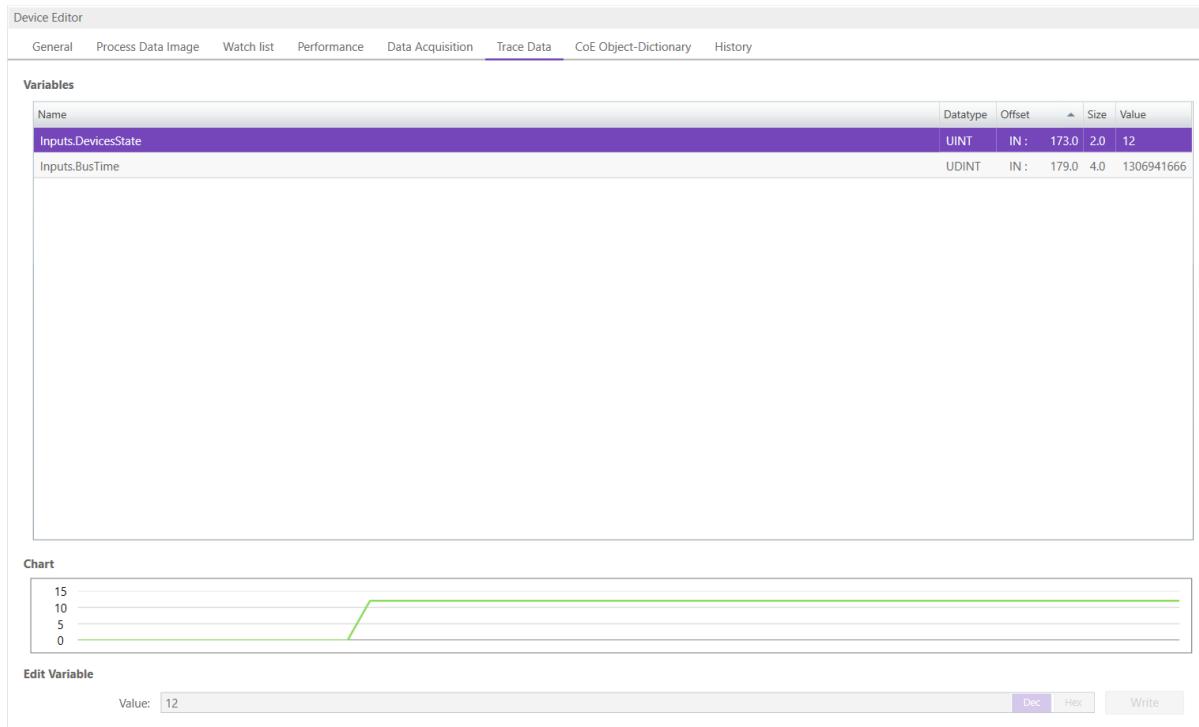
## 6.2.5 Data Acquisition Diagnosis

**In this tab, the user can start and stop the DAQ recorders. Also he can see some statistics of running recorders.**



## 6.2.6 Trace Data (Expert)

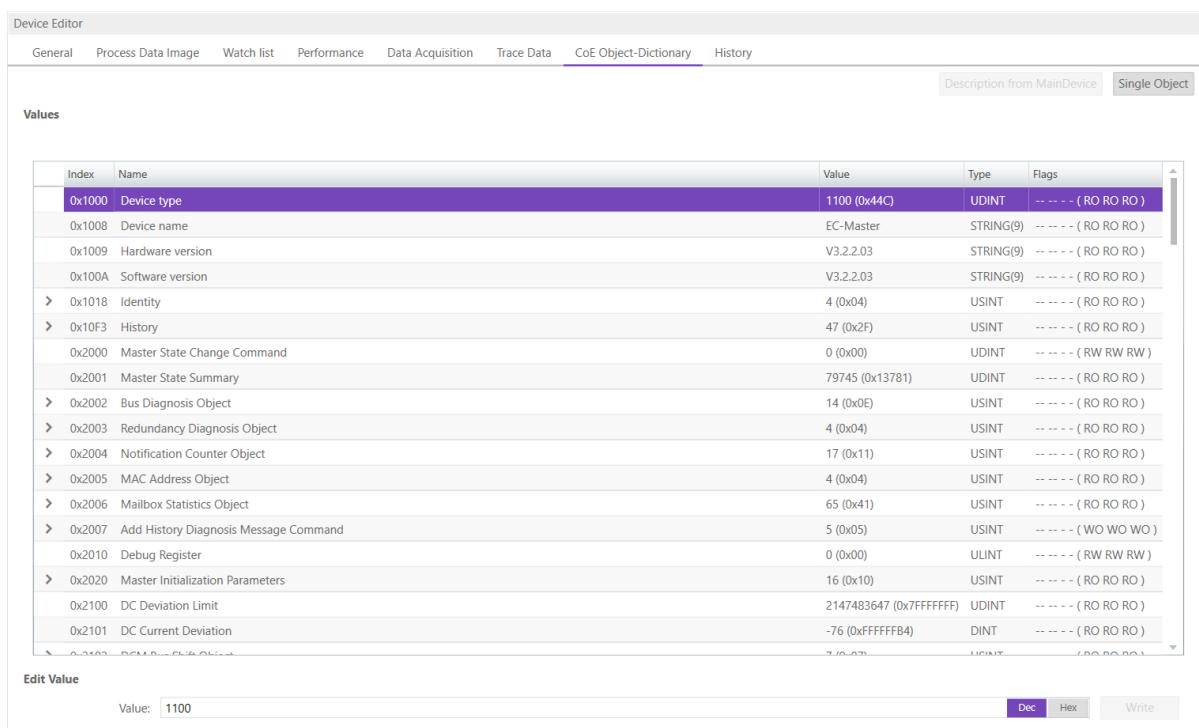
In this tab, the user can see and change the values of the trace variables. If he selects a variable he will see a chart of the values. The chart will be updated every 250 milliseconds:



The screenshot shows the Device Editor interface with the 'Trace Data' tab selected. The 'Variables' section lists two variables: 'Inputs.DevicesState' (UINT, IN: 173.0, 2.0, 12) and 'Inputs.BusTime' (UDINT, IN: 179.0, 4.0, 1306941666). Below this is a large empty area for the chart. The 'Chart' section displays a line graph with a single data series. The y-axis ranges from 0 to 15 with increments of 5. The x-axis represents time. The data series starts at 0, remains flat until approximately 10 seconds, then jumps to 12 and stays constant. At the bottom, there is an 'Edit Variable' section with a 'Value' input field set to 12, and buttons for 'Dec', 'Hex', and 'Write'.

## 6.2.7 CoE Object-Dictionary (Device)

In this tab, the user can see and change the values of the object dictionary of the MainDevice:



The screenshot shows the Device Editor interface with the 'CoE Object-Dictionary' tab selected. The 'Values' section displays a table of object dictionary entries. The table includes columns for Index, Name, Value, Type, and Flags. The 'Value' column shows the current value, and the 'Type' column shows the data type. The 'Flags' column indicates the access rights (RO, RW, etc.). The table lists various objects such as 'Device type', 'Device name', 'Hardware version', 'Software version', 'Identity', 'History', 'Master State Change Command', 'Master State Summary', 'Bus Diagnosis Object', 'Redundancy Diagnosis Object', 'Notification Counter Object', 'MAC Address Object', 'Mailbox Statistics Object', 'Add History Diagnosis Message Command', 'Debug Register', 'Master Initialization Parameters', 'DC Deviation Limit', and 'DC Current Deviation'. At the bottom, there is an 'Edit Value' section with a 'Value' input field set to 1100, and buttons for 'Dec', 'Hex', and 'Write'.

## Lists of CoE Object-Dictionary entries

- Entries are uploaded by the MainDevice from the SubDevice
- The “Flags” column tells the user if this entry is an PDO entry and if it can be edited**
  - “AA BB (CC DD EE)”
  - AA = Mapping as RX PDO or not
  - BB = Mapping as TX PDO or not
  - CC = Access rights for PreOp (RO, WO, RW)
  - DD = Access rights for SafeOp (RO, WO, RW)
  - EE = Access rights for Op (RO, WO, RW)

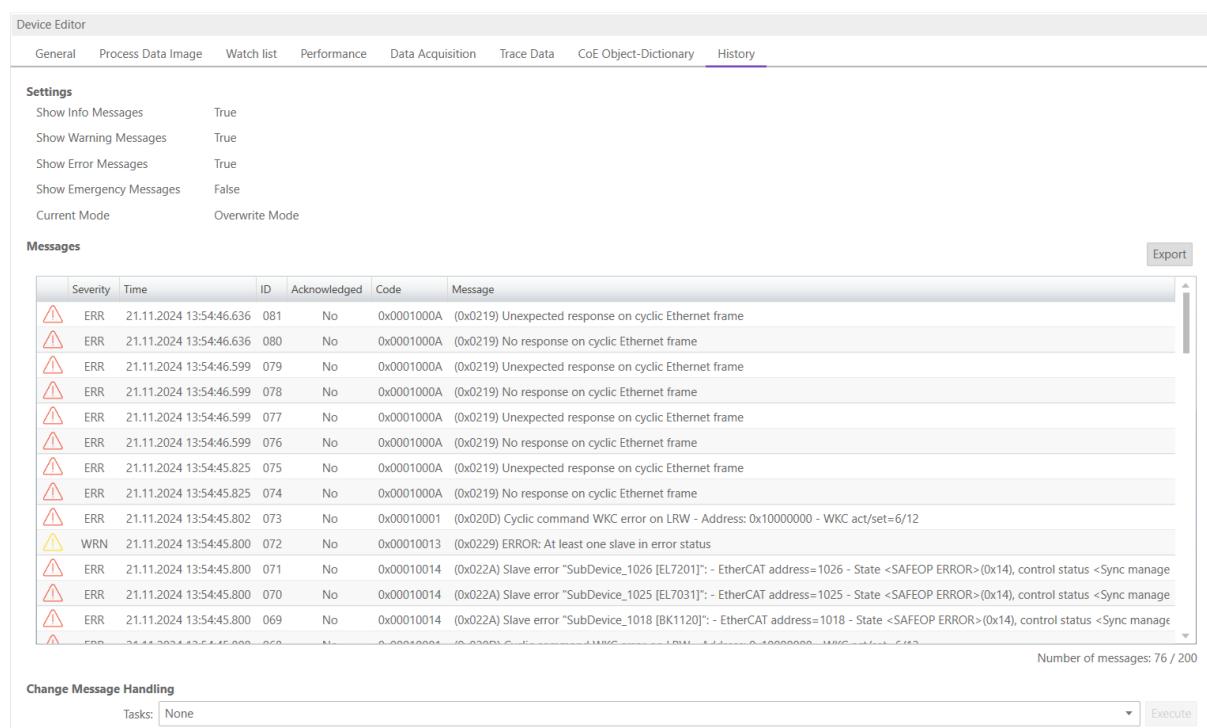
## Buttons

### Update:

Changes the selected entry

## 6.2.8 History (Device)

In this tab, the user can see and change the diagnosis history of the MainDevice (Supported from EC-Master V2.7 and above). It is also possible to export the data:



Severity	Time	ID	Acknowledged	Code	Message
ERR	21.11.2024 13:54:46.636	081	No	0x0001000A (0x0219)	Unexpected response on cyclic Ethernet frame
ERR	21.11.2024 13:54:46.636	080	No	0x0001000A (0x0219)	No response on cyclic Ethernet frame
ERR	21.11.2024 13:54:46.599	079	No	0x0001000A (0x0219)	Unexpected response on cyclic Ethernet frame
ERR	21.11.2024 13:54:46.599	078	No	0x0001000A (0x0219)	No response on cyclic Ethernet frame
ERR	21.11.2024 13:54:46.599	077	No	0x0001000A (0x0219)	Unexpected response on cyclic Ethernet frame
ERR	21.11.2024 13:54:46.599	076	No	0x0001000A (0x0219)	No response on cyclic Ethernet frame
ERR	21.11.2024 13:54:45.825	075	No	0x0001000A (0x0219)	Unexpected response on cyclic Ethernet frame
ERR	21.11.2024 13:54:45.825	074	No	0x0001000A (0x0219)	No response on cyclic Ethernet frame
ERR	21.11.2024 13:54:45.802	073	No	0x00010001 (0x020D)	Cyclic command WKC error on LRW - Address: 0x10000000 - WKC act/set=6/12
WRN	21.11.2024 13:54:45.800	072	No	0x00010013 (0x0229)	ERROR: At least one slave in error status
ERR	21.11.2024 13:54:45.800	071	No	0x00010014 (0x022A)	Slave error "SubDevice_1026 [EL7201]" - EtherCAT address=1026 - State <SAFEOP ERROR>(0x14), control status <Sync manage
ERR	21.11.2024 13:54:45.800	070	No	0x00010014 (0x022A)	Slave error "SubDevice_1025 [EL7031]" - EtherCAT address=1025 - State <SAFEOP ERROR>(0x14), control status <Sync manage
ERR	21.11.2024 13:54:45.800	069	No	0x00010014 (0x022A)	Slave error "SubDevice_1018 [BK1120]" - EtherCAT address=1018 - State <SAFEOP ERROR>(0x14), control status <Sync manage

Number of messages: 76 / 200

## Settings

### Show Info Messages:

Info messages will be collected from MainDevice

**Show Warning Messages:**

Warning messages will be collected from MainDevice

**Show Error Messages:**

Error messages will be collected from MainDevice

**Show Emergency Messages:**

Not supported from MainDevice

**Current Mode:**

Overwrite Mode: Messages will be overwritten if buffer is full Acknowledge Mode: Not supported from MainDevice

**Messages**

List of history messages

**Change Message Handling****Enable/Disable Info Messages:**

Enable or disable info messages

**Enable/Disable Warning Messages:**

Enable or disable warning messages

**Enable/Disable Info Messages:**

Enable or disable info messages

**Enable/Disable Error Messages:**

Enable or disable error messages

**Enable Acknowledge Mode:**

Enable acknowledge mode

**Clear All Messages:**

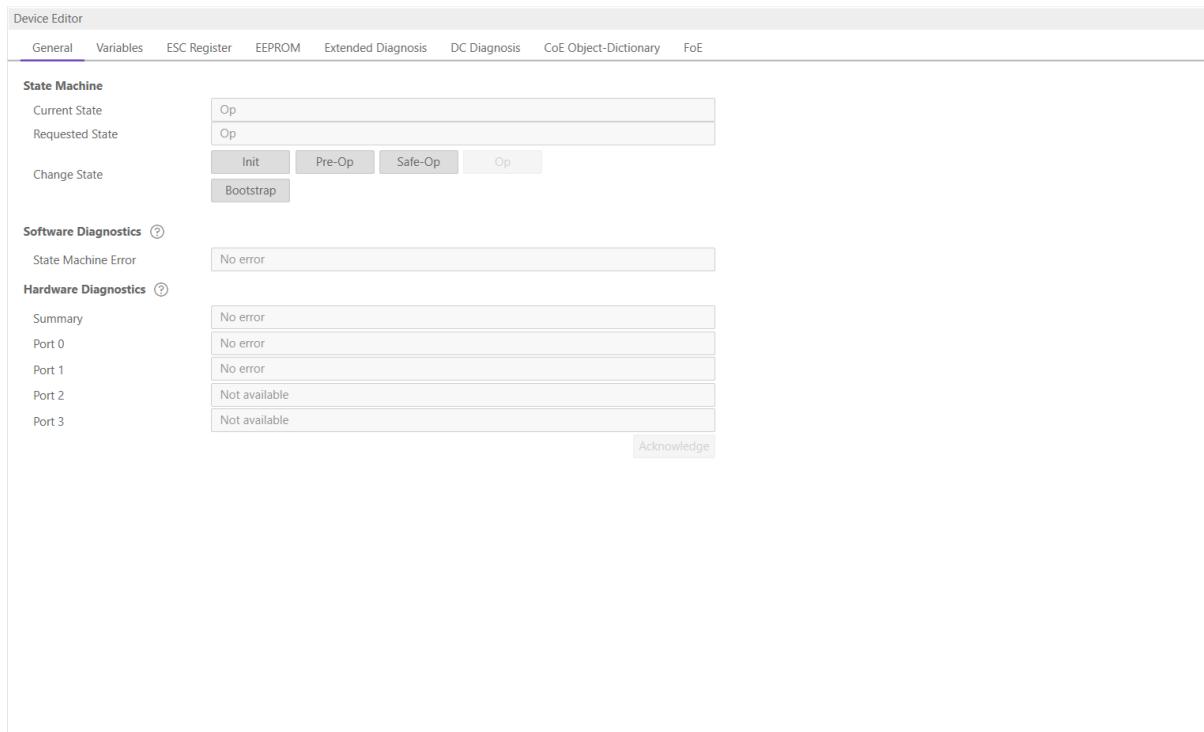
Clear all messages

## 6.3 SubDevice

This section shows the current “health” state of the selected SubDevice and helps the user to analyze SubDevice related problems.

### 6.3.1 General (SubDevice)

In this tab, the user can see the current state of the state machine of the SubDevice:



#### State Machine

##### Current State:

Current state of the selected SubDevice

##### Requested State:

Requested state of the selected SubDevice

##### Change State:

SubDevice can reach the states INIT, BOOTSTRAP, PRE-OP, SAFE-OP and OP.

#### Software Diagnostics

##### State Machine Error:

SubDevice error which occurred during state transition

#### Hardware Diagnostics

##### Summary:

Summary of hardware diagnostics

##### Port A:

Port specific error

##### Port D:

Port specific error

##### Port B:

Port specific error

**Port C:**

Port specific error

**Buttons****Acknowledge:**

Acknowledge the current error state and notify the user again if error state was changed again.

**Possible warning and errors:****Disturbed Connection:**

There may be problems in the connection between two SubDevices. The message will tell either that there is a problem between two SubDevices or two ports. The warning appears if error counters are increased (Invalid Frame: 0x300-0x306, RX Errors: 0x301-0x307, Lost Link: 0x308-0x30B). The value from which a warning is issued can be set in the User.xml files in C:/ProgramData/EC-Engineer. More information below.

**Bad Connection:**

The same as “Disturbed Connection” but the error counters are higher. The value from which an error is issued can be set in the User.xml files in C:/ProgramData/EC-Engineer. More information below.

**Line break:**

A line break is detected before a SubDevice. This error is detected by looking at the topology.

**Link missing:**

A link is missing on input port of the SubDevice. This error is detected by looking at the topology.

**Multiple warnings:**

There are multiple warning for this port.

**Multiple errors:**

There are multiple errors for this port.

**Multiple warnings and errors:**

There are multiple warning and errors for this port.

**State Machine:**

See ETG1020 “Description of AL Status Codes” or ETG.1000.6. This error is detected by looking at the AL Status (0x130).

**How to solve errors?**

- Lost Link errors are often caused by the power supply system
- Helpful might be the usage of an extra power supply
- It is recommended to clear all error counters after startup

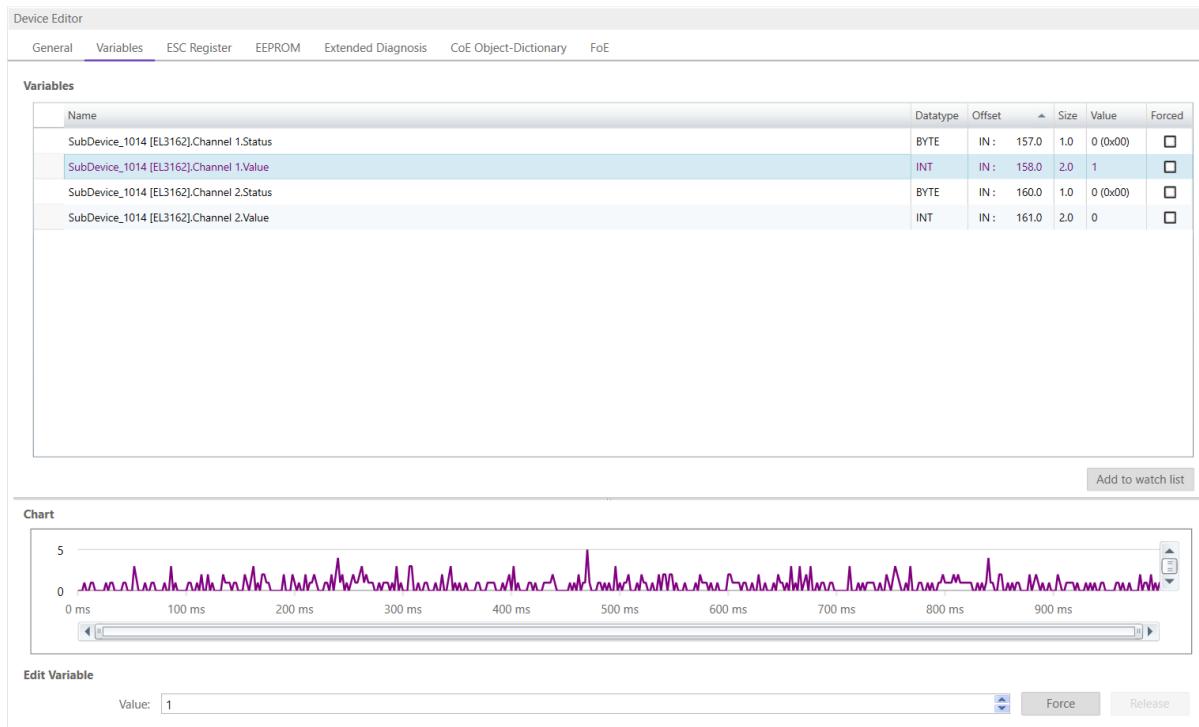
**How to change amount of errors leading to a warning or error:**

- Open C:/ProgramData/EC-Engineer
- Search for DiagGeneral
- **Change the values which should be adjusted**
  - LostLink: The value entered is used
  - All others are calculated depending on the amount of cyclic frames: (Value / CyclicFrames) x 10<sup>6</sup>

**Note:** Please refer also the “ETG.1600 EtherCAT Installation Guideline”: <http://www.ethercat.org/ETG1600>.

### 6.3.2 Variables

In this tab, the user can see and change the values of the process variables. The variables will be forced to the value the user entered. The user can press release to release the variable. If one or two variables are selected, a chart of the values is shown. Also resize and zoom is possible to see more details. The chart will be updated every 250 milliseconds:



The screenshot shows the 'Variables' tab of the Device Editor. At the top, there are tabs for General, Variables, ESC Register, EEPROM, Extended Diagnosis, CoE Object-Dictionary, and FoE. The 'Variables' tab is selected. Below the tabs is a table titled 'Variables' with columns for Name, Datatype, Offset, Size, Value, and Forced. The table contains four rows of data:

Name	Datatype	Offset	Size	Value	Forced
SubDevice_1014 [EL3162].Channel 1.Status	BYTE	IN: 157.0	1.0	0 (0x00)	<input type="checkbox"/>
SubDevice_1014 [EL3162].Channel 1.Value	INT	IN: 158.0	2.0	1	<input type="checkbox"/>
SubDevice_1014 [EL3162].Channel 2.Status	BYTE	IN: 160.0	1.0	0 (0x00)	<input type="checkbox"/>
SubDevice_1014 [EL3162].Channel 2.Value	INT	IN: 161.0	2.0	0	<input type="checkbox"/>

Below the table is a 'Chart' section with a line graph showing the value of the selected variable (SubDevice\_1014 [EL3162].Channel 1.Value) over time. The x-axis represents time from 0 ms to 900 ms, and the y-axis represents the value from 0 to 5. The graph shows a high-frequency, low-amplitude signal. At the bottom of the chart is a zoom control with arrows and a scale bar.

At the bottom of the 'Variables' section is a button labeled 'Add to watch list'.

Below the chart is an 'Edit Variable' section with a 'Value:' input field containing '1', and 'Force' and 'Release' buttons.

### 6.3.3 ESC Register

In this tab, the user can see the values of the registers. In the settings section he can set the offset and the length. If he activates the compact view, he will only see the registers which have a description:

Device Editor

General Variables ESC Register EEPROM Extended Diagnosis DC Diagnosis

**Settings**

Offset	0x0000	Dec	Hex
Length	0x0400	Dec	Hex
Compact	<input checked="" type="checkbox"/>		

**Registers**

Index	Name	Value	Type
0x0000	Type	18 (0x12)	USINT
0x0001	Revision	0 (0x00)	USINT
0x0002	Build	3 (0x0003)	UINT
0x0004	FMMUs supported	3 (0x03)	USINT
0x0005	SyncManagers supported	4 (0x04)	USINT
0x0006	RAM Size	1 (0x01)	USINT
0x0007	Port Descriptor	74 (0x4A)	USINT
0x0008	ESC Features supported	252 (0x00FC)	UINT
0x0010	Configured Station Address	1011 (0x03F3)	UINT
0x0012	Configured Station Alias	0 (0x0000)	UINT
0x0020	Write Register Enable	0 (0x00)	USINT
0x0021	Write Register Protection	0 (0x00)	USINT
0x0030	ESC Write Enable	0 (0x00)	USINT
0x0031	ESC Write Protection	0 (0x00)	USINT
0x0040	ESC Reset ECAT	0 (0x00)	USINT
0x0041	ESC Reset PDI	0 (0x00)	USINT
0x0100	ESC DL Control	509185 (0x0007C501)	UDINT

**Edit Register**

Value:  Dec Hex Write

## 6.3.4 EEPROM

This tab consists of three views:

### Smart View

In this view, the user can see and change the values of the EEPROM.

Device Editor

General Variables ESC Register EEPROM Extended Diagnosis DC Diagnosis CoE Object-Dictionary FoE

Smart View Hex View Sii View

**EEPROM Values**

Index	Name	Value	Type
0x0000	PDI Control	3080 (0x0C08)	UINT
0x0001	PDI Configuration	34818 (0x8802)	UINT
0x0002	Pulse Length of SYNC Signals	0 (0x0000)	UINT
0x0003	Extended PDI Configuration	0 (0x0000)	UINT
0x0004	Configured Station Alias	500 (0x01F4)	UINT
0x0005	Reserved	0 (0x00000000)	UDINT
0x0007	Checksum	249 (0x00F9)	UINT
0x0008	Vendor ID	45054 (0x0000AFFE)	UDINT
0x000A	Product Code	87157760 (0x0531EC00)	UDINT
0x000C	Revision Number	18 (0x00000012)	UDINT
0x000E	Serial Number	1226 (0x000004CA)	UDINT
0x0010	Execution Delay	0 (0x0000)	UINT
0x0011	Port0 Delay	0 (0x0000)	UINT
0x0012	Port1 Delay	0 (0x0000)	UINT
0x0013	Reserved	0 (0x0000)	UINT
0x0014	Bootstrap Receive Mailbox Offset	4608 (0x1200)	UINT
0x0015	Bootstrap Receive Mailbox Size	532 (0x0214)	UINT
0x0016	Bootstrap Send Mailbox Offset	5376 (0x1500)	UINT
0x0017	Bootstrap Send Mailbox Size	532 (0x0214)	UINT
0x0018	Standard Receive Mailbox Offset	7168 (0x1C00)	UINT

**Edit EEPROM Value**

Value:  Dec Hex Write

## Hex View

In this view, the user can create an EEPROM from an ESI file, upload the EEPROM from the SubDevice, load an EEPROM from the disk, download the EEPROM to the SubDevice or save the EEPROM to disk.

Device Editor

General Variables ESC Register EEPROM Extended Diagnosis CoE Object-Dictionary History FoE

EEPROM

Smart View Hex View SII View

EEPROM

```

0000: 05 04 03 00 00 00 00 00 00 00 00 00 00 00 00 00 F1 00 ..... .
0010: 00 00 00 00 52 30 50 18 00 00 15 00 00 00 00 00 ..... ROP .
0020: 00 00 00 00 00 00 00 00 00 10 F4 00 F4 10 F4 00 ..... .
0030: 00 10 00 01 11 00 01 00 00 00 00 00 00 00 00 00 ..... .
0040: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ..... .
0050: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ..... .
0060: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ..... .
0070: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0F 01 00 ..... .
0080: 0A 00 B6 00 16 00 45 4C 36 32 32 34 0D 43 6F 6D ..... EL 6224 .Com
0090: 6D 75 6E 69 63 63 74 69 6F 6E 20 43 6F 6D 6D 75 ..... munication .Commu
00A0: 65 69 63 63 74 69 6F 6E 20 54 65 72 6D 69 6E 61 ..... nication .Terminal
00B0: 65 69 63 63 74 69 6F 6E 20 54 65 72 6D 69 6E 61 ..... (EL6x xx).EL62
00C0: 32 34 20 08 49 4F 20 4C 70 59 6E 20 4D 63 71 04 ..... 24. (EL6x xx).Master
00D0: 65 72 29 07 46 52 65 65 52 75 6B 02 44 3 19 44 ..... .Free Run.DC.D
00E0: 65 76 69 63 65 53 74 61 74 65 20 49 6B 70 75 74 ..... eviceState .Input
00F0: 73 20 44 65 76 69 63 65 0B 44 65 76 69 63 65 20 ..... s.Device .Device
0100: 44 69 61 67 0C 44 65 76 69 63 65 20 53 74 61 74 ..... Diag.Dev .Ice .Stat
0110: 65 12 44 65 76 69 63 65 53 74 61 74 65 20 49 6E ..... e.Device State .In
0120: 70 75 74 73 09 53 74 61 74 65 20 43 68 31 09 53 ..... puts.State .Ch1 .S
0130: 74 61 74 65 20 43 68 32 09 53 74 61 74 65 20 43 ..... tate .Ch2 .State .d
0140: 68 33 09 53 74 61 74 65 20 43 68 34 13 49 4F 20 ..... h3.State .Ch4 .IO.
0150: 49 68 70 75 74 73 20 43 68 61 6E 6B 65 66 20 31 ..... Inputs .C channel .1
0160: 13 49 4F 20 49 68 70 75 74 73 20 43 68 61 6E 6B ..... .IO .Inputs .Chann
0170: 65 68 20 32 13 49 4F 20 49 6E 70 75 74 73 20 43 ..... el.1 .2 .IO .Inputs .C
0180: 68 63 6E 68 65 68 20 33 13 49 4F 20 49 6E 70 75 ..... hannel .1 .3 .IO .Inputs
0190: 74 73 20 43 68 61 6E 6E 65 6C 20 34 14 49 4F 20 ..... ts .Chann .el.1 .4 .IO.
01A0: 4F 75 74 70 75 74 73 20 43 68 61 6E 65 6C 20 ..... Outputs .Channel .
01B0: 31 14 49 4F 20 4F 75 74 70 75 74 73 20 43 68 61 ..... 1 .IO .Out .puts .Ch
01C0: 6E 68 65 68 20 38 14 49 4F 20 4F 75 74 70 75 74 ..... nnel .2 .1 .0 .Output
01D0: 73 20 43 68 61 6E 6B 65 68 20 33 14 49 4F 20 4F ..... s .Channe .1 .3 .IO .O
01E0: 75 74 70 75 74 73 20 43 68 61 6E 6B 65 66 20 34 ..... utput .C channel .4
01F0: 1E 00 10 00 02 00 01 00 00 00 00 00 00 00 00 00 ..... ..... / . . .
0200: 78 00 03 00 03 00 00 00 00 00 00 00 00 00 00 00 ..... x . . . . .
0210: 78 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ..... x . . . . .

```

EEPROM Operations

Timeout (ms): 60000 - +  
Data Size (byte): 2048 - +

Upload from SubDevice Load from File Create from ESI  
Download to SubDevice Save to File

## SII View

In this view, the user can create a SubDevice Information Interface (SII), by uploading the EEPROM data from the SubDevice.

