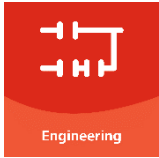




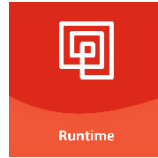
# CODESYS® V3.5 SP19

## Features and Improvements

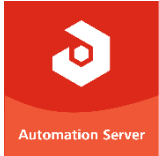
Including presentation of component updates since the release of the last Service Pack.



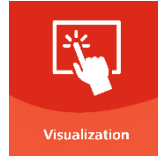
**ENGINEERING**



**RUNTIME / SAFETY**



**AUTOMATION SERVER**



**VISUALIZATION**



**MOTION CNC ROBOTICS**

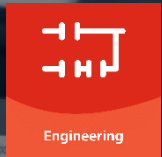


**FIELDBUS**



**COMMUNICATION**





# CODESYS ENGINEERING

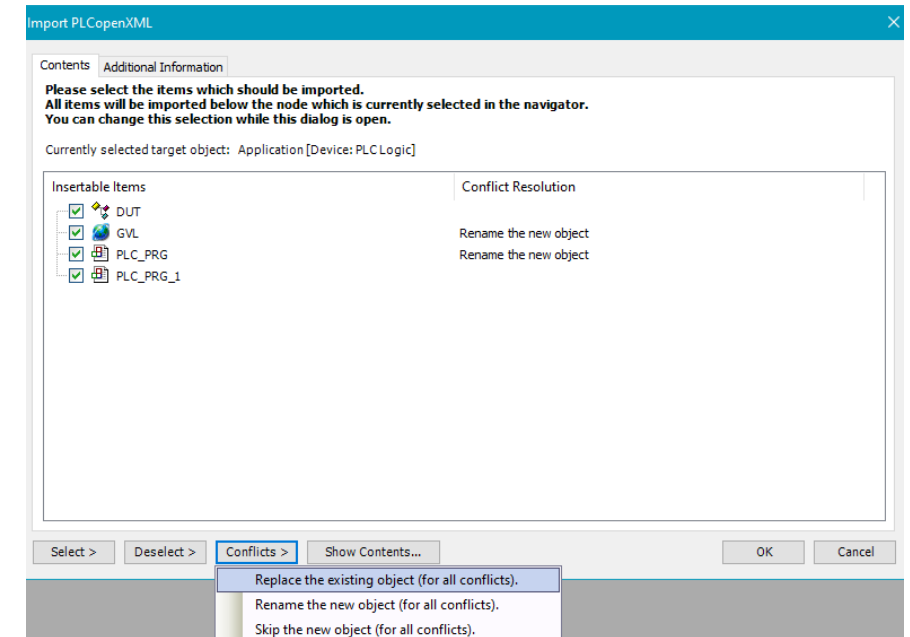


## Overview

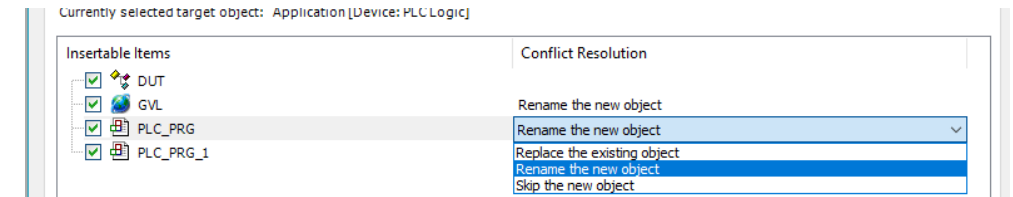
- **Improved usability**
- **Improved security**
- **Improvements of License Manager**
- **Improvements of Project Inspection**
- **Improved Installer**
- **New Package Designer**
- **Reworked Library Parameter List**
- **Partial Access to Bitfields**
- **Improvements of the Professional Developer Edition**
- **Update of IloT Libraries SL**

## Improved usability – Import PLCopen XML

- Set conflict handling for all imported items with just one command

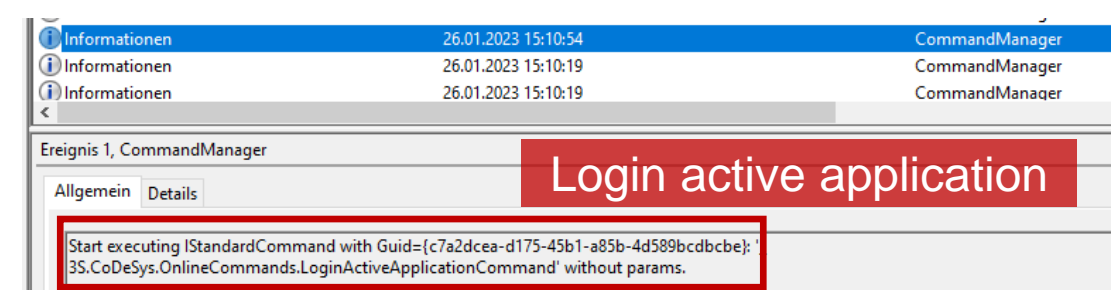
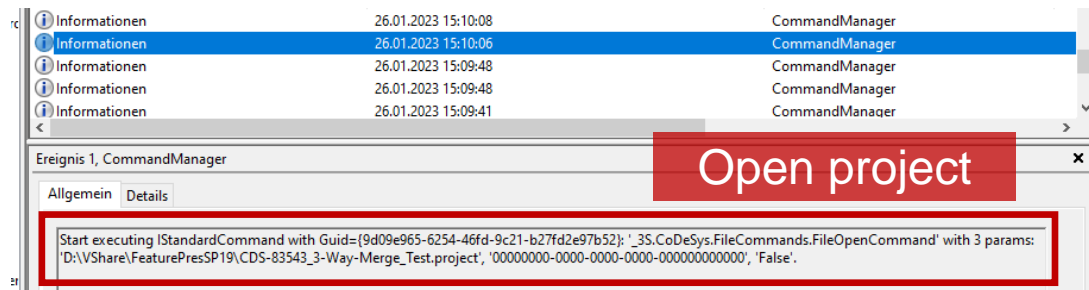
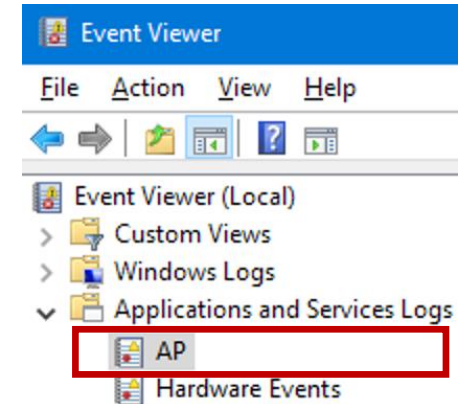


- Adaptation of preset for handling of single items



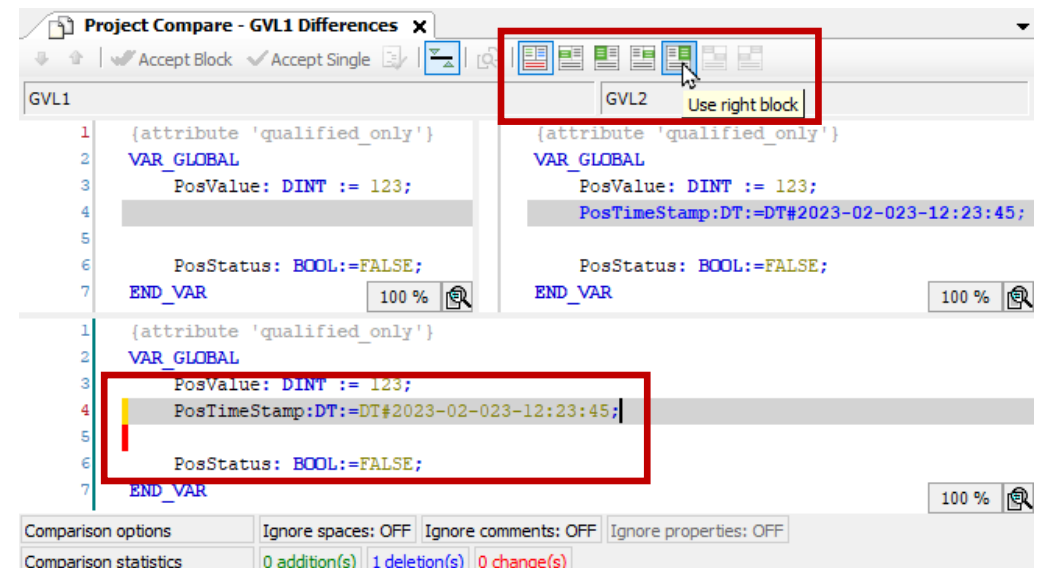
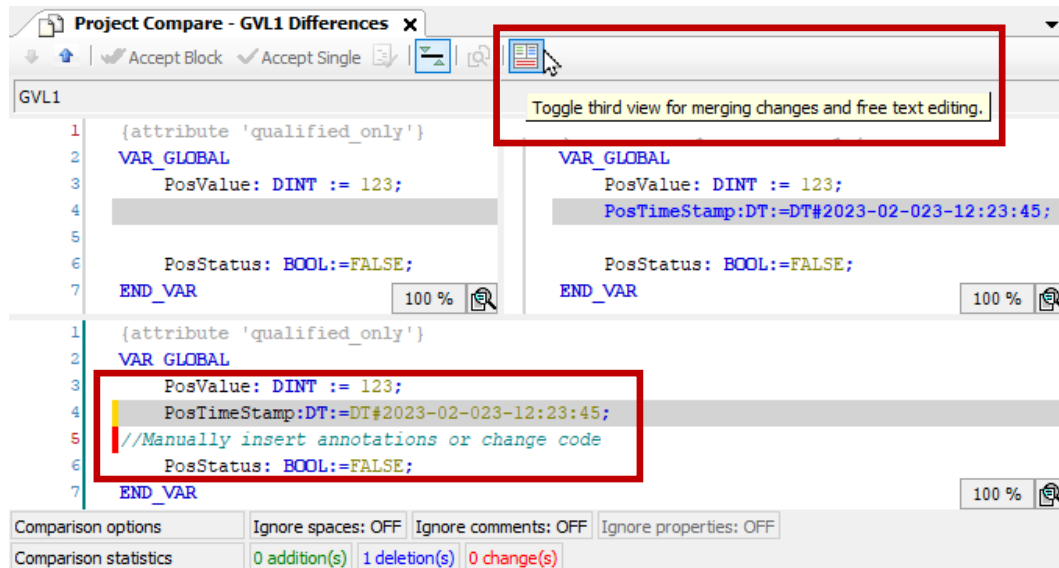
## Improved usability – Command Logging

- **Advanced Diagnosis feature**
- **Activation: Starting CODESYS.exe with command line switch "*--enableEventLog="CommandManager"*"**  
(Admin rights required)
- **Effect:**
  - New MS Windows event view entry “AP”
  - Activity log of the CommandManager:
    - Executed commands
    - Parameters of executed commands
    - Examples



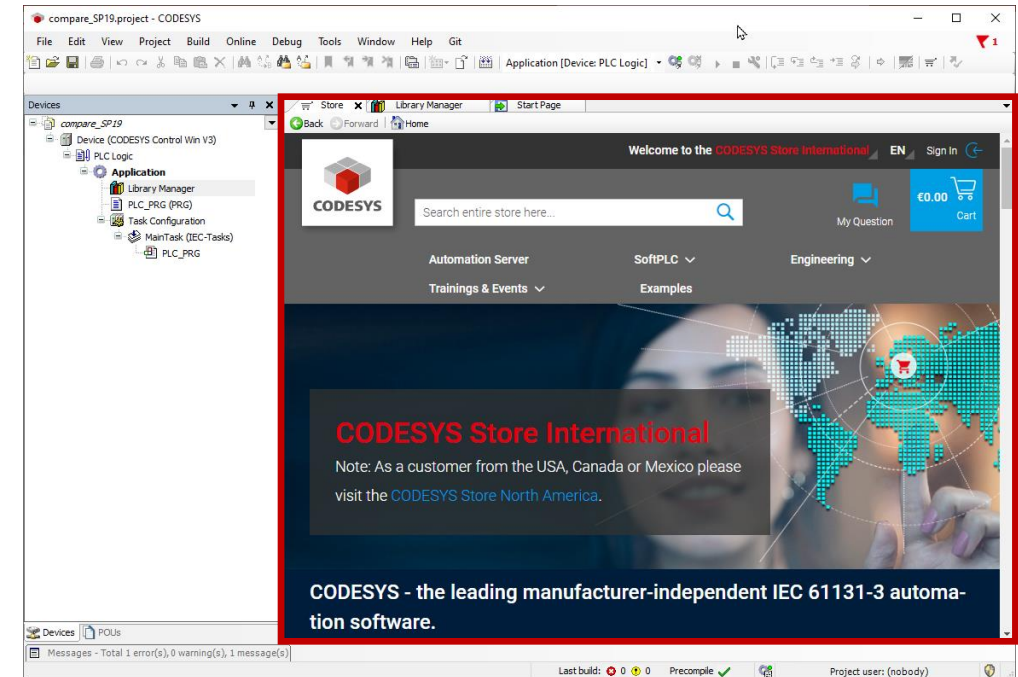
## Improved usability – Advanced Project Compare

