

# Features & Improvements CODESYS V3.5 SP13

**1** Runtime

**2** Engineering

**3** Visualization

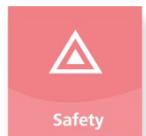
**4** Motion

**5** Fieldbus

**6** Safety

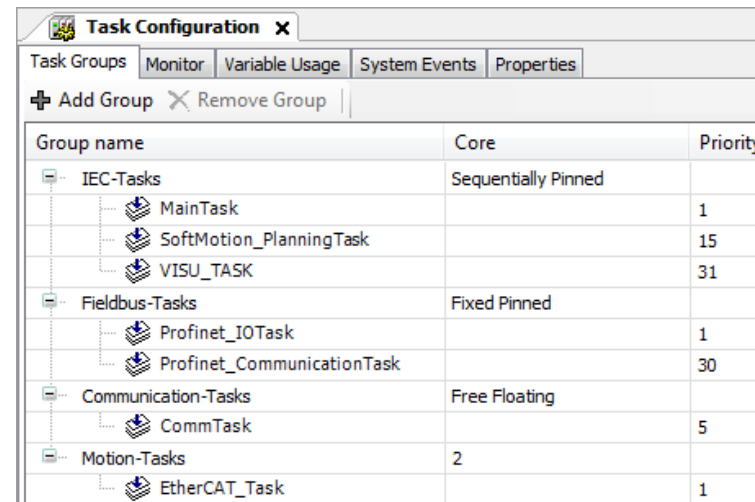
## Overview

- **New:** Multicore
- **New:** CODESYS Control for Linux SL
- SIL2 Compound Safety PLC
- Configurable set of different symbols for separate clients
- OPC UA: User management
- PLCHandler: Backup & Restore IEC Applications
- General improvements

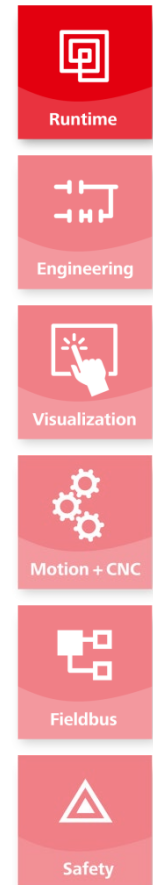


## New: Multicore

- Consistent read / write of 64Bit data types
- Define Multicore-specific target settings
- Extended task group configuration for core distribution - available settings:
  - Free floating: OS dynamically assigns tasks to cores
  - Fixed pinned: All tasks are bound to one specific core - decision for core executed by runtime system
  - Sequentially pinned: All tasks in this group are bound by the runtime system to different cores
  - Dedicated core: All tasks in this group are bound by the runtime to exactly this core



Group name	Core	Priority
IEC-Tasks	Sequentially Pinned	
MainTask		1
SoftMotion_PlanningTask		15
VISU_TASK		31
Fieldbus-Tasks	Fixed Pinned	
Profinet_IOTask		1
Profinet_CommunicationTask		30
Communication-Tasks	Free Floating	
CommTask		5
Motion-Tasks	2	
EtherCAT_Task		1