Device Editor

General Variables ESC Register EEPROM Extended Diagnosis DC Diagnosis

Smart View Hex View SII View

EEPROM SII

Strings

Name	Value
Index 0	EL2252
Index 1	DigOut
Index 2	Digitale Ausgangsklemmen (EL2xx)
Index 3	EL2252 2K. Dig. Ausgang 24V, 0.5A, DC Time Stamp
Index 4	DcTimeStamp
Index 5	SysTime
Index 6	Feedback
Index 7	DC Sync Activate
Index 8	Activate
Index 9	DC Sync Start
Index 10	StartTime
Index 11	Channel 1
Index 12	Output
Index 13	TriState
Index 14	Channel 2
Index 15	Reserved

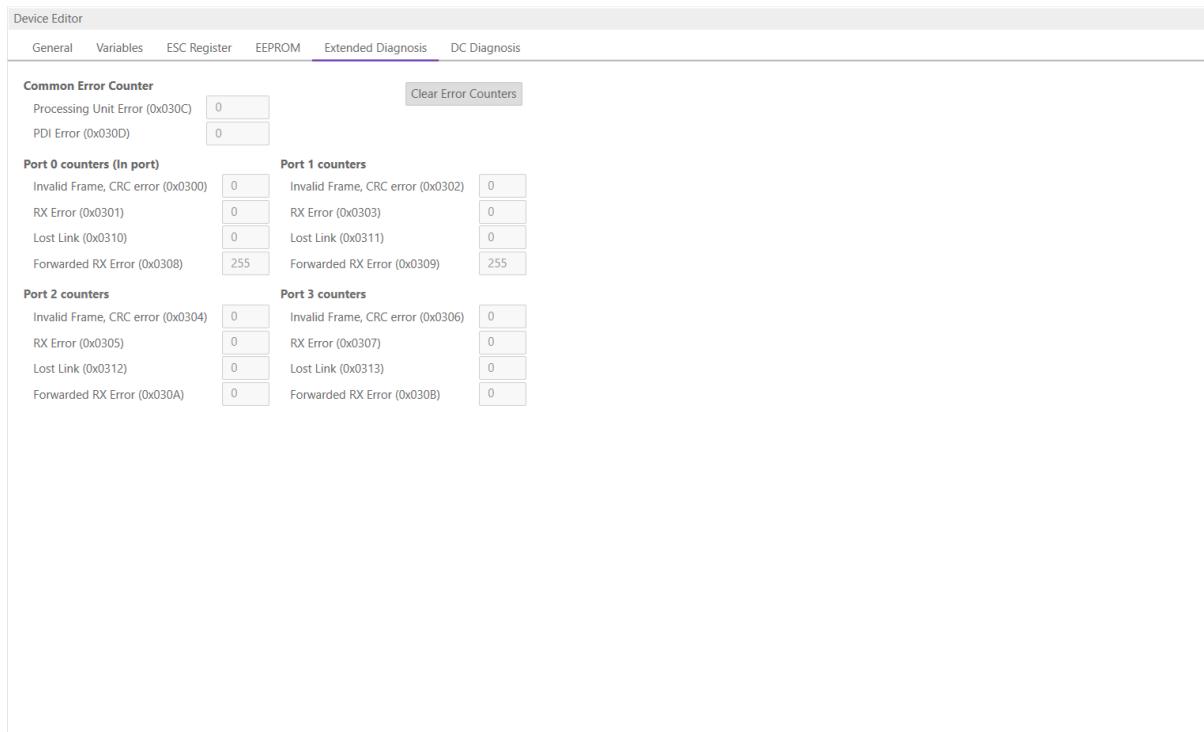
EEPROM Operations

Timeout (ms): 60000 - +

Upload from SubDevice

### 6.3.5 Extended Diagnosis

In this tab, the user can see the extended diagnosis information:



Common Error Counter	
Processing Unit Error (0x030C)	<input type="text" value="0"/>
PDI Error (0x030D)	<input type="text" value="0"/>

Port 0 counters (In port)	
Invalid Frame, CRC error (0x0300)	<input type="text" value="0"/>
RX Error (0x0301)	<input type="text" value="0"/>
Lost Link (0x0310)	<input type="text" value="0"/>
Forwarded RX Error (0x0308)	<input type="text" value="255"/>

Port 1 counters	
Invalid Frame, CRC error (0x0302)	<input type="text" value="0"/>
RX Error (0x0303)	<input type="text" value="0"/>
Lost Link (0x0311)	<input type="text" value="0"/>
Forwarded RX Error (0x0309)	<input type="text" value="255"/>

Port 2 counters	
Invalid Frame, CRC error (0x0304)	<input type="text" value="0"/>
RX Error (0x0305)	<input type="text" value="0"/>
Lost Link (0x0312)	<input type="text" value="0"/>
Forwarded RX Error (0x030A)	<input type="text" value="0"/>

Port 3 counters	
Invalid Frame, CRC error (0x0306)	<input type="text" value="0"/>
RX Error (0x0307)	<input type="text" value="0"/>
Lost Link (0x0313)	<input type="text" value="0"/>
Forwarded RX Error (0x030B)	<input type="text" value="0"/>

There will be a red ! to signalize that a counter is higher than 0. Except for the forwarded errors.

If an error counter is '-' it was not read. If it is '0' it is really zero. So there is a difference between '0' and '-'.

#### Common Error Counter

##### Processing Error Counter:

Indicates that SubDevice received “not EtherCAT frames”, which are not allowed in the EtherCAT segment (of course acceptable in a test environment)

##### PDI Error Counter:

Counts if a PDI access has an interface error (read from register: 0x30D)

#### Port 0..3

- Invalid Frame Counter of Port y (read from register: 0x0300+y\*2)
- RX Error Counter of Port y (read from register: 0x0300+y\*2+8Bit)
- Lost Link Counter of Port y (read from register: 0x0310+y)
- Forwarded RX Error Counter of Port y (read from register: 0x0308+y)

#### Acknowledge warning

If one of the error counters increase there will be a warning in the tree, signalized with an icon. With this button it is possible to acknowledge this warning. So the SubDevice can be monitored again and the icon will come back with the next error.

To see this information the error counters must be read by the EtherCAT MainDevice. Only if this is activated the EC-Engineer is able to read this. Here is a quick overview on how to activate this function on different MainDevices:

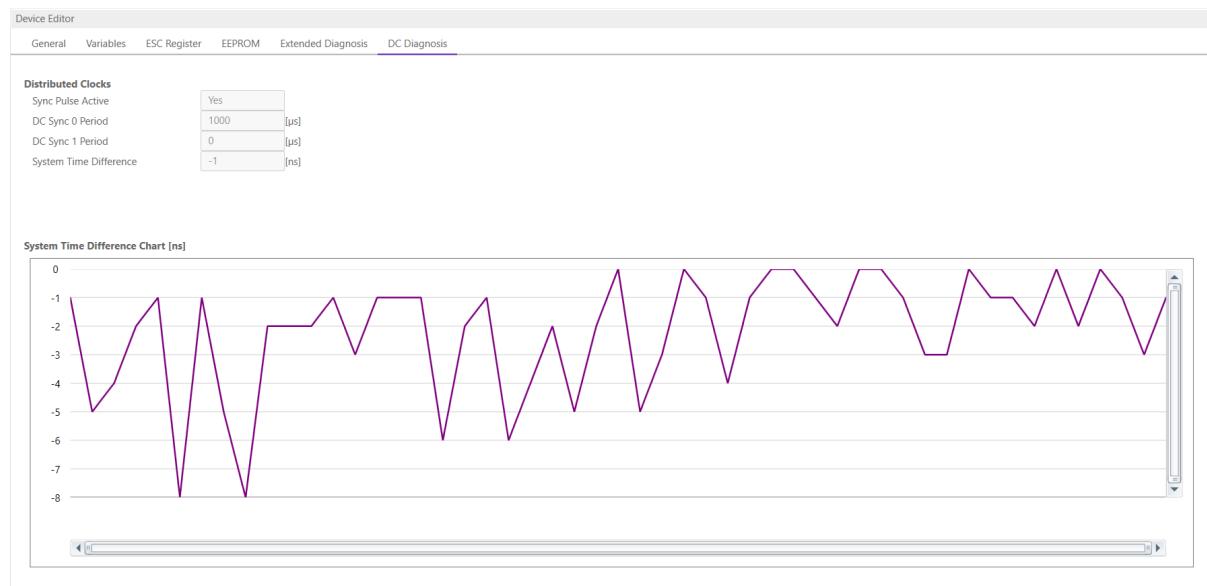
### acontis EC-Master:

To activate the error collection of the acontis EC-Master, the following API has to be called:

```
/* SubDevice statistics polling for error diagnostic */
EC_T_DWORD dwPeriodMs = 1000;
dwRes = ecatIoCtl(EC_IOCTL_SET_SLVSTAT_PERIOD, (EC_T_BYTE*)&dwPeriodMs,
sizeof(EC_T_DWORD), EC_NULL, 0, EC_NULL);
if (dwRes != EC_E_NOERROR)
{
    EcLogMsg(EC_LOG_LEVEL_ERROR, (pEcLogContext, EC_LOG_LEVEL_ERROR,
"ecatIoControl(EC_IOCTL_SET_SLVSTAT_PERIOD) returns with error=0x%x\n", dwRes));
    goto Exit;
}
```

## 6.3.6 DC Diagnosis

In this tab, the user can see all DC related values of the SubDevice:



### Distributed Clock

#### Sync Pulse Active:

Sync pulse was received or not

#### DC Sync 0 Period:

Configured period for sync unit 0

#### DC Sync 1 Period:

Configured period for sync unit 1

#### System Time Difference:

Time difference of SubDevice clock to reference clock

### System Time Difference Chart

Chart displaying the System Time Difference over time (The amount of entries and visibility can be change in *Expert*)

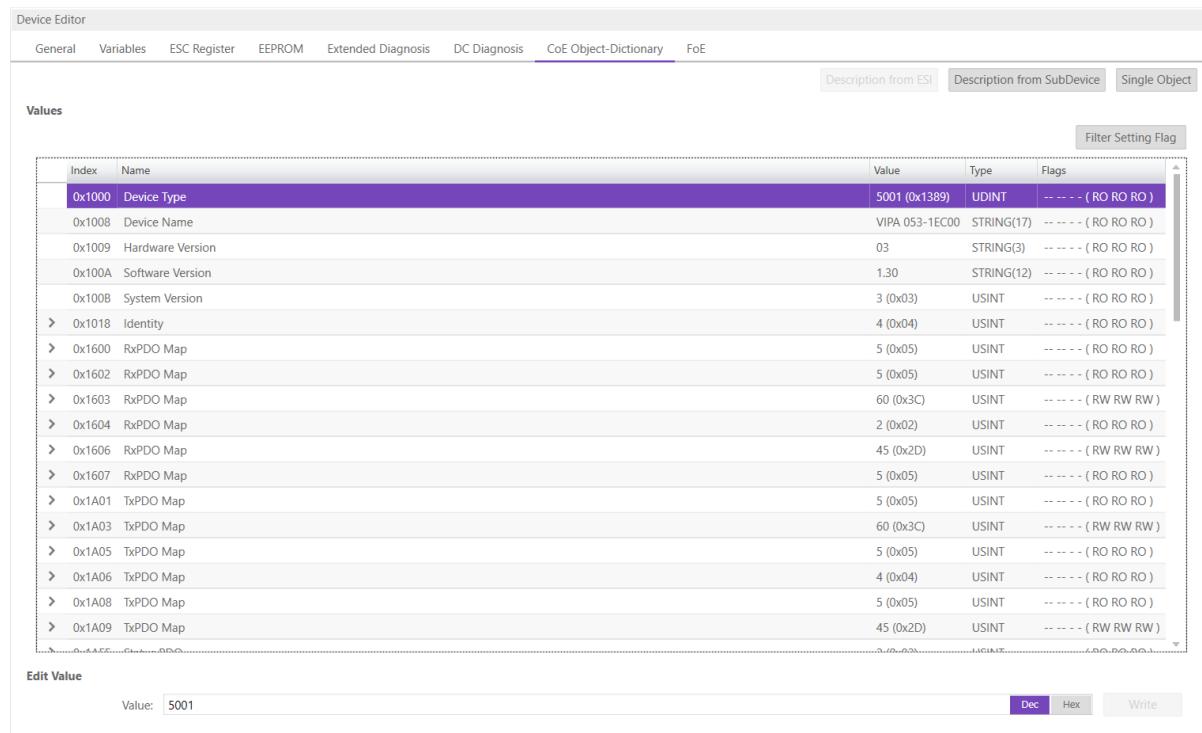
**Note:** The option “Sync Window Monitoring” must be enabled.

### 6.3.7 CoE Object-Dictionary

This tab consists of different modes:

#### Description from ESI

In this tab, the user can see the description of the object dictionary from ESI and the values from the SubDevice.



Index	Name	Value	Type	Flags
0x1000	Device Type	5001 (0x1389)	UDINT	---- ( RO RO RO )
0x1008	Device Name	VIPA 053-1EC00	STRING(17)	---- ( RO RO RO )
0x1009	Hardware Version	03	STRING(3)	---- ( RO RO RO )
0x100A	Software Version	1.30	STRING(12)	---- ( RO RO RO )
0x100B	System Version	3 (0x03)	USINT	---- ( RO RO RO )
0x1018	Identity	4 (0x04)	USINT	---- ( RO RO RO )
0x1600	RxPDO Map	5 (0x05)	USINT	---- ( RO RO RO )
0x1602	RxPDO Map	5 (0x05)	USINT	---- ( RO RO RO )
0x1603	RxPDO Map	60 (0x3C)	USINT	---- ( RW RW RW )
0x1604	RxPDO Map	2 (0x02)	USINT	---- ( RO RO RO )
0x1606	RxPDO Map	45 (0x2D)	USINT	---- ( RW RW RW )
0x1607	RxPDO Map	5 (0x05)	USINT	---- ( RO RO RO )
0x1A01	TxPDO Map	5 (0x05)	USINT	---- ( RO RO RO )
0x1A03	TxPDO Map	60 (0x3C)	USINT	---- ( RW RW RW )
0x1A05	TxPDO Map	5 (0x05)	USINT	---- ( RO RO RO )
0x1A06	TxPDO Map	4 (0x04)	USINT	---- ( RO RO RO )
0x1A08	TxPDO Map	5 (0x05)	USINT	---- ( RO RO RO )
0x1A09	TxPDO Map	45 (0x2D)	USINT	---- ( RW RW RW )

**Edit Value**

Value:  Dec Hex Write

#### Lists of CoE Object-Dictionary entries

- Entries comes from ESI
- The “Flags” column tells the user if this entry is an PDO entry and if it can be edited
  - “AA BB C D (EE FF GG)”
    - AA = Mapping as RX PDO or not
    - BB = Mapping as TX PDO or not
    - C = Backup Flag
    - D = Settings Flag
    - EE = Access rights for PreOp (RO, WO, RW)
    - FF = Access rights for SafeOp (RO, WO, RW)
    - GG = Access rights for Op (RO, WO, RW)

#### Buttons

##### Write:

Writes the selected entry

#### Description from SubDevice

In this tab, the user can see the description of the object dictionary and the values from SubDevice. He can also change the values and has the possiblility to export the object dictionary.

Device Editor

General Variables ESC Register EEPROM Extended Diagnosis DC Diagnosis CoE Object-Dictionary FoE

Description from ESI Description from SubDevice Single Object

Values

Index Name Value Type Flags

Index	Name	Value	Type	Flags
0x1000	Device Type	5001 (0x1389)	UDINT	--- - ( RO RO RO )
0x1008	Device Name	VIPA 053-1EC00	STRING(30)	--- - ( RO RO RO )
0x1009	Hardware Version	03	STRING(8)	--- - ( RO RO RO )
0x100A	Software Version	1.30	STRING(8)	--- - ( RO RO RO )
0x100B	System Version	3 (0x03)	USINT	--- - ( RO RO RO )
0x1018	Identity	4 (0x04)	USINT	--- - ( RO RO RO )
0x1600	RxPDO Map	5 (0x05)	USINT	--- - ( RO RO RO )
0x1602	RxPDO Map	5 (0x05)	USINT	--- - ( RO RO RO )
0x1603	RxPDO Map	60 (0x3C)	USINT	--- - ( RW RO RO )
0x1604	RxPDO Map	2 (0x02)	USINT	--- - ( RO RO RO )
0x1606	RxPDO Map	45 (0x2D)	USINT	--- - ( RW RO RO )
0x1607	RxPDO Map	5 (0x05)	USINT	--- - ( RO RO RO )
0x1A01	TxPDO Map	5 (0x05)	USINT	--- - ( RO RO RO )
0x1A03	TxPDO Map	60 (0x3C)	USINT	--- - ( RW RO RO )
0x1A05	TxPDO Map	5 (0x05)	USINT	--- - ( RO RO RO )
0x1A06	TxPDO Map	4 (0x04)	USINT	--- - ( RO RO RO )
0x1A08	TxPDO Map	5 (0x05)	USINT	--- - ( RO RO RO )
0x1A09	TxPDO Map	45 (0x2D)	USINT	--- - ( RW RO RO )
0x1AEE	Other PDO	2 (0x02)	USINT	--- - ( RO RO RO )

Edit Value

Value: 0

Dec Hex Write

## Lists of CoE Object-Dictionary entries

- Entries are uploaded from the SubDevice (if “SDO Information Service” is supported)
- The “Flags” column tells the user if this entry is an PDO entry and if it can be edited**  
“AA BB C D (EE FF GG)” - AA = Mapping as RX PDO or not - BB = Mapping as TX PDO or not - C = Backup Flag - D = Settings Flag - EE = Access rights for PreOp (RO, WO, RW) - FF = Access rights for SafeOp (RO, WO, RW) - GG = Access rights for Op (RO, WO, RW)

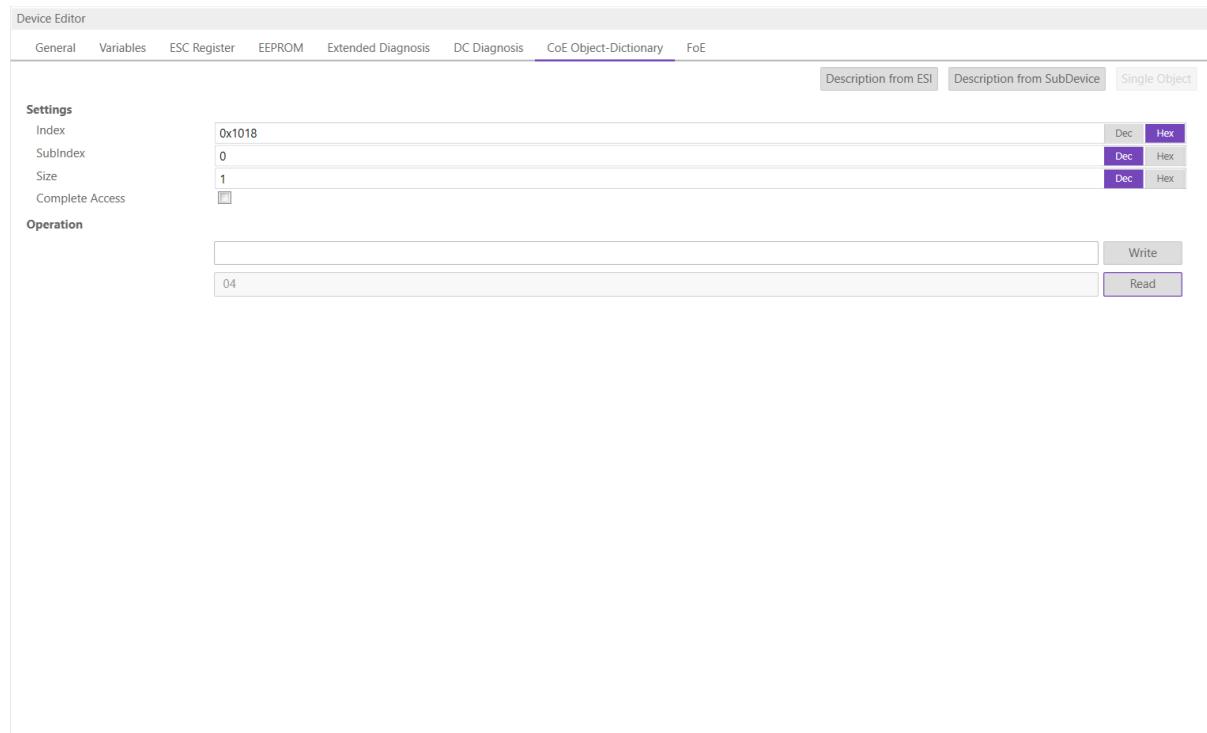
## Buttons

### Write:

Writes the selected entry

### Single Object

In this tab, the user can read and write (not EC-Inspector) the values of the object dictionary of the SubDevice.



## Settings

### **Index:**

Index of the CoE value

### **SubIndex:**

SubIndex of the CoE value

### **Size:**

Size of the CoE value (only used for reading)

### **Complete Access:**

Activate, if complete access mode should be used for reading or writing the CoE value (can be used only if it is supported from SubDevice)

## Operation

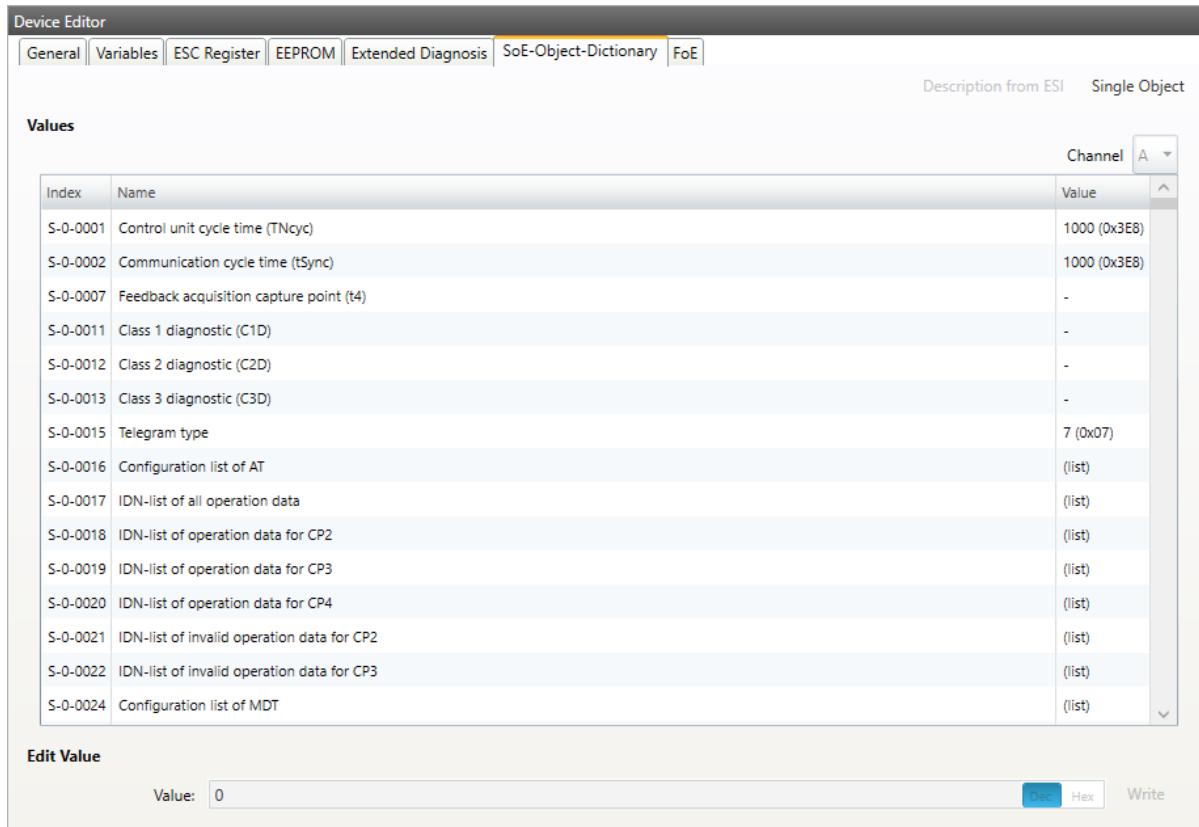
### **Write:**

Writes the value to the SubDevice (Hex format, like: "00 11 22 33 ...")

### **Read:**

Reads the value from SubDevice (Hex format, like: "00 11 22 33 ...")

### 6.3.8 SoE Object-Dictionary



Index	Name	Value
S-0-0001	Control unit cycle time (TNcyc)	1000 (0x3E8)
S-0-0002	Communication cycle time (tSync)	1000 (0x3E8)
S-0-0007	Feedback acquisition capture point (t4)	-
S-0-0011	Class 1 diagnostic (C1D)	-
S-0-0012	Class 2 diagnostic (C2D)	-
S-0-0013	Class 3 diagnostic (C3D)	-
S-0-0015	Telegram type	7 (0x07)
S-0-0016	Configuration list of AT	(list)
S-0-0017	IDN-list of all operation data	(list)
S-0-0018	IDN-list of operation data for CP2	(list)
S-0-0019	IDN-list of operation data for CP3	(list)
S-0-0020	IDN-list of operation data for CP4	(list)
S-0-0021	IDN-list of invalid operation data for CP2	(list)
S-0-0022	IDN-list of invalid operation data for CP3	(list)
S-0-0024	Configuration list of MDT	(list)

**Edit Value**

Value:

#### Lists of SoE Object-Dictionary entries

- Values are uploaded by the MainDevice from the SubDevice
- Entries comes from the ESI

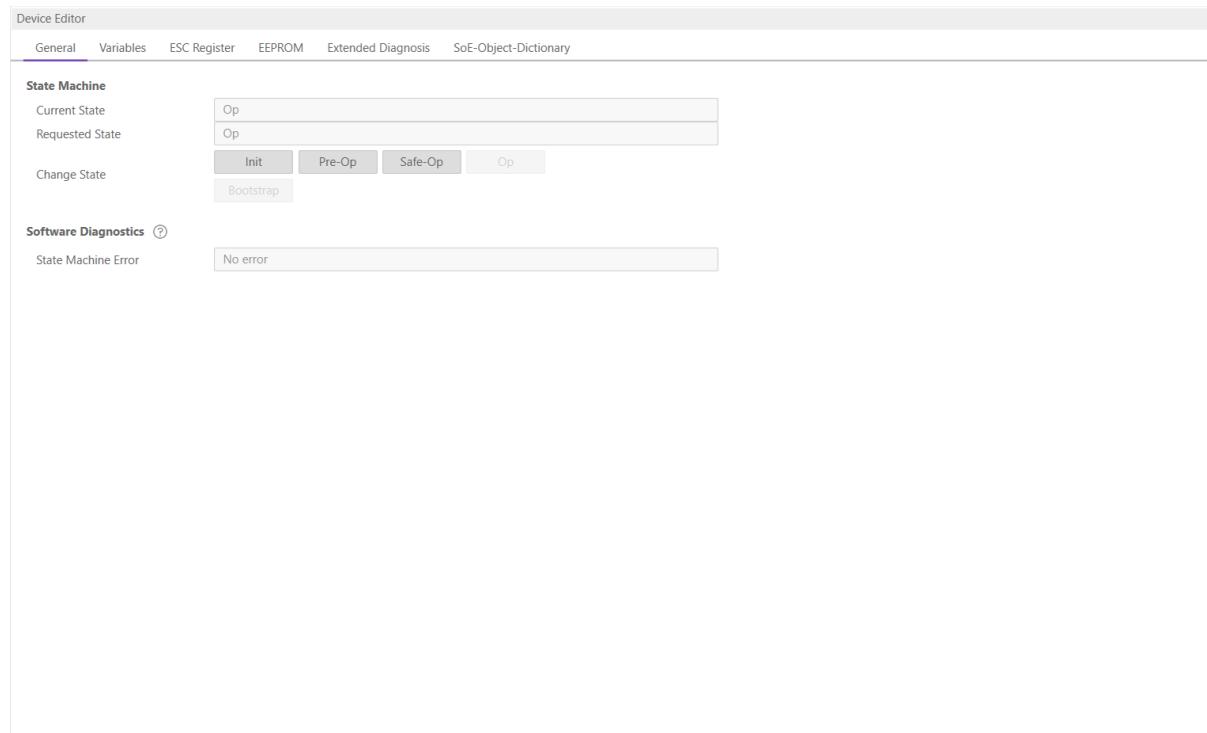
#### Buttons

##### Write:

Writes the selected entry

#### Expert View

In this tab, the user can read and write the values of the object dictionary of the SubDevice:



## Settings

**Channel:**

Channel of the SoE value

**IDN:**

Index of the CoE value

**Size:**

Size of the CoE value (only used for reading)

## Operation

**Write:**

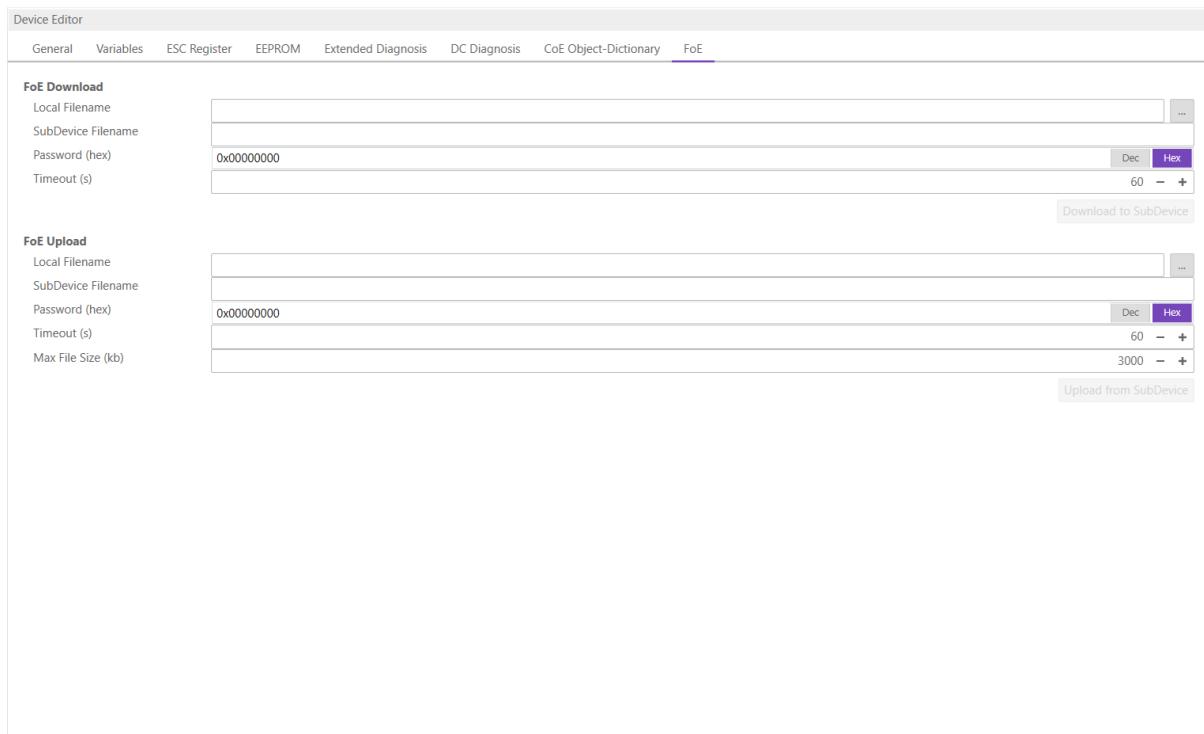
Writes the value to the SubDevice (Hex format, like: "00 11 22 33 ...")

**Read:**

Reads the value from SubDevice (Hex format, like: "00 11 22 33 ...")

