acontis technologies GmbH

SOFTWARE

EC-Lyser

User Manual

Version 4.1

Edition: August 21, 2025

Contents

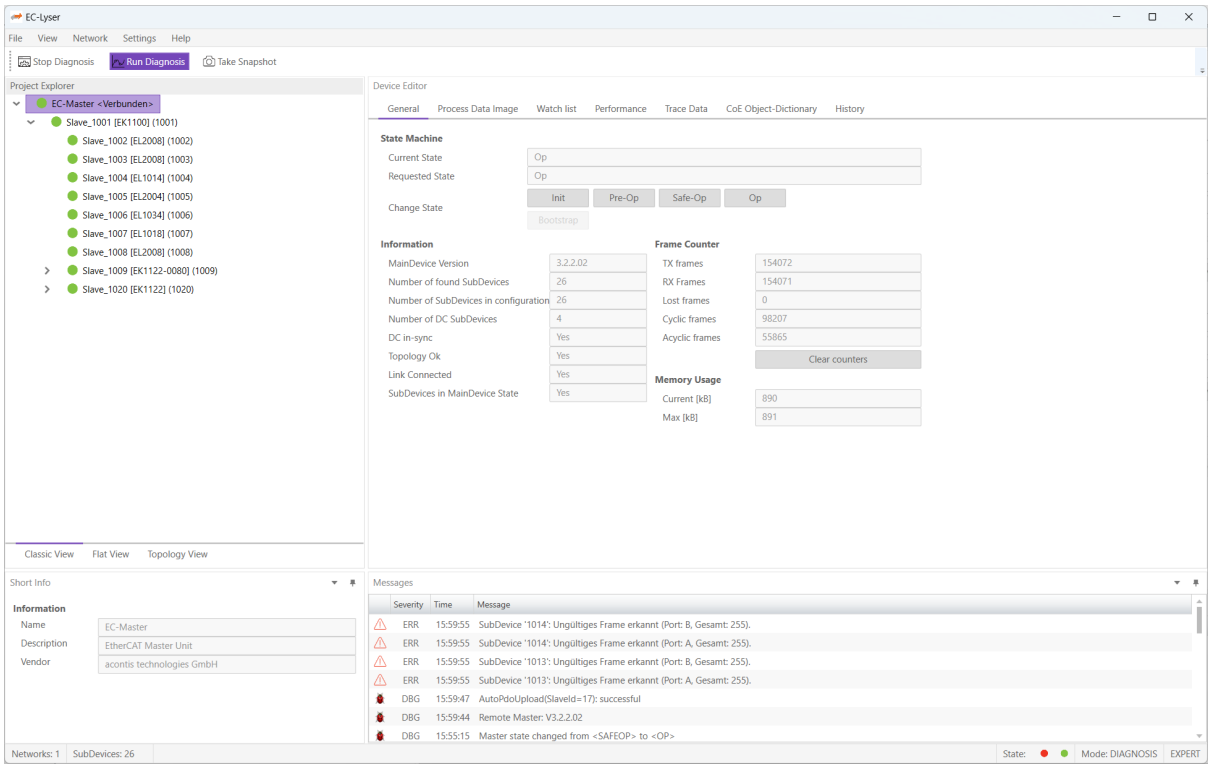
1 Introduction

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

The following screenshot shows the EC-Lyser:



Automated control systems usually require high availability of the whole system. Due to the rough industrial environment this is often hardly to achieve.

1.2 Features

MainDevice diagnosis

General:

Changing state of state machine

Reading count of SubDevices or frames, …

Compare configured and found SubDevices (network mismatch analyzer)

Process Data Image:

See value of variables in a list view or chart view

Changing value of a variable

Object-Dictionary:
Reading/Writing values

SubDevice diagnosis
General (Changing state of state machine, reading or clearing current error state, downloading or uploading file over FoE, …)

Variables:
See value of variables in a list view or chart view

Changing value of a variable

ESC Register:
Reading/Writing values

EEPROM Reading/Writing values

Extended Diagnosis:
Reading error or frame counters

CoE Object-Dictionary:
Reading/Writing values

ADS:
Reading/Writing values over AoE

1.3 Requirements

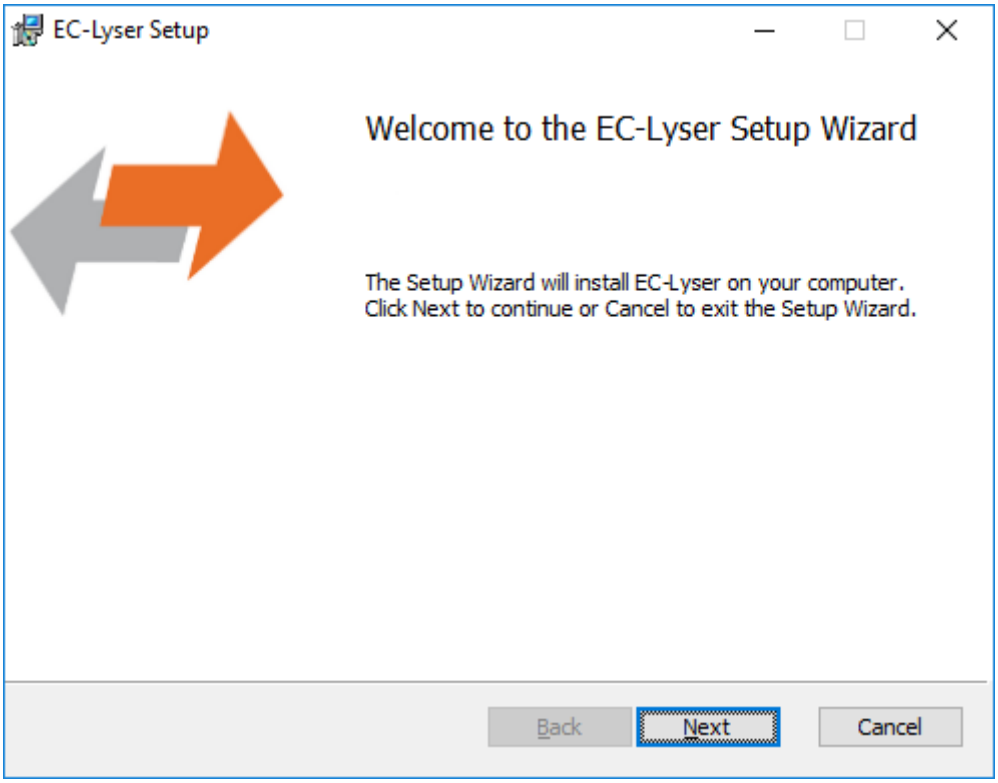
- Microsoft Windows 10 and above
- Microsoft .NET Framework 4 Client Profile
- Screen resolution at least 1024x768 pixel
- Memory as recommended for operating system
- Disk space approximately 80 MB (depend on number of `ESI` files)

2 Installation

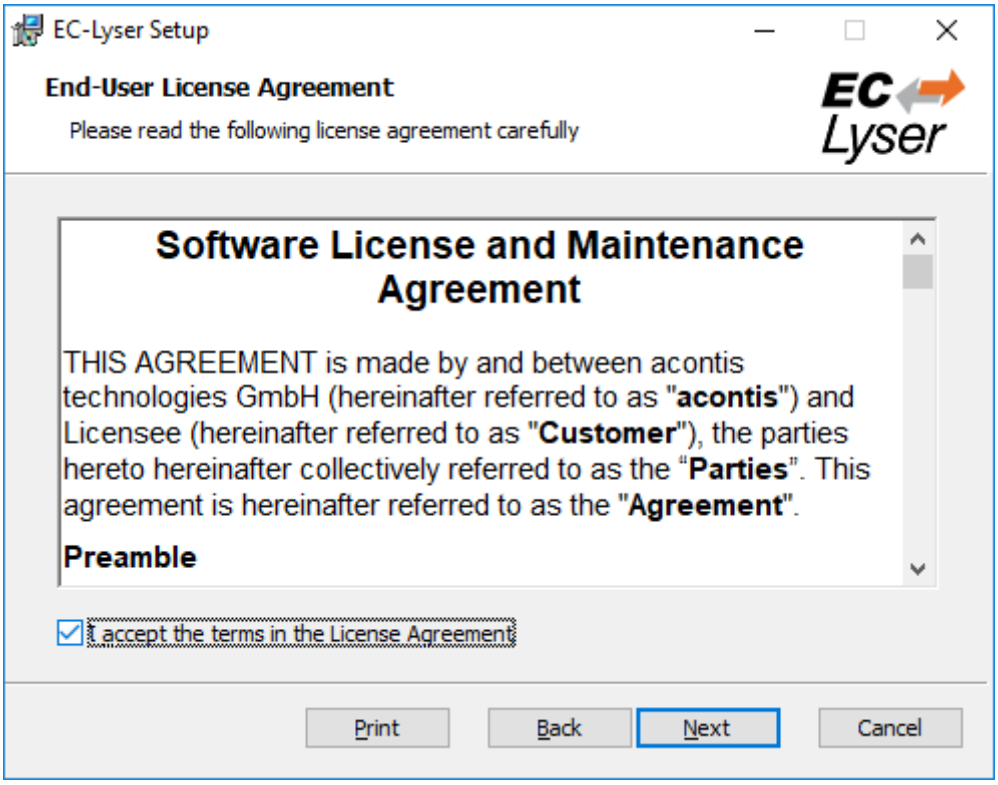
2.1 Setup Process

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

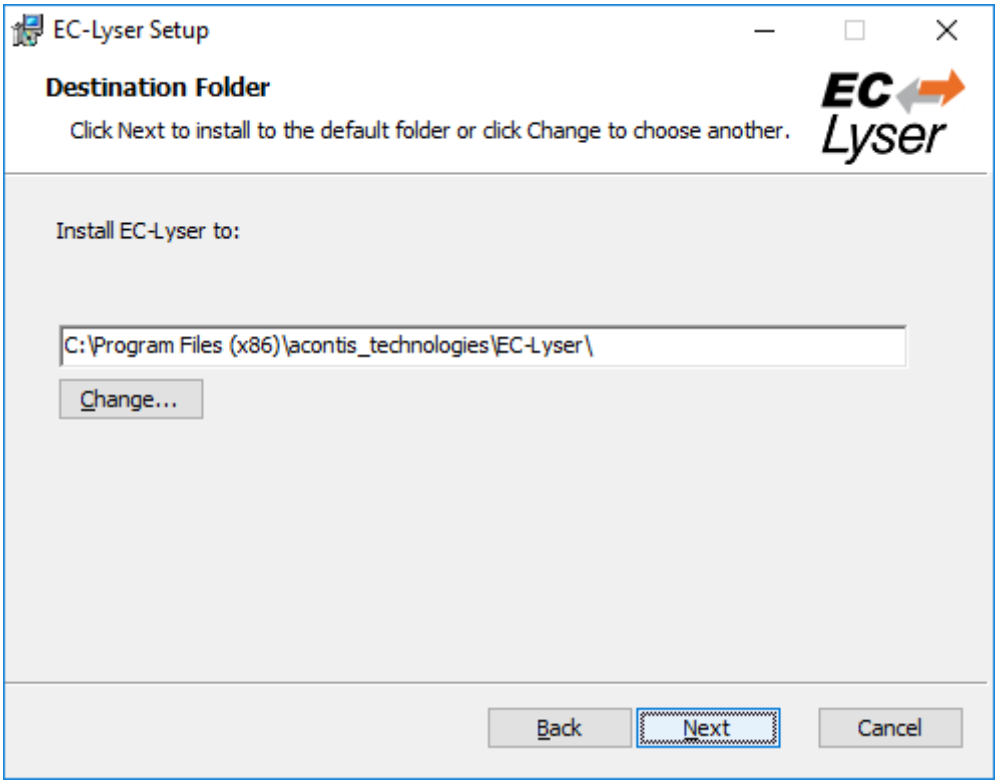
Welcome page:



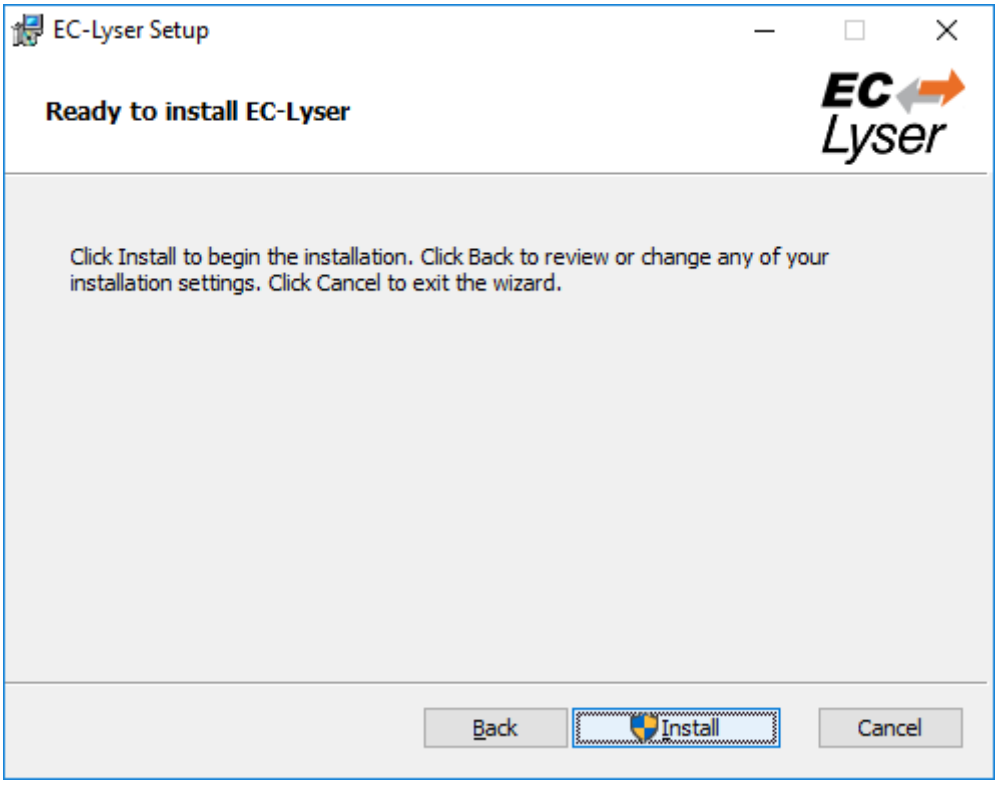
License Agreement:



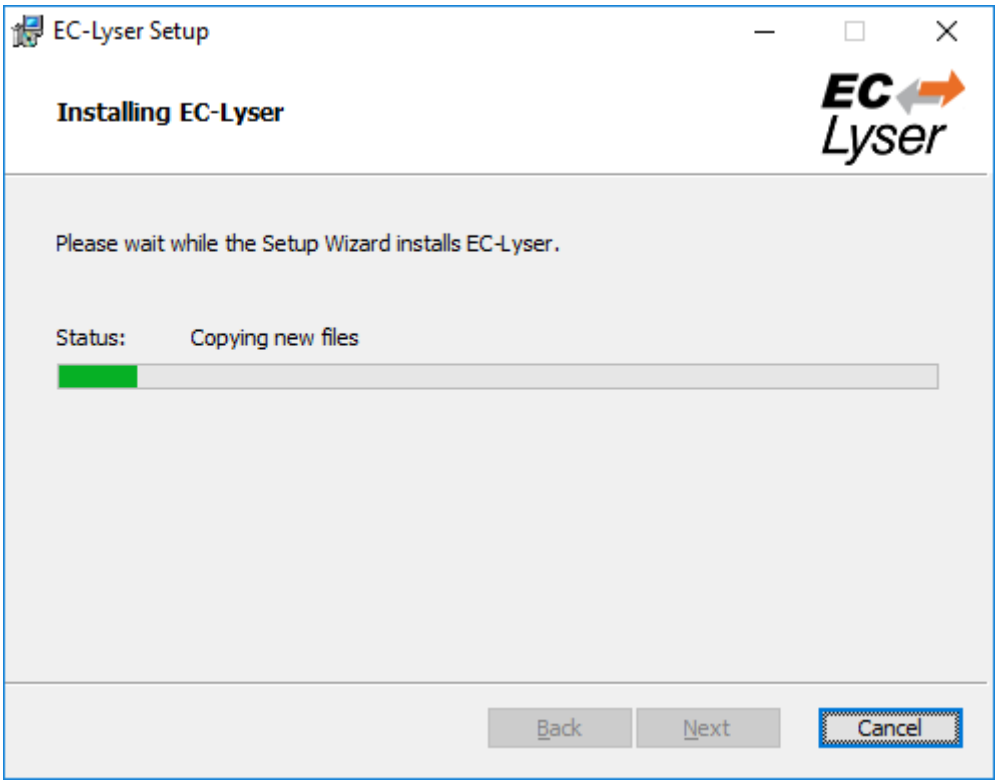
Select Installation Folder:



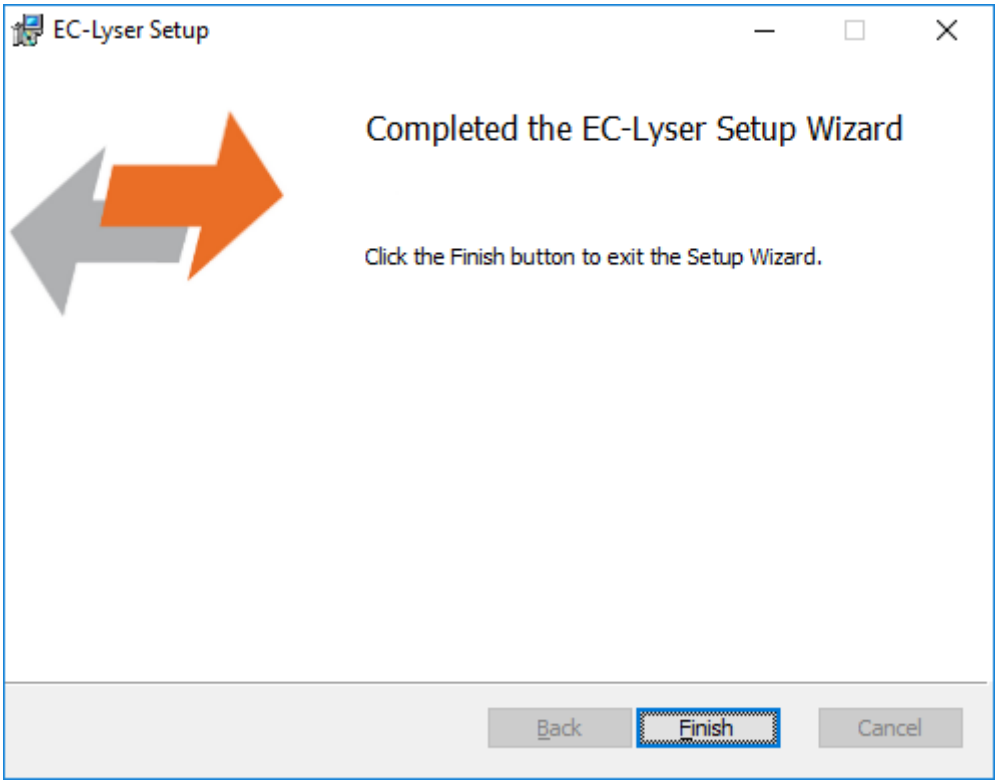
Confirm Installation:



Installing:



Installation Complete:



2.2 Silent Installation (optional)

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

Sample 1: Installs EC-Lyser into default installation folder

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

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

```
PS C:
    > msiexec /i c:/temp/ECLyserSetup.msi /quiet /qn /norestart /log
↪   c:/temp/install.log INSTALLLOCATION="C:/EC-Lyser"
```

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-Lyser.exe
- EcWrapper.dll
- …

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

/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*

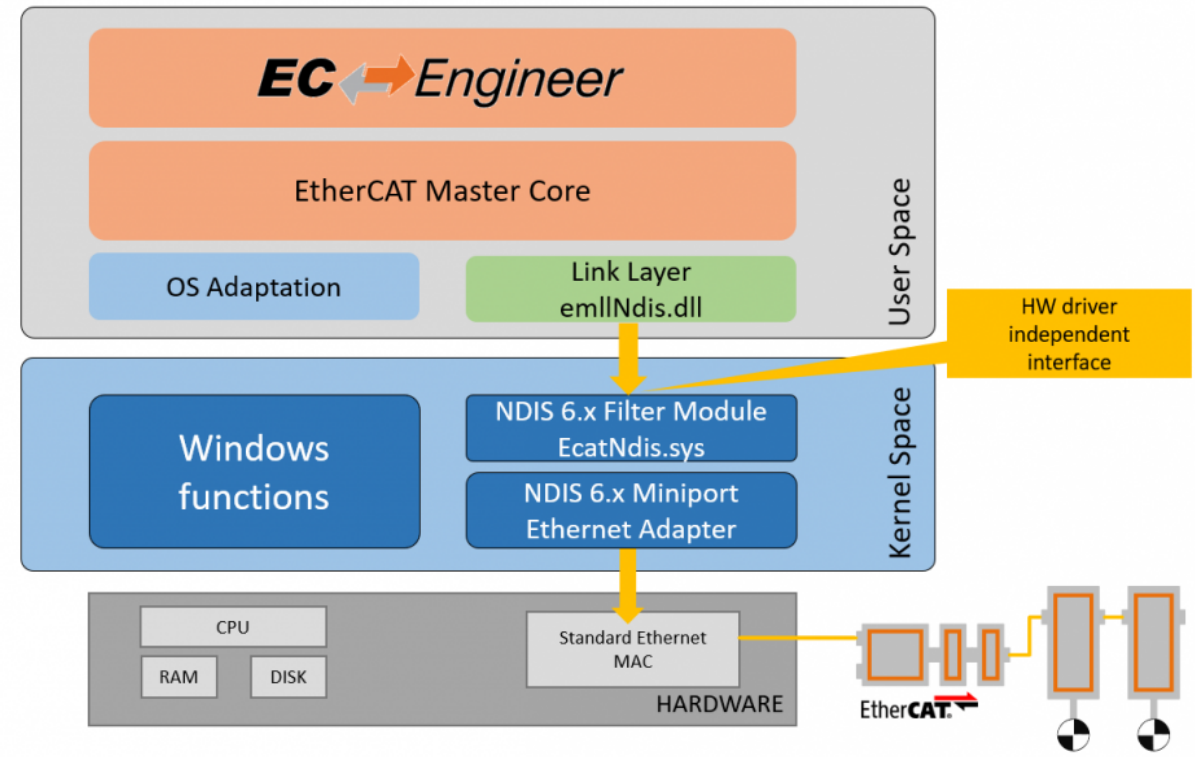
/

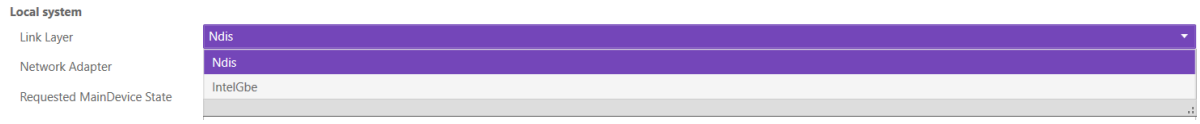
- **ESICache.xml (ESI-File-Cache for faster access of `ESI` files)**
  - EC-Lyser.log (Log File)
  - User.myusername.xml (User specific settings)

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-Lyser 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-Lyser (V3.2 and higher) includes an installation package in the install directory of EC-Lyser to install the acontis NDIS 6.x Filter Module `EcatNdis.sys`. With this new Filter Module and the new NDIS Link Layer `emllNdis.dll`, it is now possible for EC-Lyser to work without WinPcap on all Windows 10 versions.

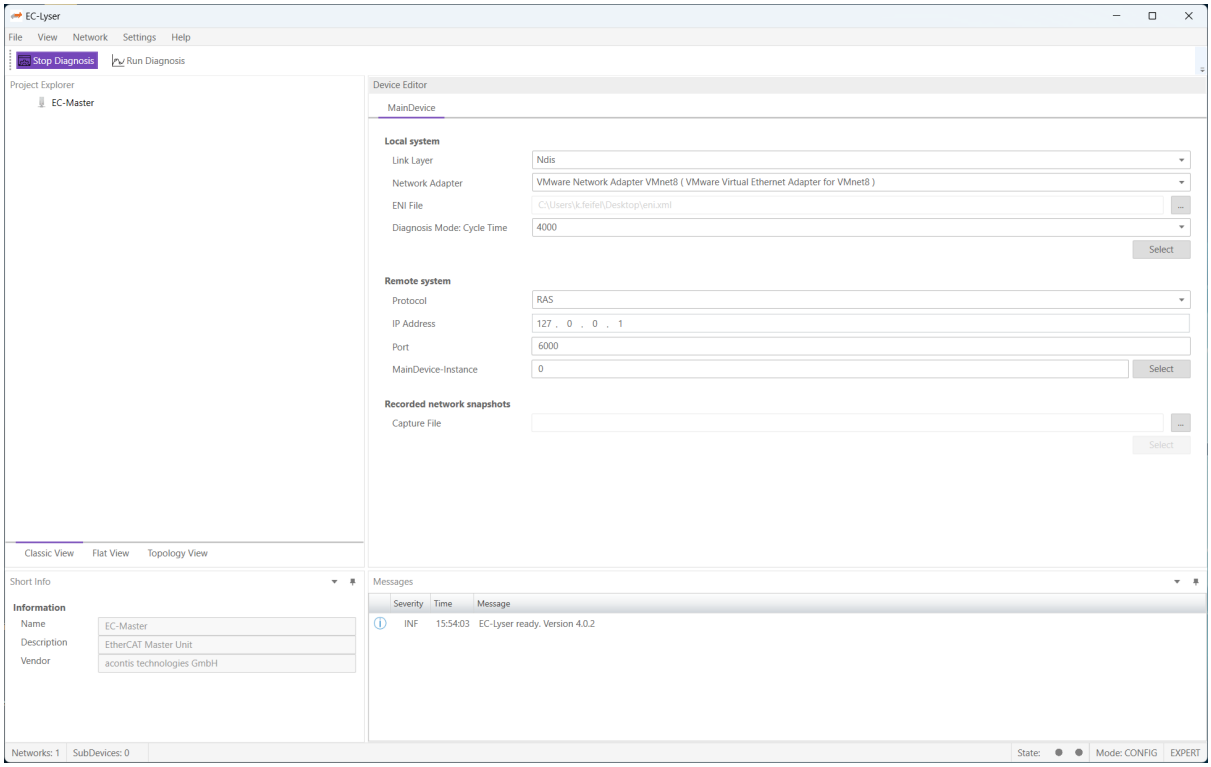
Note: Please restart EC-Lyser after the NDIS installation.


EC Engineer
EtherCAT Master Core
OS Adaptation
Link Layer
emllNdis.dll
User Space
HW driver
independent
interface
Windows
functions
NDIS 6.x Filter Module
EcatNdis.sys
NDIS 6.x Miniport
Ethernet Adapter
Kernel Space
CPU
RAM
DISK
Standard Ethernet
MAC
HARDWARE
EtherCAT


Local system
Link Layer
Network Adapter
Requested MainDevice State
Ndis
Ndis
IntelGbe

3 Getting Started

For a better usability, the product comes up with a start page, where the user can adjust the cycle time and decide if he wants to connect to the local or remote control system or to load data from a capture file.



General:

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.

SubDevices connected to local system:

Network Adapter:
Network adapter which is connected to the control system

`ENI` File:
Path to the EtherCAT Network Information (`ENI`) file (for more information about the `ENI` file, please refer the manual of EC-Engineer)

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).

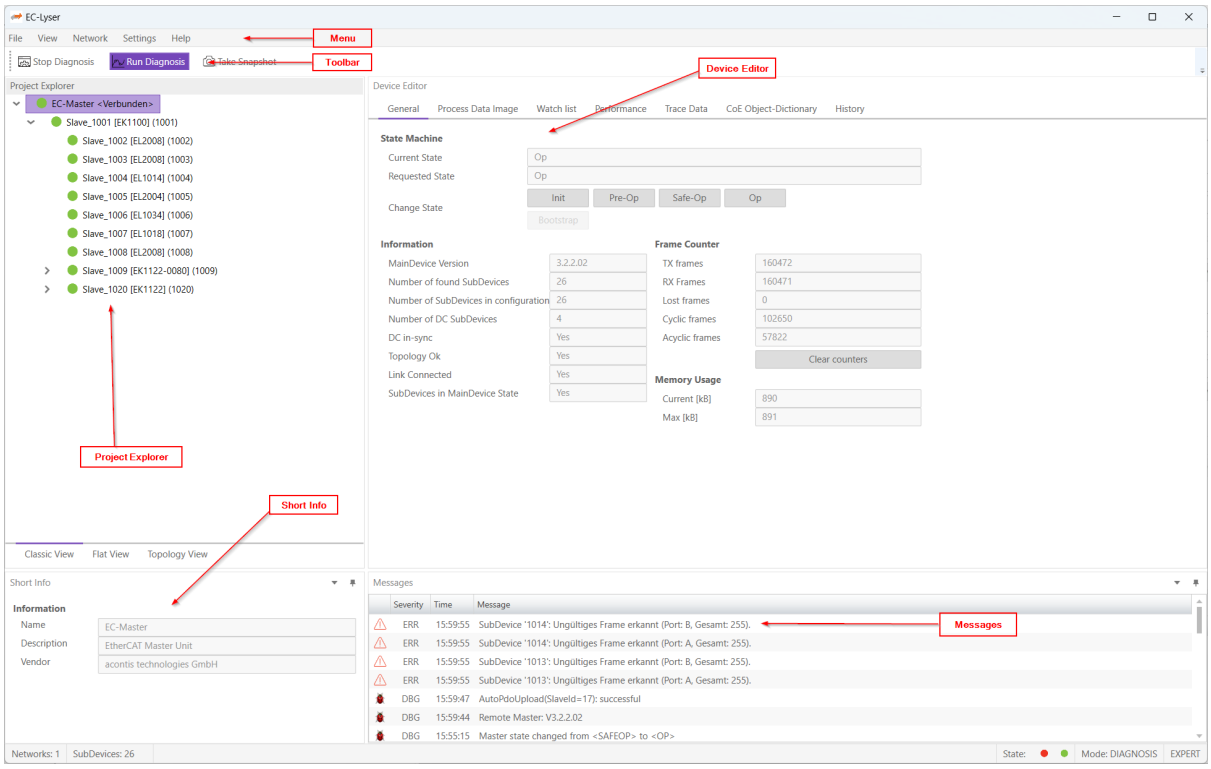
Data to load from capture file:

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

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-Lyser 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

ESI-Manager:
Add, delete or export `ESI` and `SCI` files (see: *ESI-Manager*)

Exit:
Closes the EC-Lyser

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

Motion Tabs:
(De-)Activates motion mode

Refresh:
Updates the current view

4.2.3 Network

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 diagnosistics 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*)

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

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

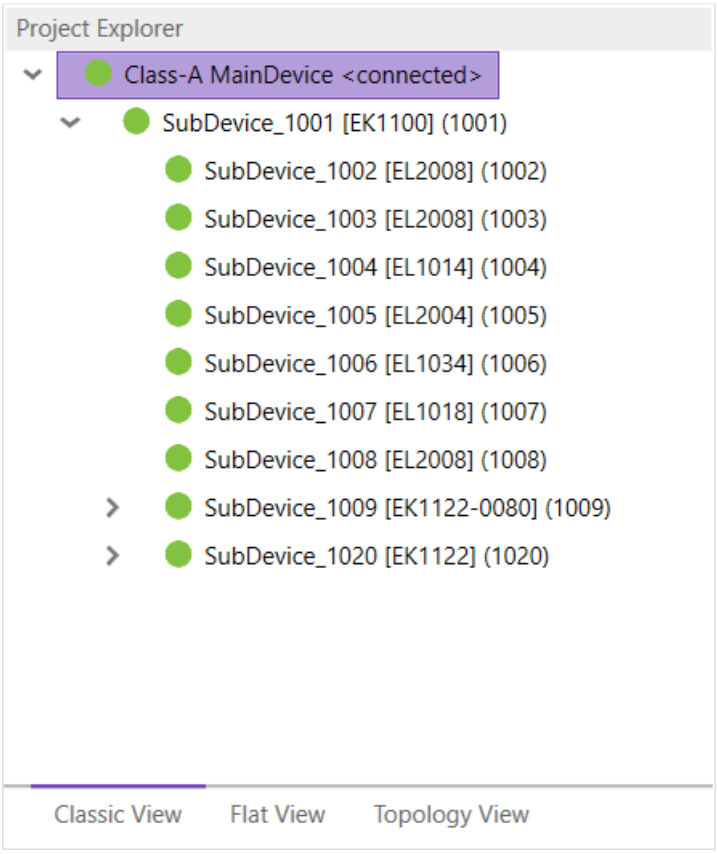
Project file
Opens the configuration stored in the `ECC`, only one project file can be imported at a time.

