

acontis technologies GmbH

SOFTWARE

EC-Engineer

User Manual

Version 3.8

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1 Introduction

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 in configuration mode:

൙ EC-Engineer []			-		×
<u>File View N</u> etwork <u>S</u> ettings <u>H</u> elp					
Configuration Mode 🛛 😵 Export ENI 🛛 🔯 Export EXI	Kan Diagnosis Mode				÷
Project Explorer	Device Editor				
▼ Uass-A Master	Master Process Data Image Wate	h list Trace Data Advanced Options Slave to Slave Distributed Clocks Tasks + Sync Units Data Acquisition			
 Slave_1001 [EK1100] (1001) 					
Slave_1002 [EL2008] (1002)	General				_
Slave_1003 [EL2008] (1003)	Unit Name	Class-A Master			_
Islave_1004 [EL1014] (1004)	Cycle Time [us]	1000	_		•
Slave_1005 [EL2004] (1005)	Source MAC address				
Slave_1006 [EL1034] (1006) Slave_1007 [EL1018] (1007)					
Slave 1008 [EL1013] (1007)					
Slave 1009 [EK1122-0080] (1009)	Slaves connected to local system				
Slave_1020 [EK1122] (1020)	Link Layer	Ndis			Ŧ
	Network Adapter	EtherCAT-Test (Intel/R) Ethernet Server Adapter (210-T1)			-
			De	eselect	
					-
	Slaves connected to remote systematic	m			
	Protocol	RAS			¥
	IP Address	127.0.0.1			
	Port				
	Master-Instance				
			Se	lect	
	Slaves simulated (Sil.)				
	Shaves simulated (Sie)				
	Slaves captured				
	Capture File				
Tradical View			Se	lect	
Classic View Plat View Topology View			_	_	
Short Info 👻 🌳	Messages				• *
Information	Severity Time Message				
Name Class-A Master	INF 09:51:42 Master state ch 0	ange from 'Init' to 'Pre-Op'			
Description EtherCAT Master Unit (Class A)	INF 09:51:39 Master state ch	ange from 'Unknown' to 'Init'			
vendor acontis technologies GmbH	INF 09:51:38 Master state ch 0	ange from 'Unknown' to 'Init'			_
	INF 09:51:34 Network scan s	uccessful - 26 slaves found			
	INF 09:34:22 EC-Engineer re	ady. Version 3.8.0			
Networks: 1 Slaves: 26		State: 🔹 单	Mode: CO	NFIG	EXPERT

It runs on the Engineering System where the engineer can configure the EtherCAT network. All slaves default to settings that match the Slave'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 slaves 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	v	 	~
Flat view	101	v	 	~
Topology view	102	v	 	~
Multiple Instances	103	v	 	~
Different themes	104	v	 	v
Different Languages	105	 ✓ 	 ✓ 	
Command line interface	106	v	 	v
EMI Manager	107	v	 	v
ESI Manager	108	v	 ✓ 	v
Expert Mode	109	 ✓ 	 ✓ 	
Edit topology view	110	v	 ✓ 	 ✓
Offline Diagnosis	111	×	 ✓ 	~
Unlimited Slave Count	112	×	 ✓ 	~



Configuration features	Feature ID	Free	Standard	Plus
Set up distributed clocks	200	 	 	~
Configure MDP slaves	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 slave	208	 	 	~
Slave to Slave	209	 	 	~
Support gateway slaves (EL6692, EL6224, EL6631-0010,)	210	 	 	~
Export ENI-File	211	×	 	~
Export Process variables	212	 	 	~
Multiple Cyclic Tasks	213	×	 	~
Import slaves from ENI	214	 	 	~
SoE Object-Dictionary (offline)	215	 	 	~
Change revision of slave	216	 Image: A set of the set of the	 	
Scan topology of local system	217	 	 	~
Scan topology of remote system	218	×	 	~
Scan PDO configuration from slave	219	 Image: A start of the start of	 	~
Scan MDP configuration from slave	220	 ✓ 	 	~
Define project templates	221	×	 	~
Support gateway masters (EL6751, EL6731,)	222	×	 	~
EtherCAT P support	223	 ✓ 	 	 ✓
Slave to Slave 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 Master	308	>	 	~
Remote System via RAS-Client	309	×	 	~
Reading count of slaves or frames	310	>	 	~
Compare configured and found slaves	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 master or slave	317	~	 	~
Reading/Writing values (SoE OD)	318	>	 ✓ 	~



1.3 Supported Slaves of Beckhoff EL6xxx

The following table shows the supported slaves 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)	v	 	~
EL6022 Interface 2Ch. (RS422/485)	 	 ✓ 	~
EL6080 EtherCAT Memory Terminal (128kB)	 	 ✓ 	~
EL6224 / EP6224 IO-Link Gateway	v	 	~
EP6228 / EPP6228 IO-Link Gateway	 	 ✓ 	~
EL6601 1 Port Switch (Ethernet, CoE)	 	 	
EL6614 4 Port Switch (Ethernet, CoE)	 	 ✓ 	~
EL6631-0010 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 Master	×	×	
EL6731-0010 PROFIBUS DP Slave	 ✓ 	 	
EL6751 CANopen Master	×	×	~
EL6751-0010 CANopen Slave	×	×	

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)

1.5 EtherCAT Slave descriptions (ESI files)

The EC-Engineer needs information about each Slave Type to correctly initialize it, give reasonable default settings and present the configurable properties to the user. The knowledge about the different Slave types is gathered from ESI files. The ESI files can be managed by the *ESI-Manager*.



2 Installation

2.1 Setup Process

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

Welcome page:

🔁 EC-Engineer Setup		_]	×
	Welcome to the E Wizard	C-Engineer	Setup		
	The Setup Wizard will insta Click Next to continue or C	Il EC-Engineer or ancel to exit the	n your co Setup W	mputer /izard.	
	<u>B</u> ack	<u>N</u> ext		Cancel	

License Agreement:



EC-Engineer Setup	_		×
End-User License Agreement Please read the following license agreement carefully	E	EC ngin	→ eer
Software License and Maintena Agreement	ince		
THIS AGREEMENT is made by and between aconti technologies GmbH (hereinafter referred to as "aco Licensee (hereinafter referred to as "Customer"), th hereto hereinafter collectively referred to as the "Par agreement is hereinafter referred to as the "Agreem Preamble	s ntis") a ne part rties". nent".	and ies This	
✓ I accept the terms in the License Agreement			
<u>P</u> rint <u>B</u> ack <u>N</u> ext	:	Cano	:el

Select Installation Folder:

🛃 EC-Engineer Setup		_		×
Destination Folder			EC	-
Click Next to install to the default folder or	click Change to o	hoose another	ngin	eer
Install EC-Engineer to:				
C:\Program Files (x86)\acontis_technologie	s\EC-Engineer\			(
Change				
	Back	<u>N</u> ext	Canc	el

Confirm Installation:





Installing EC-Engineer:

🛃 EC-Engineer Setup	– 🗆 X
Repairing EC-Engineer	EC ↔ Engineer
Please wait while the Setup Wizard repairs EC-Engineer.	
Status: Updating component registration	
Back	Next Cancel

Installation Complete:





2.2 Silent Installation (optional)

The product can be also installed in silent mode by using the command line parameters of msiexec.

Sample 1: Installs EC-Engineer into default installation folder

```
\ msiexec /i c:/temp/ECEngineerSetup.msi /quiet /qn /norestart /log \hookrightarrow c:/temp/install.log
```

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

\$ msiexec /i c:/temp/ECEngineerSetup.msi /quiet /qn /norestart /log \$\to c:/temp/install.log INSTALLLOCATION="C:/EC-Engineer"

For more information please refer command line parameters of msiexec.

Note: The system requirements Supported Slaves of Beckhoff EL6xxx will be not checked!

2.3 File and Folder Structure

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

Installation directory: (Default: %ProgramFiles%/acontis_technologies/EC-Engineer)

/Doc

Release notes and the user manual

/EEC

Files for mapping emergency error codes

/Languages



- Lanugage specific files
- EC-Engineer.exe
- EcMaster.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)

/EtherCAT

EtherCAT Slave Information (ESI) Files Can be modified via ESI-Manager

/EMI

EtherCAT Master Information files (see Themes)

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 emllNdis.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.



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

🛹 EC-Engineer []		-		×
<u>File View N</u> etwork <u>S</u> ettings <u>H</u> elp				
Configuration Mode 🛛 🐨 Export ENI 🛛 🐺 Export EXI	Kan Diagnosis Mode			÷
Project Explorer	Device Editor			
▼ Uass-A Master	Master Process Data Image Wa	tch list Trace Data Advanced Options Slave to Slave Distributed Clocks Tasks + Sync Units Data Acquisition		
 Slave_1001 [EK1100] (1001) 				
Slave_1002 [EL2008] (1002)	General			
Slave_1003 [EL2008] (1003)	Unit Name	Class-A Master		
H Slave_1004 [EL1014] (1004)	Cycle Time [us]	1000		•
Slave_1005 [EL2004] (1005)	Source MAC address			
Slave_1006 [EL1034] (1006)				
Slave_1007 [EL1018] (1007)				
Slave_1008 [EL2008] (1008)	Slaves connected to local custo			
Slave_1009 [EK1122-0080] (1009)	Link laws	Mar.		
F Slave_1020 [ck(1)22] (1020)	Link Layer	NOIS		
	Network Adapter	Ndis D		
		winPcap		
				_
	Slaves connected to remote sys	stem		
	Protocol	RAS		_
	IP Address	127.0.0.1		
	Port	6000		
	Master-Instance	0		
			Select	



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:

Getting Started



3.1 Offline Configuration

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

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



൙ Select Master Unit Dialog		×
Select the desired master unit f	rom the list:	
EtherCAT Master Unit (Class A))	•
	ОК	Cancel

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

💠 Append EtherCAT Slave to 'Clas	s-A Master'	- 0	×
Filter			
Search			
Vendors	[ALL VENDORS]		
Show Hidden Slaves			
Show Preconfigured Slaves (SCI)			
Connection			
	Port B, MII		
Connect at			
Slaver			
Select a specific slave from the lis	t and adjust the number of slaves.		
ABB ABB	-		^
Accelovant			
🕨 🦽 acontis technologies Gr	ън		
ACS Motion Control			
Advanced Energy Indust	ries, Inc.		
Advantech Co., Ltd.			
Applied Materials, Inc.			\sim
Number of Slaves	1	OK Cancel	

If you can not find your slave 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 Configuration

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

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

🤿 Select Master Unit Dialog		×
Select the desired master unit fro	m the list:	
EtherCAT Master Unit (Class A)		•
	OK	Cancel

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

Device Ed	itor								
Master	Process Data Image	Watch list Trace Da	ta Advanced Options	Slave to Slave	Distributed Clocks	Tasks + Sync Units	Data Acquisition		
Genera	d.								
Unit	Name	Class-A Maste	r						
Cycle	Time [us]	1000							•
Sourc	e MAC address	A0-36-9F-30-	00-3B						
Slaves	connected to local sy	/stem							
Link I	ayer	Ndis							•
Netw	ork Adapter	EtherCAT-Test	(Intel(R) Ethernet Serv	er Adapter I210-	T1)				•
								Select	
Clause									
Brote	connected to remote	RAS							•
IP Ad	dress	127 . 0 .	0.1						
Port	aress	6000	• • •						_
Mast	er-Instance	0							
								Select	
Clawer	cimulated (Sil)								
Slaves	sinulateu (SIL)							Select	
								Jeneer	
Slaves	captured								
Capt	ure File								

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 slaves.

3.3 Remote Configuration

This mode can be used if slaves 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 Master Unit Dialog* for choosing the desired master unit (at the moment he can choose between Class A and Class B master):

🛹 Select Master Unit Dialog		×
Select the desired master unit	from the list:	
EtherCAT Master Unit (Class A)	•
	ОК	Cancel

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

Device Ed	itor								
Master	Process Data Image	Watch list Trace Data	Advanced Options	Slave to Slave	Distributed Clocks	Tasks + Sync Units	Data Acquisition		
Genera	al								
Unit	Name	Class-A Master							
Curle	Time fuel	1000							-
Cycle	e nime (usj	1000							_
Sour	ce MAC address								
Slaves	connected to local s	/stem							
Link	Layer	Ndis							•
Netw	ork Adapter	EtherCAT-Test (Intel(R) Ethernet Serv	er Adapter I210-	T1)				-
								Select	
_									_
Slaves	connected to remote	e system							
Proto	ocol	RAS							_
IP Ad	ldress	127 . 0 . 0	. 1						
Port		6000							
Mast	er-Instance	0							
								Select	
Clause	cimulated (Sil)								
Slaves	simulated (SIL)							.	
								Select	
Slaves	captured								
Capt	ure File								
copt								Select	

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 Slaves 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 Remote Diagnosis

This mode should be used if the EC-Master is already running on the control system and the user wants to take a look into the "health" of the EtherCAT system.

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

🛹 Select Master Unit Dialog		×
Select the desired master unit f	rom the list:	
EtherCAT Master Unit (Class A))	•
	OK	Cancel

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

Device Ed	itor								
Master	Process Data Image	Watch list Trace Data	Advanced Options	Slave to Slave	Distributed Clocks	Tasks + Sync Units	Data Acquisition		
Genera	4								
Unit		Class-A Master							
Cycle	Time [us]	1000							-
cycle	MAC address		20						_
Source	e MAC address								
Slaves	connected to local s	ystem							
Link I	ayer	Ndis							•
Netw	ork Adapter	EtherCAT-Test (Intel(R) Ethernet Serv	er Adapter I210-	T1)				-
								Select	
									_
Slaves	connected to remote	e system							
Proto	col	RAS							_
IP Ad	dress	127.0.0	. 1						_
Port		6000							_
Mast	er-Instance	0							
								Select	
Slaves	simulated (SiL)								
								Select	
Slaves	captured								
Capti	ure File								
								Select	

After entering the IP address, a click to *Select* switches the EC-Engineer into Diagnosis Mode. There the user sees the "health" of his EtherCAT system.

3.5 Offline Configuration and Simulation

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

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

🤿 Select Master Unit Dialo	og	X
Select the desired master (unit from the list:	
EtherCAT Master Unit (Cla	ass A)	•
	OK	Cancel

Then the user have to select the simulator:

ice Editor		_
laster Process Data Image	Watch list Trace Data Advanced Options Slave to Slave Distributed Clocks Tasks + Sync Units Data Acquis	ition
General		
Unit Name	Class-A Master	
Cycle Time [us]	1000	
Source MAC address		
Slaves connected to local sy	stem	
Link Layer	Ndis	
Network Adapter	EtherCAT-Test (Intel(R) Ethernet Server Adapter I210-T1)	
		Select
Slaves connected to remote	sustem	
Protocol	RAS	
IP Address	127.0.0.1	
Port	6000	
Master-Instance	0	
		Select
Slaves simulated (SiL)		
		Select
Slaves captured		
Capture File		0.1
		Select

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



💠 Append EtherCAT Slave to 'Class-A Master' –			- 0 X	
Filter				
Search				
Vendors	[ALL VENDORS]			
Show Hidden Slaves				
Show Preconfigured Slaves (SCI				
Connection				
	Port B, MII			
Connect at				
(J				
Select a specific slave from the	ist and adjust the number of slaves			
			~	
ADD ADD				
Accelovant				
acontis technologies G	SmbH			
ACS Motion Control				
Advanced Energy Indu	istries, Inc.			
Advantech Co., Ltd.				
Applied Materials, Inc.			~	
Number of Slaves	Number of Slaves 1 OK Cancel			

If you can not find your slave 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 or switch to diagnosis mode and simulate the network.

3.6 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 first the *Select Master Unit Dialog* for choosing the desired master unit (at the moment he can choose between Class A and Class B master):

裙 Select Master Unit Dialo	g	×
Select the desired master u	init from the list:	
EtherCAT Master Unit (Cla	ss A)	•
	OK	Cancel



Afterwards he will see the *Master-Tab*, where he can enter the path to the capture, which contains one or more previously taken snapshots:

Device Editor			
Master Process Data Im	age Watc	h list Trace Data Advanced Options Slave to Slave Distributed Clocks Tasks + Sync Units Data Acquisition Mo	tion
General			
Unit Name	6	Class-A Master	
Cycle Time [us]		1000	•
Source MAC address		A0-36-9F-30-00-3B	
Slaves connected to lo	cal system		
Link Layer		Ndis	Ŧ
Network Adapter		EtherCAT-Test (Intel(R) Ethernet Server Adapter I210-T1)	Ŧ
			eselect
Clause connected to co			
Protocol	mote syste	RAS	-
IP Address		127.0.0.1	
Port			
Master-Instance		0	
		S	elect
Slaves simulated (Sil.)			
Slaves Simulated (SIE)		s	elect
Slaves captured			
Capture File			
			elect

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.



4 Graphical user interface

4.1 Overview

This section gives an overview about the graphical user interface:

൙ EC-Engineer []		– D X
File View Network Settings Help 🔫		Menu
Configuration Mode 💀 Export ENI 🐺 Export EXI	📕 Diagnosis Mode 🔫	Toolbar Device Editor
Project Explorer	Device Editor	
🔻 🖳 Class-A Master	Master Process Data Image Wat	tch list Trace Data Advanced Options Slave to Slave Distributed Clocks Tasks + Sync Units Data Acquisition Motion
Slave_1001 [EK1100] (1001)		
Slave_1002 [EL2008] (1002)	General	
Slave_1003 [EL2008] (1003)	Unit Name	Class-A Master
Slave_1004 [EL1014] (1004)	Cycle Time [us]	1000 *
Slave_1005 [EL2004] (1005)	Source MAC address	
Slave_1006 [EL1034] (1006)		
Slave_1007 [EL1018] (1007)		
Slave_1008 [EL2008] (1008)	Slaver connected to local system	
Filler Slave 1009 [EK1122-0080] (1009)	Link Laure	N.C.
F B Slave_1020 [ck1122] (1020)	Link Layer	Nas
↑	Network Adapter	EtherCAI-lest (Intel(R) Ethernet Server Adapter I210-11)
		Select
	Slaves connected to remote syst	tem
	Protocol	RAS
Project Explorer	IP Address	127 0 0 1
	Port	6000
	Master-Instance	0
		Select
	Slaves simulated (SiL)	
		Select
Short Info	Slaves captured	
	Capture File	
Classic View Flat View Topology View		
Short Info	Messages	÷ 9
Information	Severity Time Message	
Name Clarge A Marter	INF 14:23:07 Master state cl	thange from "Init' to 'Pre-Op'
Description EtherCAT Master Unit (Class A)	INF 14:23:04 Master state cl	thange from 'Unknown' to 'Init'
Vendor acontis technologies GmbH	INF 14:23:03 Master state cl	thanae from 'Unknown' to 'Init'
	INF 14:23:00 Network scan	successful - 26 slaves found
Naturation 1 Stauger 26		State: A Made CONER EVER

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 and allows the user to change it by adding or removing devices/slaves/modules.

Device Editor:

Show information about the selected device, like process variables or PDO mappings. It allows the user also change this information.

Short Info:

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

Messages:

Shows notifications which occur e.g. when the EtherCAT Master has changed its operation state or a slave 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 Master-Unit:

Add a new Master-Unit to the configuration. At the moment we have three Master-Units:

- EtherCAT Master Unit (Class A)
- EtherCAT Master Unit (Class B)

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 Mode:

(De-)Activates expert mode

Motion Mode:

(De-)Activates motion mode

Refresh:

Updates the current view

4.2.3 Network

Scan EtherCAT Network:

Scans the connected network for slaves

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 / 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 slaves with the connected slaves. See Network Mismatch Analyzer



Line Crossed Analyzer (active only after scan):

Shows wrong connected slaves. 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*

Clear Error Counters (active only in diagnosis mode):

Clears the error counters of all connected slaves (for more information about the extended diagnosis, see *Extended Diagnosis (Expert)*)

Acknoledge all warnings (active only in diagnosis mode):

Clears the yellow warning icon of all slaves

Self Test Scan:

Executes a self test routine for EC-Master and the network

Rescue Scan:

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

Take Snapshot (active only for local or remote system):

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 (active only for local or remote system):

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

Snapshot (active only for offline diagnosis system):

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

Language:

Changes the current language

Theme:

Changes the current theme

Message Level:

Change the current message level

Capture File:

Shows capture file settings dialog

Project Template:

Shows project template settings dialog

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 Configuration Mode

There are three topology visualisation views:

Classic View

Project Explorer				
 Class-A Master 				
 Slave_1001 [EK1100] (1001) 				
Slave_1002 [EL2008] (1002)				
Slave_1003 [EL2008] (1003)				
Slave_1004 [EL1014] (1004)				
Slave_1005 [EL2004] (1005)				
Slave_1006 [EL1034] (1006)				
Slave_1007 [EL1018] (1007)				
Slave_1008 [EL2008] (1008)				
Slave_1009 [EK1122-0080] (1009)				
Slave_1020 [EK1122] (1020)				
Classic View Flat View Topology View				

This is a tree view which has two levels. In the first level you can find coupler slaves or MDP slaves and in the second level you will see the connected slaves/modules.

Flat View



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

Topology View



v

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

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

Append Slaves:

Appends a new slaves

Remove Slaves: Deletes the selected slaves

Cut/Copy/Paste:

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

Enable Slaves:

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

Disable Slaves:

Removes the slaves from process image and from the exported ENI file, but keeps the slave 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 slave 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 slave which can be added to the configuration and is working out of the box.

Change Slave:

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

-	Ch	nange Slave		_		Х
C	omp Sele	atible Slaves	ust used revision: 0v00100000			
		FI 2008	El 2008 8Ch. Dia. Output 24V, 0.54	0v001000	00 (10485	76)
	•	EL2008	EL2008 8Ch. Dig. Output 24V, 0.5A	0x001100	00 (11141	12)
	•	EL2008	EL2008 8Ch. Dig. Output 24V, 0.5A	0x001200	00 (11796	(48)
	•	EL2008-0015	EL2008-0015 8Ch. Dig. Output 24V DC, 0.35A, not short-circuit proof	0x001000	IOF (10485	91)
			ОК	(Cancel	

Import Beckhoff Slave Description, to import slave settings from TwinCAT (or ET9000)

Import slave settings from "Beckhoff Slave Description" files

- Open project in TwinCAT
- · Select slave 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 slave from "Beckhoff Init Command Description" files

- Open project in TwinCAT
- Select slave 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 slave he will see the following dialog:

💠 Append EtherCAT Slave to 'Class-A Master' -				
Filter Search Vendors [ALL VENDORS] Show Hidden Slaves Show Preconfigured Slaves (SCI) Connection Port B, MII Connect at				
Slaves Select a specific slave from the list and adjust the number of slaves.				
ASS ABB		^		
General Accelovant				
acontis technologies GmbH				
Advanced energy industries, inc.				
Advantech Co., Ltd.				
r 👱 Applied Materials, Inc.		\rightarrow		
Number of Slaves 1 OK Cancel				

Filter

Search: Keyword to filter the slaves by type name. Vendors: List of all available vendors. User can filter all slaves 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 slave to an E-Bus. Show Hidden Slaves: Shows also hidden slaves (e.g. with older revisions, if newer slaves are available) Show Preconfiguren Slaves: Shows also slaves from SCI files

Connection

Select the port where the predecessor device is connected (see General).

List of available slaves

User can select the slave which he wants, be expanding the three levels: vendors, groups and the slaves themselves. The 3rd level consists of three parts: Type name, description and the revision number.



Number of slaves

User can change this value if he wants to add more than one slave of the same type.