### 6.3.9 File over Ethernet (FoE)

In this tab, the user has the possibility to download or upload a file to the SubDevice:



Device Editor

General Variables ESC Register EEPROM Extended Diagnosis DC Diagnosis CoE Object-Dictionary FoE

**FoE Download**

Local Filename:

SubDevice Filename:

Password (hex):  0x00000000 Dec Hex

Timeout (s):  60 - +

**FoE Upload**

Local Filename:

SubDevice Filename:

Password (hex):  0x00000000 Dec Hex

Timeout (s):  60 - +

Max File Size (kb):  3000 - +

**Download to SubDevice**

**Upload from SubDevice**

#### FoE Operations

**Local Filename:**

Name of the file on the harddrive

**SubDevice Filename:**

Name of the file on the SubDevice

**Password:**

Password on the SubDevice as a hex-number

**Timeout:**

Timeout for downloading or uploading the file in milliseconds

**Max File Size:**

Maximal file size which should be uploaded from the SubDevice in kilo bytes

### 6.3.10 History (SubDevice)

In this tab, the user can see and change the diagnosis history of the SubDevice. It is also possible to export the data:

Device Editor

General Variables ESC Register EEPROM Extended Diagnosis DC Diagnosis CoE Object-Dictionary History **History** FoE

**Settings**

Show Info Messages	True
Show Warning Messages	True
Show Error Messages	True
Show Emergency Messages	False
Current Mode	Overwrite Mode

**Messages**

Export

Severity	Time	ID	Acknowledged	Code	Message
INF	21.11.2024 13:50:14.818	030	No	0x1B77E000 (0x1135)	Cycle time o.k.: 2934
INF	21.11.2024 13:50:14.677	029	No	0x1B77E000 (0x1100)	Detection of operation mode completed: 0x100, 0
INF	21.11.2024 13:45:30.546	028	No	0x1B77E000 (0x1135)	Cycle time o.k.: 3001
INF	21.11.2024 13:45:30.404	027	No	0x1B77E000 (0x1100)	Detection of operation mode completed: 0x100, 0
INF	21.11.2024 13:41:01.102	026	No	0x1B77E000 (0x1135)	Cycle time o.k.: 2911
INF	21.11.2024 13:41:00.966	025	No	0x1B77E000 (0x1100)	Detection of operation mode completed: 0x100, 0
INF	12.11.2024 10:59:07.034	024	No	0x1B77E000 (0x1135)	Cycle time o.k.: 2972
INF	12.11.2024 10:59:06.896	023	No	0x1B77E000 (0x1100)	Detection of operation mode completed: 0x100, 0
INF	12.11.2024 10:58:53.389	022	No	0x1B77E000 (0x1135)	Cycle time o.k.: 2831
INF	12.11.2024 10:58:53.255	021	No	0x1B77E000 (0x1100)	Detection of operation mode completed: 0x100, 0
INF	12.11.2024 10:58:37.409	020	No	0x1B77E000 (0x1135)	Cycle time o.k.: 2906
INF	12.11.2024 10:58:37.272	019	No	0x1B77E000 (0x1100)	Detection of operation mode completed: 0x100, 0
INF	12.11.2024 10:58:23.712	018	No	0x1B77E000 (0x1135)	Cycle time o.k.: 2999

Number of messages: 50 / 50

**Change Message Handling**

Tasks: None

## Settings

### Show Info Messages:

Info messages will be collected from SubDevice

### Show Warning Messages:

Warning messages will be collected from SubDevice

### Show Error Messages:

Error messages will be collected from SubDevice

### Show Emergency Messages:

Emergency messages will be collected from SubDevice

### Current Mode:

Overwrite Mode: Messages will be overwritten if buffer is full  
 Acknowledge Mode: Messages will be discarded if buffer is full

## Messages

List of history messages

## Change Message Handling

### Enable/Disable Info Messages:

Enable or disable info messages

### Enable/Disable Warning Messages:

Enable or disable warning messages

### Enable/Disable Error Messages:

Enable or disable error messages

### Enable/Disable Emergency Messages:

Enable or disable emergency messages

**Enable Acknowledge Mode:**

Enable acknowledge mode

**Enable Overwrite Mode:**

Enable overwrite mode

**Clear All Messages:**

Clear all messages (only available if “Overwrite Mode” is active)

**Clear All Acknowledged Messages:**

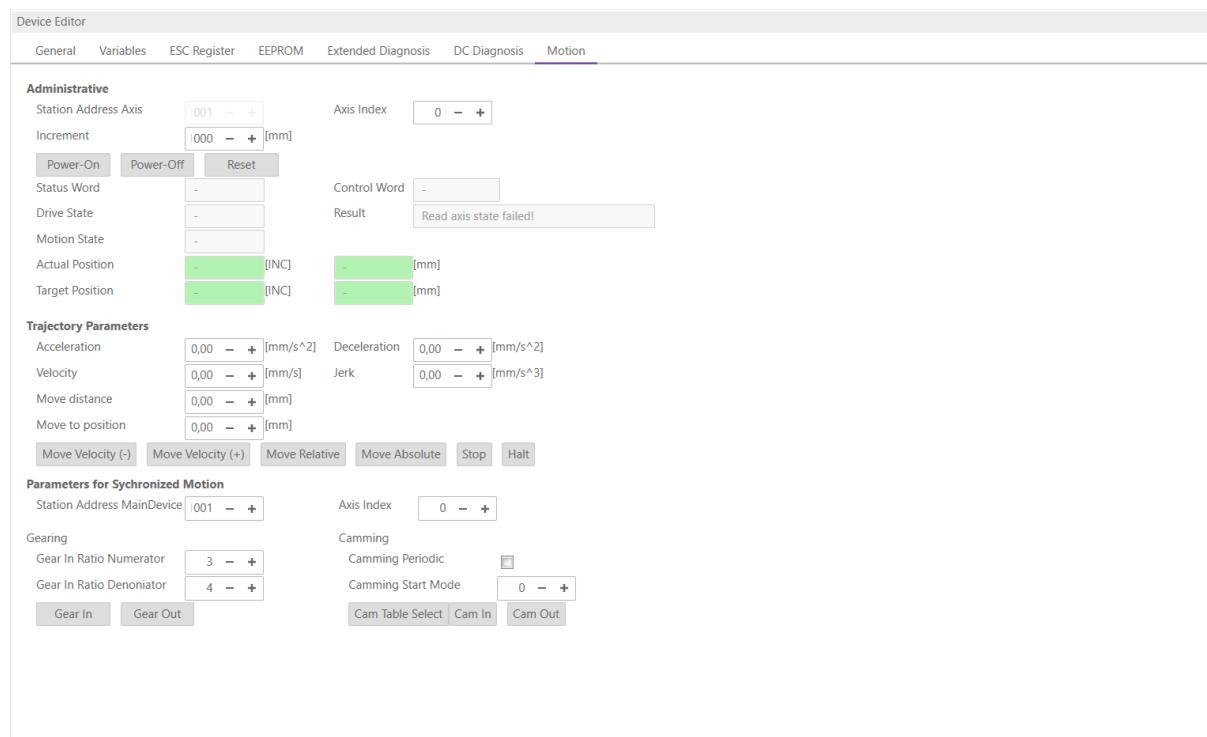
Clear all acknowledged messages (only available if “Acknowledge Mode” is active)

**Acknowledge All Messages:**

Acknowledge all messages, that they can be overwritten from new messages (only available if “Acknowledge Mode” is active)

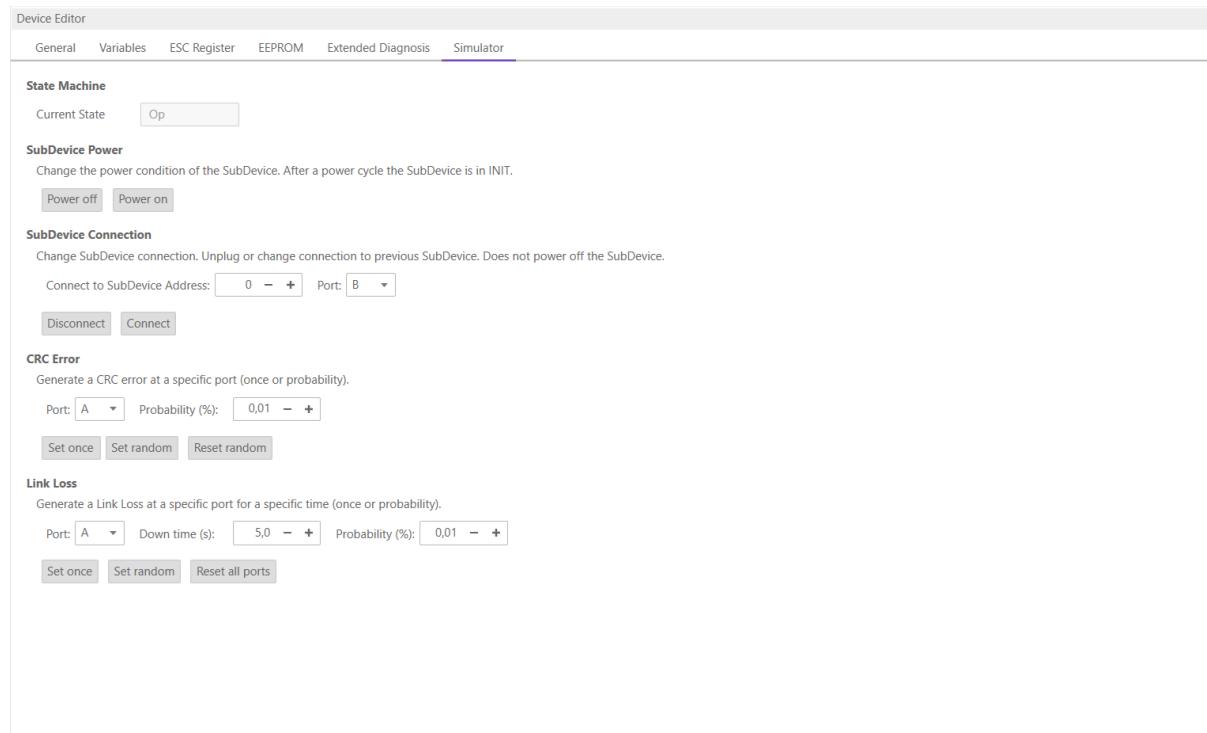
### 6.3.11 Motion (Motion Tabs only)

**In this tab, the user can see and change the motion settings of the SubDevice. He can read important variables and change velocity and direction of the axis. Also gearing and camming are possible to use:**



### 6.3.12 Simulator (Simulator Tabs only)

**In this tab, the user can see and change the simulator settings of the SubDevice. He can manipulate the SubDevice e.g. power, disconnect and produce errors:**



## State Machine

Shows the current state of the SubDevice

## SubDevice Power

### Power off:

Turn the SubDevice power off

### Power on:

Turn the SubDevice on to Init state

## SubDevice Connection

### Disconnect:

Disconnect the SubDevice. SubDevice will not be turned off

### Connect:

Connect SubDevice to selected address and port. Default is the port where the SubDevice was connected before

## CRC Error

### Set once:

Create one CRC error at the selected port

### Set random:

Generate CRC errors at the selected port with the selected probability until reset is executed

### Reset random:

Reset the CRC generation

## Link Loss

### Set once:

Create one Link Loss at the selected port for the selected time

**Set random:**

Generate Link Losses at the selected port with the selected probability for the selected time until reset is executed

**Reset random:**

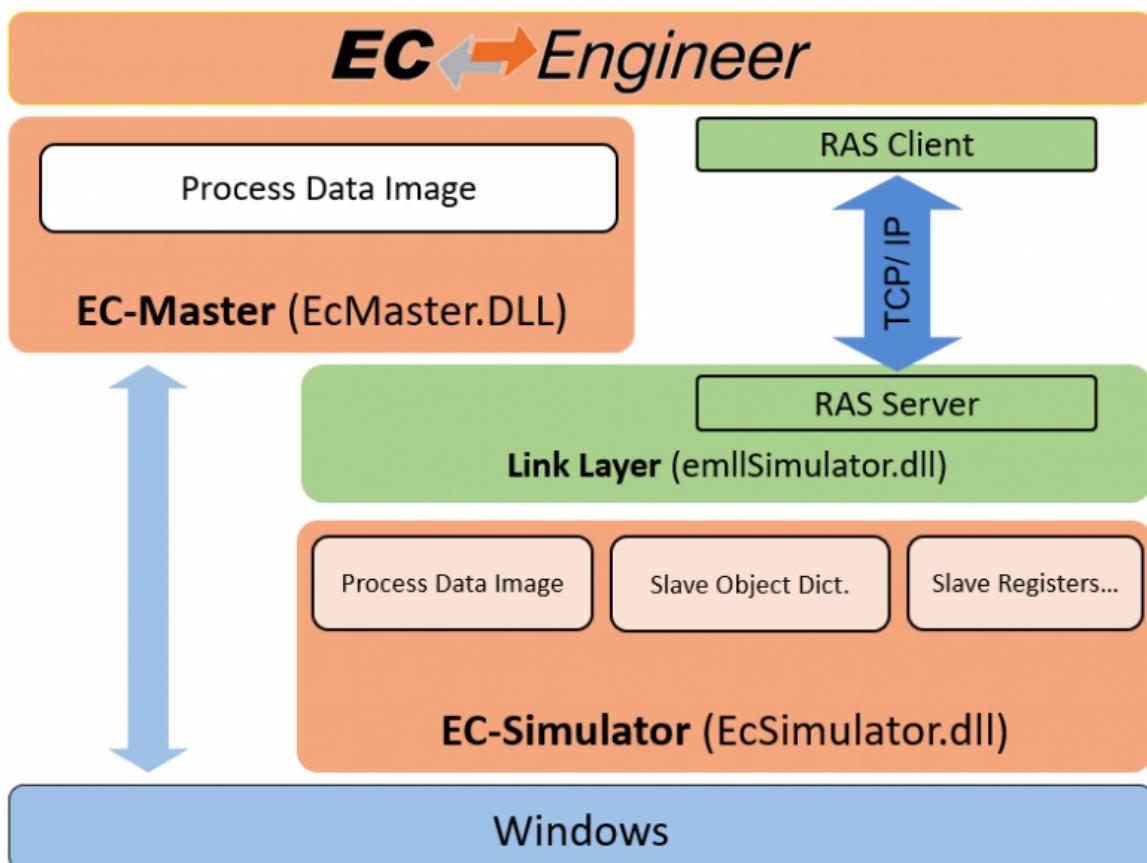
Reset the Link Loss on all ports

## 7 Simulator Mode

With the new EC-Engineer it is possible to use the EC-Simulator.

There are two possibilities:

1. The user can activate the Simulator Tabs and create an EXI File to start the simulator. It is also possible to connect to a remote system with a running Simulator. More information about offline configuration and remote diagnosis can be found in the Getting Started Chapter.
2. The second possibility is, that the user has already a configuration with a MainDevice. Now the user can do a right click on Simulation in the toolbar to start EC-Simulator with this config. Now the user has a running Simulator and running EC-Master.

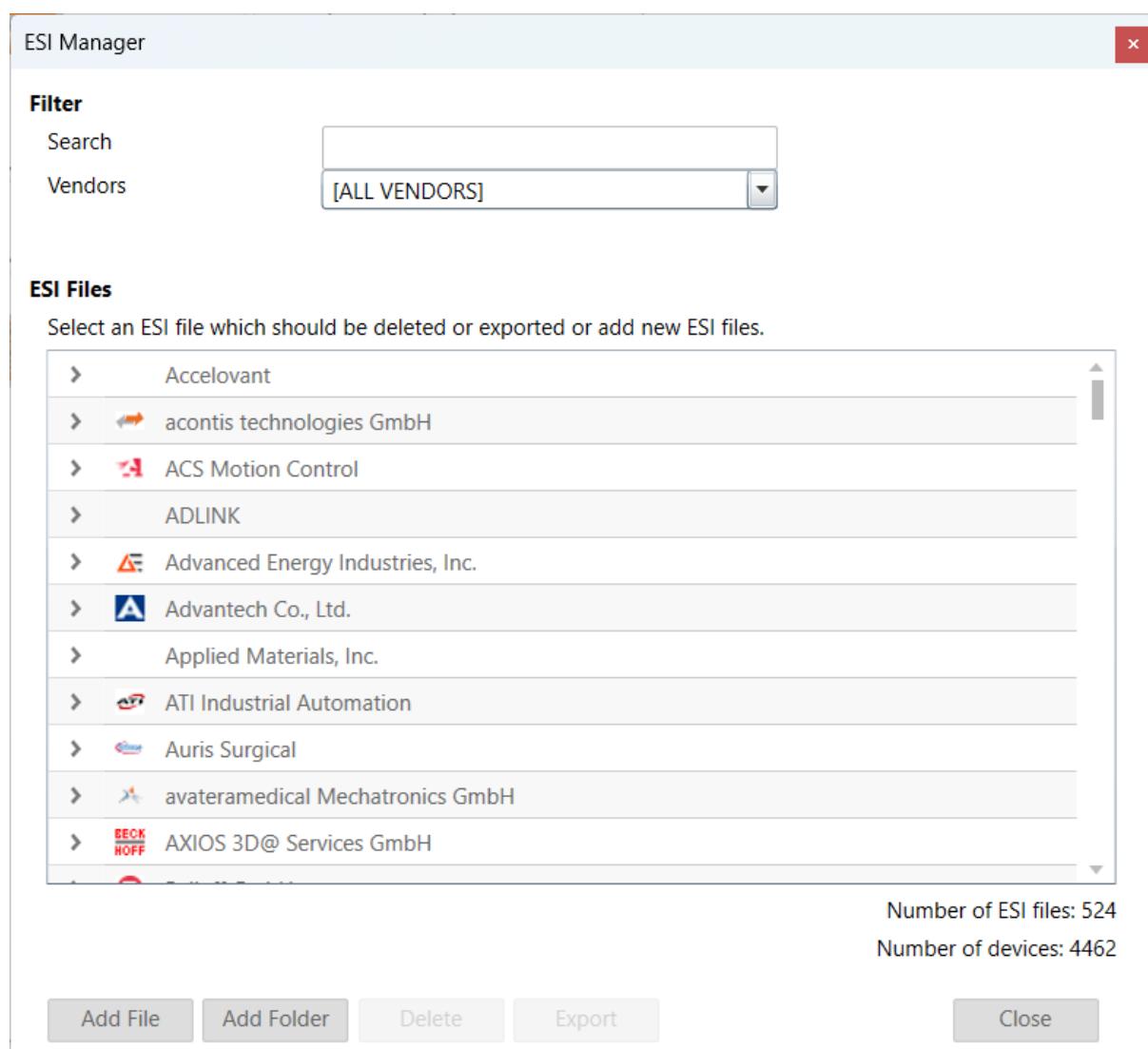


## 8 Additional Tools

### 8.1 ESI-Manager

ESI-Manager can be found through the main menu File -> ESI-Manager.

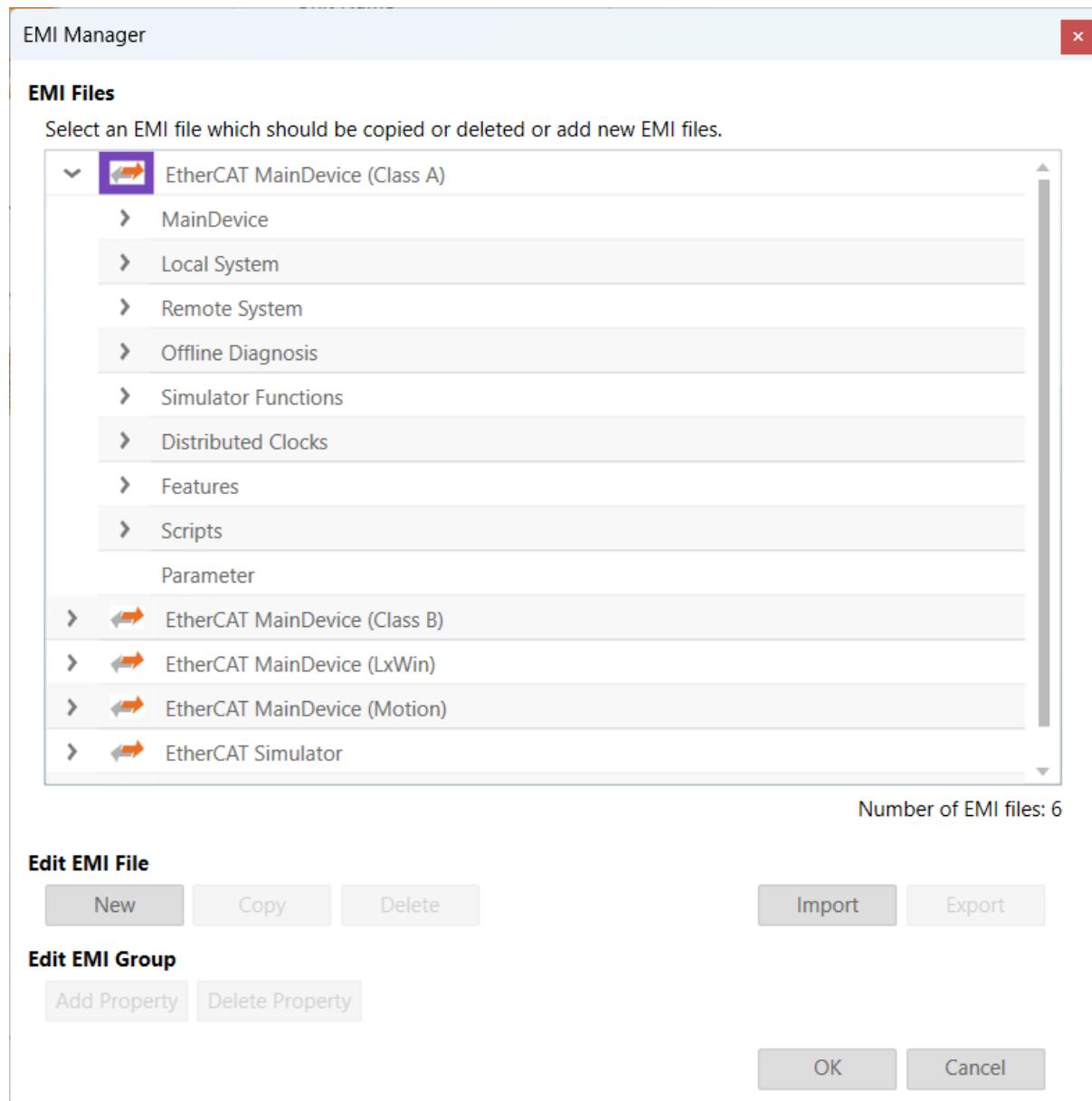
**This dialog helps the user to administrate his ESI and SCI files. Here, he can add/delete/export ESI and SCI files.**



## 8.2 EMI-Manager

EMI-Manager can be found through the main menu File -> EMI-Manager.

**This dialog helps the user to administrate his EtherCAT MainDevice Information (EMI) files.**



EMI files, are files which are specify the MainDevice features. Means that options and dialogs can be restricted to those features which are supported by the control system, e.g. available cycle times, support of scan for MDP modules or DC synchronization.

## 8.2.1 Administration

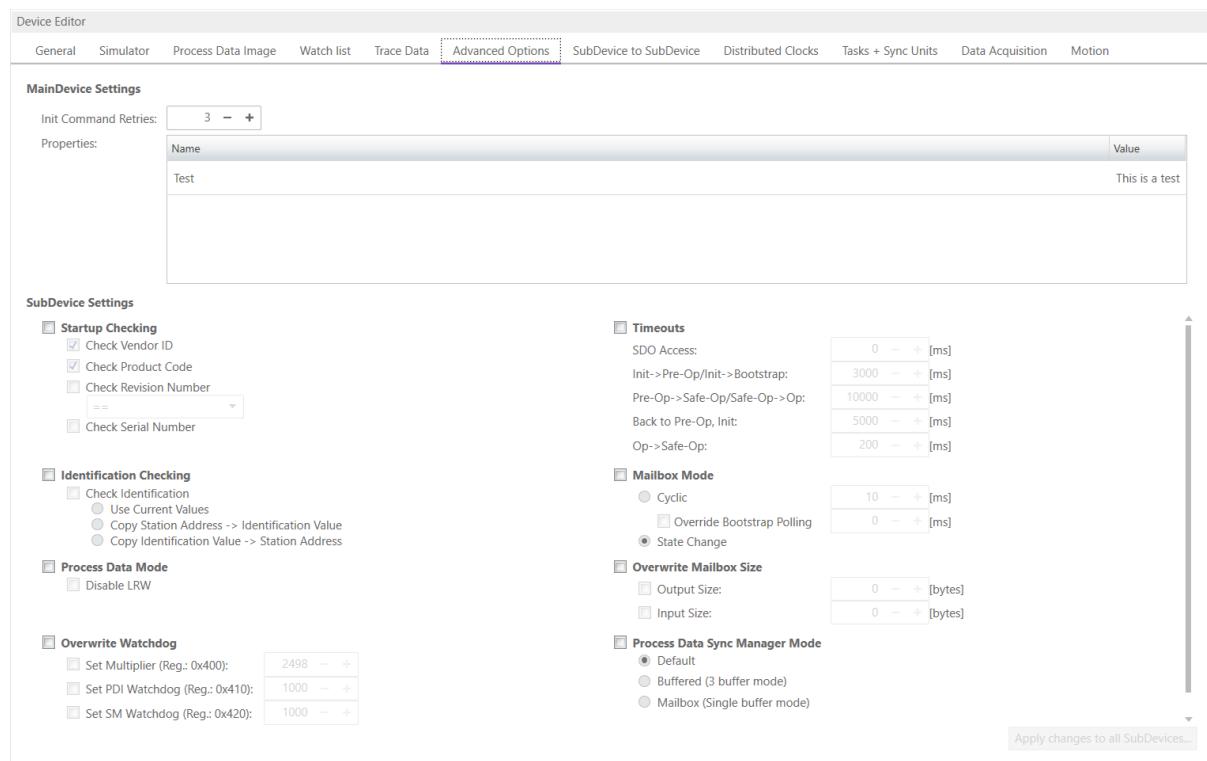
This dialog helps the user to administrate his EtherCAT MainDevice Information (EMI) files.

### By default EC-Engineer has two files included (read-only):

EtherCATMaster\_ClassA.emi: EMI template which is prepared for configuring a “Class A” MainDevice  
 EtherCATMaster\_ClassB.emi: EMI template which is prepared for configuring a “Class B” MainDevice

If the user wants to customize EC-Engineer, he can create a new EMI file with defaults, copy an existing EMI template or import an EMI file.

If he wants to add new properties to a group, he can add this only to the group “Parameters”. This group is by default empty, but if user has added some properties, he will see the list of properties on tab “Advanced Options” of the MainDevice, where the values can be modified.



## 8.2.2 Supported Entries

The following EMI entries are supported:

### MainDevice Group

Device Editor

General Simulator Process Data Image Watch list Trace Data Advanced Options SubDevice to SubDevice Distributed Clocks Tasks + Sync Units Data Acquisition Motion

**General**

Unit Name	Class-A MainDevice
Cycle Time [us]	1000
Source MAC address	60-6D-3C-E3-F2-E8

**Local system**

Link Layer	Ndis
Network Adapter	EtherCAT ( Realtek USB GbE Family Controller )
Requested MainDevice State	Init
Diagnosis Mode: Cycle Time	2000
Diagnosis Mode: DCM	Off

**Remote system**

Protocol	RAS
IP Address	127 . 0 . 0 . 1
Port	6000
MainDevice-Instance	0

**Recorded network snapshots**

Capture File	...
--------------	-----

**Display Group:**

Shows or hides group

**Lock Group:**

Locks or unlocks group

**Name of MainDevice:**

Default MainDevice name

**Show name of MainDevice:**

Enable if user should be able to view and change the name of the MainDevice

**Lock name of MainDevice:**

Enable if user should not be able to change the name of the MainDevice

**Cycle Time:**

Default Cycle Time

**Show Cycle Time:**

Enable if user should be able to view and change the Cycle Time

**Lock Cycle Time:**

Enable if user should not be able to change the Cycle Time

**List values of Cycle Time:**

Enter possible values of Cycle Time

**Frequency:**

Default Frequency

**Show Frequency:**

Enable if user should be able to view and change the Frequency

**Lock Frequency:**

Enable if user should not be able to change the Frequency

**List values of Frequency:**

Enter possible values of Frequency

**Cycle Time Mode:**

Enter Cycle Time Mode (0 = Cycle Time, 1 = Frequency)

**Init Command Retries:**

Init Command Retries

**Maximal SubDevice Count:**

Enter maximal count of SubDevices which are allowed to configure (0 = use default limit of MainDevice)

**SubDevice Start Address:**

Enter default start address for all SubDevices

**Scan for MDP SubDevices:**

Enable for activating MDP-Scan if it is supported from SubDevice

**PDO Upload:**

Enable for activating PDO upload during scan if it is supported from SubDevice

**Byte-Align Process Data Image:**

Enable if process data image should be byte aligned and not as small as possible

**Edit Complete Variable Name:**

Enable if user should be able to edit the complete variable name

**Process Image Layout:**

Enter process image layout features (0 = default, 0x1 = with protocol data, 0x2 = with VLAN tag, 0x4 = without frame alignment, 0x8 = alphabetic port order, 0x10 = Compatibility to ENI spec V1.0.0, 0x20 = Moves AL Status command to the end, 0x40 = Disable command splitting, 0x80 = Compatibility to ENI spec V1.0.1, 0x100 = Compatibility to ENI spec V1.0.2)

**Output Port Vendor Id:**

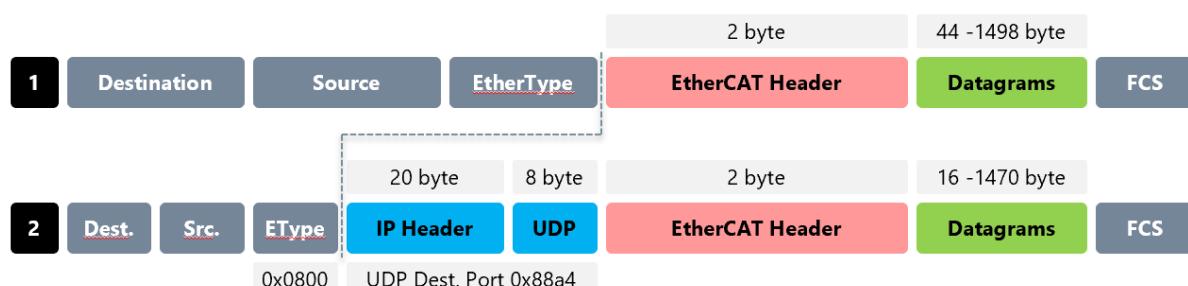
Enter output port vendor id of the MainDevice (0 = All Vendors, 1..n = Specific Vendor)

**Word-Aligned EtherCAT Datagrams:**

Enable if EtherCAT datagrams should be word aligned

**Cyclic Frame Layout:**

Enter cyclic frame layout mode (0 = default, 1 = single logical command per frame)

**Ethernet Type UDP:****Remove DC NOP Command:**

Does not include NOP Command in ENI

**Cable Redundancy:**

Sets disable LRW for all SubDevices to use cable redundancy and enables an opportunity to select a second adapter and link-layer

**Junction Redundancy:**

Allows to user to scan also with connected junction redundancy

**Local System**

Device Editor

General Simulator Process Data Image Watch list Trace Data Advanced Options SubDevice to SubDevice Distributed Clocks Tasks + Sync Units Data Acquisition Motion

**General**

Unit Name: Class-A MainDevice  
Cycle Time [us]: 1000  
Source MAC address: 60-6D-3C-E3-F2-E8

**Local system**

Link Layer: Ndis  
Network Adapter: EtherCAT (Realtek USB GbE Family Controller)  
Requested MainDevice State: Init  
Diagnosis Mode: Cycle Time: 2000  
Diagnosis Mode: DCM: Off

**Remote system**

Protocol: RAS  
IP Address: 127 . 0 . 0 . 1  
Port: 6000  
MainDevice-Instance: 0

**Recorded network snapshots**

Capture File:

**Display Group:**

Shows or hides group

**Lock Group:**

Locks or unlocks group

**Network Adapter:**

Enter index of Network Adapter in the Network Adapter List

**Show Network Adapter:**

Enable if user should be able to view and change the Network Adapter

**Lock Network Adapter:**

Enable if user should not be able to change the Network Adapter

**DCM on:**

EC-Engineer deactivated DCM on default. Enable if it should be turned off

**Remote System**

Device Editor

General   Process Data Image   Watch list   Trace Data   Advanced Options   SubDevice to SubDevice   Distributed Clocks   Tasks + Sync Units   Data Acquisition   Motion

**General**

Unit Name: Class-A MainDevice  
Cycle Time [us]: 1000  
Source MAC address: 60-6D-3C-E3-F2-E8

**Local system**

Link Layer: Ndis  
Network Adapter: EtherCAT (Realtek USB GbE Family Controller)  
Requested MainDevice State: Init  
Diagnosis Mode: Cycle Time: 2000  
Diagnosis Mode: DCM: Off

**Remote system**

Protocol: RAS  
IP Address: 127 . 0 . 0 . 1  
Port: 6000  
MainDevice-Instance: 0

**Recorded network snapshots**

Capture File: C:\ProgramData\EC-Engineer\Capture\2024-09-19\_14-07\_CaptureFile\_{local}.ecd

**Display Group:**

Shows or hides group

**Lock Group:**

Locks or unlocks group

**Protocol:**

Select protocol for Remote System

**Show Protocol:**

Enable if user should be able to view and change the protocol

**Lock Protocol:**

Enable if user should be not able to change the protocol

**IP Address:**

Enter IP Address for Remote System

**Show IP Address:**

Enable if user should be able to view and change the IP Address

**Lock IP Address:**

Enable if user should be not able to change the IP Address

**Port:**

Enter Port for Remote System

**Show Port:**

Enable if user should be able to view and change the Port"

**Lock Port:**

Enable if user should be not able to change the Port

**MainDevice-Instance:**

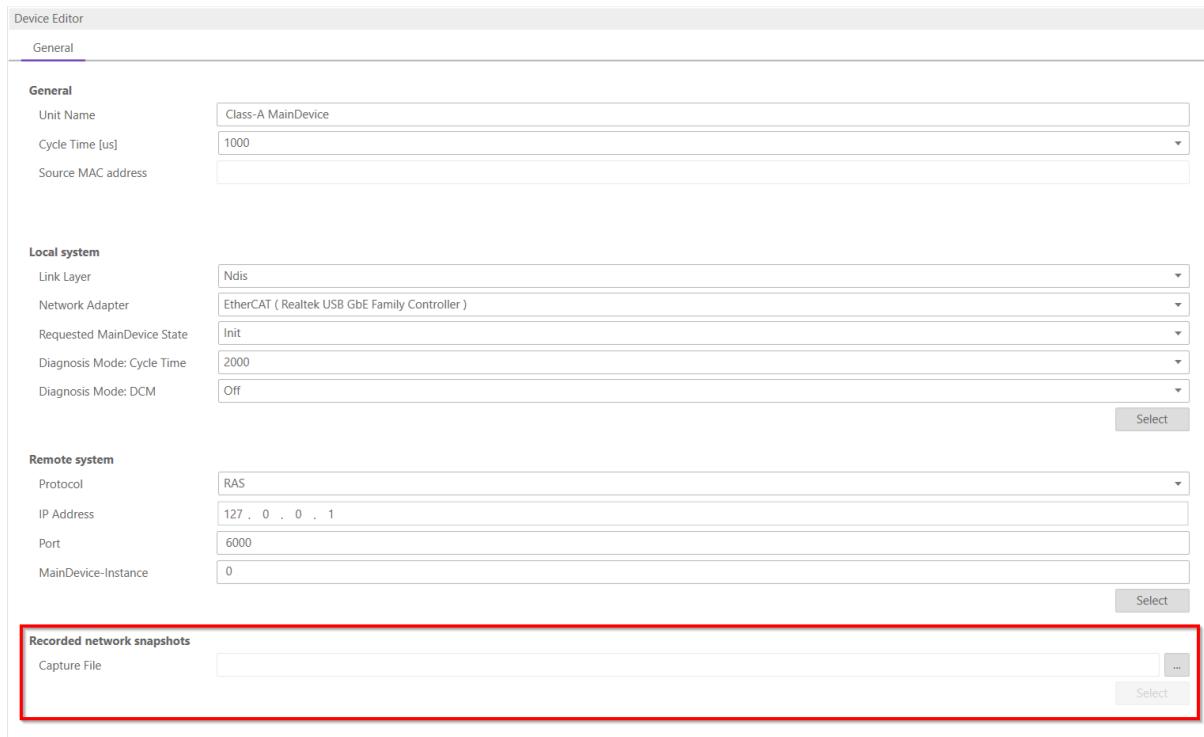
Enter MainDevice-Instance number

**Show MainDevice-Instance:**

Enable if user should be able to view and change the MainDevice-Instance

**Lock MainDevice-Instance:**

Enable if user should not be able to change the MainDevice-Instance

**Offline Diagnosis**


Device Editor

General

**General**

Unit Name: Class-A MainDevice

Cycle Time [us]: 1000

Source MAC address:

**Local system**

Link Layer: Ndis

Network Adapter: EtherCAT ( Realtek USB GbE Family Controller )

Requested MainDevice State: Init

Diagnosis Mode: Cycle Time: 2000

Diagnosis Mode: DCM: Off

**Remote system**

Protocol: RAS

IP Address: 127.0.0.1

Port: 6000

MainDevice-Instance: 0

**Recorded network snapshots**

Capture File:

Select

**Display Group:**

Shows or hides group

**Lock Group:**

Locks or unlocks group

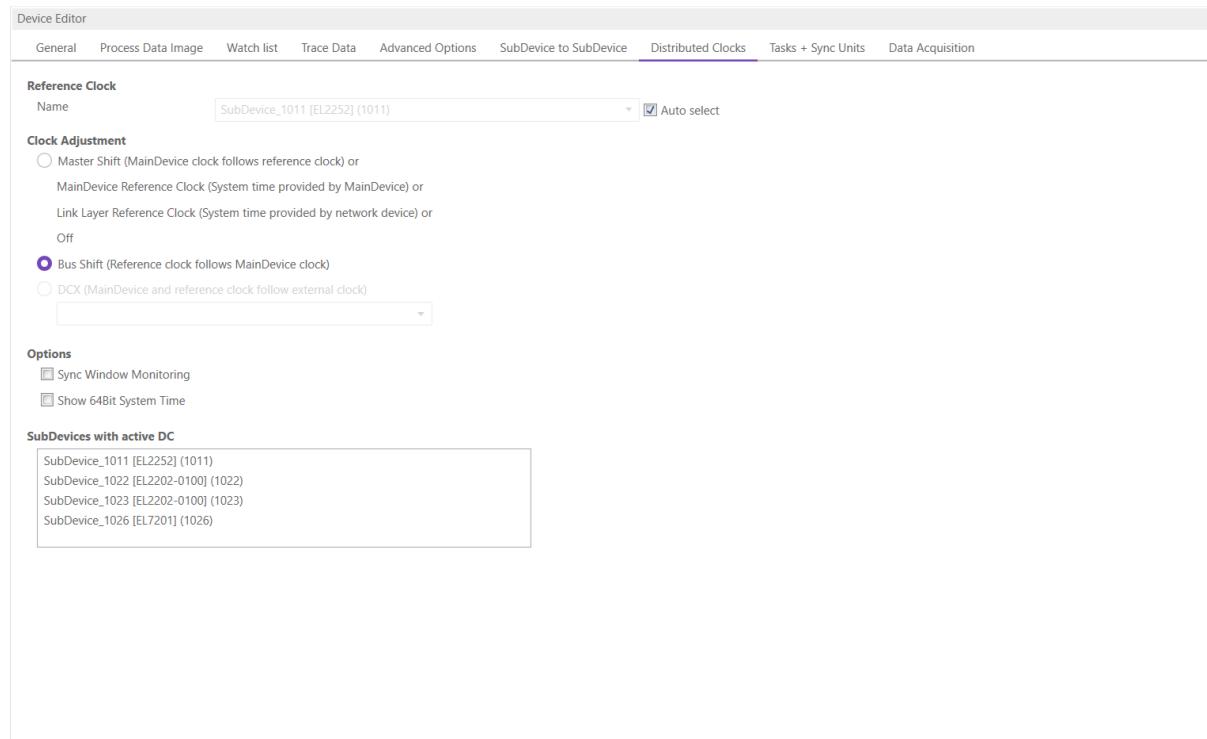
**Simulator Functions**
**Display Group:**

Shows or hides group

**Lock Group:**

Locks or unlocks group

**Distributed Clocks**



The screenshot shows the 'Device Editor' interface with the 'Reference Clock' tab selected. The 'Reference Clock' section includes a 'Name' dropdown set to 'SubDevice\_1011 [EL2252] (1011)' and an 'Auto select' checkbox. The 'Clock Adjustment' section contains three radio buttons: 'Master Shift' (selected), 'Bus Shift' (selected), and 'DCX'. The 'Options' section includes checkboxes for 'Sync Window Monitoring' and 'Show 64Bit System Time'. The 'SubDevices with active DC' section lists four subdevices: SubDevice\_1011 [EL2252] (1011), SubDevice\_1022 [EL2202-0100] (1022), SubDevice\_1023 [EL2202-0100] (1023), and SubDevice\_1026 [EL7201] (1026).