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

4.3.2 Diagnosis Mode

There are three topology visualisation views:

Classic View

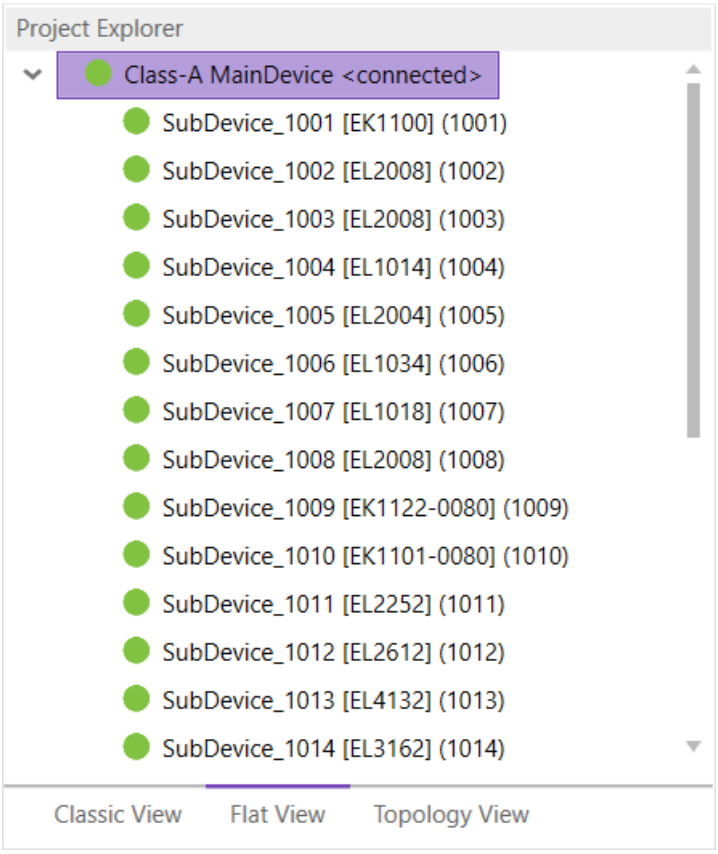


This is a tree view with multiple levels.

Possible device states:

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

Flat View

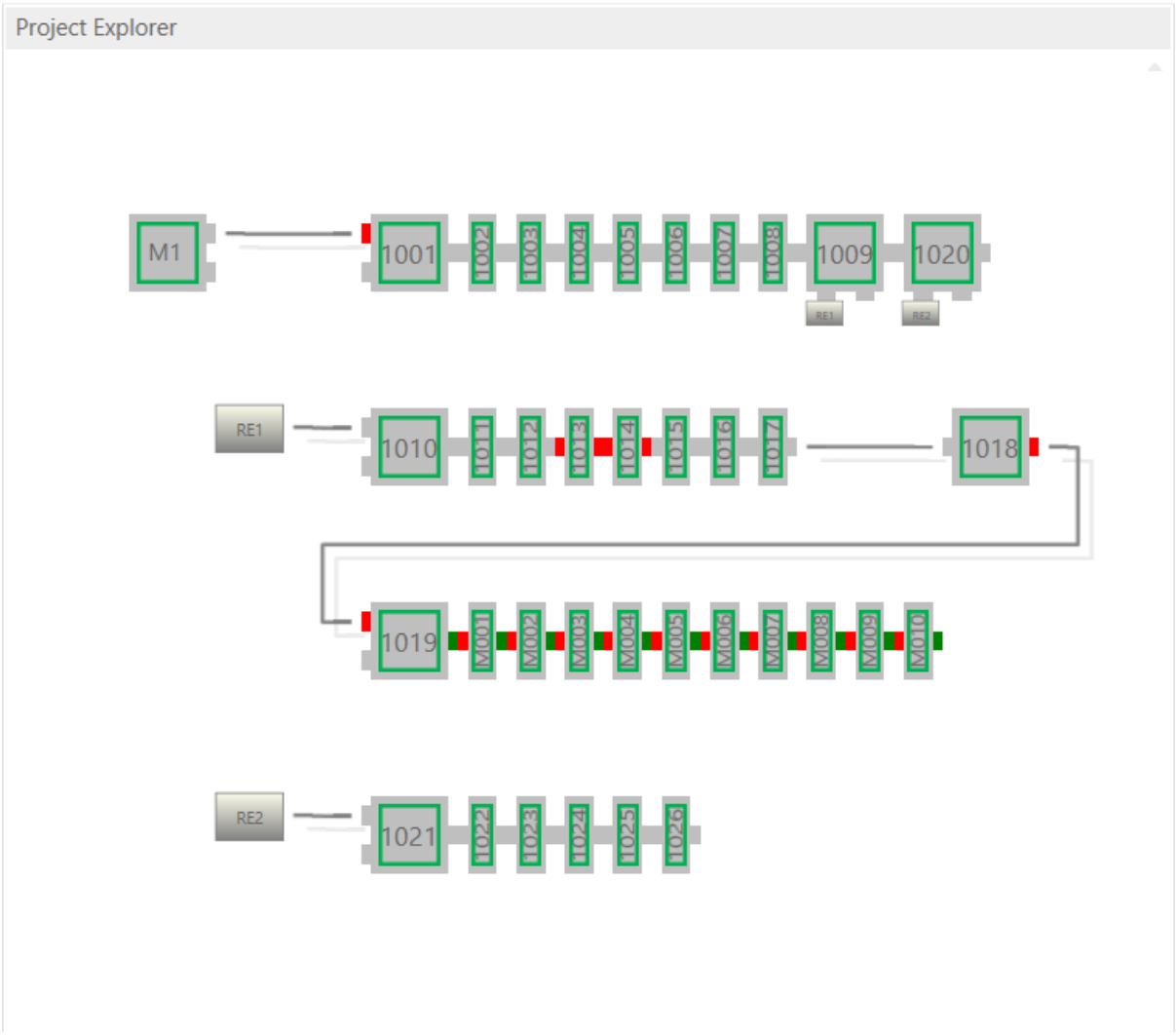


This view shows all SubDevices in a flat list, as they are connected in the EtherCAT network.

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

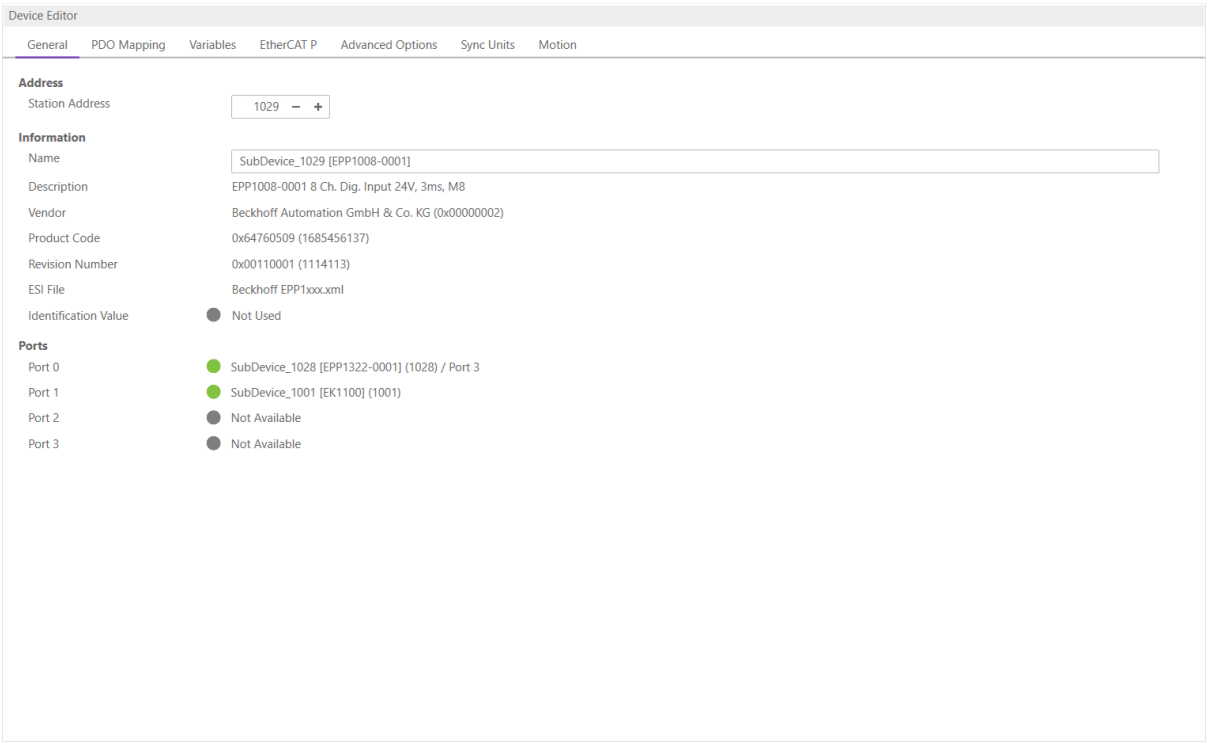
Possible port states:

- 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*).

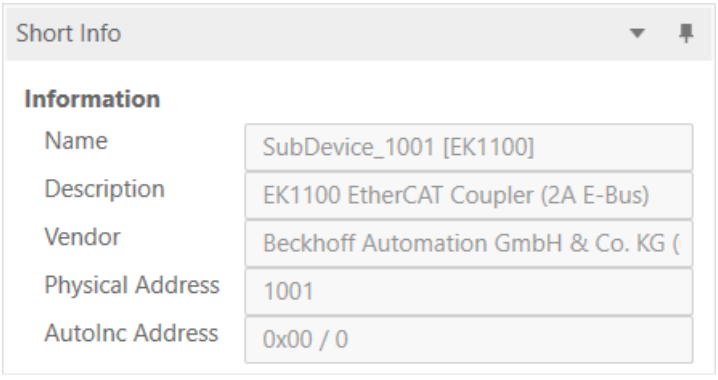
4.4 Device Editor

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:

5 Diagnosis

5.1 Overview

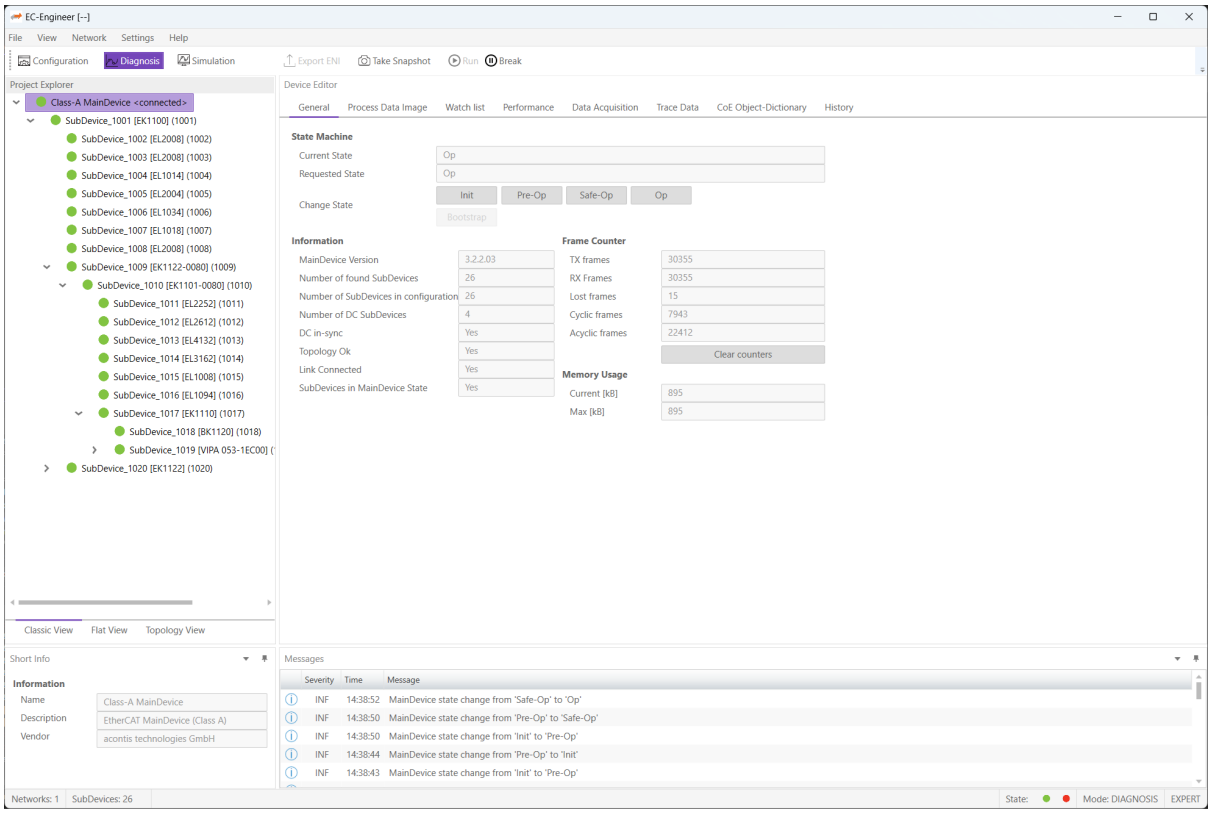
EC-Lyser is a diagnosis application specifically developed to analyze EtherCAT networks that are controlled by an EtherCAT MainDevice. Automated control systems usually require high availability of the whole system. Due to the rough industrial environment this is often hardly to achieve.

If high availability shall be guaranteed for an automated control system it is important to verify and maintain the field bus. Using EC-Lyser 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-Lyser:

- System analysis and maintenance
- Error detection
- Documentation

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

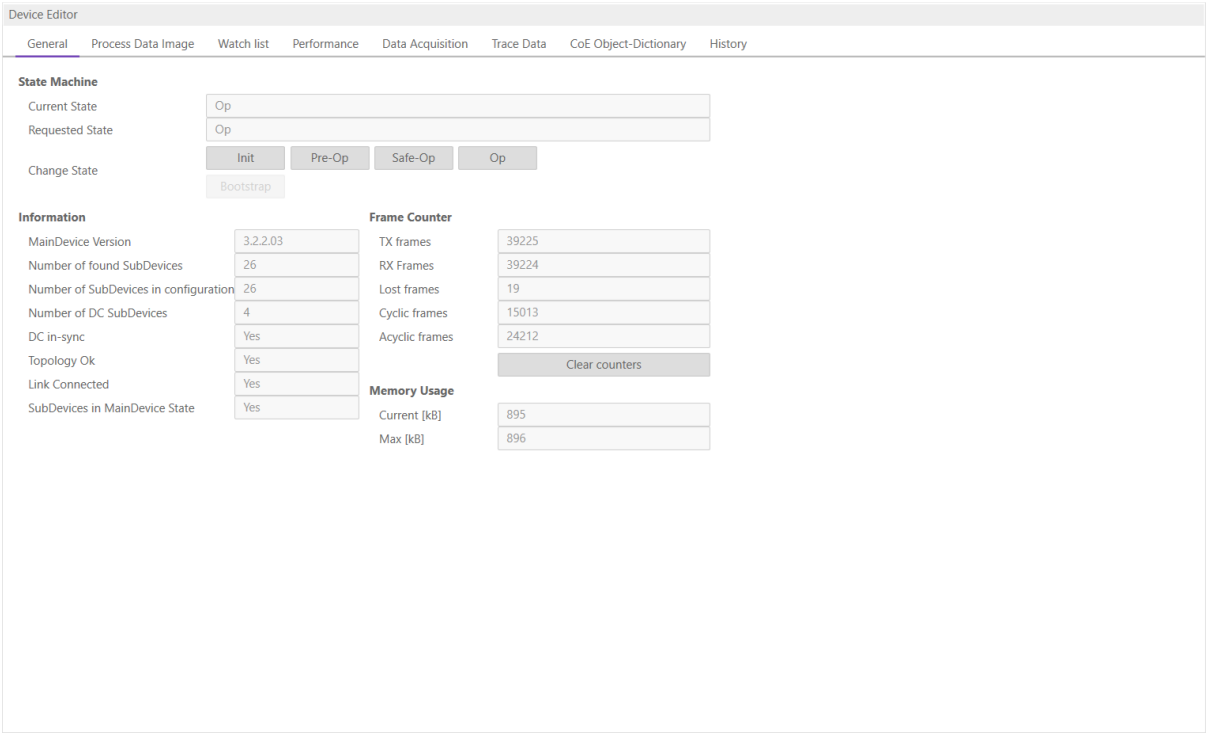


5.2 Device

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

5.2.1 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

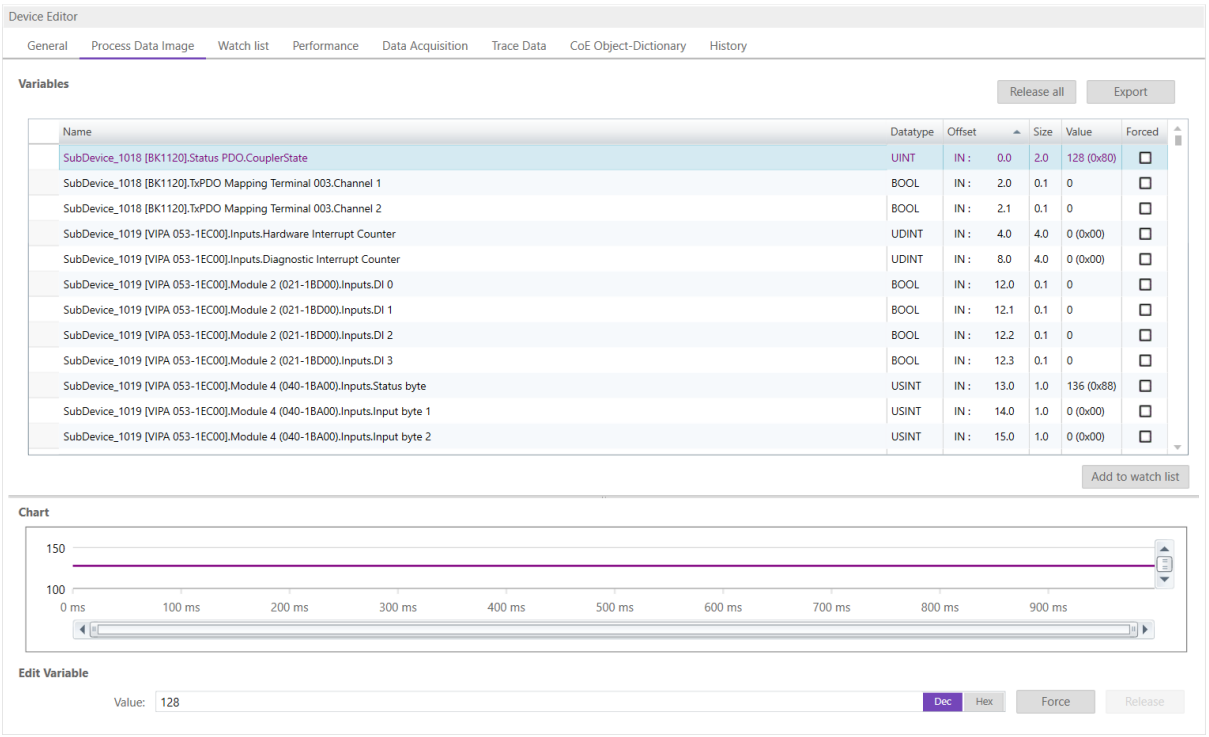
Memory Usage

Current:
Current memory usage in bytes

Max:
Maximum memory usage in bytes

5.2.2 Process Data Image

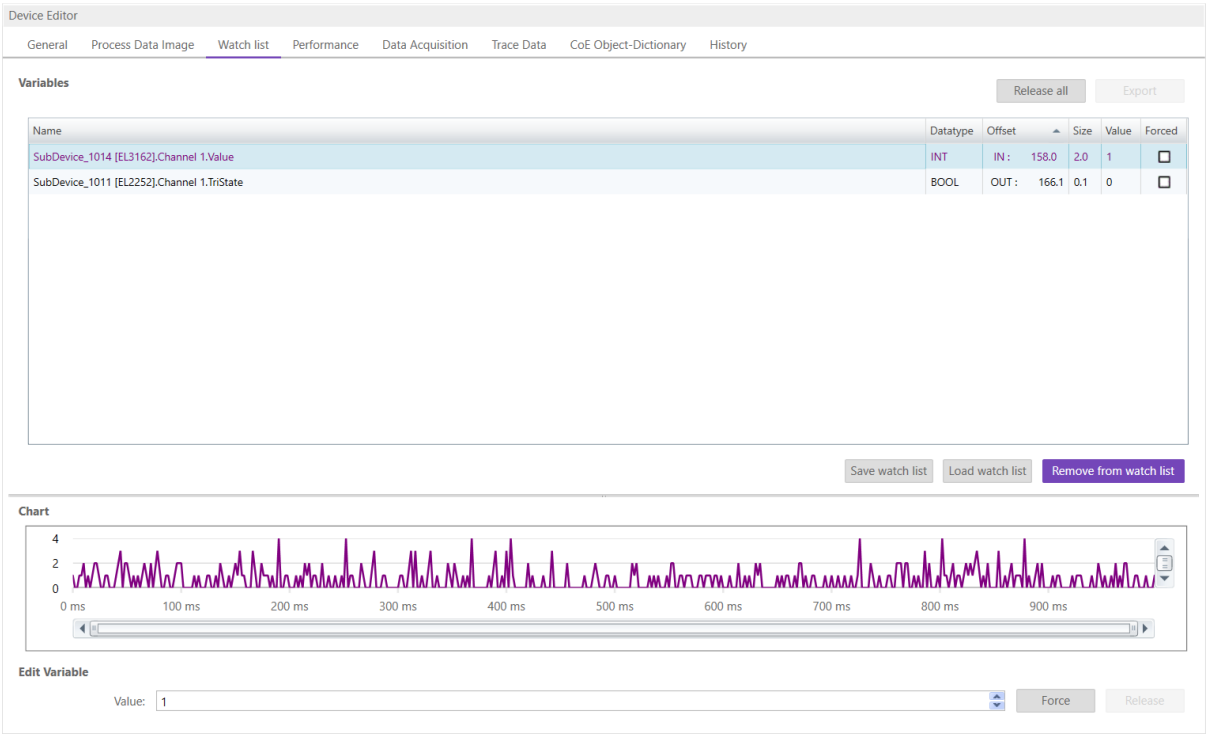
In this tab, the user can see and change the values of the process variables. The variables will be forced to the value the user entered. The user can press release to release the variable. If one or two variables are selected, a chart of the values is shown. Also resize and zoom is possible to see more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



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

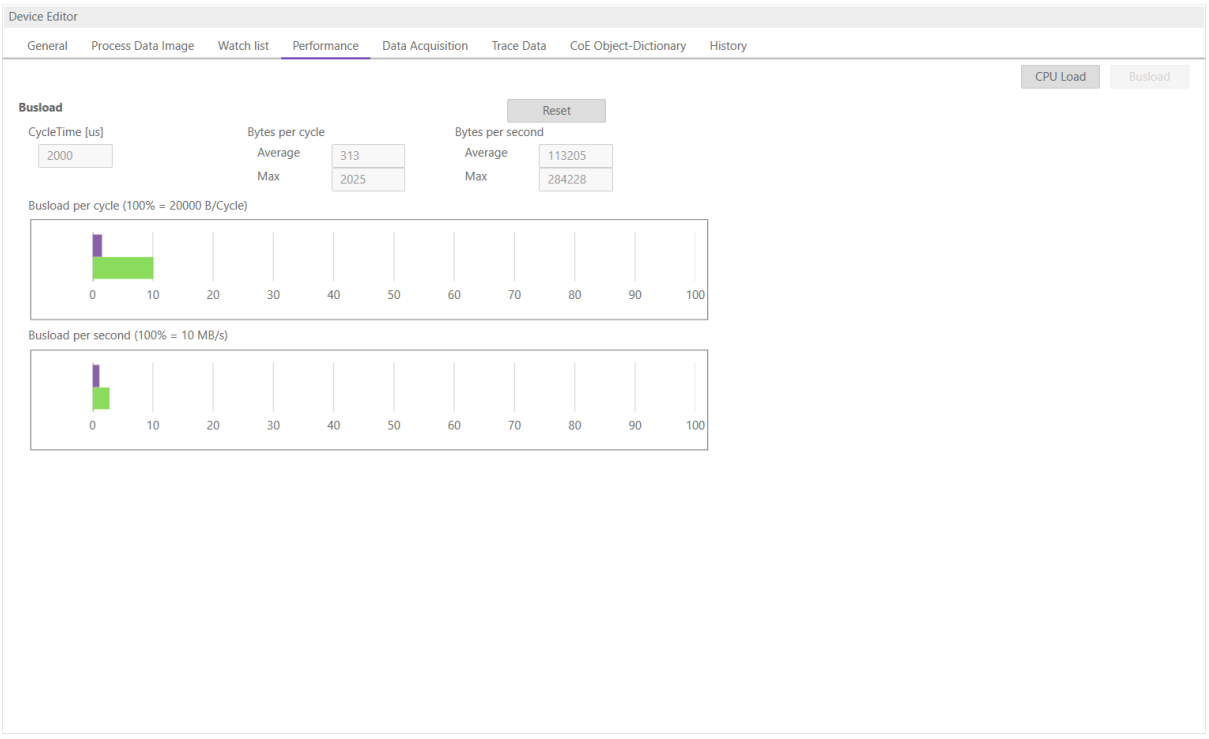
5.2.3 Watch list

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:



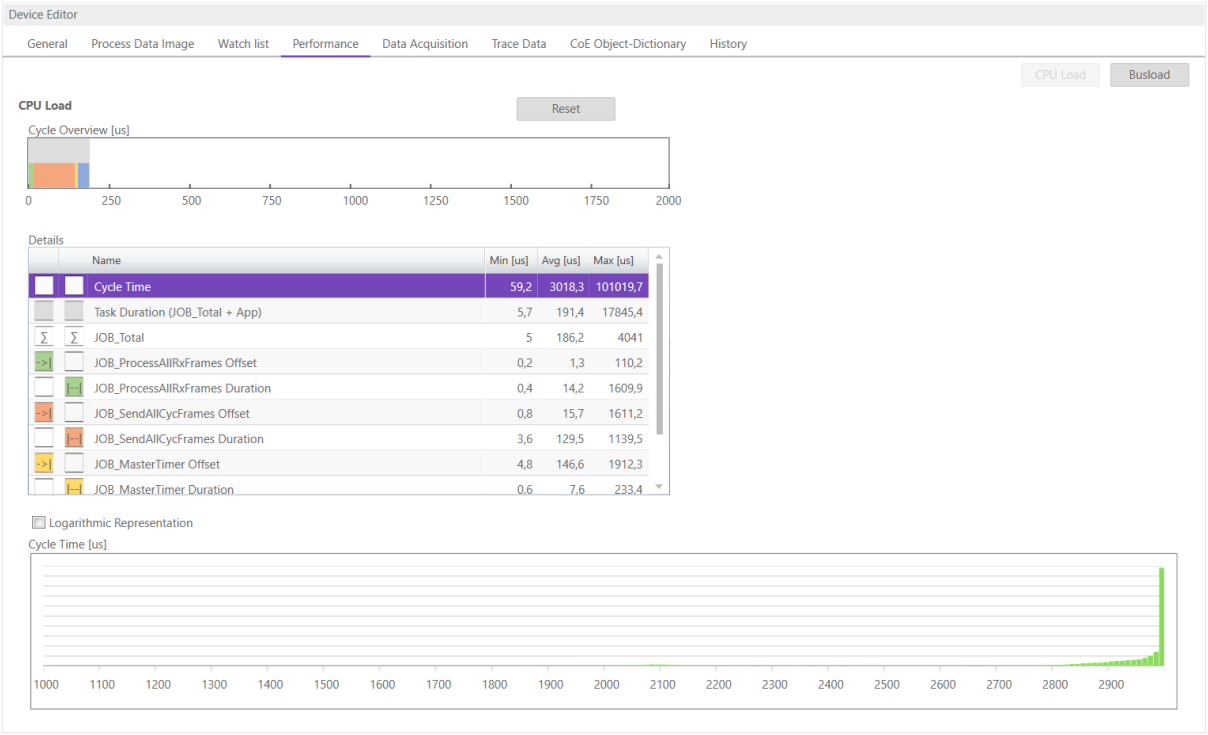
5.2.4 Performance

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



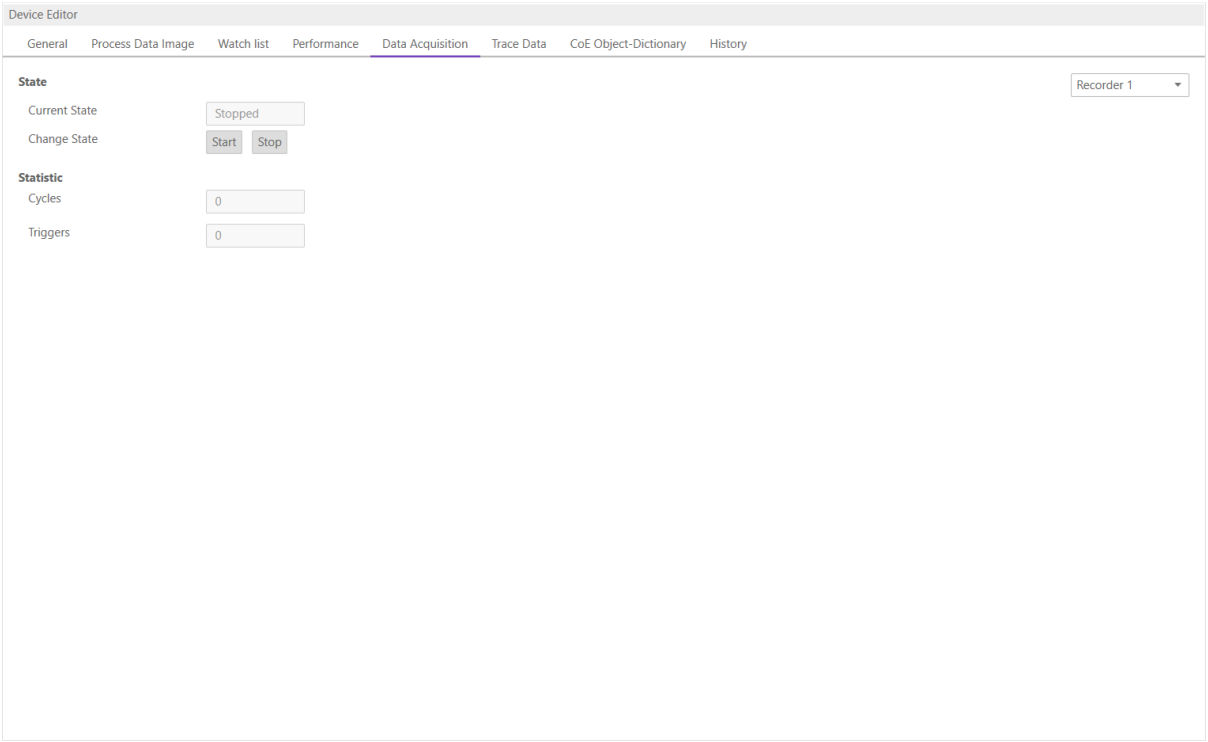
On the other tab the user can the CPU load. In the grid is a list of all running jobs and how long they take. In the diagram above is a summary of all jobs. When a job is selected, the chart shows how many

times a job has taken how long to complete.



