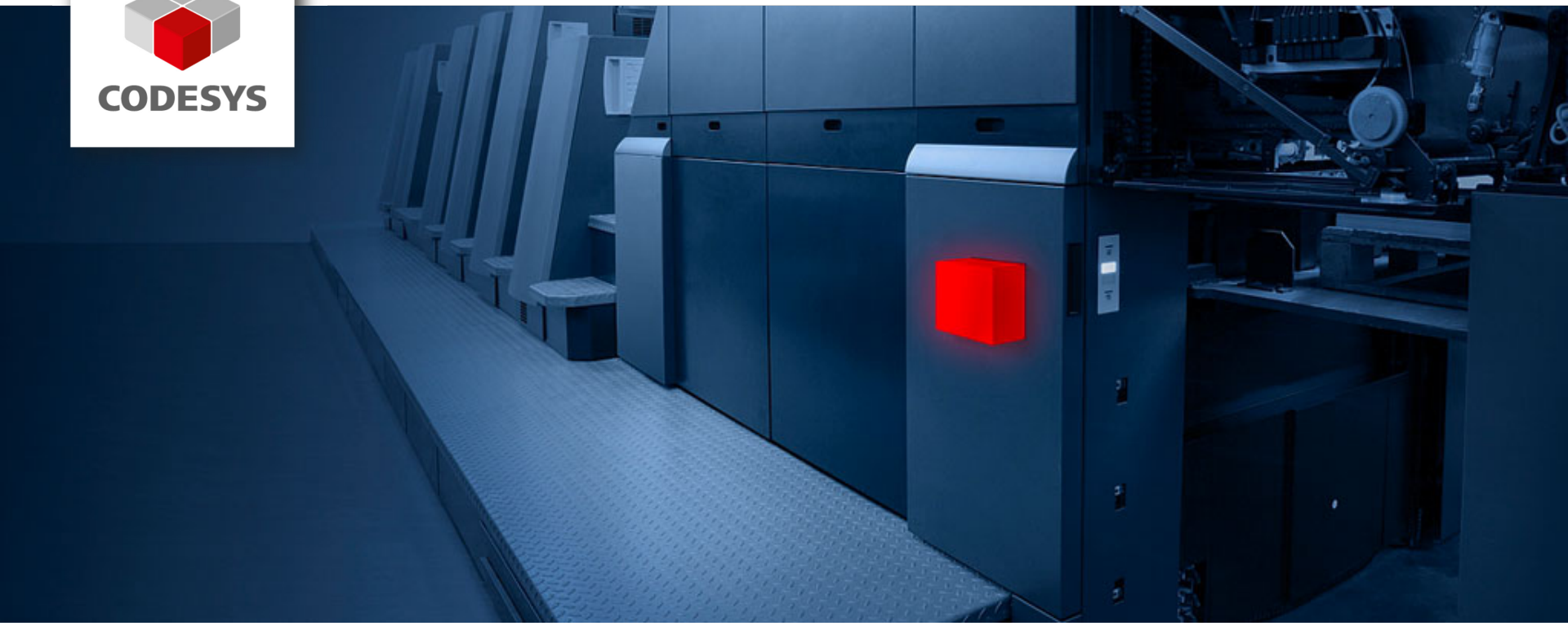

Features & Improvements
CODESYS V3.5 SP5

Agenda

1. Runtime
2. Engineering
3. Visualization
4. Motion + CNC
5. Fieldbus
6. Safety

Agenda

1. Runtime
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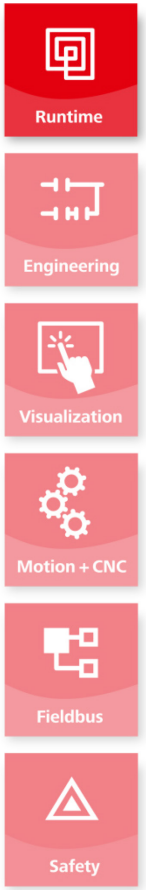
Runtime

Overview

- OpenSSL component
- CODESYS Controls 64 bit
- OPC UA
- Additional improvements:
  - Single device licensing
  - Communication
  - Diagnosis / Logging
  - Performance



OpenSSL

- OpenSSL as a runtime component
- Usage for
  - Webserver / https (with V3.5.5.0)
  - OPC UA (planned for V3.5.6.0)
  - Outlook:
    - Encryption of the communication of CODESYS clients with the runtime system
    - Clients can be:
      - CODESYS Development System
      - Webserver
      - DataServer
      - OPC-Server with PLCHandler

CODESYS Control 64 bit

- New data types in CODESYS: __XWORD, __UXINT und __XINT
- __X… data types ensure the common usage of 32 and 64 bit libraries
- Each data type has an equivalent in the runtime system
  ⇒ Runtime system is “single-source“ for 32 / 64 bit
- Runtime system and external libraries have been converted to 64 bit
  - Exceptions:
    - CAN
    - Gateway
    - Embedded and some “exotic” components
- CODESYS Control RTE 64
  - Release with support for EtherCAT, TargetVisualization and WebVisualization