### Display Group:

Shows or hides group

### Clock Adjustment:

Enter clock adjustment value (0 = default, 1 = MainDevice Shift, 2 = Bus Shift)

### Lock Clock Adjustment:

Enable if user should not be able to change clock adjustment

### Show Clock Adjustment:

Enable if clock adjustment should be visible

### Continuous Propagation Compensation:

Enter default value of Continuous Propagation Compensation

### Show Continuous Propagation Compensation:

Enable if user should be able to change value of Continuous Propagation Compensation

### Sync Window Monitoring:

Enter default value of Sync Window Monitoring

### Show External Mode:

Enable if user should be able to use an external sync device as reference clock

### System Time 64 Bit:

Enter default value of System Time 64 Bit

## Features

### AoE:

Enable if MainDevice supports AoE

### EoE:

Enable if MainDevice supports EoE

### FoE:

Enable if MainDevice supports FoE

**SoE:**

Enable if MainDevice supports SoE

**VoE:**

Enable if MainDevice supports VoE

**Export Variables:**

Enable if user should be able to export variables

**Show Enable Column:**

Shows column for enable variables on XML export

**Generate SubDevice Name with Type:**

Enable if type of SubDevice should be added to SubDevice names on generating ENI file

**Lock Variables:**

Locks or unlocks variables for editing in diagnosis mode

**Show Variable Chart:**

Enable if user should be able to view the chart of a variable

**Show Variable Comments:**

Enable if user should be able to view and edit the comments of a variable

**Allow E-Bus as HC Head:**

Enable if Ebus shall be allowed as HC Head

**ENI Deployment:**

yes: something is done with ENI after export, no: nothing done ask: you will be ask to deploy

**Deployment Mode:**

0: copy to path, 1: execute batch at path

**Deployment Path:**

Path to copy ENI or to batch for execution

**Hot Connect:**

Enable if MainDevice supports hot connect

## Scripts

**Display Group:**

Shows or hides the Scripts Tab

**P1:****Scan Start Script 1:**

First script executed before scanning

**Scan Start Script 2:**

Second script executed before scanning

**Scan Stop Script 3:**

First script executed after scanning

**Scan Stop Script 4:**

Second script executed after scanning

**P2:****Diag Start Script 1:**

First script executed before switch to diag

**Diag Start Script 2:**

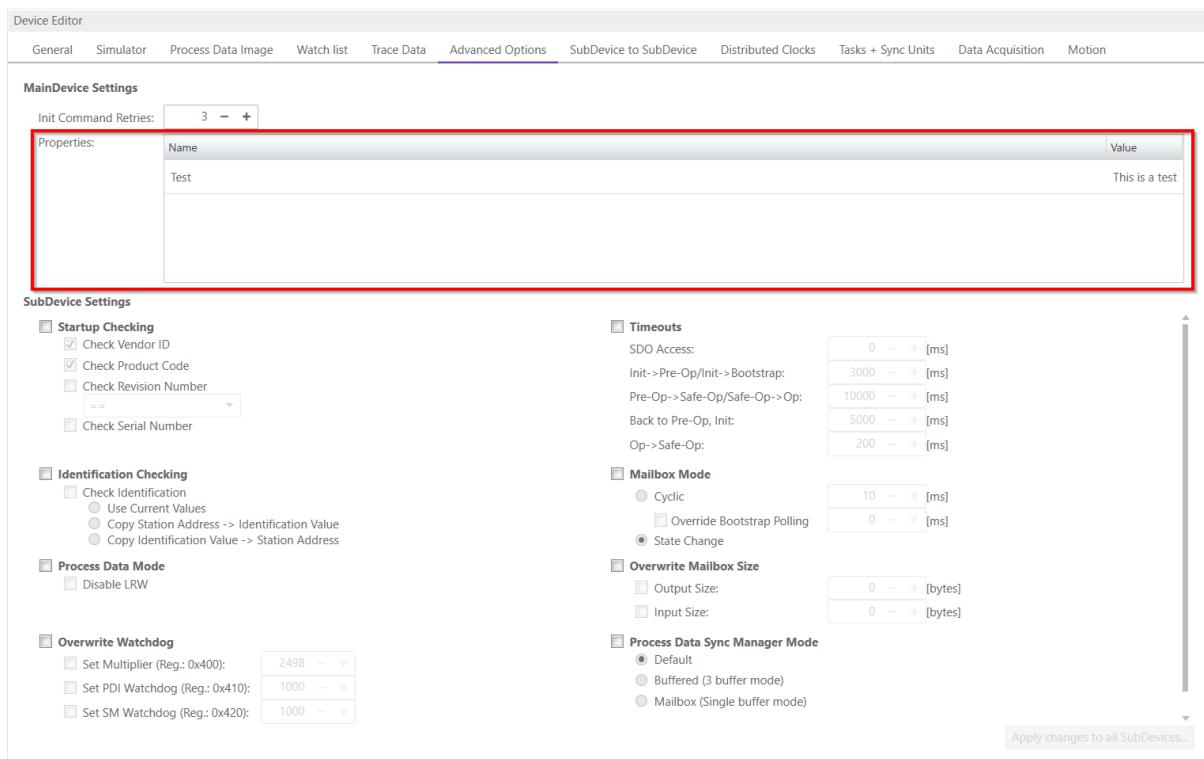
Second script executed before switch to diag

**Diag Stop Script 3:**

First script executed before switching to config

**Diag Stop Script 4:**

Second script executed before switching to config

**Parameters**

User defined properties, which will be written into ENI file and can be interpreted by the application inside EC-Master.

### 8.3 Network Mismatch Analyzer

If you have a network mismatch in your EtherCAT network it is not so easy to find the problem. For this you have the Network Mismatch Analyzer. You find it in the network main menu. If you see here some “red” entries, means that this is the start point of your network mismatch:

Network Mismatch Analyzer

**List of SubDevices**

Please, compare the configured SubDevices with the connected SubDevices. If something is red, you have a network configuration mismatch!

SubDevice Name	Config Type	Config Revision	Config Ident.	Network Type	Network Revision	Network Ident.
SubDevice_1001 [EK]	EK1100 [1001]	0x00110000	0	EK1100 [1001]	0x00110000	1017
SubDevice_1002 [EL]	EL2008 [1002]	0x00100000	0	EL2008 [1002]	0x00100000	0
SubDevice_1003 [EL]	EL2008 [1003]	0x00100000	0	EL2008 [1003]	0x00100000	1003
SubDevice_1004 [EL]	EL1014 [1004]	0x00100000	0	EL1014 [1004]	0x00100000	1004
SubDevice_1005 [EL]	EL2004 [1005]	0x00110000	0	EL2004 [1005]	0x00110000	0
SubDevice_1006 [EL]	EL1034 [1006]	0x00100000	0	EL1034 [1006]	0x00100000	0
SubDevice_1027 [EL]	EL1014 [1027]	0x00130000	0	EL1018 [1007]	0x00100000	0
SubDevice_1007 [EL]	EL1018 [1007]	0x00100000	0	EL2008 [1008]	0x00100000	0
SubDevice_1008 [EL]	EL2008 [1008]	0x00100000	0	EK1122-0080 [1009]	0x00120050	0
SubDevice_1009 [EK]	EK1122-0080 [1009]	0x00120050	0	EK1101-0080 [1010]	0x00120050	0
SubDevice_1010 [EK]	EK1101-0080 [1010]	0x00120050	0	EL2252 [1011]	0x00130000	0

Close

## 8.4 Line Crossed Analyzer

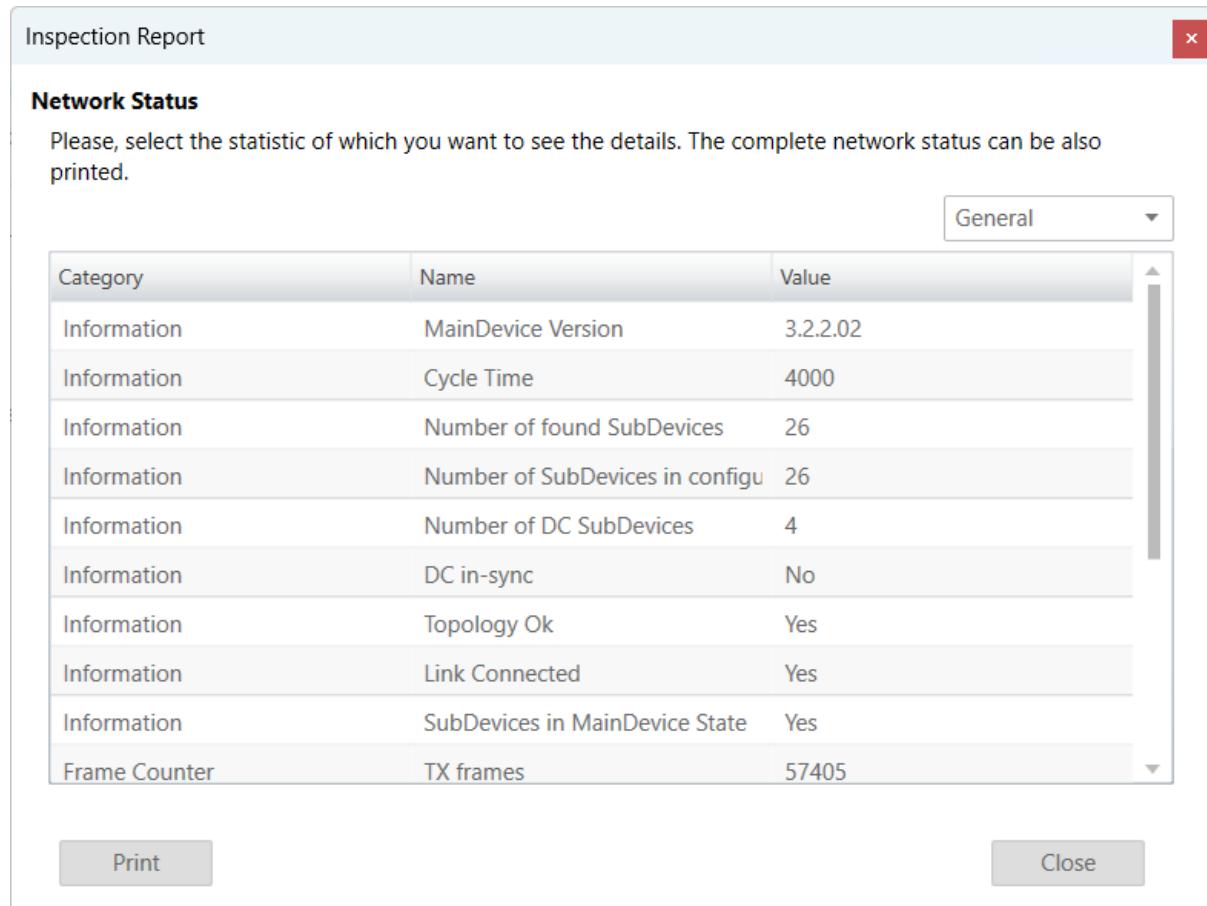
If you have connected a line to a wrong port, you can see in the Line Crossed Analyzer which SubDevice is incorrectly connected. The wrong entries will be red:

Line Crossed Analyzer		
<b>List of SubDevices</b>		
In the list you can see all connected SubDevices. The red ones are incorrectly connected		
AutoInc Address	Station Address	Type
65523	1014	EL3162
65522	1015	EL1008
65521	1016	EL1094
65520	1017	EK1110
65519	1018	BK1120
65518	1019	VIPA 053-1EC00
65517	1020	EK1122
65516	1021	EK1100
65515	1022	EL2202-0100
65514	1023	EL2202-0100
65513	1024	EL1114
65512	1025	FI 7031

**Close**

## 8.5 Inspection Report

If you want to print or show a report about the actual session, it is possible with the inspection report. It shows a lot of different data about the network communication. It is also possible to print a PDF.



## 8.6 EoE Endpoint Configuration

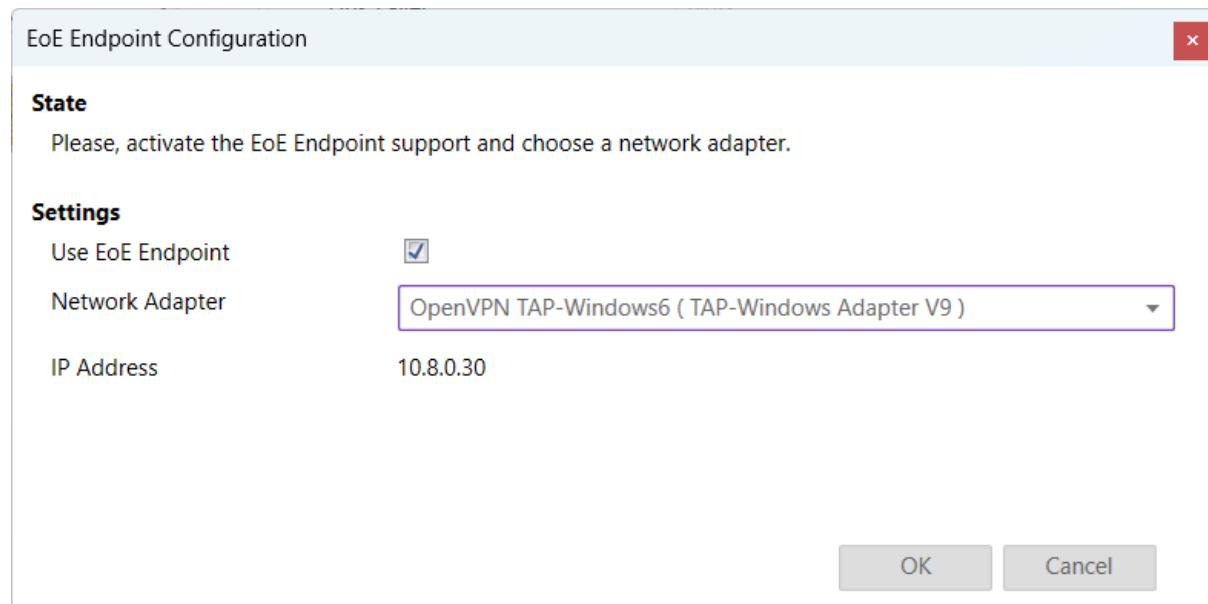
If you want to use EoE SubDevices with your local MainDevice, you can activate the EoE Endpoint.

---

**Note:** This feature is only available if the package "Tap-Windows" from OpenVPN is installed: <http://openvpn.net/index.php/download/community-downloads.html>

---

**If this package is installed, you will see the following dialog:**



## Settings

**Use EoE Endpoint:**

Activate EoE Endpoint support for the selected device

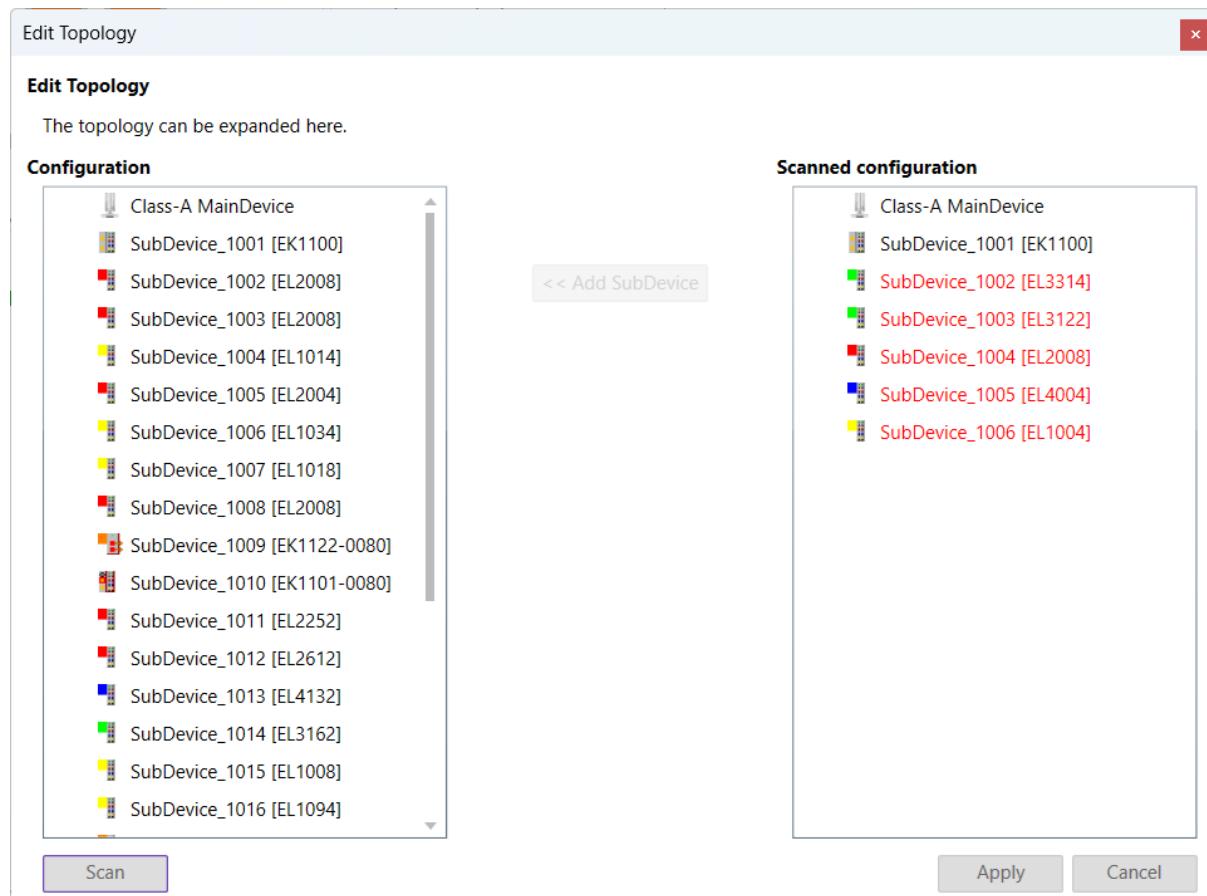
**Network Adapter:**

List of installed network adapters (TAP)

**IP Address:**

IP Address of the selected network adapter

## 8.7 Edit Topology



### Disconnect:

Disconnects the selected port

### Connect:

Connects the selected SubDevice in the not connect SubDevices list, with the selected port in the configuration

**Up:** Moves the SubDevice up in the configuration

### Down:

Moves the SubDevice down in the configuration

### Scan:

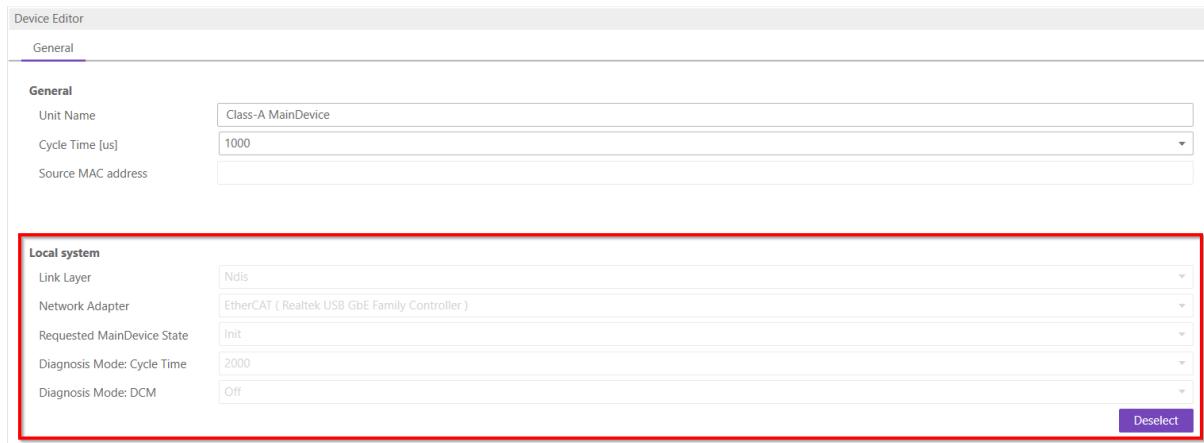
Scans the network. The network is shown by the scanned configuration. It is possible to add SubDevice to the configuration with "Add SubDevice".

### Apply:

The configuration will be applied to the EC-Engineer (only possible if all SubDevices are connected)

## 8.8 Self Test Scan

To perform a Self Test Scan, a MainDevice and a target system must be selected.



The settings for the Self Test Scan can be found on the expert tab in the settings dialog, see [Expert](#).

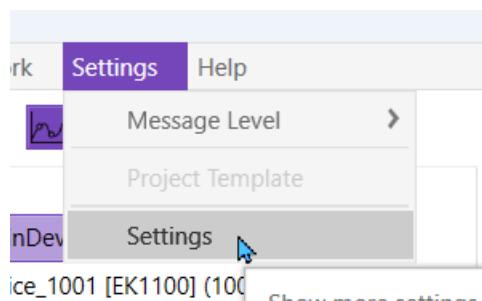
After the Self Test Scan is successful, we get the following logs from the message panel.



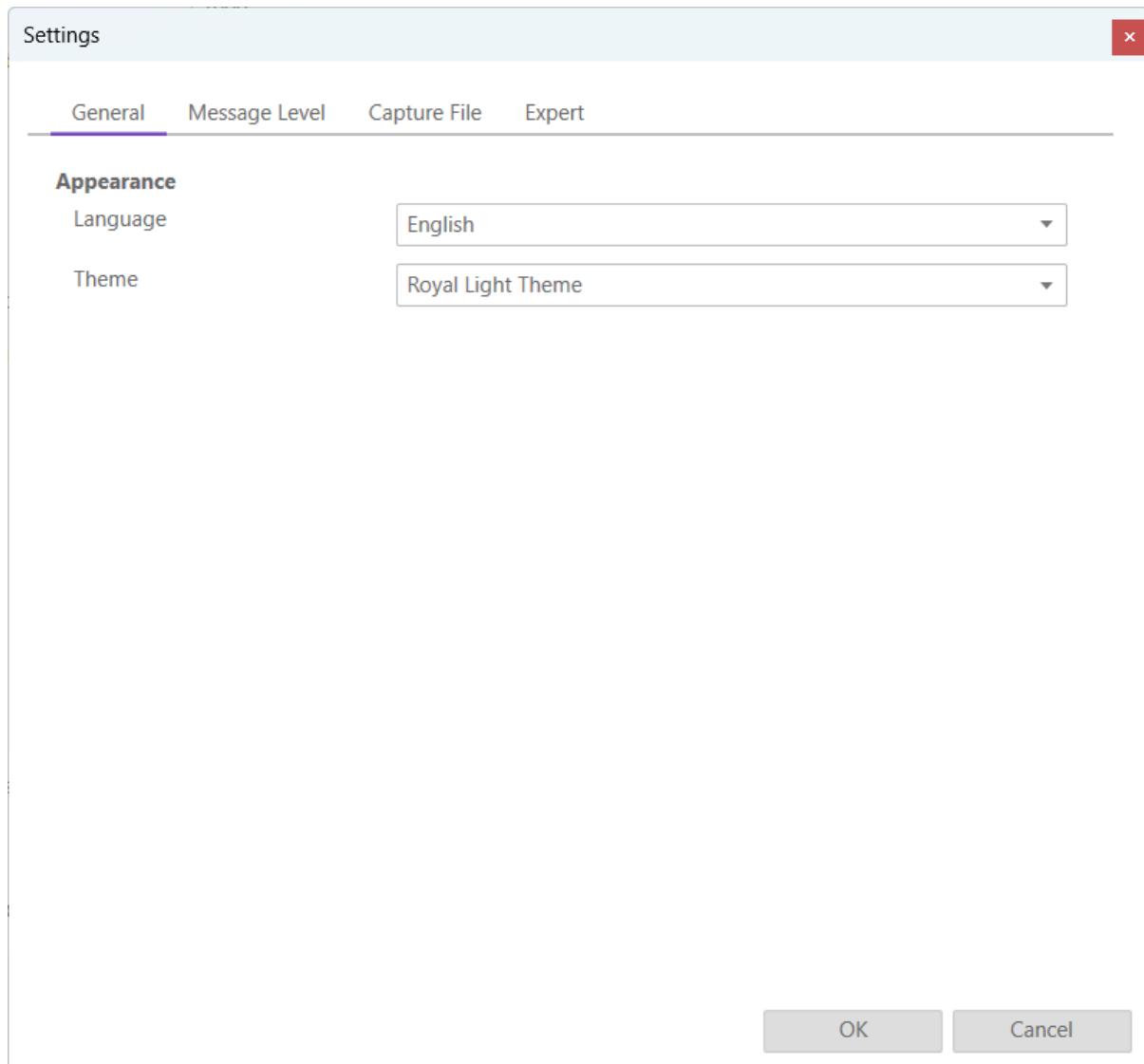
A capture file is produced after the scan and it is saved to diagnose the results. The file is saved in the path given in the capture file settings.

## 8.9 Settings

Can be found inside the settings menu bar.



### 8.9.1 General



#### Appearance

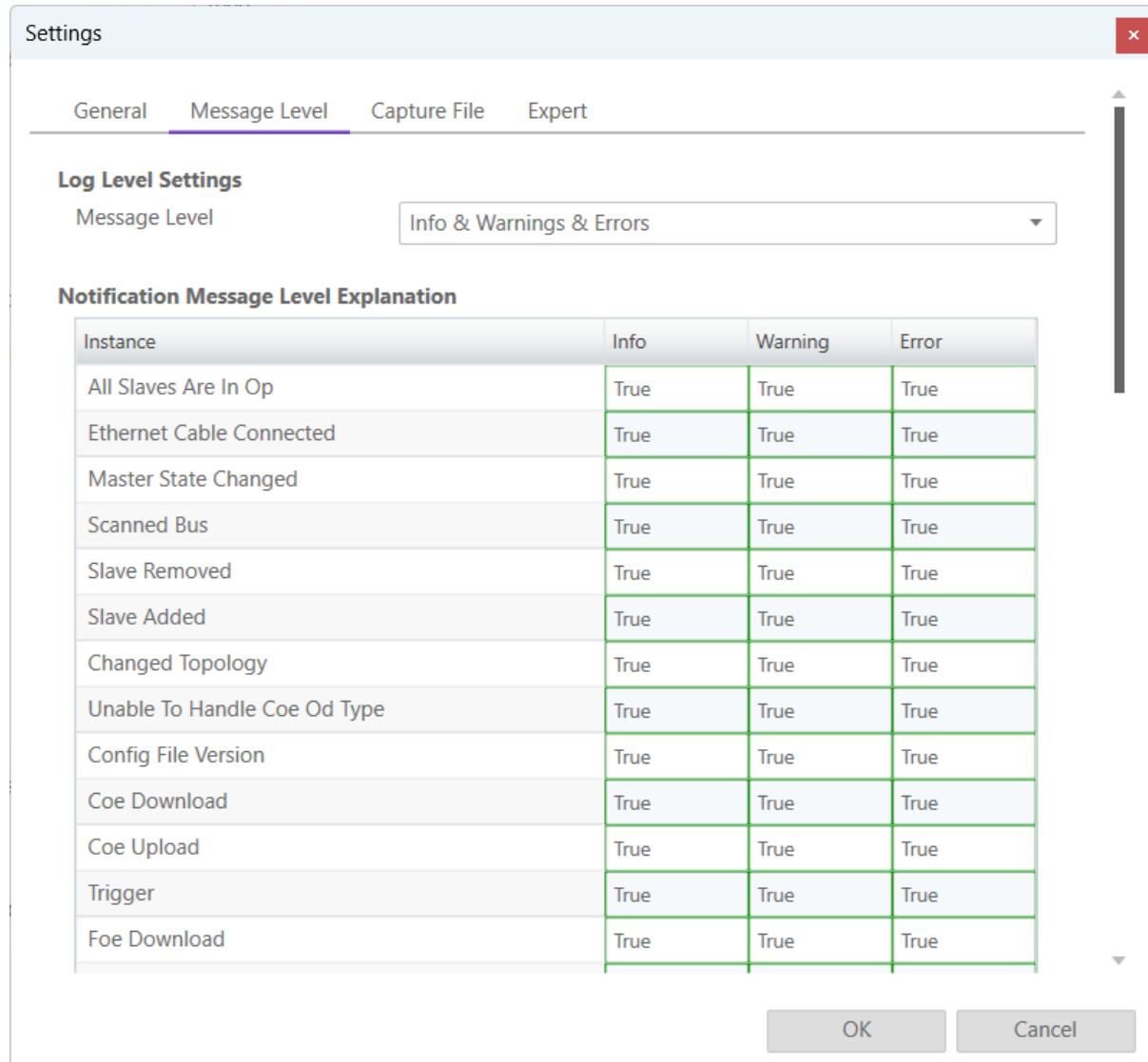
##### **Language:**

Changes the current language

##### **Theme:**

Changes the current theme

## 8.9.2 Message Level



In this tab the log level of the message panel can be changed.