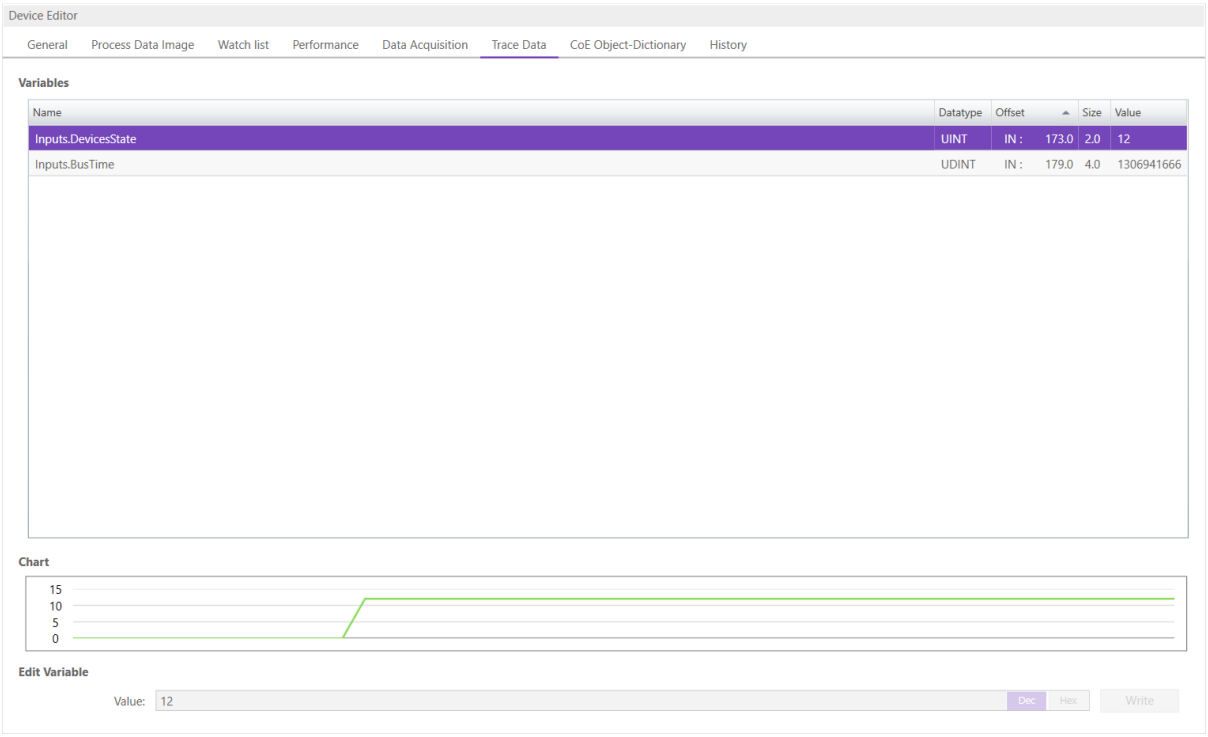
5.2.5 Data Acquisition Diagnosis

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



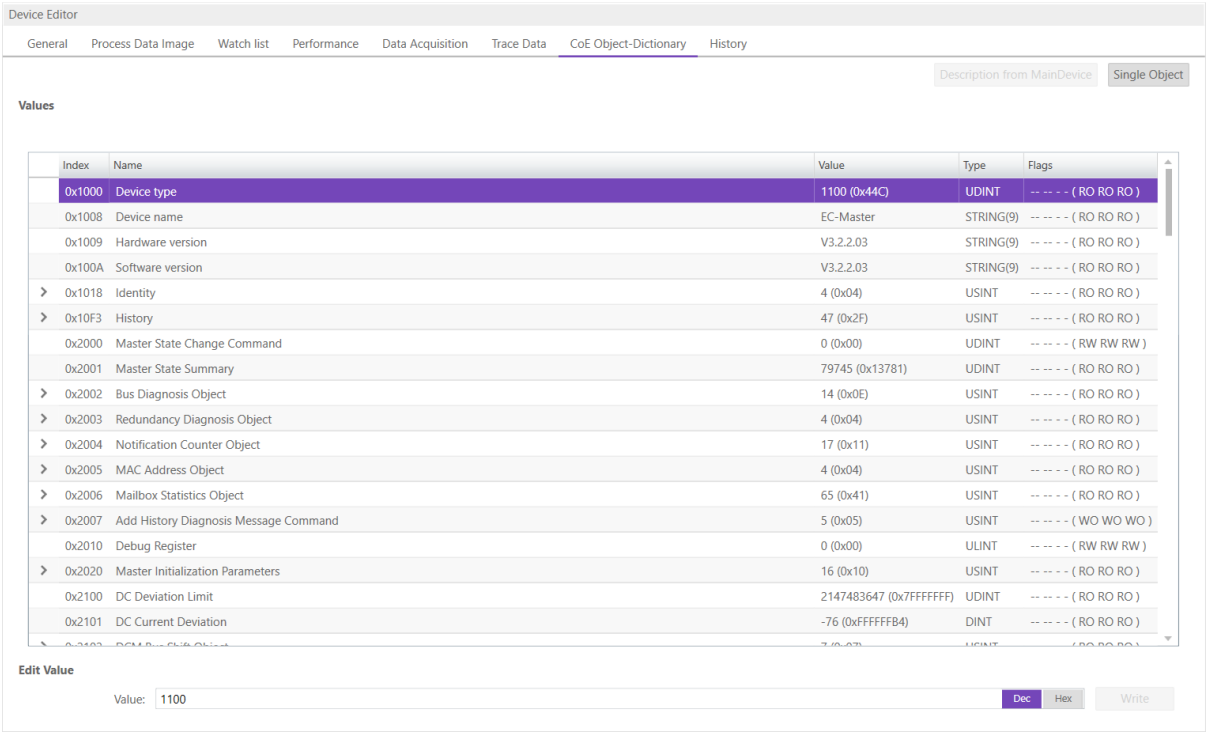
5.2.6 Trace Data (Expert)

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:



5.2.7 CoE Object-Dictionary (Device)

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



Lists of CoE Object-Dictionary entries

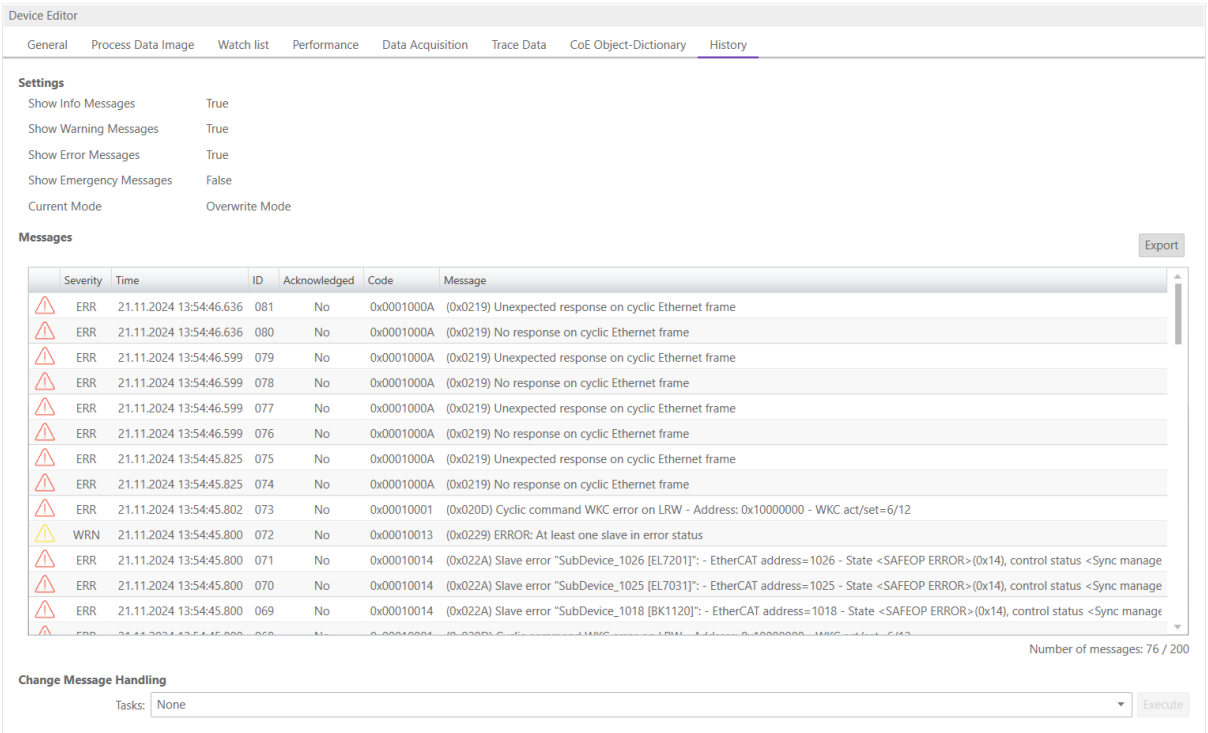
- Entries are uploaded by the MainDevice from the SubDevice
- **The “Flags” column tells the user if this entry is an PDO entry and if it can be edited**
  - “AA BB (CC DD EE)”
  - AA = Mapping as RX PDO or not
  - BB = Mapping as TX PDO or not
  - CC = Access rights for PreOp (RO, WO, RW)
  - DD = Access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

Buttons

Update:
Changes the selected entry

5.2.8 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:



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

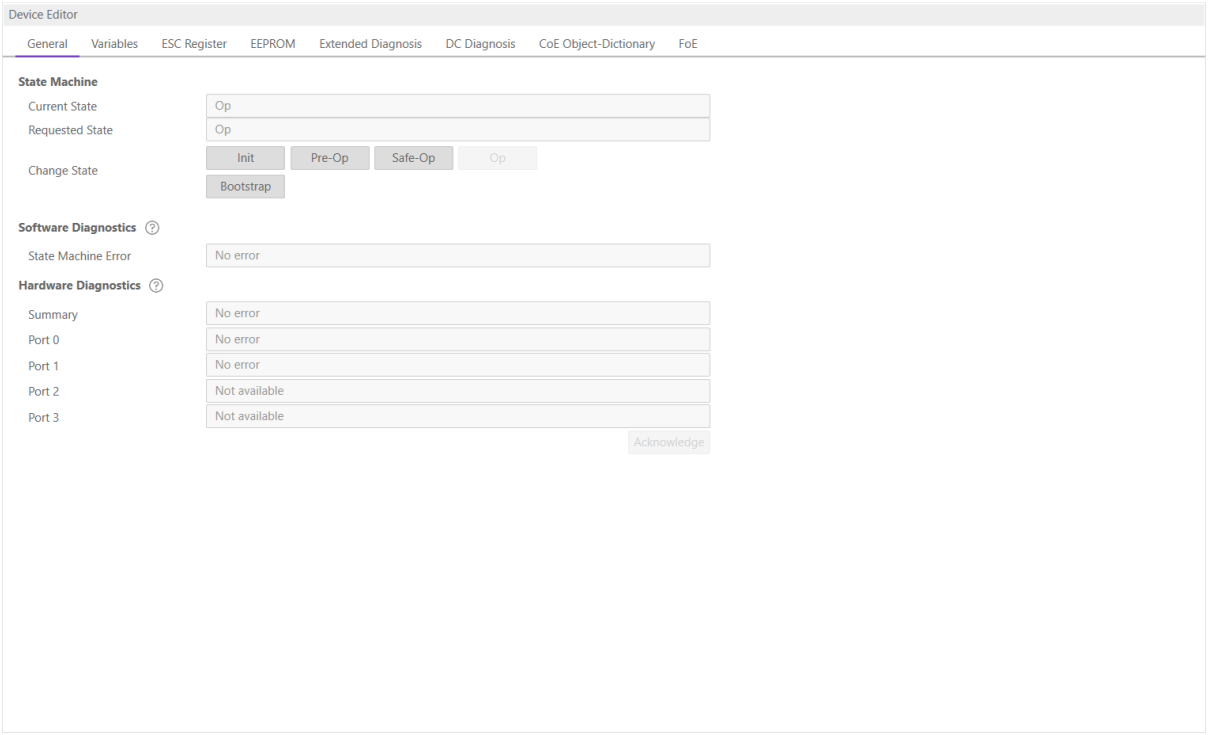
Clear All Messages:
Clear all messages

5.3 SubDevice

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

5.3.1 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

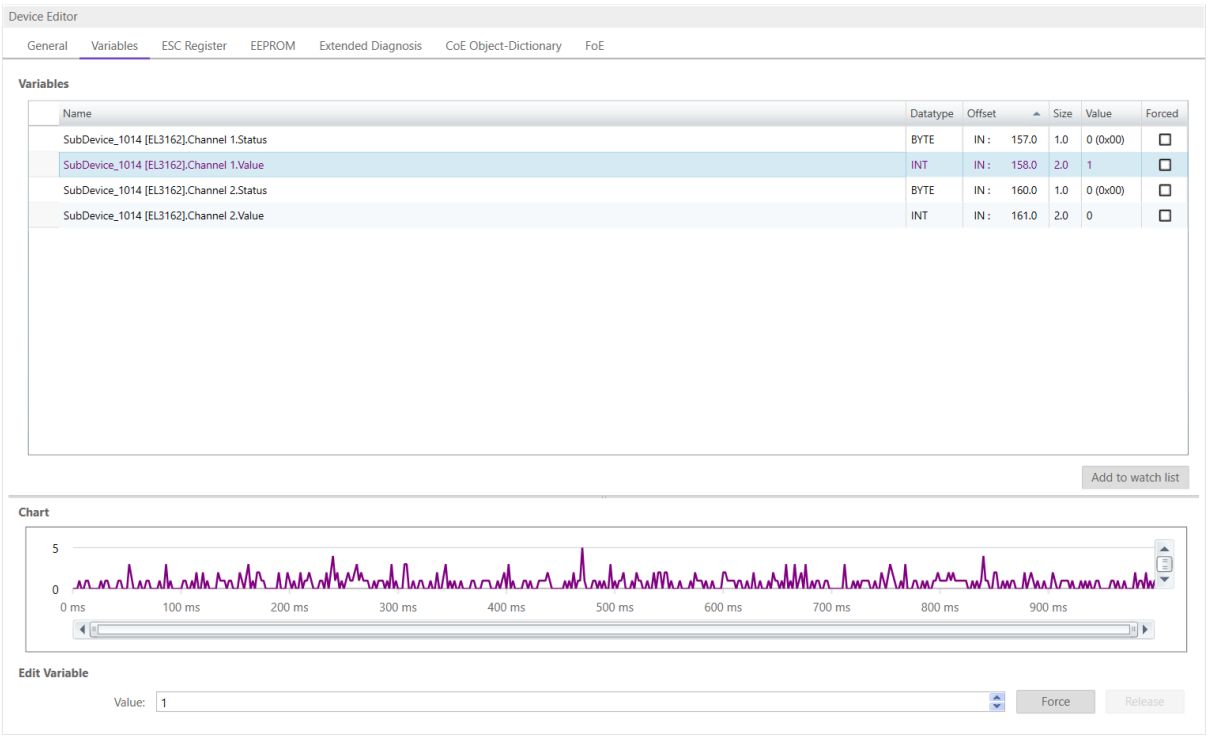
How to change amount of errors leading to a warning or error:

- Open C:/ProgramData/EC-Lyser
- 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 10^6

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

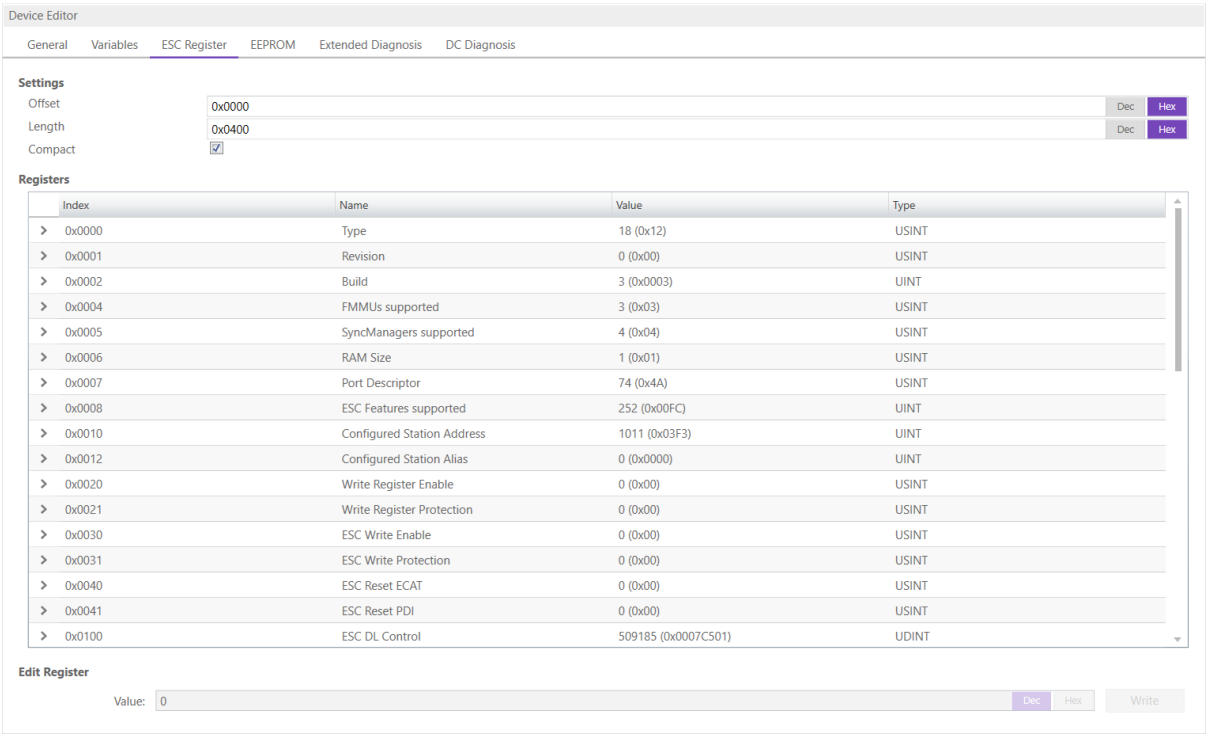
5.3.2 Variables

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:



5.3.3 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:

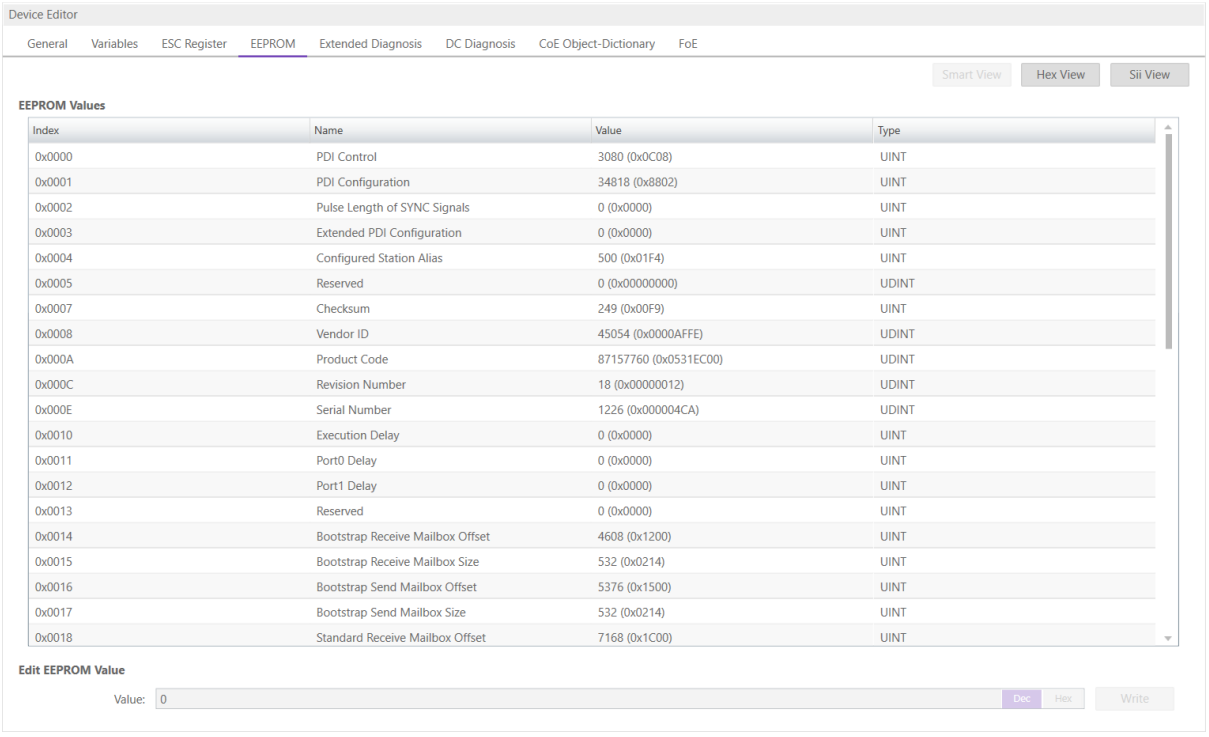


5.3.4 EEPROM

This tab consists of three views:

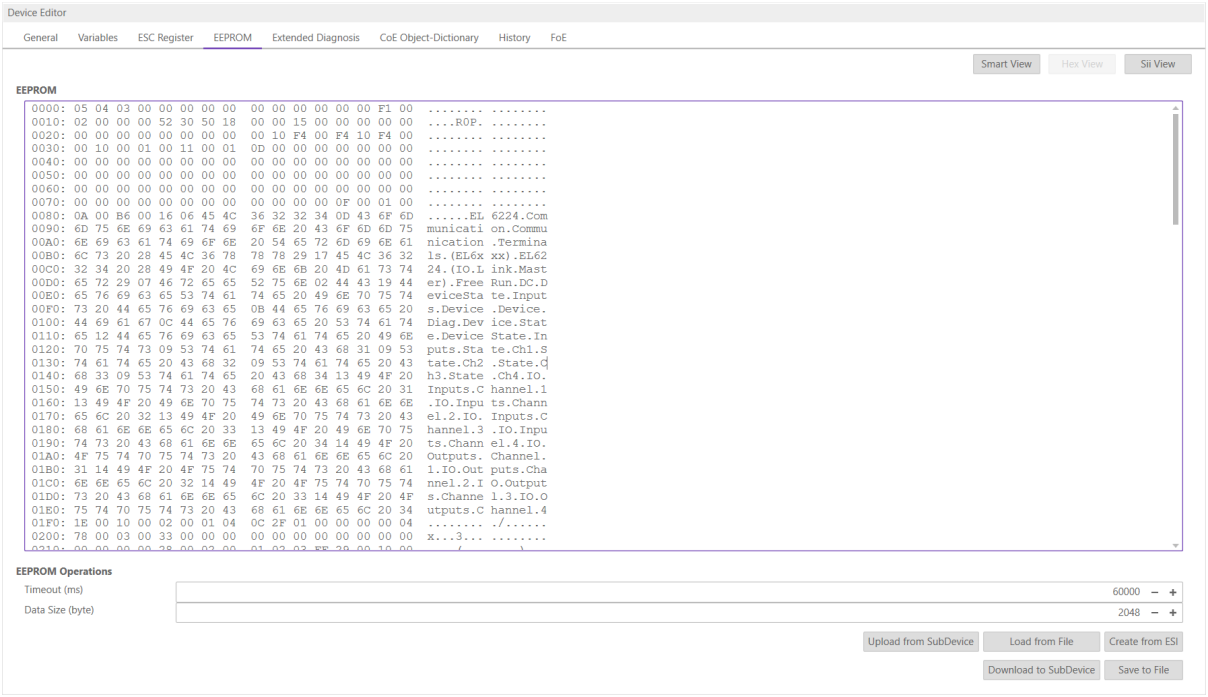
Smart View

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



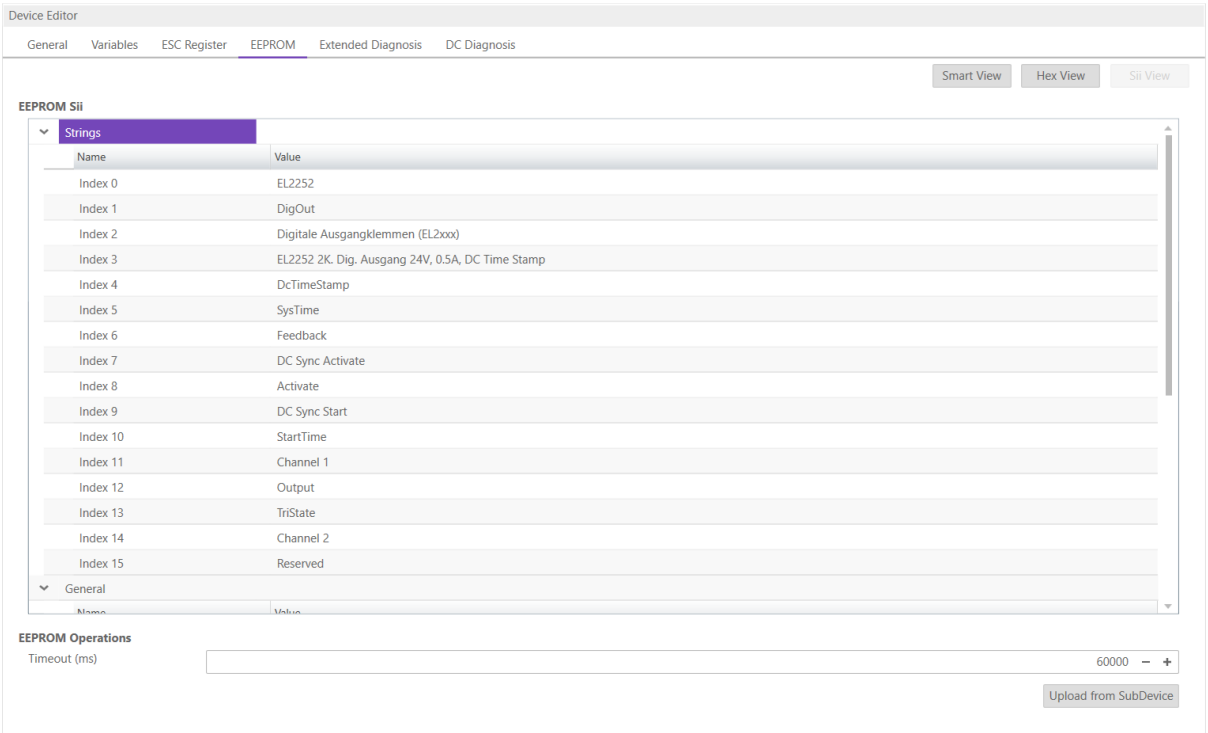
Hex View

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.