OPC UA – Preview (upon request, preview for Windows only)

- OPC UA as a runtime component
- In symbol configuration an extended export for OPC UA is supported :
  - Storage class: VAR_INPUT, VAR_OUTPUT, …
  - NodeType: Program, FB, Structure, …
  - Export of customer specific pragmas for extended description of variables
  - Browsing of types
- Released with V3.5.5.0 as a **preview**
- Full release planned for V3.5.6.0

Additional improvements

- Single device licensing
  - Extended support of Wibu dongles and soft containers in the runtime system for license protection of runtime components and IEC 61131-3 libraries
- New PLC shell commands
- Communication
  - No redirection of received broadcasts by the Gateway (network scanning) per default
  - Ping: runtime system mirrors received data (currently only available for PLC Handler)
- Diagnosis / Logging
  - Forwarding of logger messages as UDP telegrams (denotable with syslog clients or Wireshark)
- Performance improvements within online change

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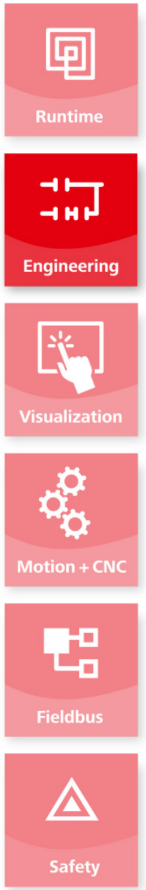
Engineering

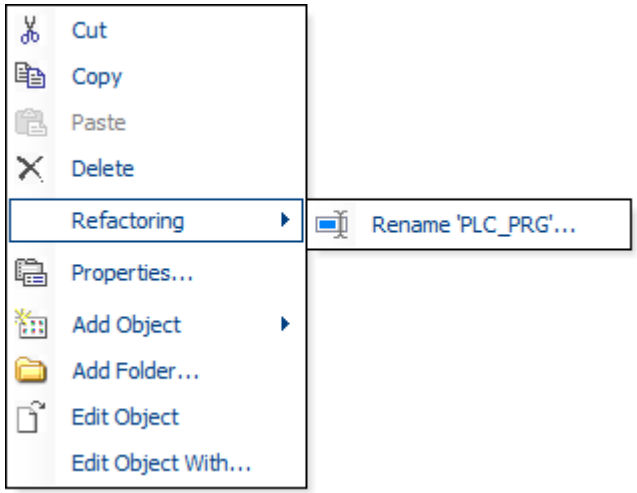
Overview

- Refactoring
- Security features
- Documentation of libraries / library features
- Debugging
  - Indication of precompile errors
  - Core dump
  - Execution points
- Additional improvements



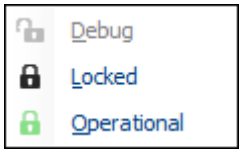
Refactoring

- Application-wide renaming of symbols (variables and objects)
- In contrast to global “find & replace“: semantically correct
- The following objects can be renamed:
  - Functions
  - POUs
  - GVLs
  - Methods
  - Properties
  - Devices



Security features

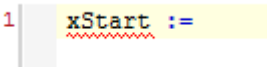
- Interactive login (*Level 1 Security*)
  - Connection with the right PLC - device manufacturers decide on method Login options (target settings):
    - Input of data (e.g. serial number)
    - Operating a push button
    - PLC blinking
- Operation mode *(Level 2 Security)*
  - Prevention of unwanted changes on running application
  - Operation modes:
    - *Debug*: all PLC functions are available
    - *Locked*: e.g. no forcing, no break points, no start / stop / delete application, but writing is possible (e.g. for visualization or protocol files)
    - *Operational*: locked modes + boot application must be available / no difference between IDE and PLC

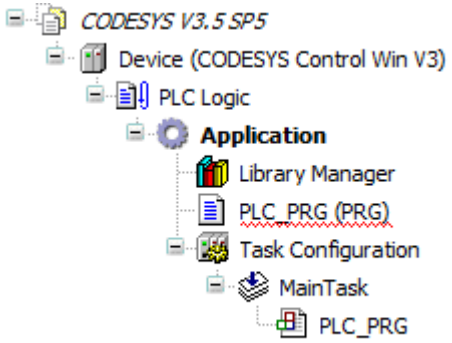


Documentation of libraries / library features

- Defined format for the documentation of source code modules with “reStructured Text”
  - Simple semantic text format
  - Integration of graphs, links and frame documents etc.
  - Raw format can be used for different tool chains
    - Adaption of the output format: html, pdf, cosima-xml
    - Adaption of the style: css
    - Adaption of the frame document
- Download of missing CODESYS libraries from the CODESYS Store server (adaptable for OEMs)
- Better indication of missing libraries
- Possibility to sign compiled libraries