### Log Level Settings

#### Message Level:

Changes what messages are displayed on the message panel

#### Explanation

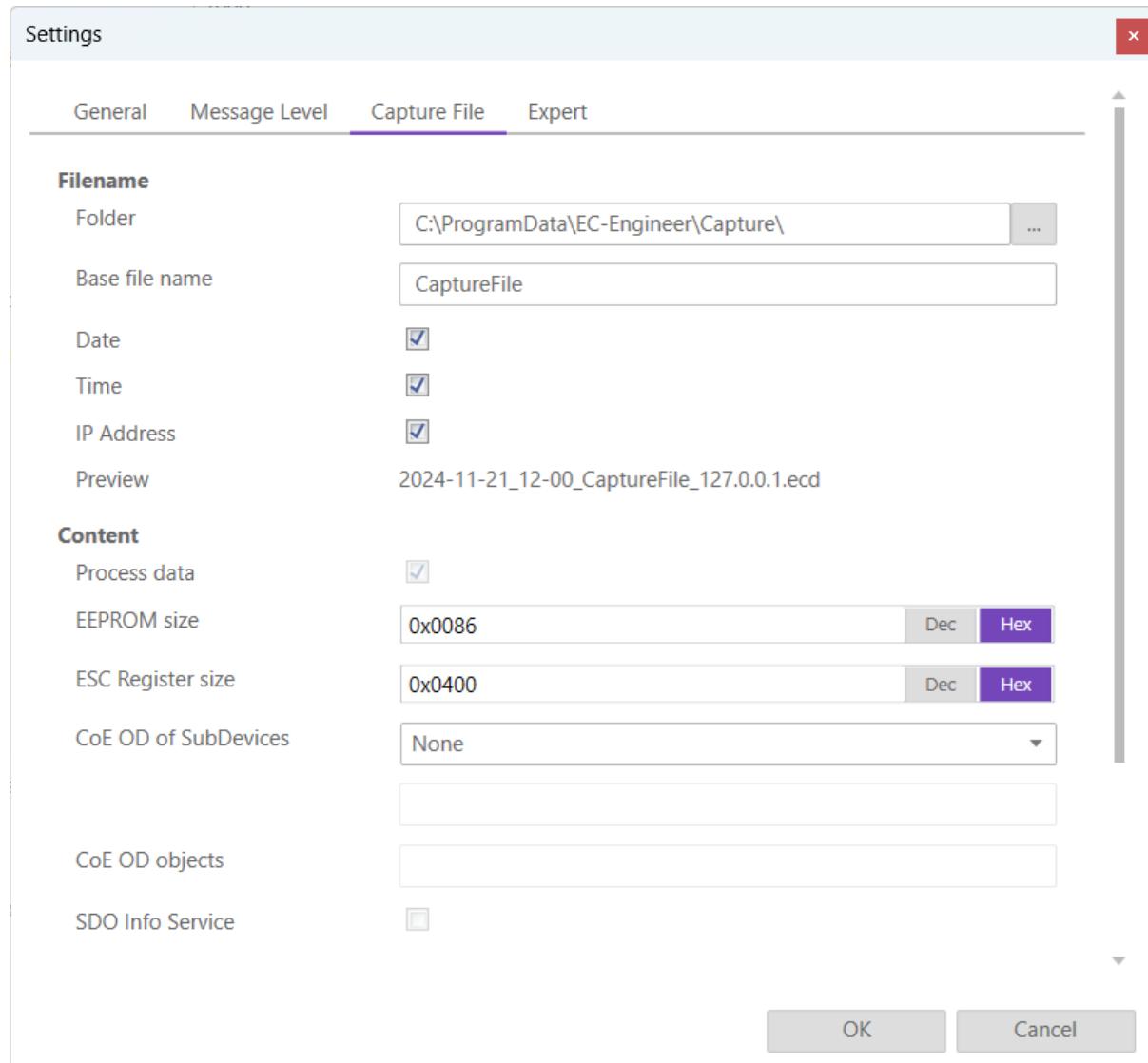
We can see what messages are displayed depending on the selected message level (true it is displayed, false it is not displayed)

### 8.9.3 Capture File

A capture file could be helpful, if a very large system is given or the system is not always available. In that case the user can connect to their system, save one or more snapshots into a capture file and analyse the created capture file later.

Another use case is, that their system from time to time some problems. In that case the user can activate the automatic mode and create the snapshots at specific intervals or based on specific MainDevice notifications.

**At the moment there are the following options:**



#### Filename

##### Folder:

Path, where the capture files should be saved

##### Base file name:

Base file name of the generated capture file name

##### Date:

Activate, to add the date to the generated capture file name

**Time:**

Activate, to add the time to the generated capture file name

**IP Address:**

Activate, to add the IP address to the generated capture file name

**Preview:**

Shows a preview of the generated capture file name

**Content****Process data:**

Activate to add process data to the capture file (read-only)

**EEPROM size:**

Enter size of the EEPROM (0x86 = default, 0 = no EEPROM)

**ESC Register size:**

Enter size of the ESC Registers (0x400 = default, 0 = no ESC register)

**CoE OD of SubDevices:**

**Select the SubDevices of which the CoE OD information will be captured**

**None:**

CoE OD will be not captured

**All:**

CoE OD will be captured of all SubDevices

**User defined:**

CoE OD will be captured of the defined SubDevices by physical address (e.g. 1001-1003; 1005)

**CoE OD objects:**

Enter index of specific objects or all objects will be collected (e.g. 0x1018; 0x7000-0x7FFF)

**SDO Info Service:**

Activate to use the SDO Info Service for loading the CoE Object Dictionary instead of readying the information from the ESI file.

**Automatic Mode****Interval (min):**

Time to wait until next snapshot will be taken

**Maximum Snapshots:**

Enter count of maximum snapshots

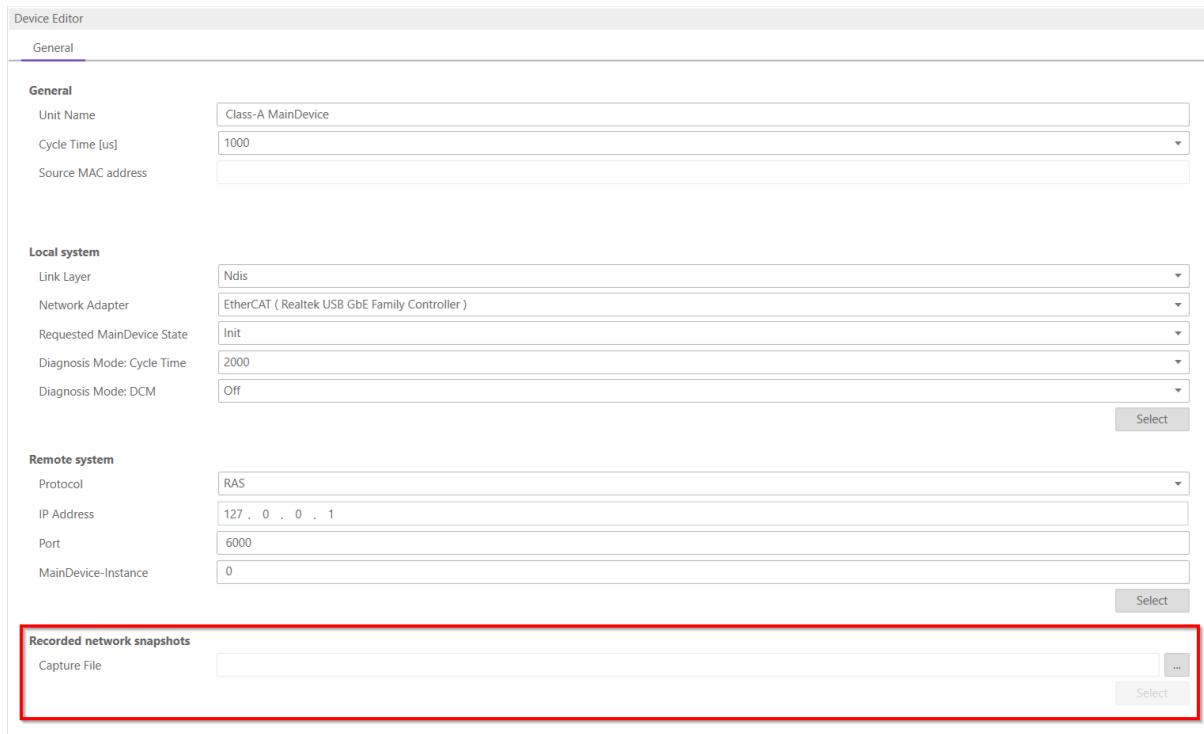
**Notifications:**

**Select the notifications, which will trigger a snapshot. The following notifications are available (for more information about notifications please refer the manual of EC-Master):**

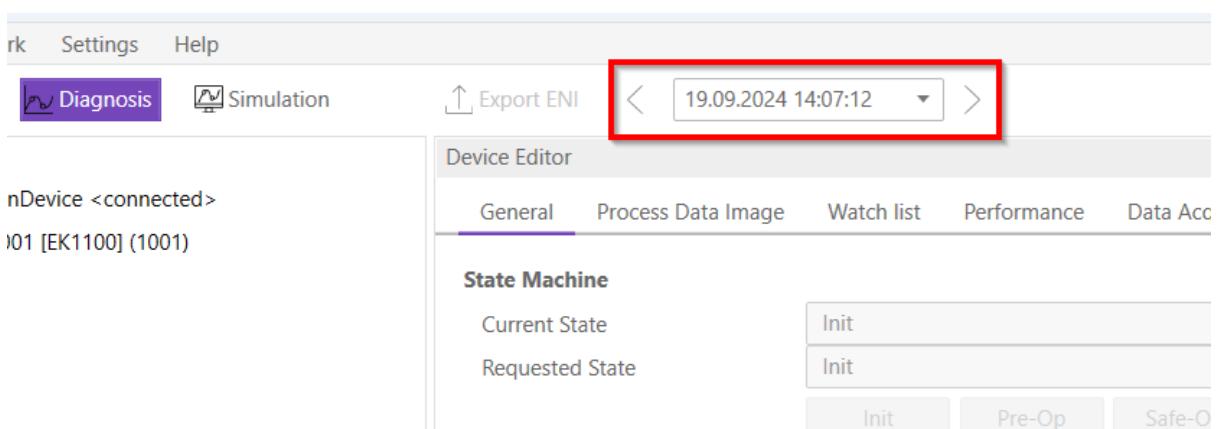
- STATECHANGED
- ETH\_LINK\_CONNECTED
- ETH\_LINK\_NOT\_CONNECTED
- SLAVE\_STATECHANGED
- SLAVE\_PRESENCE
- SLAVE\_INITCMD\_RESPONSE\_ERROR

- STATUS\_SLAVE\_ERROR
- SLAVE\_UNEXPECTED\_STATE
- DC\_SLV\_SYNC
- DCM\_SYNC

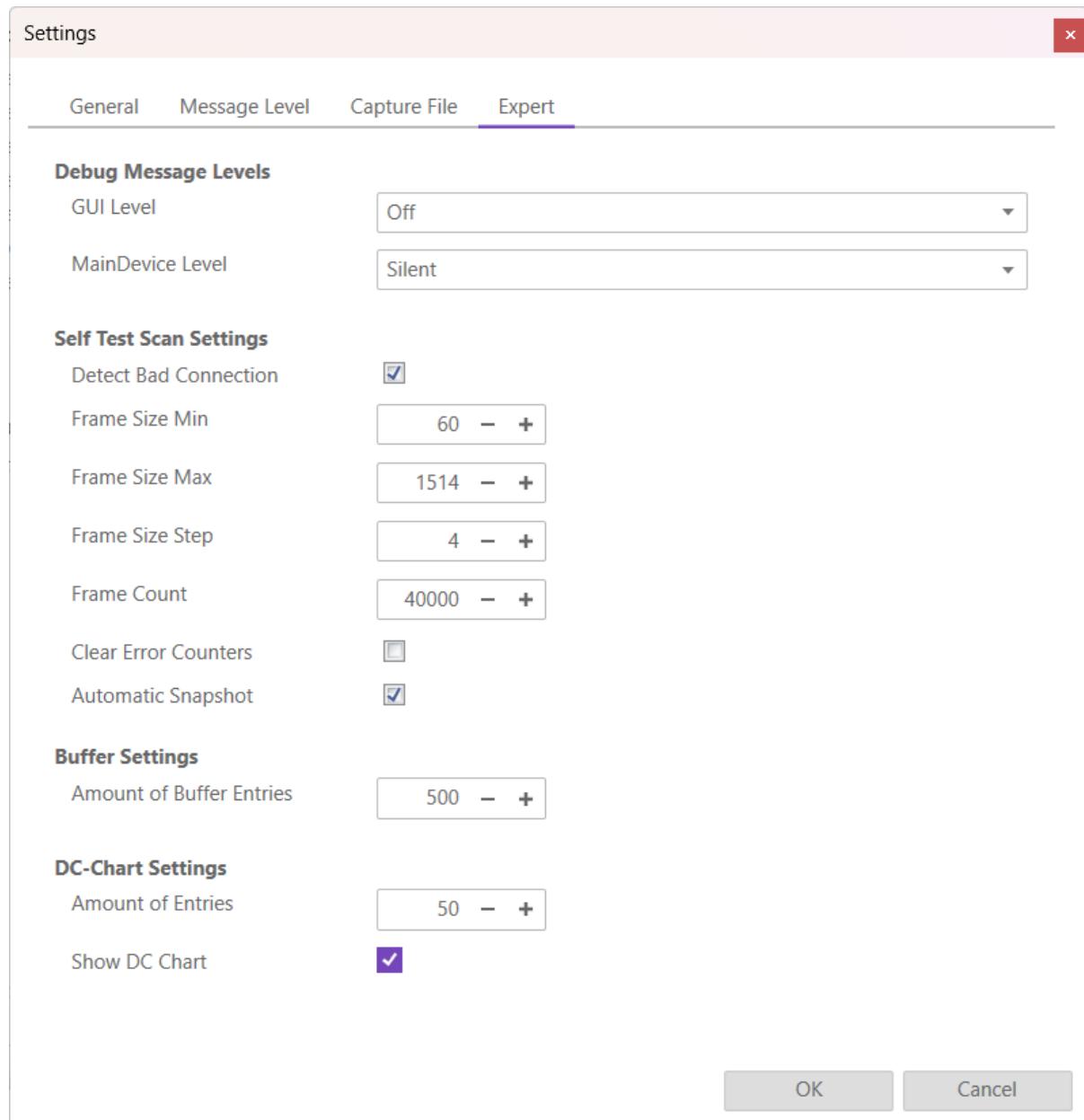
After the snapshot(s) is / are made in diagnosis mode they can be selected in the overview in config mode:



**After the selection switching to diagnosis mode is possible. In the toolbar will be an additional combobox to select the snapshot and switch between them:**



### 8.9.4 Expert



#### Debug Message Levels

##### GUI Level

Changes the GUI debug message level

##### MainDevice Debug Message Level

Changes the MainDevice debug message level

#### Self Test Scan Settings

##### Detect Bad Connection

(De-)Activates bad connection detection

**Frame Size Min**

Changes the min frame size

**Frame Size Max**

Changes the max frame size

**Frame Size Step**

Changes the frame step size

**Frame Count**

Changes the frame count

**Clear Error Counters**

Resets the error counters on the MainDevice

**Automatic Snapshots**

Enables the creation of a snapshot after running a successful Self Test Scan

**Buffer Settings****Amount of Buffer Entries**

Changes the amount of entries in the Buffer/Charts (eg. Variables)

**DC-Chart Settings****Amount of Entries**

Changes only the amount of entries in the chart in the DC Diagnosis Tab

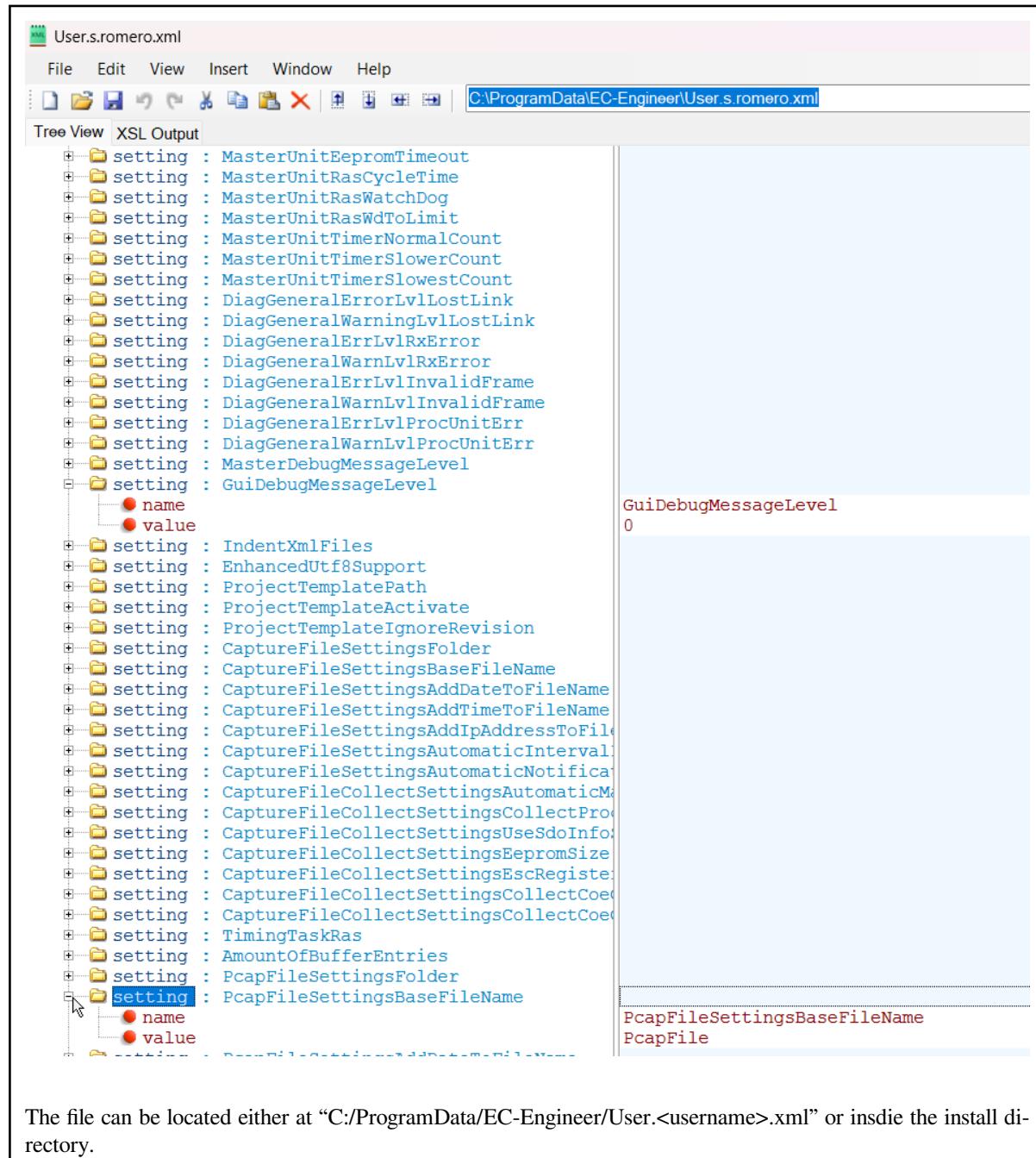
**Show DC Chart**

Check to display the chart in the DC Diagnosis Tab

## 8.9.5 Settings File

Inside this file the user can modify all settings, including some that are not present in the settings dialog.

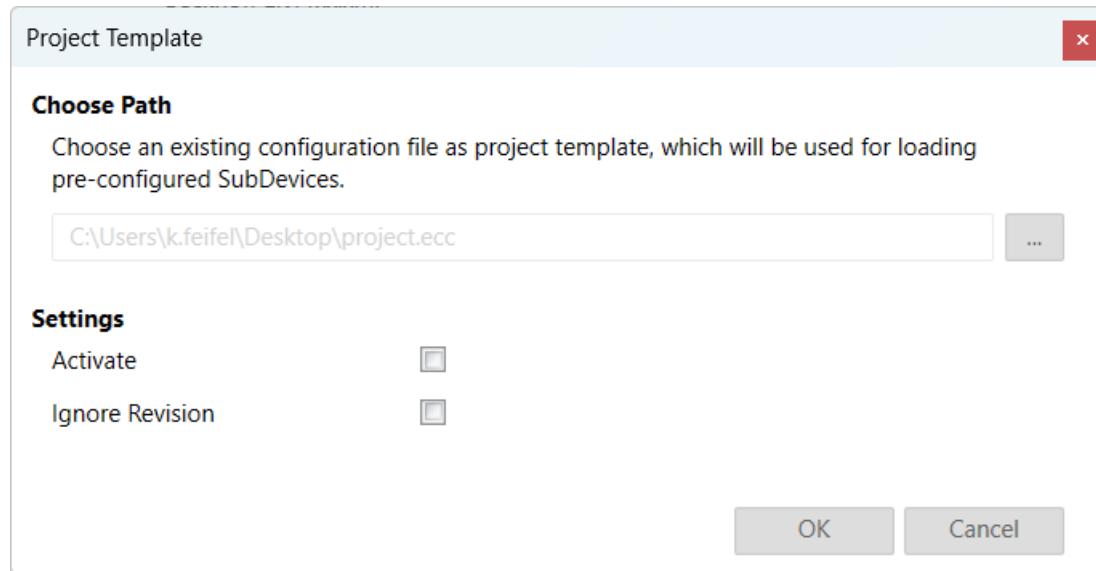
**Warning:** Only modify this file if you know what you are doing.



## 8.10 Project Templates

If you have a lot of SubDevices with the same configuration (e.g. PDOs, InitCmds) you can use a project template. In that case new SubDevices will be first copied from this template (if available) and then taken from the ESI cache. This behaviour is also used for the bus scan.

**At the moment there are the following options:**



Path: Path to the selected project template

### Settings

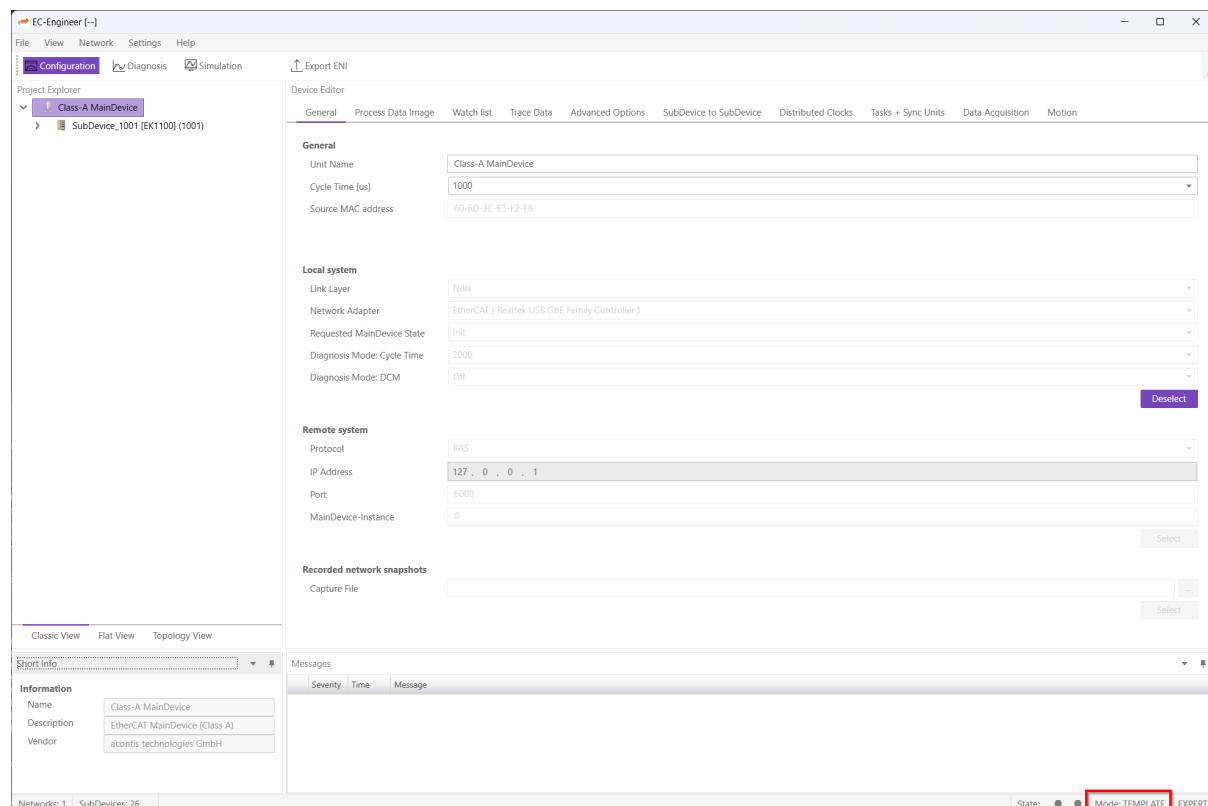
#### Activate:

True, for activating this project template (necessary if you want to turn it temporary off)

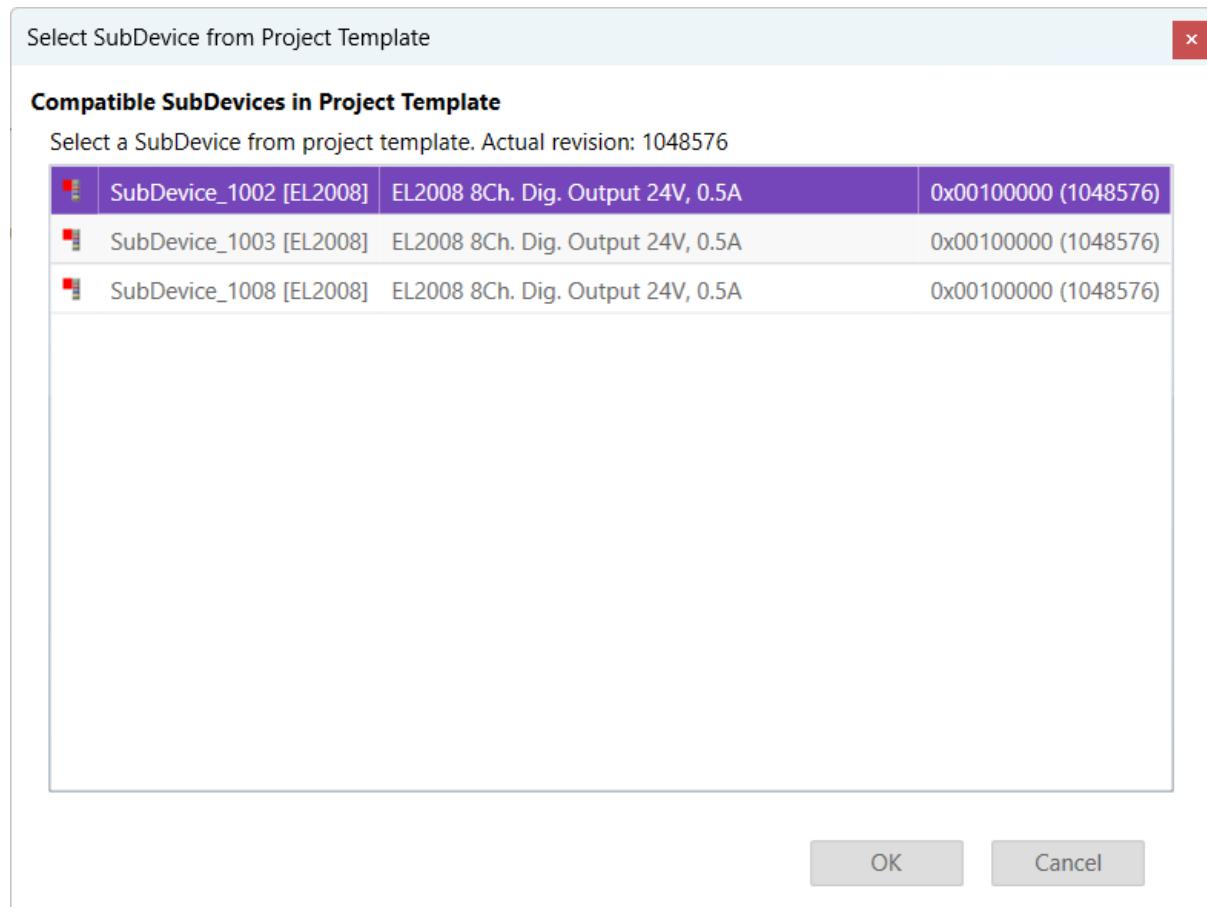
#### Ignore Revision:

The revision will be not used as search criteriom

If the project template mode is active, it will be displayed in the status bar:



Normally the first match will be taken from project template. If this is wrong, you can open the context menu *Select from Project Template* and select another one:



## 8.11 Real-time Support

Normally on Windows you do not have real-time support, but to get DCM in sync you can install the “ECAT driver” in the following modes:

### Network driver

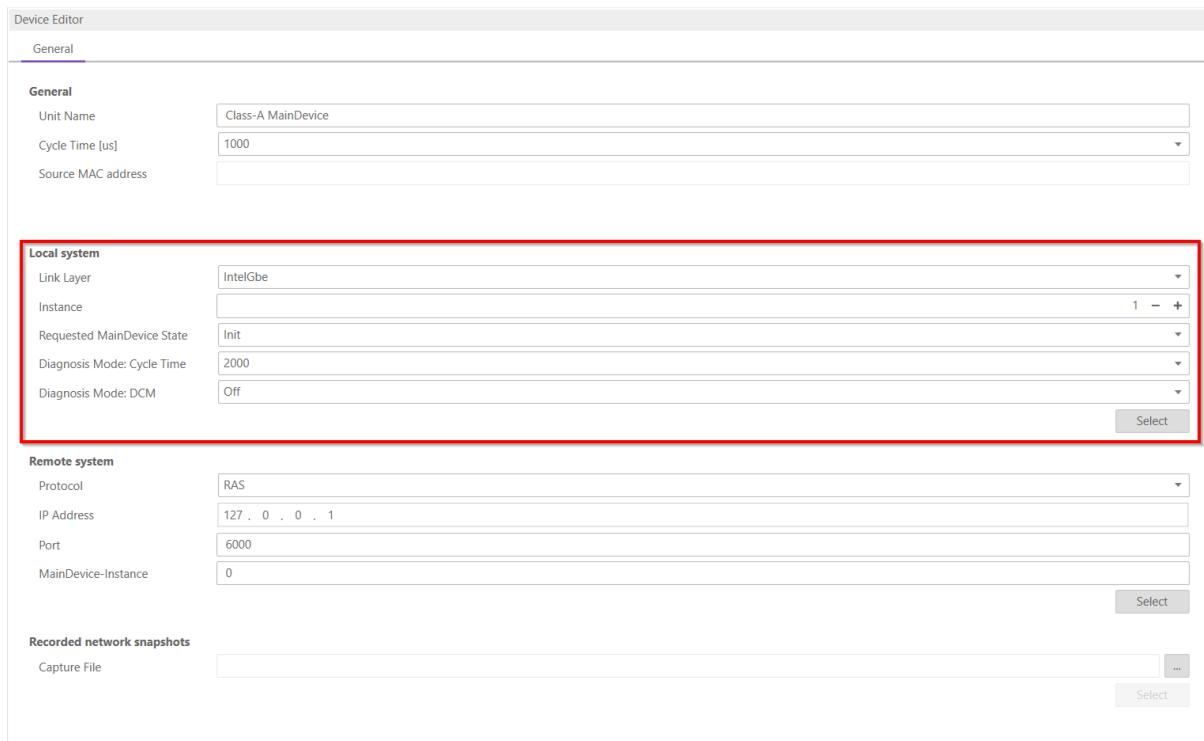
The network driver can be used from the optimized link layers

The real-time support is normally hidden in EC-Engineer. It can be activate by copying the specific link layer libraries into the installation directory of EC-Engineer.

For the local system, EC-Engineer will turn on DCM and use the real-time clock for generating the job task cycles. For more information about how to install the “ECAT driver” please refer the manual of EC-Master Class A DCM on Windows

### 8.11.1 Optimized Link Layers

After activating the real-time support the optimized link layer can be selected in the option “Link Layer”:



Depending on the link layer type the user can chose the network adapter or the instance.