4.3.2 Diagnosis Mode

There are three topology visualisation views:

Classic View

Project Explorer
 Class-A Master <connected></connected>
 Slave_1001 [EK1100] (1001)
Slave_1002 [EL2008] (1002)
Slave_1003 [EL2008] (1003)
Slave_1004 [EL1014] (1004)
Slave_1005 [EL2004] (1005)
Slave_1006 [EL1034] (1006)
Slave_1007 [EL1018] (1007)
Slave_1008 [EL2008] (1008)
Slave_1009 [EK1122-0080] (1009)
Slave_1020 [EK1122] (1020)
Classic View Flat View Topology View

This is a tree view which has two levels. In the first level you can find coupler slaves and in the second level you will see the connected slaves.









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



Topology View



Project Explorer	
100% 🗸	
Classic View Flat View Topology View	

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



If cable quality is constricted or bad, please check the error counters of the slave (for more information about the extended diagnosis, see *Extended Diagnosis (Expert)*).



4.4 Device Editor

This Editor gives the user the possibility to read and write information of the selected master or slave:

Device Editor	
General E-Bus Current Adv	red Options Motion
Address	
Station Address	1001
Information	
Name	Slave 1001 [EK1100]
Description	EK1100 EtherCAT Coupler (2A E-Bus)
Vendor	Beckhoff Automation GmbH & Co. KG (0x0000002)
Product Code	0x044C2C52 (72100946)
Revision Number	0x00110000 (1114112)
ESI File	Beckhoff EK11xx.xml
Identification Value	Not Used
Ports	
A [X1 IN]	Class-A Master
D	Not Available
В	Slave_1002 [EL2008] (1002)
C [X2 OUT]	Not Connected

Some tabs in the Device Editor are Expert Settings. The menu item *View Expert Settings* enables or disables the Expert Settings' visibility. Some tabs appear when configuring the first Slave.

4.5 Short Info

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

Short Info		v	ф
Information			
Name	Slave_1001 [SGDV-E1 CoE Drive]		
Description	SGDV-E1 EtherCAT(CoE) SERVOPACK Rev3		
Vendor	Yaskawa Electric Corporation (0x00000539)		
Physical Address	1001		
AutoInc Address	0x00 / 0		



4.6 Message Window

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

Messages			
	Severity	Time	Message
0	INF	14:21:16	Master state change from 'Init' to 'Pre-Op'
0	INF	14:21:13	Master state change from 'Unknown' to 'Init'
0	INF	14:21:12	Master state change from 'Unknown' to 'Init'
0	INF	14:21:09	Network scan successful - 26 slaves found


5 Configuration Mode

5.1 Overview

The EC-Master needs the EtherCAT-Network-Information (ENI) file to initialize and control the EtherCAT network. In most cases the automatically generated Slave settings can be used to run the EtherCAT network. In this chapter you can read how EC-Engineer helps you to view or adjust those settings.

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

🛹 EC-Engineer []				- 0	נ	×
<u>File View Network Settings H</u> elp						
Configuration Mode 🛛 🖗 Export ENI 🛛 🖗 Export EXI	📕 Diagnosis Mode					÷
Project Explorer	Device Editor					
	Start Page					
	EC 📥 Engli	inoor				
	Add Master Unit G	Setting Started				
	🛹 EtherCAT Master Unit (Class A)					^
	EtherCAT Master Unit (Class B)		Offline Configuration			
	EtherCAT Master Unit (Exwin)		in the blice			
	Attention of the temperature of temperate					
	HerCAT Monitor	EtherCAT	Online Configuration			
	Recent Projects		Slaves connected to engineering system			
	C:\Users\\project.ecc					
	C:\Users\\SpencerPM2.ecc		Remote Configuration			
			Slaves connected to target system			
			Remote Diagnosis			
			Slaves connected to target system			
			Offline Configuration and Simulation			
			Slaves simulated (SiL)			
		SiL SiL				
Classic View Flat View Topology View						~
Short Info 👻 👎	Messages					- 4
Information	Severity Time Message					
	INF 15:12:28 EC-Engineer ready. Version 3.8.0					
Networks: 0 Slaves: 0			State: 👄 👄	vlode: CONF	IG EX	(PERT

It consists of three sections:

- Add Master Unit: List of available master units
- Recent Projects: List of the last five opened projects
- Getting Started: List of available run modes

If the user clicks on one of the links, it runs a new master unit, opens an already existing project or switches in the "Getting Started" mode.



5.2 Master Settings

This section includes network related or master related settings. Some of those settings will also affect the "Master" section of the ENI.

5.2.1 Master

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

Device Ed	itor									
Master	Process Data Image	Watch list	EtherCAT P	Trace Data	Advanced Options	Slave to Slave	Distributed Clocks	Tasks + Sync Units	Data Acquisitio	n
Genera										
Genera										_
Unit I	Name	Clas	s-A Master							
Cycle	Time [us]	1000)							•
Sourc	e MAC address									
Slaves	connected to local sy	/stem								
Link l	ayer	Ndis	5							•
Netw	ork Adapter	Ethe	rCAT-Test (In	tel(R) Ethern	et Server Adapter I21	0-T1)				•
									Select	
Slaves	connected to remote	system								
Proto	col	RAS								•
IP Ad	dress	127	. 0 . 0	. 1						
Port		6000)							
Mast	er-Instance	0								
									Select	
	-1									
Slaves	simulated (SiL)									
									Select	
Slaves	captured									
Cant	ura Fila									
Capit	are the								Select	

General

Unit Name:

Name of the master device

Cycle Time:

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

Source MAC address:

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

Slaves connected to local system

Network Adapter:

Network adapter which is connected to the control system. In newer versions it is also a possibility to select the Link-Layer.





Slaves 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

Master-Instance:

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

Data to load from capture file

Capture File:

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

5.2.2 Process Data Image

In this tab, the user can see all variables of the process data image. If he wants, he can also export the list:

Device Ed	litor												
Master	Process Data Image	Watch list	EtherCAT P	Trace Data	Advanced Options	Slave to Slave	Distribut	ted Clocks	Tasks + Sync Ur	its Data	a Acqu	uisition	
Variabl	es									E	kport		
	Name							Datatype	Master Sync Unit	Offset	*	Size	^
	Slave_1002 [IndraDrive	MPC17 (1 CC	D Master +0 C	CD Slaves)].AT	(CCD Master).Drive st	atus word		UINT	ld 0: Default 0	IN :	0.0	2.0	
	Slave_1002 [IndraDrive	MPC17 (1 CC	D Master +0 C	CD Slaves)].AT	(CCD Master).Position	feedback value 1		DINT	Id 0: Default 0	IN:	2.0	4.0	
	Slave_1003 [EPP2308-0	001].Channel	1.Input					BOOL	Id 0: Default 0	IN:	6.0	0.1	
	Slave_1003 [EPP2308-0	001].Channel	2.Input					BOOL	Id 0: Default 0	IN:	6.1	0.1	
	Slave_1003 [EPP2308-0	001].Channel	3.Input					BOOL	Id 0: Default 0	IN :	6.2	0.1	
	Slave_1003 [EPP2308-0	001].Channel	4.Input					BOOL	Id 0: Default 0	IN :	6.3	0.1	
	Slave_1005 [EPP1004-0	061].Channel	1.Input					BOOL	Id 0: Default 0	IN :	7.0	0.1	
	Slave_1005 [EPP1004-0	061].Channel	2.Input					BOOL	Id 0: Default 0	IN :	7.1	0.1	
	Slave_1005 [EPP1004-0	061].Channel	3.Input					BOOL	Id 0: Default 0	IN :	7.2	0.1	
	Slave_1005 [EPP1004-0	061].Channel	4.Input					BOOL	Id 0: Default 0	IN:	7.3	0.1	
	Slave_1006 [EPP1004-0	061].Channel	1.Input					BOOL	ld 0: Default 0	IN :	7.4	0.1	
	Slave_1006 [EPP1004-0	061].Channel	2.Input					BOOL	Id 0: Default 0	IN:	7.5	0.1	
	Slave_1006 [EPP1004-0	061].Channel	3.Input					BOOL	ld 0: Default 0	IN:	7.6	0.1	
	Slave_1006 [EPP1004-0	061].Channel	4.Input					BOOL	Id 0: Default 0	IN :	7.7	0.1	
	Slave_1007 [EPP1004-0	061].Channel	1.Input					BOOL	ld 0: Default 0	IN :	8.0	0.1	
Edit Va	rizbla									Add to v	watch	list	-
M	ove Up Move Do	wn							New E	dit	C)elete	

If user wants to export the variables, he will see the following dialog:

裙 Export	Process Data Image	×
Format:	CSV	•
To File	To Clipboard	Cancel

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)

5.2.3 Watchlist

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

ice Edi	tor										
aster	Process Data Image	Watch list	Trace Data	Advanced Options	Slave to Slave	Distributed Clocks	Tasks + Sync l	Jnits Data Acquis	sition N	Notion	
riable	s									Export	
Name							Datatype	Master Sync Unit	Offset	*	Si
Slave_	1007 [EL1018].Channel	6.Input					BOOL	ld 0: Default 0	IN :	154.5	0.1
Slave_	1003 [EL2008].Channel	3.Output					BOOL	ld 0: Default 0	OUT :	154.2	0.1
Slave_	1013 [EL4132].Channel	2.Output					INT	ld 0: Default 0	OUT :	170.0	2.0
								Re	move fro	om watc	hl
it Var	iable							Re	move fro	om watc	th li

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 slaves in the configuration. For those EtherCAT P slaves, he can calculate and check the power consumptions in the EtherCAT P segments based on cables and loads:



Device Editor								
Master Process Data Image Watch list EtherCAT P	Trace Data	Advanced Opt	ions Slave t	o Slave Dist	tributed Clo	cks Tasks	+ Sync Units Da	ata Acquisition
EtherCAT P Checking								
Slave_1004 [EPP1322-0001]	ng Devices)							Validate
Name	Us(V)	Up(V)	ls(A)	Ip(A)	Us Load	Up Load	Us Load Type	Up Load Type
Slave_1004 [EPP1322-0001]	24,00	24,00	0,342	0				
Slave_1003 [EPP2308-0001]	23,92	24,00	0,242	0	0 W 0	0 W	Sw Regulator	Sw Regulator
Slave_1005 [EPP1004-0061]	23,86	24,00	0,181	0	0 W 0		Sw Regulator	
Slave_1006 [EPP1004-0061]	23,82	24,00	0,121	0	0 W 0		Sw Regulator	
Slave_1007 [EPP1004-0061]	23,80	24,00	0,061	0	0 W 0		Sw Regulator	

In the ComboBox the user can switch between all Power Sourcing Devices (PSD) in the configuration. In the grid are shown all the supplied slaves 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 correspondending PSD is selecte. 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:



Devi	ce Editor							_	_			
Ma	ster Process	; Data Image	Watch list	Trace Data	Advanced Options	Slave to Slave	Distributed Clocks	Tasks + Sync Units	Data Acqui	sition	Motion	
Va	riables											
	Name								Datatype	Offset	*	Size
	Variable 0								BOOL	OUT :	: 14.0	0.1
	Variable 1								BOOL	OUT :	14.1	0.1
	Variable 2								BYTE	OUT :	15.0	1.0
Ed	it Variable											
	Move Up	Move Dow	vn					New	Edit		Delet	e

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 (Expert)

In this tab, the user can change master specific settings or he can change slave specific settings which will be applied to all slaves:



Device Editor		
Master Process Data Image Watch list Trace Data Advanced Options	Slave to Slave Distributed Clocks Tasks + Sync U	nits Data Acquisition
Master Settings		
Init Command Retries: 3		
Slave Settings		
Startup Checking	Timeouts	
Check Vendor ID	SDO Access:	0 🔤 [ms]
Check Product Code	Init->Pre-Op/Init->Bootstrap:	3000 🚔 [ms]
Check Revision Number	Pre-Op->Safe-Op/Safe-Op->Op:	10000 🔤 [ms]
== Check Serial Number	Back to Pre-Op, Init:	5000 🚔 [ms]
	Op->Safe-Op:	200 🚭 [ms]
Identification Checking	Mailbox Mode	
Check Identification	Cyclic	10 🔤 [ms]
 Use Current Values Copy Station Address -> Identification Value 	State Change	
Copy Identification Value -> Station Address		
Process Data Mode	Overwrite Mailbox Size	
Disable LRW	Output Size:	0 bytes]
	Input Size:	0 🔤 [bytes]
Overwrite Watchdog	Process Data Sync Manager Mode	
Set Multiplier (Reg.: 0x400): 2498	Default	
Set PDI Watchdog (Reg.: 0x410): 1000	Buffered (3 buffer mode)	
Set SM Watchdog (Reg.: 0x420):	 Mailbox (Single buffer mode) 	
		Apply changes to all slaves

Master Settings

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

Slave Settings

- Slave settings can be applied to all slaves with one click on the button *Apply changes to all slaves*. For a detailed description of the Advanced Slave Options, see *Advanced Slave Options (Expert)*.
- Identification Checking

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

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

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

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



5.2.7 Slave to Slave (Expert)

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

This tab consists of 2 views:

Default view

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

e Editor	Advanced Options Slave to Slave Dis	tributed Clesks Tasks + Supe Units Data	Acquisition
ster Process Data Image Watch list I frace L	ata Advanced Options Slave to Slave Dis	tributed Clocks lasks + Sync Units Data	Acquisition
			Default In C
ve to Slave			
h active S2S connections it is not possible to ch	ange PDOs and some other settings.		
puts	Ou	tputs	
Slave_1002 [EL1002]	•	Slave_1005 [EL2008]	
Annel 1 [1 Bits]	-	Slave_1006 [EL2008]	
Channel 2 [1 Bits]	>>	Ghannel 1 [1 Bits]	
Slave_1003 [EL1014]	x	 Channel 2 [1 Bits] 	
Slave_1004 [EL1809]		 Channel 3 [1 Bits] 	
		Channel 4 [1 Bits]	
		 Channel 5 [1 Bits] 	
		Channel 6 [1 Bits]	
		 Channel 7 [1 Bits] 	
		Channel 8 [1 Bits]	
	•	Slave_1007 [EL4004]	
nnections			
nput	Offset Output		Offset BitSize
Slave_1002 [EL1002].Channel 1	0.0 >> Slave_1006 [EL	2008].Channel 1	1.0 1

In cycle view

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



nputs		Outputs Slave_1005 [EL2008] Slave_1006 [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 6 [1 Bits] Channel 8 [1 Bits] Slave_1007 [EL4004]	
nnections			
Input	Offset	utput	Offset BitSize

Limitations of one cycle slave to slave communication:

- Input slave must be located before output slave
- Complete sync unit of the slave must be connected (this means all PDOs of a sync unit must be connected and not only one variable)

5.2.8 Distributed Clocks (Expert)

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



Device Editor		_	_			
Master Process Data Image	Watch list Trace Data	Advanced Options	Slave to Slave	Distributed Clocks	Tasks + Sync Units	Data Acquisition
Reference Clock						
Name	Slave_1011 [EL22	52] (1011)			✓ Auto select	
Clock Adjustment						
○ Master Shift (Master clo	ck follows reference cloc	k) or				
Master Reference Clock	(System time provided k	oy master device) or				
Link Layer Reference Cl	ock (System time provide	d by network device)	or			
Off						
Bus Shift (Reference clo	ck follows master clock)					
DCX (Master and refere	nce clock follow external	clock)				
			-			
Ontions						
Sync Window Monitori	ng					
Show 64Bit System Tim	e					
Slaves with active DC						
Slave_1011 [EL2252] (1011)					
Slave_1022 [EL2202-0100]	(1022)					
Slave_1023 [EL2202-0100]	(1023)					
Slave_1026 [EL/201] (1026	ŋ					

Reference Clock

Name:

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

Clock Adjustment

Master Shift:

The reference clock controls the Master time

Bus Shift:

The Master 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 master will throw a notification.

Show 64Bit System Time:

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

Slaves with active DC

Shows a list of all slaves with active DC.

5.2.9 Tasks + Sync Units (Expert)

In this tab, the user can define additional cyclic tasks and master sync units. After adding a new master sync unit, the user can assign one or more slave sync units on tab *Slave Sync* > *Units* to this master sync unit:

Device E	ditor												
Master	Process	; Data Image	Watch list	Trace Data	Advanced (Options	Slave t	o Slave	Distributed C	locks	Tasks + Sync U	nits Data Acquisi	tion Motion
Tasks													
	Task Id	Comment				Cycle Tim	ne [us]	Input PD	O Size [bytes]	Outpu	t PDO Size [byte	s] Ethernet Size [b	ytes] Frame Count
•	0	Task 0				1000		2		10		81	1
	MSU Id	Name									Offset [bytes]	Input Size [bytes]	Output Size [bytes]
	0	Default 0									0	3	10
	1000	MasterSyncU	nit 1000								0	0	0
•	1	Task 1				1000		0		0		0	0
	MSU Id	Name									Offset [bytes]	Input Size [bytes]	Output Size [bytes]
Edit Ta	sk										Nev	v Edit	Frame Count: Delete
Edit M	aster Syn	c Unit (MSU))								Nev	w Edit	Delete

Tasks:

List of cyclic tasks and master sync units.

Buttons:

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

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

ल Edit Task		_	×
Comment	Task 0		
Cycle Time [us]	1000		•
	ОК	Cancel	

Comment:

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

Cycle Time:

Cycle time of this task



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

븓 Edit Master Sy	ync Unit	_		×
Name	MasterSyncUr	it 1000		
MSU Id			10	00 曼 00
Task Id	0			•
Offsets				
Input	0		Dec	Hex
Output	0		Dec	Hex
	ОК	Cancel		

Name:

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

Sync Unit Id:

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

- ID 0 .. 9: Generated / internal master sync unit
- ID 10 .. 999: Generated / internal master sync unit for groups
- ID 1000 .. 2000: User defined master sync unit

Task Id:

Task Id to which is this master sync unit assigned

Offsets:

Activate to pin this master sync unit to a specific offset

Input:

Input offset of pinned master sync unit

Output:

Output offset of pinned master sync unit

5.2.10 Data Acquisition (Expert)

In this tab, the user can configure our Data Acuisition (DAQ) library. This library can 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:



ice Editor		_	_							
aster Process Data Image Watch list Trace Data Adva	inced Optio	ns Slave to Slave	Distributed Clocks	Tasks + S	ync Unit	s Data	Acquis	tion		
riables					Exp	ort	Record	ler 1	•	0
Name				Da	tatype	Offset		Size	Recorded	^
Slave_1025 [EL7031].STM Control.Control_Reset				BO	OL	OUT :	143.1	0.1		
Slave_1025 [EL7031].STM Control.Control_Reduce torque				BO	OL	OUT :	143.2	0.1		
Slave_1025 [EL7031].STM Velocity.Velocity				IN	r	OUT :	145.0	2.0		
Slave_1026 [EL7201].DRV Controlword.Controlword				IIU	NT	OUT :	147.0	2.0		
Slave_1026 [EL7201].DRV Target velocity.Target velocity				DI	NT	OUT :	149.0	4.0		
Slave_1002 [EL2008].Channel 1.Output				BO	OL	OUT :	153.0	0.1	Ø	
Slave_1002 [EL2008].Channel 2.Output				BO	OL	OUT :	153.1	0.1		1
ggers Left Operand	Operator	Right Operand				Enable	e Star	t Du	ration Co	ount
Slave_1014 [EL3162].Channel 1.Value	=	3				True	True	10	0	
Slave_1002 [EL2008].Channel 1.Output	=	1				True	True	0	0	
Slave_1002 [EL2008].Channel 1.Output	-	Slave_1002 [EL2008]	.Channel 3.Output			True	True	0	0	
lit Trigger					New		Edit		Delete	2

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:

൙ Edit Recorder		_	×
General			
Name	Recorder 1	1	
File	Recorder.r	nf4	
Format	MDF		•
Frequency			
Sample rate			1 🖨
Cycle time	1000		[µs]
Sample time	1000		[µs]
Optional			
Real time stamp			
Cycle counter			
Auto start			
c	ок	Cancel	

Name:

Name of the recorder

File:

Absolute path of the recorder file on the master 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:

൙ Edit Trigger		_		×
General				
Left variable		Slave_1014 [EL3162].Channel 1.Value		
Operator		=		,
Right value	۲	3		
Right variable	$^{\circ}$]
Enable				
Start				
Optional	_			
Duration			10 韋	[ms]
Count			0 🌩	
		OK Cancel		

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 Mode only)

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

Device Editor	
Process Data Image Watch list Eth	herCAT P Trace Data Advanced Options Slave to Slave Distributed Clocks Tasks + Sync Units Data Acquisition Motion
Common Settings	
Use local EcMasterDemoMotion	\checkmark
Export	
FcMasterDemoMotion Config	
Enable RAS	I Port coop
Lise Aux Clock	
OSE Adx Clock	
CPU affinity	
Link Layer	-ndis 192.168.1.1 1
Verbosity level	1
ENI Path	C:\ProgramData\EC-Engineer\Motion\eni.xml
Performance Measurement	

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. $LxWin \rightarrow$ then start the master on the real-time system \rightarrow scan the network \rightarrow stop the master \rightarrow stop LxWin.

The second procedure is for switching the modes (configuration and diagnosis). The user can e.g. start LxWin \rightarrow start the master \rightarrow switch to diagonis. On switching back the user can stop the master 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

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



Device Editor						
Image Watch list EtherCAT P Trace Data Advan	ced Options Slave to Slave	Distributed Clocks	Tasks + Sync Units	Data Acquisition	Motion Sim	nulator 🔹
Master Settings						
Simulator RAS Port 6001						
License key:						
Slave Settings						
Operation Mode Ignore CoE Download Error Simulated		Starting Pos	ition ff			
CoE Settings		EEPROM Set	ttings			
Use generic Object Dictionary		Use ESI	EEPROM			
 Load from Slave 		 Loa 	d from Slave			
Register Settings						
Use default register values						
				Арр	ly changes to	all slaves

Simulator RAS Port:

The port which is opend through the simulator link layer

License key:

The license key for the simulator

Slave Settings:

Operation Mode: Ignore Download Error

CoE Settings:

Select which CoE should be used in $\ensuremath{\texttt{EXI}}$

Register Settings:

Select if register should be in EXI

Starting Position: Select if slave 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 Slave Settings

This section includes slave related settings. The most of all settings will affect the "Slave" section of the ENI.