## New: Multicore

- Display of variable usage in different tasks

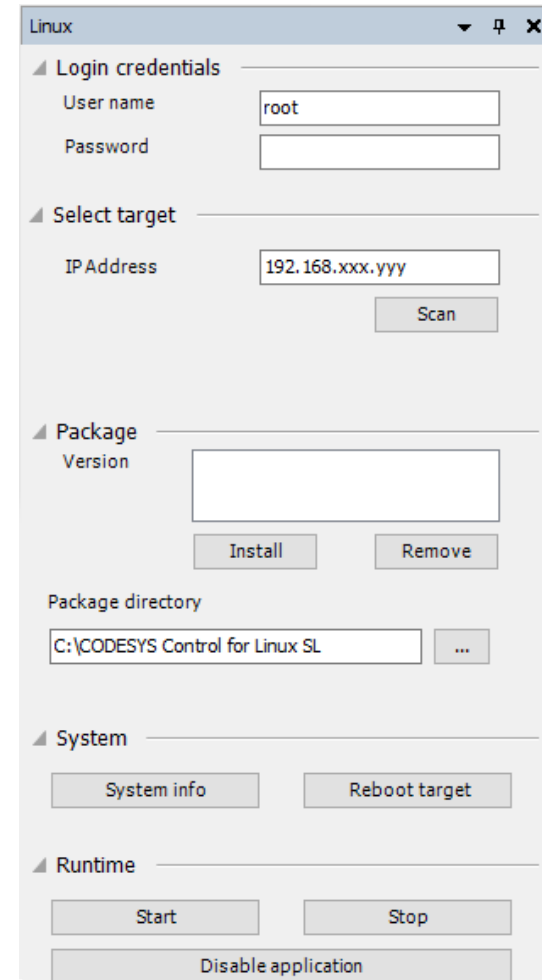
Variables	Type	Count	EtherCAT_Task	Logic	Motion
PLC_PRG.IndustriesArray	ARRAY [0..iMaxIndex, 0,....	1		r	
PLC_PRG.StrArray	ARRAY [0..iMaxIndex] OF ...	1		r	
PLC_PRG.Switch1	BOOL	1		r	
PLC_PRG.Switch2	BOOL	1		r	
PLC_PRG.BildArray	ARRAY [0..iMaxIndex] OF ...	1		r	
PLC_PRG.TextTimer	TIME	1		r	
PLC_PRG.Timer	TON	1		r	
PLC_PRG.Timer2	TON	1		r	
Ablauf.Wait1	IecSfc.SFCStepType	1			rw
Ablauf.Wait3	IecSfc.SFCStepType	1			rw
Ablauf.WaitTime	TIME	1		r	
Ablauf.xAuto	BOOL	1			r

- Monitor core load through device monitoring

Task	Status	IEC-Cycle Count	Cycle Count	Last Cycle Time (µs)	Average Cycle Time (µs)	Max. Cycle Time (µs)	Min. Cycle Time (µs)	Jitter (µs)	Min. Jitter (µs)	Max. Jitter (µs)	Core	
EtherCAT_Task	Valid	70755	72040	33	29	7640		1	46522	-3995	42527	1
Logic	Valid	14301	14569	16	15	1947		1	52005	-19994	32011	1
Motion	Valid	14302	14568	8	9	11073		1	62853	-19992	42861	2
TrendRecording...	Valid	2862	2916	8729	802	46741		1	41432	-20725	20707	1
VISU_TASK	Valid	2862	2917	28	259	64370		1	119029	-99989	19040	1

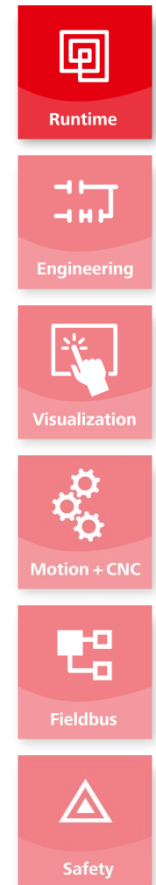
## New: CODESYS Control for Linux SL

- Linux Runtime for X86 (64 Bit) – Debian
- Features
  - Multicore
  - SoftMotion
  - WebVisu
  - OPC UA Server
  - Security Features (encrypted communication/bootapp/etc.)
  - Ethernet based fieldbus systems supported