- Compare window: additional 3<sup>rd</sup> window possible
  - Offers additional commands for more merge options
  - Possibility to edit the changes in text



## Improved Security – New Web View

- **MS WebView2 replaces Chromium Embedded Framework (CEF) for**
    - Start page
    - Library Manager
    - Integrated CODESYS Store
- ➔ **Self-updating component with recent Patches**
- ➔ **Reduced setup size (~50 MB)**





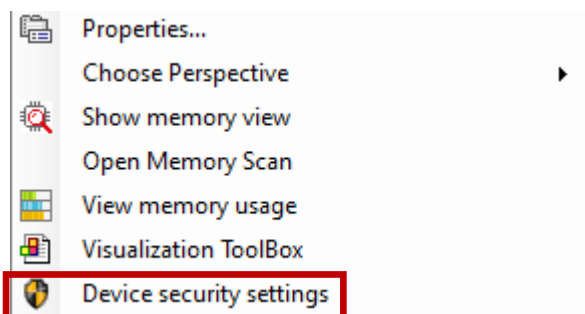
## Improved security – CODESYS Security Agent

### ■ Improved certificate handling

- Install multiple certificates in one go
- Allow for import / export of PKCS#12 containers
- Quick access to all security settings

### ■ Prerequisites:

- Installed add-on  
“CODESYS Security Agent”
- Added menu command  
“Device security settings”



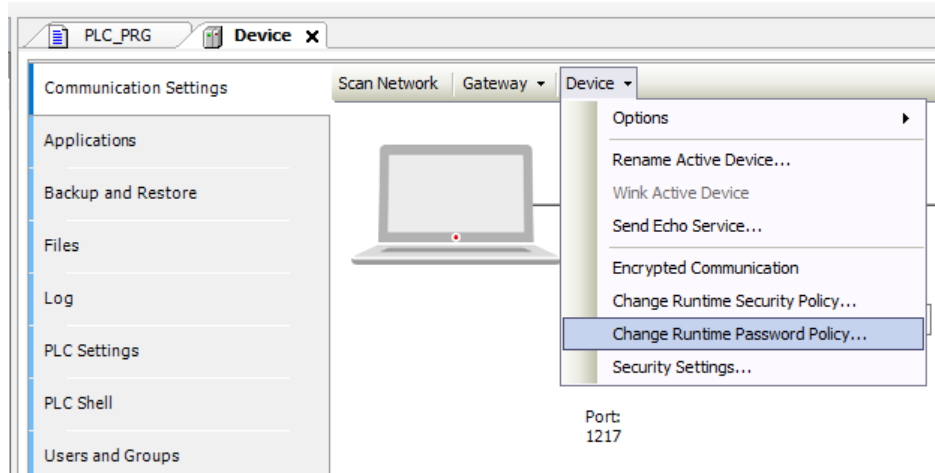
Device Security Settings

Setting	Value	Description
CommunicationPolicy	POLICY_AES128SHA256RSAOAE	Support for all policies beginning with Aes128Sha256RsaOaep (AES 128 with SHA256)
CommunicationMode	ALL	Add all available modes. No security, just signed, signed and encrypted
Activation	ACTIVATED	Activates the OPC UA Server. [Default]
UserAuthentication	ENABLED	Activates the user authentication for the OPC UA Server. [Default]
AllowUserPasswordOnPlaintext	NO	Forbids to transmit the password in a plaintext way.
ApplicationName	OPCUAServer@WAGNERONB	The application name of the OPC UA server. This will be used for the certificate and the ApplicationName fields of the OPC UA Server.
CompanyOrOrganizationName		The name of the organization running the OPC UA server. (If empty field is ignored)
City		Will fill up the city field of the OPC UA Server certificate. If empty the field won't be used.
State		Will fill up the state field of the OPC UA Server certificate. If empty the field won't be used.
Country		Will fill up the country field of the OPC UA Server certificate. If empty the field won't be used.
CmpOpenSSL		
DiffieHellmanParameter_Generate	ON_REQUEST	Create Diffie-Hellman parameters only on request
RSAMinKeyLen	2048	Minimal key length for RSA keys.
CmpUserMgr		
UserLogin_AuthenticationType	AUTO_NEGOTIATE	Negotiate authentication algorithm
UserLogin_RSASKeyLen	2048	RSA key length for asymmetric authentication algorithm
UserMgmtEnforce	YES	User management is enforced, i.e. no anonymous login possible (only for excluded components when UserMgmt.AllowAnonymous is set)
UserMgmtAllowAnonymous	NO	No anonymous login is allowed when user management is activated.
UserMgrEdit Timeout	300	Maximum time in [s] between subsequent services calls to edit the user management. If the time is expired the user has to authenticate again.
CmpApp		
EnforceSignedCode	NO: All applications will be loaded by	All applications will be loaded by the PLC.
CmpSecureChannel	YES: Enforce that only signed applications can be loaded by the PLC.	
CommunicationMode	NO: All applications will be loaded by the PLC.	
CreateSelfSignedCert	YES	Create a self-signed cert
CmpWeb Server		
CommunicationMode	HTTP, HTTPS	HTTP and HTTPS connections supported
CreateSelfSignedCert	NO	Don't create a self-signed cert

OK Cancel

## Improved security – Password policy settings

- Support of runtime feature: Configurable password policy



The 'Password Policy' dialog box is shown with the following settings:

- Password policy is active
- Password settings:
  - Minimum length: 8
  - Number of unique characters: 4
  - Requires lowercase letter:
  - Requires uppercase letter:
  - Requires digit:
  - Requires special character:
  - Must not contain username:
- Login lock is active
- Login lock settings:
  - Scope: ADMINS
  - Maximal Retries: 5
  - Timeout [s]: 3600

Buttons: OK, Cancel

- Immediate report of violations to security policy when adding a new user

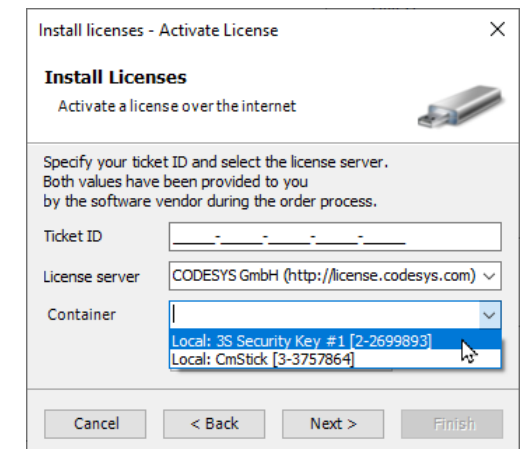
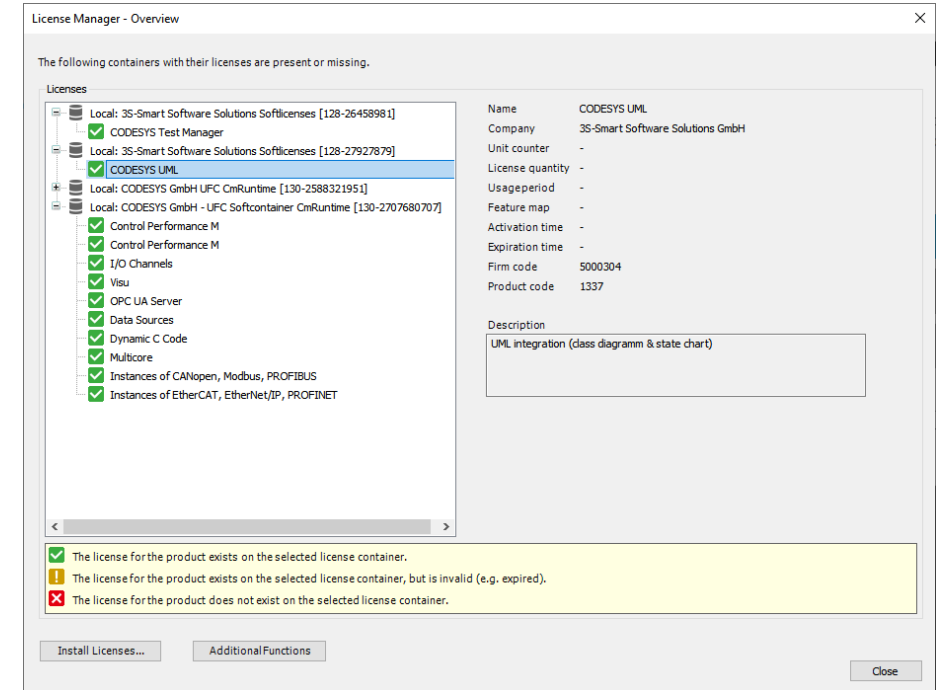
The 'Add User' dialog box is shown with the following fields and options:

- Name: Jane Doe
- Default group: <please select>
- Password: [password field]
- Confirm password: [password field]
- Password strength: Very weak
- Password can be changed by user
- Password must be changed at first login
- Password policy:
  - Zero-length passwords are not allowed.
  - The password must have a length of at least 8 characters.
  - The password must consist of at least 4 different characters.
  - The password must contain lowercase letters.
  - The password must contain uppercase letters.
  - The password must contain digits.
  - The password must contain special characters.