5.3.1 General

In this tab, the user can change general slave settings like station address or the name of the slave. He has also the possibility to change his predecessor device:

Device Editor	
General Modules PDO Mapping	Variables Advanced Options Init Commands CoE Object-Dictionary Sync Units Motion
Address	
Station Address	1019 🗬
Information	
Name	Slave_1019 [VIPA 053-1EC00]
Description	VIPA 053-1EC00 EtherCAT Fieldbus coupler (MDP)
Vendor	VIPA GmbH (0x0000AFFE)
Product Code	0x0531EC00 (87157760)
Revision Number	0x0000012 (18)
ESI File	Vipa 053-1EC00 MDP.xml
Identification Value	Not Used
Ports	
А	Slave_1018 [BK1120] (1018) / Port B
D	Not Available
В	Not Connected
С	Not Available

Address

Station Address:

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

Information

Name:

Name of the slave. By default the following format is used "Slave_N [TYPE]"

Description:

Description of the slave (Read from ESI file)

Vendor:

Name of the vendor the slave

Product Code:

Product Code of the slave



Revision Number:

Revision Number of the slave

ESI File:

Name of the ESI `file where the description of the slave is stored. :file:`ESI files can be managed by using the *ESI-Manager*

Identification Value:

Identification Value of the slave

Ports

Connected Devices:

List of connected devices

Predecessor Device:

Name of the predecessor device. If topology should be changed, please use the Edit Topology dialog

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 slave:

Device Editor			
General Modules PDO Mapping Variables Advanced Options Init Con	nmands CoE Ob	bject-Dictionary Sync Units	Motion
Assign the modules			
U01 : Terminals [022-18D00] (VIPA 022-18D00, DO 4xDC 24		🝷 👔 SM 021 - Digital Ir	nput Modules
1 002 : Terminals [021-1BD00] (VIPA 021-1BD00, DI 4xDC 24V		1 021-1BB00	(VIPA 021-1BB00, DI 2xDC 24V)
003 : Terminals [022-1BD00] (VIPA 022-1BD00, DO 4xDC 24	< <	1 021-1BB10	(VIPA 021-1BB10, DI 2xDC 24V 2µs4
1 004 : Terminals [032-1BB30] (VIPA 032-1BB30, AO 2x12Bit 0	x	1 021-1BB50	(VIPA 021-1BB50, DI 2xDC 24V NPN)
1 005 : Terminals [021-1BD00] (VIPA 021-1BD00, DI 4xDC 24V	~	1 021-1BB70	(VIPA 021-1BB70, DI 2xDC 24V ETS)
006 : Terminals [022-1BB70] (VIPA 022-1BB70, DO 2xDC 24		1 021-1BD00	(VIPA 021-1BD00, DI 4xDC 24V)
007 : Terminals [022-1BD00] (VIPA 022-1BD00, DO 4xDC 24		1 021-1BD10	(VIPA 021-1BD10, DI 4xDC 24V 2µs4
1 008 : Terminals [021-1BD00] (VIPA 021-1BD00, DI 4xDC 24V		1 021-1BD40	(VIPA 021-1BD40, DI 4xDC 24V 3 wire
1 009 : Terminals [021-1BB70] (VIPA 021-1BB70, DI 2xDC 24V		1 021-1BD50	(VIPA 021-1BD50, DI 4xDC 24V NPN)
010 : Terminals []		1 021-1BD70	(VIPA 021-1BD70, DI 4xDC 24V ETS)
011 : Terminals []		1 021-1BF00	(VIPA 021-1BF00, DI 8xDC 24V)
012 : Terminals []		1 021-1BF01	(VIPA 021-1BF01, DI 8xDC 24V 0.5ms)
013 : Terminals []		1 021-1BF50	(VIPA 021-1BF50, DI 8xDC 24V NPN)
014 : Terminals []		1 021-1DF00	(VIPA 021-1DF00, DI 8xDC 24V Diagn
1015 : Terminals []		🝷 丰 SM 022 - Digital O	Output Modules
016 : Terminals []		↓ 022-1BB00	(VIPA 022-1BB00, DO 2xDC 24V 0.5A)
017 : Terminals []		↓ 022-1BB20	(VIPA 022-1BB20, DO 2xDC 24V 2A)
1 018 : Terminals []		↓ 022-1BB50	(VIPA 022-1BB50, DO 2xDC 24V 0.5A
1019 : Terminals []		J 022-1BB70	(VIPA 022-1BB70, DO 2xDC 24V 0.5A
020 : Terminals []		↓ 022-1BB90	(VIPA 022-1BB90, DO 2xDC 24V 0.5A
021 : Terminals []		↓ 022-1BD00	(VIPA 022-1BD00, DO 4xDC 24V 0.5A) 🔍
< >		<	>
Additional settings			
Develord Slat Configuration			Load Markelan
Download Slot Conliguration			Load Modules

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 slave)

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 Slave types the user can activate or deactivate some PDO configurations:

eral	PDO Mapping Varia	bles Advanced (Options Distribute	d Clocks Init	Comm	ands CoE Object-Dicti	onary Sync Units	Motion	
								PDC	FMMU
ts					Outpu	ıts			
٣	1st Transmit PDO n	napping (excluded l	by 0x1A01)	0x1A00	•	1st Receive PDO r	mapping (excluded b	y 0x1601)	0x1600
	Name	Index	Bit Length			Name	Index	Bit Length	
	Status word	0x6041:00	16			Control word	0x6040:00	16	
	Position actual value	0x6064:00	32			Target position	0x607A:00	32	
	Torque actual value	0x6077:00	16			Target velocity	0x60FF:00	32	
	Following error actual v	0x60F4:00	32			Target torque	0x6071:00	16	
	Modes of operation dis	0x6061:00	8			Max torque	0x6072:00	16	
		0x0000:00	8			Modes of operation	0x6060:00	8	
	Touch probe status	0x60B9:00	16				0x0000:00	8	
	Touch probe 1 position	0x60BA:00	32			Touch probe function	0x60B8:00	16	
٣	2nd Transmit PDO	mapping		0x1A01		2nd Receive PDO	mapping		0x1601
	Name	Index	Bit Length			Name	Index	Bit Length	
	Status word	0x6041:00	16			Control word	0x6040:00	16	
	Position actual value	0x6064:00	32			Target position	0x607A:00	32	
•	3rd Transmit PDO r	mapping (excluded	by 0x1A01)	0x1A02	•	3rd Receive PDO	mapping (excluded b	oy 0x1601)	0x1602
	Name	Index	Bit Length			Name	Index	Bit Length	
	Status word	0x6041:00	16			Control word	0x6040:00	16	
	Position actual value	0x6064:00	32			Target velocity	0x60FF:00	32	
	4th Transmit DDO r	nanning (oveluded	by 0v1A01)	0+1402	_	4th Bossiva BDO	manning (oveluded k	0-1-01	0,1602

Lists of inputs or outputs

Checkbox:

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

Buttons (Expert mode only!)

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 slave

Context Menu

Both lists provide a context menu:

								PDO	FINING
ıts				_	Output	ts			
Ŧ	1st Transmit PDO n	napping (excluded by 0	x1A01)	0x1A00	•	1st Receive PDO n	napping (excluded by	(0x1601)	0x1600
	Name	Ir Expand All	th			Name	Index	Bit Length	
	Status word	Ox Collapse A	Ů			Control word	0x6040:00	16	
	Position actual value	ON Unselect A				Target position	0x607A:00	32	
	Torque actual value	0x6077:00	16			Target velocity	0x60FF:00	32	
	Following error actual v	0x60F4:00	32			Target torque	0x6071:00	16	
	Modes of operation dis	0x6061:00	8			Max torque	0x6072:00	16	
		0x0000:00	8			Modes of operation	0x6060:00	8	
	Touch probe status	0x60B9:00	16				0x0000:00	8	
	Touch probe 1 position	0x60BA:00	32			Touch probe function	0x60B8:00	16	
Ŧ	2nd Transmit PDO	mapping		0x1A01	•	2nd Receive PDO	mapping		0x1601
	Name	Index	Bit Length			Name	Index	Bit Length	
	Status word	0x6041:00	16			Control word	0x6040:00	16	
	Position actual value	0x6064:00	32			Target position	0x607A:00	32	
Ŧ	3rd Transmit PDO r	mapping (excluded by 0	x1A01)	0x1A02	-	3rd Receive PDO r	napping (excluded b	y 0x1601)	0x1602
	Name	Index	Bit Length			Name	Index	Bit Length	
	Status word	0x6041:00	16			Control word	0x6040:00	16	
	Position actual value	0x6064:00	32			Target velocity	0x60FF:00	32	

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



൙ Edit PDO				_		×
General				Option	al	
Name	1st Transmi	it PDO mapp	ing	Exclu	de:	
Index	0x1A00		Dec Hex	1	1A01	
Flags	D	rastian.		1	1A02	
Mandatan				1	1A03	
Fixed Content		RvPdo				
Vietual DDO						
Entries						
Name		Index	Bit Length	Con	nment	^
Status word		0x6041:00	16			
Position actual value		0x6064:00	32			
Torque actual value		0x6077:00	16			
Following error actua	l value	0x60F4:00	32			~
Add	Delete	Edit	Up	Do	wn	
	O	к	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 a PDO entry, he will see the following dialog:

裙 Add	PDO Entry						×
General							
Name Error code							
Comm	ent						
Swapp	ing	None					-
Settings		·					_
Index		0x603F Dec Hex	SubIndex	0		Dec H	ex
Dataty	pe	UINT 👻	Bit Length	16			
Show E	Base Datat	types					
CoE Obi	ect-Dictio	onarv					
	Index	Name				Туре	\sim
•	0x2720	Safety module monitors				UDINT	
± ►	0x603F	Error code				UINT	
•	0x6040	Controlword				UINT	
•	0x6041	Statusword				UINT	
•	0x6060	Modes of operation				SINT	
•	0x6061	Modes of operation display				SINT	
+	0x6062	Position demand value				DINT	\sim
		OK	Cancel				

General

Name:

Name of the PDO entry

Comment:

Commet of the PDO entry

Swapping:

Swapping mode of the PDO entry

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 slave)

If user wants to edit a PDO entry without a CoeOD, he will see the following dialog:

裙 Edit I	PDO Entry	,		_		×
General						
Name		Max torque				
Comm	ent					
Swapp	ing	None				-
Settings	;					
Index		0x6072 Dec Hex	SubIndex	0	Dec H	Hex
Dataty	pe	UINT 🝷	Bit Length	16		
Show I	Base Datat	types				
CoE Obj	ect-Dictio	onary				
	Index	Name			Туре	\sim
+	0x6063	Position actual internal value			DINT	
•	0x6064	Position actual value			DINT	
•	0x606B	Velocity demand value			DINT	
•	0x606C	Velocity actual value			DINT	
•	0x6071	Target torque INT				
± 🕨	0x6072	Vax torque UINT				
+	0x6074	Torque demand value			INT	\sim
		ОК	Cancel			

General

Name:

Name of the PDO entry

Comment:

Commet of the PDO entry

Swapping:

Swapping mode of the PDO entry



FMMU/SM

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

	litor			_								
nera	Modules	PDO Mapping	Variables	Advanced Opt	tions Init Comman	ds CoE Object-Dictionary	Sync Uni	ts Motion				
										PDO	FMN	/U/S
IMU												
No	Туре					Logical Start Address	Length	Logical End	Bit Phy	sical Address	Sm	Su
0	Outputs					0x10000004.0	127	7	0x10	000	-	-
1	Inputs					0x1000004.0	135	7	0x1	500	-	-
2	Mailbox Stat	e				0x0900000.2	1	2	0x08	BOD	-	-
1												
I No	Туре						2	itart Address	Length	Buffer Mode	Ena	able
No 0	Type Mailbox Out	puts					<u>s</u>	itart Address Ix1C00	Length 512	Buffer Mode	Ena 1	able
No 0	Type Mailbox Outp Mailbox Inpu	puts its					s 0	itart Address Ix1C00 Ix1E00	Length 512 512	Buffer Mode 1 1	Ena 1	able
No 0 1 2	Type Mailbox Out Mailbox Inpu Outputs	puts uts						itart Address hx1C00 hx1E00 hx1000	Length 512 512 127	Buffer Mode 1 1 3	Ena 1 1 1	able
No 0 1 2 3	Type Mailbox Outp Mailbox Inpu Outputs Inputs	puts its					2 0 0 0	istart Address Ix1C00 Ix1E00 Ix1000 Ix1600	Length 512 512 127 135	Buffer Mode 1 1 3 3	Ena 1 1 1	able
1 No 0 1 2 3	Type Mailbox Outp Mailbox Inpu Outputs Inputs	puts its						istart Address Ix1C00 Ix1E00 Ix1000 Ix1600	Length 512 512 127 135	Buffer Mode 1 1 3 3	Ena 1 1 1 1	able
1 No 0 1 2 3	Type Mailbox Out Mailbox Inpu Outputs Inputs	puts its						itart Address ix1C00 ix1E00 ix1000 ix1600	Length 512 512 127 135	Buffer Mode 1 1 3 3	Enz 1 1 1 1 1	able
1 No 0 1 2 3	Type Mailbox Out Mailbox Inpu Outputs Inputs	puts its						itart Address ix1C00 ix1E00 ix1000 ix1600	Length 512 512 127 135	Buffer Mode 1 1 3 3	Ena 1 1 1 1 1	able
1 No 0 1 2 3	Type Mailbox Out Mailbox Inpu Outputs Inputs	puts its						istart Address Ix1C00 Ix1E00 Ix1000 Ix1600	Length 512 512 127 135	Buffer Mode 1 1 3 3	Ena 1 1 1 1	able
No 0 1 2 3	Type Mailbox Out Mailbox Inpu Outputs Inputs	puts its						start Address Ix1C00 Ix1E00 Ix1000 Ix1600	Length 512 512 127 135	Buffer Mode 1 1 3 3	Ena 1 1 1 1	able

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 slave and if it is allowed he can also add/edit/delete/move variables. Also "Add to watchlist" is possible:



Name				Datatype	Master Sync Unit	Offset	*	Size
Slave_101	9 [VIPA 053-1EC00].li	nputs.Hardware Inter	rupt Counter	UDINT	Id 1000: MasterSyncUnit 1000	IN :	38.0	4.0
Slave_101	9 [VIPA 053-1EC00].II	nputs.Diagnostic Inte	rrupt Counter	UDINT	Id 1000: MasterSyncUnit 1000	IN:	42.0	4.0
Slave_101	9 [VIPA 053-1EC00].N	Module 2 (021-1BD00).Inputs.DI 0	BOOL	Id 1000: MasterSyncUnit 1000	IN:	46.0	0.1
Slave_101	9 [VIPA 053-1EC00].N	Module 2 (021-1BD00).Inputs.DI 1	BOOL	Id 1000: MasterSyncUnit 1000	IN:	46.1	0.1
Slave_101	9 [VIPA 053-1EC00].N	Module 2 (021-1BD00).Inputs.DI 2	BOOL	Id 1000: MasterSyncUnit 1000	IN:	46.2	0.1
Slave_101	9 [VIPA 053-1EC00].N	Module 2 (021-1BD00).Inputs.DI 3	BOOL	Id 1000: MasterSyncUnit 1000	IN:	46.3	0.1
Slave_101	9 [VIPA 053-1EC00].N	Module 4 (040-1BA00).Inputs.Status byte	USINT	Id 1000: MasterSyncUnit 1000	IN:	47.0	1.0
Slave_101	9 [VIPA 053-1EC00].N	Module 4 (040-1BA00).Inputs.Input byte 1	USINT	Id 1000: MasterSyncUnit 1000	IN:	48.0	1.0
Slave_101	9 [VIPA 053-1EC00].N	Module 4 (040-1BA00).Inputs.Input byte 2	USINT	Id 1000: MasterSyncUnit 1000	IN:	49.0	1.0
Slave_101	9 [VIPA 053-1EC00].N	Module 4 (040-1BA00).Inputs.Input byte 3	USINT	Id 1000: MasterSyncUnit 1000	IN:	50.0	1.0
Slave_101	9 [VIPA 053-1EC00].N	Module 4 (040-1BA00).Inputs.Input byte 4	USINT	Id 1000: MasterSyncUnit 1000	IN:	51.0	1.0
Slave_101	9 [VIPA 053-1EC00].N	Module 4 (040-1BA00).Inputs.Input byte 5	USINT	Id 1000: MasterSyncUnit 1000	IN:	52.0	1.0
Slave_101	9 [VIPA 053-1EC00].N	Module 4 (040-1BA00).Inputs.Input byte 6	USINT	Id 1000: MasterSyncUnit 1000	IN:	53.0	1.0
Slave_101	9 [VIPA 053-1EC00].N	Module 4 (040-1BA00).Inputs.Input byte 7	USINT	Id 1000: MasterSyncUnit 1000	IN:	54.0	1.0
Slave_101	9 [VIPA 053-1EC00].N	Module 4 (040-1BA00).Inputs.Input byte 8	USINT	Id 1000: MasterSyncUnit 1000	IN:	55.0	1.0
						Add to v	vatch	list

Lists of Variables

Variables comes from the ${\tt ESI}$ 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:

ल Add Variable		-		×
Group	2nd Transn	nit PDO mapp	oing	•
Datatype	ARRAY [0	15] OF BYTE		•
Count				1 🜩
Combine				
	ОК	Cancel		

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 vailable. In that case he will see the following dialog:

ल Add Alias		-	\times
Name	Alias 0		
Datatype	BOOL		•
Offset	0		
	ОК	Cancel	

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:

븓 Edit Alias		_	×
Name	Alias 0		
	ОК	Cancel	

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 slave. The Tab is only visible when the selected slave is an EtherCAT P slave:

Device Editor				
General PDO Mapping	Variables EtherCAT P Advan	ced Options Sync Units		
Input Cable				
Wire Gauge	22 [AWG] 🔹			
Wire Length (m)	1,00			
Slave				
Powered Device				\searrow
Us: System Voltage		Up: Peripheral Voltage		
Actual Voltage	23,98	Actual Voltage	24	
Min Voltage	20,4	Min Voltage	20,4	
Load	0,00	Load	0,00	
Load Type	Sw Regulator [W] 🔹	Load Type	Sw Regulator [W] 🔻	
Supplied Slaves				
Name				

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 slave

Min Voltage:

The min Voltage the slave 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 slave 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 Slave Options (Expert)

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



Device Editor		
General PDO Mapping Variables Group Advanced Options Distributed	Clocks Init Commands CoE Object-Diction	ary Sync Units
Startup Checking	Timeouts	
Check Vendor ID	SDO Access:	0 🖨 [ms]
Check Product Code	Init->Pre-Op/Init->Bootstrap:	3000 🚭 [ms]
Check Revision Number	Pre-Op->Safe-Op/Safe-Op->Op:	10000 😜 [ms]
Check Serial Number	Back to Pre-Op, Init:	5000 🚭 [ms]
	Op->Safe-Op:	200 💽 [ms]
Identification Checking	Mailbox Mode	
Check Identification	O Cyclic	10 🜉 [ms]
0 Dec Hex Write to EEPROM	 State Change 	
Select Local Address		
UXUU12 Dec Hex		
Process Data Mode	Overwrite Mailbox Size	
✓ Disable LRW	Output Size:	128 🚍 [bytes]
	Input Size:	128 🔤 [bytes]
Overwrite Watchdog	Process Data Sync Manager Mode	
Set Multiplier (Reg.: 0x400): 2498 👹	 Default 	
Set PDI Watchdog (Reg.: 0x410): 1000 🚍	 Buffered (3 buffer mode) 	
Set SM Watchdog (Reg.: 0x420): 1000 🚍	 Mailbox (Single buffer mode) 	
Distributed Clocks		

Startup Checking

Master will check the Vendor ID, Product code, Revision number if the state machine changes from INIT to PREOP of the slave. 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 slave 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, Slave-to-slave-copy needs LRW.

Watchdog

Set Multiplier:

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

Set PDI Watchdog:

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



Set SM Watchdog:

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

Distributed Clocks

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

- This might be useful, if e.g. a hot connect slave, 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 slave was found, the first DC slave will be used

Timeouts

SDO Access:

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

Init -> PreOp:

Internal master timeout with is used for changing slave state

Pre-Op -> Save-Op or Safe-Op ->Op:

Internal master timeout with is used for changing slave state

Back to Pre-Op, Init:

Internal master timeout with is used for changing slave state

Op -> **Safe-Op**:

Internal master timeout with is used for changing slave state

Mailbox Mode

Cyclic:

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

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:

Device Editor	
General PDO Mapping Variables	Group Advanced Options Distributed Clocks Init Commands CoE Object-Dictionary Sync Units
General	
MSU Id	10 Dec Hex
Name	Group 0
Pinned Group	
Input Offset (byte)	0 Dec Hex
Output Offset (byte)	0 Dec Hex
Hot Connect Group	
Identification Offset	0x0012
Identification Value	0 Dec Hex
Position in Topology	Fixed to 'Class-A Master'

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

General

MSU Id:

Generated Master 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 slave



Identification Value:

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

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

൙ EC-Engineer []		-	o x								
File View Network Settings Help											
Configuration M	Aode 🛛 😻 Export ENI 🛛 🖗 Export EXI	Kan Diagnosis Mode	Ŧ								
Project Explorer		Device Editor									
👻 🕘 Class-A Mas	ster	General PDO Mapping Variables Advanced Options Sync Units Motion									
Slave_10	001 [EK1100] (1001)	Address									
 Slave_10 	Append Slave(s)	s Station Address 1011									
I Slav	e_10 🗶 Remove Slave(s) De										
	Cut Slave(s) Ctrl+)	Normation X Name Class 1011 (Cl 1002)	_								
Slave 10	003 Copy Slave(s) Ctrl+0	C Description El 1002 30% Dia larget 201/ 200									
IL, Slave_10	D12 Paste Slave(s) Ctrl+1	V Description EL 1002 2CR. Dig. Input 24V, Sms									
R, Slave_10	013 🔶 Enable Slave(s)	Vendor Becknott Automation GmbH & Co. KG (UXUUUUUU2)									
N., Slave_10	014 🗱 Disable Slave(s)	Product Code UXU3EA3U32 (050/9442)									
	🕐 Reload ESI data	Revision Number 0x00120000 (1179648)									
	Export SCI	ESI File Beckhoff EL1xxx.xml									
	Change Slave	Identification Value 🔍 Not Used									
	Select from Project Template Import Beckhoff Slave Description	Ports									
		A Slave_1010 [EL1002] (1010) / Port B									
	Create Group	D 🕘 Not Available									
	Create	e Hot Connect- or Pinning-Group 🜒 Not Connected									
	Detach HC Group	C 🕒 Not Available									
	J Attach HC Group										
l las											
Classic View Flat V	iew Topology View										
Short Info	• •	Messages	- 1								
Information		Severity Time Message									
Name	Slave_1011 [EL1002]										
Description	EL1002 2Ch. Dig. Input 24V, 3ms										
Vendor Dhusiaal Addaese	Beckhoff Automation GmbH & Co. KG (0x0000)										
AutoInc Address	1011										
Automic Address	UXFFF / -9										
Networks: 1 Slaves: 1	4	State: I Adde: COV	NFIG EXPERT								

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

User Manual



븓 EC-Engineer []							– 🗆 X		
File View Netv	vork Settings Help								
Configuration N	Mode 🛛 🛷 Export ENI 🛛 🐺 Export EXI	🧾 Diagno	sis Mode				÷		
Project Explorer			Device Editor						
Class-A May Class-A May Slave_10	ster 001 [EK1100] (1001) e_1002 [EK1100] (1002) Slave_1009 [EL1002] (1010) Slave_1010 [EL1002] (1011) 003 [EK1100] (1003) 012 [SGDV-E1 CcE Drive] (1012) 013 [SGDV-E1 CcE Drive] (1013) 014 [SGDV-E1 CcE Drive] (1014)	General General MSU I	Group E-	Bus Current Advanced Option	ns Motion		Cee Hex		
I Slave_1		Pinned	ned Group put Offset (byte)				Dec		
I, Slave_1 I, Slave_1		Hot Cor Identi	nect Group	c 0x0012			Use Hex		
		Identification Value Position in Topology	y Fixed to 'Sla	ve_1001 [EK1100] (1001)'		Dec Hex			
Classic View Flat View Topology View									
Short Info	• •	Messages					~ #		
Information		Sever	ty Time	Message	1002 (5K/1100) (days served at 110	1			
Description	Slave_1002 [EK1100]	ERG ERG	10:33:12	Invalid topology from Slave Sl	ave_1005 [EK1100] (slave connected to HC group)	1			
Vendor	Beckhoff Automation GmbH & Co. KG (0=0000)		10:33:12	Invalid topology from Slave Sl	ave 1003 [EK1100] (slave connected to HC group)				
Physical Address	1002		10:32:59	Invalid topology from Slave Sl	ave 1003 [EK1100] (slave connected to HC group)				
AutoInc Address	0xFFF6 / -10		10.52:59	intend topology from Slave Sk	are_roos (excinos) (save connected to HC group).				
Networks: 1 Slaves:	14					s	tate: 🔹 🛎 Mode: CONFIG EXPERT		