Debugging

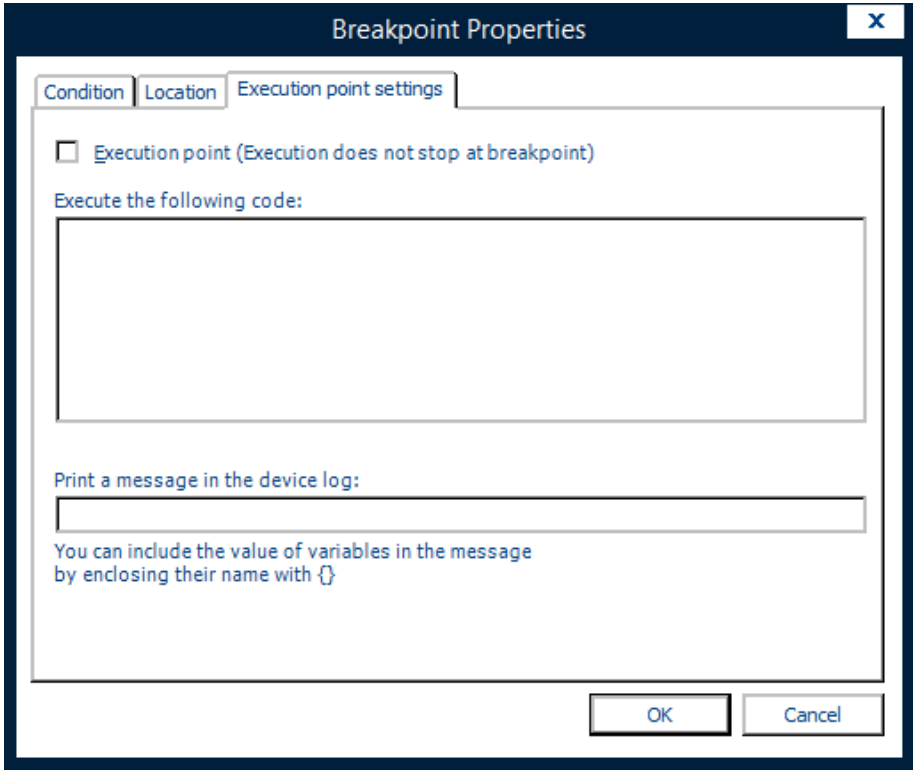




- Display of precompile errors
  - Syntax errors (like before)
  - Typing errors
  - Not declared variables
  - Display of objects with warning within device tree
- Core dump
  - New runtime component is needed
  - Two possibilities: online with debugger in IDE or on exception on the PLC
  - Core dump content:
    - Device log
    - Complete application stack
    - Call stack
    - Data areas and start addresses of the areas in the runtime

Debugging

- Execution points
  - Break points without break - actions are operated without stopping the application
  - Possible actions:
    - “Arbitrary” code, e.g. writing variables
    - Record watch variables
    - Output of log messages



Additional improvements

- Application Composer
  - Improved CODESYS SVN support
  - Modification of existing modules on the basis of extension modules
  - Persistence Manager: possible data storage in NVRAM (retain)
- Better indication of partially loaded projects
- Frame: Window command support for editor-like views (e.g. CODESYS Test Manager)
- Drag & Drop within watch window (issue sorting)
- Diagnosis tool (for recording of “First Chance Exceptions” and potential memory issues) is now part of the CODESYS setup

Additional improvements

- Procedure for execution of concurrent code before and after online change
- Standard procedure for request of compiler version
- Variable declaration: `VAR_INST`
- Overloaded type conversions: `rl := TO_REAL(int);`
- Implementation of built-in system constants

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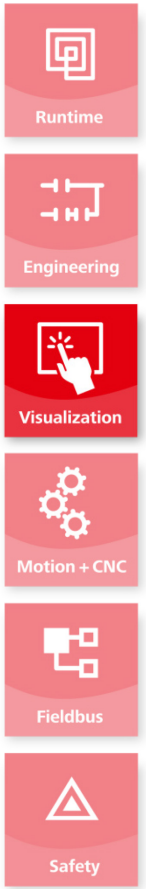
Visualization

Overview

- Improved trend
- Multitouch
- Structured view within recipe definition
- Project compare for visualization
- Additional improvements