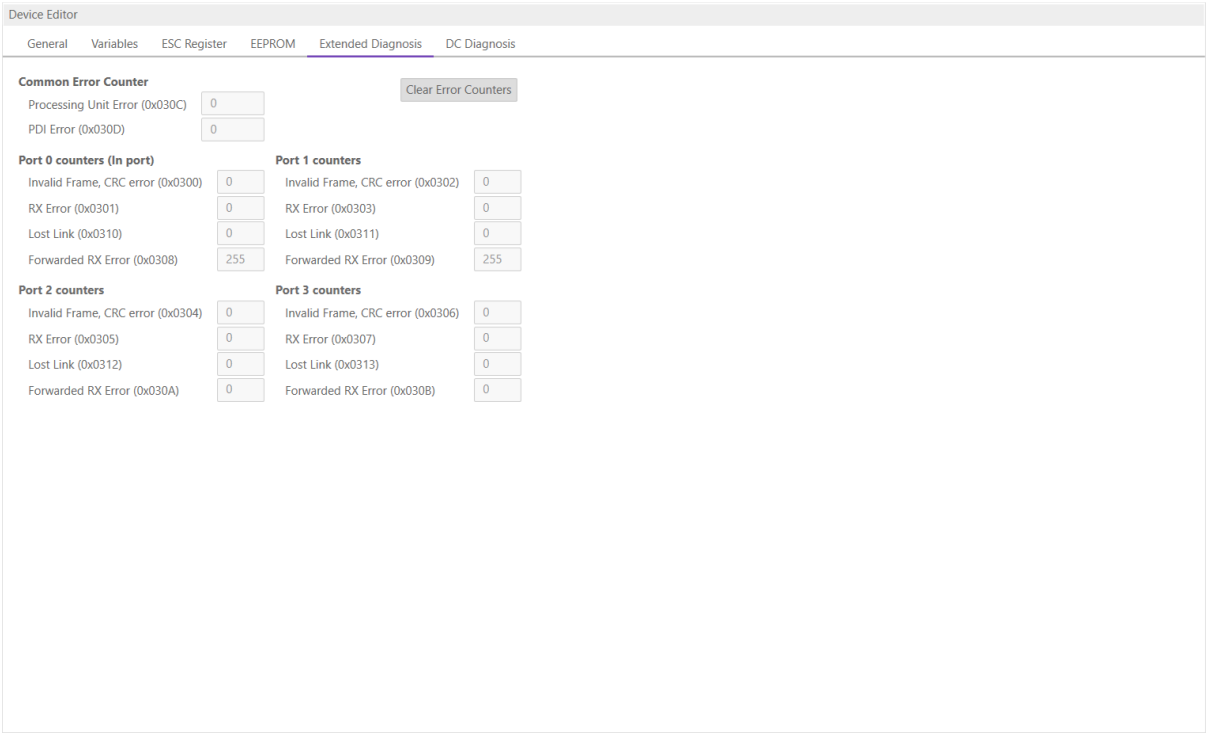
SII View

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



5.3.5 Extended Diagnosis

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



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, sigalized 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-Lyser is able to read this. Here is a quick overview on how to activate this function on different MainDevices:

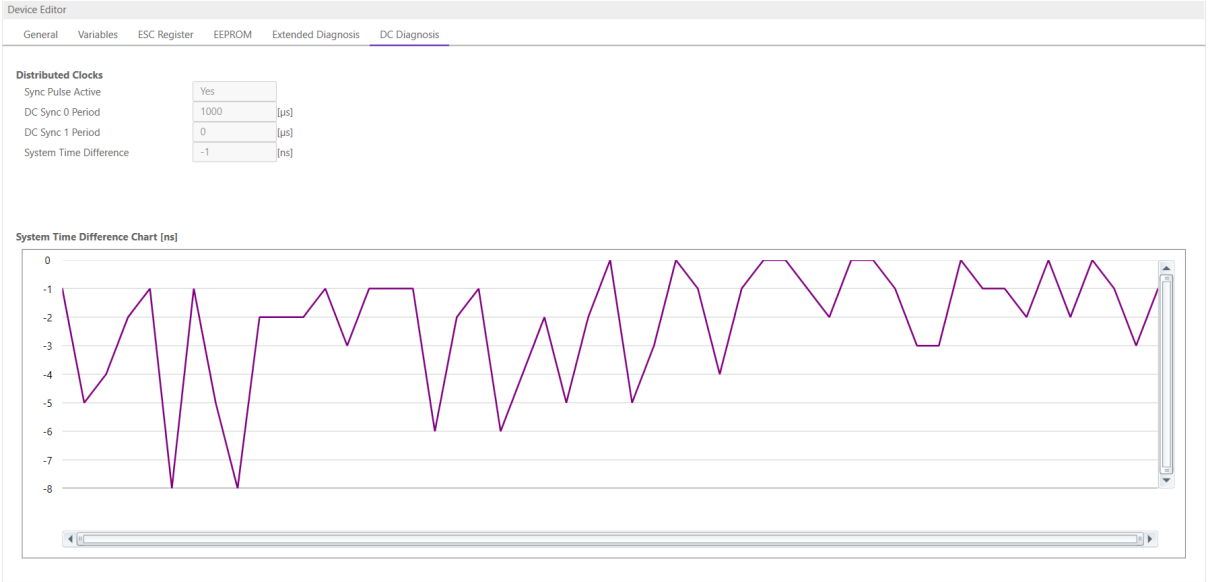
acontis EC-Master:

To activate the error collection of the acontis EC-Master, the follwing 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;
}
```

5.3.6 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

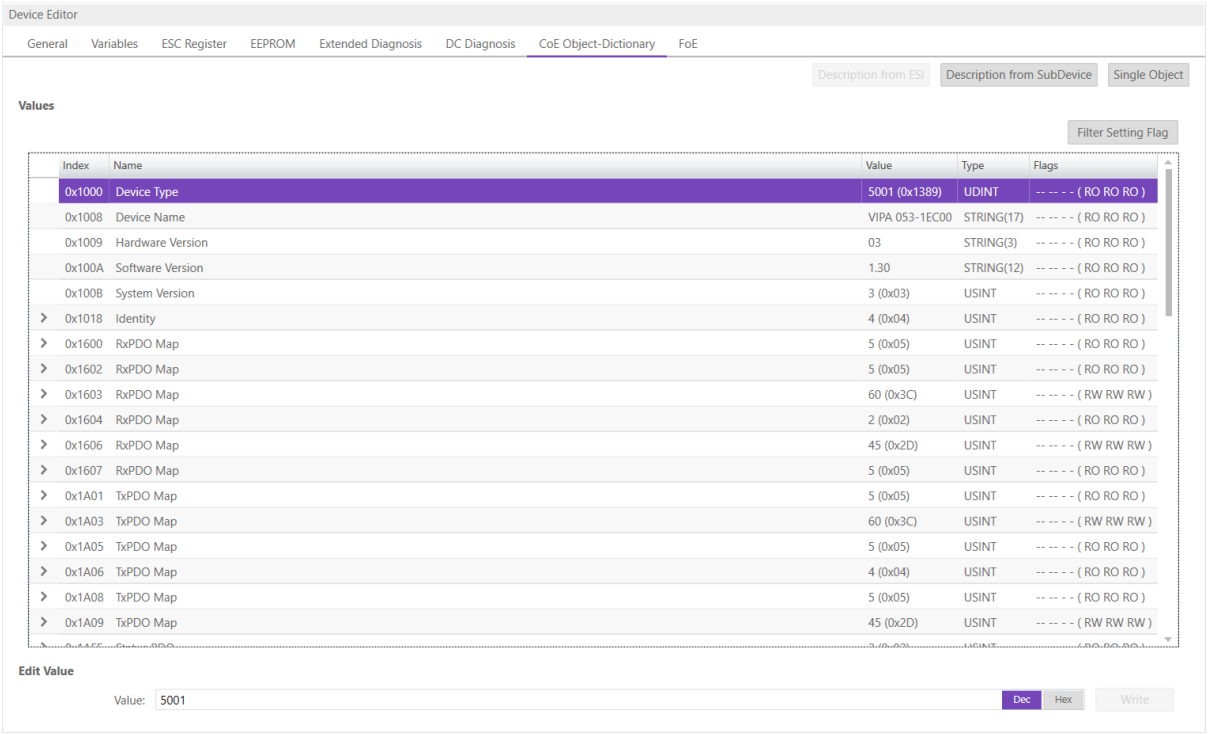
System Time Difference Chart
Chart displaying the System Time Difference over time (The amount of entries and visibility can be change in *Expert*)

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

5.3.7 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.



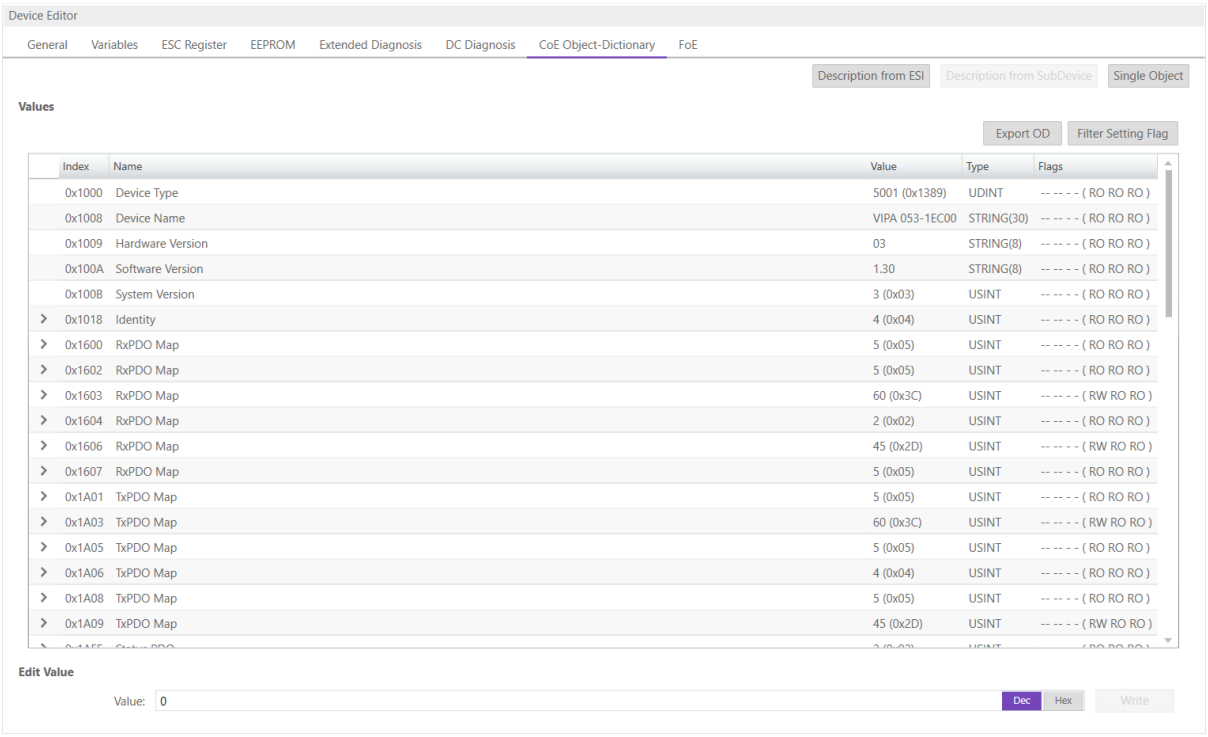
Lists of CoE Object-Dictionary entries

- 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 possiblillty to export the object dictionary.



Lists of CoE Object-Dictionary entries

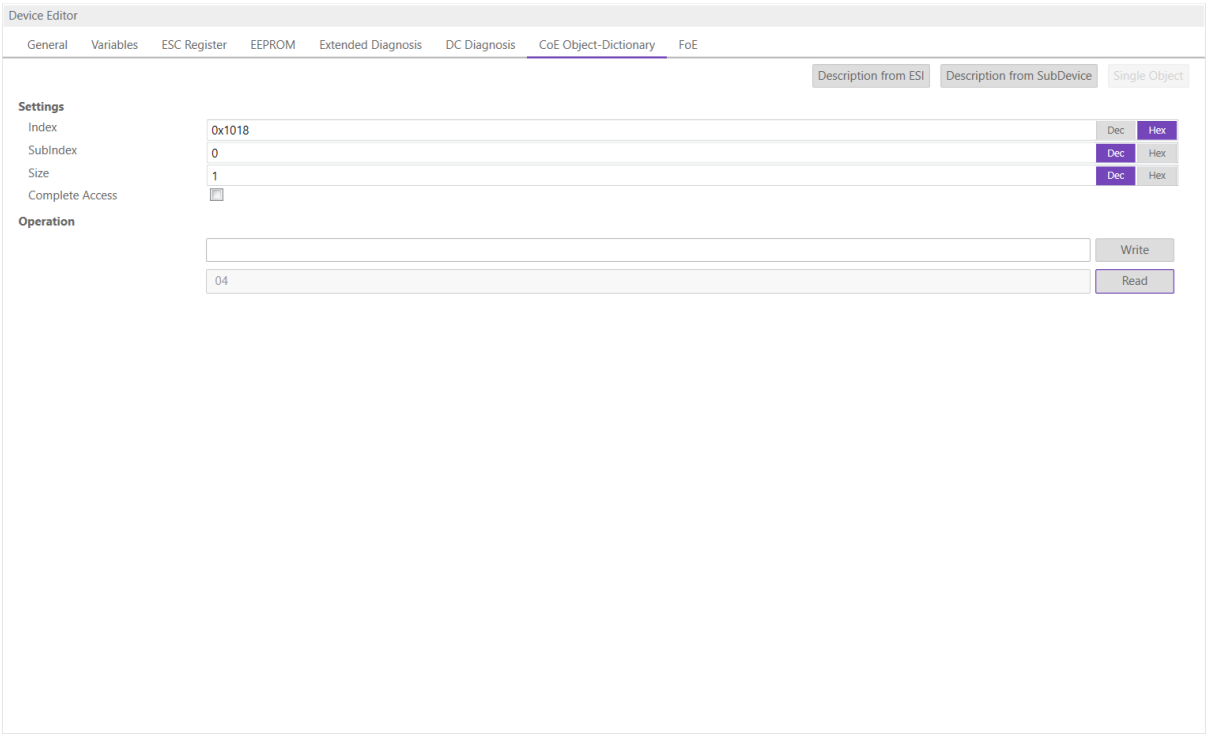
- Entries are uploaded from the SubDevice (if “SDO Information Service” is supported)
- **The “Flags” column tells the user if this entry is an PDO entry and if it can be edited**
  “AA BB C D (EE FF GG)” - AA = Mapping as RX PDO or not - BB = Mapping as TX PDO or not - C = Backup Flag - D = Settings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

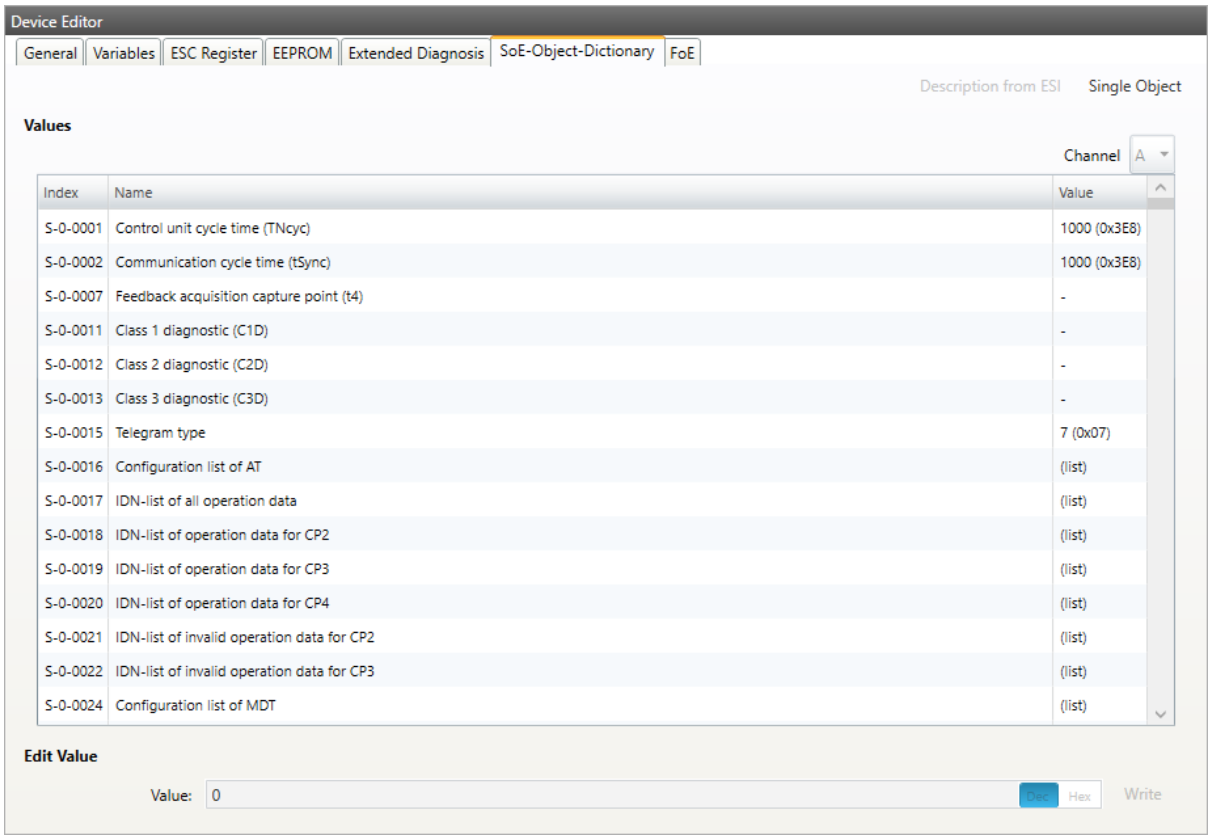
Complete Access:
Activate, if complete access mode should be used for reading or writing the CoE value (can be used only if it is supported from SubDevice)

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 …”)

5.3.8 SoE Object-Dictionary



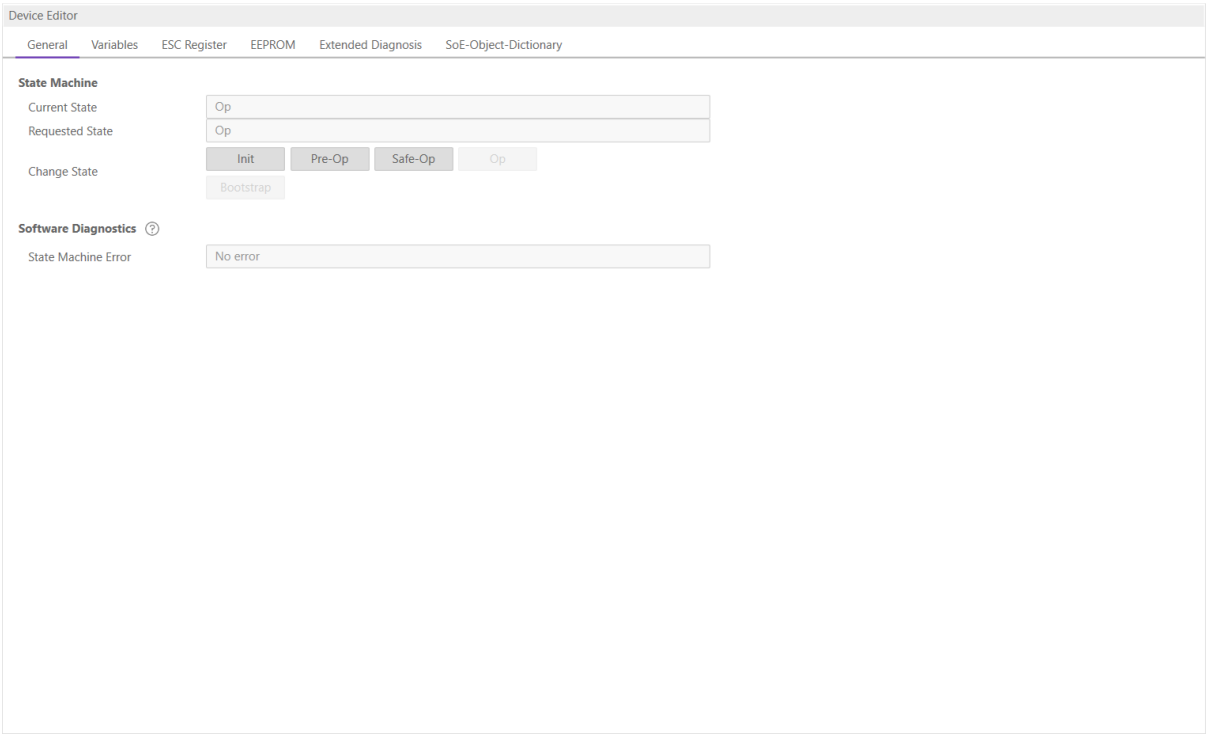
Lists of SoE Object-Dictionary entries

- 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)

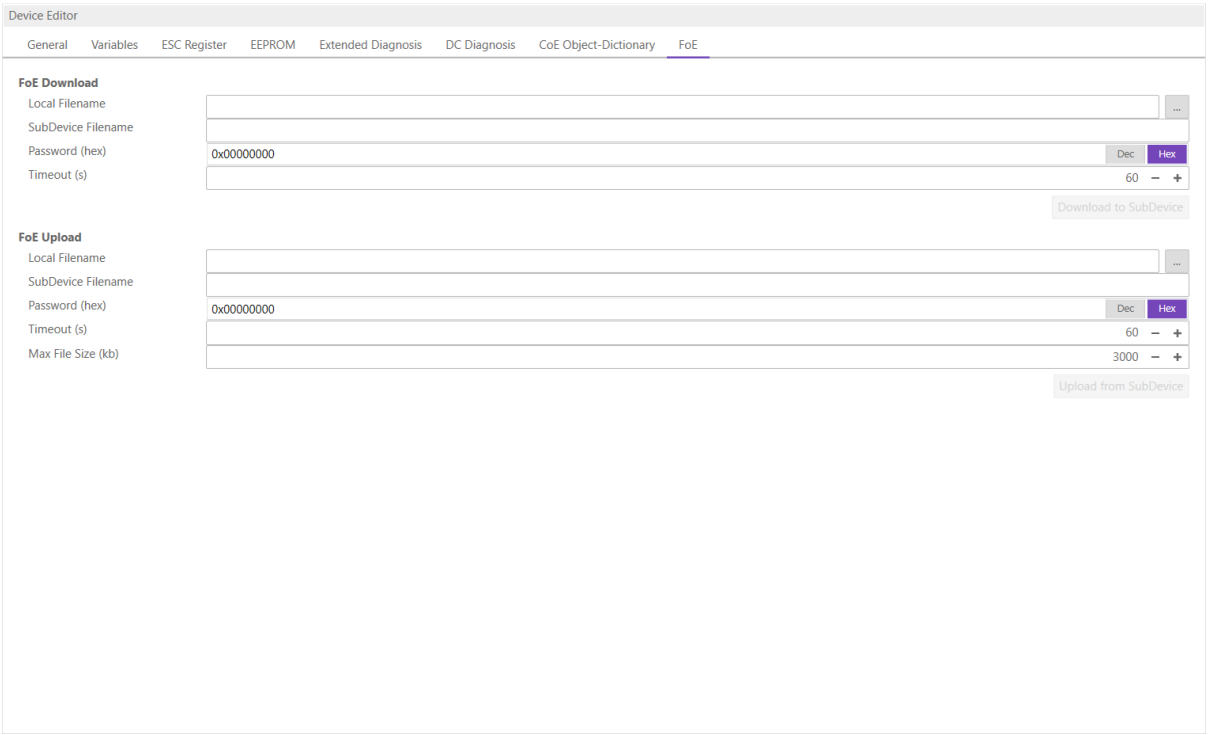
Operation

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 …”)

5.3.9 File over Ethernet (FoE)

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



FoE Operations

Local Filename:
Name of the file on the harddrive

SubDevice Filename:
Name of the file on the SubDevice

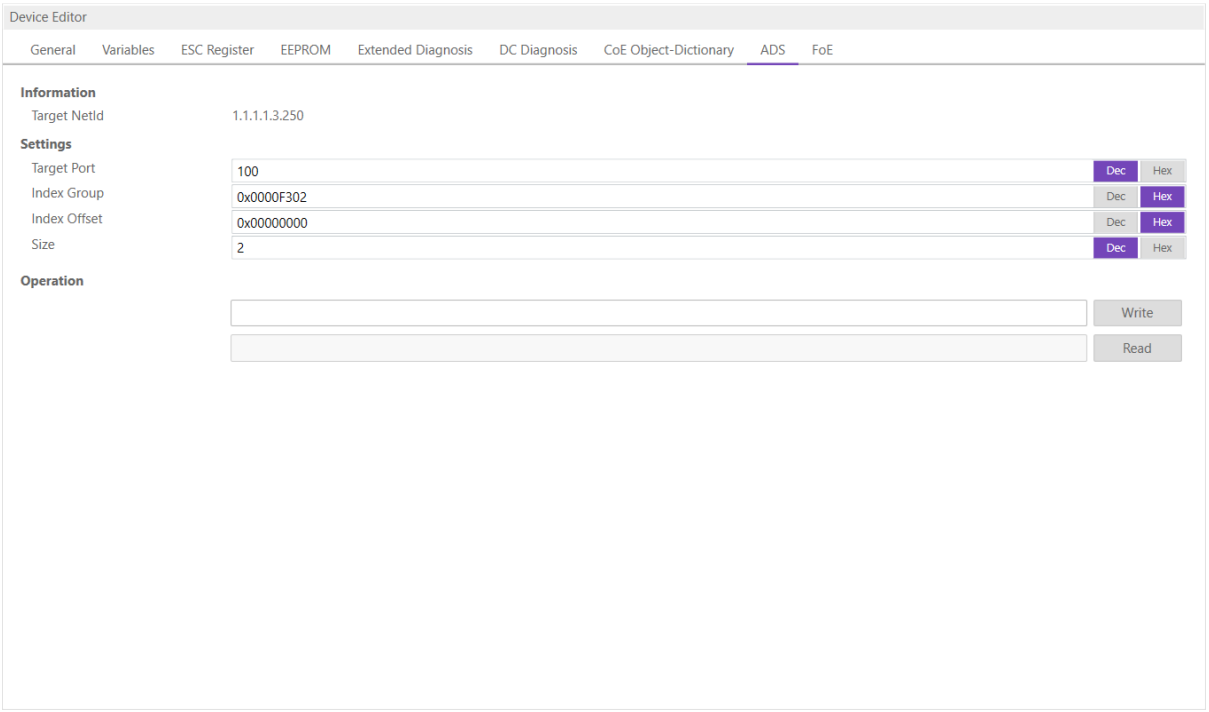
Password:
Password on the SubDevice as a hex-number

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

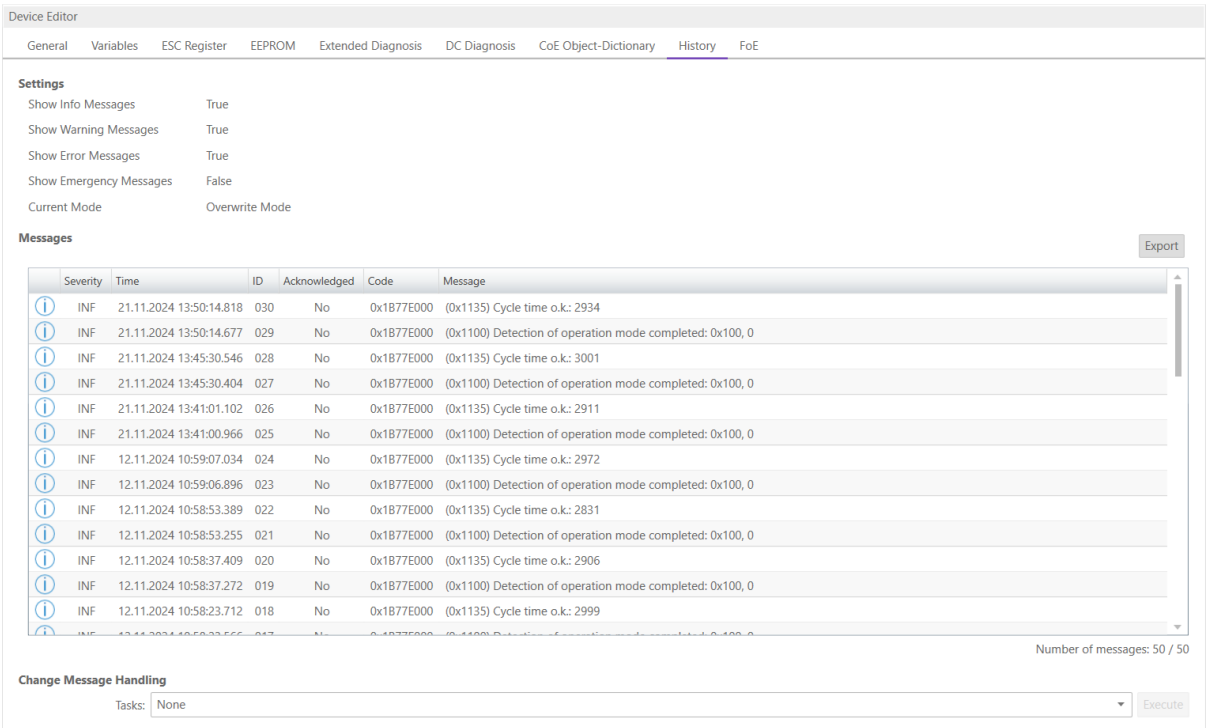
5.3.10 ADS

In this tab, the user can see and change the ADS values of the SubDevice.



5.3.11 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:



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 Info Messages:
Enable or disable info 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

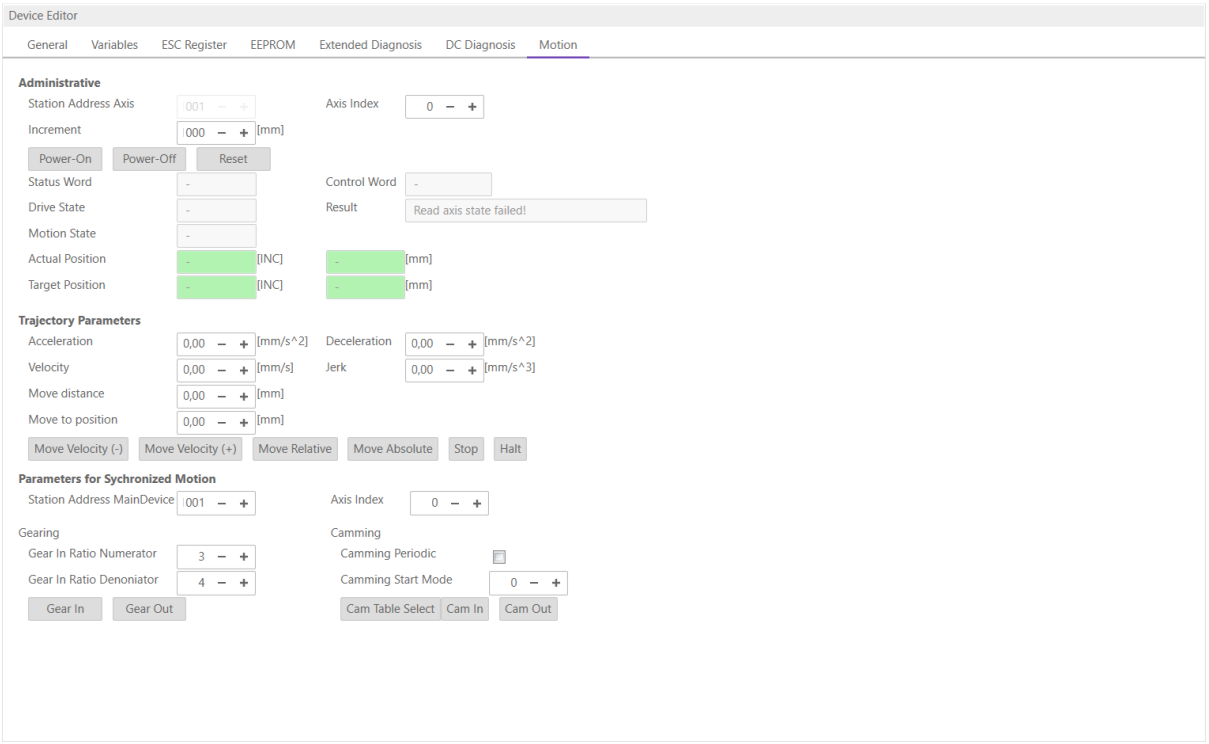
Clear All Messages:
Clear all messages (only available if “Overwrite Mode” is active)

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)

5.3.12 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:

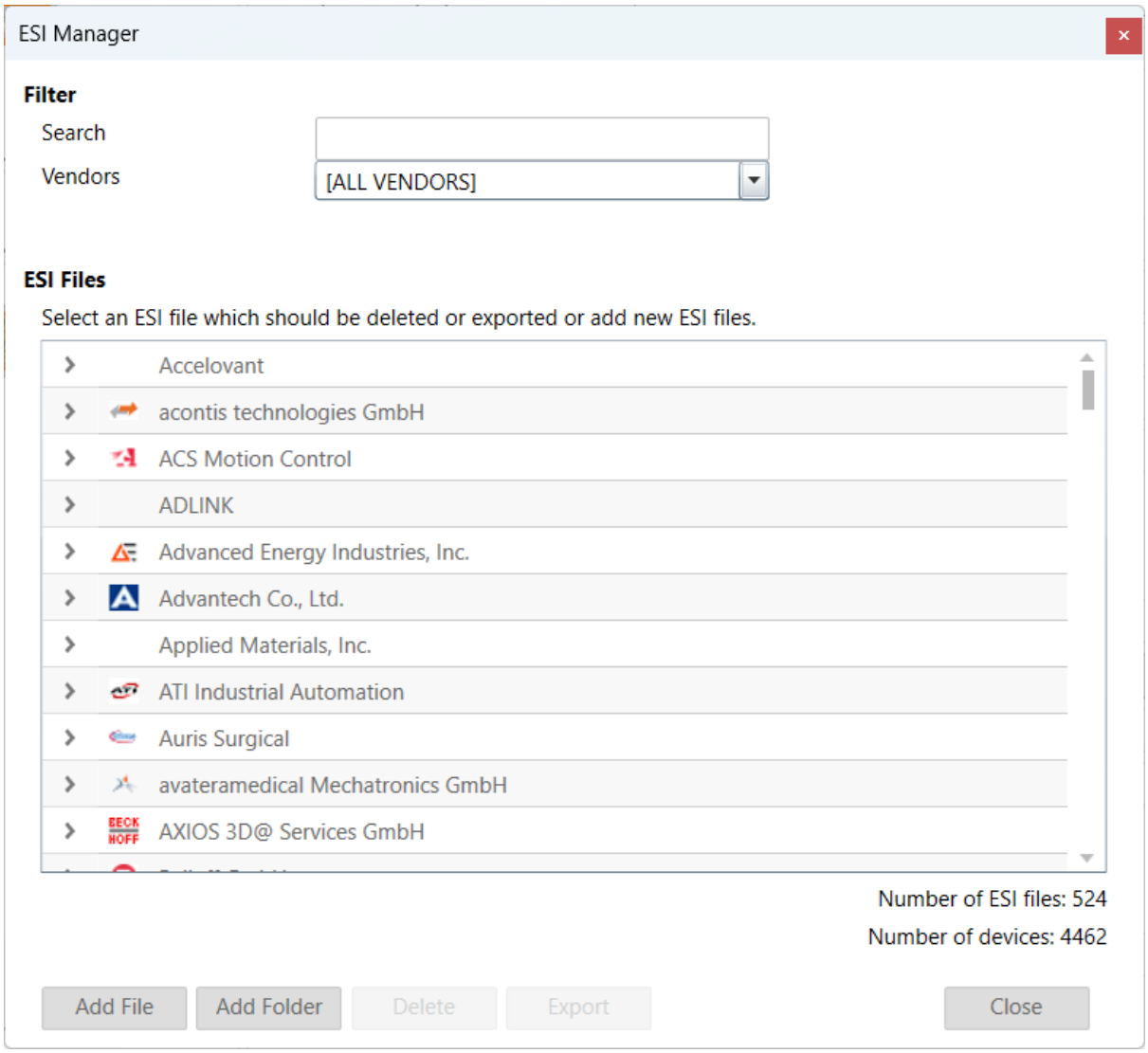

Device Editor
General
Variables
ESC Register
EEPROM
Extended Diagnosis
DC Diagnosis
Motion
Administrative
Station Address Axis
001
Axis Index
0
Increment
000
[mm]
Power-On
Power-Off
Reset
Status Word
Control Word
Drive State
Result
Read axis state failed!
Motion State
Actual Position
[INC]
[mm]
Target Position
[INC]
[mm]
Trajectory Parameters
Acceleration
0,00
[mm/s^2]
Deceleration
0,00
[mm/s^2]
Velocity
0,00
[mm/s]
Jerk
0,00
[mm/s^3]
Move distance
0,00
[mm]
Move to position
0,00
[mm]
Move Velocity (-)
Move Velocity (+)
Move Relative
Move Absolute
Stop
Halt
Parameters for Sychronized Motion
Station Address MainDevice
001
Axis Index
0
Gearing
Gear In Ratio Numerator
3
Gear In Ratio Denoniator
4
Gear In
Gear Out
Camming
Camming Periodic
Camming Start Mode
0
Cam Table Select
Cam In
Cam Out

6 Additional Tools

6.1 ESI-Manager

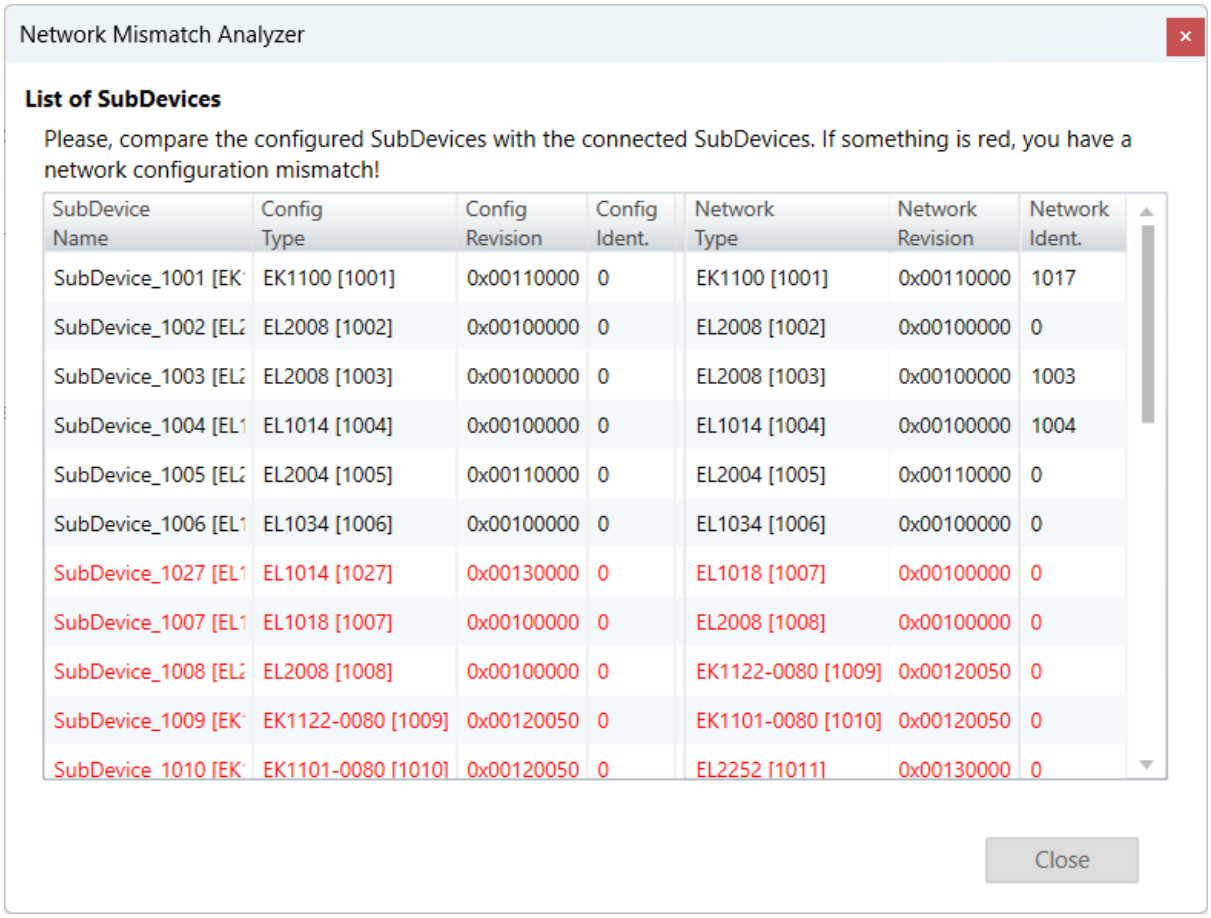