On this tab, the user can pin this group of slaves 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 slave 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 slaves:
User Manual



븓 EC-Engineer []			-		×
<u>File V</u> iew <u>N</u> et	work <u>S</u> ettings <u>H</u> elp				
Configuration	Mode 🛛 🛷 Export ENI 🛛 🐺 Export EXI	🌉 Diagnosis Mode			÷
Project Explorer		Device Editor			
👻 📙 Class-A Ma	aster	General Group E-Bus Current Advanced Options Motion			
Slave_1	001 [EK1100] (1001)	Address			
I Slave_1	003 [EK1100] (1003)	Station Address 1002			
IL, Slave_1	012 [SGDV-E1 CoE Drive] (1012) 013 [SGDV-E1 CoE Drive] (1013)	Information			
IL. Slave	014 [SGDV-E1 CoE Drive] (1014)	Name Slave 1002 [EK1100]		- C X	
👻 🌻 🐰 Slav	e_1002 [EK1100] (1002)	Description FK1100 FtherCAT Coupler (2A F-Bus)			
1 1	Slave_1009 [EL1002] (1009)	Vendor Beckhoff Automation GmbH & Co. KG (0x0000002)			× •
	Slave_1010 [EL1002] (1010)	Product Code 0x044C2C52 (72100946)			
	Slave_1011 [EL1002] (1011)	Revision Number (V00120000 (1170648)			
		FSI File Berkhoff FK11vx vml			
		Identification Value Not Lised			
		A [X1 IN]			
		D O Not Available			
		B Slave 1009 [EI 1002] (1009)			
		C [X2 OIIT]			
Classic View Flat	View Topology View				
Short Info	↓ [‡]	Messages		-	- 4
Information		Severity Time Message			- î
Name	Slave_1002 [EK1100]	INF 10:35:22 All pending errors were solved.			-11
Vendor	EK1100 EtherCAT Coupler (2A E-Bus)	INF 10:55:22 All pending errors were solved.			
Physical Address	BECKNOTT AUTOMATION GMDH & Co. KG (0x0000)	ERR 10:33:12 Invalid topology from Slave Slave Slave 1003 [EK1100] (slave connected to HC group). ERR 10:32:42 Invalid topology from Slave Slave 1003 (EK1100) (slave connected to HC group).			-11
AutoInc Address	0xFFF6 / -10	ERX 10:25:12 Invalid topology from Slave Slave_1003 [EX 1100] (slave connected to HC group). EDD 10:25:50 Journal topology from Slave Slave 1002 (EX 1100) (clave connected to HC group).			- 1
	·	ERR 10:32:59 Invalid topology from Slave 'Slave 1003 [EK1100] (slave connected to HC group).			-
Networks: 1 Slaves:	14	State: • •	Mode: C	ONFIG	EXPERT





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

🛹 EC-Engineer []			-		×
<u>File View N</u> etwo	ork <u>S</u> ettings <u>H</u> elp				
Configuration M	ode 🛛 🔗 Export ENI 🛛 🐺 Export EXI	. Diagnosis Mode			÷
Project Explorer		Device Editor			
👻 🖳 Class-A Mas	ter	General Group E-Bus Current Advanced Options Motion			
Slave_10	01 [EK1100] (1001)	Address			
Slave_10	03 [EK1100] (1003)	Station Address			
N., Slave_10	12 [SGDV-E1 CoE Drive] (1012)				
N., Slave_10	13 [SGDV-E1 CoE Drive] (1013)	Information			
N, Slave_10	14 [SGDV-E1 CoE Drive] (1014)	Name Slave_1002 [EK1100])
🔻 🌻 🎚 Slave_	1002 [EK1100] (1002)	Description EK1100 EtherCAT Coupler (2A E-Bus)			
SI SI	ave Remove Slave(s) Del	Vendor Beckhoff Automation GmbH & Co. KG (0x0000002)			
SI	ave <u>Remote state(s)</u>	Product Code 0x044C2C52 (72100946)			
I SI	ave <u>Y</u> <u>Cut Slave(s)</u> Ctrl+X	Revision Number 0x00120000 (1179648)			
	Copy Slave(s) Ctri+C				
	Enable Slave(s)	Identification Value Vot Used			
	X Disable Slave(s)	² orts			
	🤔 Reload ESI data	A [X1 IN] Slave_1014 [SGDV-E1 CoE Drive] (1014) / Port B			
	Export SCI	D 🔷 Not Available			
	Change Slave	B Slave_1009 [EL1002] (1009)			
	Select from Project Template	C IX2 QUTI Not Connected			
	Import Beckhoff Slave Description				
	🔎 Create Group				
	X Remove Group				
	💥 Detach HC Group				
	🖉 Attach HC Group				
l la sur					
Classic View Flat Vi	ew Topology View				
Short Info	▲ †	Messages			↓ ‡
Information		Severity Time Message			A
Name	Slave_1002 [EK1100]	INF 10:35:22 All pending errors were solved.			
Description	EK1100 EtherCAT Coupler (2A E-Bus)	INF 10:35:22 All pending errors were solved.			
Vendor	Beckhoff Automation GmbH & Co. KG (0x0000)	ERR 10:33:12 Invalid topology from Slave 'Slave_1003 [EK1100]' (slave connected to HC group).			
Physical Address	1002	ERR 10:33:12 Invalid topology from Slave 'Slave_1003 [EK1100]' (slave connected to HC group).			
AutoInc Address	0xFFF6 / -10	ERR 10:32:59 Invalid topology from Slave 'Slave_1003 [EK1100]' (slave connected to HC group).			
		ERR 10:32:59 Invalid topology from Slave 'Slave_1003 [EK1100]' (slave connected to HC group).			v
Networks: 1 Slaves: 14	4	State: 🗶 🔘	Mode: O	ONFIG	EXPERT

A group can be deleted by selecting the head slave 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 slaves was deleted or disabled) the head slave of the group will be reported as "not connected". In that case the user can connect the head slave by using "cut" and "paste".
- Invalid topology from slave (fixed HC group on master) was displayed: this means that the first HC group which is connected to the master should be detached, because this is not valid in the ENI file
- Invalid topology from slave (slave connected to HC group) was displayed: this means that a normal slave 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:

Device Editor	
General PDO Mapping Variables	Ethernet Advanced Options Distributed Clocks Init Commands Sync Units
Ethernet	V
Virtual MAC address	02 00 00 03 EA 🗸 🗸 Auto
Time Stamp Requested	
Port Mode	○ Switch Port
Overwrite IP Settings	
IP Address	1.0.0.0
Subnet Mask	1.0.0.0
Default Gateway	1.0.0.0
DNS Server	1,0,0,0
DNS Name	

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:

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

Port Mode:

Slave can run in "Switch Port" or in "IP Port" mode

Override IP Settings:

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



5.3.9 Distributed Clock (Expert)

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

Device Editor		_			
General PDO Mapping Variable	s Group Advanced Options	Distributed Clocks	Init Commands	CoE Object-Dictionary	Sync Units
Distributed Clocks					
Operation Mode	DC for synchronization	•			
Sync Unit Cycle (us)	1000				
Overwrite Mode					
/ Sunc Unite					
Sync Unit U					
Cycle Time		1000 us			
	1000	1000 us			
	1000				
Shift Time (us)					
Sync Unit 1					
Cycle Time					
Sync Unit Cyc	ile x 1 💌 () us			
Sync 0 Cycle	x 1 💌 () us			
User defined					
Shift Time (us)					

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 master (see Master)

Overwite Mode:

Overwrites the settings of the selected operation mode (might be necessary, if the slave 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

Unit has its own inte

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

5.3.10 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:

Devi	ice Editor								
Ge	eneral PDO Mapp	oing Varial	bles Advan	ed Options Distributed Clocks	Init Commands	CoE Object-Dictionary	Sync Units Motion		
In	it Commands								
	Transition	Protocol	Index	Value			Comment	Access	^
	Pre-Op->Safe-Op	CoE	0x1C12:000	0			clear sm pdos (0x1C12)	RO	
	Pre-Op->Safe-Op	CoE	0x1C13:000	0			clear sm pdos (0x1C13)	RO	
	Pre-Op->Safe-Op	CoE	0x1A00:000	0			clear pdo 0x1A00 entries	RO	
	Pre-Op->Safe-Op	CoE	0x1A00:001	1614872592			download pdo 0x1A00 entry	RO	
	Pre-Op->Safe-Op	CoE	0x1A00:002	1617166368			download pdo 0x1A00 entry	RO	
	Pre-Op->Safe-Op	CoE	0x1A00:003	1618411536			download pdo 0x1A00 entry	RO	
	Pre-Op->Safe-Op	CoE	0x1A00:004	1626603552			download pdo 0x1A00 entry	RO	
	Pre-Op->Safe-Op	CoE	0x1A00:005	1616969736			download pdo 0x1A00 entry	RO	
	Pre-Op->Safe-Op	CoE	0x1A00:006	8			download pdo 0x1A00 entry	RO	
	Pre-Op->Safe-Op	CoE	0x1A00:007	1622736912			download pdo 0x1A00 entry	RO	
	Pre-Op->Safe-Op	CoE	0x1A00:008	1622802464			download pdo 0x1A00 entry	RO	
	Pre-Op->Safe-Op	CoE	0x1A00:000	8			download pdo 0x1A00 entry count	RO	
	Pre-Op->Safe-Op	CoE	0x1A01:000	0			clear pdo 0x1A01 entries	RO	
	Pre-Op->Safe-Op	CoE	0x1A01:001	1614872592			download pdo 0x1A01 entry	RO	
	Pre-Op->Safe-Op	CoE	0x1A01:002	1617166368			download pdo 0x1A01 entry	RO	\sim
Fd	lit Value								
	//	luce 0						Dec He	
	va	ide: U						He He	
Ed	lit Init Command								
	Move Up	Move Dow	'n				New Copy Ed	dit Dele	ete

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:

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):

裙 Add	l CoE Init	: Command		_		Х				
Genera	I									
Index		0x0000 Dec Hex	SubIndex	0	Dec	Hex				
Value										
Comn	nent									
Transiti	Transition									
V P	re-Op->	Safe-Op Safe-Op->Pre-Op								
<u> </u>	afe-Op-	>Op 🗌 Op->Safe-Op								
Further	Setting	s	Direction							
	Complete	Access	Download			-				
V	/alidate v	alue								
CoE Ob	iect-Dic									
	Jeer Die	tionary		Filter S	etting F	lag				
	Index	tionary Name	Flags	Filter So Type	etting F Value	lag				
Þ	Index 0x1010	Name Store Parameters	Flags	Filter So Type USINT	etting F Value -	lag				
•	Index 0x1010 0x1011	tionary Name Store Parameters Restore Default Parameters	Flags (RO RO RO) (RO RO RO)	Filter So Type USINT USINT	etting F Value - -	lag				
) 	Index 0x1010 0x1011 0x10F1	tionary Name Store Parameters Restore Default Parameters Sync Error Settings	Flags (RO RO RO) (RO RO RO) (RO RO RO)	Filter So Type USINT USINT USINT	etting F Value - -	lag				
+ + + +	Index 0x1010 0x1011 0x10F1 0x1600	tionary Name Store Parameters Restore Default Parameters Sync Error Settings 1st receive PDO Mapping	Flags (RO RO RO) (RO RO RO) (RO RO RO) (RW RW RW)	Filter So Type USINT USINT USINT	etting F Value - - -	hag				
+ + +	Index 0x1010 0x1011 0x10F1 0x1600 0x1601	tionary Name Store Parameters Restore Default Parameters Sync Error Settings 1st receive PDO Mapping 2nd receive PDO Mapping	Flags (RO RO RO) (RO RO RO) (RO RO RO) (RW RW RW) (RW RW RW)	Filter Si Type USINT USINT USINT USINT	Value	^				
	Index 0x1010 0x1011 0x10F1 0x1600 0x1601 0x1602	tionary Name Store Parameters Restore Default Parameters Sync Error Settings 1st receive PDO Mapping 2nd receive PDO Mapping 3rd receive PDO Mapping	Flags (RO RO RO) (RO RO RO) (RO RO RO) (RW RW RW) (RW RW RW)	Filter Si Type USINT USINT USINT USINT USINT	Value	îag				
	Index 0x1010 0x1011 0x10F1 0x1600 0x1601 0x1602	tionary Name Store Parameters Restore Default Parameters Sync Error Settings 1st receive PDO Mapping 2nd receive PDO Mapping 3rd receive PDO Mapping	Flags (RO RO RO) (RO RO RO) (RO RO RO) (RW RW RW) (RW RW RW) (RW RW RW)	Filter Si Type USINT USINT USINT USINT USINT	etting F Value - - -	^				

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 slave

Upload:

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

For SoE the user will see the following dialog:

裙 Edit Co	oE Init	Command		_		×				
General										
Index		0x6060 Dec Hex	SubIndex	0	Dec I	lex				
Value		8				÷				
Commer	nt	Op mode								
Transition	Transition Init->Pre-Op Pre-Op->Safe-Op Safe-Op->Pre-Op									
Safe	e-Op->	>Op Op->Safe-Op								
Further Se	etting	s	Direction							
Con	mplete	Access	Download			•				
Vali	idate v	alue								
CoE Objec	ct-Dict	tionary		Filter S	etting F	lag				
In	dex	Name	Flags	Туре	Value	^				
0x	x605A	Quick stop option code	(RW RW RW)	INT	-					
Ox	x605B	Shutdown option code	(RW RW RW)	INT	-					
0x	x605C	Disable operation option code	(RW RW RW)	INT	-					
Ox	x605D	Halt option code	(RW RW RW)	INT	-					
0x	x605E	Fault reaction option code	(RW RW RW)	INT	-					
Ox	x6060	Modes of operation	RX TX (RW RW RW)	SINT	-					
						~				
		ОК	Cancel							

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

5.3.11 CoE Object-Dictionary (Expert)

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

					Filter Setting
	Index	Name	Value	Туре	Flags
	0x1000	Device Type	131474 (0x20192	UDINT	(RO RO RO)
	0x1001	Error Register	-	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	-	USINT	(RO RO RO)
►	0x1011	Restore Default Parameters	-	USINT	(RO RO RO)
•	0x1018	Identity Object	-	USINT	(RO RO RO)
►	0x10F1	Sync Error Settings	-	USINT	(RO RO RO)
•	0x1600	1st receive PDO Mapping	-	USINT	(RW RW RW)
►	0x1601	2nd receive PDO Mapping	-	USINT	(RW RW RW)
•	0x1602	3rd receive PDO Mapping	-	USINT	(RW RW RW)
►	0x1603	4th receive PDO Mapping	-	USINT	(RW RW RW)
•	0x1A00	1st transmit PDO Mapping	-	USINT	(RW RW RW)
•	0x1A01	2nd transmit PDO Mapping	-	USINT	(RW RW RW)
►	0x1A02	3rd transmit PDO Mapping	-	USINT	(RW RW RW)
►	0x1A03	4th transmit PDO Mapping		USINT	(RW RW RW)

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

5.3.12 SoE Object-Dictionary (Expert)

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

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

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

5.3.13 Sync Units (Expert)

In this tab, the user can assign a slave sync unit to a specific master sync unit by using the combobox column "Master Sync Unit" (only visible if user has defined additional master sync units).

ice Edito	or						_						
eneral I	Modules	PDO Mapping	Variables	Advanced Optio	ns Init Commands	CoE Object-	Dictionary	Sync Units	Motion				
ave Syne	nc Units												
Na	lame					Inj	put Size [bytes]] Output	Size [bytes]	Master Syn	c Unit		
▼ Sy	yncUnit 0					13	5.0	127.0		Id 1000: Ma	asterSyn	cUnit 1	000
Sla	lave_1019 [V	IPA 053-1EC00].I	nputs.Hardw	are Interrupt Coun	ter					UDINT	IN:	38.0	4.0
Sla	lave_1019 [V	IPA 053-1EC00].I	nputs.Diagn	ostic Interrupt Cour	nter					UDINT	IN:	42.0	4.0
Sla	lave_1019 [V	IPA 053-1EC00].	Module 2 (02	1-18D00).Inputs.D	0					BOOL	IN:	46.0	0.1
Sla	lave_1019 [V	IPA 053-1EC00].	Module 2 (02	1-18D00).Inputs.DI	1					BOOL	IN:	46.1	0.1
Sla	lave_1019 [V	IPA 053-1EC00].	Module 2 (02	1-18D00).Inputs.DI	2					BOOL	IN:	46.2	0.1
SI	lave_1019 [V	IPA 053-1EC00].	Module 2 (02	1-18D00).Inputs.DI	3					BOOL	IN:	46.3	0.1
Sla	lave_1019 [V	IPA 053-1EC00].	Module 4 (04	0-1BA00).Inputs.St	atus byte					USINT	IN:	47.0	1.0
Sla	lave_1019 [V	IPA 053-1EC00].	Module 4 (04	0-1BA00).Inputs.In	put byte 1					USINT	IN:	48.0	1.0
Sla	lave_1019 [V	IPA 053-1EC00].	Module 4 (04	0-1BA00).Inputs.In	put byte 2					USINT	IN:	49.0	1.0
Sla	lave_1019 [V	IPA 053-1EC00].	Module 4 (04	0-1BA00).Inputs.In	put byte 3					USINT	IN:	50.0	1.0
Sla	lave_1019 [V	IPA 053-1EC00].	Module 4 (04	0-1BA00).Inputs.In	put byte 4					USINT	IN:	51.0	1.0
Sla	lave_1019 [V	IPA 053-1EC00].I	Module 4 (04	0-1BA00).Inputs.In	put byte 5					USINT	IN:	52.0	1.0
Sla	lave_1019 [V	IPA 053-1EC00].I	Module 4 (04	0-1BA00).Inputs.In	put byte 6					USINT	IN:	53.0	1.0
SI	lave_1019 [V	IPA 053-1EC00].I	Module 4 (04	0-1BA00).Inputs.In	put byte 7					USINT	IN:	54.0	1.0
Sla	lave_1019 [V	IPA 053-1EC00].I	Module 4 (04	0-1BA00).Inputs.In	put byte 8					USINT	IN:	55.0	1.0
SI	lave_1019 [V	IPA 053-1EC00].I	Module 4 (04	0-1BA00).Inputs.In	put byte 9					USINT	IN:	56.0	1.0
Sla	lave_1019 [V	IPA 053-1EC00].I	Module 4 (04	0-1BA00).Inputs.In	put byte 10					USINT	IN:	57.0	1.0
SI	lave_1019 [V	IPA 053-1EC00].I	Module 4 (04	0-1BA00).Inputs.In	put byte 11					USINT	IN:	58.0	1.0
SI	Iave 1010 IV	IRA 053 1EC001	Module 4 (0/	0.1BA00) Inputs In	out bute 12					LISINIT	IN .	50.0	10

5.3.14 Slave Specific Tabs (Expert)

Some slaves needs special configuration options. If this is necessary we display a slave specific tab.

Important: At first "Activate" have to be set, to activate the automatism for generating PDOs and Init Commands.

This tab will be displayed for the following slaves:

EL6731-0010 PROFIBUS DP Slave

General:



De	vice Ed	itor			
0	General	PDO Mapping Variables Advanced Options Init Commands CoE Object-Dictionary Sync Units Motion EL6731-0010			
				eneral	Modules
١	alues				
	_				
		Name			
	•	General			
		Name	Value	Туре	Access
		Activate	0	INT32	RW
	•	DP Slave Parameter Set			
		Name	Value	Туре	Access
		Station Address	0	UINT32	RW
		Device Type	2399	UINT32	RW
		Change of DP inputs after DP fault	0	INT32	RW
E	dit Val	ue			
		Value: 0	Dec	Hex	Write

Activate: Activates the automatism for generating PDOs and Init Commands

DP Slave Parameter Set

Station Address:

DP station address of the DP slave (permitted values: 0-125)

Device Type:

DP Ident Number of the DP slave

Modules:



Device Editor				
General PDO Mapping Variables Advanced Options	Init Commands	CoE Object-Dictionar	y Sync Units Motion EL6731-0010	
				General Modules
Assign the modules				
000 Terminal [1 BVTE Slave In (Master Out)	^	-	RVTE Sizua In (Mastar Out	<u>^</u>
001/ Terminal []			1 BVTE Slave-In/Master-Out	
2 001: Terminal []			2 PVTE Slave-In/Master-Out	
2 002: Terminal []		<<	2 BYTE Slave-In/Master-Out	
2004 Terminal []		Х	S BYTE Slave-In/Master-Out	
2 004: Terminal []			4 BYTE Slave-In/Master-Out	
2005: Terminai []			BYTE Slave-In/Master-Out	
2 000: Terminal []			6 BYTE Slave-In/Master-Out	
2 007: Terminal []			7 BYTE Slave-In/Master-Out	
2 008: Terminal []			8 BYTE Slave-In/Master-Out	
🖉 009: Terminal []			9 BYTE Slave-In/Master-Out	
🖉 010: Terminal []			10 BYTE Slave-In/Master-Out	
🤌 011: Terminal []			11 BYTE Slave-In/Master-Out	
012: Terminal []			12 BYTE Slave-In/Master-Out	
🖉 013: Terminal []			13 BYTE Slave-In/Master-Out	
💉 014: Terminal []			14 BYTE Slave-In/Master-Out	
👷 015: Terminal []			15 BYTE Slave-In/Master-Out	
👷 016: Terminal []			16 BYTE Slave-In/Master-Out	
🥢 017: Terminal []		-	WORD Slave-In/Master-Out	
💉 018: Terminal []			1 WORD Slave-In/Master-Out	
💉 019: Terminal []			2 WORD Slave-In/Master-Out	
💉 020: Terminal []			📱 3 WORD Slave-In/Master-Out	
🤌 021: Terminal []	~		4 WORD Slave-In/Master-Out	\sim

Connect modules to slot ("<<")

Used for connecting the selected modules (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)

EL6631-0010 PROFINET IO Device

General:



De	vice Ed	itor									
G	ieneral	PDO Mapping Variables A	dvanced Options	Init Commands	CoE Object-Dictionary	Sync Units	Motion	EL6631-0010			
										eneral	Modules
v	alues										
	_										
		Name									_
	•	General									
		Name							Value	Туре	Access
		Activate							0	INT32	RW
	•	IO Device Parameter Set									
		Name							Value	Туре	Access
		Module DAP Version							0	UINT32	RW
		Station Name								STRING	RW
		IP Address								STRING	RW
		Subnet								STRING	RW
		Gateway								STRING	RW
E	dit Val	ue									
		Value: 0							Dec	Hex	Write

Activate: Activates the automatism for generating PDOs and Init Commands

IO Device Parameter Set

Module DAP Version:

Module DAP version of the DP slave (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)

Station Name:

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

Modules:



Device Editor				
General PDO Mapping Variables Advanced Options Init Commands	CoE Object-Dictio	nary Sync Units Motion EL6631-0010		
			General	Modules
Assign the modules				
) Г	- DVTF la suit		~
OO1 Truninal [1 BY IE Input]		BYTE Input		
OOD Terminal []				
2 002: Terminai []	<<			
2 004 T i II I	Х	4 BYTE Input		
2 004: Terminal []		8 BYTE Input		
2 005: Ierminal []		10 BYTE Input		
2 006: Terminal []		16 BYTE Input		
🔌 007: Terminal []		32 BYTE Input		
🔌 008: Terminal []		64 BYTE Input		
💉 009: Terminal []		100 BYTE Input		
💉 010: Terminal []		200 BYTE Input		
🖉 011: Terminal []		VORD Input		
🖉 012: Terminal []		1 WORD Input		
🖉 013: Terminal []		2 WORD Input		
👷 014: Terminal []		4 WORD Input		
👷 015: Terminal []		8 WORD Input		
🛫 016: Terminal []		10 WORD Input		
💉 017: Terminal []		16 WORD Input		
💉 018: Terminal []		32 WORD Input		
💉 019: Terminal []		64 WORD Input		
🖉 020: Terminal []		100 WORD Input		
🖉 021: Terminal []		 DWORD Input 		~
	J L			