Improved trend

- Additional trend elements via trend wizard

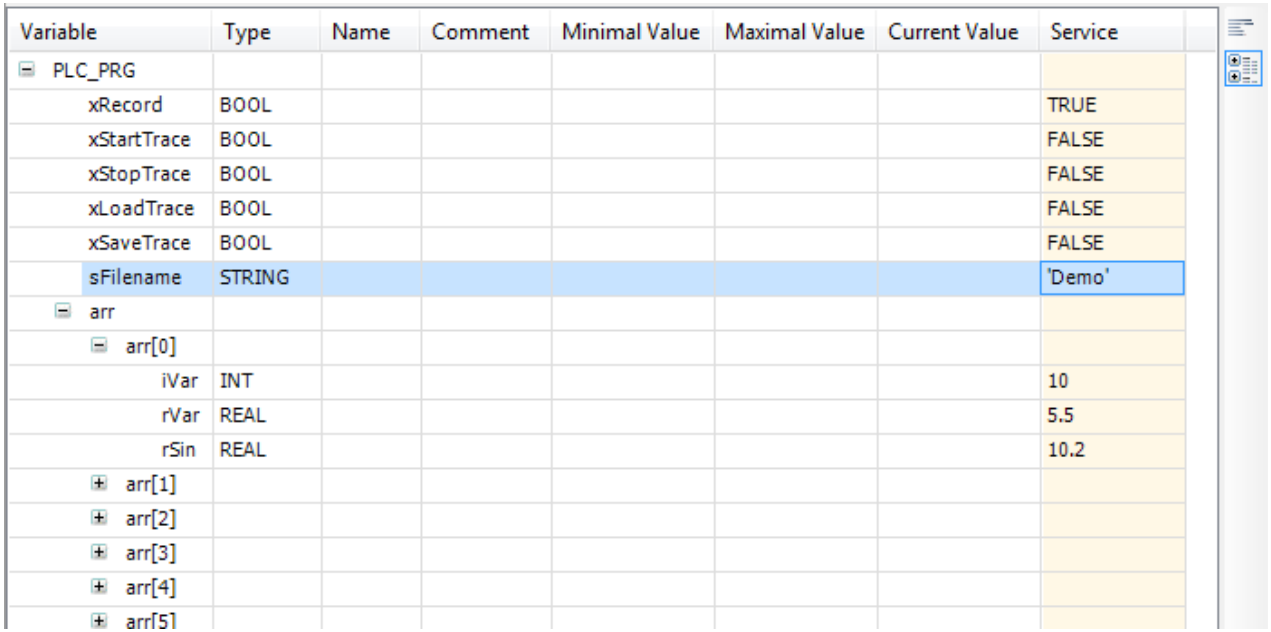
- New dialogue for trend recording options
- Additional features
  - Cursor for indication of current data position
  - Configurable date / time format
  - CODESYS HMI: access to remote data records

Multitouch

- Scrolling via touch (pan) in frame / tab control
- Simultaneous input on multiple elements (e.g. switch or slider)
- Touch response within the application (via IEC 61131-3 code)
- Support of CODESYS TargetVisualization under Windows® (≥ Windows® 7) and Linux®

Structured view within recipe definition

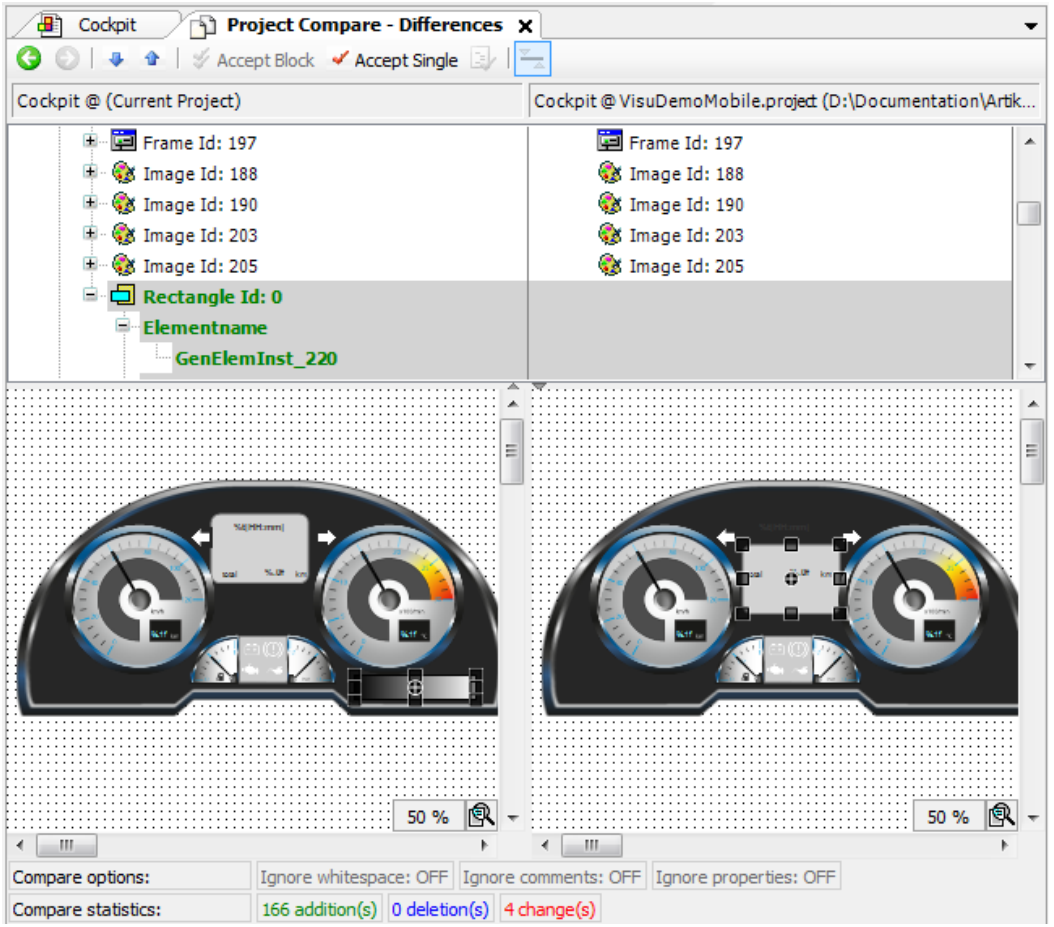
- Better overview for big amounts of data
- Not included structure members available via context menu
- Switching between flat and structured view possible