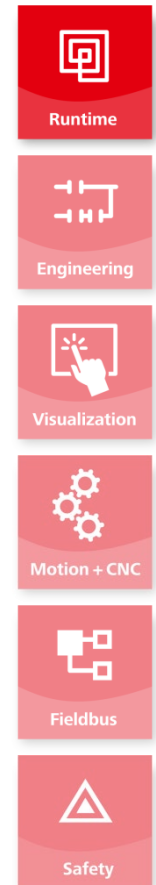
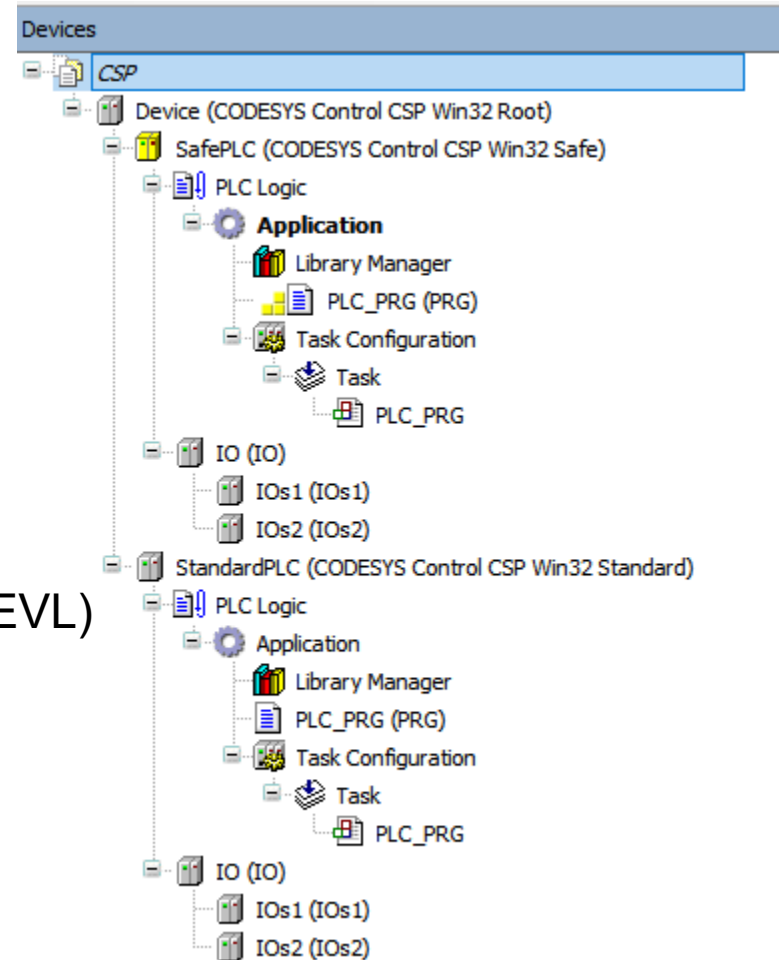
The screenshot shows the 'Linux' configuration window with the following sections:

- Login credentials:** User name: root, Password: [empty]
- Select target:** IP Address: 192.168.xxx.yyy, Scan button
- Package:** Version: [empty], Install button, Remove button
- Package directory:** C:\CODESYS Control for Linux SL, ... button
- System:** System info button, Reboot target button
- Runtime:** Start button, Stop button, Disable application button