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)

K-bus Coupler / IP Link Coupler

Supported devices:

K-bus Coupler

- BK1120
- BK1150
- BK1250

IP Link Coupler

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

General:

Activate:

Activates the automatism for generating PDOs and Init Commands

Check Terminals at Startup:

Activates the automatism for checking terminals at startup



Device	Editor			
Gen	eral PDO Mapping Variables Advanced Options Init Commands Sync Units Motion BK1120			
		Ge	neral	Modules
Valu	es			
	Name			
	General			
	Name	Value	Туре	Access
	Activate	0	INT32	RW
	Check Terminals at Startup	0	INT32	RW
Edit	Value			
	Value: 0	Dec	Hex	Write

Terminals:

eral	PDO Mapping	Variables	Advanced Options	Init Commands	Sync Units	Motion	BK1120		
an th	e modules							General	Modul
g.r	 000: Terminal 	[]		^		-	U Virt	tual Terminals (CP1xxx)	^
	001: Terminal	[]					- U	CP9940-0001 40 Ch. Input	
	002: Terminal	[]					Ū.	CPx9xx-4 LEDs/Buttons	
	003: Terminal	[]			v		U.	CPx9xx-8 LEDs/Buttons	
	004: Terminal	[]			~		U.	CPx9xx-12 LEDs/Buttons	
	005: Terminal	[]					ų	CPx9xx-16 LEDs/Buttons	
	006: Terminal	[]					ų.	CPx9xx-20 LEDs/Buttons	
	007: Terminal	[]					ų.	CPx9xx-24 LEDs/Buttons	
	008: Terminal	[]					ų.	CPx9xx-28 LEDs/Buttons	
	> 009: Terminal	[]						CPx9xx-3-2 LEDs/Buttons/Inputs	
1	2 010: Terminal	[]						CPx9xx-4-2 LEDs/Buttons/Inputs	
1	2 011: Terminal	[]						CPx9xx-E-Stop	
1	2 012: Terminal	[]				-	👢 Dig	gital Input Terminals (KL1xxx)	
1	2 013: Terminal	[]						KL 1002, 2 Ch. Input (24V, 3.0ms)	
1	2 014: Terminal	[]						KL 1012, 2 Ch. Input (24V, 0.2ms)	
1	2 015: Terminal	[]						KL 1032, 2 Ch. Input (48V, 3.0ms)	
1	2 016: Terminal	[]						KL 1052, 2 Ch. Input +/- (24V, 3.0ms)	
1	2 017: Terminal	[]						KL 1104, 4 Ch. Input (24V, 3.0ms)	
1	2 018: Terminal	[]						KL 1114, 4 Ch. Input (24V, 0.2ms)	
1	2 019: Terminal	[]						KL 1124, 4 Ch. Input (5V, 0.2ms)	
1	2 020: Terminal	[]						KL 1154, 4 Ch. Input +/- (24V, 3.0ms)	
	021: Terminal	[]						KL 1164, 4 Ch. Input +/- (24V, 0.2ms)	

Connect terminials to slot ("<<")

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

```
Disconnect terminals from slot ("X")
```

Used for disconnecting the selected slot (left list)

5.3.15 IO-Link

In this tab, the user can configure the IO-Link terminal EL6224, EP6224 and EP(P)6228. He can add different devices to the ports (IODD). The user can see 4 or 8 ports. Depends on the configured slave.

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

Device Edito	or		06	Ŷ	Ŷ	Ŷ				
General	PDO Mapping	Variables	Advanced Optic	ons Distribu	ted Clocks Init	Commands Co	oE Object-Dictionary	Sync Units	Motion	IO-Link
IO-Link										
Port 1		Po	ort 2		Port 3		Port 4			
Add dev	ice Clea	r A	dd device	Clear	Add device	Clear	Add device	Clear		
Port 5		Po	ort 6		Port 7		Port 8			
Add dev	ice Clea	r A	dd device	Clear	Add device	Clear	Add device	Clear		

5.3.16 Profibus Master (EL6731)

In this tab, the user can configure the Profibus Master EL6731. New Profibus modules can be added in the tree. Right click and then 'Append module'.

Each module has an own EL6731 tab with settings and the possibility to load a GSD file. After the GSD file was loaded the user gets also PRM data settings and the possibility to add a submodule (e.g. K-Bus) via the tree.

-							
	Name						
•	General				Value	Type	Access
	Activate				1	BOOL	RW
•	DP Slave Paramete	r Set					
	Name				Value	Туре	Access
	Station Address				1	UINT32	RW
	Baudrate				8	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 Rotat	ion Time			34617	UINT32	RW
	GAP Update Factor				100	UINT32	RW
	HSA				126	UINT32	RW
	Max Retry Limit				4	UINT32	RW

5.3.17 CANopen Master (EL6751)

In this tab, the user can configure the CANopen Master EL6751. He can add Modules, PDOs, SDOs and variables by clicking the right mouse button. To activate the master, 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:



Dev	ice Ed	itor								
G	eneral	Modules	PDO Mapping	Variabl	es Advanced Options	Distributed Clocks	Init Commands	CoE Object-Dictionary	Sync Units Motion	EL6751
Fi	ter									
	F1 675				5-W					
	EL6/5	1			Settings					
	CANo	pen Module	1							
	CANo	pen Module	2							
Se	tting	5								
		Name								^
	Ŧ	General								
		Name							Value	Type
		Activate							0	BOOL
		Control							0	BOOL
	-	CAN Rue Do	ramator Eat						Ŭ	DOOL
	•	Name	ameter set						Value	Turne
		CAN Due De	and a Cat						17	e type
		CAN BUS Par	ameter Set						17	UINT32
		Master Nod	e Address						127	UINT32
Fr	lit Val	Paudrata ue								LIINIT 25
			alum 0							
		v	aiue: U						Dec	Hex Write

5.3.18 CANopen Slave (EL6751-0010)

In this tab, the user can configure the CANopen Slave EL675-0010. 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:



ditor										
al PDO Mapping	Variables Ac	dvanced Options	Init Commands	CoE Objec	t-Dictionary	Sync Units	Motion	EL6751-0010		
751 0010		Settings								
51-0010		Typpor								
		IXPDUS								
		RXPDOS								
gs										
Name										^
General										
Name									Value	Туре
Activate									1	BOOL
Settings										
Name									Value	Туре
Node Id									1	UINT32
Baudrate									2	UINT32
Cycle Time									1000000	UINT32
Chiff Time									600000	
alue										
Value:	True									 Write
	ditor	ditor al PDO Mapping Variables A	ditor al PDO Mapping Variables Advanced Options T51-0010 Settings TxPDOs RxPDOs RxPDOs g s Name General Name Activate Settings Name Node Id Baudrate Cycle Time chile Time alue Value: True	ditor al PDO Mapping Variables Advanced Options Init Commands 751-0010 Settings TXPDOs RxPDOs g g Name General Name Activate Settings Name Node Id Baudrate Cycle Time chine Time alue Value: True Value: True	ditor al PDO Mapping Variables Advanced Options Init Commands CoE Object 751-0010 Settings TXPDOs RxPDOs RxPDOs gs Name General Name Activate Settings Name Node Id Baudrate Cycle Time chine Time alue Value: True	ditor al PDO Mapping Variables Advanced Options Init Commands CoE Object-Dictionary 751-0010 Settings TXPDOs RxPDOs RxPDOs RvPDOs RvPDOs Settings Name Activate Settings Name Node Id Baudrate Cycle Time chine Time alue Value: True	ditor al PDO Mapping Variables Advanced Options Init Commands CoE Object-Dictionary Sync Units T51-0010 Settings TXPDOs RxPDOs RxPDOs gs Name General Name Activate Settings Name Node Id Baudrate Cycle Time Exist Time Salue Value: True	ditor al PDO Mapping Variables Advanced Options Init Commands CoE Object-Dictionary Sync Units Motion 751-0010 Settings TxPDOs RxPDOs RxPDOs RxPDOs Settings Name Activate Settings Name Activate Settings Name Node Id Baudrate Cycle Time Exit Time Setting Salue Value: True	ditor al PDO Mapping Variables Advanced Options Init Commands CoE Object-Dictionary Sync Units Motion EL6751-0010 751-0010 Settings TXPDOS RxPDOS RxPDOs RxPDOs Name General Name General Name Activate Settings Name Node Id Baudrate Cycle Time Exit Time Sature Value: True	ditor al PDO Mapping Variables Advanced Options Init Commands CoE Object-Dictionary Sync Units Motion EL6751-0010 751-0010 Settings 751-0010 RvPDOs RvPDOs RvPDOs RvPDOs statistic Commands CoE Object-Dictionary Sync Units Motion CoE Object-Dictionary Sync Units Motion EL6751-0010 Settings statistic CoE Object-Dictionary Sync Units Motion EL6751-0010 Settings statistic CoE Object-Dictionary Sync Units Motion EL6751-0010 Settings statistic CoE Object-Dictionary Sync Units Motion EL6751-0010 Settings Settings Name Value Node Id Baudrate Coc Object-Dictionary Sync Units Motion EL6751-0010 Settings Setting Settings Setting Setting Settings Setting S

5.3.19 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 master motion tab, to configure the Demo Motion:



Axis 1 Axis 2 Mode of Operation 8 Increments per mm 1000 Increment Factor 0 Controlword Object 0x6040 Dec Hex 0x00 Statusword Object 0x6041 Dec Hex 0x00 Postion Actual Value Object 0x6064 Dec Hex 0x00 Target Position Object 0x607A
Axis 1 Axis 2 Mode of Operation 8 Increments per mm 1000 Increment Factor 0 Controlword Object 0x6040 0x6040 Dec Hex 0x00 Statusword Object 0x6041 Dec Hex Oxfold Dec Hex Postion Actual Value Object 0x6064 Dec Hex 0x6064 Dec Hex 0x00 Value Object 0x6064 0x607A Dec Hex 0x00 Value Object 0x607A Dec Hex 0x607A Dec Hex 0x00 Value Value
Mode of Operation 8 Increments per mm 1000 Increment Factor 0 Controlword Object 0x6040 Dec Hex Ox00 Dec Statusword Object 0x6041 Dec Hex Ox00 Dec Postion Actual Value Object 0x6064 Dec Hex 0x00 Dec Hex 0x00 Ox6064 Dec Hex 0x00 Ox6840 Dec Hex 0x00 Dec Hex 0x6064 Dec Hex 0x00 Dec Hex 0x607A Dec Hex 0x00 Dec Hex 0x607A Dec Hex 0x00 Ux607A Dec Hex 0x607A Dec Hex Ux607A Dec Ux607A Dec Hex 0x607A
Increments per mm 1000 ♀ Increment Factor 0 ♀ Controlword Object 0x6040 Dec Hex 0x00 Dec Hex Statusword Object 0x6041 Dec Hex 0x00 Dec Hex 0x6841 Dec Hex Postion Actual Value Object 0x6064 Dec Hex 0x00 Dec Hex 0x6846 Dec Hex 0x00 Dec Hex Target Position Object 0x607A Dec Hex 0x00 Dec Hex 0x687A Dec Hex 0x00 Dec Hex
Increment Factor 0 Controlword Object 0x6040 Dec Hex 0x00 Dec Hex 0x6840 Dec Hex 0x6841 Dec Hex 0x6841 Dec Hex 0x6864 Dec Hex 0x6864 Dec Hex 0x6864 Dec Hex 0x6064 Dec Hex 0x687A Dec Hex 0x607A Dec Hex 0x687A Dec Hex Dec
Controlword Object 0x6040 Dec Hex 0x00 Dec Hex 0x6840 Dec Hex Statusword Object 0x6041 Dec Hex 0x00 Dec Hex 0x6841 Dec Hex 0x00 Dec Hex Postion Actual Value Object 0x6064 Dec Hex 0x00 Dec Hex 0x6840 Dec Hex 0x00 Dec Hex 0x6841 Dec Hex 0x00 Dec Hex 0x00 Dec Hex 0x00 Dec Hex 0x00 Dec Hex 0x687A Dec Hex 0x00 Dec Hex 0x00 Dec Hex 0x00 Dec Hex 0x687A Dec Hex Dec Hex Dec
Statusword Object 0x6041 Dec Hex 0x00 Dec Hex 0x6841 Dec Hex 0x00 Dec Hex Postion Actual Value Object 0x6064 Dec Hex 0x00 Dec Hex
Postion Actual Value Object 0x6064 Dec Hex 0x00 Dec Hex 0x6864 Dec Her 0x00 Dec Her Target Position Object 0x607A Dec Hex 0x00 Dec Hex 0x687A Dec Hex 0x00 Dec Hex 0x687A Dec Hex 0x00 Dec Hex Dec Hex Dec Hex Dec Hex Dec Hex Dec
Target Position Object 0x607A Dec Hex 0x00 Dec Hex 0x687A Dec Hex 0x00 Dec Hex
Target Velocity Object 0x60FF Dec Hex 0x00 Dec Hex 0x68FF Dec Hex 0x00 Dec Hex
Modes of operation Object 0x6060 Dec Hex 0x00 Dec Hex 0x00 Dec Hex

5.3.20 Simulation Settings

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



Device Editor							
General PDO Mapping Variables	Advanced Options Di	stributed Clocks	Init Commands	CoE Object-Dictionary	Sync Units Mo	otion Simulator	
					General	CoE EEPROM	Register
Operation Mode							
operation mode							
Application Name	None 🔻 N	lame					
✓ Ignore CoE Download Error							
✓ Simulated							
Starting Position							
Power off							
			0				
Custom previous port	B A	Address	U	¥.			

Application Name:

The application name for the EXI file

Ignore Download Error:

Ignores errors on download

Starting Position

Power Off:

Select if slave should be powered on or off on start

Custom previous port:

manipulate the topology

CoE Tab



Device	Editor			_	_					
Gene	eral PDO N	lapping Variables	Advanced Options	Distributed Clocks	Init Commands	CoE Object-Dict	ionary Sync Ur	nits Motio	n Simulator	
							Ge	eneral C	DE EEPROM	Register
CoE	Settings									
	Use gen	eric Object Diction	ary					Create fr	om ESI Load from	Slave
	Index	Name				١	/alue	Туре	Flags	^
	0x100	0 Device Type				1	131474 (0x20192)	UDINT	(RO RO RO)
	0x100	1 Error Register				C	0 (0x00)	USINT	(RO RO RO)
	0x100	8 Manufacturer De	vice Name					STRING(1)	(RO RO RO)
	0x100	A Manufacturer Sof	tware Version					STRING(1)	(RO RO RO)
	▶ 0x101	0 Store Parameters				c	0 (0x00)	USINT	(RO RO RO)
	▶ 0x101	1 Restore Default P	arameters			C	0 (0x00)	USINT	(RO RO RO)
	▶ 0x101	8 Identity Object				C	0 (0x00)	USINT	(RO RO RO)
	Ox10F	1 Sync Error Setting	js			C	0 (0x00)	USINT	(RO RO RO)
	0x160	0 1st receive PDO M	Mapping			C	0 (0x00)	USINT	(RW RW RV	V)
	▶ 0x160	1 2nd receive PDO	Mapping			C	0 (0x00)	USINT	(RW RW RV	V)
	▶ 0x160	2 3rd receive PDO I	Mapping			C	0 (0x00)	USINT	(RW RW RV	V)
	► 0x160	3 4th receive PDO I	Mapping			C	0 (0x00)	USINT	(RW RW RV	V)
	0x1A0	0 1st transmit PDO	Mapping			C	0 (0x00)	USINT	(RW RW RV	V)
	0x1A0	1 2nd transmit PDC) Mapping			C	0 (0x00)	USINT	(RW RW RV	V)
	Ox1A0	2 3rd transmit PDO	Mapping			0	0 (0x00)	USINT	(RW RW RV	V) 🗸
Edit	Value									
		Value: 0							Dec Hey	Write
		i and i							Disc Hex	

The simulated CoE can be changed here.

EEPROM Tab



e Editor	Variables Advanced Ontions Di	stributed Clocks Init Commands	CoE Object-Dictionany Sync Lin	its Motion Simulator	-
ierar Poo Mapping	vanables Auvanced options Di		Ger	neral CoE EEPROM	Regis
ROM Settings					
Use ESI EEPROM				Create from ESI Load from	n Slav
Index	Name	Value	Туре		
0x0000	PDI Control	6 (0x0006)	UINT		
0x0001	PDI Configuration	60929 (0xEE01	I) UINT		
0x0002	Pulse Length of St	YNC Signals 1000 (0x03E8)	UINT		
0x0003	Extended PDI Con	figuration 0 (0x0000)	UINT		
0x0004	Configured Station	n Alias 0 (0x0000)	UINT		
0x0005	Reserved	0 (0x0000000	UDINT		
0x0007	Checksum	61 (0x003D)	UINT		
0x0008	Vendor ID	1337 (0x0000	0539) UDINT		
0x000A	Product Code	35651585 (0x0	J2200001) UDINT		
0x000C	Revision Number	196613 (0x000	030005) UDINT		
0x000E	Serial Number	0 (0x0000000	J) UDINT		
0x0010	Execution Delay	0 (0x0000)	UINT		
0x0011	Port0 Delay	0 (0x0000)	UINT		
0x0012	Port1 Delay	0 (0x0000)	UINT		
	Deconved	0 (0×0000)	UINT		

The simulated EEPROM can be changed here.

Register Tab



ister !	Settings				
	ise default register values				Load from Sla
	Index	Name	Value	Туре	
•	0x0000	Туре	1 (0x01)	USINT	
►	0x0001	Revision	1 (0x01)	USINT	
►	0x0002	Build	12 (0x000C)	UINT	
•	0x0004	FMMUs supported	2 (0x02)	USINT	
•	0x0005	SyncManagers supported	4 (0x04)	USINT	
►	0x0006	RAM Size	4 (0x04)	USINT	
►	0x0007	Port Descriptor	0 (0x00)	USINT	
•	0x0008	ESC Features supported	0 (0x0000)	UINT	
•	0x0010	Configured Station Address	1013 (0x03F5)	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	

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.



6 Diagnosis Mode

6.1 Overview

EC-Engineer is also a diagnosis application specifically developed to analyze EtherCAT networks that are controlled by the EC-Master. 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, slave devices).

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

- Useful for setting up the system
- System analysis and maintenance
- Error detection
- Documentation

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

൙ EC-Engineer []						- 0	×
<u>File View Network Settings H</u> elp							
X Configuration Mode 🛛 Export ENI 🕞 Export EXI	📕 Diagnosis Mode 🛛 🕼 Take Snap	oshot 🕞 Run 📵 Break					÷
Project Explorer	Device Editor						
Configuration Mode Project Explorer Class-A Master connected> Slave_1001 [EK1100] (1001) Slave_1002 [EL2008] (1002) Slave_1003 [EL2008] (1003) Slave_1006 [EL1014] (1004) Slave_1006 [EL2008] (1005) Slave_1006 [EL2008] (1007) Slave_1006 [EL2008] (1007) Slave_1007 [EL1018] (1007) Slave_1007 [EL1018] (1007) Slave_1010 [EK112-0080] (1009) Slave_1010 [EK1122000] (1007) Slave_1010 [EK1122000] (1010) Slave_1013 [EL4132] (1013) Slave_1014 [EL3162] (1014) Slave_1015 [EL1008] (1016) Slave_1016 [EL1094] (1016) Slave_1016 [EK1120] (1017) Slave_1016 [EK1120] (1018) Slave_1010 [EK1112] (1020) Slave_1020 [EK1122] (1020) Slave_1020 [EK1122] (1020)	Chagnosis Mode UE Take Snap Ceneral Process Data Image Wi State Machine Current State Requested State Change State Information Master Version Number of found slaves Number of alwes in configuratio Number of alwes in configuratio Number of DC slaves DC in-sync Topology Ok Link Connected Slaves in Master State Saves in Master State Severity Time Message	Op Op Op Op Op Init Bootstrap Pre-Op Pre-Op Safe-Op Op Op Init Bootstrap Pre-Op Safe-Op Op Op Init Bootstrap Pre-Op Safe-Op Op Ves Yes Yes Yes Yes	Pata CoE Object-Dicti Frame Counter Sent frames Lost frames Cyclic frames Acyclic frames Acyclic frames Current [kB] Max [kB]	ionary History 309292 27 241970 67322 Clear counters 860 861			•
							Lovocot
Networks: 1 Slaves: 26					State: 🔍 🔿	Mode: DIAGNOSIS	EXPERT



6.2 Master

This section shows the current "health" state of the master and helps the user to analyze master related problems.

6.2.1 General (Master)

In this tab, the user can see and change the current state of the state machine of the master. He has also an overview over the current "health" state of his EtherCAT network:

Device Editor				
General Process Data Image Wat	ch list Performance Trace [Data CoE Object-Dictionar	History	
State Machine				
Current State	On			
Requested State	Op			
hequested state	Init Bootstrap			
Change State	Pre-Op Safe-Op			
	Ор			
l-ft		Farmer Carration		
Information		Frame Counter		
Master Version	3.2.0.3	Sent frames	101094	
Number of found slaves	26	Lost frames	3	
Number of slaves in configuration	26	Cyclic frames	73520	
Number of DC slaves	4	Acyclic frames	27574	
DC in-sync	Yes		Clear counters	
Topology Ok	Yes	Memory Usage		
Link Connected	Yes	Current [kB]	860	
Slaves in Master State	Yes	Max [kB]	861	

State Machine

Current State:

Current state of the master

Requested State:

Requested state of the master

Change State:

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

Information

Master version:

Version number of the running master

Number of found slaves:

Number of slaves, which were found from master on the network

Number of slaves in configuration:

Number of slaves, which are configured in the ${\tt ENI}$ file



Number of DC slaves:

Number of slaves with DC support, which were found from master on the network

DC in-sync:

Signals that all slaves with DC support are correctly synchronized or not. If not all slaves 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.

Slaves in Master State:

Signals that all slaves are in master state.

Frame Counter

Sent frames: Number of sent 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:



able	25								Release	e all		Expo	rt
	Name							Datatype	Offset	*	Size	Value	Forced
	Slave_1010 [Ek	(1101-0080].	D.ID					UINT	IN :	155.0	2.0	1	
	Slave_1014 [EL	3162].Chann	el 1.Status					BYTE	IN:	157.0	1.0	0	
	Slave_1014 [EL	3162].Chann	el 1.Value					INT	IN :	158.0	2.0	0	
	Slave_1014 [EL	3162].Chann	el 2.Status					BYTE	IN:	160.0	1.0	0	
	Slave_1014 [EL	3162].Chann	el 2.Value					INT	IN :	161.0	2.0	0	
	Slave_1015 [EL	.1008].Chann	el 1.Input					BOOL	IN :	163.0	0.1	0	
	Slave_1015 [EL	.1008].Chann	el 2.Input					BOOL	IN :	163.1	0.1	0	
	Slave_1015 [EL	.1008].Chann	el 3.Input					BOOL	IN:	163.2	0.1	0	
rt 5	No. And And	A ak mil	A.L. MA AL	n stalete russ	ula a Mica	MM	Malu A Au	udha Ndan da		n III	Add	n Ana	Mille
0	0	50	100	150	200	250	300	350	40	0	45	0	
	•												

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 slaves 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:



Dev	ice Editor												
G	eneral Proce	ss Data Image V	Vatch list Perfo	ormance Trace	e Data CoE Oł	oject-Dictionary	History						
Va	ariables							Releas	e all		Б	kport	
	Name							Datatype	Offset	*	Size	Value	Forced
	Slave_1019 [\	'IPA 053-1EC00].Mo	dule 4 (040-1BA0	00).Inputs.Status	byte			USINT	IN :	13.0	1.0	136	
	Slave_1014 [E	L3162].Channel 1.Va	alue					INT	IN:	158.0	2.0	0	
	Slave_1013 [E	L4132].Channel 2.O	utput					INT	OUT :	170.0	2.0	0	
CI	hart						Save w	atch list Loa	d watch li	st Re	move	from w	atch list
	160												
	140												-
	120	50	100	150	200	250	300	350	400	4	150		
	•	50	100	155	200	200	500	550	100			I	Þ
Ec	dit Variable	Value: 136						Dec	Hex	Force		Re	ease

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 Edit	or			_								
General	Process Data Ima	ge Watch list	Performance	Trace Data	CoE Obje	ct-Dictionar	y His	tory				
											CPU Load	Busload
Busload								Reset				
CycleTir	me [us]		Bytes per cyc	e		Bytes per	secon	d				
2000)		Average	313		Averag	e	142361				
			Max	1677		Max		314244				
Busload	l per cycle (100% :	= 20000 B/Cycl	e)									
	0 10	20	30	40	50	60	70	80	90	100		
Busload	l per second (1009	6 = 10 MB/s)										
	0 10	20	30	40	50	60	70	80	90	100		

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.