Variable	Type	Name	Comment	Minimal Value	Maximal Value	Current Value	Service
PLC_PRG							
xRecord	BOOL						TRUE
xStartTrace	BOOL						FALSE
xStopTrace	BOOL						FALSE
xLoadTrace	BOOL						FALSE
xSaveTrace	BOOL						FALSE
sFilename	STRING						'Demo'
arr							
arr[0]							
iVar	INT						10
rVar	REAL						5.5
rSin	REAL						10.2
arr[1]							
arr[2]							
arr[3]							
arr[4]							
arr[5]							

Project compare for visualization

- New compare editors for
  - Visualization
  - Visualization Manager
  - Alarm Management
  - Recipe Management
  - Unit Conversion



Visualization

Additional improvements

- OpenSSL support for WebServer
- Keep alive support for WebServer
- Refactoring support
- Visualization for 64 bit runtime systems
- Language dependent fonts

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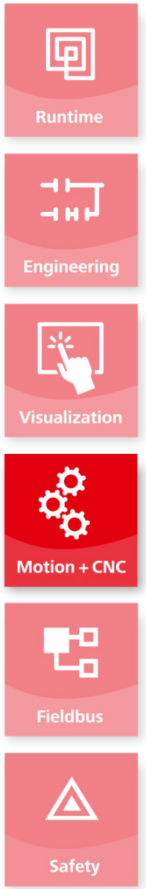
Motion + CNC

Overview

- Driver support
- Additional improvements



Driver support

- Support for Sercos III drives (generic driver)
- Support for AKD (EtherCAT drive)
- Support for KEB “Stepless Technology” (CAN drive)
- Support for two- and three-axle devices with generic CiA DS-402 driver

Additional improvements

- Commissioning page for drives (based on Online ConfigMode)
- Device diagnosis for SoftMotion devices
- CNC/CAM: Support for cross references and refactoring
- CNC objects can be added to libraries
- Single license support for SoftMotion Light
- Higher resolution for gear ratio (31 bit / 32 bit instead of 15 bit / 32 bit)
- Improved online view (configurator)
- Improved error logging
- Performance improvements in base driver

1 Runtime

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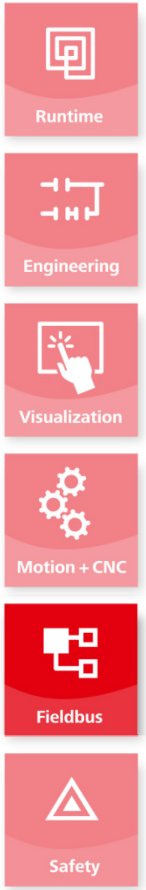
Fieldbus

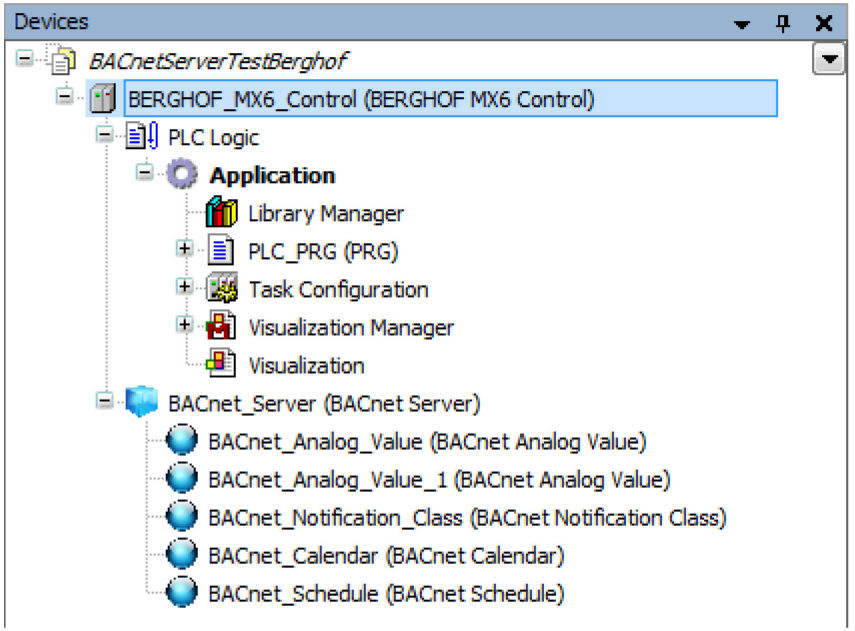
Overview

- New product: CODESYS BACnet
- CANopen
- J1939
- EtherCAT
- Modbus
- Additional improvements