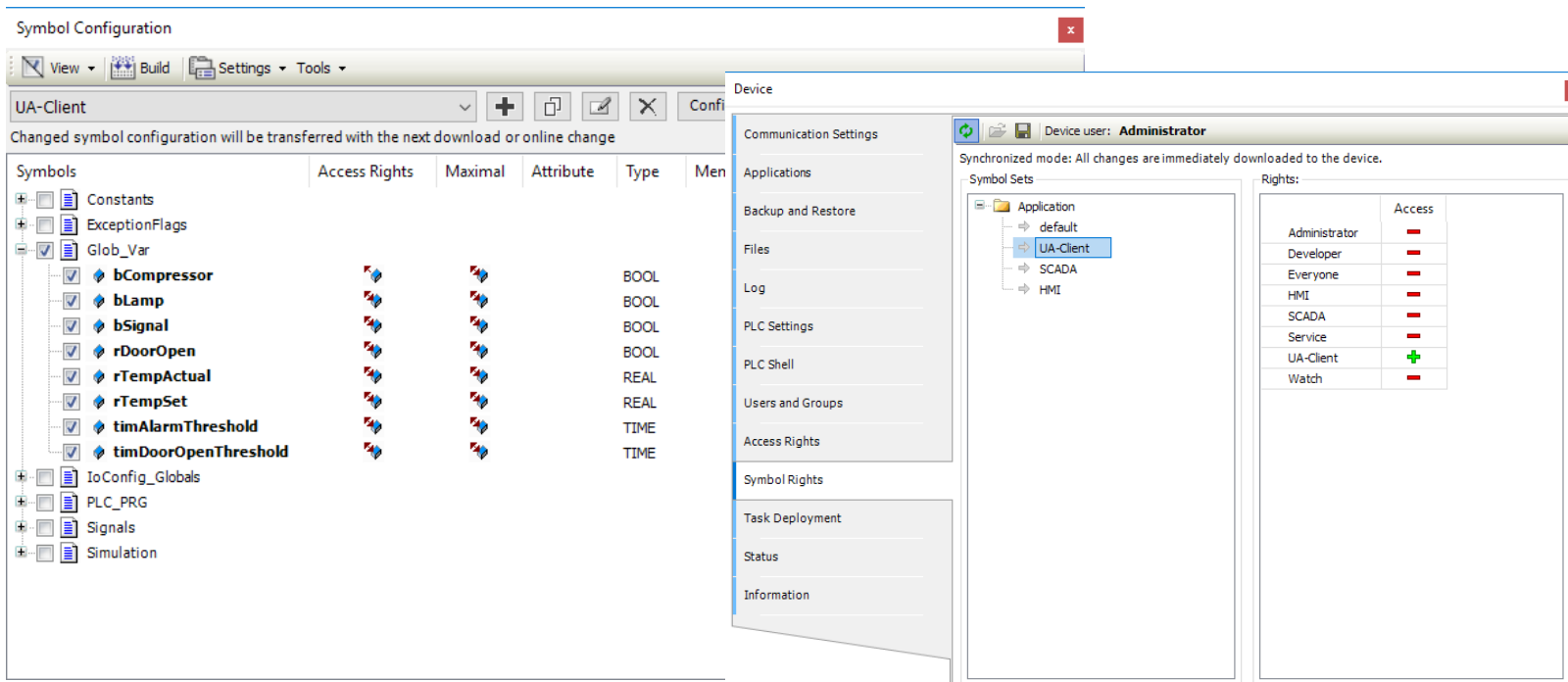
## SIL2 Compound Safety PLC

- 1 Target
- 2-n Runtimes
  - 1 SafetySIL2 Runtime
  - n Standard Runtimes
- 2-n Applications
  - 1 Safety Application (certified)
  - Exchange of data possible (EVC/EVL)



## Configurable set of different symbols for separate clients

- Create symbol sets within the symbol configuration
  - Define access rights for each symbol set
  - Select different symbols per symbol set
  - Refer symbol sets to user groups



The screenshot shows two overlapping windows from the CODESYS software. The background window is titled 'Symbol Configuration' and displays a tree view of symbols for a 'UA-Client' device. The foreground window is titled 'Device' and shows the 'Symbol Sets' configuration for the same device, including a table of access rights for various users.

**Symbol Configuration Window:**

Symbols	Access Rights	Maximal	Attribute	Type	Men
Constants					
ExceptionFlags					
Glob_Var					
bCompressor	⚙️	⚙️		BOOL	
bLamp	⚙️	⚙️		BOOL	
bSignal	⚙️	⚙️		BOOL	
rDoorOpen	⚙️	⚙️		BOOL	
rTempActual	⚙️	⚙️		REAL	
rTempSet	⚙️	⚙️		REAL	
timAlarmThreshold	⚙️	⚙️		TIME	
timDoorOpenThreshold	⚙️	⚙️		TIME	
IoConfig_Globals					
PLC_PRG					
Signals					
Simulation					

**Device Window:**

Device user: Administrator

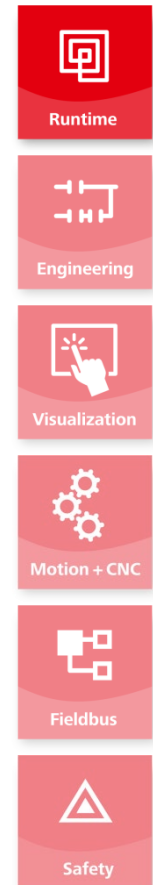
Synchronized mode: All changes are immediately downloaded to the device.