Buttons: OK, Cancel

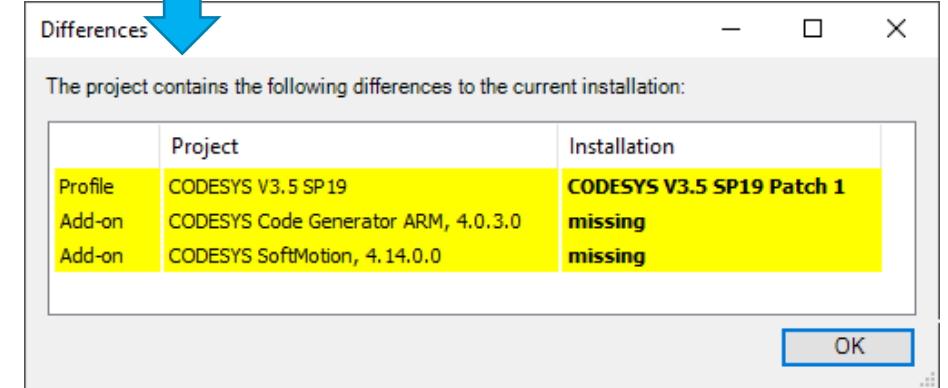
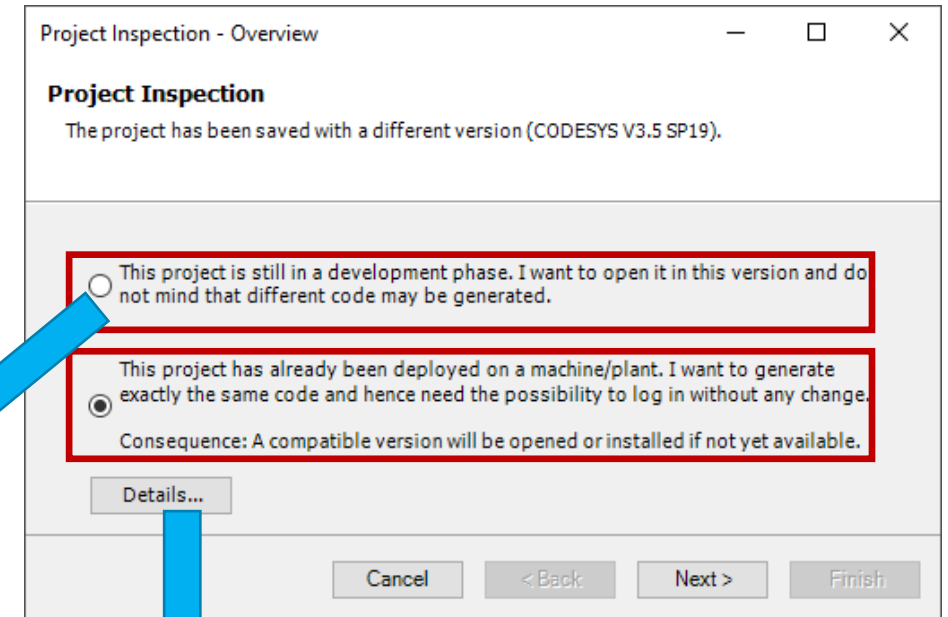
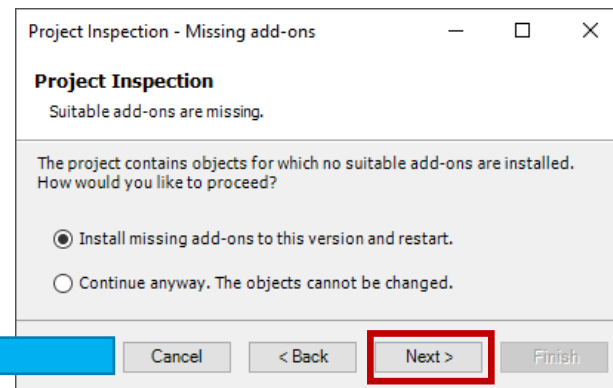
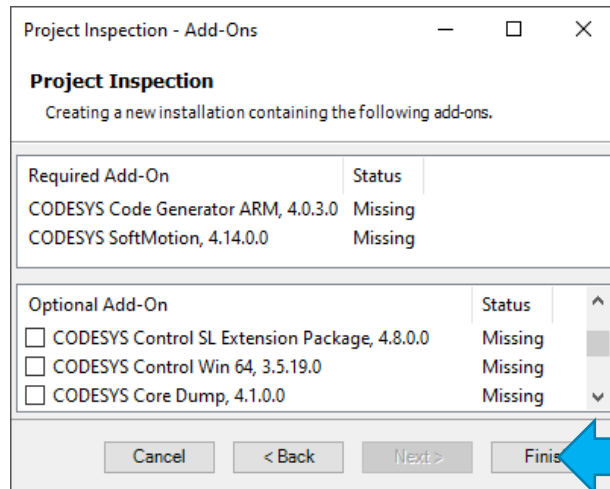
## Improved License Manager

- List of all available containers
- Container selection within license activation workflow
- Automatic container preselection for activation



## Improved Project Inspection

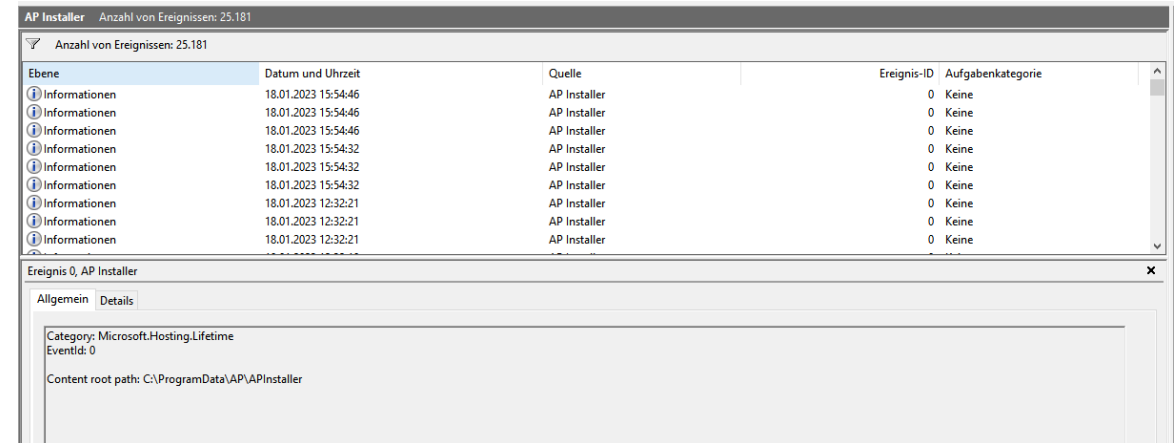
- **Use-case-oriented instead problem-oriented**
- **Project provides complete data**
  - No internet connection required for analysis
  - Faster analysis
  - Compare view
  - For projects saved with SP19 and later





## Improved Installer

- Customization possible
- Multi-selection of add-ons
- Logging into MS Windows event view
- Localization (German / English)
- Updated framework to .Net6
- Reduced administrative rights



The screenshot shows the Windows Event Viewer window for 'AP Installer' with 25,181 events. The main pane displays a table of events with columns for 'Ebene', 'Datum und Uhrzeit', 'Quelle', 'Ereignis-ID', and 'Aufgabenkategorie'. Below the table, the details pane for a selected event shows the category 'Microsoft.Hosting.Lifetime' and the content root path 'C:\ProgramData\AP\APInstaller'.

Ebene	Datum und Uhrzeit	Quelle	Ereignis-ID	Aufgabenkategorie
Informationen	18.01.2023 15:54:46	AP Installer	0	Keine
Informationen	18.01.2023 15:54:46	AP Installer	0	Keine
Informationen	18.01.2023 15:54:46	AP Installer	0	Keine
Informationen	18.01.2023 15:54:32	AP Installer	0	Keine
Informationen	18.01.2023 15:54:32	AP Installer	0	Keine
Informationen	18.01.2023 15:54:32	AP Installer	0	Keine
Informationen	18.01.2023 12:32:21	AP Installer	0	Keine
Informationen	18.01.2023 12:32:21	AP Installer	0	Keine
Informationen	18.01.2023 12:32:21	AP Installer	0	Keine

Ereignis 0, AP Installer

Allgemein Details

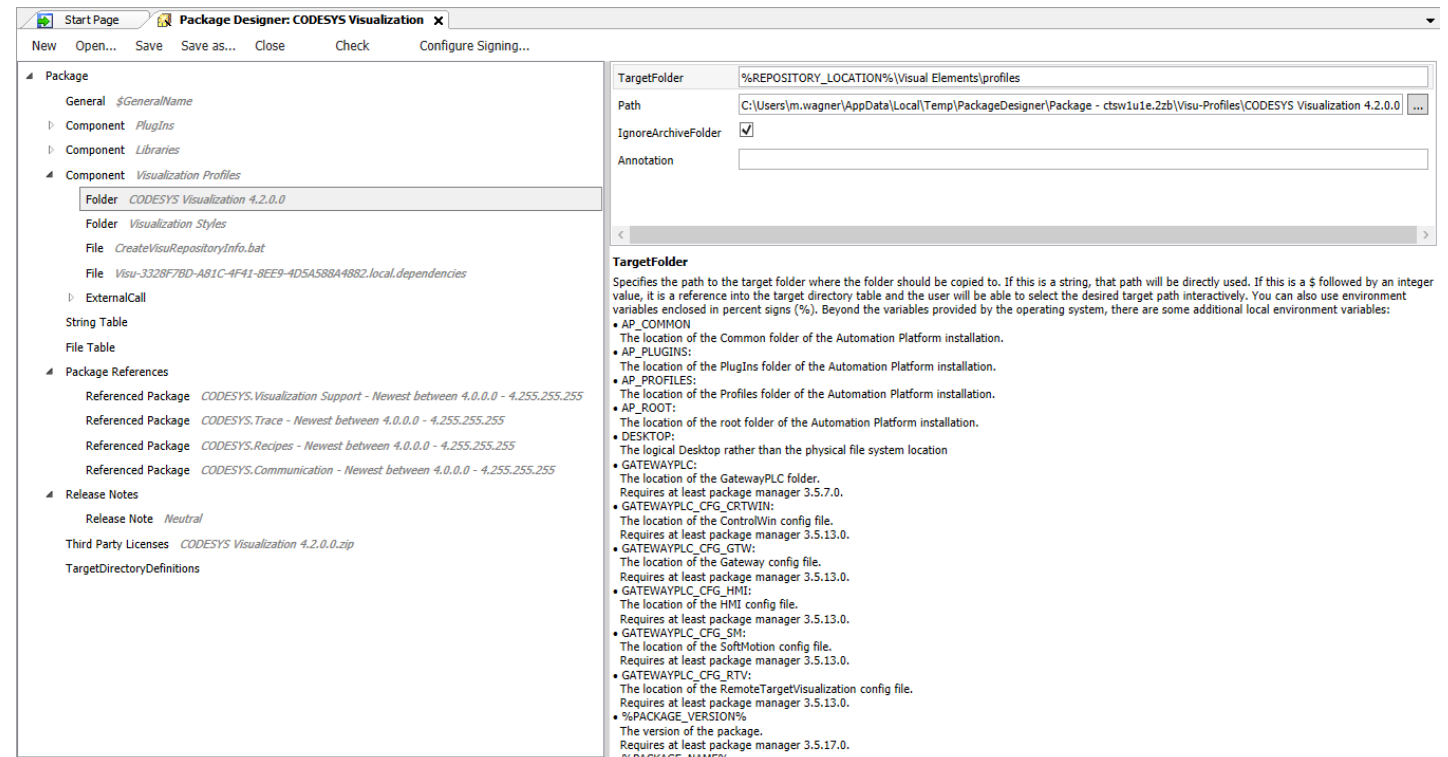
Category: Microsoft.Hosting.Lifetime  
EventId: 0  
Content root path: C:\ProgramData\AP\APInstaller

## Improved Installer

- **Project handling on double click**
- **Reduced administrative rights**

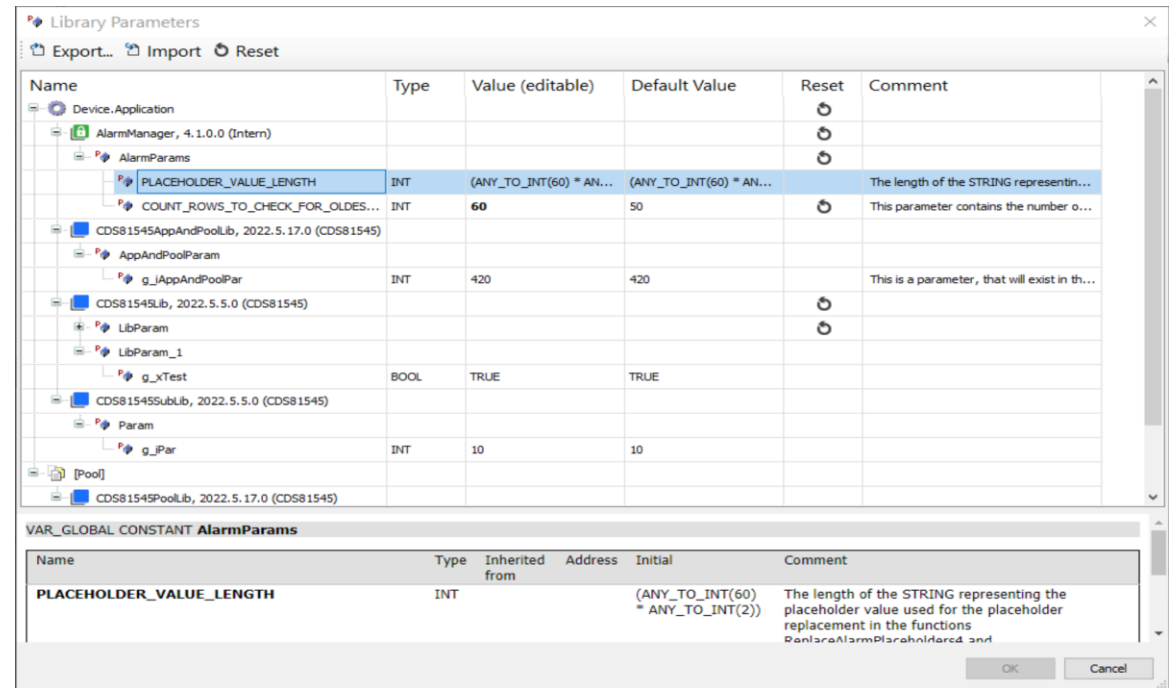
## New Package Designer

- Packages for CODESYS V3.5 SP17 and higher
- Properties:
  - Common functions available
  - New features
  - Package references
  - Signing
  - Release notes