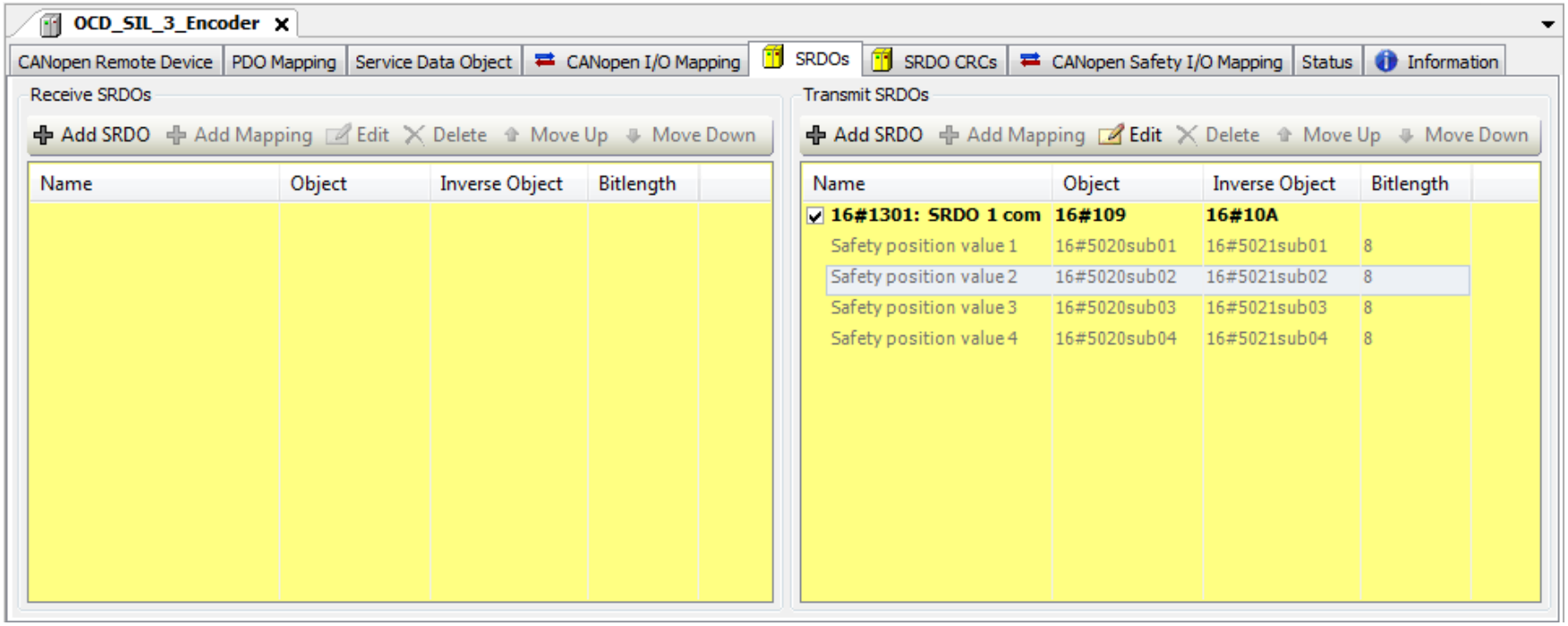
New product: CODESYS BACnet

- Support for BACnet/IP as runtime component for Windows and Linux devices
- Representation of BACnet server objects as CODESYS devices
- Support for BACnet objects and BACnet client devices according to AMEV-AS-B standard