Device Eo	ditor												
Genera	I Pro	cess Data Im	age Watch list	Performance	Trace Data	CoE Object-Dictio	onary Hist	ory					
												CPU Loa	Busload
CPU Lo	oad							Reset					
Cycle	Overv	view [us]								_			
0		250	500	750	1000	1250	1500	17	'50	2000			
Detai	ils	Name					Min [us]	Ava [us]	Max [us]	^			
		Cycle Time					55,5	2266,9	19386,4				
		Task Duration	n (JOB_Total + Ap	p)			11,9	63,4	5976				
Σ	Σ	JOB_Total					8,3	61	5972,6				
->		JOB_Process/	AllRxFrames Offse	t			0,1	0,7	225,4				
		JOB_Process/	AllRxFrames Dura	tion			0,3	8,5	562,8	\sim			
Cycle	ogariti Time	nmic Represe [us]	ntation										
Í-													
						- h.	а.						
							h.,						
100	0 11	00 1200	1200 1400	1500 1600	1700 1800	1000 2000	2100.22	00.220	2400	2500	2600.2	700 2800 2	000
1000	0 110	00 1200	1300 1400	1200 1000	1700 1800	1900 2000	2100 22	00 2300	5 2400	2300	2000 27	2800 2	900



6.2.5 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:

Device Editor					
General Process Data Image Watch list Performance Trace Data CoE Object-Dictionary History					
Variables					
Name	Datatype	Offset		Size	Value
Inputs.DevicesState	UINT	IN :	173.0	2.0	8
Inputs.BusTime	UDINT	IN :	179.0	4.0	3904556720
Chart					
5000					
0					
Edit Variable					
Value: 3904556720		Dec	Hex		Write

6.2.6 CoE Object-Dictionary (Expert)

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



Devi	ce Ed	itor									
Ge	neral	Proces	s Data Image Watch list	Performance	Trace Data	CoE Object-Dictionary	History				
								De	escription fr	rom Master Single O	bject
Va	lues										
	_										
		Index	Name					Value	Туре	Flags	^
		0x1000	Device type					1100 (0x44C)	UDINT	(RO RO RO)	
		0x1008	Device name					EC-Master	STRING(9)	(RO RO RO)	
		0x1009	Hardware version					V3.2.0.03	STRING(9)	(RO RO RO)	
		0x100A	Software version					V3.2.0.03	STRING(9)	(RO RO RO)	
	•	0x1018	Identity					4 (0x04)	USINT	(RO RO RO)	
	•	0x10F3	History					18 (0x12)	USINT	(RO RO RO)	
		0x2000	Master State Change Comr	mand				0 (0x00)	UDINT	(RW RW RW)	
		0x2001	Master State Summary					79745 (0x13781)	UDINT	(RO RO RO)	
	•	0x2002	Bus Diagnosis Object					14 (0x0E)	USINT	(RO RO RO)	
	•	0x2003	Redundancy Diagnosis Obj	iect				4 (0x04)	USINT	(RO RO RO)	
	•	0x2004	Notification Counter Object	t				15 (0x0F)	USINT	(RO RO RO)	
	•	0x2005	MAC Address Object					4 (0x04)	USINT	(RO RO RO)	
	•	0x2006	Mailbox Statistics Object					65 (0x41)	USINT	(RO RO RO)	
	•	0x2007	Add History Diagnosis Mes	sage Command				5 (0x05)	USINT	(WO WO WO)	
		0x2010	Debug Register					5 (0x05)	ULINT	(RW RW RW)	~
F -1											
Ed	it val	ue								_	
			Value: 1100							Dec Hex Wri	te

Lists of CoE Object-Dictionary entries

- Entries are uploaded by the master from the slave
- 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



6.2.7 Master History (Expert)

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

Device B	ditor									
Gener	al Proces	s Data Image W	atch list	Performance	Trace Data	CoE Object-Dictionary	History			
Settin	gs									
Show	w Info Me	ssages	True							
Show	w Warning	Messages	True							
Show	w Error Me	essages	True							
Show	w Emerger	ncy Messages	False							
Curr	ent Mode		Overw	rite Mode						
Messa	iges								Exp	oort
	Severity	Time	• ID	Acknowledged	Code	Message				^
×	ERR	11.05.2023 09:55:	41 022	No	0x0001000A	(0x0219) Unexpected resp	oonse on cy	clic Ethernet frame		
	ERR	11.05.2023 09:55:	41 021	No	0x0001000A	(0x0219) No response on	cyclic Ether	net frame		
×	ERR	11.05.2023 09:55:	39 020	No	0x0001000A	(0x0219) Unexpected resp	oonse on cy	clic Ethernet frame		
	ERR	11.05.2023 09:55:	39 019	No	0x0001000A	(0x0219) No response on	cyclic Ether	net frame		
×	ERR	11.05.2023 09:53:	08 018	No	0x0001000A	(0x0219) Unexpected resp	oonse on cy	clic Ethernet frame		
	ERR	11.05.2023 09:53:	08 017	No	0x0001000A	(0x0219) No response on	cyclic Ether	net frame		
×	ERR	11.05.2023 09:52:	17 016	No	0x0001000A	(0x0219) Unexpected resp	oonse on cy	clic Ethernet frame		
	ERR	11.05.2023 09:52:	17 015	No	0x0001000A	(0x0219) No response on	cyclic Ether	net frame		
×	ERR	11.05.2023 09:52:	16 014	No	0x0001000A	(0x0219) Unexpected resp	oonse on cy	clic Ethernet frame		~
									Number of messages: 17	/ 200
Chano	e Messac	e Handling								
		Tasks: None							▼ Exe	cute

Settings

Show Info Messages:

Info messages will be collected from master

Show Warning Messages:

Warning messages will be collected from master

Show Error Messages:

Error messages will be collected from master

Show Emergency Messages:

Not supported from master

Current Mode:

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

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 Slave

This section shows the current "health" state of the selected slave and helps the user to analyze slave related problems.

6.3.1 General (Slave)

In this tab, the user can see and change the current state of the state machine of the slave. He can see and clear also the current error state of the slave:

Device Editor	
General Variables E	SC Register EEPROM Extended Diagnosis DC Diagnosis CoE Object-Dictionary FoE
State Machine	
Current State	Op
Requested State	Op
	Init Bootstrap
Change State	Pre-Op Safe-Op
	Ор
Software Diagnostics	s (?)
State Machine Error	No error
Hardware Diagnostic	s (?)
Summary	No error
A	No error
D	Not available
В	No error
С	Not available
	Acknowledge

State Machine

Current State:

Current state of the selected slave

Requested State:

Requested state of the selected slave

Change State:

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

Note: The BOOTSTRAP mode can only be reached from the INIT state.

Software Diagnostics

State Machine Error:

Slave 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 slaves. The message will tell either that there is a problem between two slaves 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:ProgramDataEC-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:ProgramDataEC-Engineer. More information below.

Line break:

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

Link missing:

A link is missing on input port of the slave. 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:ProgramDataEC-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 10⁶

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:


Device Ed	litor													
General	Variables	ESC Register	r EEPROM E	tended Diagno	osis DC Diagn	osis CoE Obje	ct-Dictionary	οE						
Variables														
	Name							Datatype	Offset	*	Size	Value	Forced	^
	Slave_1019 [UDINT	IN :	4.0	4.0	0								
	Slave_1019 [VIPA 053-1ECC	0].Inputs.Diagno	stic Interrupt Co	unter			UDINT	IN :	8.0	4.0	0		
	Slave_1019 [VIPA 053-1ECC	00].Module 2 (02	I-1BD00).Inputs.	DI 0			BOOL	IN :	12.0	0.1	0		
	Slave_1019 [BOOL	IN :	12.1	0.1	0								
	Slave_1019 [BOOL	IN :	12.2	0.1	0								
	Slave_1019 [VIPA 053-1EC00].Module 2 (021-1BD00).Inputs.DI 3									12.3	0.1	0		
	Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Status byte									13.0	1.0	136		
	Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 1									14.0	1.0	0		
	Siave_1019 [ViPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 2									15.0	1.0	0		~
											Ado	d to wat	ch list	
Chart														
1														
0,5	5													
0		1			1		1				1			
	0	50	100	150	200	250	300	350	400		45	0		
	. ◀													
Edit Va	riable													
	V	alue: 0						Dec	Hex	Fo	rce		Release	
								Dec						

6.3.3 ESC Register (Expert)

In this tab, the user can see and change 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:



ffse	t	0×0000				Dec
engt	th	0x0400				Dec H
omp	pact	1				
jiste	ers					
	Index		Name	Value	Туре	
•	0x0000		Туре	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	
۲	0x0020		Write Register Enable	0 (0x00)	USINT	
•	0x0021		Write Register Protection	0 (0x00)	USINT	
۲	0x0030		ESC Write Enable	0 (0x00)	USINT	

6.3.4 EEPROM (Expert)

This tab consists of 2 views:

Smart View

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



ice Editor			_	
eneral Variables ESC Register	EEPROM Extended Diagnosis DC Diagn	IOSIS		Spart View Hor Vi
DOM N I				Smart view riex vie
PROM Values			-	0
Index	Name	Value	Type	
0x0000	PDI Control	260 (0x0104)	UINT	
0x0001	PDI Configuration	128 (0x0080)	UINT	
0x0002	Pulse Length of SYNC Signals	1000 (0x03E8)	UINT	
0x0003	Extended PDI Configuration	65535 (0xFFFF)	UINT	
0x0004	Configured Station Alias	0 (0x0000)	UINT	
0x0005	Reserved	0 (0x0000000)	UDINT	
0x0007	Checksum	199 (0x00C7)	UINT	
0x0008	Vendor ID	2 (0x0000002)	UDINT	
0x000A	Product Code	147599442 (0x08CC3052)	UDINT	
0x000C	Revision Number	1245184 (0x00130000)	UDINT	
0x000E	Serial Number	0 (0x0000000)	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	~
I's FERROM Volum				
III EERKUM Value				
Value: 0				Dec Hex Write

Hex View

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

	51	_	_					_													
eneral 🛛	Variab	les	ESC	Regis	ster	EEPI	ROM	Ext	ended	Diag	gnosi	s ∥ D	C Di	agno	sis						
																			Smart	View	Hex V
PROM																					
0000	: 04	01	80	00	E8	03	FF	FF	00	00	00	00	00	00	C7	00					
0010	: 02	00	00	00	52	30	CC	08	00	00	13	00	00	00	00	00	R0				
0020	: 00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00					
0030	: 00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00					
0040	: 00	00	06	00	8D	0E	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	0F	00	01	00					
0080	: 0A	00	6F	00	10	06	45	4C	32	32	35	32	06	44	69	67	oEL	2252.Dig			
0090	: 4F	75	74	20	44	69	67	69	74	61	6C	65	20	41	75	73	Out.Digi	tale.Aus			
00A0	: 67	61	6E	67	6B	6C	65	6D	6D	65	6E	20	28	45	4C	32	gangklem	men.(EL2			
0080	: 78	.78	78	29	30	45	4C	32	32	35	32	20	32	4B	2E	20	xxx) OEL2	252.2K			
0000	: 44	69	67	2E	20	41	75	73	67	61	6E	67	20	32	34	56	DigAus	gang.24V			
OODO	: 2C	20	30	2E	35	41	2C	20	44	43	20	54	69	6D	65	20	,.0.5A,.	DC.Time.			
ODED	: 53	/4	61	6D	70	UB	44	63	54	69	6D	65	53	74	61	6D	Stamp.Dc	TimeStam			
00100	: /0	07	53	/9	/3	54	69	6D	65	08	46	65	65	64	62	61	p.SysTim	e.reedba			
0110	: 63	68	10	44	43	20	23	/9	6E	63	20	41	63	/4	69	76	ck.DC.Sy	nc.Activ			
0110	: 61	74	60	08	41	63	74	69	76	91	/4	60	20	44	43	20	ate.Acti	Vate.DC.			
0120	: 53	/9	6E	63	20	23	/4	61	12	74	09	23	20	61	12	/4	Sync.Sta	rt.Start			
0130	: 34	69	50	60	74	43	68	51	65	65	60	60	20	31	06	41	Time.Cha	nnel.1.0			
0140	: /5	74	70	/5	74	08	24	12	69	23	74	51	/4	60	09	43	utput.fr	1State.C			
0150	: 68	6T	0E 1 1	6E	10	60	20	32	08	52	60	/3	60	60	/6	60	nanne1.2	.Keserve			
0160			1.0.			00	U.X.	00		04			00	00	00	00	0				
PROM	Opera	tion	5																		
Timeou	t (ms)																				60000
Data Siz	e (byte	e)																			2048
																		Create from ESI	Upload from Slave	Load	from Fi
																			Download to Slave	Sav	e to File



6.3.5 Extended Diagnosis (Expert)

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

Device Editor			
General Variables ESC Register	EEPROM	Extended Diagnosis DC Diagnosis	
Common Error Counter		o	
Processing Unit Error (0x030C)	0	Clear Error (Counters
PDI Error (0x030D)	0	ĺ	
Port 0 counters (In port)		Port 1 counters	
Invalid Frame, CRC error (0x0300)	0	Invalid Frame, CRC error (0x0302)	0
RX Error (0x0301)	0	RX Error (0x0303)	0
Lost Link (0x0310)	0	Lost Link (0x0311)	0
Forwarded RX Error (0x0308)	2	Forwarded RX Error (0x0309)	2
Port 2 counters		Port 3 counters	
Invalid Frame, CRC error (0x0304)		Invalid Frame, CRC error (0x0306)	
RX Error (0x0305)		RX Error (0x0307)	
Lost Link (0x0312)		Lost Link (0x0313)	
Forwarded RX Error (0x030A)		Forwarded RX Error (0x030B)	

Common Error Counter

Processing Error Counter:

Indicates that slave 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)

Note: All error counters can be cleared by clicking on *Clear Error Counters* of the context menu of the master.



6.3.6 DC Diagnosis (Expert)

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

Device Editor	
General Variables ESC Register EEF	ROM Extended Diagnosis DC Diagnosis
Distributed Clocks	
Sync Pulse Active	Yes
DC Sync 0 Period	2000000 [µs]
DC Sync 1 Period	0 [µs]
System Time Difference	0 [ns]
Please activate 'Sync Window Monito	ring' option!

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 slave clock to reference clock

Note: The option "Sync Window Monitoring" must be enabled (see Distributed Clocks (Expert)).

6.3.7 CoE Object-Dictionary

This tab consists of 3 modes (in user mode, only the description from ESI or slave is available):

Description from ESI

In this tab, the user can see the description of the object dictionary from ESI and the values from the slave. He can also change the values.

ies					Filter Setting F
	Index	Name	Value	Туре	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)

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 Slave

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

alues Export OD Filter Setting Flag								
	Index	Name	Value	Туре	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)			

Lists of CoE Object-Dictionary entries

- Entries are uploaded from the slave (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 the values of the object dictionary of the slave.



General Variables ESC Register EEPROM Extended Diagnosis DC Diagnosis CoE Object-Dictionary FoE Description from ESI Description from ESI Description from Slave Single Object Settings	
Description from ESI Description from Slave Single Objec	
Settings	t
Index 0x1018 Dec Hex	
SubIndex 0 Dec Hex	
Size 1 Dec Hex	
Complete Access	
Operation	
Write	
Read	

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 slave)

Operation

Write:

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

Read:

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



6.3.8 SoE Object-Dictionary

ues		
	News	Channel A
	Name	Value
5-0-0001	Control unit cycle time (I Ncyc)	1000 (0X3E8)
5-0-0002	Communication cycle time (tsync)	1000 (0X3E8)
5-0-0007	reedback acquisition capture point (t4)	
5-0-0011	Class 1 diagnostic (CID)	-
5-0-0012	Class 2 diagnostic (C2D)	-
5-0-0015	Class 5 diagnostic (C5D)	-
5-0-0015	Configuration list of AT	/ (UXU/)
5-0-0010	IDN list of all operation data	(iist)
5-0-0017		(iist)
5 0 0010		(iist)
5 0 0020	IDN list of operation data for CPJ	(iist) (iist)
5-0-0020	IDNList of invalid operation data for CP2	(ist)
5-0-0021	IDN-list of invalid operation data for CP3	(iist) ([ict)
5 0-0022		((154)

Lists of SoE Object-Dictionary entries

- Values are uploaded by the master from the slave
- 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 slave:



Device Editor					
General Variables ESC Register	EEPROM Extended Diagnosis So	pE-Object-Dictionary	FoE		
				Description from ESI	Single Object
Settings					
Channel	0				
IDN	0				Dec Hex
Size	2				Dec Hex
Operation					
					Write
					Read

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 slave (Hex format, like: "00 11 22 33 ...")

Read:

Reads the value from slave (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 slave:



Device Editor		
General Variables ESC Register	EEPROM Extended Diagnosis DC Diagnosis CoE Object-Dictionary FoE	
FoF Download		
Local Filename		
Slave Filename		
Password (hex)	0x0000000	Dec Hex
Timeout (s)		60 😭
		Download to Slave
FoF Unload		
Local Filename		
Slave Filename		
Password (hex)	0x0000000	Dec Hex
Timeout (s)		60 🛃
Max File Size (kb)		3000
		Upload from Slave

FoE Operations

Local Filename:

Name of the file on the harddrive

Slave Filename:

Name of the file on the slave

Password:

Password on the slave 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 slave in kilo bytes



6.3.10 Slave History (Expert)

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

Settings					
,					
0					
2					
5 5					

Settings

Show Info Messages:

Info messages will be collected from slave

Show Warning Messages:

Warning messages will be collected from slave

Show Error Messages:

Error messages will be collected from slave

Show Emergency Messages:

Emergency messages will be collected from slave

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)

6.3.11 Motion (Motion Mode only)

In this tab, the user can see and change the motion settings of the slave. 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 Regis	ter EEPROM Extended [Diagnosis DC D	Viagnosis Motion
Administrative			
Station Address Axis	1004 🚍	Axis Index	0
Increment	1000 [mm]		
Deven Or Deven Off	Decet		
Power-On Power-Off	Keset	Cantral Ward	
Status word	-		-
Drive State		Result	Read axis state failed!
PLCOpen State	-		
Actual Position	_ [INC]	-	[mm]
Target Position	_ [INC]	-	[mm]
Trajectory Parameters			
Acceleration	1.000,00 🎑 [mm/s^2]	Deceleration	1.000,00 📮 [mm/s^2]
Velocity	100,00 🖨 [mm/s]	Jerk	0,00 [mm/s^3]
Move distance	100,00 🚭 [mm]		
Move to position	0,00 🖨 [mm]		
Move Velocity (-) Move	Velocity (+) Move Relati	ve Move Abs	olute Stop Halt
Parameters for Sychronized I	Notion		
Station Address Master Axis	1001 🖨	Axis Index	0
Gearing		Camming	
Gear In Ratio Numerator	3 🚭	Camming Pe	eriodic
Gear In Ratio Denoniator	4	Camming St	art Mode 0
Gear In Gear Out		Cam Table	Select Cam In Cam Out



6.3.12 Simulator (Simulator only)

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

Device Editor
General Variables ESC Register EEPROM Extended Diagnosis CoE Object-Dictionary Simulator
State Machine
Current State Op
Slave Power
Change the power condition of the slave. After a power cycle the slave is in INIT.
Power off Power on
Slave Connection
Change slave connection. Unplug or change connection to previous slave. Does not power off the slave.
Connect to Slave Address: 1001 🖨 Port: B
Disconnect Connect
CRC Error
Generate a CRC error at a specific port (once or probability).
Port: A Probability (%): 0,01
Set once Set random Reset random
Link Loss
Generate a Link Loss at a specific port for a specific time (once or probability).
Port: A Down time (s): 5,0 Probability (%): 0,01
Set once Set random Reset all ports

State Machine

Shows the current state of the slave

Slave Power

Power off:

Turn the slave power off

Power on:

Turn the slave on to Init state

Slave Connection

Disconnect:

Disconnect the slave. Slave will not be turned off

Connect:

Connect slave to selected address and port. Default is the port where the slave 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 use the Simulator EMI file and create an EXI File to start the simulator. It is also possible to connect to a remote system with the 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 master unit. Now the user can do a right click on the master unit and select: "Add EC-Simulator Unit (linked)". A linked simulator unit is added. The user can change the connection settings of the simulator. Now, it is possible to start the master with the simulator link layer and also connect via RAS with the simulator node.





8 Additional Tools

8.1 ESI-Manager

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

This dialog helps the use	r to administrate his	ESI and SCI file	s. Here, he can	add/delete/export ESI a	nd
SCI files.					

-	ESI	Mana	ager					_		×
Filt S V	t er earc /endo	h ors		[ALL VEND	OORS]	[,	•			
ES	File	5								
S	elect	t an E	ESI file which shou	ld be delete	d or exported	or add new ESI files.				
	•	AB	ABB							
	•		acontis technologi	es GmbH						
	۲	*4	ACS Motion Contro	ol						
	•	<u>⊿</u> =	Advanced Energy I	ndustries, In	ε,					
	۲		Applied Materials,	Inc.						
	•	Ð	ATI Industrial Auto	mation						
	۲		Auris Surgical							
	•	×	avateramedical Me	echatronics G	mbH					
	۲	B	Balluff GmbH							
	•	۵	Baumueller Nuern	berg GmbH						
	►	BECK	Beckhoff Automati	ion GmbH &	Co. KG					\sim
								Number of	ESI files	s: 249
								Number of (devices:	4217
	A	Add F	ile Add Fo	older	Delete	Export			Close	

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 Master Information (EMI) files.

븓 EMI Manager	🕈 EMI Manager — 🗆 🔿									
EMI Files										
Select an EMI file whic	ch should be copied or d	leleted or add new El	VII files.							
🔻 🫹 EtherCAT N	▼ 《→ EtherCAT Master Unit (Class A)									
Master	Master									
Local System	Local System									
Remote Sy	/stem									
Offline Dia	agnosis									
Simulator	Functions									
Distributed	d Clocks									
Features										
Scripts										
Parameter										
🕨 🧀 EtherCAT N	Master Unit (Class B)									
🕨 🧀 EtherCAT N	Master Unit (LxWin)									
► 🦛 EtherCAT N	Master Unit (Motion)					\sim				
				Number of	f EMI fil	es: б				
Edit EMI File										
New	Сору	Delete	Import	Exp	port					
Edit EMI Group										
Add Property	Delete Property									
			ОК	Can	cel					

EMI files, are files which are specify the master 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 Master 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" master EtherCATMaster_ClassB.emi: EMI template which is prepared for configuring a "Class B" master

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 (Expert)" of the master, where the values can be modified.