## Reworked Library Parameter List

- New editor with export / import / reset
- Re-enabled addition of parameter list object to libraries
- Central edit of all parameters of all libraries in one Library Manager





## Partial access to bitfields

- Feature of 61131-3 3<sup>rd</sup> edition
- Similar to bit access „x.1“
- Use of % like for direct addresses
- Available for bitfield variables (BYTE, WORD, DWORD, LWORD)
- Examples:
  - variable.%B0
  - variable.%W1
  - variable.%D2
  - variable.%L0
  - variable.%X11

Device.Application.PLC_PRG		
Expression	Type	Value
byVar1	BYTE	16#F1
byVar2	BYTE	16#88
wVar1	WORD	16#88F1

1	●	byVar1	16#F1	:=wVar1.	%B0	16#F1	;
2	●	byVar2	16#88	:=wVar1.	%B1	16#88	;

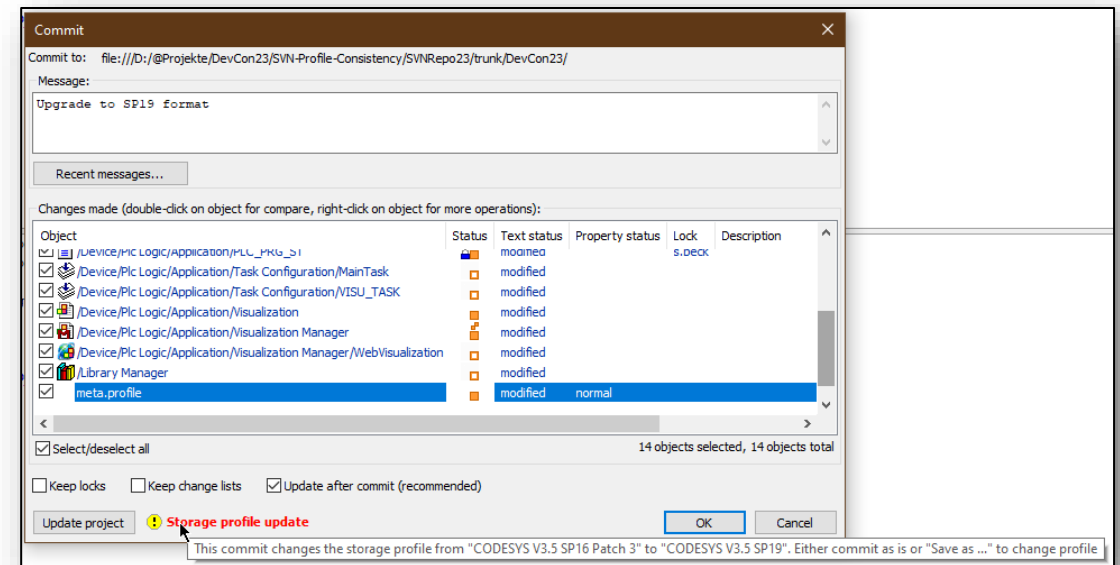
## Improvements of the Professional Developer Edition

### ■ CODESYS SVN

- Improved project profile consistency
  - Tool support for consistent storage format among different CODESYS versions
  - No operations possible in case the repository storage format is inconsistent

### ■ Good to know

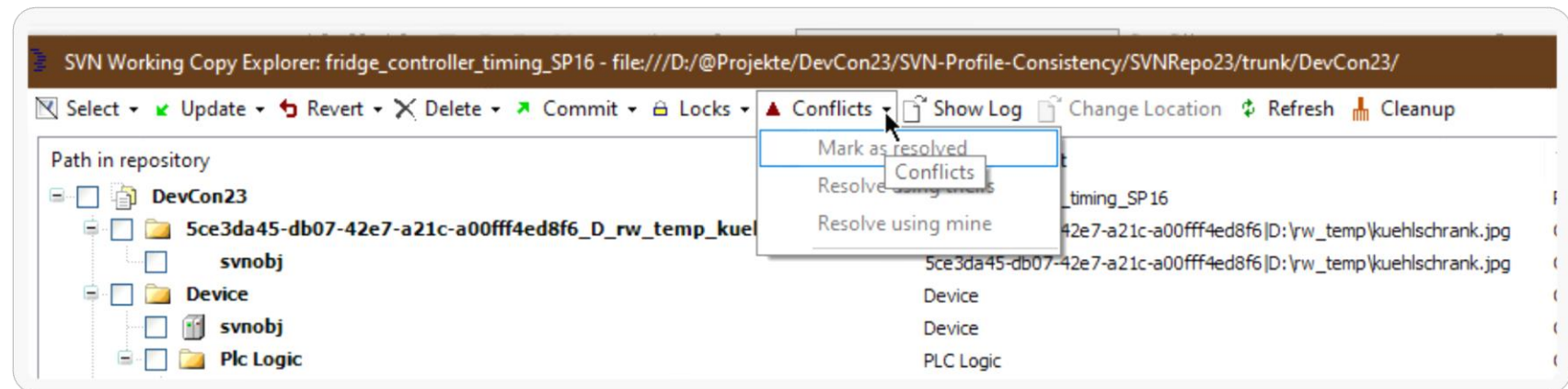
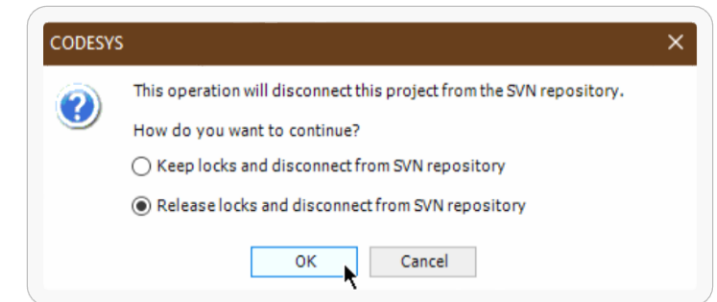
- „meta.profile“:  
Repository storage profile contained – mandatory for profile change commits
- „Save as“:  
The way to change the storage profile of a project explicitly
- „Project information“:  
Shows the current project storage profile



## Improvements of the Professional Developer Edition

### ■ CODESYS SVN

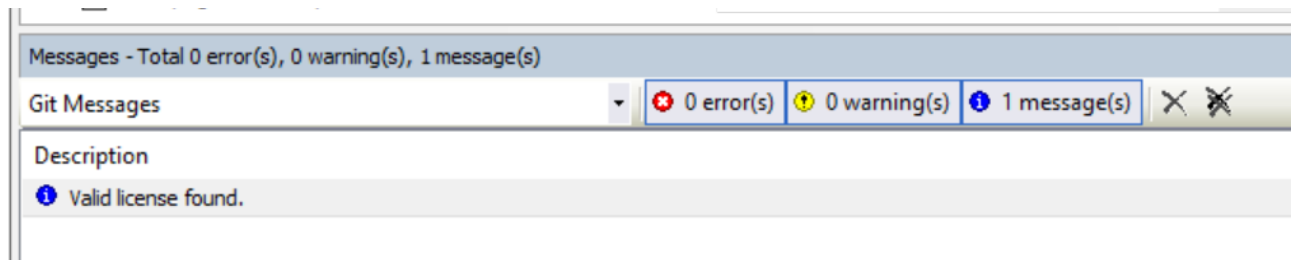
- „Disconnect from repository“ now releases locks
  - Disconnect / reconnect:  
Common quick fix for SVN-related problems
- Better control over tree conflicts
  - Concurrent deletion now resolvable
  - „SVN Working Copy Explorer“: to resolve tree conflicts



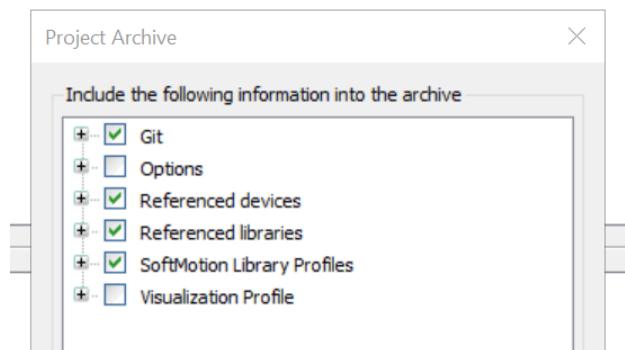
## Improvements of the Professional Developer Edition

### ■ CODESYS Git

- License information



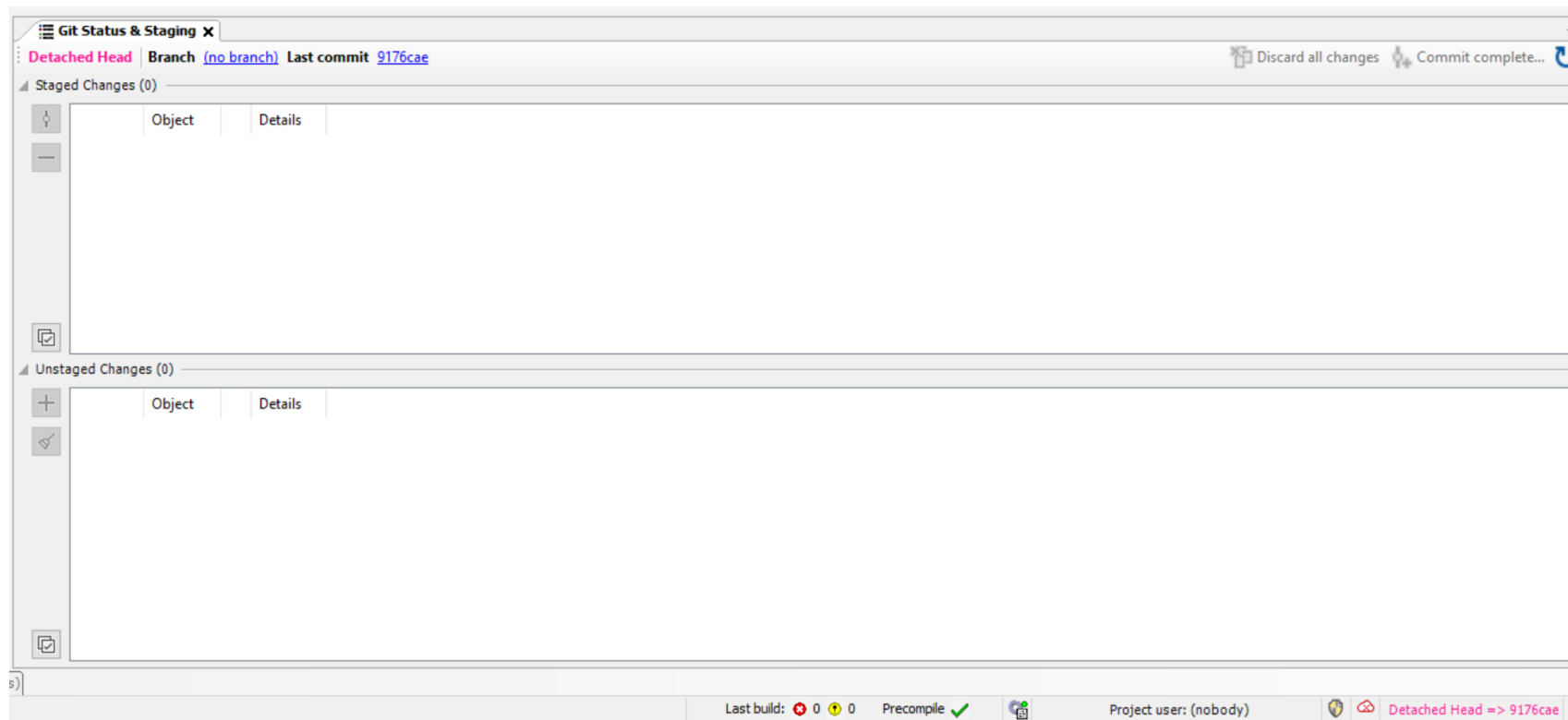
- Handling of Git repository in the CODESYS Project Archive





## Improvements of the Professional Developer Edition

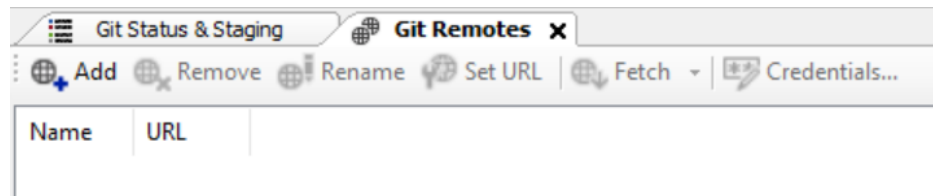
- **CODESYS Git**
  - Support of “Detached Head”