ESI-Manager can be found through the main menu File -> ESI-Manager.

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



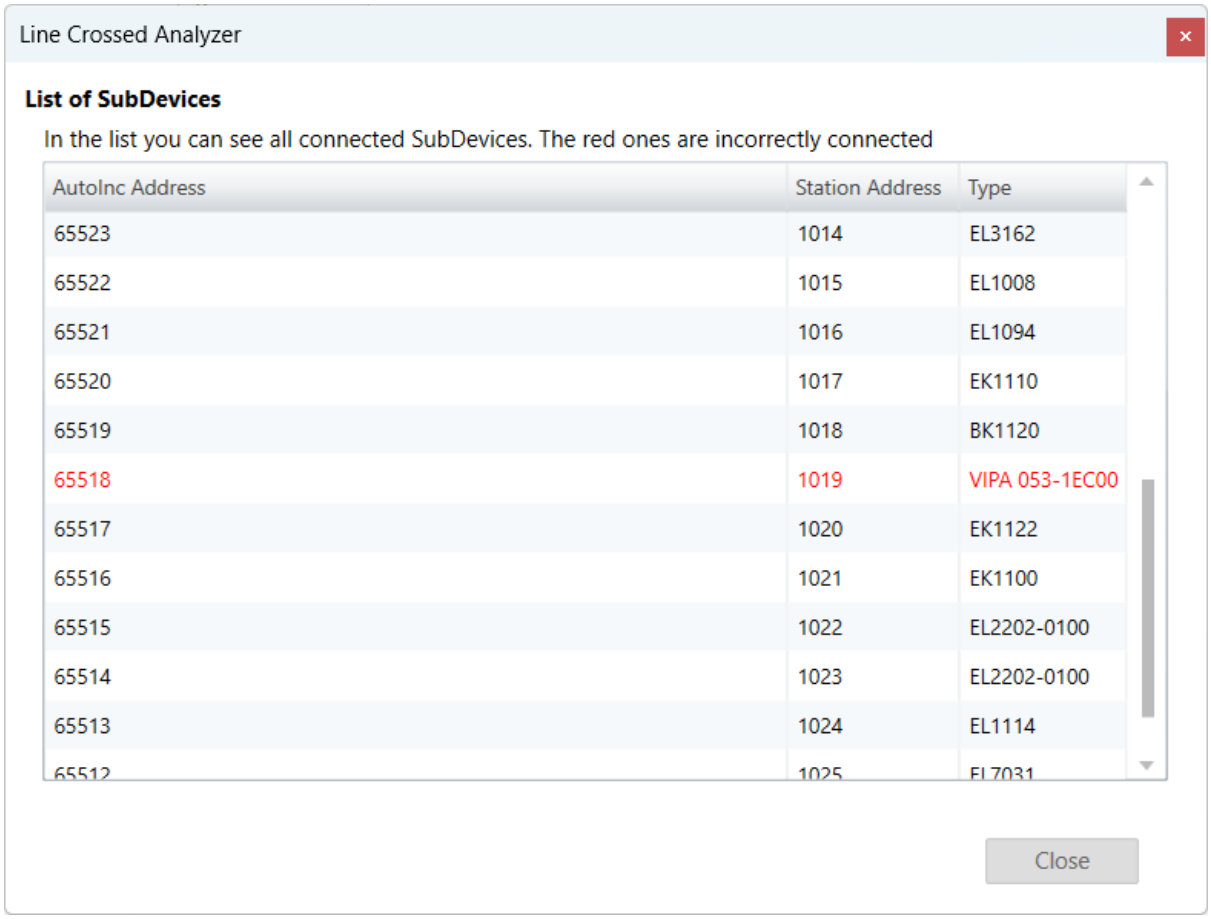
6.2 Network Mismatch Analyzer

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:



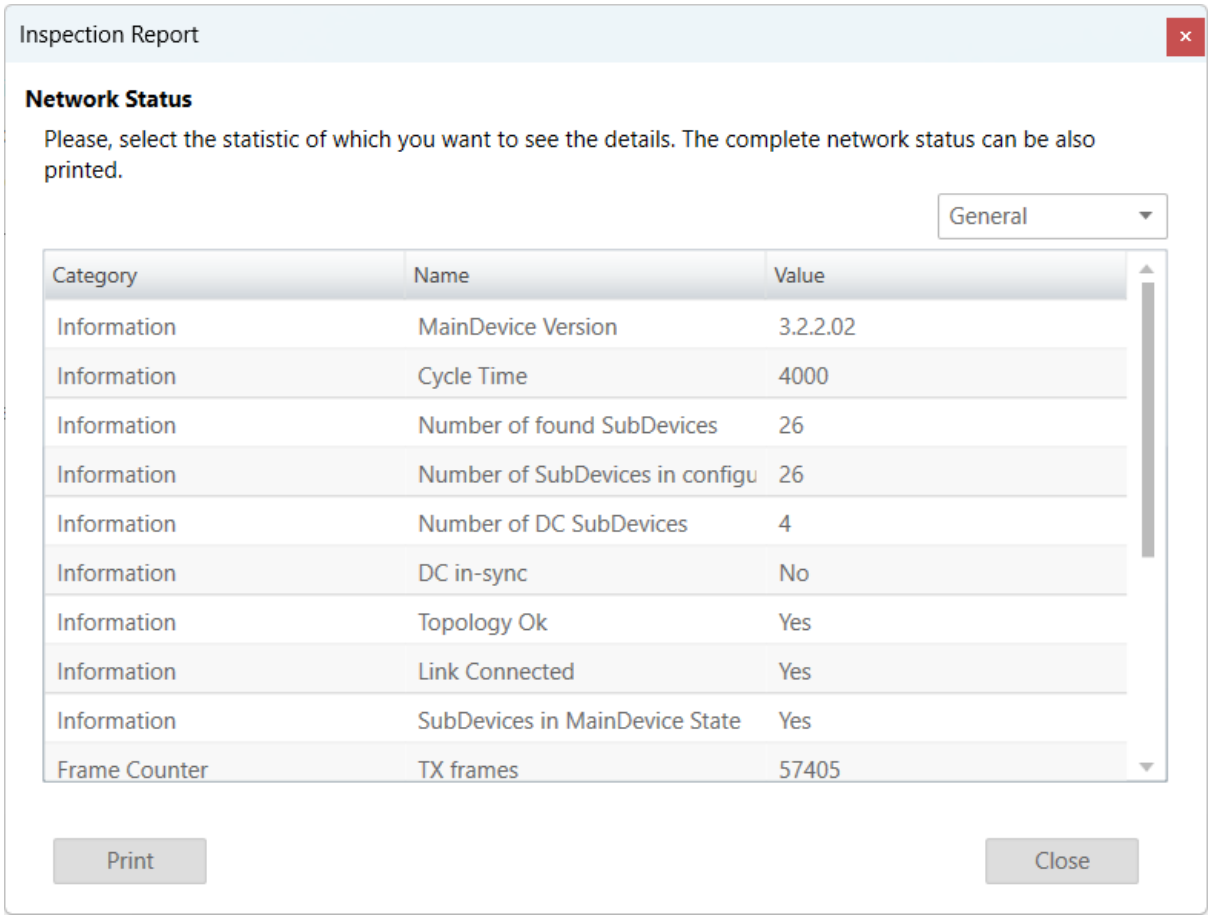
6.3 Line Crossed Analyzer

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



6.4 Inspection Report

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



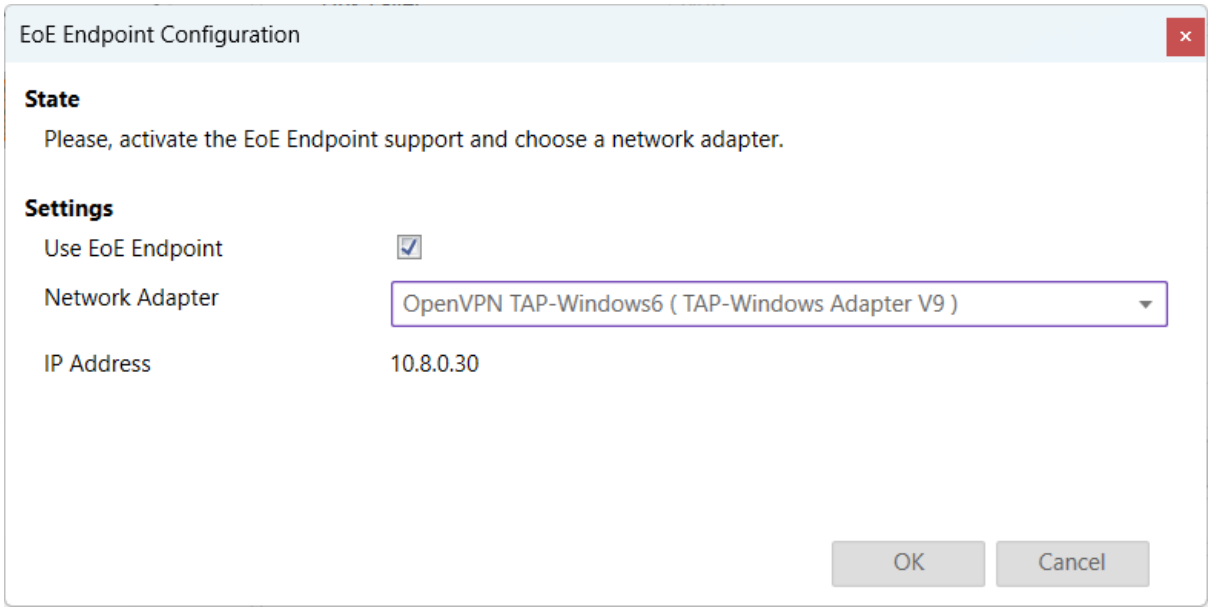
6.5 EoE Endpoint Configuration

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

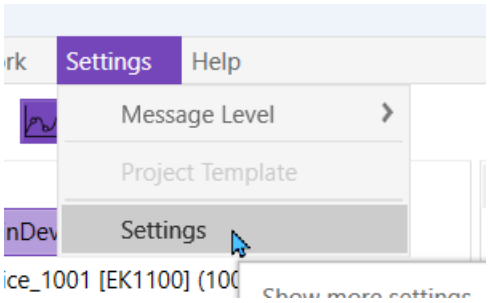
Use EoE Endpoint:
Activate EoE Endpoint support for the selected device

Network Adapter:
List of installed network adapters (TAP)

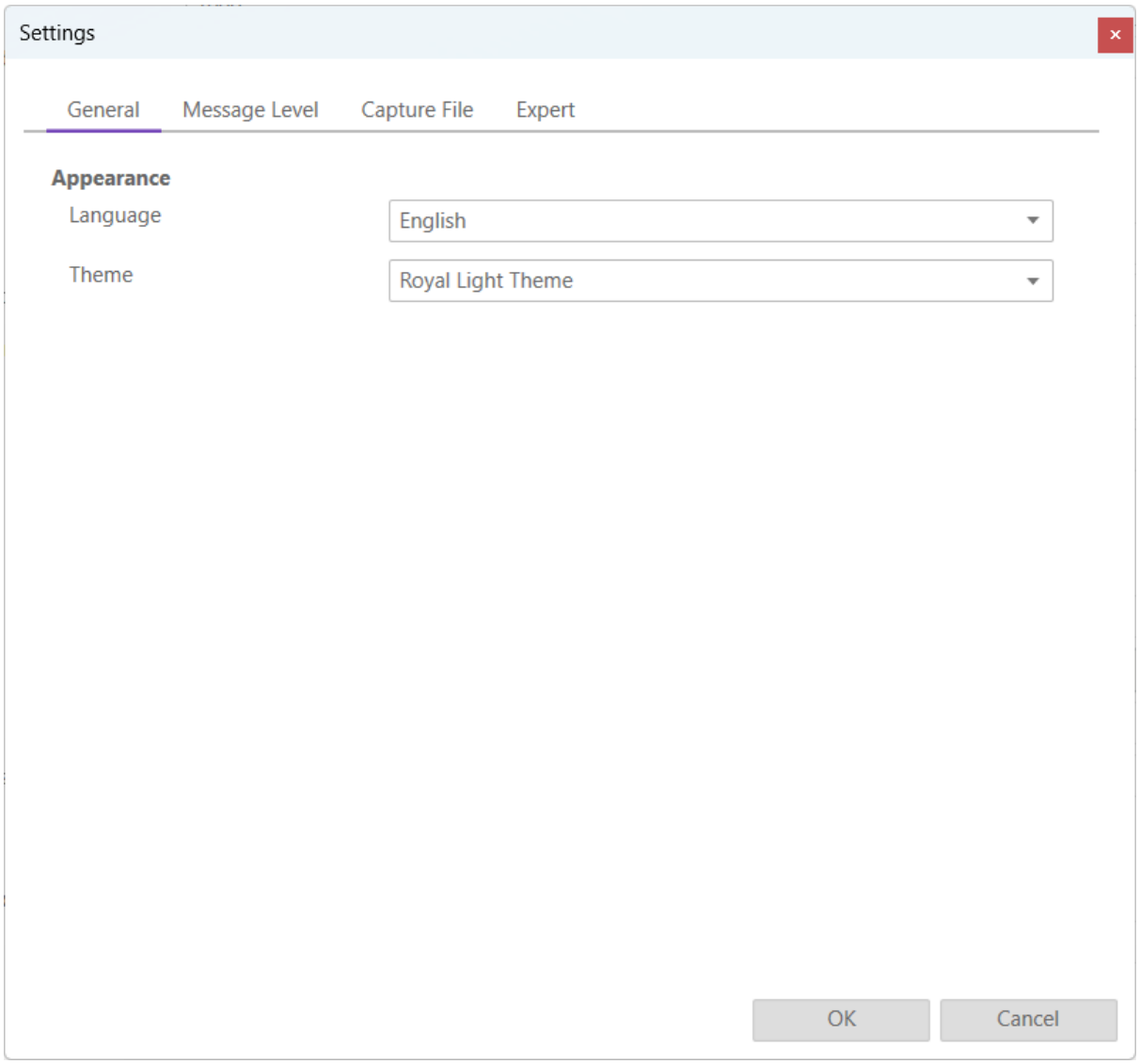
IP Address:
IP Address of the selected network adapter

6.6 Settings

Can be found inside the settings menu bar.



6.6.1 General

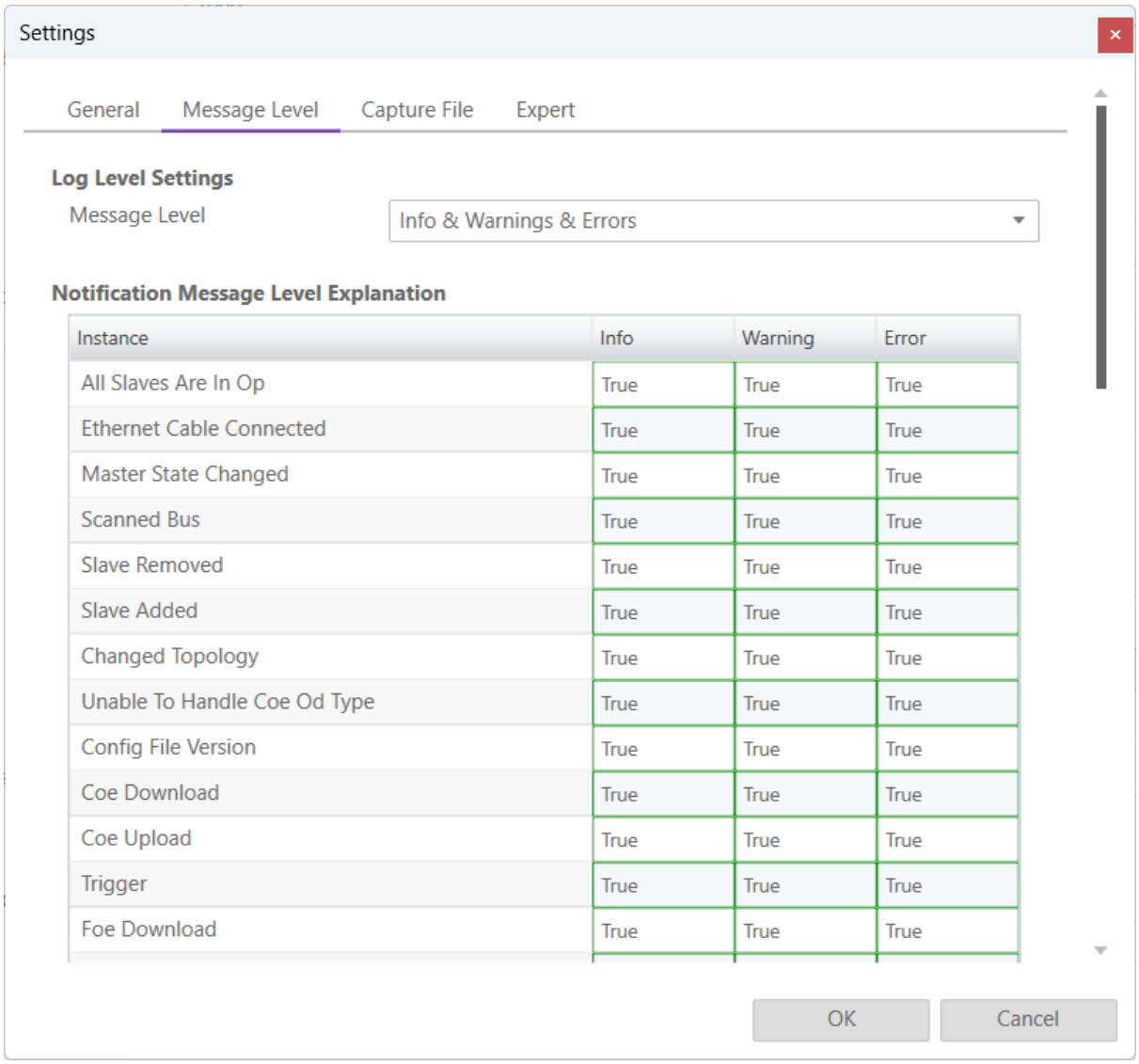


Appearance

Language:
Changes the current language

Theme:
Changes the current theme

6.6.2 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

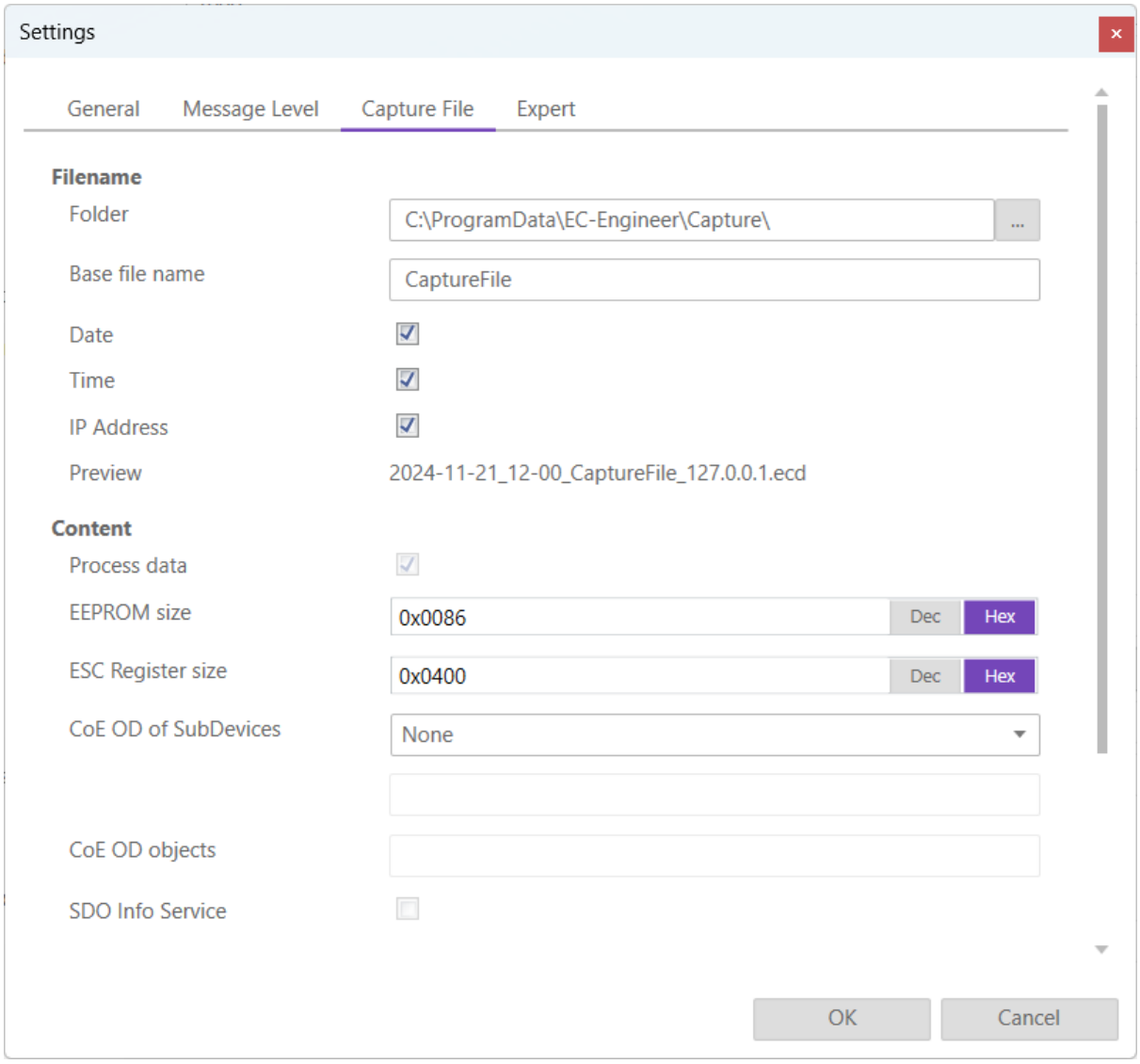
Explanation
We can see what messages are displayed depending on the selected message level (true it is displayed, false it is not displayed)

6.6.3 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

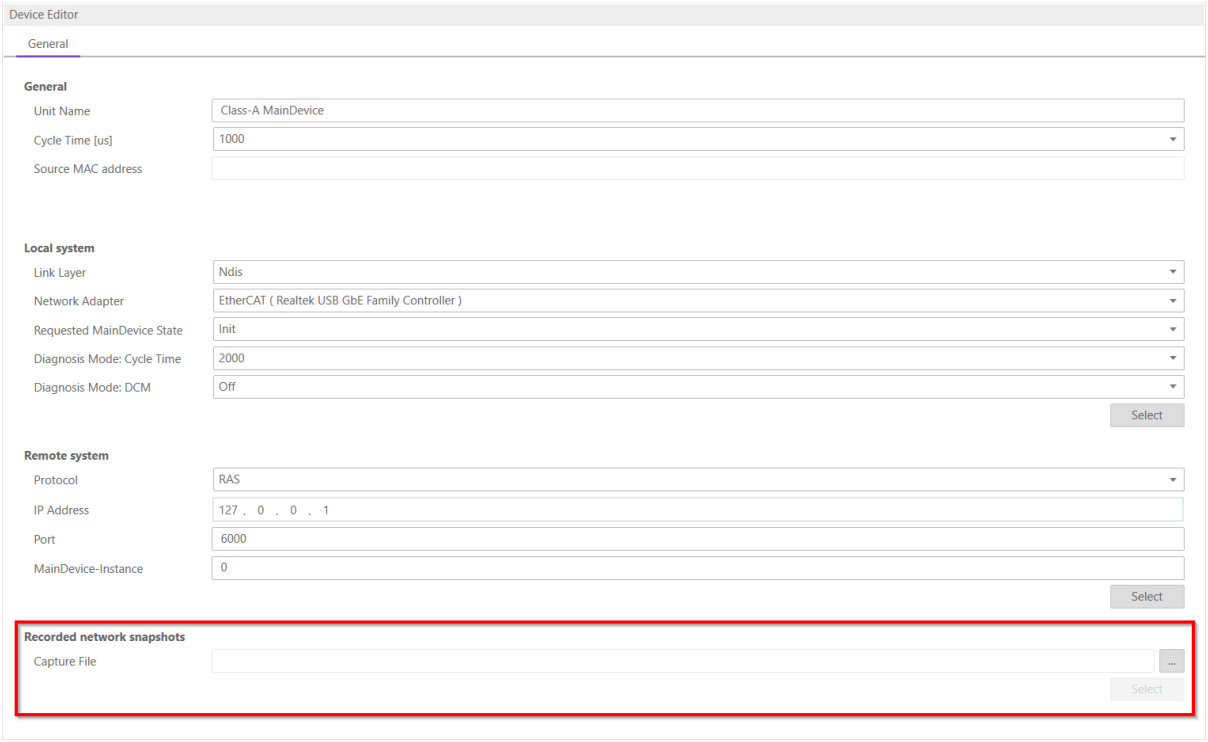
Notifications:

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

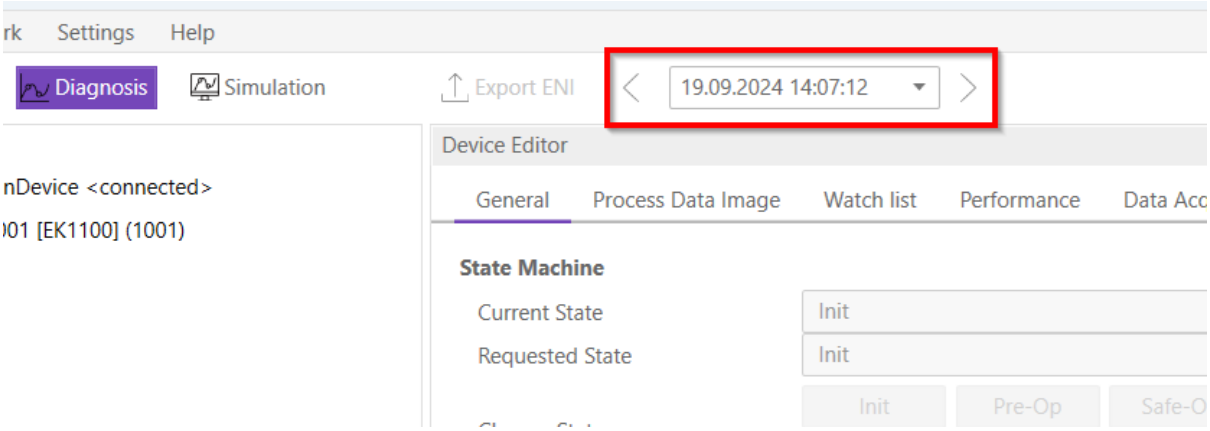
- STATECHANGED
- ETH_LINK_CONNECTED
- ETH_LINK_NOT_CONNECTED
- SLAVE_STATECHANGED
- SLAVE_PRESENCE
- SLAVE_INITCMD_RESPONSE_ERROR

- STATUS_SLAVE_ERROR
- SLAVE_UNEXPECTED_STATE
- DC_SLV_SYNC
- DCM_SYNC

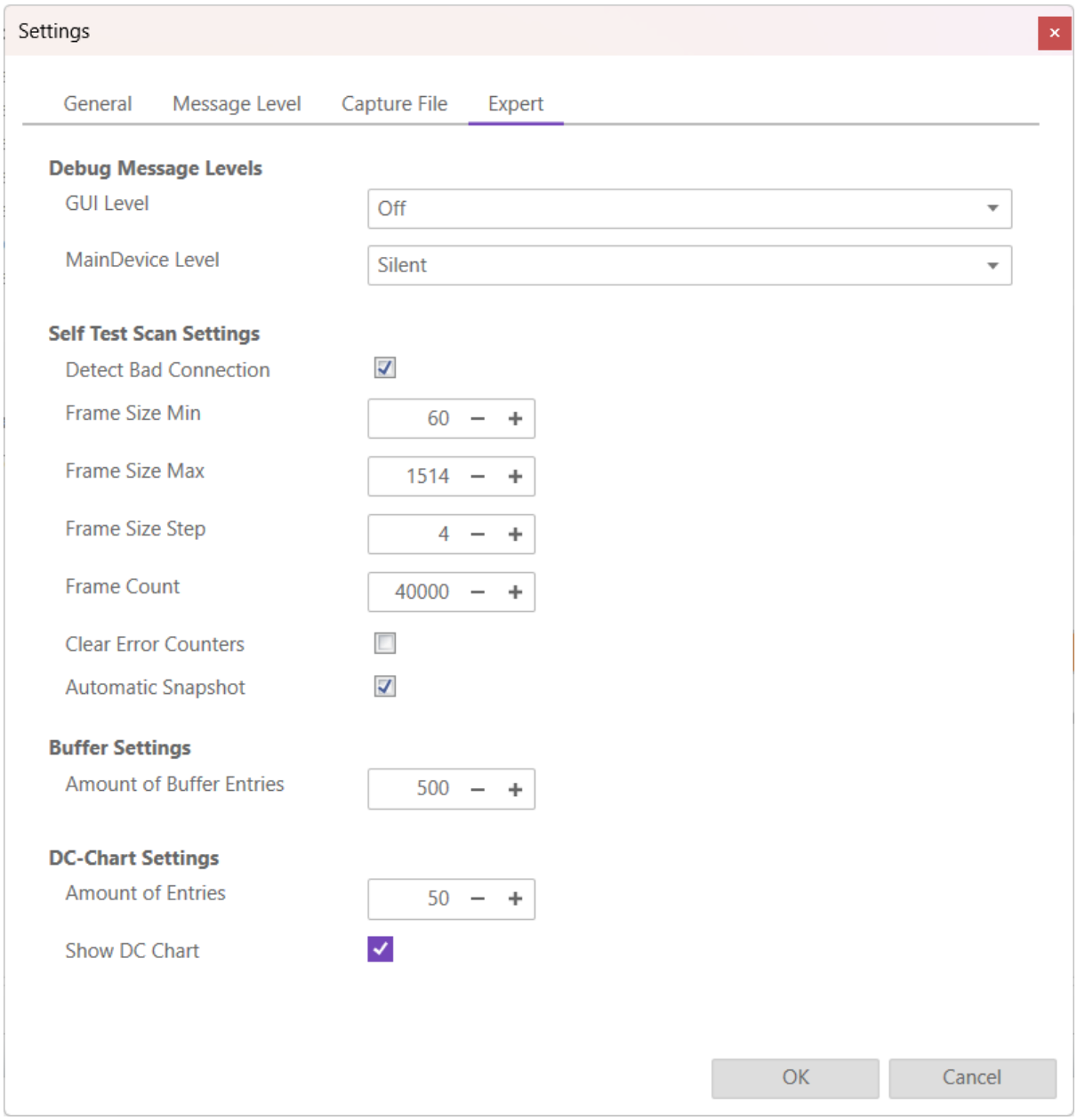
After the snapshot(s) is / are made in diagnosis mode they can be selected in the overview in config mode:



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:



6.6.4 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

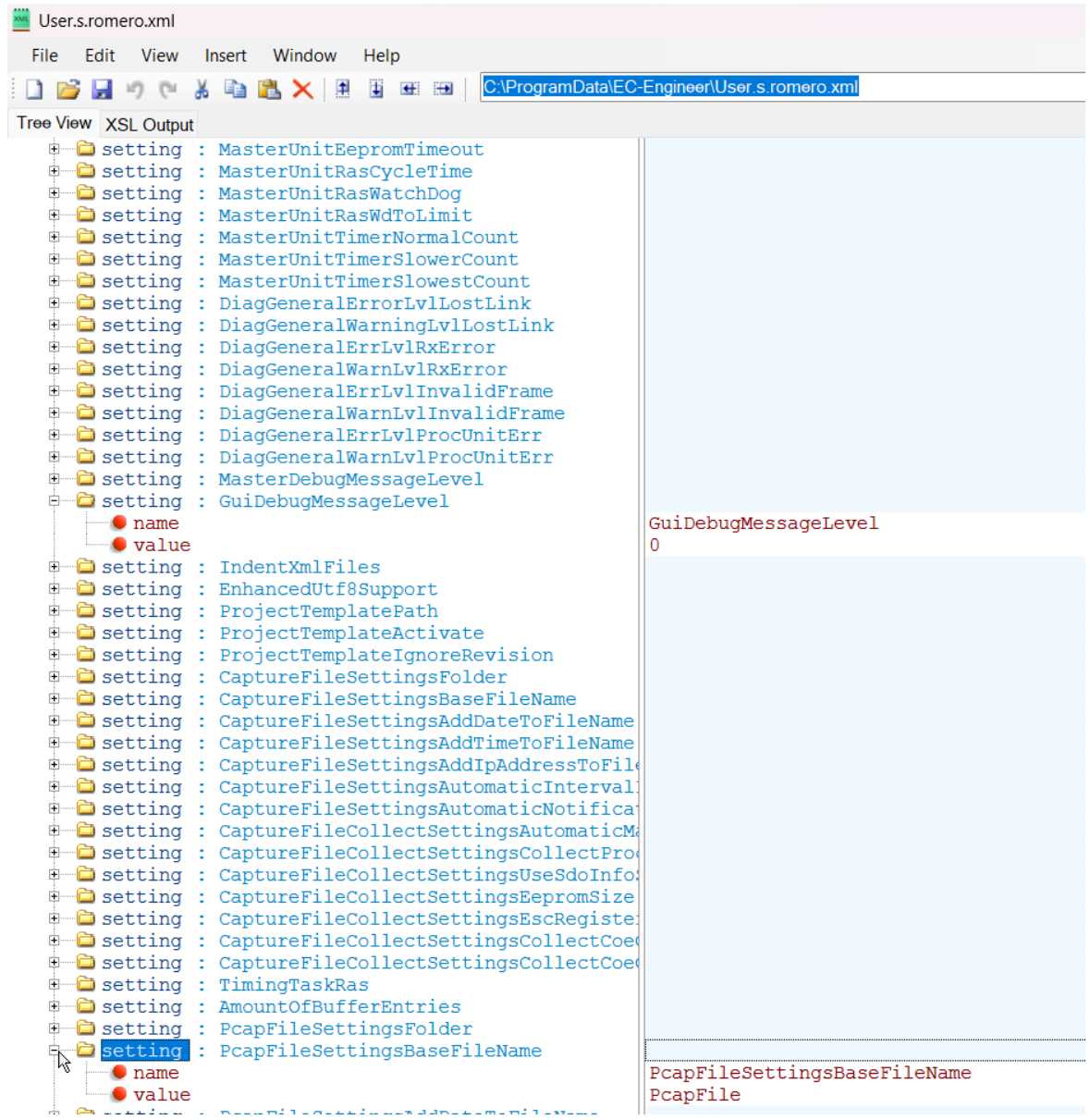
Amount of Entries
Changes only the amount of entries in the chart in the DC Diagnosis Tab

Show DC Chart
Check to display the chart in the DC Diagnosis Tab

6.6.5 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.



The file can be located either at “C:/ProgramData/EC-Engineer/User.<username>.xml” or insdie the install directory.

6.7 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:

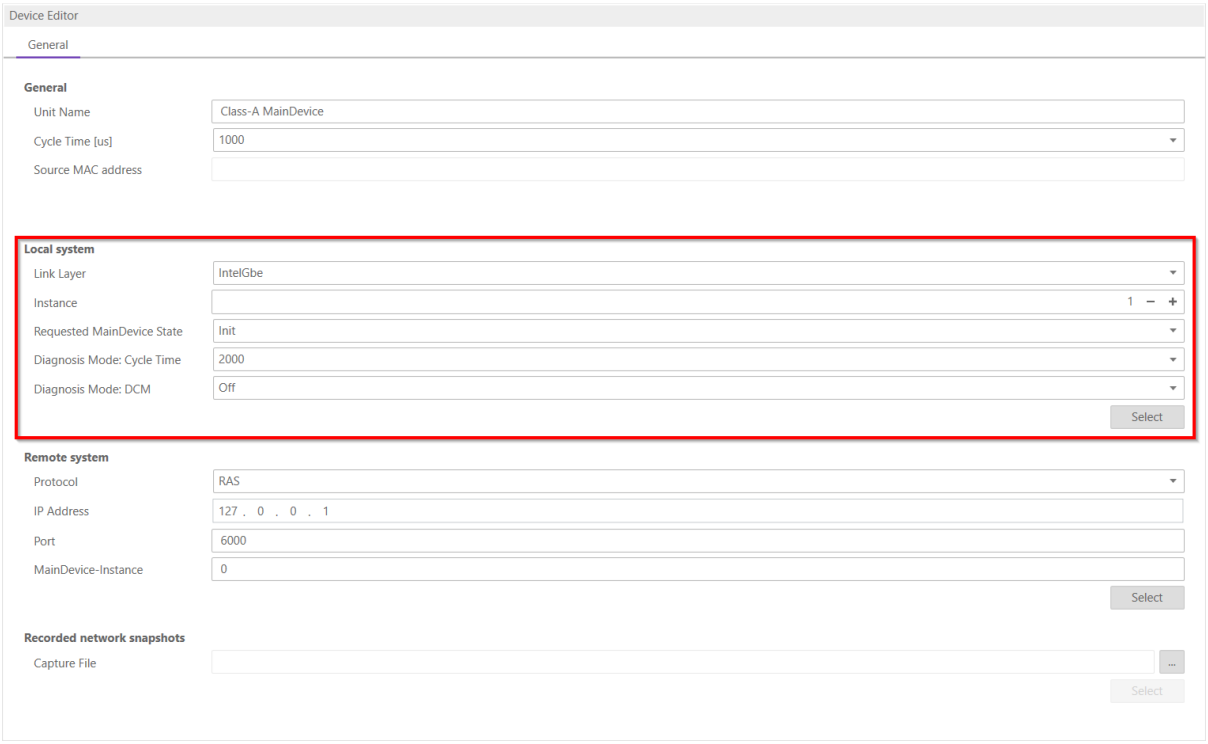
Network driver
: The network driver can be used from the optimized link layers

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

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

6.7.1 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 currenty supported:

`emllI8254x.dll` (Intel PRO/1000 Network Adapters)

`emllI8255x.dll` (Intel PRO/100 Network Adapters)

`emllIRTL8139.dll` (Realtek 8139 Fast Ethernet Adapters)

`emllIRTL8169.dll` (Realtek Gigabit Ethernet Adapters)

`emllICCAT.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

7 Command Line Interface

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

/HELP, /?
Shows the help dialog

/REMOTE="127.0.0.1:6000:0:0":
Runs diagnosis with a remote system, **where** IP address is "127.0.0.1", **port** is 6000, **MainDevice** instance is set to 0 and protocol is set to RAS. It is also supported to use the DNS name instead of the IP address

/LOCAL="127.0.0.1":
Runs diagnosis with the local system and the network adapter with IP address "127.0.01" will be chosen