Device Editor							
Master Process Data Ima	ge Watch list Trace Data A	dvanced Options	Slave to Slave	Distributed Clocks	Tasks + Sync Un	its Data Acquisition	
Master Settings							
muster settings							
Init Command Retries:	3						
Properties:	Name						Value
	MyTestProperty						
	ing restricted by						
Slave Settings							
Slave Settings			T.				\sim
Check Vendor I	D			neouts		0 Imcl	
✓ Check Product	Code		30	t > Dra On/Init > Pag	-	2000 C [ms]	
Check Revision	Number		ini Der	- On Safe On (Safe	On NOn	10000 [ms]	
==	T		Pre	e-Op->Safe-Op/Safe	-Op->Op:	5000 [ms]	
Check Serial Nu	imber		Ва	ck to Pre-Op, Init:	-		
			Op	o->Sate-Op:		200 📷 [ms]	
Identification Chec	king		M	ailbox Mode		_	
Check Identifica	ation at Values			Cyclic		10 🔤 [ms]	
Copy Stati	on Address -> Identification Va	lue	۲	State Change			
Copy Iden	tification Value -> Station Addr	ess					
Process Data Mode			0	verwrite Mailbox Si	ze		
Disable LRW				Output Size:		0 🔤 [bytes]	
				Input Size:		0 🔤 [bytes]	~
						Apply changes t	o all slaves



8.2.2 Supported Entries

The following EMI entries are supported:

Master Group

Device E	ditor		
Maste	r Script Automation Process	s Data Image Watch list EtherCAT P Trace Data Advanced Options Slave to Slave Distributed Clocks Task	s + Sync Uni 💶 🕨
Gene	ral		
Uni	t Name	Class-A Master	
0	la Tima Iuci	1000	
Cyc	ie nine jusj		
Sou	irce MAC address		
Slave	s connected to local system	· · · · · · · · · · · · · · · · · · ·	
Lin	c Layer	Ndis	•
Net	work Adapter	EtherCAT-Test (Intel(R) Ethernet Server Adapter I210-T1)	•
			Select
Slave	s connected to remote syste	m 	
Pro	tocol	RAS	
IP A	ddress	127.0.0.1	
Por	t	6000	
Ma	ster-Instance	0	
			Select
Slave	s simulated (Sil)		
Side	S Sinduced (SIE)		Select
			Select
Slave	s captured		
Cap	oture File		
			Select

Display Group:

Shows or hides group

Lock Group:

Locks or unlocks group

Name of Master-Unit:

Default Master-Unit name

Show name of Master-Unit:

Enable if user should be able to view and change the name of the Master-Unit

Lock name of Master-Unit:

Enable if user should not be able to change the name of the Master-Unit

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 Slave Count:

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

Slave Start Address:

Enter default start address for all slaves

Scan for MDP slaves:

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

PDO Upload:

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

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

Output Port Vendor Id:

Enter output port vendor id of the master (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 Red active:

Sets disable LRW for all slaves to use cable redundancy



Local System

Device Editor							
Master Process	Data Image W	/atch list Trace Data Advanced Options Slave to Slave Distributed Clocks Tasks + Sync Units Data Acquisition					
General							
Unit Name		Class-A Master					
Cycle Time [u	us] 1000 🔻						
Source MAC a	ddress	A0-36-9F-30-00-3B					
Slaves connect	ed to local syste	em					
Link Layer		Ndis	-				
Network Adap	ter	EtherCAT-Test (Intel(R) Ethernet Server Adapter I210-T1)	•				
			Select				
Slaver connect	ad to comoto c						
Brotocol	ed to remote sy						
IP Address							
Port		6000					
Master-Instan	ce	0					
			Select				
Clause also date							
Slaves simulate	a (SIL)		Select				
			Select				
Slaves capture	ł						
Capture File							
			Select				

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



User Manual

ce Editor		
aster Process Data Image V	Vatch list Trace Data Advanced Options Slave to Slave Distributed Clocks Tasks + Sync Units Data A	Acquisition
eneral		
Unit Name	Class-A Master	
Cycle Time [us]	1000	-
Source MAC address		
aves connected to local syst	em	
Link Layer	Ndis	-
Network Adapter	EtherCAT-Test (Intel(R) Ethernet Server Adapter I210-T1)	-
		Select
aves connected to remote s	ystem	
Protocol	RAS	-
IP Address	127.0.0.1	
Port	6000	
Master-Instance	0	
aves simulated (SiL)		Select
aves captured		
Capture File		Select
Display Group: Shows or hi	des group	
Lock Group: Locks or ur	llocks group	
Protocol: Select proto	col for Remote System	
Show Protocol:		
Enable if us	ser should be able to view and change the 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

Master-Instance:

Enter Master-Instance number



Show Master-Instance:

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

Lock Master-Instance:

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

Offline Diagnosis

Device Editor			
Master Process Data Im	age Watc	h list Trace Data Advanced Options Slave to Slave Distributed Clocks Tasks + Sync Units Data Acquisition Moti	ion
General			
Unit Name	\square	Class-A Master	
Cycle Time [us]		1000	-
Source MAC address		A0-36-9F-30-00-3B	
Slaves connected to lo	cal system		
Link Layer		Ndis	-
Network Adapter		EtherCAT-Test (Intel(R) Ethernet Server Adapter I210-T1)	-
		De	select
Slaves connected to re	mote syste	m	
Protocol		RAS	-
IP Address		127.0.0.1	
Port			
Master-Instance			
		Sel	lect
Slaves simulated (SiL)			
		Sel	lect
Slaves captured			
Capture File			
		Sei	lect

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



ica Editor		
aster Process Data Ima	age Watch list Trace Data Advanced Options Slave to S	lave Distributed Clocks Tasks + Sync Units Data Acquisition
eference Clock		
Name	Slave_1011 [EL2252] (1011)	✓ 🖌 Auto select
lock Adjustment		
O Master Shift (Master	clock follows reference clock) or	
Master Reference CI	ock (System time provided by master device) or	
Link Layer Reference	Clock (System time provided by network device) or	
Off		
Bus Shift (Reference DCV (Master and art)	clock follows master clock)	
DCX (Master and ref	erence clock follow external clock)	
)ptions		
Show 64Pit Sustain	Time	
Show 04bit System	inite	
laves with active DC		
Slave_1011 [EL2252] (1 Slave_1022 [EL2202-01	011) 001 (1022)	
Slave_1023 [EL2202-01	00] (1023)	
Slave_1026 [EL7201] (1	026)	
Display Gro Shows	or hides group	
Clock Adjus	stment:	Agetar Shift 2 - Rue Shift
Enter e	lock aufustment value (0 – delautt, 1 – N	laster Shift, 2 – Dus Shift
Lock Clock Enable	Adjustment: if user should not be able to change cloc	k adjustment
Show Clock Enable	Adjustment: if clock adjustment should be visible	
Continuous Enter d	Propagation Compensation: lefault value of Continuous Propagation (Compensation
Show Conti Enable	nuous Propagation Compensation: if user should be able to change value of	² Continuous Propagation Compensation
Sync Windo Enter d	w Monitoring: lefault value of Sync Window Monitoring	5
Show Exter Enable	nal Mode: 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 master supports AoE

EoE:

Enable if master supports EoE



FoE:

Enable if master supports FoE

SoE:

Enable if master supports SoE

VoE:

Enable if master 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 Slave Name with Type:

Enable if type of slave should be added to slave 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 master 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

Device Editor							
Master Process Data Ima	ge Watch list Trace Data A	dvanced Options	Slave to Slave	Distributed Clocks	Tasks + Sync Units	Data Acquisition	
Master Settings							
Lik Commend Babian	2						
Init Command Retries:	³ 🔽						
Properties:	Name						Value
	MyTestProperty						
Slave Settings							
Startup Checking			🗌 Ti	neouts			^
Check Vendor I	D		SD	O Access:		0 🚔 [ms]	
Check Product	Code		Ini	t->Pre-Op/Init->Boo	otstrap:	3000 🚔 [ms]	
Check Revision	Number		Pro	e-Op->Safe-Op/Safe	e-Op->Op:	10000 🚔 [ms]	
Check Serial Nu	ımber		Ba	ck to Pre-Op, Init:		5000 🚔 [ms]	
			Op	o->Safe-Op:		200 🚔 [ms]	
Identification Chec	king		M	ailbox Mode			
Check Identifica	ation			Cyclic		10 🔤 [ms]	
 Use Currer Copy Stati 	nt Values on Address -> Identification Val	ue		🖲 State Change			
Copy Iden	tification Value -> Station Addre	ess					
Process Data Mode			0	verwrite Mailbox Si	ze		
Disable LRW				Output Size:		0 🔤 [bytes]	
				Input Size:		0 🔤 [bytes]	~
						Apply changes	to all slaves

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:



onfiguration mis	match!	ian and conine	cteu siav	es. It something is re	u, you nave a	THELWOIK	
Slave Name Slave_1016 [EL10	Config Type EC1094 [1010]	Config Revision	Config Ident.	Network Type EC1094 [1016]	Network Revision	Network Ident.	^
Slave_1017 [EK11	EK1110 [1017]	0x00100000	0	EK1110 [1017]	0x00100000	0	
Slave_1018 [BK11	BK1120 [1018]	0x00120000	0	BK1120 [1018]	0x00120000	1019	
Slave_1019 [VIPA	VIPA 053-1EC00 [1019]	0x00000012	0	EK1122 [1020]	0x00120000	0	
Slave_1020 (EK11	EK1122 [1020]	0x00120000	0	EK1100 [1021]	0x00120000	2001	
Slave_1021 (EK11	EK1100 [1021]	0x00120000	0	EL2202-0100 [1022]	0x00100064	0	
Slave_1022 (EL22	EL2202-0100 [1022]	0x00100064	0	EL2202-0100 [1023]	0x00100064	0	
Slave_1023 (EL22	EL2202-0100 [1023]	0x00100064	0	EL1114 [1024]	0x00110000	0	
Slave_1024 [EL11	EL1114 [1024]	0x00110000	0	EL7031 [1025]	0x00170000	0	
Slave_1025 (EL70	EL7031 [1025]	0x00170000	0	EL7201 [1026]	0x00130000	0	
Slave_1026 [EL72	EL7201 [1026]	0x00130000	0				~

8.4 Line Crossed Analyzer

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

Line Crossed Analyzer			—)
t of slaves					
In the list you can see all connected slaves. Th	e red ones are incorrectly co	onnected	-		~
Autoinc Address		Station Address	Type		
65521		16	EL1094		
65520		17	EK1110		
65519		18	BK1120		
65518		19	VIPA 053	8-1EC00	
65517		20	EK1122		
65516		21	EK1100		
65515		22	EL2202-	0100	
65514		23	EL2202-	0100	
65513		24	EL1114		
65512		25	EL7031		
65511		26	EL7201		\sim
	· · ·				
			Clo	ose	

8.5 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.



Inspection Report			-		>
etwork Status Please, select the statistic of printed.	f which you want to see the details. The co	mplete network s	tatus can l	oe also	
			General		•
Category	Name	Value			^
Information	Master Version	3.2.0.3			
Information	Cycle Time	2000			
Information	Number of found slaves	26			
Information	Number of slaves in configuration	26			
Information	Number of DC slaves	4			
Information	DC in-sync	Yes			
Information	Topology Ok	Yes			
Information	Link Connected	Yes			
Information	Slaves in Master State	Yes			
Frame Counter	Sent frames	22305			\sim
Print			С	lose	

8.6 EoE Endpoint Configuration

If you want to use EoE slaves with your local master, 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:



൙ EoE Endpoint Configurati	_		×	
State Please, activate the EoE End	point support and choose a network adapter.			
Settings Use EoE Endpoint Network Adapter IP Address	LAN-Verbindung (TAP-Windows Adapter V9) 169.254.153.176			•
	ОК	С	ancel	

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

≓ Edit Topology	— C	x נ				
Edit Topology						
The topology can be expanded here.						
Configuration	Configuration Scanned configuration					
🖳 Class-A Master	🖳 Class-A Master	\sim				
III Slave_1001 [EK1100]	III Slave_1001 [EK1100]					
Slave_1004 [EL2004]	<< Add Slave Slave_1002 [EL2008]					
Slave_1005 [EL2004]	Slave_1003 [EL2008]					
Slave_1006 [EL2004]	Slave_1004 [EL1014]					
Slave_1007 [EL2004]	Slave_1005 [EL2004]					
Slave_1008 [EL2004]	Slave_1006 [EL1034]					
Ilave_1003 [EK1100]	Slave_1007 [EL1018]					
N., Slave_1012 [SGDV-E1 CoE Drive]	Slave_1008 [EL2008]					
🖺 , Slave_1013 [SGDV-E1 CoE Drive]	Blave_1009 [EK1122-0080]					
🖺 , Slave_1014 [SGDV-E1 CoE Drive]	Blave_1010 [EK1101-0080]					
Ilave_1002 [EK1100]	Slave_1011 [EL2252]					
Slave_1009 [EL1002]	Slave_1012 [EL2612]					
Slave_1010 [EL1002]	Slave_1013 [EL4132]					
Slave_1011 [EL1002]	Slave_1014 [EL3162]					
	Slave_1015 [EL1008]					
	L+ Slave_1017 [EK1110]					
	間 Slave 1018 [BK1120]	\rightarrow				
Scan	Apply	Cancel				

Disconnect:

Disconnets the selected port

Connect:

Connects the selected slave in the not connect slaves list, with the selected port in the configuration

Up: Moves the slave up in the configuration

Down:

Moves the slave down in the configuration

Scan:

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

Apply:

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

8.8 Capture File

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

Another use case is, that your system from time to time some problems. In that case you can activate the automatic mode and create the snapshots every specific interval or based on specific master notifications.

At the moment there are the following options:

🧀 Capture File	_						
Filename							
Folder	D:\prj\atctk\UI\EcEngineer\Run\Capture\						
Base file name	CaptureFile						
Date	\checkmark						
Time	1						
IP Address	4						
Preview	2023-05-11_12-00_CaptureFile	_127.0.0.1.ecd					
Content							
Process data	1						
EEPROM size	0x0086	Dec Hex					
ESC Register size	0x0400	Dec Hex					
CoE OD of slaves	None	•					
CoE OD objects							
SDO Info Service							
Automatic Mode		~					
Interval (min)		5					
Maximum Snapshots		50 🚭					
Notifications		•					
	ОК	Cancel					

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 slaves:

Select the slaves of which the CoE OD information will be captured

None:

CoE OD will be not captured

All:

CoE OD will be captured of all slaves

User defined:

CoE OD will be captured of the defined slaves 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

8.9 Project Templates

If you have a lot of slaves with the same configuration (e.g. PDOs, InitCmds) you can use a project template. In that case new slaves 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:

൙ Project Template			_		×
Choose Path					
Choose an existing config configured slaves.	guration file as projec	t template, which will be u	used for lo	ading pr	e-
C:\Users\k.feifel\Desktop	o\project.ecc				
Settings					
Activate					
Ignore Revision					
		ОК	C	ancel	

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:



User Manual

· · · · · · ·			
EC-Engineer []			- U X
<u>File View Network Settings H</u> elp			
Configuration Mode 🛛 🖗 Export ENI 💮 Export EXI	🜉 Diagnosis Mode		÷
Project Explorer	Device Editor		
🖳 Class-A Master	Master		
	General		
	Unit Name	Class-A Master	
	Cycle Time [us]	1000	•
	Source MAC address		
	Slaves connected to local syst	tem	
	Link Layer	Ndis	•
	Network Adapter	EtherCAT-Test (Intel(R) Ethernet Server Adapter I210-T1)	•
			Select
	Slaves connected to remote s	ystem	
	Protocol	RAS	•
	IP Address	127.0.0.1	
	Master-Instance	0	
	master mathice	v	Select
	Slaves simulated (SiL)		
			Select
	Slaves captured		
	Capture File		
			Select
Classic View Hat View Topology View			
Short Info	 # Messages 		~ #
Information	Severity Time Message		
Name Class-A Master	INF 15:12:28 EC-Enginee	r ready, version 5.6.0	
Vendor acontis technologies GmbH			
aconta technologica ambri	II		
Networks: 1 Slaves: 0			State: Mode: TEMPLATE EXPERT

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:
	Select Slave from Project Template							
с	omp	atible Slaves in Pro	ject Template					
	Sele	ct a slave from proje	ct template. Actual revision	: 1048576				
	•	Slave_1002 [EL2008]	EL2008 8Ch. Dig. Output 24\	/, 0.5A		0x0010000	0 (104857)	6)
		Slave_1003 [EL2008]	EL2008 8Ch. Dig. Output 24V	/, 0.5A		0x0010000	0 (104857)	6)
		Slave_1008 [EL2008]	EL2008 8Ch. Dig. Output 24V	/, 0.5A		0x0010000	0 (104857)	6)
					OK	Ca	ancel	

8.10 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 cylces. For more information about how to install the "ECAT driver" please refer the manual of EC-Master Class A DCM on Windows

8.10.1 Optimized Link Layers

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



Device Ed	itor								
Master	Process Data Image	Watch list Trace	Data Advanced Option	ns Slave to Slave	Distributed Clocks	Tasks + Sync Units	Data Acquisition		
Gapar									^
Genera									
Unit	Name	Class-A Ma	ister						
Cycle	Time [us]	1000						•	
Sourc	ce MAC address								
Slaves	connected to local sy	vstem							
Link	Laver	18254x						•	
								1	
Insta	nce							🗹	
							Se	elect	
C 1									
Slaves	connected to remote	system							
Proto	ocol	RAS						-	
IP Ad	dress	127.0	. 0 . 1						
Port		6000							
Mast	er-Instance	0							
							Se	elect	
Slaves	simulated (SiL)								
							Se	lect	
Claure	capturad								
Slaves	captured								
Capti	ure File								
							Se	lect	5

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

The following optimized link layers are currenty supported:

emll18254x.dll (Intel PRO/1000 Network Adapters)

emll18255x.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

8.11 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:



S xml	version="1.0" encoding="utf-8"
🖻 🗝 ConfigVariants	
🥌 xmlns:xsi	http://www.w3.org/2001/XMLSchema-instance
🥌 xmlns:xsd	http://www.w3.org/2001/XMLSchema
🚊 📖 🔁 General	
🕂 🛶 🌔 RenumberBus	true
🕀 🖳 🕒 ExportPath	D:\temp\enis
🗄 🖳 🕒 ExportEcc	true
🗄 🤤 Configs	
🚊 📖 🛅 Config	
🕂 🌔 Name	Config1
🕀 🛶 🕒 CycleTime	1000
🖻 🗝 Slaves	
🖃 🗁 🗁 Exclude	
🖻 🔤 Entry	
🥵 Name	Slavel
🗄 🔤 Entry	
🗄 🔤 Entry	
🗄 🔚 Entry	
🗄 🔚 Entry	
🚊 🛅 Config	
🕀 🚥 🌔 Name	Config2
🕀 😡 CycleTime	4000
🗄 🗁 🚞 Slaves	
	-

RenumberBus: If this is true, all slaves will be enumerated in a row. Otherwise each slave 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.

To find a slave in the config the name is required. With that it is possible to remove some slaves from a big config for example.



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, master 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 entires 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 "127.0.01" 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, master 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 master instances (only if ecc exists with more master units). 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 slave (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 master 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 master unit in the ecc, you can create an ENI file and variable export for all with this paramter

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

 \hookrightarrow /VARTYPE="csv"

Run "EC-Engineer", scan automatically the remote system with IP address 127.0.0.1, Port 6000, MasterInstance 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



Run EC-Engineer and switch to offline diagnosis mode

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:

൙ EC-Engineer []			– 🗆 X		
Datei <u>A</u> nsicht	<u>N</u> etzwerk <u>E</u> instellungen <u>H</u> ilfe				
Konfiguration	🛷 ENI-Export 🛛 🐺 EXI Export 🛛 💻 D	iagnose			
Projekt-Explorer		Geräte-Editor			
 Class-A Ma 	ster	Master Prozessabbild Beobachtu	ungsliste Trace-Daten Frweiterte Finstellungen Slave zu Slave Verteilte Uhren Tasks + Sync Units Daten Akquisition Motion		
	001 [EK1100] (1001)				
Slav	re_1002 [EL2008] (1002)	Allgemein			
Slav	re_1003 [EL2008] (1003)	Name	Class-A Master		
- Slav	re_1004 [EL1014] (1004)	Zykluszeit [us]	1000 *		
Slav	re_1005 [EL2004] (1005) re_1006 [EL1034] (1006)	Quell-MAC-Adresse			
📲 Slav	re_1007 [EL1018] (1007)				
Slave_1008 (EL2008) (1008)					
Slave_1009 [EK1122-0080] (1009) Slaves sind mit dem lokalen System verbunden					
Slav	/e_1020 [EK1122] (1020)	Link Layer	Ndis		
		Netzwerkadapter	EtherCAT-Test (Intel(R) Ethernet Server Adapter I210-T1)		
			Abwählen		
		Clause start with size on Democratic			
		Destation			
		ID-Advarra	127 0 0 1		
		Port	600		
		Master-Instanz			
			Auswählen		
		Slaves simuliert (SiL)			
			Auswählen		
		Slaver rind aufgezeichnet			
		Auferickeur endetei			
		Autzeichnungsdatei			
Klassische Ansicht	Flache Ansicht Topologie-Ansicht		r Naarren nen		
Informationen	↓ ‡	Meldungen	▼ [
Gerätedaten		Severity Time Message			
Name	Class-A Master	INF 10:53:58 Master state ch	hange from 'Init' to 'Pre-Op'		
Beschreibung	EtherCAT Master Unit (Class A)	INF 10:53:54 Master state ch	hange from "Unknown" to "Init"		
Hersteller	acontis technologies GmbH	INF 10:53:54 Master state ch	hange from "Unknown" to "Init"		
		INF 10:53:50 Network scan s	successful - 26 slaves found		
		INF 10:35:22 All pending err	rors were solved.		
	1	INF 10:35:22 All pending err	rors were solved.		
Netzwerke: 1 Slaves:	26		Status: 🔷 🖉 Modus: KONFIGURATION EXPERT		

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:

IG Theme





🛹 EC-Engineer []		- O X
<u>File View N</u> etwork <u>S</u> ettings <u>H</u> elp		
Configuration Mode 🛛 Export ENI 🖉 Export	EXI 📕 Diagnosis Mode	-
Project Explorer	Device Editor	
✓ Uass-A Master	Master Process Data Image Wa	tch list Trace Data Advanced Options Slave to Slave Distributed Clocks Tasks + Sync Units Data Acquisition Motion
 Slave_1001 [EK1100] (1001) 		A
Slave_1002 [EL2008] (1002)	General	
Slave_1003 [EL2008] (1003)	Unit Name	Class-A Master
Slave_1004 [EL1014] (1004)	Cycle Time [us]	1000 *
-I Slave_1005 (EL2004) (1005)	Source MAC address	
Slave 1007 [EL1034] (1000)		
Slave 1008 [El 2008] (1007)		
 Slave 1009 [EK1122-0080] (1009) 	Slaves connected to local system	n
Slave_1020 [EK1122] (1020)	Link Layer	Ndis
	Network Adapter	Ether(CAT-Test / Intel/R) Ethernet Server Adapter (210-T1.)
		Decelert
	Slaves connected to remote sys	tem
	Protocol	RAS *
	IP Address	127.0.0.1
	Port	
	Master-Instance	
		Select
	Slaves simulated (SIL)	
	Slaves captured	
	Capture File	
Classic View Flat View Topology View		Select
Short Info	▼ ₽ Mescages	÷ ‡
	Severity Time Message	
Name Class-A Master		
Description EtherCAT Master Unit (Class A)		
Vendor acontis technologies GmbH		
Networks 1 Slaves 26		
Networks: 1 Slaves: 20		State: State: Mode: CONFIG EXPERT