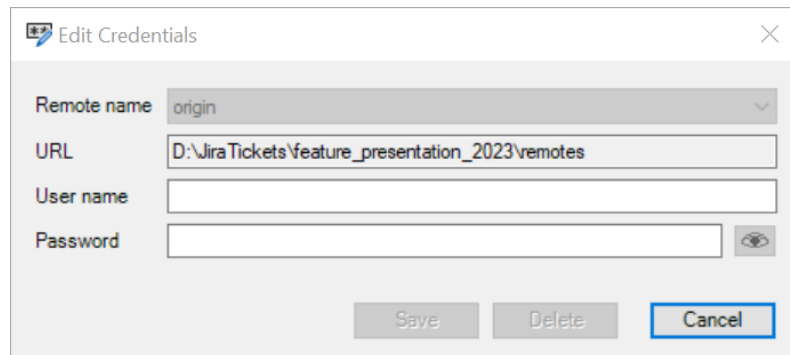
## Improvements of the Professional Developer Edition

### ■ CODESYS Git

- Remote commands disabled in case of no remote repository



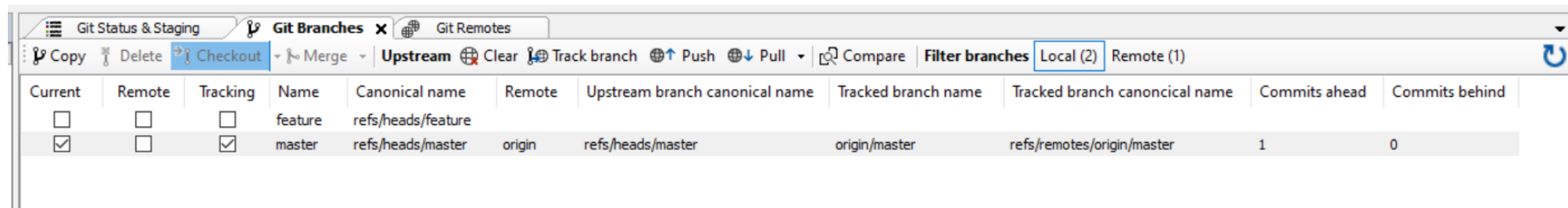
- Improved credential handling
  - Editing credentials of remote repositories inside CODESYS



## Improvements of the Professional Developer Edition

### ■ CODESYS Git

- Display of number of differences of commits in the Git Branches view :
  - Between tracking branch and tracked remote branch

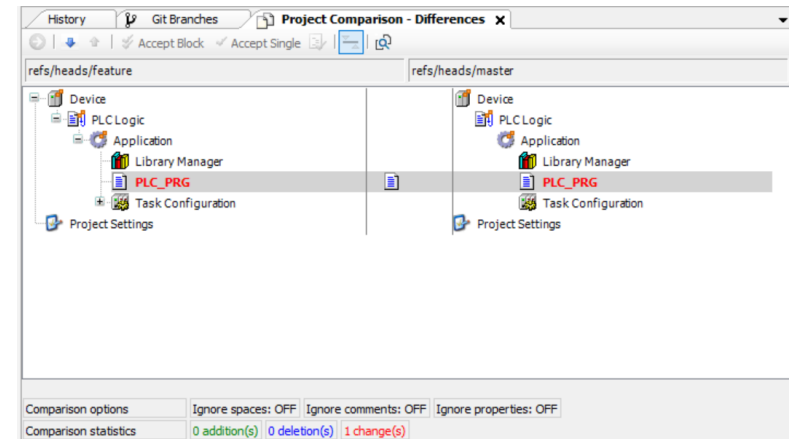
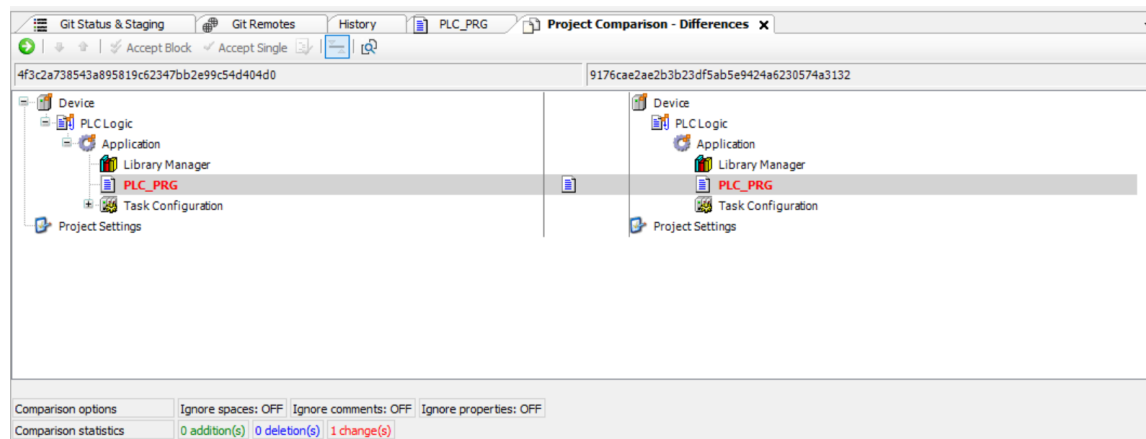


Current	Remote	Tracking	Name	Canonical name	Remote	Upstream branch canonical name	Tracked branch name	Tracked branch canonical name	Commits ahead	Commits behind
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	feature	refs/heads/feature						
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	master	refs/heads/master	origin	refs/heads/master	origin/master	refs/remotes/origin/master	1	0

## Improvements of the Professional Developer Edition

### ■ CODESYS Git

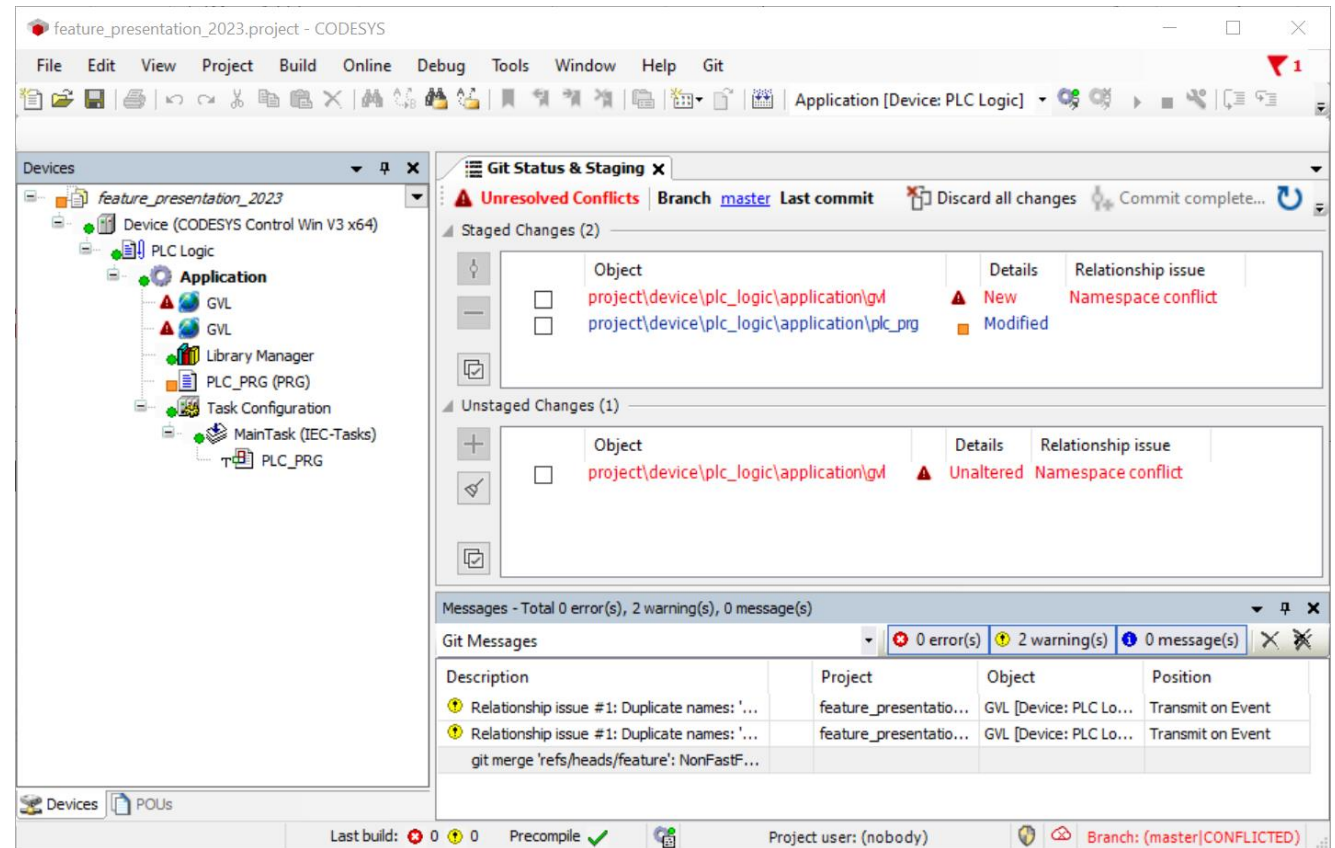
- Compare two commits in the Git History view



- Compare two branches in the Git Branches view

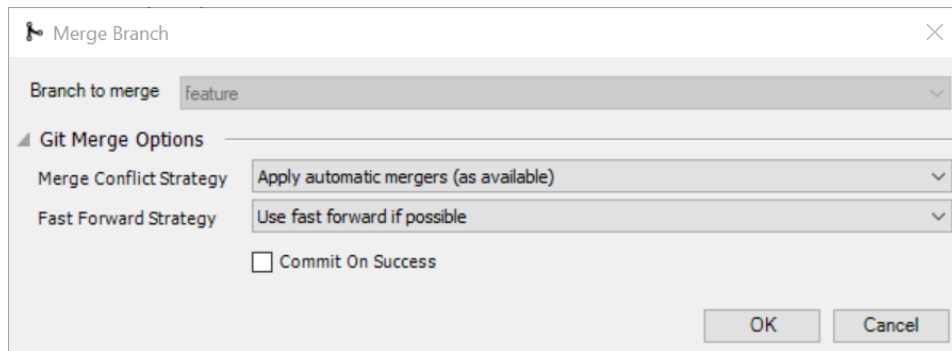
## Improvements of the Professional Developer Edition

- **CODESYS Git**
  - Merge: Handling „Relationship Issues“



## Improvements of the Professional Developer Edition

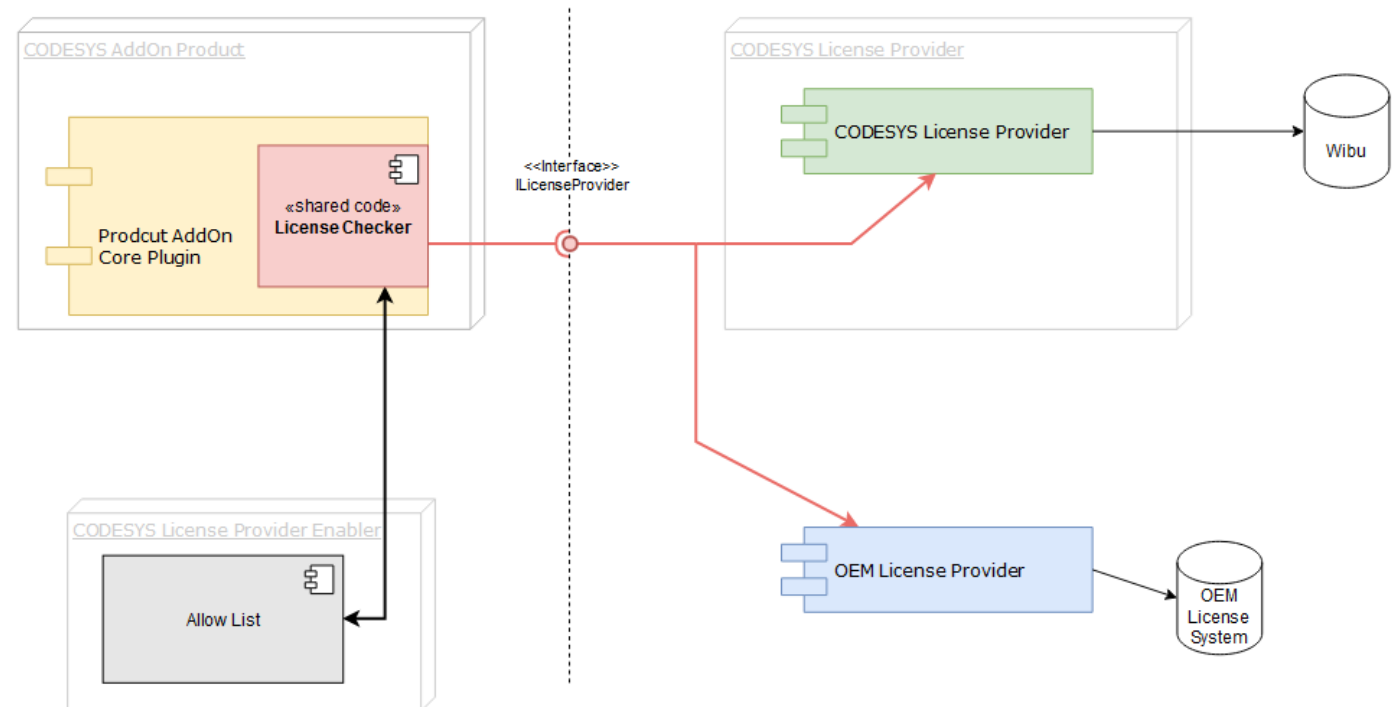
- **CODESYS Git**
  - Merging: With usual Git merge options (same for Git Pull)