/CAPTURE="C:/myfile.ecd:0":
Runs diagnosis with the offline diagnosis system,
where the path to the capture file is :file:`c:/myfile.ecd` and the selected snapshot is "0"

/ENI="eni.xml":
Sets the path to the ENI file which should be used

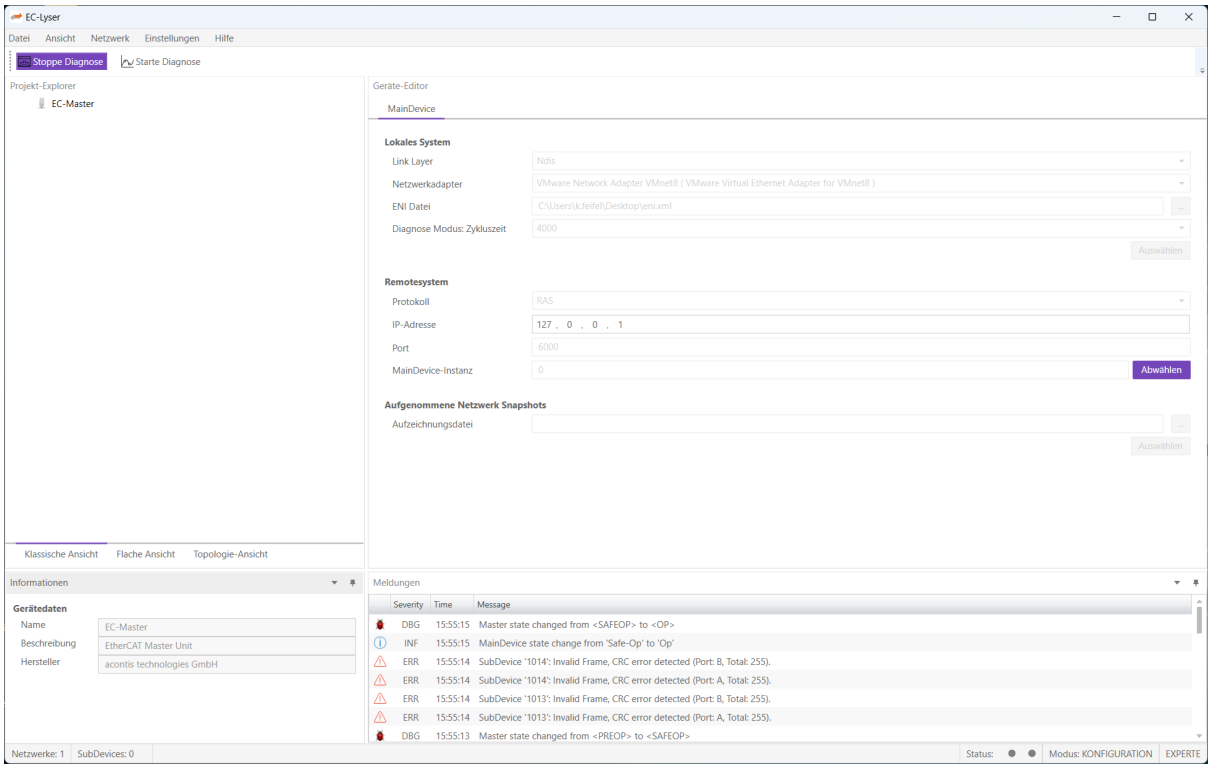
8 Customization

8.1 Multi-Language-Support

EC-Lyser 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-Lyser/Languages/…`

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

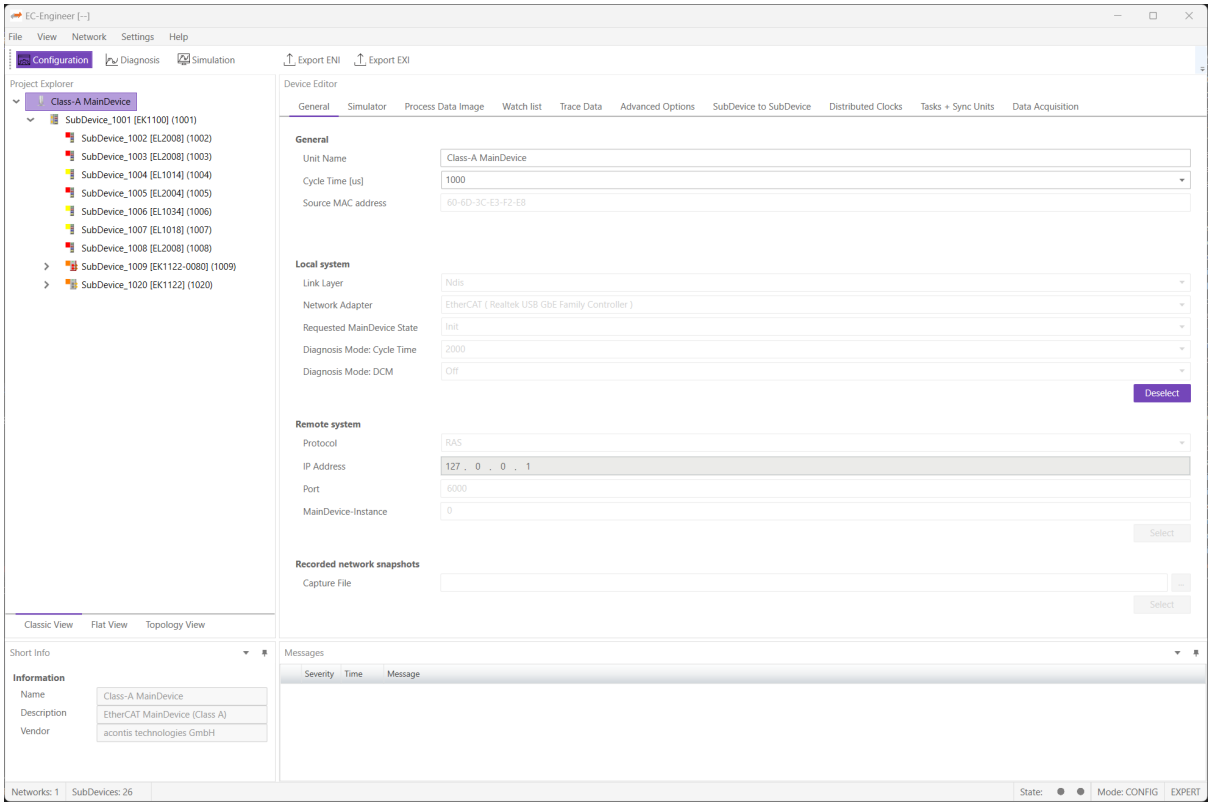


8.2 Themes

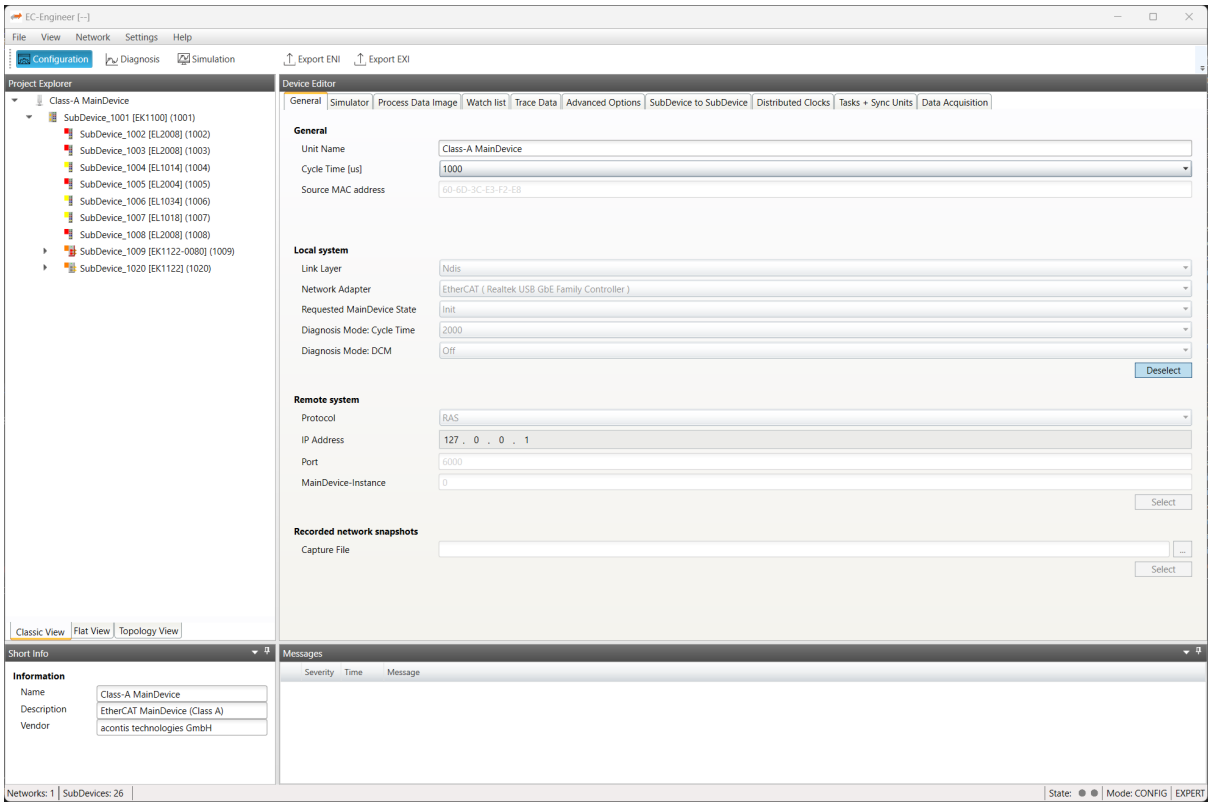
EC-Lyser supports multiple themes, which can be changed during compile time. Adding support for further themes is quite easy because a theme consists of a couple of XAML files which must be added to the kit.

Five themes are already included into EC-Lyser:

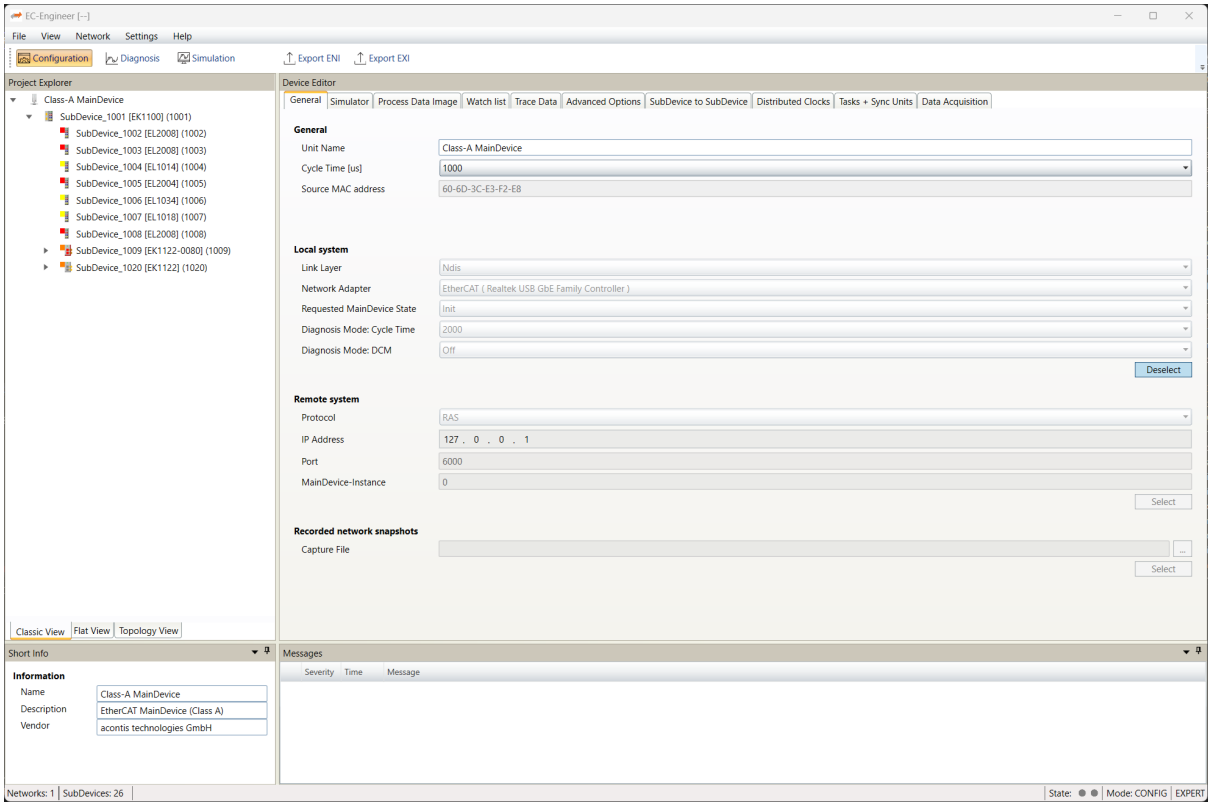
Royal Light Theme



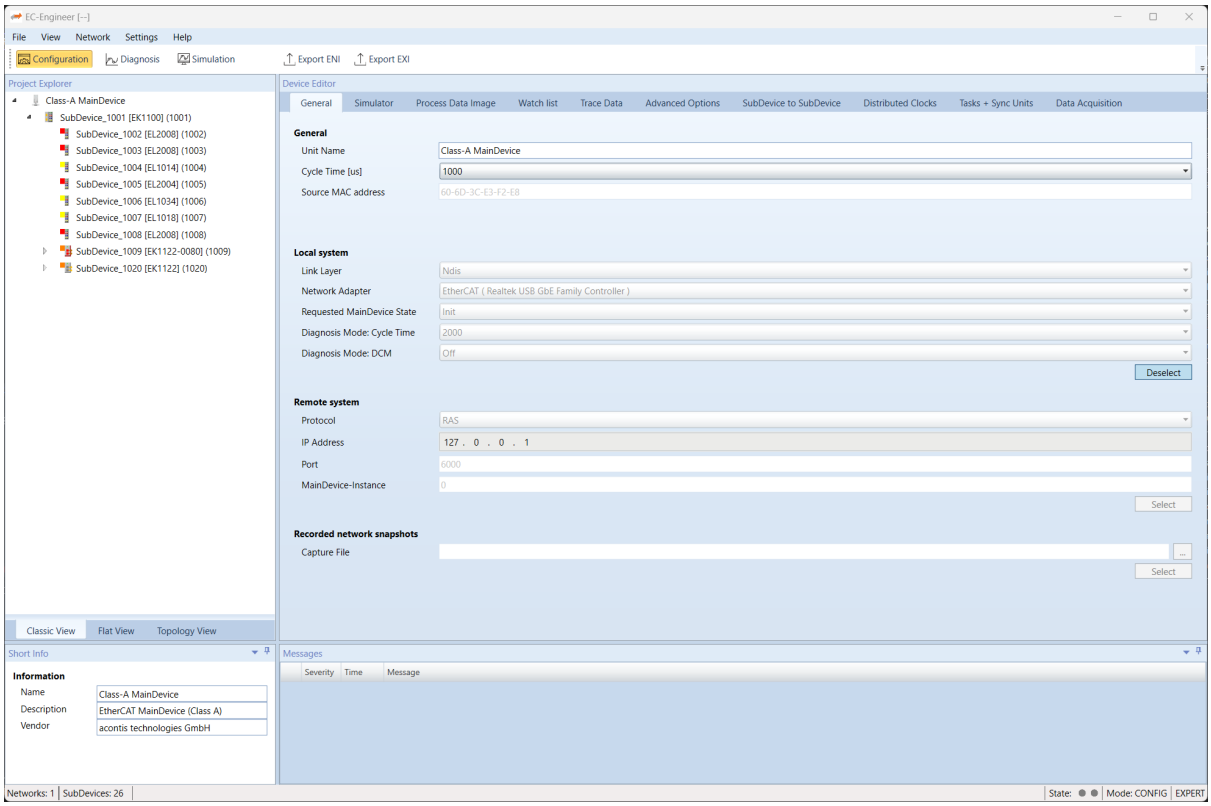
IG Theme



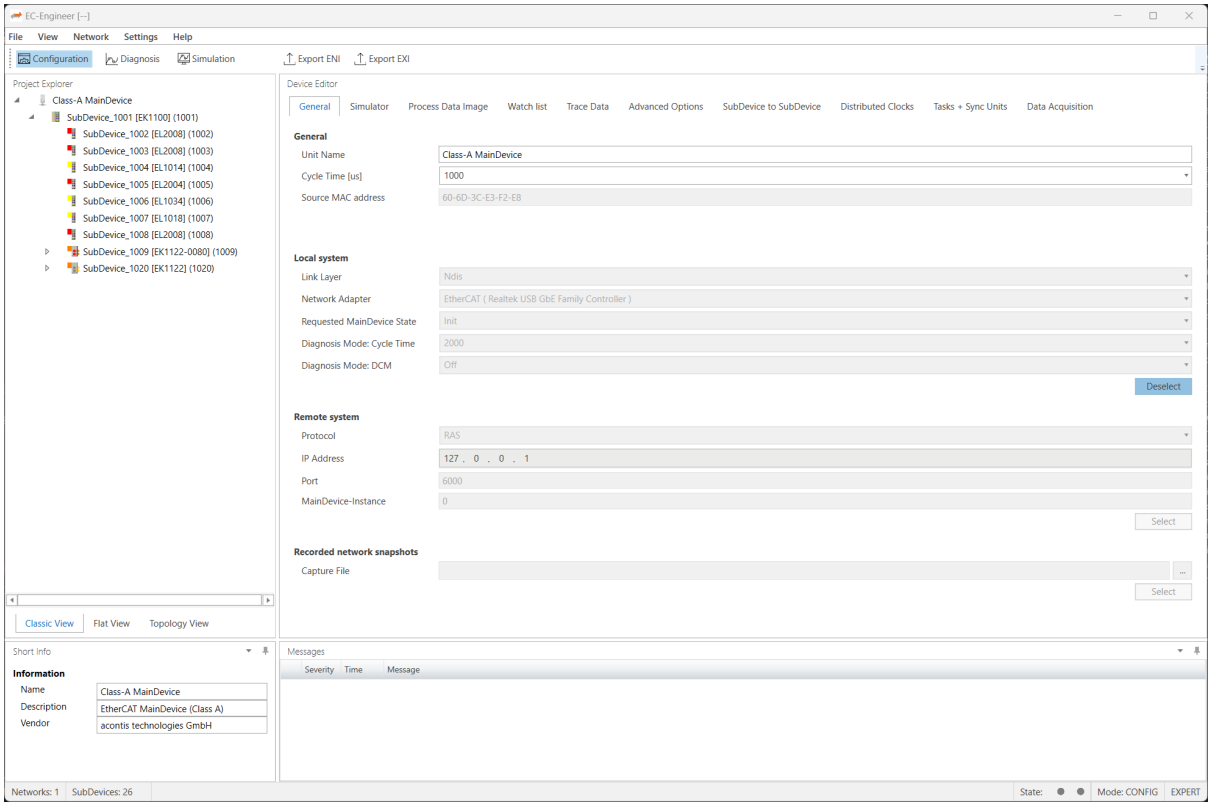
Luna Theme



Office 2010 Blue Theme



Office 2013 Theme


EC-Engineer [--]
File View Network Settings Help
Configuration Diagnosis Simulation Export ENI Export EXI
Project Explorer
Class-A MainDevice
SubDevice_1001 [EK1100] (1001)
SubDevice_1002 [EL2008] (1002)
SubDevice_1003 [EL2008] (1003)
SubDevice_1004 [EL1014] (1004)
SubDevice_1005 [EL2004] (1005)
SubDevice_1006 [EL1034] (1006)
SubDevice_1007 [EL1018] (1007)
SubDevice_1008 [EL2008] (1008)
SubDevice_1009 [EK1122-0080] (1009)
SubDevice_1020 [EK1122] (1020)
Classic View Flat View Topology View
Device Editor
General Simulator Process Data Image Watch list Trace Data Advanced Options SubDevice to SubDevice Distributed Clocks Tasks + Sync Units Data Acquisition
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
Deselect
Remote system
Protocol RAS
IP Address 127 . 0 . 0 . 1
Port 6000
MainDevice-Instance 0
Select
Recorded network snapshots
Capture File
Select
Short Info
Information
Name Class-A MainDevice
Description EtherCAT MainDevice (Class A)
Vendor acontis technologies GmbH
Messages
Severity Time Message
Networks: 1 SubDevices: 26
State:
Mode: CONFIG EXPERT

9 Licensing

9.1 Third party Software

EC-Lyser is using the following third party software:

- Infragistics

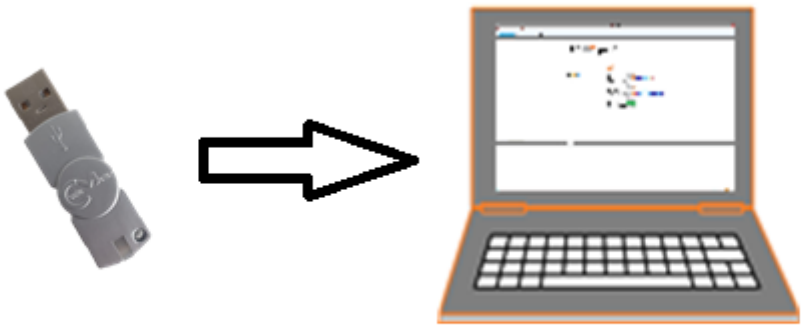
9.2 EC-Lyser License

For EC-Lyser we have two license models:

- Node Locked License
- Floating License

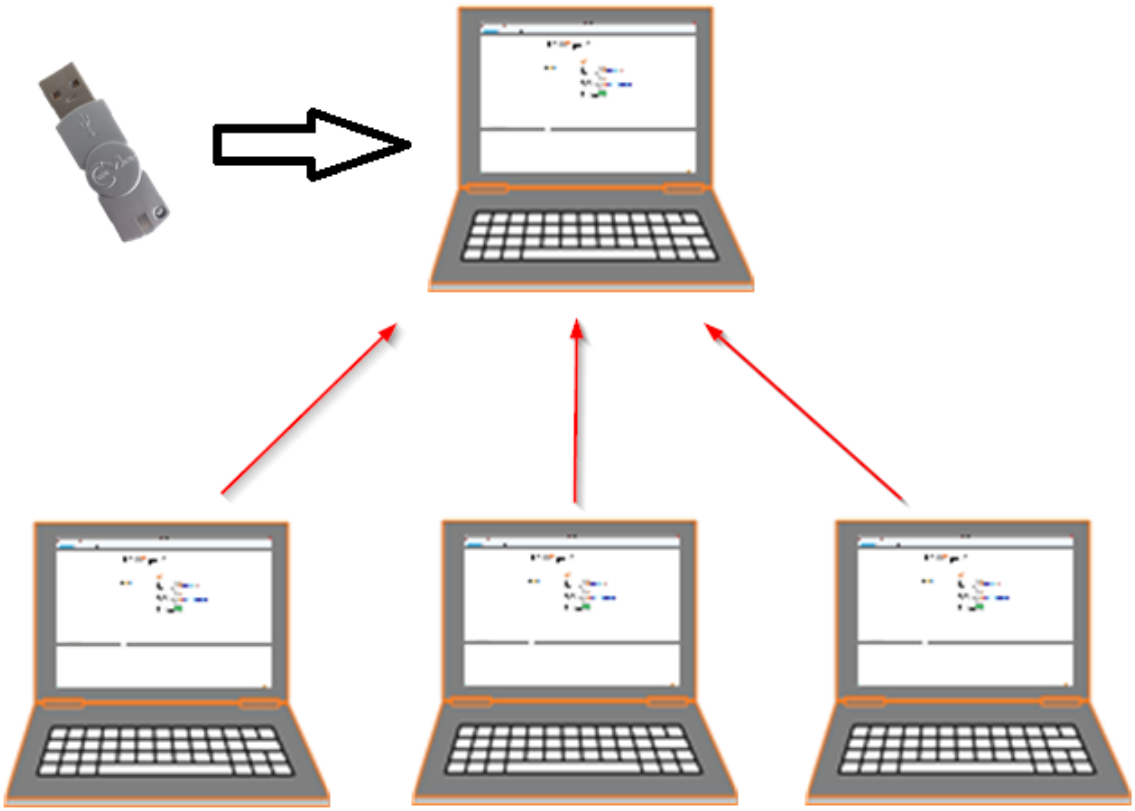
9.3 Node Locked License

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-Lyser.



9.4 Floating License

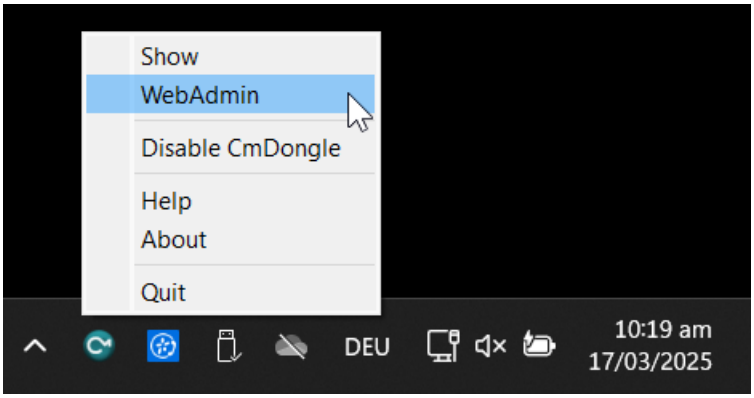
If you choose this license model, you need only one USB dongle with multiple floating licenses. This dongle must be plugged into your license server and all client computers will connect to this license server.



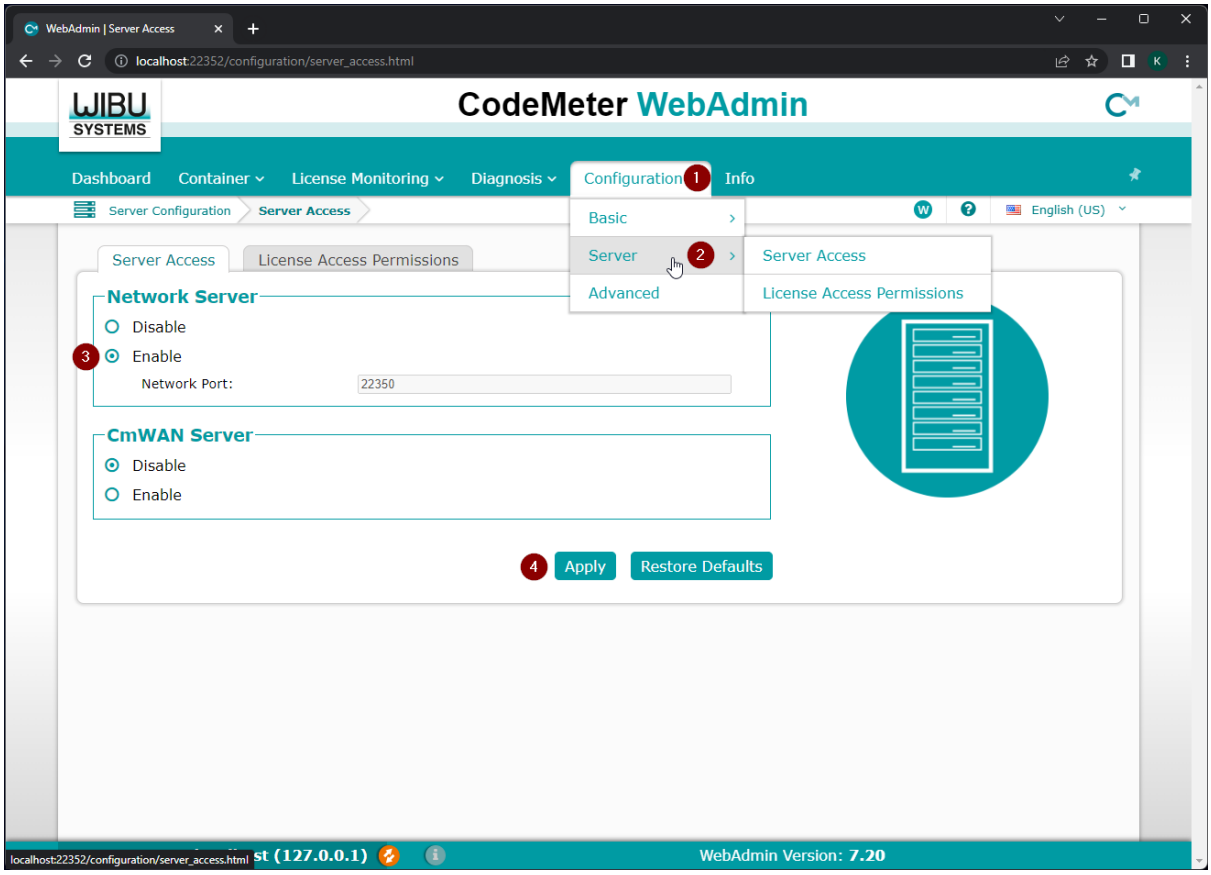
Note: This requires that the “WebAdmin” of the “Code Meter” is installed on the system. Please download and install the “Code Meter Runtime” from WIBU: https://www.wibu.com/

9.4.1 Configure License Server

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

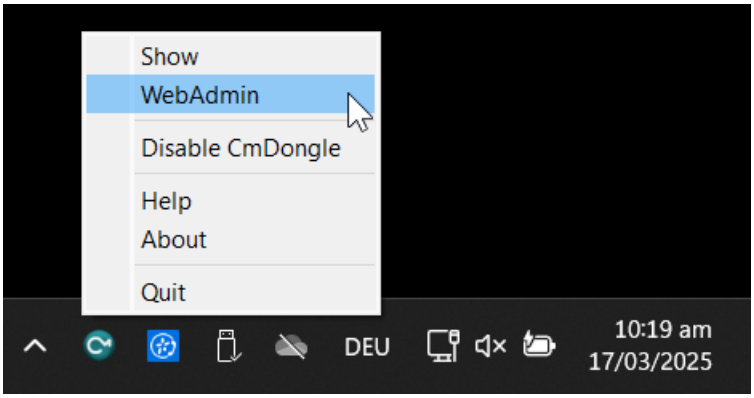


In the “WebAdmin” navigate to “Configuration Server”, select the option “Run Network Server” and press *Apply*:

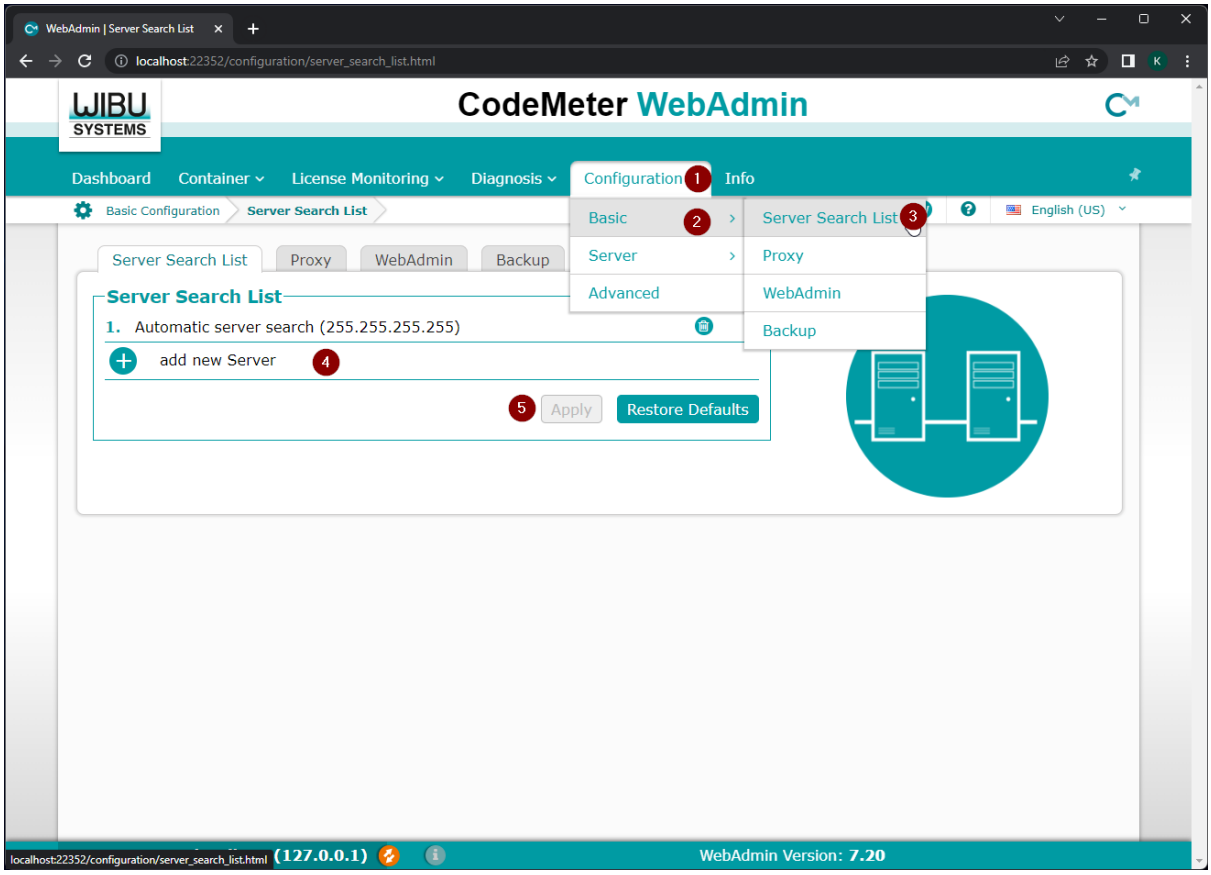


9.4.2 Configure Client Computer

Install the "Dongle-Version" of EC-Lyser and open the "WebAdmin":

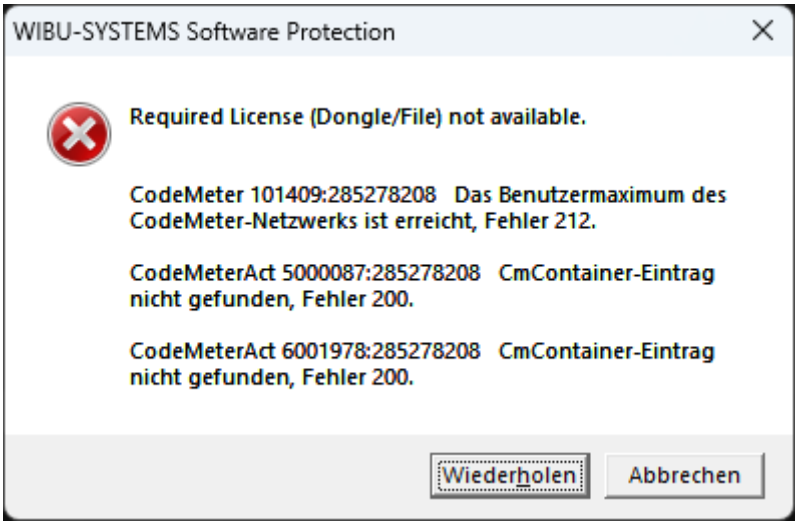


In the "WebAdmin" navigate to "Configuration Network", press *add*, enter your IP address of your license server and press *Apply*:



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

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

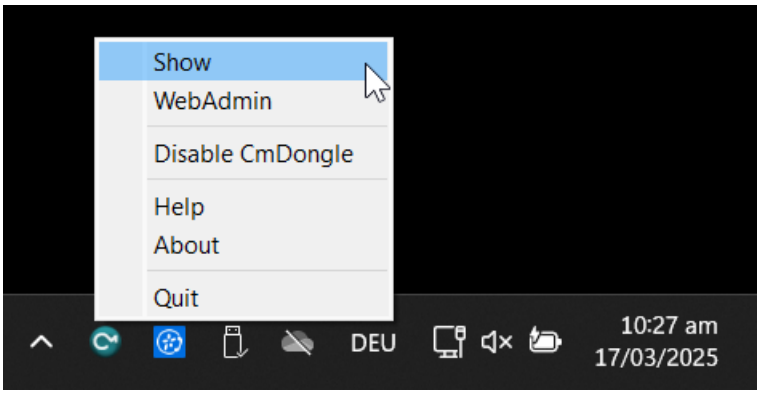


In that case, you should try to close unused EC-Lyser instances or buy more floating licenses.

9.5 License Update

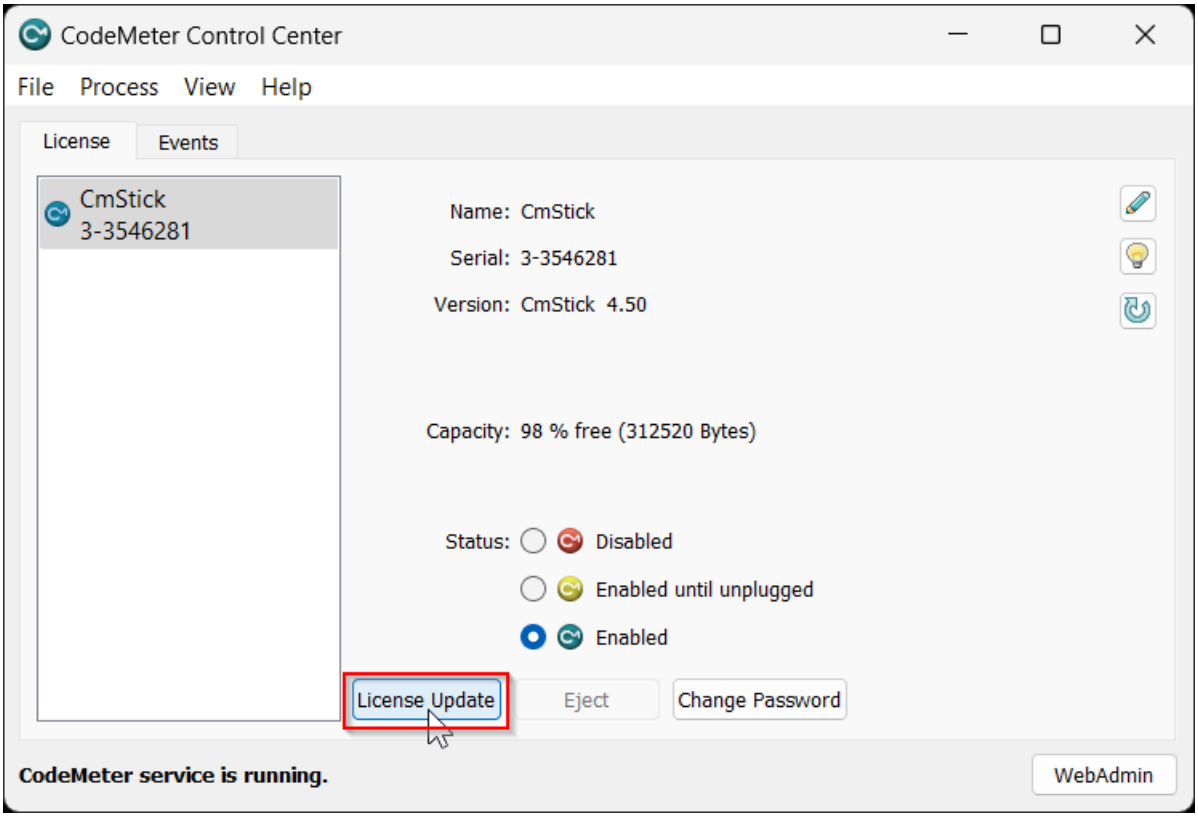
9.5.1 Request License Update

Step 1: Install the "Dongle-Version" of EC-Lyser and open the "CodeMeter Control Center":

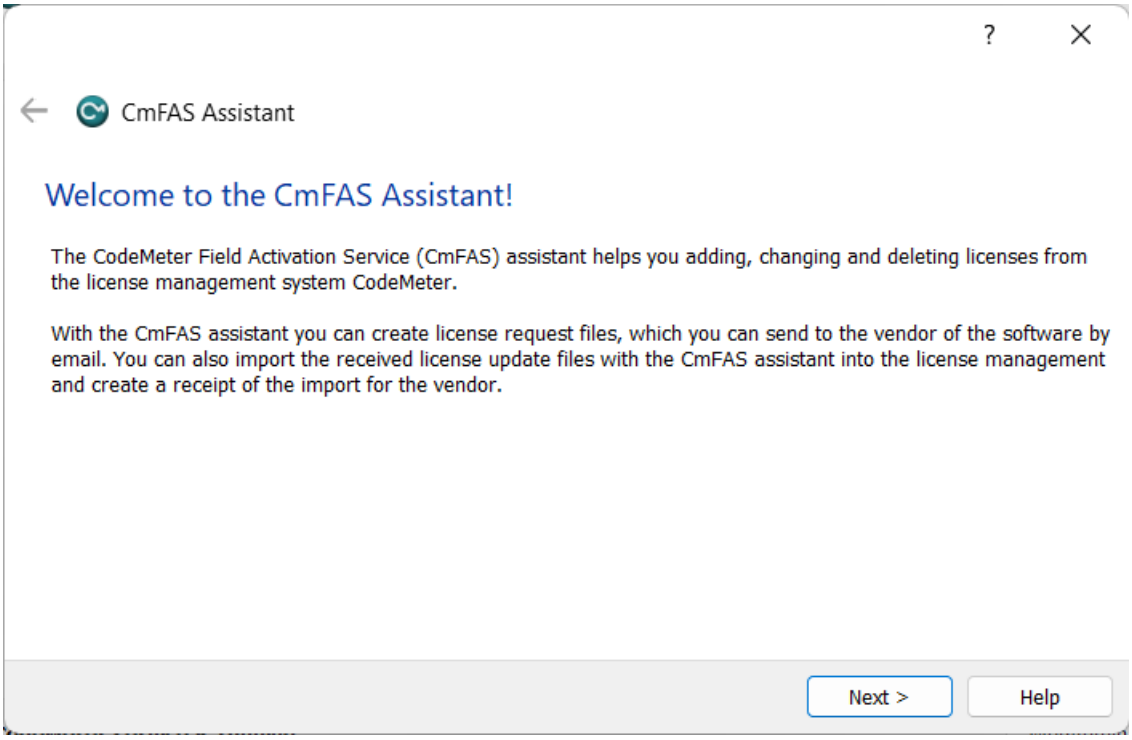


If the selected license is a virtual dongle, simply drag and drop the WibuCmLIF file onto the CodeMeter Control Center. Otherwise, the dongle should already be visible.

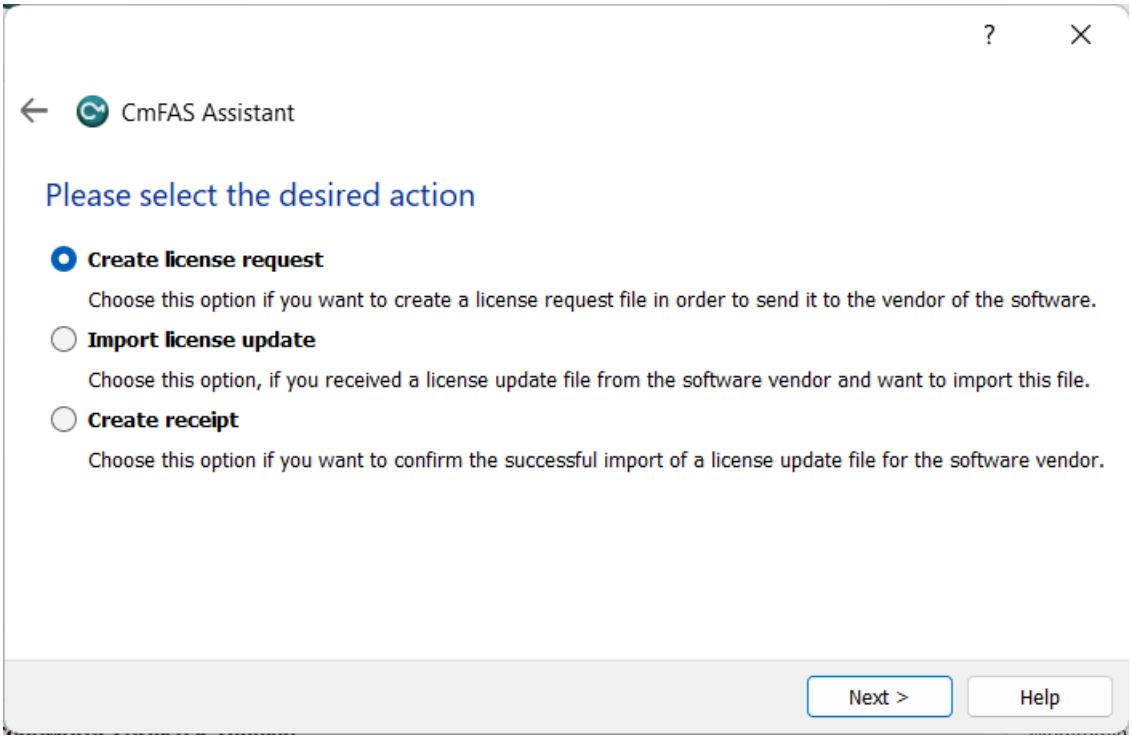
Step 2: In the "CodeMeter Control Center" open the "CmFAS Assistent" by clicking on *License Update*:



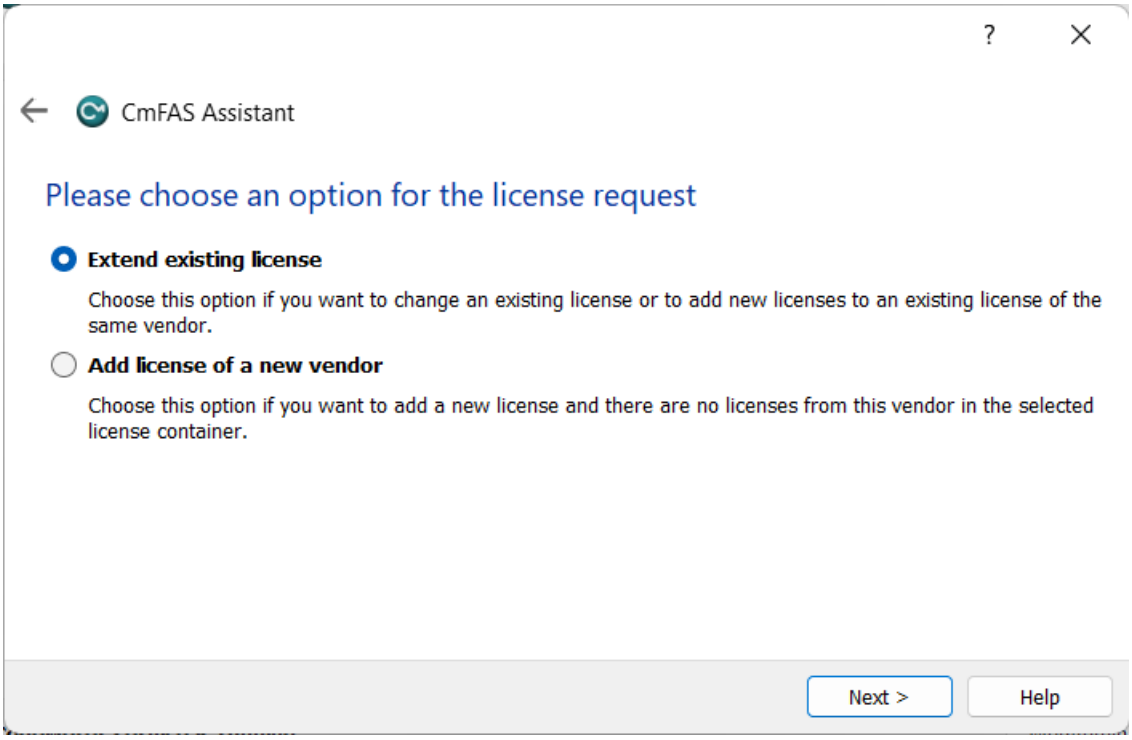
Step 3: Now, follow the assistant until you can select a file name:



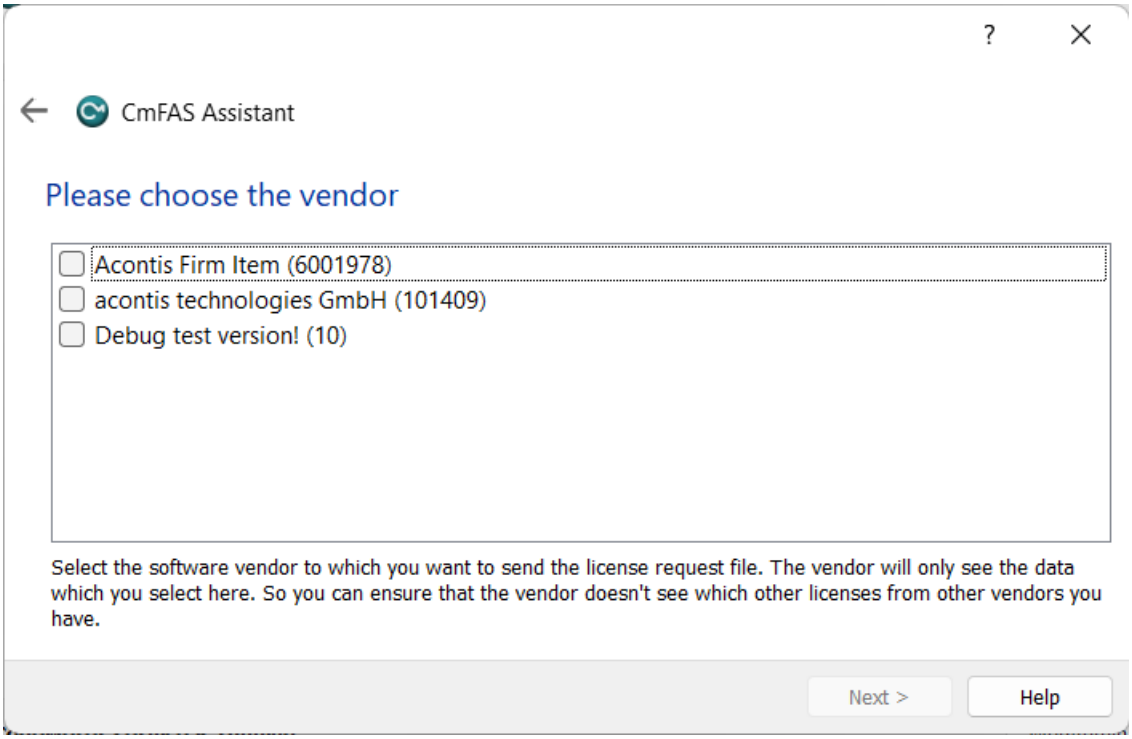
Step 4: Select "Create license request":



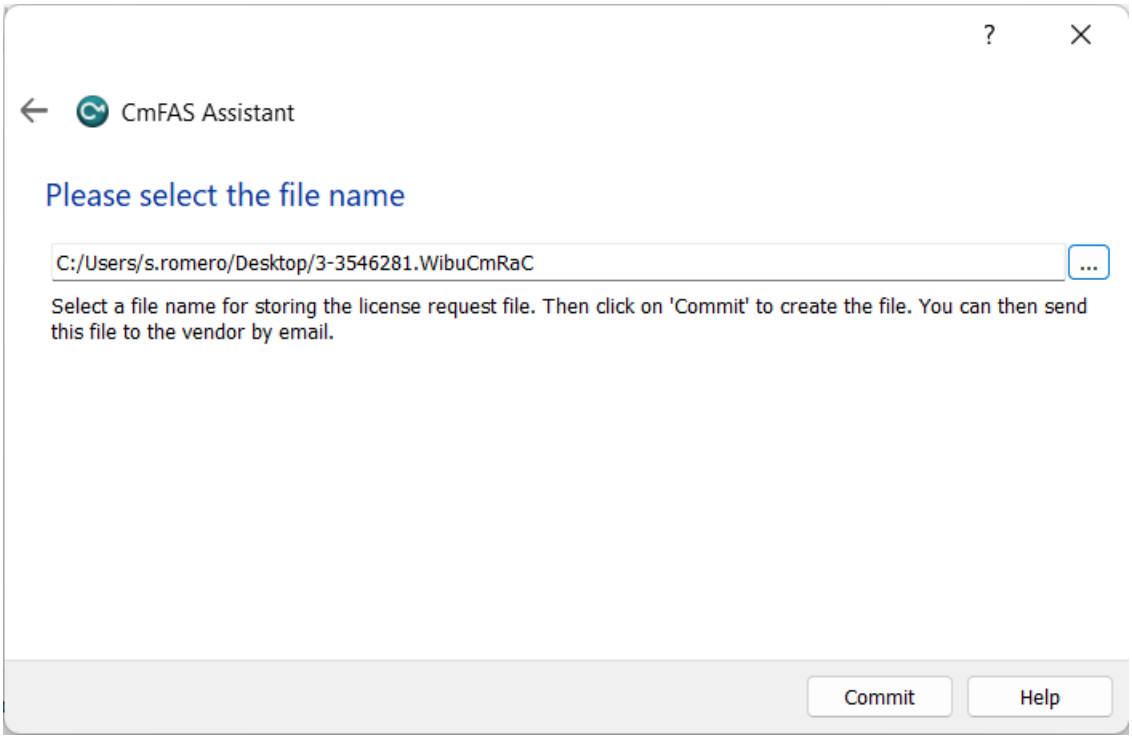
Step 5: Select "Extend existing license":



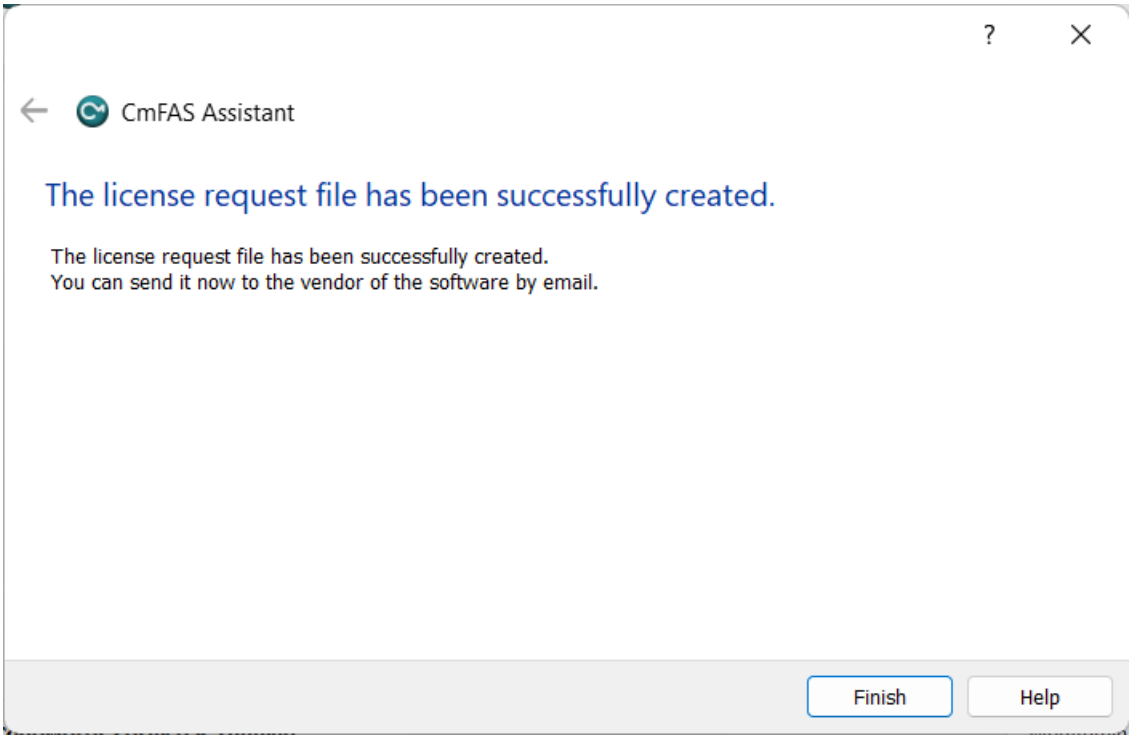
Step 6: Keep the selected the vendor:



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

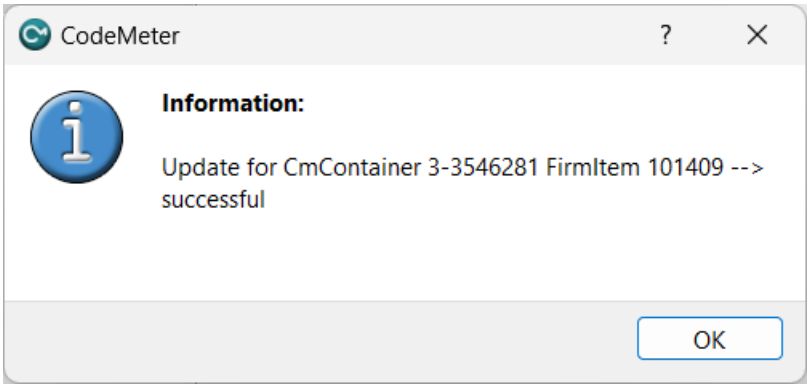
9.5.2 Install License Update

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

Step 1: Connect your dongle.

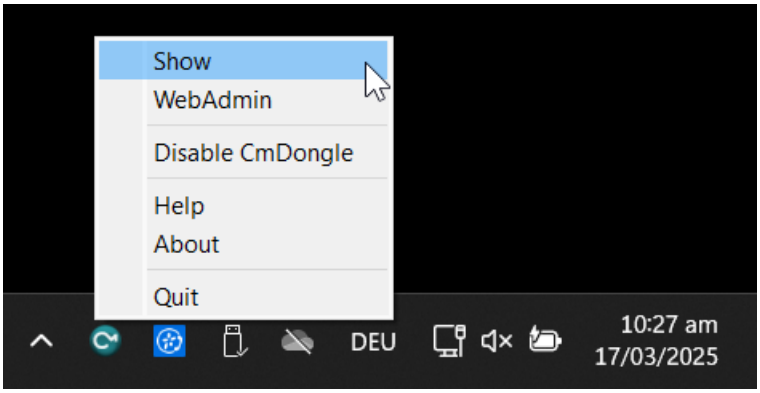
Step 2: Copy the license update file to your desktop.

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

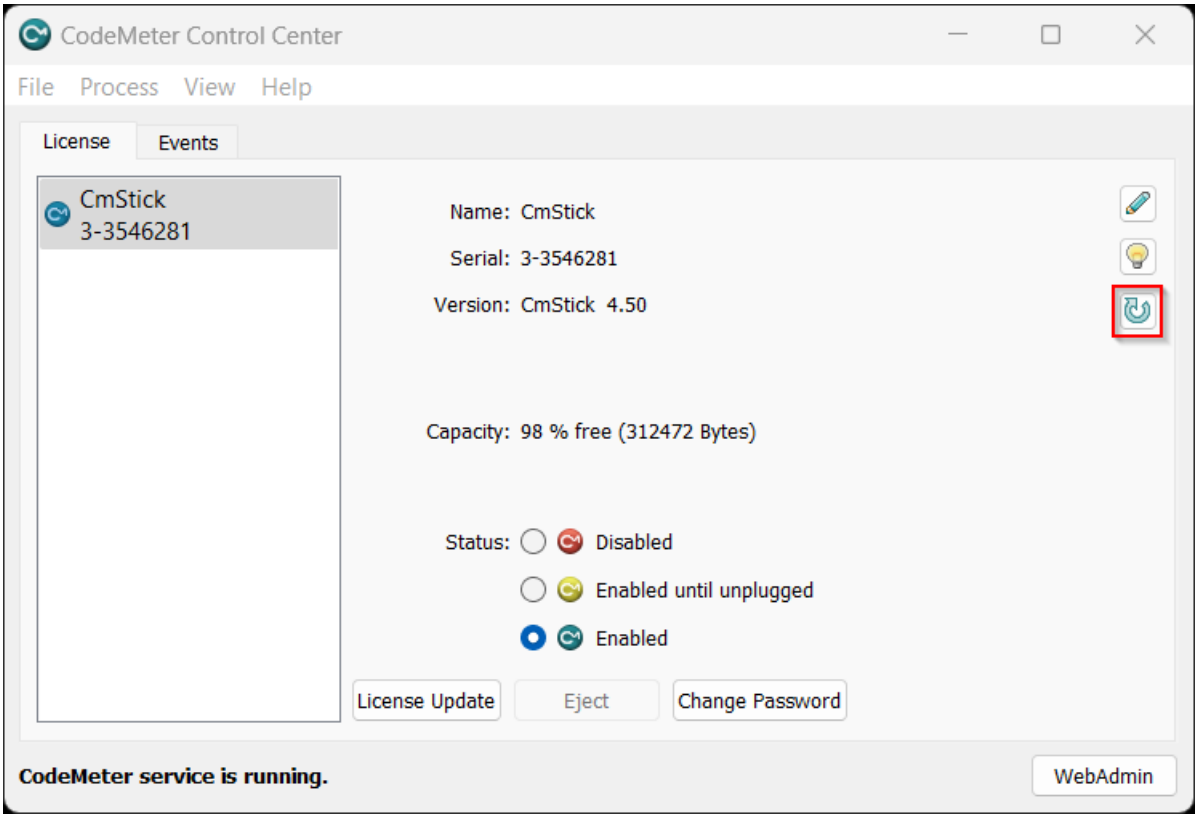


9.6 Dongle Firmware Update

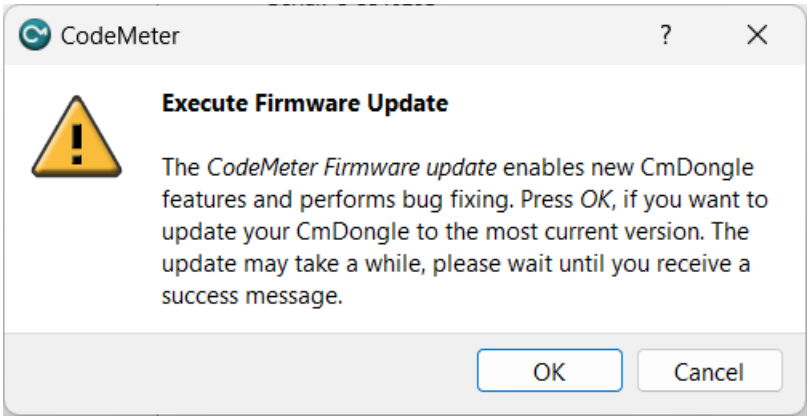
Step 1: Install the "Dongle-Version" of EC-Lyser and open the "CodeMeter Control Center":



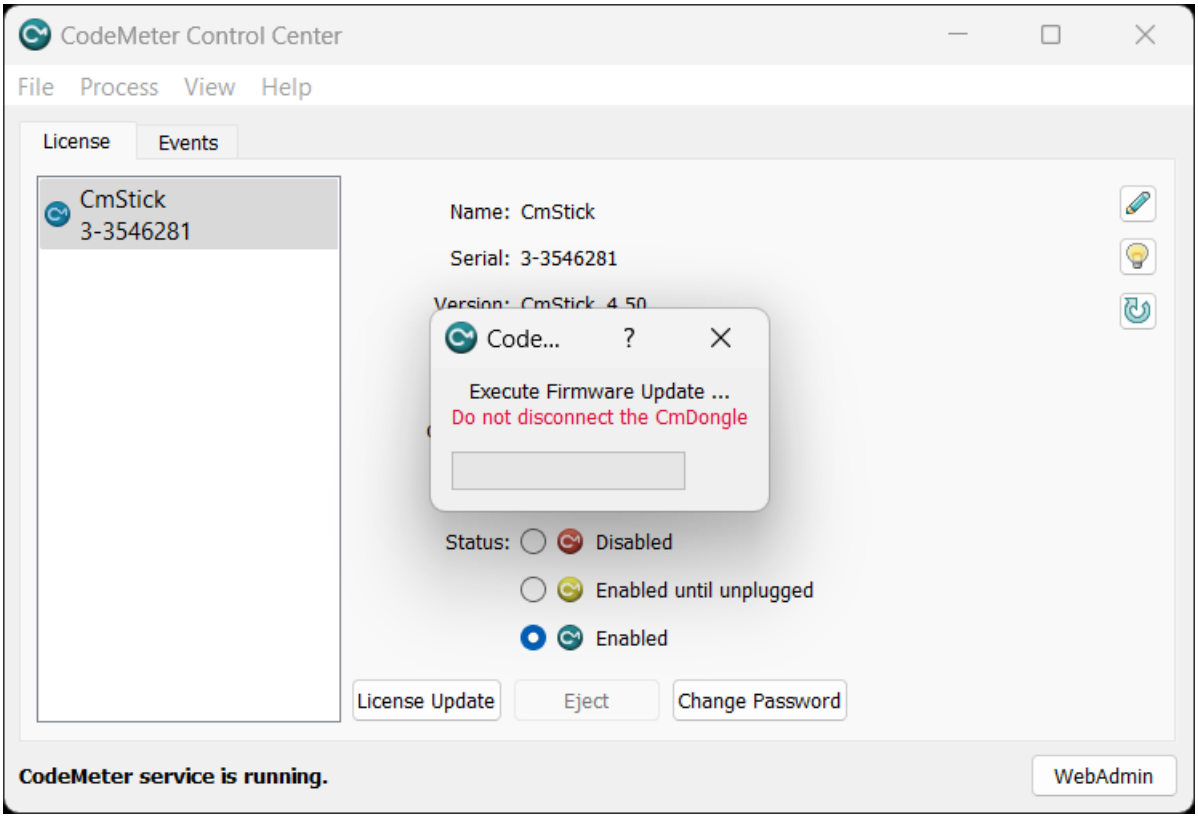
Step 2: In the "CodeMeter Control Center" click on *Update Firmware of selected Cm Dongle*:



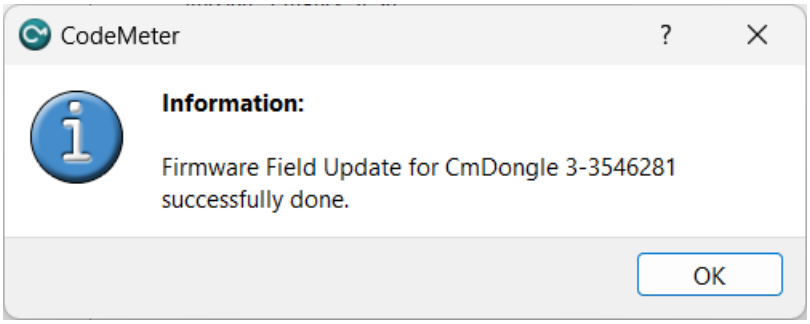
Step 3: Execute firmware update by pressing *OK*:



Step 4: Wait until firmware update was executed:

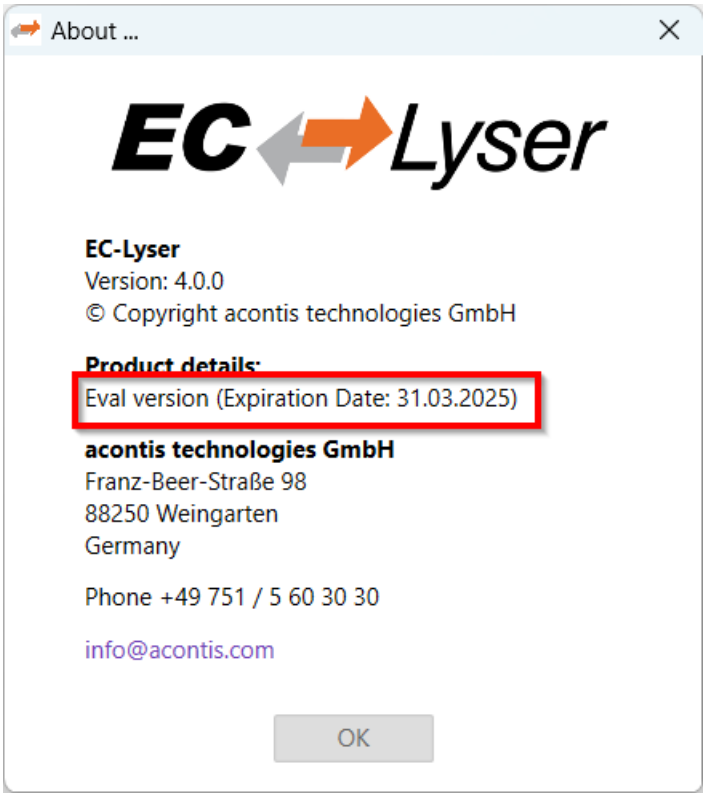


Step 5: Firmware update was done and dongle can be removed:



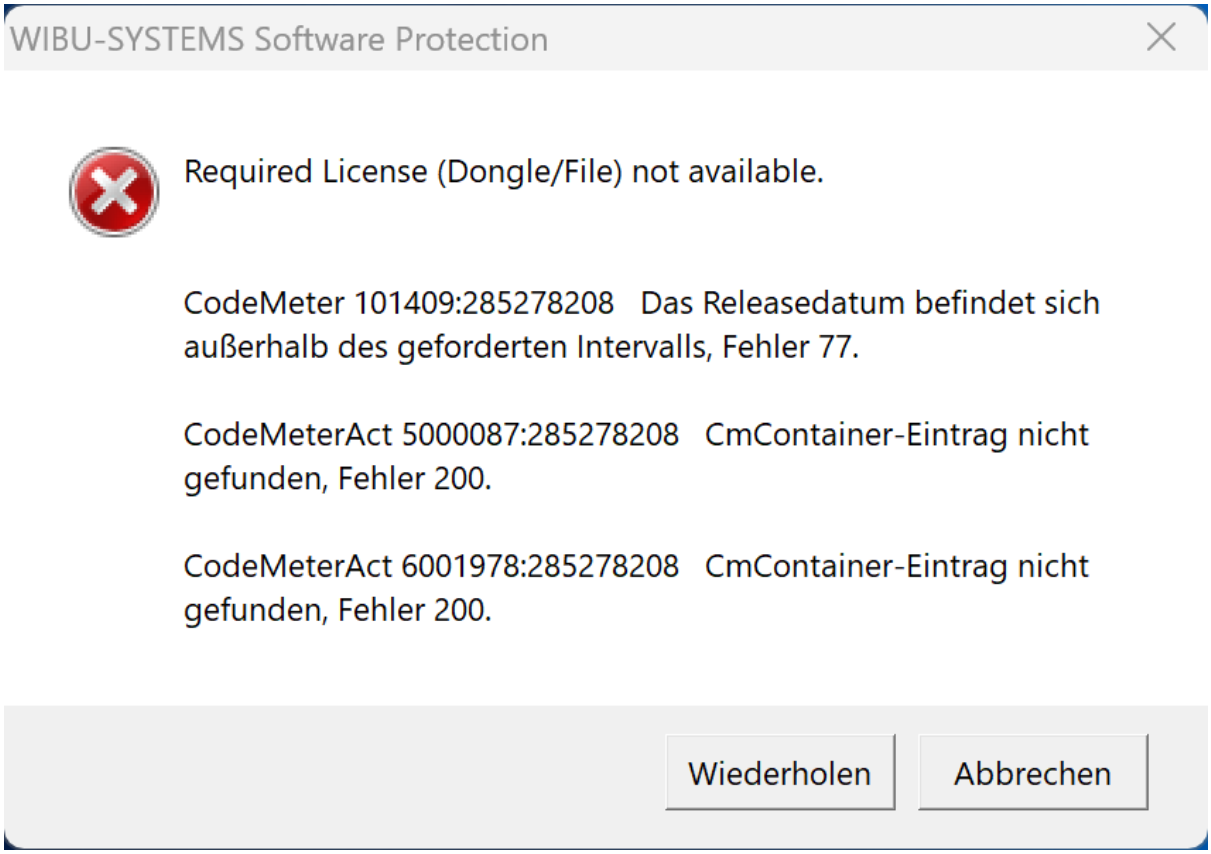
9.7 Expiration Date Dongle

If you chosed 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:



10 FAQ, Tips

10.1 Help in case of a problem

If you have a problem with EC-Lyser 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-Lyser and try to do it again
- **Contact support by sending a mail to ecsupport@acontis.com and attach the following information**
  - Project file `.ecc` or `.eci` if available
  - EC-Lyser Version *Menu* ‣ *Help* ‣ *About*
  - Log file *Menu* ‣ *Help* ‣ *Show Log File*
  - Short description how the reproduce it

10.2 Internal User Specific Settings

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

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
Timeot 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
Theshold 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

10.3 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-Lyser reports a message with ErrCode: 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-Lyser 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-Lyser reports the following message: Changing topology failed: Bus configuration mismatch (ErrCode: 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-Lyser 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?
- **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*)