The following optimized link layers are currently supported:

em11I8254x.dll (Intel PRO/1000 Network Adapters)

em11I8255x.dll (Intel PRO/100 Network Adapters)

em11IRTL8139.dll (Realtek 8139 Fast Ethernet Adapters)

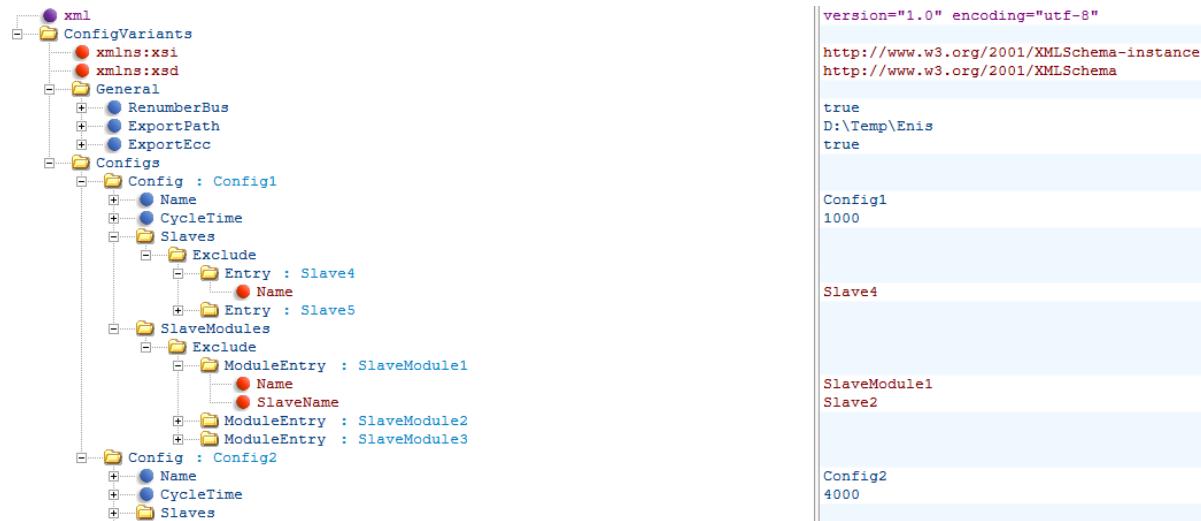
em11IRTL8169.dll (Realtek Gigabit Ethernet Adapters)

em11ICCAT.dll (BECKHOFF CCAT)

For more information about optimized link layers and how to install the ECAT driver please refer the manual of [EC-Master Class B EcatDrv for Optimized Link Layers](#)

### 8.12 Export ENI Variants

With this function it is possible to export different ENI file variants of an config. Therefore a xml file has to be created. Then it is possible to select this xml file and create more ENI files at once. The xml file should look like this:



**RenumberBus:** If this is true, all SubDevices will be enumerated in a row. Otherwise each SubDevice stays with his address.

**Export Path:** The path were the ENI / ECC files should be saved.

**ExportEcc:** If true, also the ECC file be exported and not only the ENI.

Each Config needs a name. This name is used for the ENI file and the optional ECC file.

**CycleTime (optional):** If this is set the cycle time will be changed to this value.

**Exclude:** To find a SubDevice in the config the name is required. With the exclude it is possible to remove some SubDevices from a big config for example.

**Include:** To find a SubDevice in the config the name is required. With the include it is possible to easy delete all SubDevices in the config despite except the include ones.

**Exclude (SubDeviceModules):** To find a SubDeviceModule in the config the name and the name of the SubDevice are required. With the exclude it is possible to remove some SubDeviceModules from a big config for example.

**Include (SubDeviceModules):** To find a SubDeviceModule in the config the name and the name of the SubDevice are required. With the include it is possible to easy delete all SubDeviceModules in the config despite except the include ones.

**Warning:** Please use Exclude OR Include. Both in the same config does not work

## 9 Command Line Interface

For helping users in some special situations and to do not confuse other users the EC-Engineer supports a small command line interface:

**/HELP, /?**

Shows the help dialog

**/CFG = config.ecc**

Open a specific configuration file config.ecc directly after starting EC-Engineer

**/EMI = emi.xml**

Sets the path to the EMI file which should be used (Mandatory if ecc does not already exist)

**/REMOTE = "127.0.0.1:6000:0"**

Activates the remote system, where IP address is "127.0.0.1", port is 6000, MainDevice instance is set to 0

**/ENIEXPORT = config.eni**

Activates an automatic ENI export on close

**/EXIEXPORT = config.exi**

Activates an automatic EXI export on close

**/CYCLETIME = "2000"**

Changes the cycle time from ecc or EMI in config

**/DIAG**

Activates diagnosis mode

**/CAPTURE= capture.ecd**

Open a specific capture file capture.ecd directly after starting EC-Engineer and activates the diagnosis mode

**/ENIBUILDER**

Activates the EniBuilder support, means two additional context menu entries of the device will be available to export and import the configuration file for the EniBuilder

**/PROJECTTEMPLATEPATH**

Opens a specific configuration file as project template

**/FORCECFG= config.ecc**

Activates the "integration" mode, to be able create an ENI file automatically on closing EC-Engineer

**Some menu entries are also hidden, like**

- "New/Open/Save"
- "EMI Manager"
- "Export Process Variables / Import ENI file / Export ENI file"
- Toolbar

Further supported parameters:

**/EMI = emi.xml**

Sets the path to the EMI file which should be used (Mandatory)

**/LOCAL = "127.0.0.1"**

Activates the local system and the network adapter with IP address "127.0.0.1" will be chosen. If you use the optimized LinkLayer you can write **/LOCAL = "I8254x"** or **/LOCAL = "RTL8169"** (**/LOCAL** or **/REMOTE** or **/CAPTURE** is mandatory).

**/REMOTE = "127.0.0.1:6000:0:0"**

Activates the remote system, where IP address is "127.0.0.1", port is 6000, MainDevice instance is set to 0 and protocol is 0 (RAS). It is also supported to use the DNS name instead of the IP address (**/LOCAL** or **/REMOTE** or **/CAPTURE** is mandatory). It is also possible to set the parameter for more MainDevice instances (only if ecc exists with more MainDevices). Therefore just add the additional parameter with a ;. E.g.: **/REMOTE** = "127.0.0.1:6000:1;127.0.0.2:6001:2" or **/REMOTE** = "127.0.0.1:6000:1:0;127.0.0.2:6001:2:0"

**/CAPTURE = C:/myfile.ccd:0**

Activates the offline diagnosis system, where the path to the capture file is c:/myfile.ccd and the selected snapshot is "0" (**/LOCAL** or **/REMOTE** or **/CAPTURE** is mandatory)

**/ENIEXPORT = config.eni**

Activates the ENI export (Optional)

**/EXIEXPORT = config.exi**

Activates the EXI export (Optional)

**/VAREXPORT = config.var**

Activates the process variables export (Optional)

**/VARTYPE = "csv|plc|pd|xml" (default=csv)**

Sets the format of the process variables export SubDevice (for more information about the supported formats

**/EBIEXPORT = config.ebi**

Activates the EBI (EniBuilder input file) export

**/SCAN**

Scans the bus after startup

**/FORCEDIAG**

Activates the diagnosis mode after startup. If diagnosis mode can not be activated the application will be closed.

**/CYCLETIME = "1000"**

Sets the MainDevice cycle time and locks it for the user

**/AUTOSAVE**

Current configuration will be saved automatically on exit (without asking the user if he want to discard all changes)

**/ALLMASTERUNITS**

If there is more than one MainDevice in the ecc, you can create an ENI file and variable export for all with this parameter

**Samples**

Run EC-Engineer, scan automatically the local system with IP address 127.0.0.1, export ENI file and export process variables (as CSV Format) on closing

```
> EcEngineer.exe /FORCECFG="cfg_local.ecc" /EMI="emi.xml" /LOCAL=127.0.0.1
→ /SCAN /ENIEXPORT="cfg_local.eni" /VAREXPORT="cfg_local.var"
→ /VARTYPE="csv"
```

Run EC-Engineer, scan automatically the remote system with IP address 127.0.0.1, Port 6000, MainDeviceInstance 0, export ENI file and export process variables (as PLC Format) on closing

```
> EcEngineer.exe /FORCECFG="cfg_remote.ecc" /EMI="emi.xml"
→ /REMOTE=127.0.0.1:6000:0:0 /SCAN /ENIEXPORT="cfg_remote.eni"
→ /VAREXPORT="cfg_remote.var" /VARTYPE="plc"
```

Run EC-Engineer and switch to diagnosis mode

```
> EcEngineer.exe /FORCECFG="cfg_remote.ecc" /EMI="emi.xml"  
→ /REMOTE=127.0.0.1:6000:0:0 /FORCEDIAG
```

Run EC-Engineer and switch to offline diagnosis mode

```
> EcEngineer.exe /FORCECFG="cfg_capture.ecc" /EMI="emi.xml"  
→ /CAPTURE=C:/myfile.ccd:0 /FORCEDIAG
```

#### **In case of an error, EC-Engineer will do the following**

- Add error message to the log file (message level must be set to “All Messages”)
- If the GUI is already visible, he will show a message box
- Set exit code to “-1”

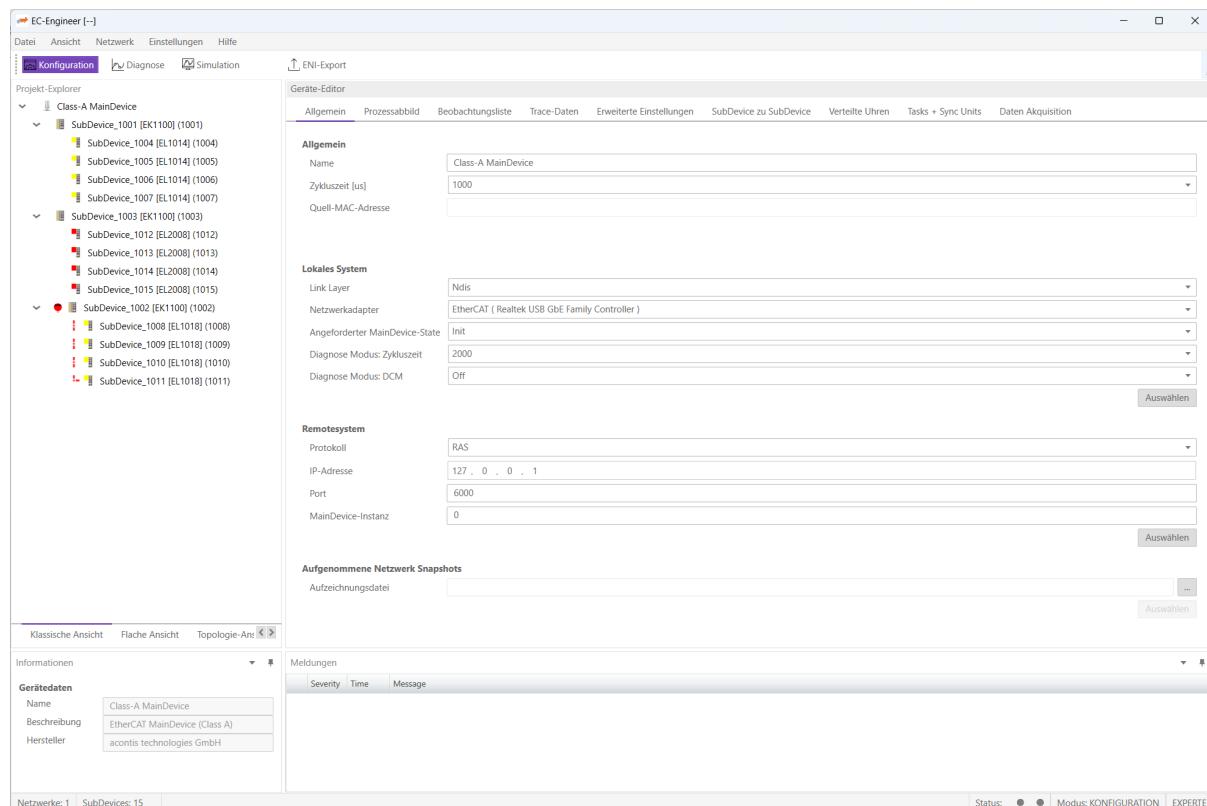
## 10 Customization

### 10.1 Multi-Language-Support

EC-Engineer supports multiple languages, which can be changed at runtime. Adding support for further lanuages is quite easy because it is just a simple XML file which must be added to the kit.

All language files are stored in: "%ProgramFiles%/acontis\_technologies/EC-Engineer/Languages/...`

EC-Engineer has also full UNICODE support, which means that it is also possible to support Asian languages:

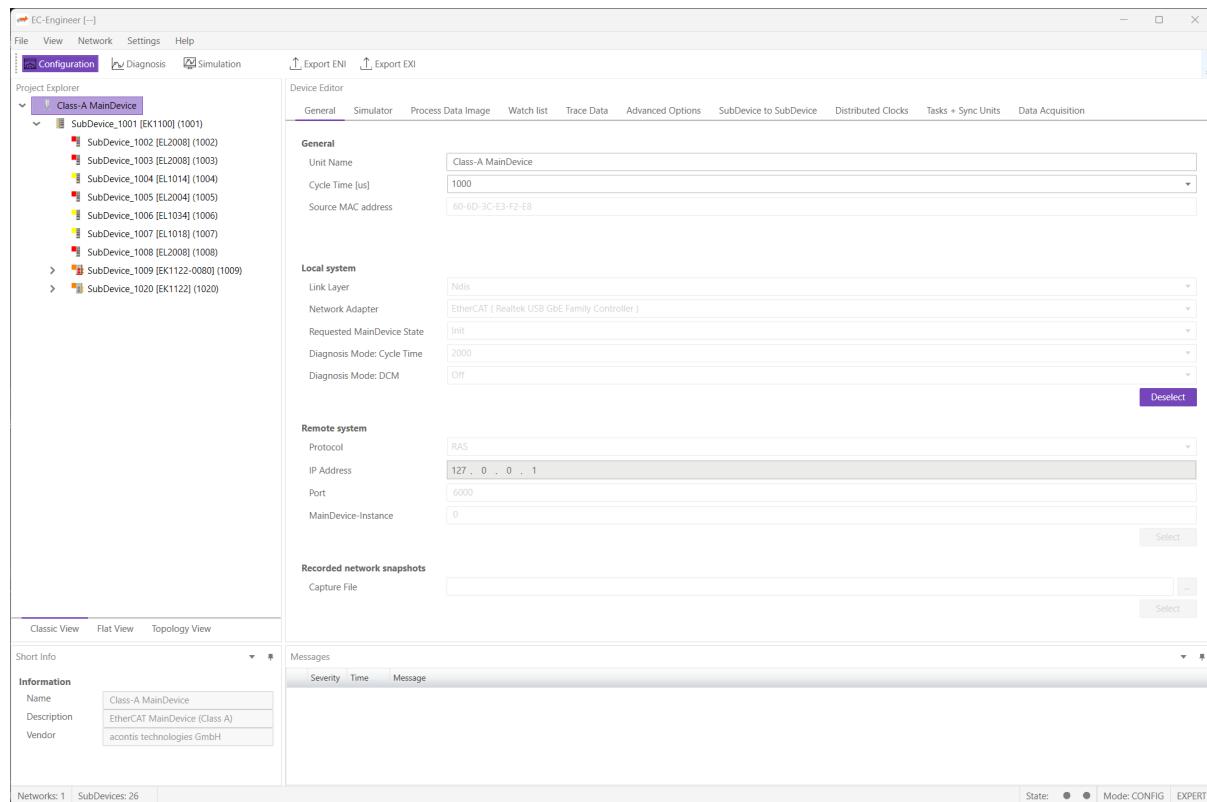


### 10.2 Themes

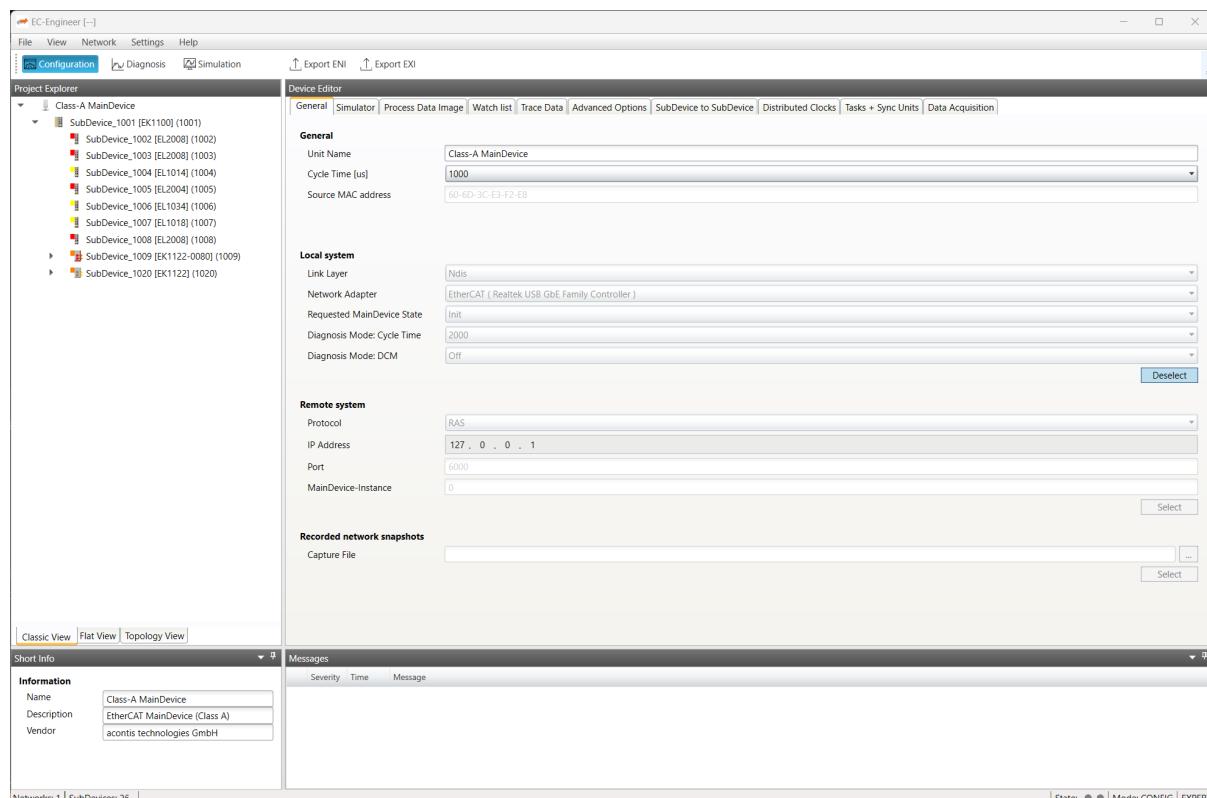
EC-Engineer supports multiple themes, which can be changed during compile time. Adding support for further themes is quite easy because a theme consists of a couple of XAML files which must be added to the kit.

Five themes are already included into EC-Engineer:

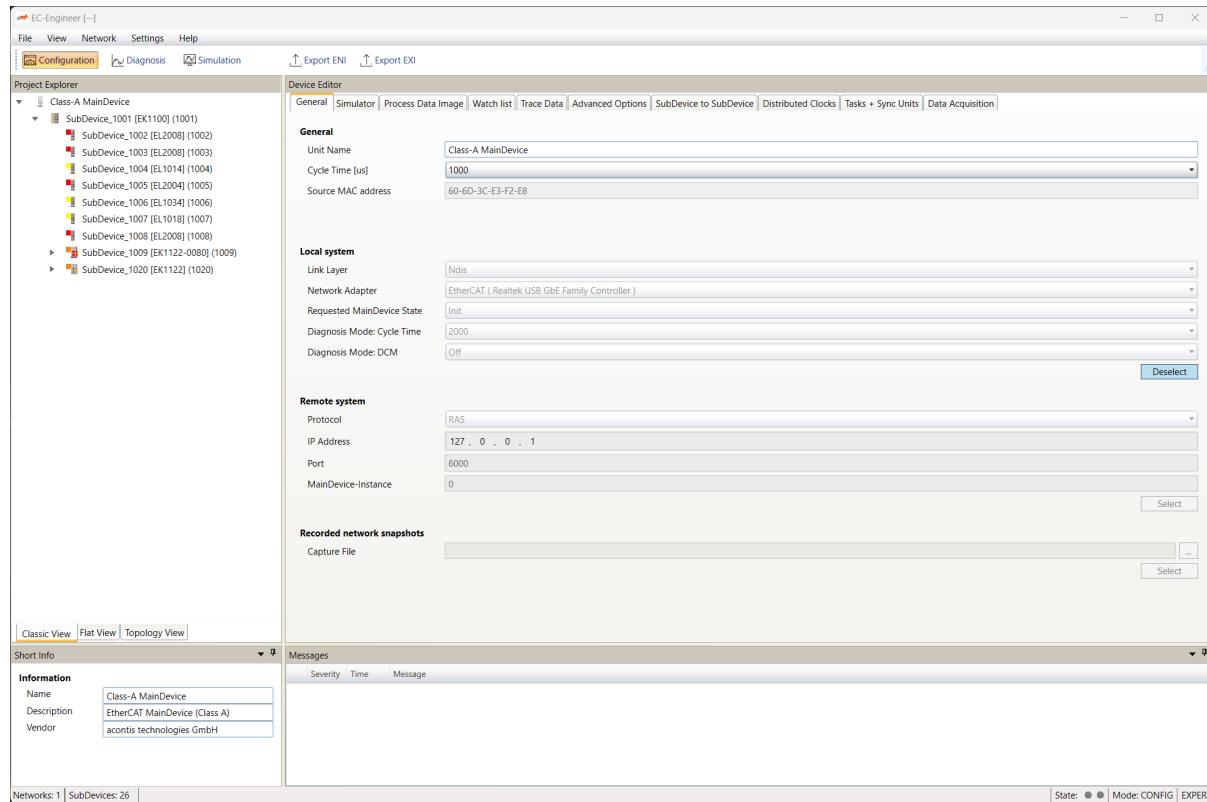
#### Royal Light Theme



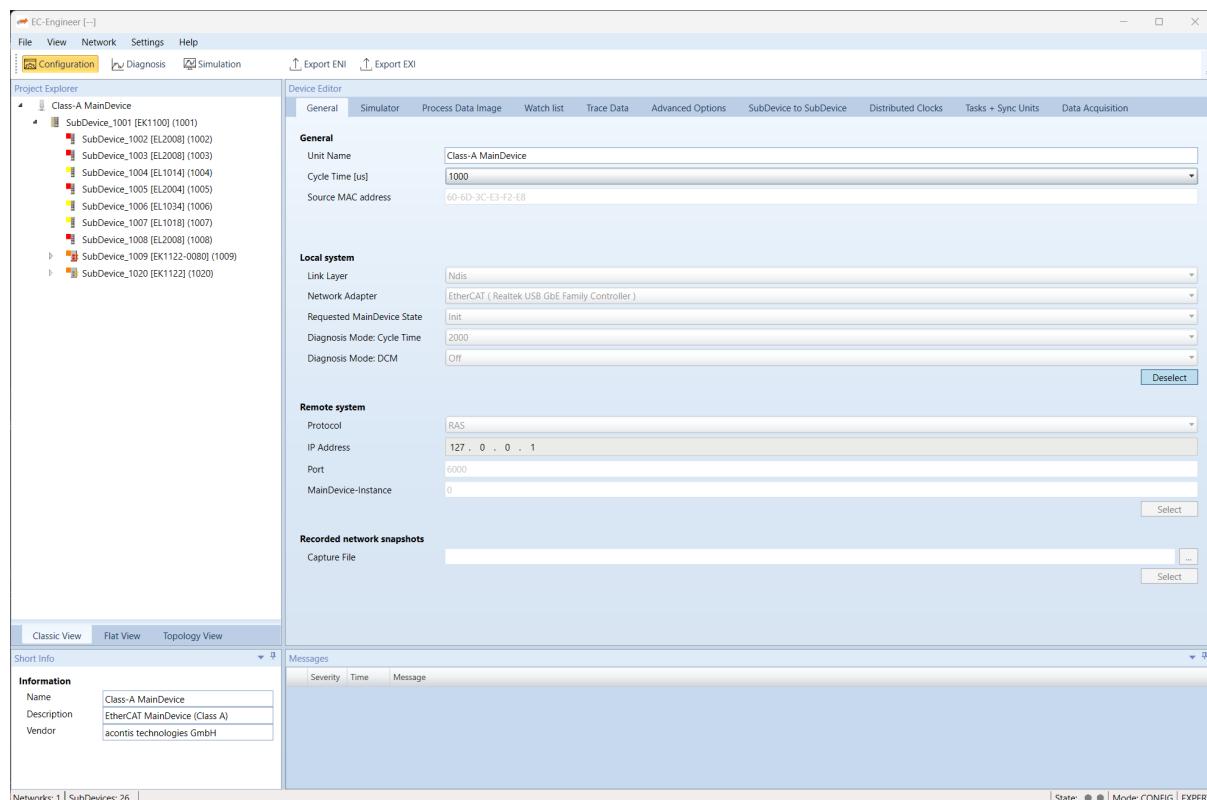
## IG Theme



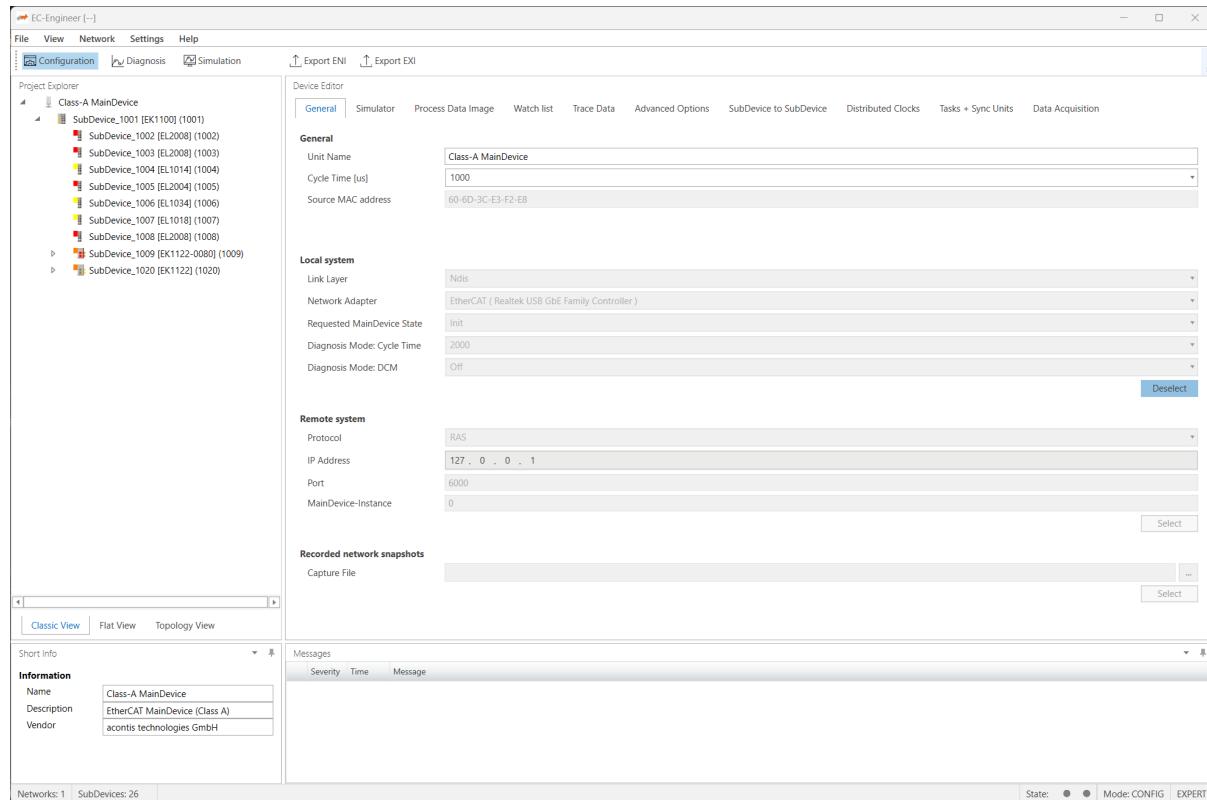
## Luna Theme



## Office 2010 Blue Theme

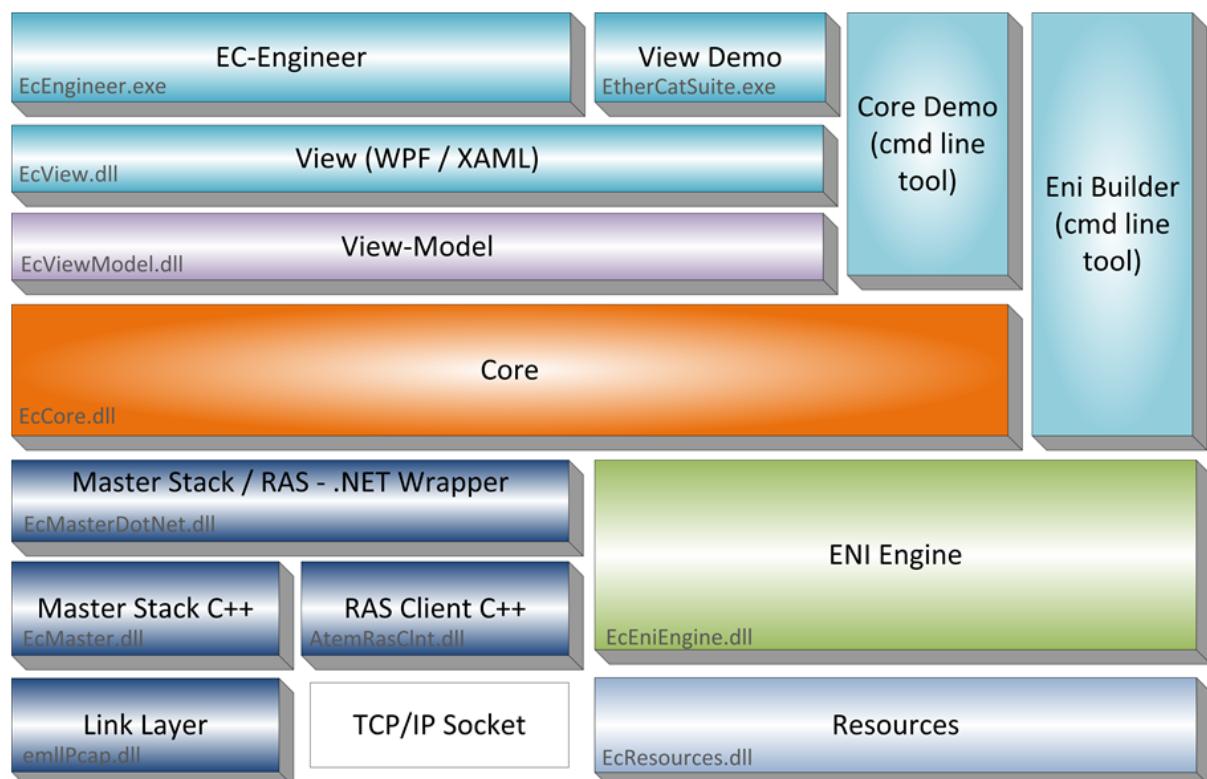


## Office 2013 Theme



## 10.3 Integration into 3rd-Party Applications

The software architecture of EC-Engineer is kept very modular:



This allows us adjust to customer needs and to integrate it into nearly every customer engineering environment. We can integrate the complete product or only parts of it, like:

**View-Layer**

Only changes on XAML-level needed, only a few changes are necessary to get your own look and feel

**ViewModel-Layer**

For a customer which has already his own GUI or wants to be very flexible

**Core-Layer**

- Used with CoreDemo as a commandline tool
- Used directly as library by adding the C# assembly as reference to the existing project

**EniEngine-Layer**

- Used with EniBuilder as a commandline tool
- Used directly as library by adding the C# assembly as reference to the existing project

If you are interested in integrating the product or parts of the product into your existing framework, please contact us.

## 11 Licensing

### 11.1 Third party Software

EC-Engineer is using the following third party software:

- Infragistics

### 11.2 EC-Engineer License

For EC-Engineer we have two license models:

- Node Locked License
- Floating License

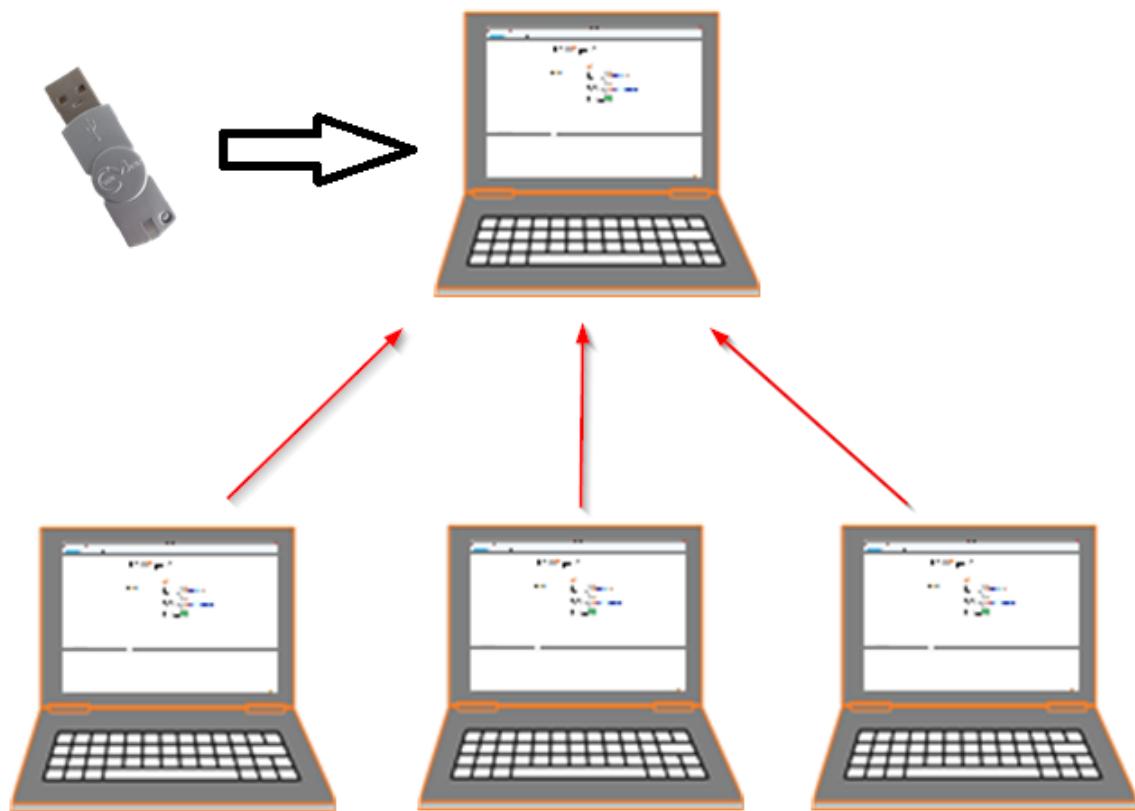
### 11.3 Node Locked License

If you choose this license model, you need an USB dongle for every single computer. This dongle must be plugged into the computer where you want to use EC-Engineer.