CANopen

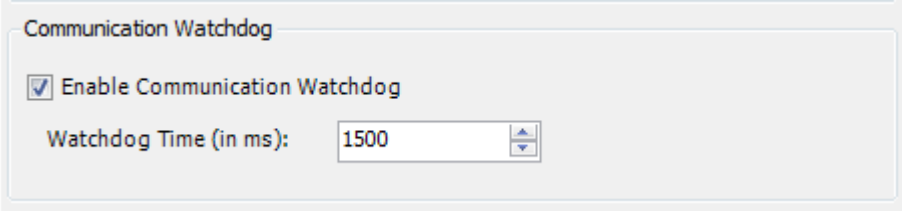
- CANopen Safety Master Configurator

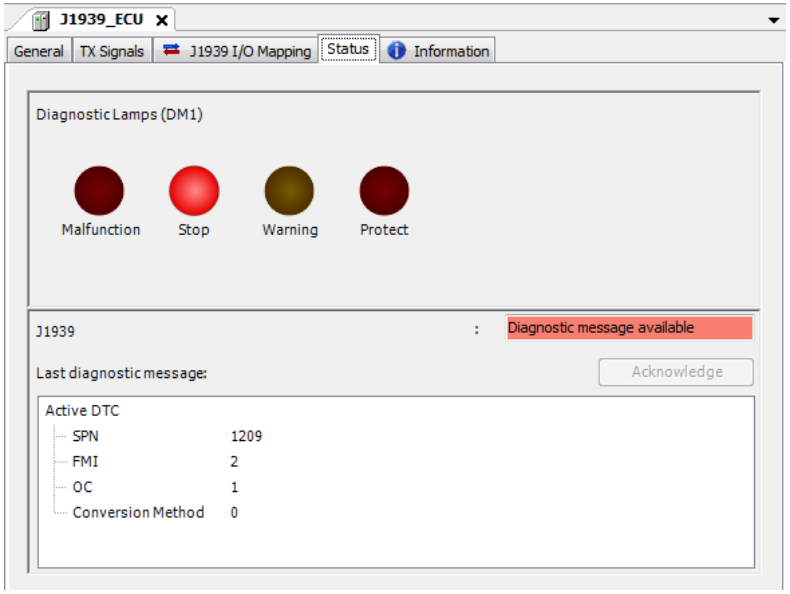


- Debug output: compiler define for debug log messages

J1939

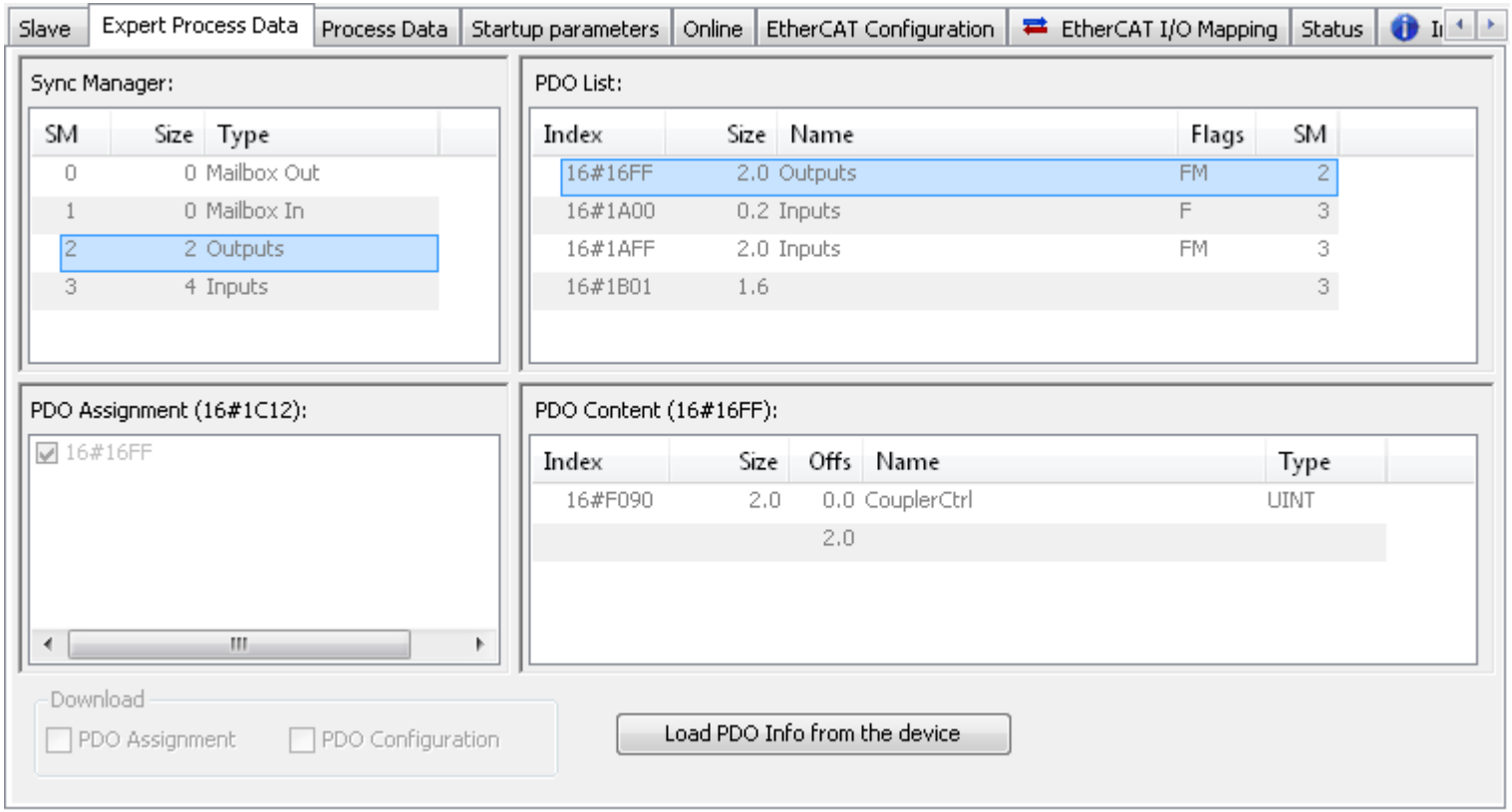
- Diagnosis
  - Communication Watchdog
  - Diagnosis API
    - DM1/DM2 read and write functions blocks
    - Receive watchdog for monitoring of single parameter groups
  - Diagnostic lamps
  - Last DTC (diagnostic message)