- „Automatic Mergers“ supported if available

## Improvements of the Professional Developer Edition

- **Exchangeable licensing system for add-ons (will be released with 3.5.19.3)**
  - “License Provider”
    - Provision of a valid license from OEM or WIBU licensing system
    - Enabling by CODESYS necessary

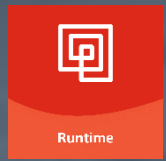




## Update of IIoT Libraries SL

- **Simple Network Management Protocol (SNMP):**
  - Internet Standard protocol for collecting /organizing information about managed devices in IP networks
  - Often used by IT departments to monitor device states
- **New: Support of SNMP V3**
- **Advantages:**
  - User management
  - Strong authentication
  - Data encryption
- **New feature of SNMP V3**
  - Support of SET command in SNMP Agent





# CODESYS RUNTIME

# CODESYS SAFETY

## Overview

- **Improvements in Device User Management**
- **Support of App-based Licenses**
- **UFC support**
- **Further general improvements**
- **Support of new platforms**
- **Virtual PLC**
- **CODESYS Mass Licenser**
- **CODESYS Safety SIL2 PSP AURIX TC3**
- **J1939 Safety**

## Improvements in Device User Management

- Password policy:
  - Configurable password strength
  - Configurable user lock after invalid authentication  
Scopes: ADMINS | NONADMINS | ALL
  - Configurable password expiration
  - See [“Password Policy Settings” \(Engineering\)](#) for further information

Setting	Value	Description
Device Security Settings		
<ul style="list-style-type: none"> <li>CmpOPCUAServer</li> <li>CmpOpenSSL</li> <li>CmpUserMgr               <ul style="list-style-type: none"> <li>UserLogin_AuthenticationType: AUTO_NEGOTIATE (Negotiate authentication algorithm)</li> <li>UserLogin_RSAKeyLen: 2048 (RSA key length for asymmetric authentication algorithm)</li> <li>UserMgrEnforce: YES (User management is enforced, i.e. no anonymous login possible (only for excluded components when UserMgrAllowAnonymous is set))</li> <li>UserMgrAllowAnonymous: NO (No anonymous login is allowed when user management is activated.)</li> <li>UserMgrEditTimeout: 300 (Maximum time in [s] between subsequent services calls to edit the user management. If the time is expired the user has to authenticate again.)</li> <li>UserMgr.PasswordPolicy: DISABLED (User management password policy is disabled)</li> <li>UserMgr.PasswordPolicy.Length: 8 (Minimum length)</li> <li>UserMgr.PasswordPolicy.UniqueCharacters: 4 (Minimum number of unique characters)</li> <li>UserMgr.PasswordPolicy.Characters.Lowercase: YES (User management passwords have to contain lowercase letters.)</li> <li>UserMgr.PasswordPolicy.Characters.Uppercase: YES (User management passwords have to contain uppercase letters.)</li> <li>UserMgr.PasswordPolicy.Characters.Digits: YES (User management passwords have to contain digits.)</li> <li>UserMgr.PasswordPolicy.Characters.Special: YES (User management passwords have to contain special characters.)</li> <li>UserMgr.PasswordPolicy.Characters.NoUsername: YES (User management passwords must not contain the username.)</li> <li>UserLogin.Lock: ENABLED (User login lock enabled.)</li> <li>UserLogin.Lock.Scope: ADMINS (User login lock scope for admins.)</li> <li>UserLogin.Lock.MaxRetries: 5 (After how many tries of invalid credentials the login user is locked)</li> <li>UserLogin.Lock.Timeout.Sec: 3600 (After how many seconds a locked user is released)</li> <li><b>Password.Expiration: DISABLED (Check password expiration disabled.)</b></li> <li><b>Password.Expiration.Scope: ADMINS (Password expiration scope for admins.)</b></li> <li><b>Password.Expiration.Timeout.Days: 100 (After how many days a new password is required [1..1000])</b></li> </ul> </li> <li>CmpApp</li> <li>CmpSecureChannel</li> <li>CmpWebServer</li> </ul>		

Change Runtime Password Policy

Password policy is active

Password settings

Minimum length: 8

Number of unique characters: 4

Requires lowercase letter:

Requires uppercase letter:

Requires digit:

Requires special character:

Must not contain username:

Login lock is active

Login lock settings

Scope: ADMINS

Maximal Retries: 5

Timeout [s]: 3600

OK Cancel

# Improvements in Device User Management

- Group management:
  - Restricted administrator groups:  
*Example: Administrator-Operator*



A screenshot of the 'UserManagement' interface. On the left, a tree view shows 'Groups' expanded to 'Administrator-Operator'. On the right, a table shows permissions for various groups. The 'Administrator-Op...' row is highlighted.

	Add/Remove	Modify	View
Administrator		+	+
Administrator-Op...		=	=
Developer		=	=
Operator		=	=
Service		=	=
Watch		=	=

A screenshot of the 'UserManagement' interface. On the left, a tree view shows 'Groups' expanded to 'Operator'. On the right, a table shows permissions for various groups. The 'Operator' row is highlighted.

	Add/Remove	Modify	View
Administrator		+	+
Administrator-Op...		=	=
Developer		=	=
Operator		+	+
Service		=	=
Watch		=	=

A screenshot of the 'UserManagement' interface. On the left, a tree view shows 'Groups' expanded to 'Administrator-Operator'. On the right, a table shows permissions for various groups. The 'Administrator-Op...' row is highlighted.

	Add/Remove	Modify	View
Administrator		+	+
Administrator-Op...		+	+
Developer		=	=
Operator		=	=
Service		=	=
Watch		=	=

## Support of App-based Licenses (as of SP19 Patch 1)

- Licenses dependent on the usage in IEC applications

500 KB 64 IO	1 MB 128 IO	3 MB 256 IO	3 MB 256 IO	5 MB 1.024 IO	6 MB 2.048 IO	8 MB 4.096 IO	10 MB 8.192 IO
<b>Basic S</b>	<b>Basic M</b>	<b>Basic L</b>	<b>Standard S</b>	<b>Standard M</b>	<b>Standard L</b>	<b>Performance M</b>	<b>Performance L</b>
	2xCANopen/ Modbus	2xCANopen/ Modbus/Profibus	4xCANopen/ Modbus/Profibus 1xECAT/EIP/PN Dynamic C Code	4xCANopen/ Modbus/Profibus 1xECAT/EIP/PN Dynamic C Code	4xCANopen/ Modbus/Profibus 2xECAT/EIP/PN Dynamic C Code MultiCore (4 Cores)	4xCANopen/ Modbus/Profibus 2xECAT/EIP/PN Dynamic C Code MultiCore (4 Cores)	4xCANopen/ Modbus/Profibus 4xECAT/EIP/PN Dynamic C Code MultiCore (4 Cores)

- License values are determined by CODESYS and the associated Plug-ins

## Support of App-based Licenses (as of SP19 Patch 1)

- Investigate license values *before* download:  
Device dialog „Licensed Software Metrics“:

Read current metrics from device

Metric	Value in Project	Max. allowed by License	Value on Device
<b>Size of User Code</b>	<b>12.528 Byte</b>	<b>3.145.728 Byte</b>	<b>12.528 Byte</b>
App2	n/a		
Application	12.528 Byte		12.528 Byte
<b>Communication</b>			
<b>Number of OPC UA tags</b>	<b>11</b>	<b>unlimited</b>	<b>0</b>
Application	11		
Symbol Configuration	11		
App2	0		
<b>Variables used in visualizations</b>	<b>1 Variables</b>	<b>not yet supported</b>	<b>not yet supported</b>
App2	n/a		not yet supported
Application	1 Variables		not yet supported
<b>Fieldbus</b>			
<b>IO Channels</b>	<b>1 Channel(s)</b>	<b>512 Channel(s)</b>	<b>1 Channel(s)</b>
Application	1 Channel(s)		1 Channel(s)
<b>Instances of EtherCAT, EtherNet/IP, PROFIN...</b>	<b>1 Instance(s)</b>	<b>1 Instance(s)</b>	<b>1 Instance(s)</b>

- Investigate license values *at* download of an application:
  - Download/Online Change: Is denied if a value exceeds the license!
  - Loading boot project: Is denied if a value exceeds the license!



## UFC Support

- **CodeMeter® UFC (Universal Firm Code) container:**
  - One new CODESYS firm code for all containers: CmAct and CmDongle
  - UFC Firm code = 6000437
- **UFC support:**
  - CmAct: Runtime installer / Runtime system creates UFC container by default if not available
  - CmDongle: 3-xxx dongles required (UFC not supported on 2-xxx dongles!)
- **Available on runtime systems:**
  - CODESYS Control Win SL
  - CODESYS Control Linux SL → next release
  - CODESYS Control RTE SL: not supported in SP19
  - On all targets of device manufacturers with CodeMeter® feature
- **App-based Licenses exclusively installable on UFC containers!**

## Further improvements

- **IEC-application RUN/STOP transition improved:**
  - Three exactly specified phases for handling IEC tasks and reset IOs:
    - Phase1: Wait max. 10s for all IEC tasks to execute their RUN/STOP cycle
      - Tasks with referenced I/Os: Watchdog error after 10s if no reaction
      - Tasks without referenced I/Os: Can keep running until the end of phase 3
    - **Phase2: Reset/Init outputs => Safe state of the machine**
    - Phase3: Wait max. 25s for all tasks without referenced I/Os for their RUN/STOP cycle
      - Watchdog error at the end if no reaction
  - Timeouts for phase 1 and 3 can be configured via settings
  - New logfilter to instrument RUN/STOP transition:

```
[CmpLog]
;--Component specific logger filters:--
CmpApp.Filter=0xFFFFFFFF
CmpIecTask.Filter=0xFFFFFFFF
CmpSchedule.Filter=0xFFFFFFFF           ;OPTIONAL
```

## Further improvements

- **New SysSocket interface function: SysSockRecvMsg():**
  - Detection of unicast and broadcast UDP messages
  - Details see documentation in SysSocketIrf.h
- **CODESYS Control Win - SysEthernet:**
  - WinPcap:
    - Integration in Control Win::SysEthernetWin32
    - **WinPcap out of maintenance!**
    - Usage: Ethernet-based fieldbuses
  - Porting from WinPcap => Npcap
    - Npcap: already included in wireshark network analyzer
    - Comparison Npcap vs. WinPcap: <https://npcap.com/vs-winpcap.html>

The screenshot shows the Npcap website with a navigation menu (Docs, Download, Licensing, Windows 11, WinPcap) and a search bar. The main heading is "Npcap or WinPcap?". Below this, there is a paragraph explaining that WinPcap is no longer supported and Npcap is the recommended update. A comparison table follows, detailing the maintenance status, release dates, versions, and licenses of both tools.