Office 2010 Blue Theme



🛹 EC-Engineer []		- 0	×
<u>File View N</u> etwork <u>S</u> ettings <u>H</u> elp			_
Configuration Mode 🔗 Export ENI 🔤 Export EXI	Kan Diagnosis Mode		÷
Project Explorer	Device Editor		
🔻 📙 Class-A Master	Master Process Data Image Wa	tch list Trace Data Advanced Options Slave to Slave Distributed Clocks Tasks + Sync Units Data Acquisition Motion	
Slave_1001 [EK1100] (1001)			\sim
Slave_1002 [EL2008] (1002)	General		_
Slave_1003 [EL2008] (1003)	Unit Name	Class-A Master	
Slave_1004 [EL1014] (1004)	Cycle Time [us]	1000	•
Slave_1005 [EL2004] (1005)	Source MAC address	A0-36-9F-30-00-3B	
Slave_1006 [EL1034] (1006)			
Slave_1007 [EL1018] (1007)			
Slave_1008 [EL2008] (1008)		_	
Slave_1009 [EK1122-0080] (1009)	Slaves connected to local system	n .	
Slave_1020 [EK1122] (1020)	Link Layer	Ndis	<u> </u>
	Network Adapter	EtherCAT-Test (Intel(R) Ethernet Server Adapter I210-T1)	_
		Deselect	
	Slaves connected to remote svs	tem	
	Bratasal	RAS .	-
	IB Addross	177 0 0 1	-
	De t	6000	-
	Master Instance	0000	
	Waster-Instance	0 Selert	-
		uterte etc.	
	Slaves simulated (SiL)		
		Select	
	Slaves captured		
	Capture File		
Classic View Flat View Topology View		Select	~
Short Info 👻	# Messages		• ¢
Information	Severity Time Message		_
Name Class-A Master			
Description EtherCAT Master Unit (Class A)	1		
Vendor acontis technologies GmbH]		
Networks: 1 Slaves: 26		State: 🔷 🕘 Mode: CONFIG	EXPERT

Office 2007 Black Theme



← EC-Engineer []		- 0	×
<u>File View Network Settings H</u> elp			_
Configuration Mode 🛷 Export ENI 🛛 🐺 Export EXI	📕 Diagnosis Mode		÷
Project Explorer	Device Editor		
▼ U Class-A Master	Master Process Data Image Wate	h list Trace Data Advanced Options Slave to Slave Distributed Clocks Tasks + Sync Units Data Acquisition Motion	
 Slave_1001 [EK1100] (1001) 			\sim
Slave_1002 [EL2008] (1002)	General		
Slave_1003 [EL2008] (1003)	Unit Name	Class-A Master	_
Slave_1004 [EL1014] (1004)	Cycle Time [us]	1000	-
Slave_1005 [EL2004] (1005)	Source MAC address	A0-36-9F-30-00-3B	
Slave_1006 [EL1034] (1006)			
Slave_1007 [EL1018] (1007)			
Slave_1008 [EE2008] (1008)	Slaves connected to local system		
 Slave_1009 [EK1122] (1009) Slave_1020 [EK1122] (1020) 	Link Laver	Ndis	-
	Natural Adapter	Paker AT Test (late (0) Paker and Constant (010, T1)	5
	Network Adapter	EthercAl-Test (Intel(N) Ethernet Server Adapter (210-11.)	
		Deselect	
	Slaves connected to remote syste	em	
	Protocol	RAS	-
	IP Address	127.0.0.1	
	Port	6000	
	Master-Instance	0	
		Select	
	Slaves simulated (SiL)		
		Select	
	Slaves cantured		
	Capture File		
Classic View Flat View Topology View	captare rite	Select	····
Short Into	Messages		
Information	Severity Time Message		
Name Class-A Master			
Vender			
acontis technologies GmbH			
Networks 1 Clause 26		State: A Moder CONFIG	I EVDEDT

Office 2007 Sliver Theme



← EC-Engineer []			– 🗆 X
<u>File View Network Settings H</u> elp			
Configuration Mode 🐨 Export ENI 🔤 Export EXI	📕 Diagnosis Mode		÷
Project Explorer	Device Editor		
💌 📙 Class-A Master	Master Process Data Image	Watch list Trace Data Advanced Options Slave to Slave Distributed Clocks	Tasks + Sync Units
Slave_1001 [EK1100] (1001)			^
Slave_1002 [EL2008] (1002)	General		
Slave_1003 [EL2008] (1003)	Unit Name	Class-A Master	
Slave_1004 [EL1014] (1004)	Cycle Time [us]	1000	-
Slave_1005 [EL2004] (1005)	Source MAC address	A0-36-9F-30-00-3B	
Slave_1006 [EL1034] (1006)	boarce mixe boarces		
Slave_1007 [EL1018] (1007)			
Slave_1008 [EL2008] (1008)			
Slave_1009 [EK1122-0080] (1009)	Slaves connected to local system		
Slave_1020 [EK1122] (1020)	Link Layer	Ndis	
	Network Adapter	EtherCAT-Test (Intel(R) Ethernet Server Adapter I210-T1)	Ψ
			Deselect
	Slaves connected to remote syste	m	
	Protocol	RAS	
	IP Address	127.0.0.1	
	Port	6000	
	Master-Instance	0	
			Select
	Slaves simulated (SiL)		
			Select
	Slaves cantured		
	Cantura File		
Classic View Flat View Topology View	Capture The		· · · · · · · · · · · · · · · · · · ·
Short Info 👻 🖡	Messages		* û
Information	Severity Time Message		
Name Class-A Master			
Description EtherCAT Master Unit (Class A)			
Vendor acontis technologies GmbH			
Networks: 1 Slaves: 26	JI	State:	Mode: CONFIG EXPERT

Luna Theme



🛹 EC-Engineer []						- 0	×
<u>File View N</u> etwork <u>S</u> ettings <u>H</u> elp							
Configuration Mode 🔗 Export ENI 🛛 🐺 Export EXI	📕 Diagnosis Mode						
· Project Explorer	Device Editor						÷
Class-A Master	Master Process Data Image	Watch list Trace Dat	Advanced Options	Slave to Slave	Distributed Clocks	Tasks + Sync Linite	14.0
 Slave_1001 [EK1100] (1001) 	Master Process Data Image	Watch list linde bat	Advanced Options	Slave to Slave	Distributed clocks	lasks + Sync Onits	
Slave_1002 [EL2008] (1002)	General						
Slave_1003 [EL2008] (1003)	Unit Name	Class-A Master					
	Cycle Time [us]	1000					•
Slave_1005 [EL2004] (1005)	Source MAC address	A0-36-9F-30-00-3B					
Slave_1006 [EL1034] (1006)							
Slave_1007 [EL1018] (1007)							
Slave_1008 [EL2008] (1008)							
Slave_1009 [EK1122-0080] (1009)	Slaves connected to local system	11					
P Slave_1020 [EK1122] (1020)	Link Layer	Ndis					·
	Network Adapter	EtherCAT-Test (Intel(R) Ethe	met Server Adapter I210-T1				·
						Deselect	
	Slaver connected to remote curt	am					
	Distant	PAC .					-
	ID Address	137 0 0 1					-
	IP Address	127.0.0.1					
	Master-Instance						
	Master-Instance					Select	
	Slaves simulated (SiL)						
						Select	
	Slaves captured						
Charles Davies Testers Frank	Capture File						
Classic view Plat view loppingy view						Select	~
Short Info	Messages						• *
Information	Seventy Time Message						_
Name Class-A Master							
Vendor EtherCAT Master Unit (Class A)							
acontis technologies GmbH							
Networks: 1 Slaves: 26					State	e: 🔍 🔍 Mode: CONFI	G 🔽 🐨 🤇

10.3 Integration into 3rd-Party Applications

The software architecture of EC-Engineer is keept 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 exisiting project

EniEngine-Layer

- Used with EniBuilder as a commandline tool
- Used directly as library by adding the C# assembly as reference to the exisiting 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*:

CodeMeter WebAdmin Oshboard Container × Disable Server Configuration Server Access License Access Permissions Server Access Metwork Server O Disable O Disable Disable Disable Onable Disable O Disable Disable O Disable <th>dmin Server Access × + C (i) localhost:22352/configuration/server_access.html</th> <th></th> <th></th> <th>ê ☆ □</th>	dmin Server Access × + C (i) localhost:22352/configuration/server_access.html			ê ☆ □
Dashboard Container < License Monitoring < Diagnosis < Configuration Info Server Configuration Server Access Basic Server Access License Access Permissions Server Access Network Server Advanced O Disable TemWAN Server O Disable Disable Enable Metwork Server Advanced License Access Permissions Server Access Metwork Server Advanced License Access Permissions Metwork Port: 2350 CmWAN Server Image: Configuration Image: Configuration <th>LUBU CodeM</th> <th>leter WebAc</th> <th>dmin</th> <th>C</th>	LUBU CodeM	leter WebAc	dmin	C
 Server Configuration Server Access Server Access License Access Permissions Server 2 Server Access Advanced License Access Permissions O Disable O Disable Enable CmWAN Server O Disable O Disable Enable Metwork Port: Me	Dashboard Container ~ License Monitoring ~ Diagnosis ~	Configuration 1 In	fo	
Server Access License Access Permissions Advanced License Access Disable Metwork Port: 22350 CmWAN Server O Disable O Disable </th <th>Server Configuration Server Access</th> <th>Basic ></th> <th>Ø</th> <th>💻 English (US) 🗡</th>	Server Configuration Server Access	Basic >	Ø	💻 English (US) 🗡
Network Server Advanced License Access Permissions Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server Image: Constraint of the server </td <td>Server Access License Access Permissions</td> <td>Server 1 ></td> <td>Server Access</td> <td></td>	Server Access License Access Permissions	Server 1 >	Server Access	
 Disable Enable Network Port: 22350 CmWAN Server Disable Enable 4 Apply Restore Defaults 	-Network Server	Advanced	License Access Permissions	
3 © Enable Network Port: 22350 CmWAN Server ① Disable ① Enable 4 Apply Restore Defaults	O Disable			
Network Port: 122350 CmWAN Server Image: Comparison of the server of the se	3 • Enable			
	4 [Apply Restore Defau	ılts	
		14/ob A	dmin Version: 7 30	

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*:



S WebAdmin Server Search List x +			✓ - □ X
← → C ③ localhost:22352/configuration/server_search_list.html			🖻 🖈 🔲 🔣 🗄
LUBU CodeM	eter WebA	dmin	CM
SYSTEMS			
Dashboard Container v License Monitoring v Diagnosis v	Configuration 1	info	*
Basic Configuration Server Search List	Basic 2	> Server Search List	😧 🔤 English (US) 🗡
Server Search List Proxy WebAdmin Backup	Server	> Proxy	
Server Search List	Advanced	WebAdmin	
1. Automatic server search (255.255.255)	(Backup	
add new Server 4			
5 AP	Restore Defau	lts	
localhost22352/configuration/server_search_list.html (127.0.0.1) 🕗 👔	Web	Admin Version: 7.20	~

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:

📀 CodeMeter Kontrollzentrum — 🗆 >							
<u>D</u> atei A <u>k</u> tion <u>A</u> nsicht <u>H</u> ilfe							
Lizenz Ereignisse							
CmStick 3-6146866	Name:	CmStick					
	Serien-Nr.:	3-6146866			9		
	Version:	CmStick 4.40			U		
	Kapazität:	99 % frei (313400 Bytes)					
	Status:	🔿 😋 Deaktiviert					
		🔿 😋 Aktiviert solange angeschlossen					
		O S Aktiviert					
	Lizenzaktualisierung	Auswerfen Kennwort ändern					
Der CodeMeter-Dienst wird ausgefü	hrt.			Web	Admin		

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



	?	×
 CmFAS Assistent 		
Willkommen beim CmFAS Assistenten!		
Der CodeMeter Field Activation Service (CmFAS) Assistent unterstützt Sie beim Hinzufügen, Änder von Lizenzen im Lizenzverwaltungssystem CodeMeter.	n und Lösc	hen:
Mit dem CmFAS Assistenten können Sie Lizenzanfragen erzeugen, die Sie z.B. per Email an den Her Software schicken können. Sie können die erhaltenen Lizenzaktualisierungsdateien mit dem CmFAS Ihre Lizenzverwaltung einspielen und dem Hersteller das Einspielen mittels einer Quittung bestätige	steller der Assistente n.	, en in
<u>W</u> eiter >		fe

Step 4: Select "Create license request":

	?	×
← ⓒ CmFAS Assistent		
Wählen Sie die gewünschte Aktion		
 Lizenzanforderung erzeugen 		
Wählen Sie diese Option, wenn Sie eine Lizenzanforderungsdatei erzeugen möchten, um diese Softwarehersteller zu schicken.	e an den	
🔘 Lizenzaktualisierung einspielen		
Wählen Sie diese Option, wenn Sie eine Lizenzaktualisierungsdatei vom Softwarehersteller erh diese einspielen möchten.	alten habe	n und
O Quittung erzeugen		
Wählen Sie diese Option, wenn Sie dem Softwarehersteller das erfolgreiche Einspielen einer Lizenzaktualisierungsdatei quittieren möchten.		
<u>W</u> eiter >		lfe

Step 5: Select "Extend existing license":



	?	×
← ⓒ CmFAS Assistent		
Wählen Sie die Option für die Lizenzanforderung		
O Bestehende Lizenz erweitern		
Wählen Sie diese Option, wenn Sie eine bereits bestehende Lizenz verändern oder zu einer bere Lizenz eine weitere Lizenz des gleichen Herstellers hinzufügen möchten.	its beste	henden
🔘 Lizenz eines neuen Herstellers hinzufügen		
Wählen Sie diese Option, wenn Sie eine neue Lizenz hinzufügen möchten und von diesem Softwa noch keine Lizenz in dem ausgewählten Lizenzcontainer vorhanden ist.	reherste	eller
<u>W</u> eiter >	Hi	lfe

Step 6: Keep the selected the vendor:

	?	×
← ⓒ CmFAS Assistent		
Wählen Sie den Softwarehersteller		
 Acontis Firm Item (6001978) acontis technologies GmbH (101409) 		
Wählen Sie den Softwarehersteller, an den Sie die Lizenzanforderungsdatei schicken möchten. Der H nur die Daten, die Sie hier auswählen. Sie können damit sicherstellen, dass der Hersteller nicht sieht, Lizenzen Sie von anderen Anbietern besitzen.	ersteller welche	r sieht
<u>W</u> eiter >	Hi	lfe

Step 7: Select the file name:



		?	×
←	CmFAS Assistent		
	Wählen Sie den Dateinamen		
	:\Users\k.feifel\Desktop\3-6146866.WibuCmRaC		
	Wählen Sie den Dateinamen, unter dem Sie die Lizenzanforderungsdatei speichern möchten. Klicken Sie 'Fertigstellen', um die Datei zu erzeugen. Diese Datei können Sie dann z.B. per Email an den Softwareh schicken.	erstelle	auf r
	Anwenden	Hilf	è

Step 8: Finish the assistant:

	?	×
← ⓒ CmFAS Assistent		
Die Lizenzanforderungsdatei wurde erfolgreich erzeugt.		
Die Lizenzanforderungsdatei wurde erfolgreich erzeugt. Sie können diese Datei nun per Email an den Softwarehersteller schicken.		
Abschließen	Н	lilfe

Step 9: Your license request file * . WibuCmRaC has been successfully created. Please send it to 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:



S CodeMeter Kontrollzentrum			_		×
<u>D</u> atei A <u>k</u> tion <u>A</u> nsicht <u>H</u> ilfe					
Lizenz Ereignisse					
CmStick 3-6146866	Name:	CmStick			
	Serien-Nr.:	3-6146866			_
	Version:	CmStick 4.40			U
	Kapazität:	99 % frei (313384 Bytes)			
	Status:	S Deaktiviert S Aktiviert solange angeschlossen S Aktiviert			
	Lizenzaktualisierung	Auswerfen Kennwort ändern			
Der CodeMeter-Dienst wird ausgefül	hrt.			Web	Admin

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

🞯 CodeMet	er	?	×
	Firmware-Aktualisierung		
	Die CodeMeter Firmware Aktualisierung aktualisiert Ihren ermöglicht Ihnen neue Funktionen bzw. behebt ggf. Prob Sie OK falls Sie Ihren CmDongle auf die neueste Version ak wollen. Die Aktualisierung kann einige Minuten dauern. B den CmDongle nicht ab, bevor der Vorgang beendet ist.	CmDongle leme. Drücl ttualisieren itte ziehen S	und ken Sie
	ОК	Abbre	chen

Step 4: Wait until firmware update was executed:



CodeMeter Kontrollzentrum		_		×
<u>D</u> atei A <u>k</u> tion <u>A</u> nsicht <u>H</u> ilfe				
Lizenz Ereignisse				
CmStick 3-6146866	Name: CmStick Serien-Nr.: 3-6146866 Version: CmStick 4.40 Version:			
			Wab	ماست
Der Codemeter-Dienst wird ausgen	unrt.		web	Aamin

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

😋 CodeMete	r	?	×
i	Information: Die Firmware-Aktualisierung für den CmDongle 3-6146866 w	/ar erfol	greich.
		0	к

11.7 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:



WIBU-SYSTEMS Software Protection



Required License (Dongle/File) not available.

CodeMeter 101409:285278208 Das Releasedatum befindet sich außerhalb des geforderten Intervalls, Fehler 77.

CodeMeterAct 5000087:285278208 CmContainer-Eintrag nicht gefunden, Fehler 200.

CodeMeterAct 6001978:285278208 CmContainer-Eintrag nicht gefunden, Fehler 200.





12 FAQ, Tips

12.1 Problems with install or uninstall

If you have a problem with the setup of the EC-Engineer remove the following keys and folders to uninstall EC-Engineer manually:

C:/Program Files (x86)/acontis_technologies/EC-Engineer

C:/ProgramData/EC-Engineer

C:/Windows/Installer/{07985CE9-9024-422C-8E72-C449BFC33CA0}

&temp%

```
HKEY_LOCAL_MACHINE/SOFTWARE/Microsoft/Windows/CurrentVersion/Uninstall/
{07985CE9-9024-422C-8E72-C449BFC33CA0}
```

```
HKEY_LOCAL_MACHINE/SOFTWARE/acontis technologies/EC-Engineer
HKEY_LOCAL_MACHINE/SOFTWARE/Classes/Installer/Products/
9EC589704209C224E8274C94FB3CC30A
```

After these steps try to install EC-Engineer again.

12.2 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@acontis.com and attach the following information
 - Project file .ecc
 - EC-Engineer Version Menu + Help + About
 - Log file Menu + Help + Show Log File
 - Short description how the reproduce it

12.3 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



Context menu of project explorer

- Ctrl + X: Cut slave including all subslaves
- Ctrl + C: Copy slave including E-Bus subslaves
- Ctrl + V: Paste (previously cut or copied) slave

12.4 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 directory 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 master in milliseconds

MasterUnitLocalWorkerSleepTimeMs = 100

Cycle time of the local master thread in milliseconds

MasterUnitRemoteWorkerSleepTimeMs = 300

Cycle time of the remote master thread in milliseconds

MasterUnitTimerNormalCount = 4

- Time shift to cycle time of the normal refresh cycle
- E.g. local master = 100 ms, normal refresh cycle is every 400 ms
- Used e.g. for updating master information, error counters of slave, ...

MasterUnitTimerSlowerCount = 20

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

MasterUnitTimerSlowestCount = 120

- · Time shift to cycle time of the slowest refresh cycle
- E.g. local master = 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

12.5 FAQ

Here you can find solutions of possible problems:

- The integrated EC-Master does not react as estimated Increase the message level (Menu Settings All Messages) and try it again.
- EC-Engineer reports a message with ErrCode: 0x...

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

• EC-Engineer reports the following message: Not all EtherCAT slave devices are in operational state Check if all slaves have a green icon. If the color is not green, open tab "Diagnosis Slave General". Here you can see the error state of the slave. 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 (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-Engineer reports the following message: Slave '...' has unexpected state (Current state: '...', Expected state: '...')

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

- Slave reports the error state: "Sync manager watchdog" (Diagnosis Slave General) You need a realtime operating system. If you still want to use your slave on Windows, you can turn off this watchdog (Slave->Advanced Settings: Set SM Watchdog = 0).
- How can I configure the modules of a BK1120 slave?

EC-Engineer supports only the MDP-Version of BK1120 slave. If you want to add this slave, enter "BK1120" into the search field, enable option "Show Hidden Slaves" and double-click on slave "BK1120 EtherCAT Fieldbus Coupler (MDP)" (Revision Number: 0x120001). The modules of this slave can be configured in tab "Modules" like in all other MDP slaves.

If you have one of the other versions of BK1120 and you want to use it, please contact our support.

• How can I update the firmware of my slave via FoE?

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

- Enable diagnosis mode
- Set master state to INIT
- Select your slave, and set his state machine to BOOTSTRAP
- Enter path of file on slave (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 WinPcap / 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 show 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 slaves which are used (ALStatus, DC Support, Mailbox, ...).

• EC-Engineer reports the following message: Failed to query EtherCAT Slaves. No slaves found. Verify that WinPcap is correctly installed.

Try to restart you 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 master

- 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 slaves found. Make sure you have connected the input and not the output port of your first slave 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)"

Eigenschaften von EtherCAT-Test	
Netzwerk Freigabe	
Verbindung herstellen über:	
Intel(R) Ethemet Server Adapter I210-T1	
Konfigurieren	
Diese <u>V</u> erbindung verwendet folgende Elemente:	
 QoS-Paketplaner Internetprotokoll, Version 4 (TCP/IPv4) Microsoft-Multiplexorprotokoll für Netzwerkadapter Microsoft-LLDP-Treiber ECAT Protocol Driver for NDIS Internetprotokoll, Version 6 (TCP/IPv6) Antwort für Verbindungsschicht-Topologieerkennung 	
Installieren Deinstallieren Eigenschaften	
Beschreibung A NDIS 6 filter driver and WFP callout driver to support packet capturing and sending	
OK Abbrechen	

Do you have TwinCAT installed on this machine?

Open "Compatible Devices":



General Adapter Et	herCAT Online CoE - Online
Network Adapte	er
	OS (NDIS) OPCI OPRAM
Description:	EtherCAT (TwinCAT-Intel PCI Ethernet Adapter (Gigabit))
Device Name:	\DEVICE\{C3BBE6DD-ADC2-4306-AA82-07F84E7E1BEF}
PCI Bus/Slot:	Search
MAC Address:	00 15 17 86 81 b7 Compatible Devices
IP Address:	192.168.1.23 (255.255.255.0)
	Promiscuous Mode (use with Wireshark only)
	Virtual Device Names
- O Adapter Referer	nce
Adapter:	
Adaptor.	
Freerun Cycle (ms):	4

Uninstall or disable the "TwinCAT RT-Ethernet Adapter" for your network adapter:



Installation of TwinCAT RT-Ethernet Adapters	×
Ethernet Adapters	Update List Install Update Bind Unbind Enable Disable Show Bindings

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 slaves from the Beckhoff CX5000 series?

The ENI file of those slaves must start with an Ebus slave, but EC-Master exports only an MII port. This problem can be solved by first adding a helper slave "EK1200". The "real" EBus slaves can be connected afterwords to this helper slave.

• 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*)