### 11.4 Floating License

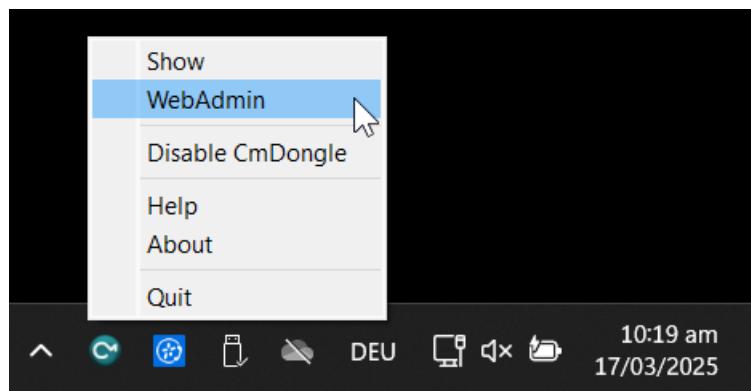
If you choose this license model, you need only one USB dongle with multiple floating licenses. This dongle must be plugged into your license server and all client computers will connect to this license server.



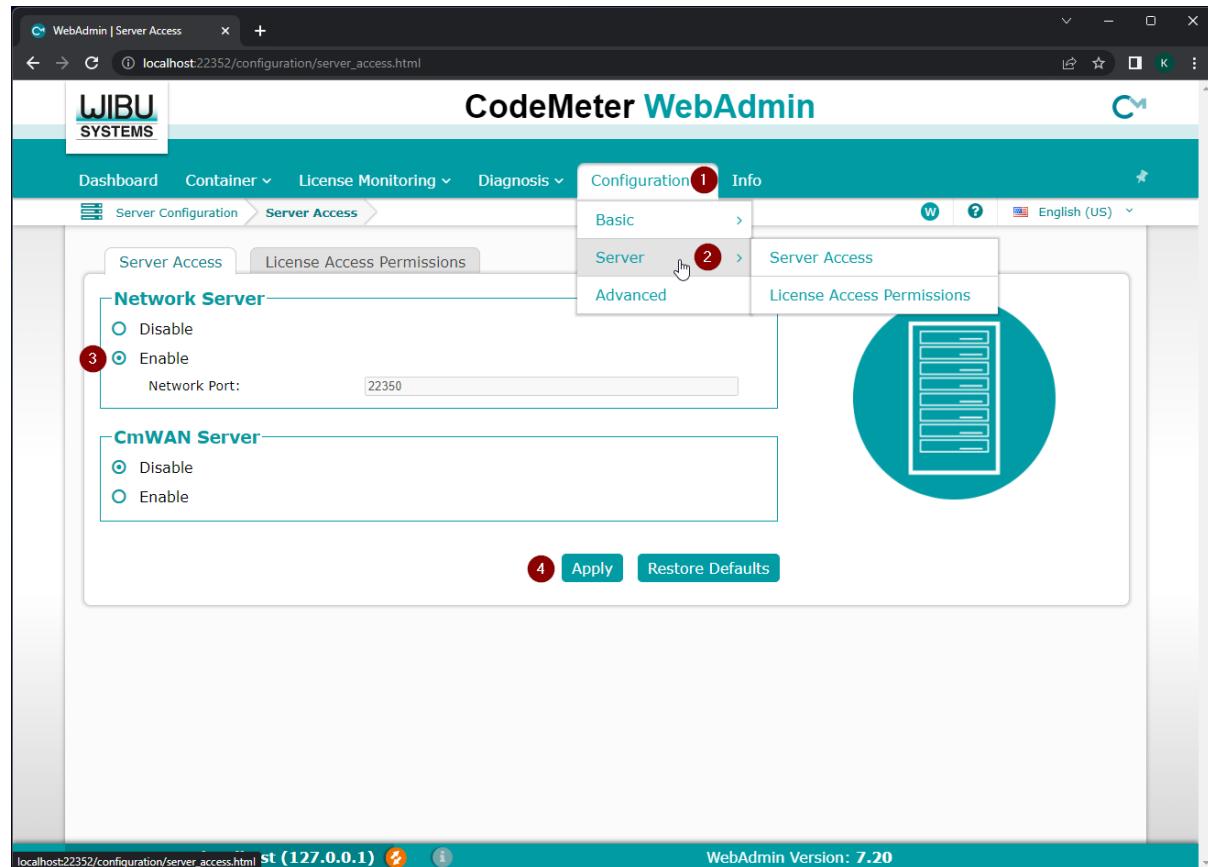
**Note:** This requires that the “WebAdmin” of the “Code Meter” is installed on the system. Please download and install the “Code Meter Runtime” from WIBU: <https://www.wibu.com/>

#### 11.4.1 Configure License Server

Install the “Dongle-Version” of EC-Engineer on your license server, plug-in your USB dongle and open the “WebAdmin”:

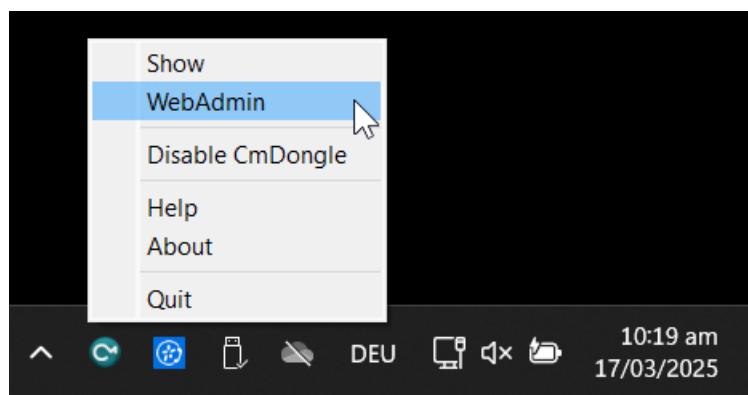


In the “WebAdmin” navigate to “Configuration Server”, select the option “Run Network Server” and press **Apply**:

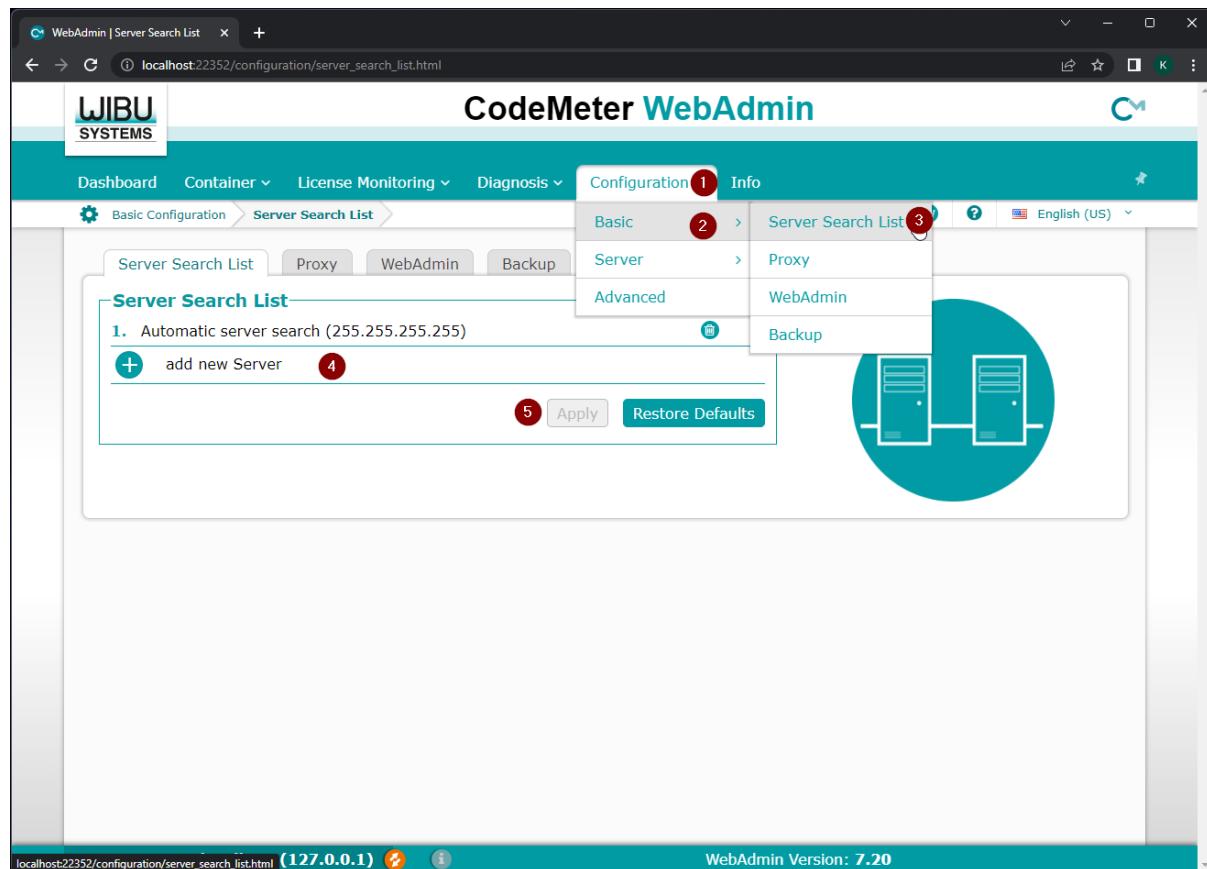


## 11.4.2 Configure Client Computer

Install the “Dongle-Version” of EC-Engineer and open the “WebAdmin”:

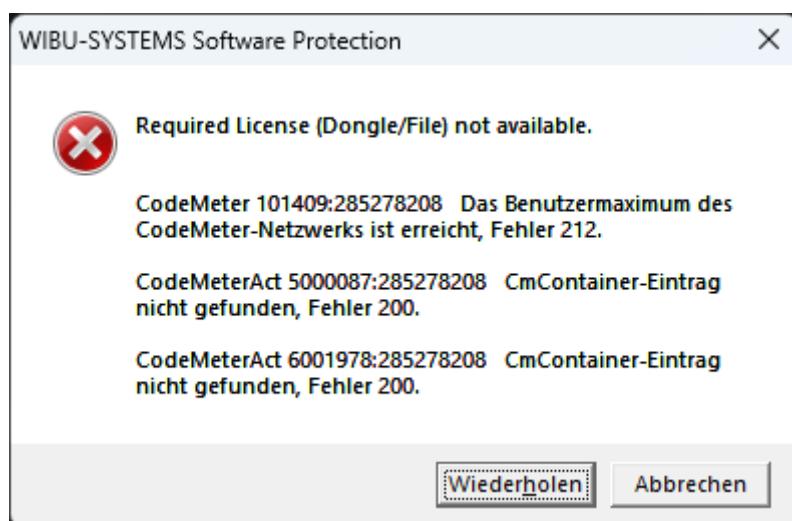


In the “WebAdmin” navigate to “Configuration Network”, press *add*, enter your IP address of your license server and press *Apply*:



Now, you should be able to start EC-Engineer.

**Note:** If too many clients are connected you will, you will receive the following error message:

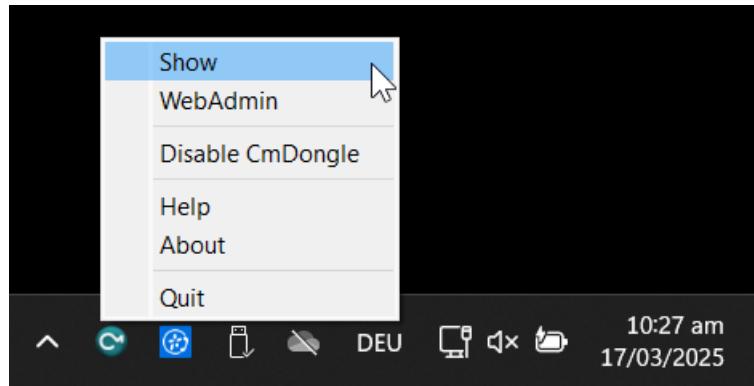


In that case, you should try to close unused EC-Engineer instances or buy more floating licenses.

## 11.5 License Update

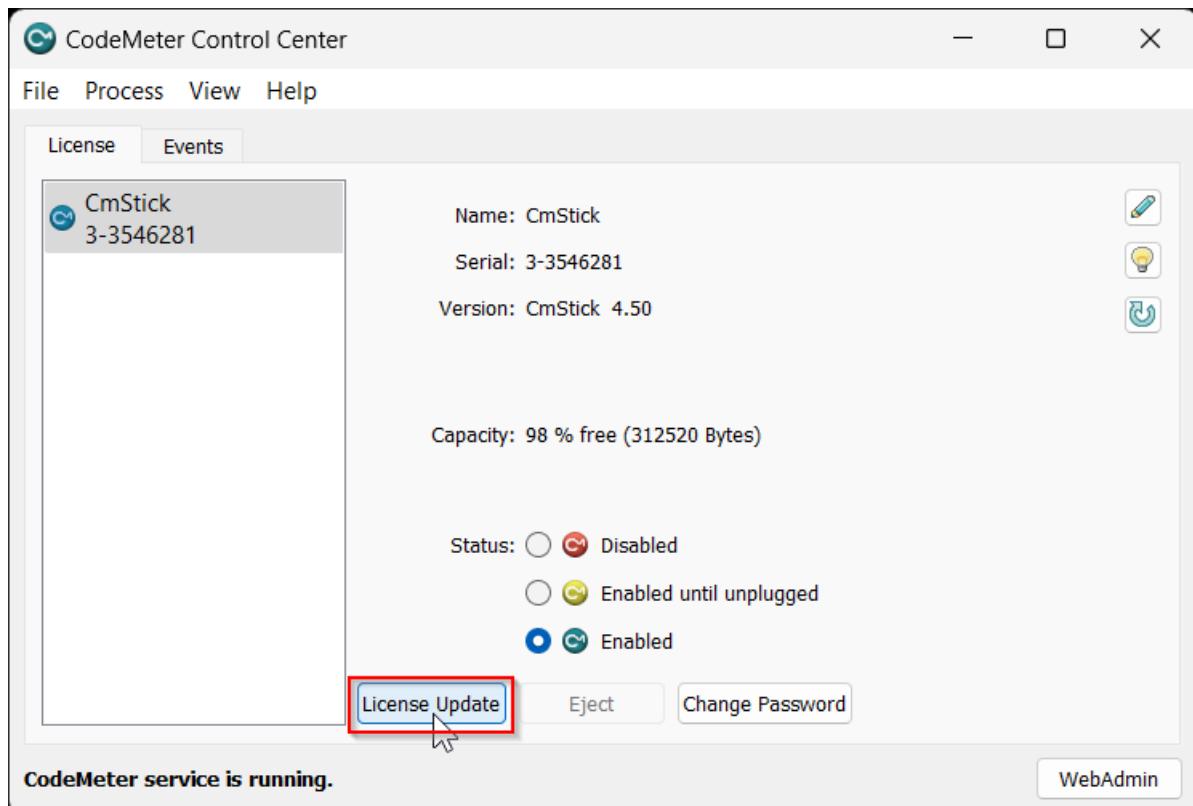
### 11.5.1 Request License Update

**Step 1:** Install the “Dongle-Version” of EC-Engineer and open the “CodeMeter Control Center”:

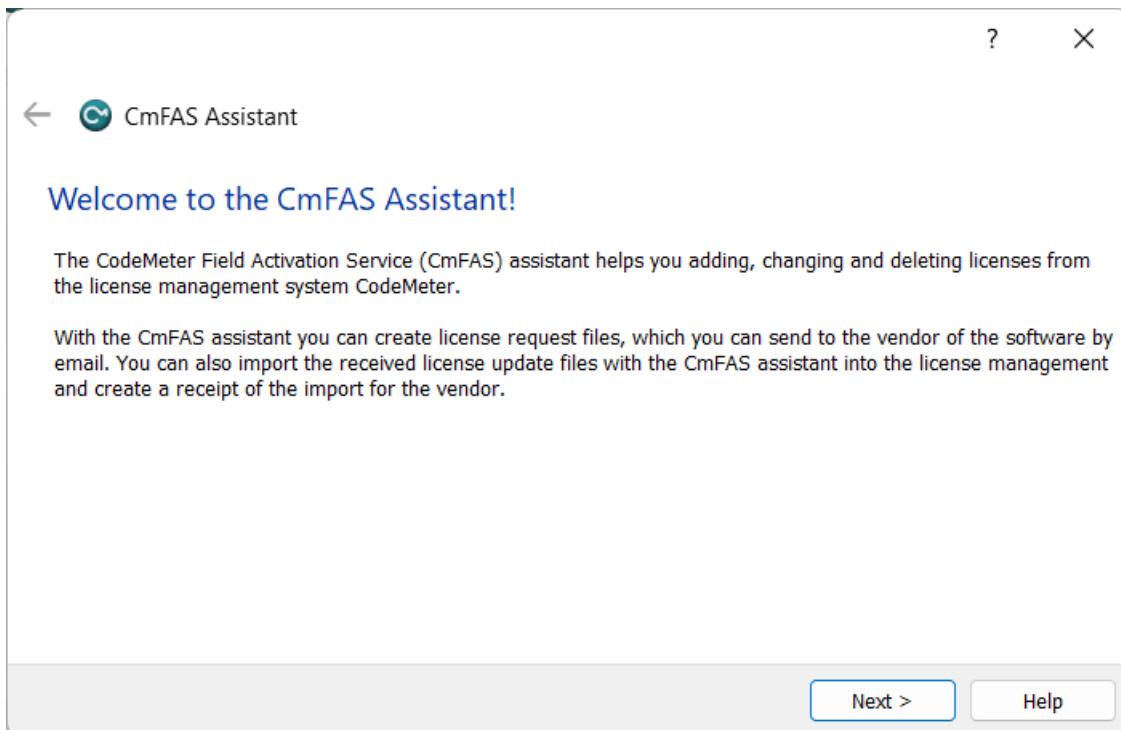
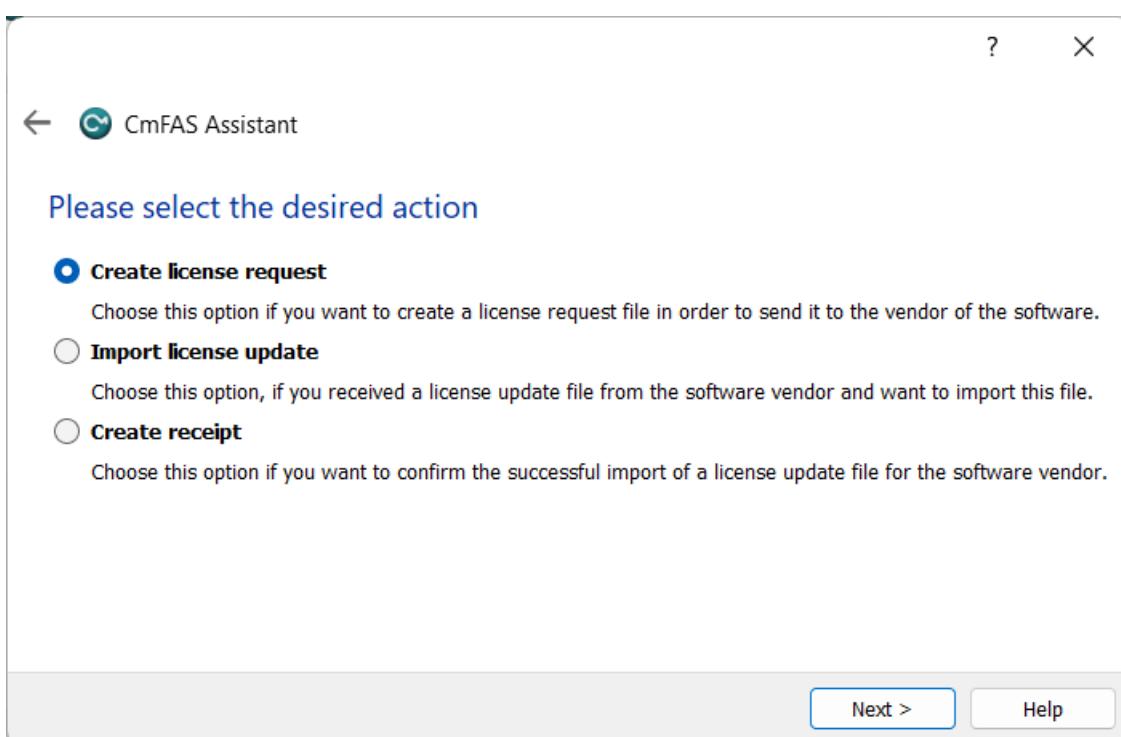


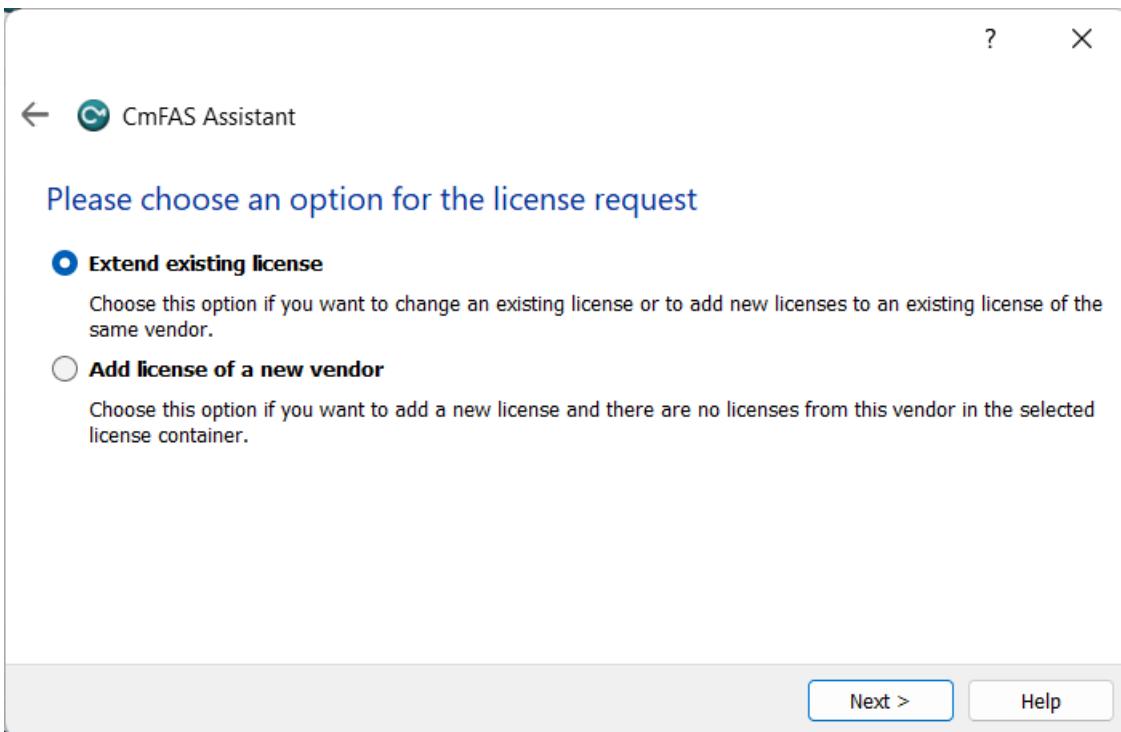
If the selected license is a virtual dongle, simply drag and drop the WibuCmLIF file onto the CodeMeter Control Center. Otherwise, the dongle should already be visible.

**Step 2:** In the “CodeMeter Control Center” open the “CmFAS Assistent” by clicking on *License Update*:



**Step 3:** Now, follow the assistant until you can select a file name:

**Step 4: Select “Create license request”:****Step 5: Select “Extend existing license”:**



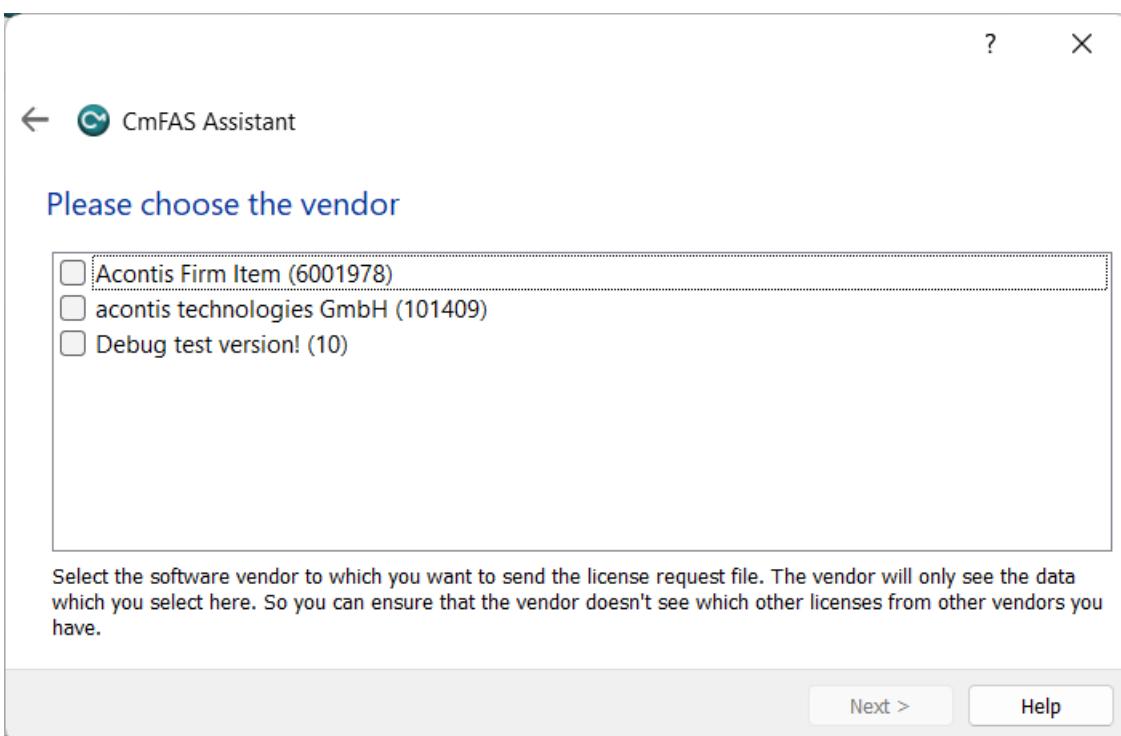
←  CmFAS Assistant

Please choose an option for the license request

**Extend existing license**  
Choose this option if you want to change an existing license or to add new licenses to an existing license of the same vendor.

**Add license of a new vendor**  
Choose this option if you want to add a new license and there are no licenses from this vendor in the selected license container.

Next > Help

**Step 6: Keep the selected the vendor:**

←  CmFAS Assistant

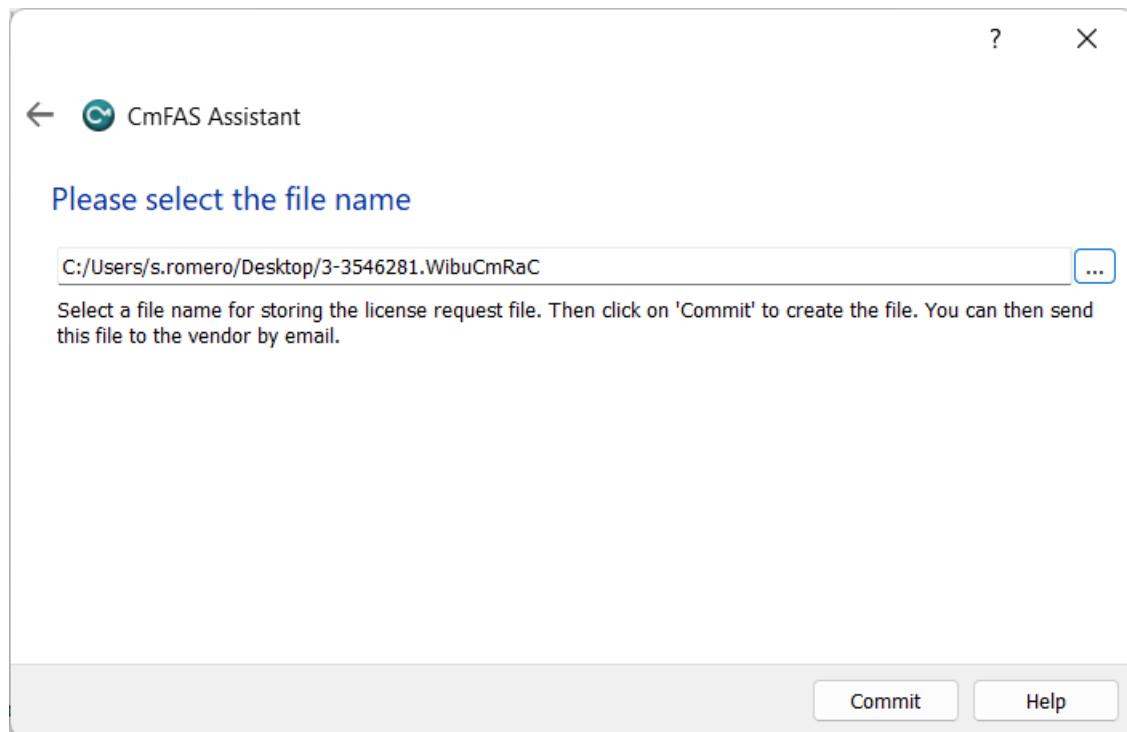
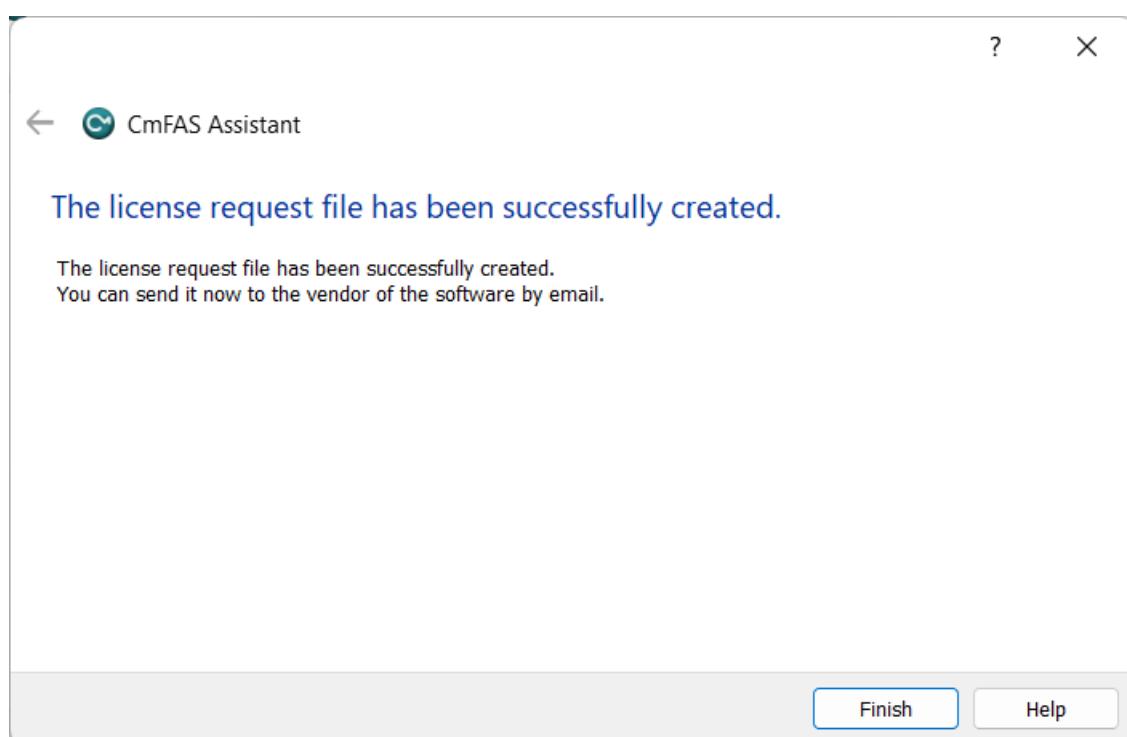
Please choose the vendor

<input type="checkbox"/> Acontis Firm Item (6001978)
<input type="checkbox"/> acontis technologies GmbH (101409)
<input type="checkbox"/> Debug test version! (10)

Select the software vendor to which you want to send the license request file. The vendor will only see the data which you select here. So you can ensure that the vendor doesn't see which other licenses from other vendors you have.