Symbol Sets:

- Application
  - default
  - UA-Client**
  - SCADA
  - HMI

Rights:

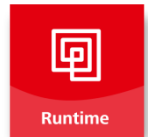
User	Access
Administrator	⚙️
Developer	⚙️
Everyone	⚙️
HMI	⚙️
SCADA	⚙️
Service	⚙️
UA-Client	⚙️
Watch	⚙️





## OPC UA: User Management

- Login to OPC UA Server with user name / password combination
- Logon via the user administration of the PLC
- Control of access rights to the OPC UA Server for the user groups
- Check rights before services are processed
- Check of access rights down to object level possible



Runtime



Engineering



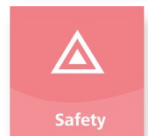
Visualization



Motion + CNC



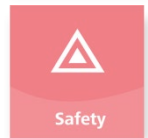
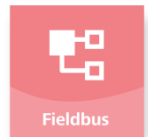
Fieldbus



Safety

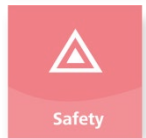
## PLCHandler Backup & Restore IEC Applications

- For PLCs from version V3.5.8.0
- New interfaces are available in the PLCHandler for both operations:
  - Backup IEC Applications
  - Restore IEC Applications
- Both interfaces work synchronously



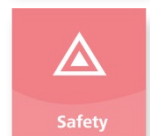
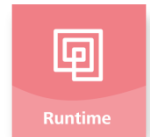
## General improvements

- Update CodeMeter SDK 2.1
- CmpTLS: Support of ECC
  - Webserver now supports ECDH cipher suites by default
  - With Webclient also connection to websites with ECDH possible
- SysSocket2: Support of Server Name Indication
  - Connection to cloud-based TLS servers possible.
  - New socket options: `SOCKET_IPPROTO_TLS`, `SOCKET_SO_HOSTNAME`



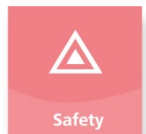
## Overview

- CODESYS in a sandbox
- Automation Platform Modularization
- Licensing improvements
- General improvements



## CODESYS in a sandbox

- Programming system now "self-contained"
- Completely isolated installations without mutual interference
- Migration Assistant for user settings
  
- Transfer of a CODESYS installation from one PC to another only under certain prerequisites



## Automation Platform Modularization

- Goal:  
Remove interdependencies between plug-ins in the Automation Platform
- Create infrastructure
- Definition of architecture layers
- Assignment of all plug-ins to a legacy layer



Runtime



Engineering



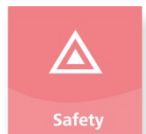
Visualization



Motion + CNC



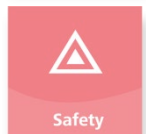
Fieldbus



Safety

## Licensing Improvements

- Clearer division into device and workstation licenses ("In which container must the license be installed?")
- Backup and restore of licenses
- Support of multiple firm codes for plug-ins and libraries
- **All add-ons from the next version on can be purchased dongle-free via pure software licenses!**



## General improvements

- Communication: Access to a controller via host name / DynDNS name
- User management: improvement of data security
- CFC: Features for Process Automation
  - Support of qualified values
  - Code generation for automatic assignment and monitoring
  - Forcing of inputs now without restrictions
- Task locale variables
- ABSTRACT as new keyword
- Filter for cross references
- Offline status field for "Up To Date" application



Runtime



Engineering



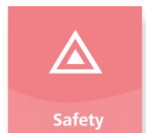
Visualization



Motion + CNC



Fieldbus

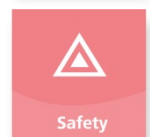
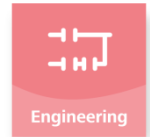


Safety



## Overview

- **New:** HMI Toolkit for Linux
- General improvements



## New: HMI Toolkit for Linux

- Ability for OEMs to create HMI devices under Linux



Runtime



Engineering



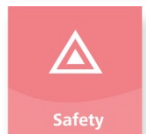
Visualization



Motion + CNC



Fieldbus



Safety

## General Improvements

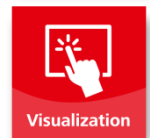
- Stabilization of XY Chart
- Trace
  - Filling curves
  - Curls as markings
- Exact determination of element outlines
- HMI
  - Performance improvements for formulations
  - Diagnostics for application code