Info	Npcap	WinPcap
Actively maintained and supported	Yes	No (Note)
Last release date	March 30, 2023	March 8, 2013
<a href="#">libpcap</a> version	1.10.3 (2023)	1.0.0 (2008)
License	<a href="#">Free for personal use</a>	<a href="#">BSD-style</a>

## Runtime Toolkit support for new platforms

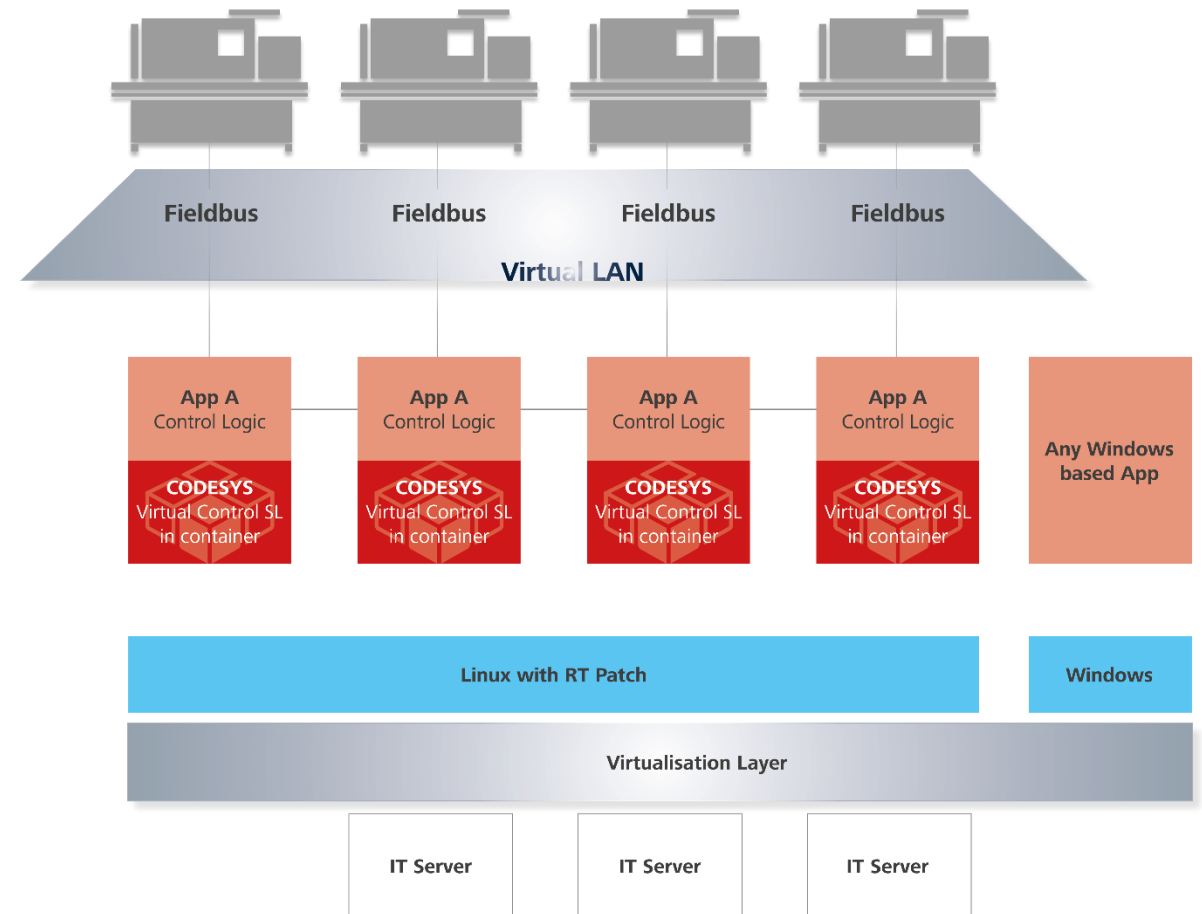
- **Support of DragonCore (Loongson) platform**
  - Integrated compiler
  - Support of add-on functions, e.g.
    - Fieldbus, e.g., EtherCAT, PROFINET, EtherNet/IP
    - Visualization, e.g., WebVisu, TargetVisu
    - Motion / CNC / Robotics
  
- **Support of VxWorks/ARM64 platform**
  - All known CODESYS features



WINDRV

## Virtual PLC: CODESYS Virtual Control SL

- Hyperconverged infrastructure (HCI)
- Seamless integration IT and OT
- Micro-service approach
- Secure by design
- Pay-per-use



## Virtual PLC: CODESYS Virtual Control SL

- **CODESYS Control SL in a container**
- **Use of network licenses**
- **Business model**
  - Application-based
  - Time-based
- **Handling / management with CODESYS Automation Server On Premises (pending)**

## CODESYS Mass Licenser: Automatic licensing of devices

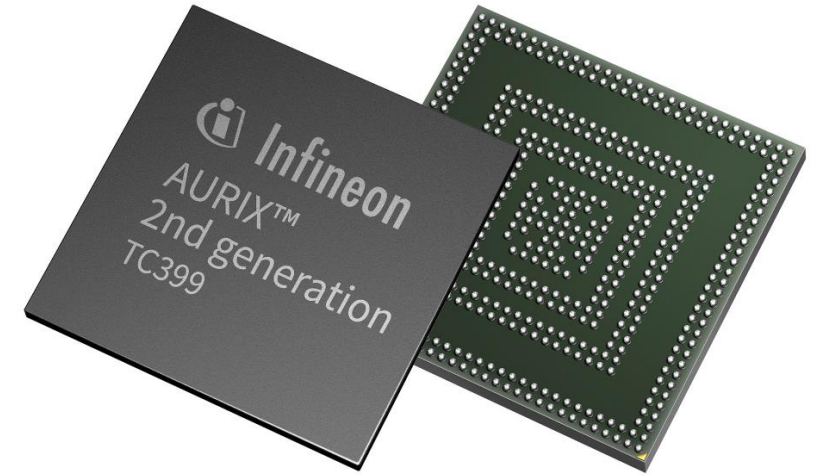
- Auto-connect to devices
- Device identity check
- Automatic license download, activation, and validation
- Extensive and comprehensive licensing reports

```
CODESYSMassLicenser 03.01.2023 09:39:02
WARNING: only 5 license(s) remaining in C:\Users\l.zickl\AppData\Roaming\CODESYS CML\licenses\CML_TestA_LicenseA.txt
PLC Name      DeviceId  SN              Status          Online  Step/total
*****
CODESYSControl-4  32833    RTS-00000000ec86d893  Done            True    2/2
CODESYSControl-6  32833    RTS-00000000753d8f46  Done            True    2/2
CODESYSControl-1  32833    RTS-000000003fe15b9d  Done            True    2/2
CODESYSControl-2  32833    RTS-00000000a8a838c2  ConnectingToPLC  True    1/2
CODESYSControl-7  32833    RTS-0000000069a4d874  WaitingInQueue  True    1/2
CODESYSControl-3  32833    RTS-00000000525dfa8a  WaitingInQueue  True    1/2
CODESYSControl-5  32833    RTS-00000000c411b29e  WaitingInQueue  True    1/2
CODESYSControl-0  32833    RTS-0000000000425caa  WaitingInQueue  True    1/2
_
```



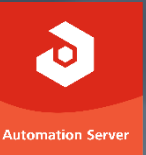
## Platform Support Package - Infineon AURIX TC39x

- **AURIX TC39x**
  - 6x TriCore™ at 300 MHz (with 4 lockstep cores)
  - 16 MB flash/ ECC protection
  - Up to 6.9 MB SRAM/ ECC protection
  - Built-in HW self tests
- **Pre-certified CODESYS Safety SIL2 adaptation**
  - Platform adaptation
  - Integration manuals
  - Integration tests
- **Customer-specific integration**
  - flexible PSP interface
  - Custom IO drivers
  - Custom components



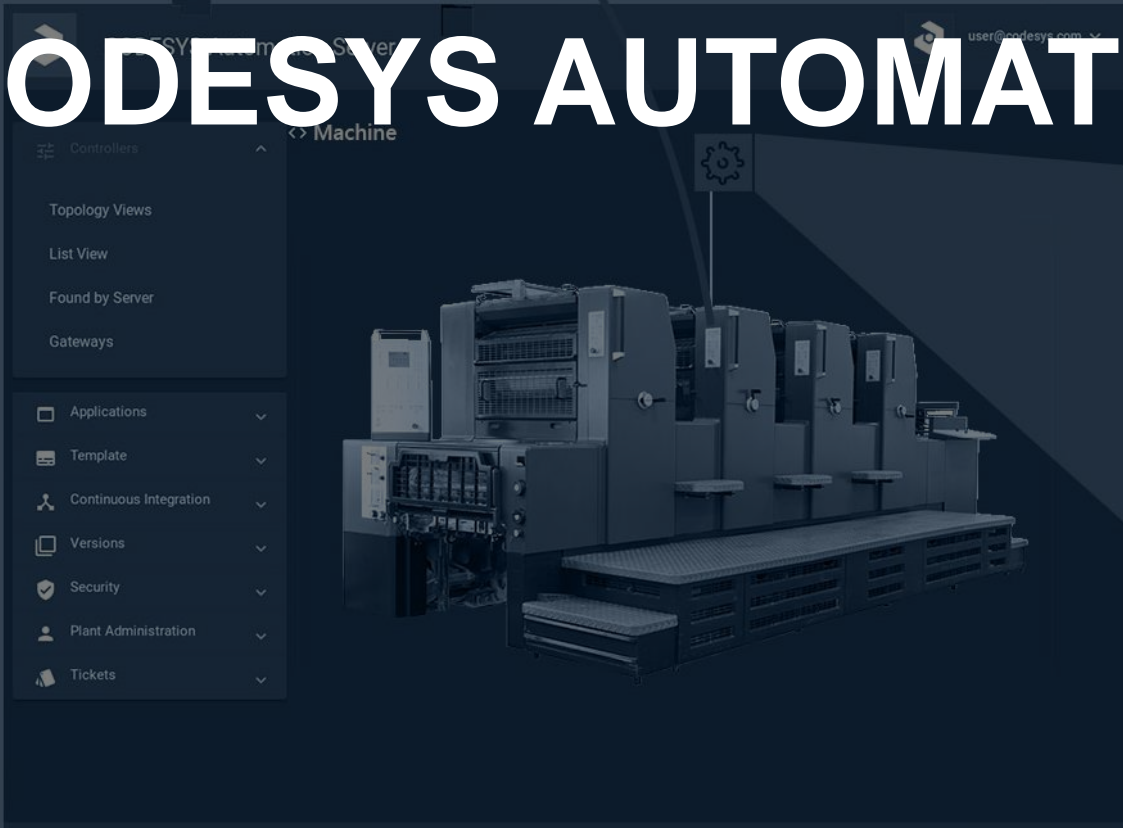
## J1939 Safety Library for CODESYS Safety SIL2

- **Certified in combination with CODESYS Safety SIL2**
  - Implementation of the SAE J1939 Safety specification
  - Assessment
  - Specification
  - Manuals (user and integration manual)
  - Unit tests
- **Library**
  - Part of the **CODESYS SAE J1939** package
  - Library interface without CODESYS configurator
    - J1939 Safety
    - J1939 Safety Std
    - J1939 Safety Itf
  - Separated from standard SAE J1939 fieldbus



# CODESYS AUTOMATION SERVER

# CODESYS AUTOMATION SERVER





CODESYS Automation Server

1.24.0 – 1.29.0



## Overview

### ▪ **Functional and frontend developments**

- 1.24.0 Replace PLC without ticket | E-mail address validation | Disabled network scan for offline Edge Gateways | Re-scan for PLCs | Move PLC to new/updated Edge Gateway
- 1.25.0 Force MFA | Extended multi-edit | Configurable password policy
- 1.26.0 Activate device user management | Support secure WebVisu | Multi-app information | Display of licenses | Synchronize applications warning
- 1.27.0 Application update scheduler | Configurable in-app messages | “Password lost” guide
- 1.29.0 Updates highlighting & visibility | Set default user language | Access notification

### ▪ **Backend and infrastructure developments**

- On-premises | EaaS Manager | Edge Communication rework | CML support

### ▪ **Planned developments and activities**

- LDAP support | Deployment log | Enhanced licensing | Encrypted communication | Certificate handling | Virtual Control synergies | Topology view 2.0 | Security audit

## Replace PLC without ticket (1.24.0)

### Requirement

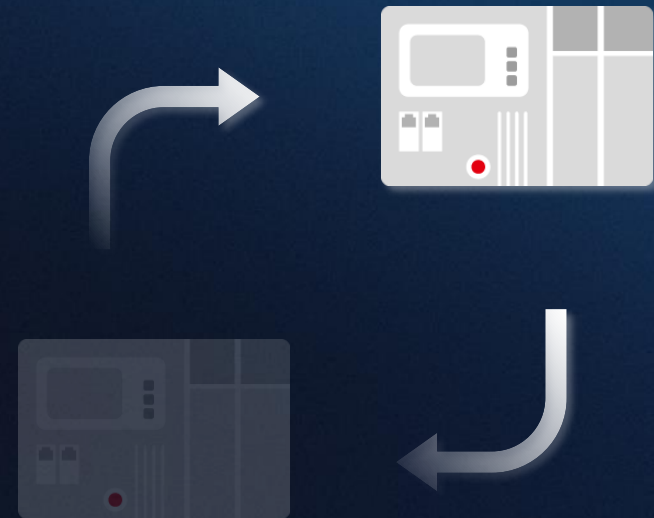
- A PLC needs to be replaced with a spare device.