EtherCAT

- PDO upload functionality (expert settings for slave required)

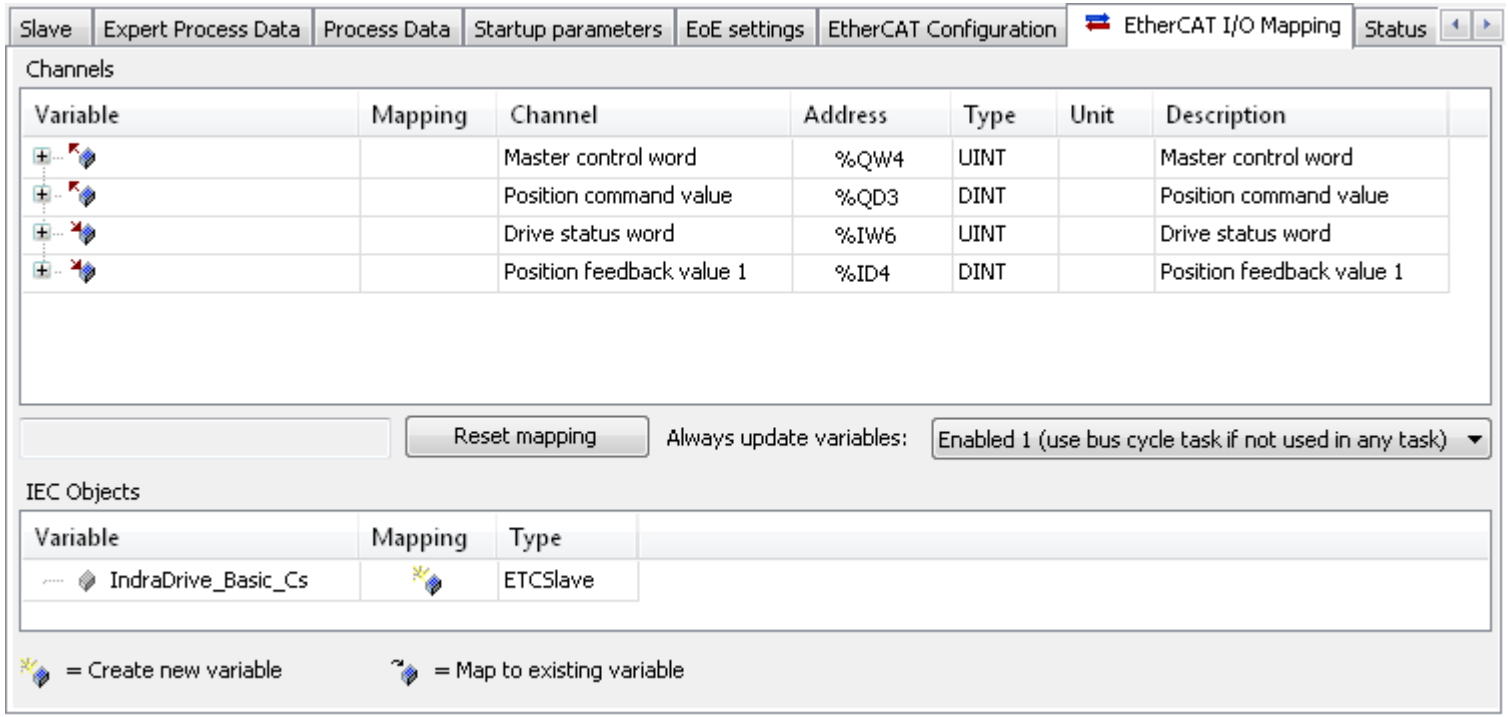


Modbus

- Modbus Slave Device: Bit-Access Function codes
- Modbus Slave Driver: Write Holding Registers
- Modbus TCP Device: Reset / Restart Server-Socket

Additional improvements

- I/O Mapping: additional option to always update variables in fastest task / bus cycle task



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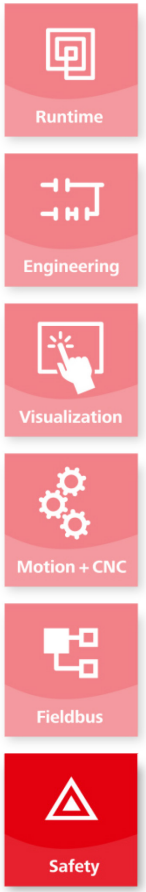
Safety

Overview

- New Product: CODESYS Safety SIL2 PSP (Platform Support Package)



New Product: CODESYS Safety SIL2 PSP (Platform Support Package)

- Pre-certified CODESYS Control SIL2 runtime toolkit adaptation for specific platforms
- First supported platform: TI / Hercules RM48
- Delivery content:
  - CODESYS Control Toolkit + CODESYS Safety SIL2 Package
  - Set of safety documentation
  - Project files for the platform (e.g. Code Composer Studio for TI / RM48)
  - Integration tests to be running on the final build

Inspiring Automation Solutions

Thank you for your attention.