Runtime



Engineering



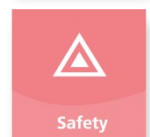
Visualization



Motion + CNC



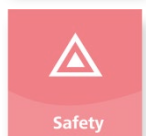
Fieldbus



Safety

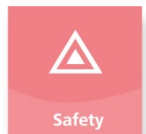
## Overview on General Improvements

- Cam-Editor
- CNC
- Robotics



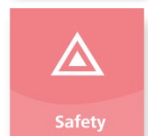
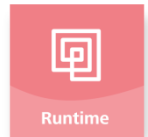
## General improvements

- **Robotics**
  - Support for pure orientation movements with constant TCP
  - PTP true to the path (path of the robot does not change due to override)
  - Waiting on the track
  - Improved blending
  - Improved quality of trajectory with high dynamics
- **CNC**
  - Support for subroutines in G code
  - Support for G-code expressions
  - Support for variables in G code
- **Cam-Editor**
  - Improved editing of cams



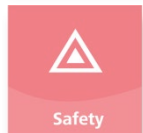
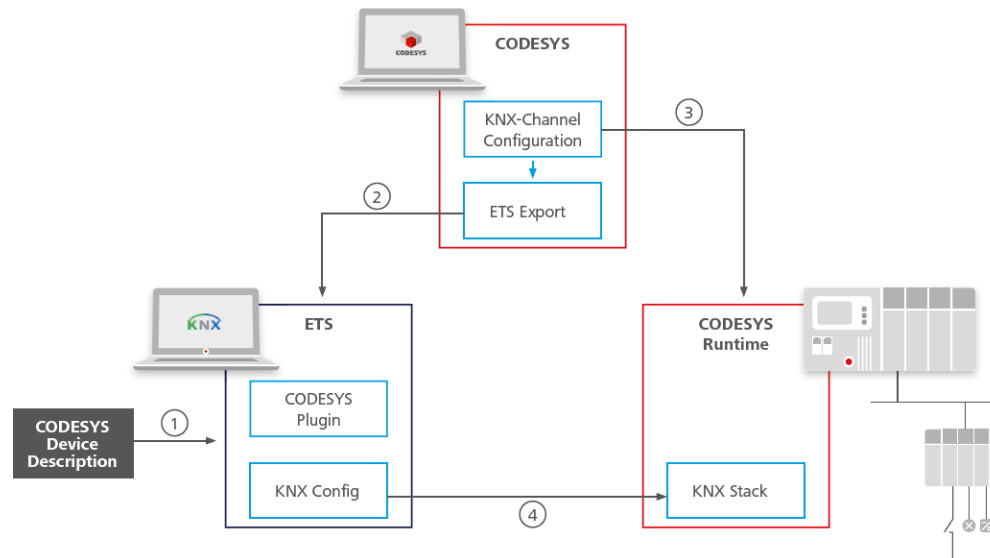
## Overview

- **New:** CODESYS KNX
- Predictive/Preventive Maintenance
- Cloud connectivity
- General improvements



## New: CODESYS KNX

- KNX IP support for building automation
- Integration of KNX stack as runtime component
- Editor for KNX objects in CODESYS
- IO driver for KNX
- Connection to ETS5 programming software



## Predictive/Preventive Maintenance

- Add support for function block for I/O channels

Find Filter Show all

+ Add FB for IO channel... Go to instance

Variable	Mapping	Channel	Address	Type	Unit	Description
Application.EL2002_Output_Boot.xOutput	FB	Output	%QX1.4	BIT		Output
		Output	%QX1.5	BIT		Output

+ Add... Edit... Delete Go to variable

Variable	Mapping	Type
EL2002		ETCSlave
EL2002_Output_Boot		Output_Boot

Select function block

Find

Type

- Application
  - Relay\_Test
  - Relay\_Test1
- PredictiveID
  - Output\_Boot
  - Relay

Inputs/Outputs Graphical Documentation

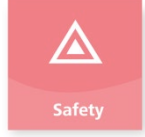
### Output\_Boot (FB)