Next > Help

**Step 7: Select the file name:**

**Step 8: Finish the assistant:**

Step 9: Your license request file \* .WibuCmRaC has been successfully created. Please send it to [sales@acontis.com](mailto:sales@acontis.com)

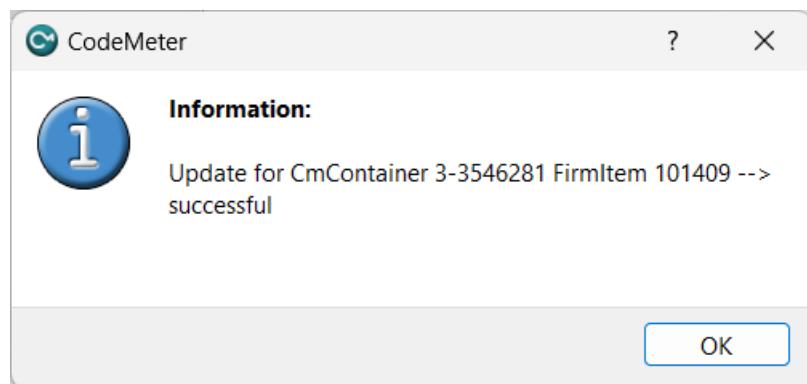
### 11.5.2 Install License Update

After you have been sent your license request file you will receive the license update file \*.WibuCmRaU.

Step 1: Connect your dongle.

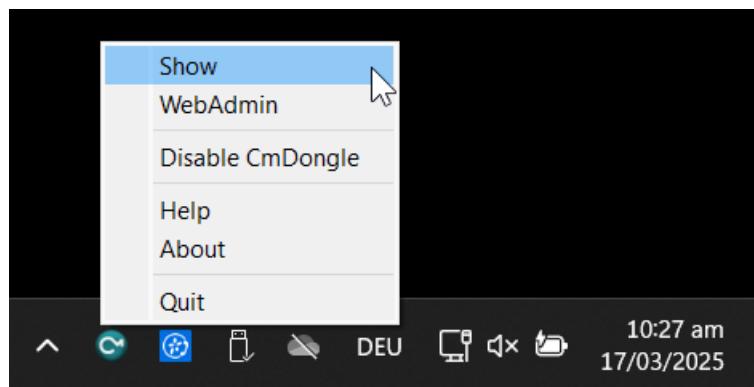
Step 2: Copy the license update file to your desktop.

**Step 3: Double-click on the license update file:**

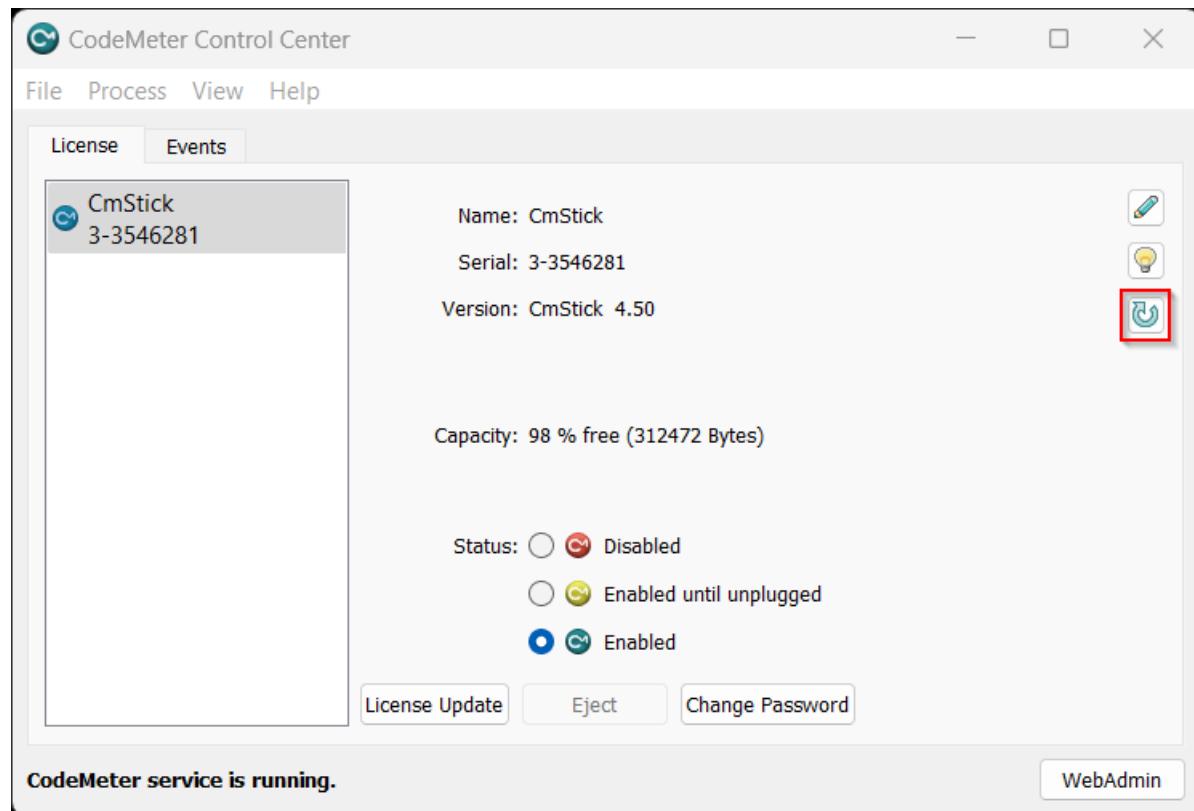
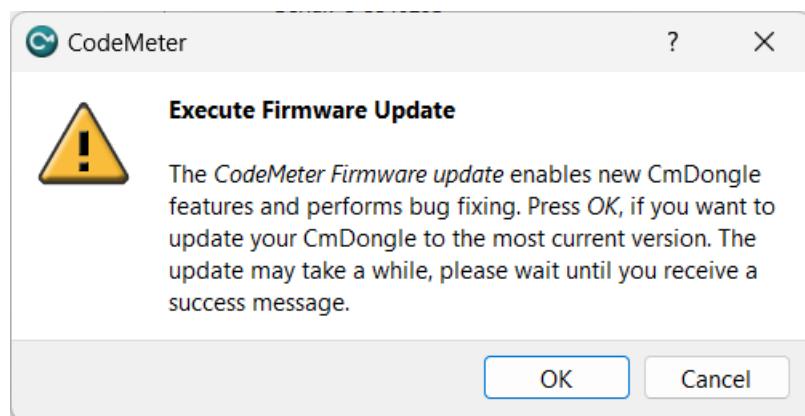


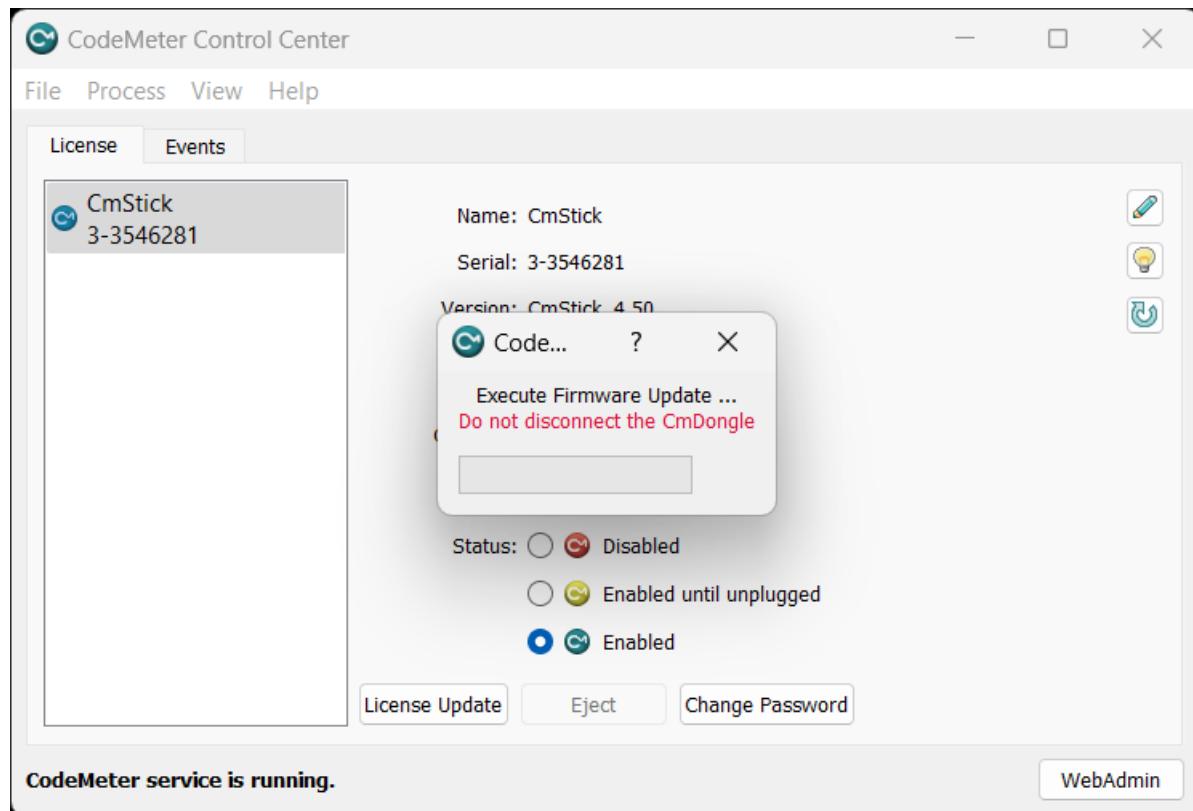
## 11.6 Dongle Firmware Update

**Step 1: Install the “Dongle-Version” of EC-Engineer and open the “CodeMeter Control Center”:**

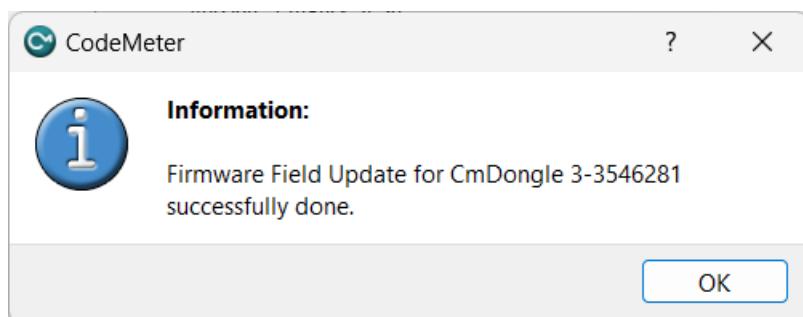


**Step 2: In the “CodeMeter Control Center” click on *Update Firmware of selected Cm Dongle*:**

**Step 3: Execute firmware update by pressing *OK*:****Step 4: Wait until firmware update was executed:**



**Step 5:** Firmware update was done and dongle can be removed:



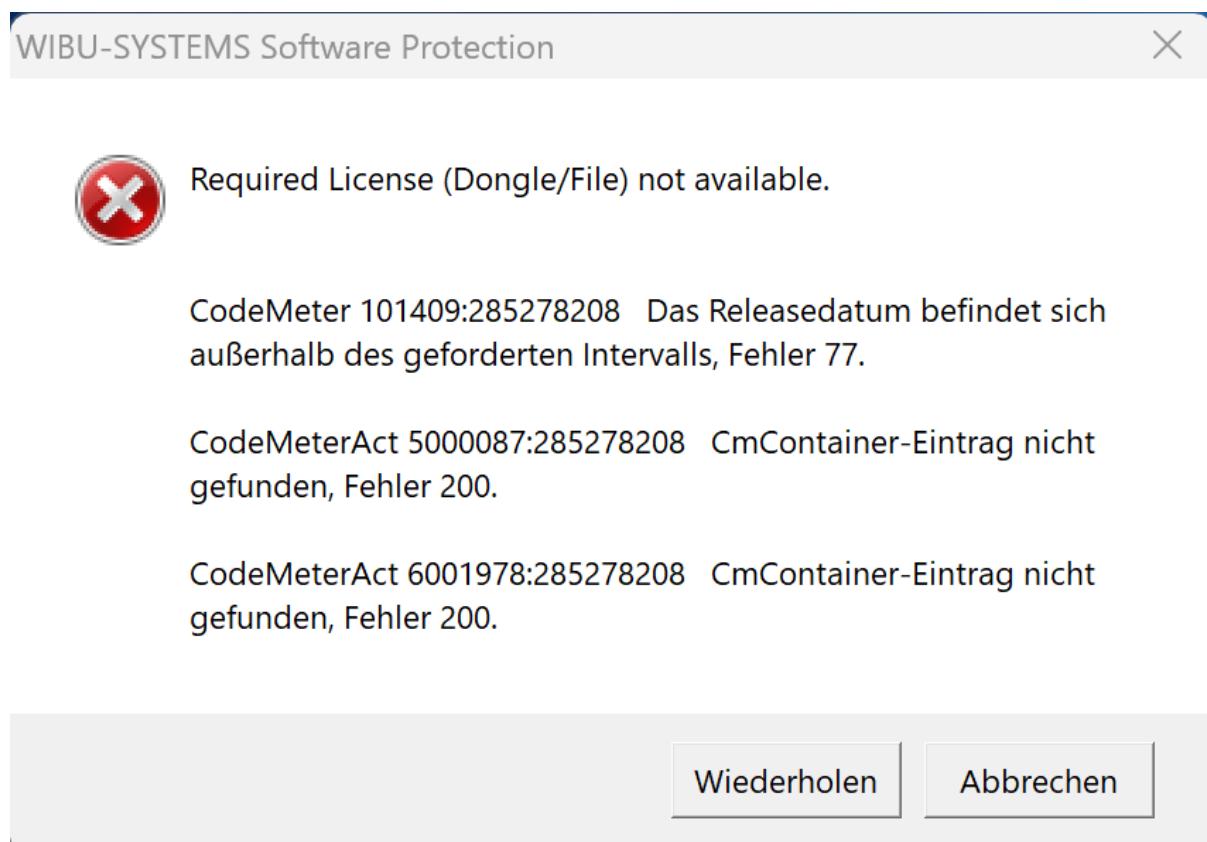
## 11.7 Expiration Date Dongle

If you chose a expiration dongle you can find your expiration date in the 'About Dialog'. If you have an unlimited dongle you will not see a date in the dialog.



If you see this date you can not use an Engineer which was released after the expiration date, but all older ones are possible.

**If you try to start an Engineer which is newer than the expiration date, you will get the following error:**



## 12 FAQ, Tips

### 12.1 Help in case of a problem

If you have a problem with EC-Engineer or something does not run as expected, please try first the following things:

- Read messages in message window
- Increase message level *Menu* ▶ *Settings* ▶ *All Messages*
- Read log file for more information *Menu* ▶ *Help* ▶ *Show* ▶ *Log* ▶ *File*
- Restart EC-Engineer and try to do it again
- **Contact support by sending a mail to [ecsupport@icontis.com](mailto:ecsupport@icontis.com) and attach the following information**
  - Project file .ecc or .eci if available
  - EC-Engineer Version *Menu* ▶ *Help* ▶ *About*
  - Log file *Menu* ▶ *Help* ▶ *Show Log File*
  - Short description how the reproduce it

### 12.2 Shortcuts

EC-Engineer supports shortcuts for the most commonly used actions, like:

#### Menu

- **Ctrl + N:** Create new project
- **Ctrl + O:** Open project
- **Ctrl + S:** Save project
- **Alt + F4:** Exit program

### 12.3 Internal User Specific Settings

EC-Engineer saves all user specific settings in a subfolder of the all users directoy %ALLUSERSPROFILE%/EC-Engineer like C:/ProgramData/EC-Engineer.

In this directoy there is a XML file called `User.myusername.xml`. In this file, the user can find additional settings, which can be helpful for solving some problems:

#### **MasterUnitLocalCycleTime = 1**

Bus cycle time of the internal MainDevice in milliseconds

#### **MasterUnitLocalWorkerSleepTimeMs = 100**

Cycle time of the local MainDevice thread in milliseconds

#### **MasterUnitRemoteWorkerSleepTimeMs = 300**

Cycle time of the remote MainDevice thread in milliseconds

#### **MasterUnitTimerNormalCount = 4**

- Time shift to cycle time of the normal refresh cycle

- E.g. local MainDevice = 100 ms, normal refresh cycle is every 400 ms
- Used e.g. for updating MainDevice information, error counters of SubDevice, ...

**MasterUnitTimerSlowerCount = 20**

- Time shift to cycle time of the slower refresh cycle
- E.g. local MainDevice = 100 ms, slower refresh cycle is every 2 seconds
- Used e.g. for updating the SubDevice information, EEPROM data, register data, ...

**MasterUnitTimerSlowestCount = 120**

- Time shift to cycle time of the slowest refresh cycle
- E.g. local MainDevice = 100 ms, slower refresh cycle is every 12 seconds
- Used e.g. for updating the CoE Object Dictionary, ...

**MasterUnitScanBusTimeout = 5000**

Timeout for bus scan in milliseconds

**MasterUnitMailboxTimeout = 5000**

Timeout for mailbox access in milliseconds

**MasterUnitStateChangeTimeout = 5000**

Timeout for changing state machines in milliseconds

**MasterUnitRegisterTimeout = 3000**

Timeout for register access in milliseconds

**MasterUnitProcessDataTimeout = 1000**

Timeout for process data access in milliseconds

**MasterUnitEepromTimeout = 3000**

Timeout for EEPROM access in milliseconds

**MasterUnitRasCycleTime = 0**

Internal RAS cycle time for polling

**MasterUnitRasWatchDog = 0**

Internal RAS watchdog interval

**MasterUnitRasWdToLimit = 0**

Internal RAS watchdog limit

**DiagGeneralErrorLvlLostLink = 10**

Theshold value for the “Lost Link Errors”, which leads to an error

**DiagGeneralWarningLvlLostLink = 1**

Theshold value of the “Lost Link Errors”, which leads to a warning

**DiagGeneralErrLvlRxError = 10**

Theshold value for the “RX Errors”, which leads to an error

**DiagGeneralWarnLvlRxError = 0.001**

Theshold value of the “RX Errors”, which leads to a warning

**DiagGeneralErrLvlInvalidFrame = 10**

Theshold value for the “Invalid Frames”, which leads to an error

**DiagGeneralWarnLvlInvalidFrame = 0.001**

Theshold value of the “Invalid Frames”, which leads to a warning

**DiagGeneralErrLvlProcUnitErr = 1000**

Theshold value for the “Processing Unit Errors”, which leads to an error

**DiagGeneralWarnLvlProcUnitErr = 100**

The shold value of the “Processing Unit Errors”, which leads to a warning

**MasterDebugMessageLevel = 0**

Activates extended debug messages of the EC-Master (0 = Silent, 1 = Any, 2 = Critical, 3 = Error, 4 = Warning, 5 = Info, 6 = InfoApi, 7 = Verbose, 8 = VerboseCyc)

**GuiDebugMessageLevel = 0**

Activates extended debug messages of the GUI (0 = Off, 1 = Errors, 2 = All)

**IndentXmlFiles = False**

Activates indenting of XML files (makes exported XML files readable, but increases size)

**EnhancedUtf8Support = False**

Activates the enhanced UTF-8 support, which might be necessary if characters will be not displayed correctly

## 12.4 FAQ

Solutions for possible problems:

- **The integrated Device does not react as estimated**

Increase the message level (Menu Settings All Messages) and try it again.

- **EC-Engineer reports a message with ErrorCode: 0x...**

Error Codes comes directly from the Device. If you want to know what to know how to solve this problem, please refer the manual of EC-Master / EC-Monitor.

- **EC-Engineer reports the following message: Not all EtherCAT SubDevice devices are in operational state**

Check if all SubDevices have a green icon. If the color is not green, open tab “Diagnosis SubDevice General”. Here you can see the error state of the SubDevice. If it has no error, try to change the state to OP again.

- **EC-Engineer reports the following message: Changing topology failed: Bus configuration mismatch (ErrorCode: 0x9811001E)**

The configured bus and the currently connected bus does not match. Please open the ‘Network Mismatch Analyzer’ (Menu Network Network Mismatch Analyzer) to solve the problem.

- **EC-Engineer reports the following message: SubDevice ‘...’ has unexpected state (Current state: ‘...’, Expected state: ‘...’)**

Select the SubDevice and open the tab “General”. Here you can see the error state of the SubDevice. If it has no error, try to change the state again.

- **SubDevice reports the error state: “Sync manager watchdog” (Diagnosis SubDevice General)**

You need a realtime operating system. If you still want to use your SubDevice on Windows, you can turn off this watchdog (SubDevice->Advanced Settings: Set SM Watchdog = 0).

- **How can I update the firmware of my SubDevice via FoE?**

**For updating the firmware of your SubDevice via FoE, please follow these steps:**

- Enable diagnosis mode
- Set MainDevice state to INIT
- Select your SubDevice, and set his state machine to BOOTSTRAP
- Enter path of file on SubDevice (optional)
- Enter password (optional)
- Press button “Download” (it will open the FileOpen-Dialog, where you can choose the file which contains the new firmware and uploads this file)

- **Connect to local system is not possible**

Is Npcap / NDIS installed?

Is at least one network adapter installed?

- **Why is the process image size different between EC-Engineer and EC-Master?**

EC-Engineer shows on tab *Process Data Image* not the real size of the process data image. It shows only the offsets and the size of the variables.

If you want to get the real size of the process data image, which is used from EC-Master, you have to look into the ENI file: EtherCATConfig/Config/ProcessImage/Inputs/ByteSize or EtherCATConfig/Config/ProcessImage/Outputs/ByteSize. This is the offset + size of the last variable and additional administration data depending on the SubDevices which are used (AL-Status, DC Support, Mailbox, ...).

- **EC-Engineer reports the following message: Failed to query EtherCAT SubDevices. No SubDevices found.**

Verify that NDIS or Npcap driver is installed. WinPcap may not work anymore.

Try to restart your operating system, because this is sometimes necessary if you e.g. using a USB network adapter

Increase the message level (Menu Settings All Messages)

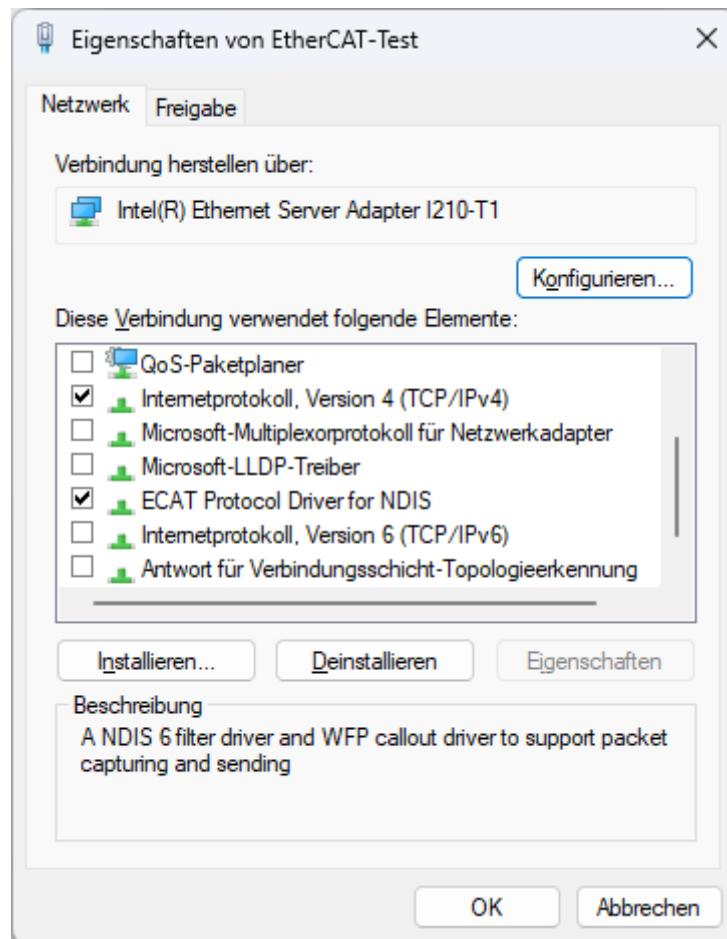
**Turn on debug message of the MainDevice**

- Stop “EC-Engineer”
- Set “MasterDebugMessageLevel” to “7” (verbose) in %ProgramData%/EC-Engineer/user.myusername.xml
- Start “EC-Engineer” again

- **EC-Engineer reports the following message: Network scan successful - 0 SubDevices found.**

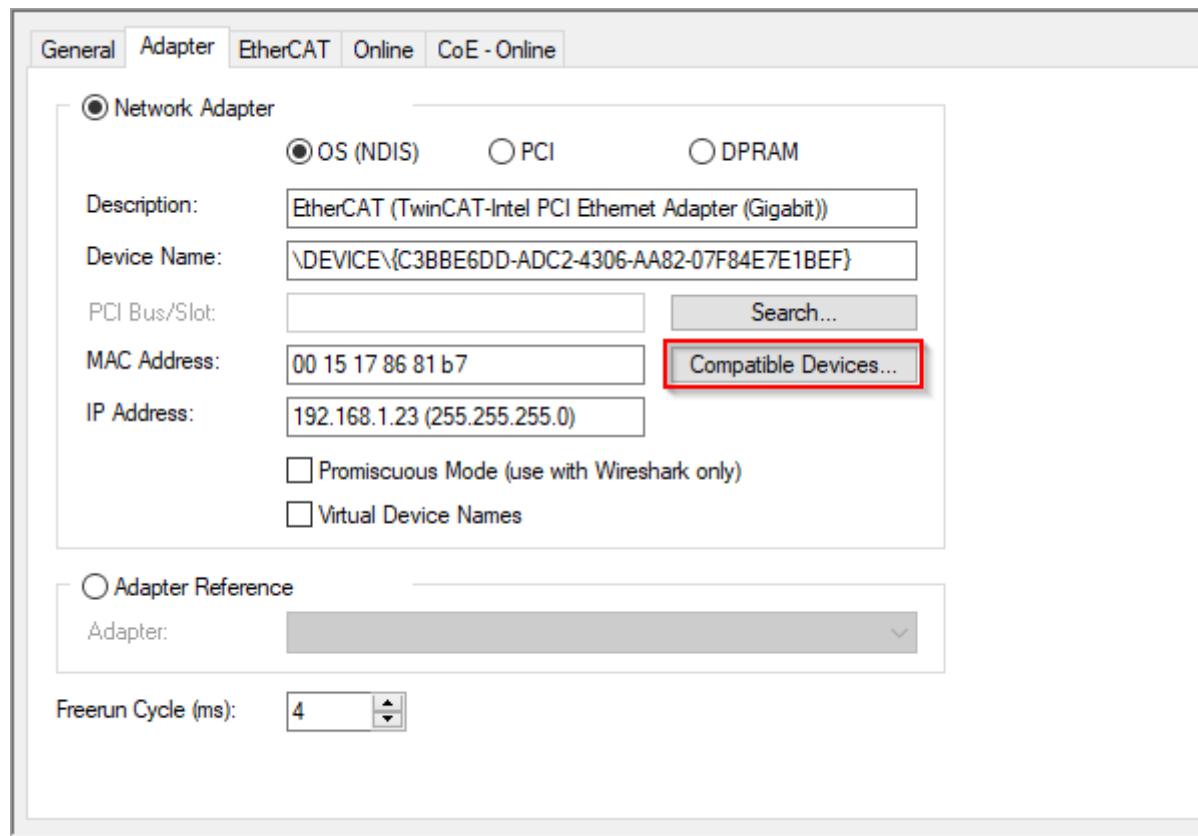
Make sure you have connected the input and not the output port of your first SubDevice to the computer.

**Open “Network and Internet Connections Network Connections” and open the properties of your network adapter and uncheck all protocols except “Internet Protocol (TCP/IPv4)”**

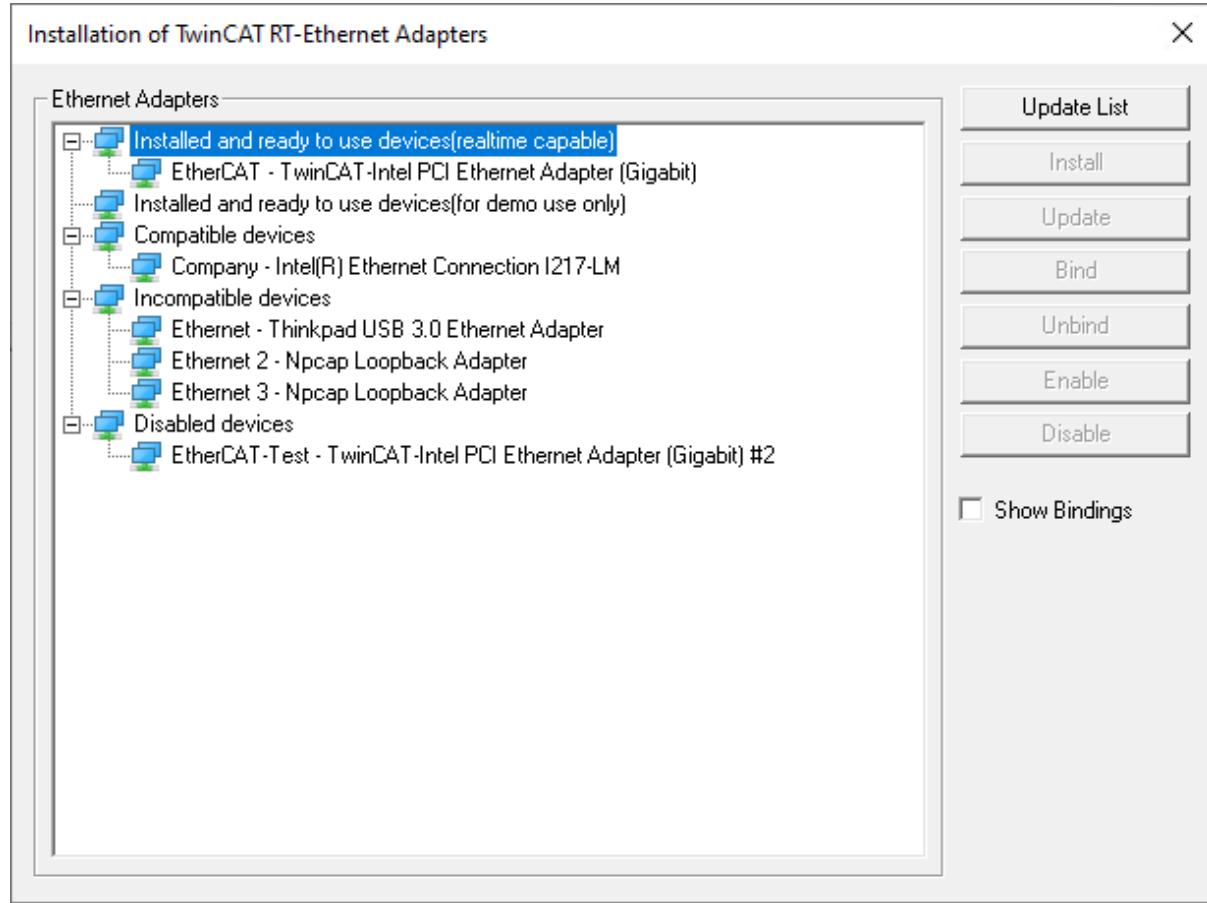


**Do you have TwinCAT installed on this machine?**

**Open “Compatible Devices”:**



**Uninstall or disable the “TwinCAT RT-Ethernet Adapter” for your network adapter:**



If this doesn't help, try to disable the "TwinCAT RT-Ethernet Driver" in the properties of your network adapter and reboot your system.

Run EC-Engineer with administrative rights? Does it help?

**Do you have a some kind of security software (like firewall, antivirus, ...) installed on this machine?**

Try to turn it off and check if problem is solved

**Do you have problems on sending or receiving pakets?**

Install "Wireshark" and check which pakets are missing

**Do you have only problems on sending packets?**

Try to exclude ethernet protocol type "0x88a4" from your firewall. For more information see <https://en.wikipedia.org/wiki/EtherCAT/>

Try it with Npcap instead of WinPcap. Make sure you chose "Install Npcap in WinPcap API-compatible Mode"

**– How can I create ENI files for SubDevices from the Beckhoff CX5000 series?**

The ENI file of those SubDevices must start with an Ebus SubDevice, but EC-Master exports only an MII port. This problem can be solved by first adding a helper SubDevice "EK1200". The "real" EBus SubDevices can be connected afterwards to this helper SubDevice.

**• WebAdmin in Dongle-Version shows page not found, what can I do?**

You have to download and install the Code Meter Runtime from WIBU <https://www.wibu.com/>

**• UTF8 characters e.g. in variables or PDOs will be not displayed correctly**

This requires the enhanced UTF-8 support and can be enabled by setting "EnhancedUtf8Support = True", (see *Internal User Specific Settings*)