FUNCTION\_BLOCK Output\_Boot

InOut:

Scope	Name	Type
Input	xInput	BOOL
Output	xOutput	BOOL
	udiCount	UDINT

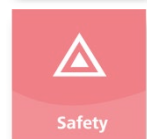
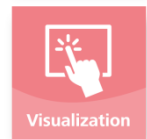
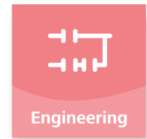
OK Cancel





## Cloud connectivity

- Azure IoT Hub Client
  - Library for communicating with the cloud 'Azure IoT Hub' from Microsoft
  - Sending device messages (D2C messages)
  - Receiving cloud messages (C2D messages)
  - Updating/reading device twins (JSON file with device status information)
- MQTT Client (Message Queue Telemetry Transport)



## General improvements

- BACnet
  - Update to Revision 14
- CANopen Device
  - Support of CANfox USB Dongle
- EtherCAT
  - TwinSafe SC modules
  - Function blocks to query state of slave, reinit slave, check DC
  - Manual changes for MDP devices
  - Implement link loss/detect delay time



Runtime



Engineering



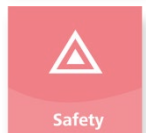
Visualization



Motion + CNC



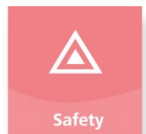
Fieldbus



Safety

## General improvements

- PROFINET
  - Link Status
  - CommFB Library: Function Blocks for Field Devices
  - Scan without started Application
  - ModuleState and SubmoduleState
  - DataTypes of GSDML V2.33
- EtherNet/IP
  - Conformance to CT15
  - Basic support for modular EDS files



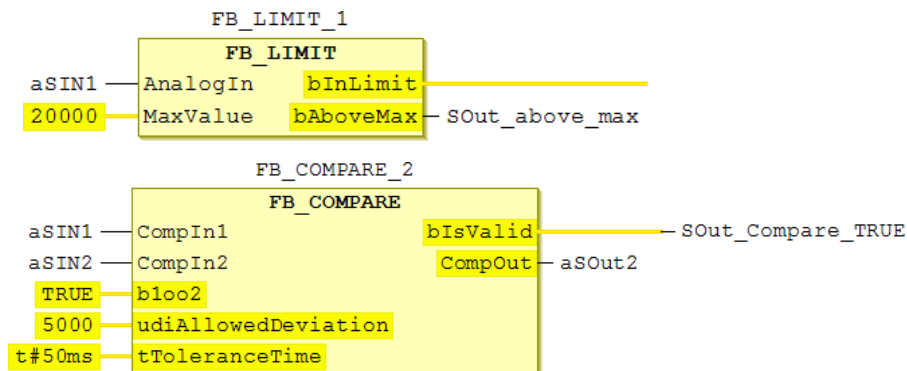
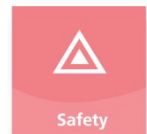
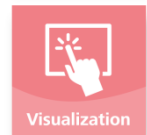
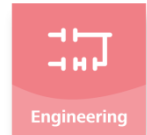
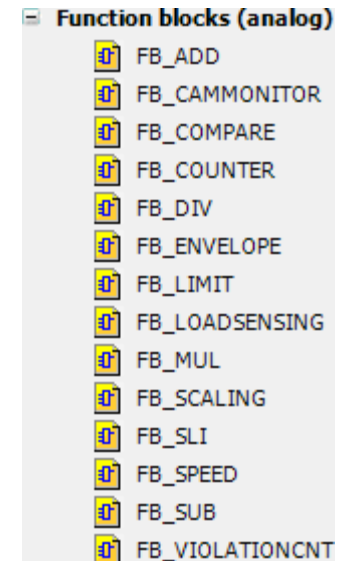
## Overview

- Support of EL6910/EK1960



## Support of EL6910/EK1960

- Extended functionality (compared to EL6900)
  - Analog safety operations
  - Safety validation of TwinSAFE SC inputs
- EK1960: Integrated digital Safety I/Os
- Safety solution certified by TÜV SÜD for CODESYS V3.5 SP11 P5, releases for further versions pending





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