### Solution

- Already possible: replacement ticket
- New: scan for a replacement device

### Benefit

- Very simple - just a few clicks
- Very fast - takes only a few seconds
- Everything is automatically taken over - applications and all other settings.
- The CODESYS Development System is not required to commission new controller.



The screenshot displays the CODESYS Automation Server interface. On the left, a sidebar contains navigation options: PLCs, Topology Views, List View, Network Scan, Gateways, Applications, Licenses, Template, and Tickets. The main area shows 'List View / PLC Details: Testrack\_1\_PLC'. A 'Debug mode' toggle is visible with a red exclamation mark icon. A 'Replace PLC' dialog box is open, showing a table of available PLCs. A red circle '1.' highlights the 'Scan for Replacement' button in the bottom left, and a red circle '2.' highlights the 'Replace PLC' button in the dialog. The table lists PLCs with columns for Name, Gateway, Device, Vendor Name, Version, and Serial Number.

Name ↑	Gateway	Device	Vendor	Version	Serial Number
<input type="checkbox"/> DECKERMNBnew	Edge_MDe_local_3.5.18.0	Vendor 3S - Smart Software Solutions GmbH Name CODESYS Control Win V3 x64	3S - Smart Software Solutions GmbH	3.5.18.0	00978600-83968B3A-536C5887-16D2FB35
<input type="checkbox"/> Office_PLC1	Office_Edge_02OG	Vendor 3S - Smart Software Solutions GmbH Name CODESYS Control Win V3 x64	3S - Smart Software Solutions GmbH	3.5.18.0	60681389-15A45f9L-36HU9S49-12834K5TZ
<input type="checkbox"/> JohnDevice	Gateway@home	Vendor 3S - Smart Software Solutions GmbH Name CODESYS Control Win V3 x64	3S - Smart Software Solutions GmbH	3.5.18.0	10831389-15P95f9L-16HU9ST8-92834KU77
<input checked="" type="checkbox"/> SparePLC	OnSpareGateway	Vendor 3S - Smart Software Solutions GmbH Name CODESYS Control Win V3 x64	3S - Smart Software Solutions GmbH	3.5.18.0	00671389-15A75f9L-36HU9S49-12834K8TL



## Re-scan for PLCs (1.24.0)

## Move PLC to new/updated Edge Gateway (1.24.0)

### Requirements

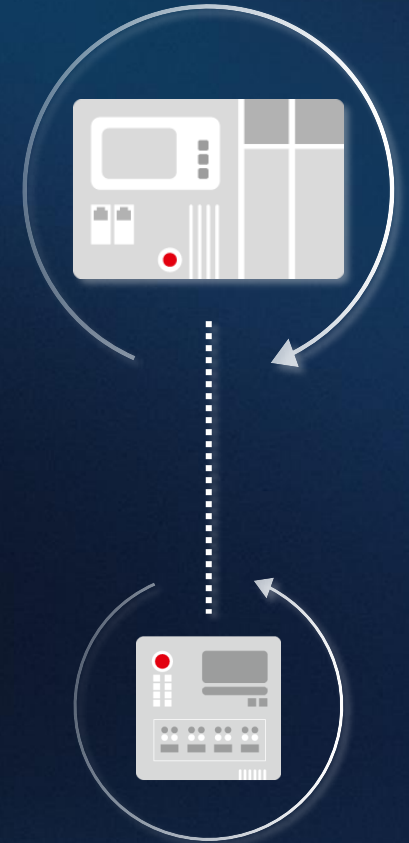
- Rescan for existing PLCs
- Change the PLC name
- Move PLC to another or new Edge Gateway

### Solution

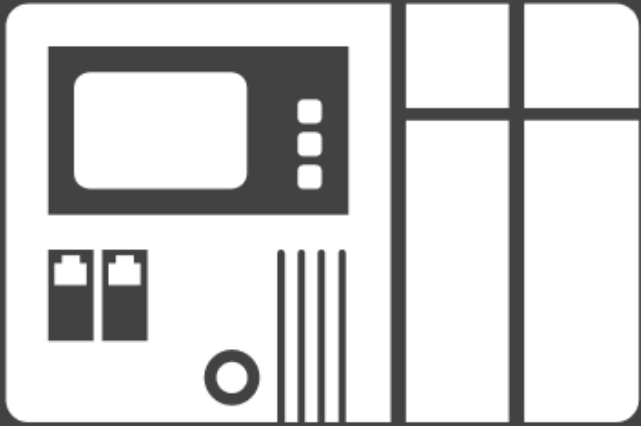
- Rescanning with automatic recognition of the changed PLC
- Editable PLC names
- Edge Gateway change via drop-down menu

### Benefit

- Keep existing PLCs despite changes to connection or name
- Easy transition from test to productive operation



General State Information Configuration Analyzer Projects

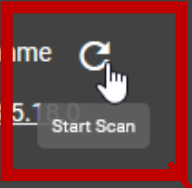


### Testrack\_1\_PLC

#### PLC Information

Device name DECKERMNBnewname

Gateways Edge\_MDe\_local\_3.5.18.0



Serial number 00978600-83968B3A-536C5887-16D27FB35

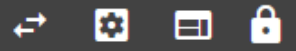
Connection state Disconnected

#### Device Identification

**Name** CODESYS Control Win V3 x64  
**Vendor** 3S - Smart Software Solutions GmbH  
**Device type** Programmable  
**Firmware version** 3.5.18.0  
**Runtime version** 3.5.18.0  
**Target ID** 4

Debug mode

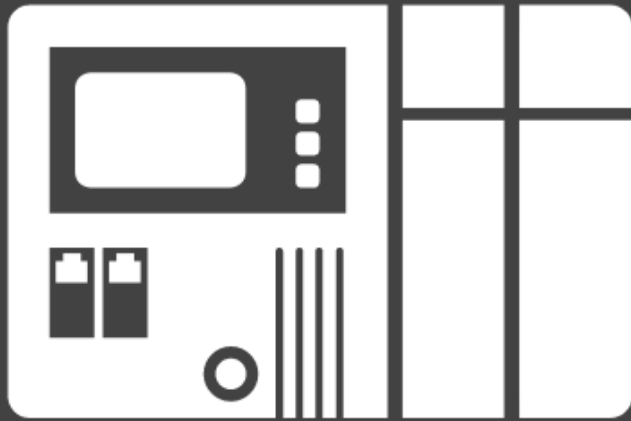
New tag




**Rescan PLC**


Do you want to replace the PLC with the following device?

<b>Name</b>	DECKERMNB
<b>Vendor</b>	3S - Smart Software Solutions GmbH
<b>Device type</b>	Programmable
<b>Firmware version</b>	3.5.18.0
<b>Target ID</b>	4



  Debug mode


New tag



General    State Information    Configuration    Analyzer Projects

### Testrack\_1\_PLC

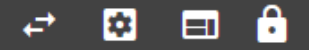
#### PLC Information

Device name    DECKERMNB   
Gateways        Edge\_MDe\_local\_3.5.18.0

Serial number    00978600-83968B3A-536C5887-16...  
Connection state    Disconnected

#### Device Identification


Name            CODESYS Control Win V3 x64  
Vendor            3S - Smart Software Solutions GmbH  
Device type        Programmable  
Firmware version    3.5.18.0  
Runtime version    3.5.18.0  
Target ID            4





### Testrack\_1\_PLC

#### PLC Information

Device name    DECKERMNB

Gateways        Edge\_MDe\_local\_3.5.18.0 

Search  

- Office\_Gateway
- My new Gateway
- PiHome
- MDe\_NB\_local
- Edge\_MDe\_local\_3.5.18.0** 

## E-mail address validation (1.24.0)

### Requirement

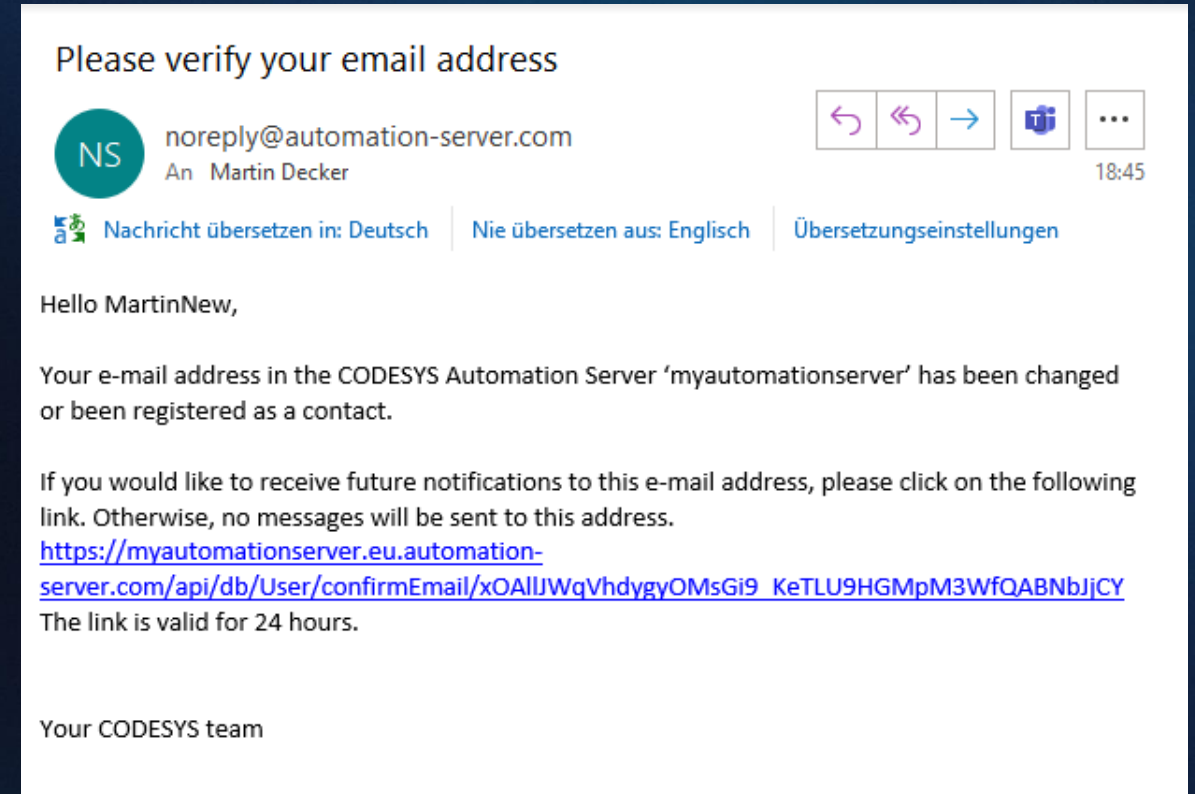
- Verification of email address

### Solution

- Mandatory verification of email addresses before use

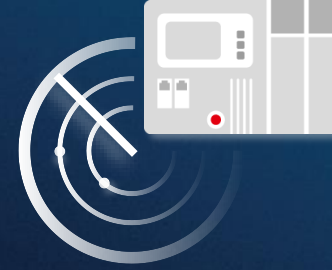
### Benefit

- Increased protection against unauthorized use of the email address
- Reachable at known address
- Better protection against typos



Error occurred while sending the email: Email not verified. ❌





## Improved network scan (1.24.0)

### Requirement

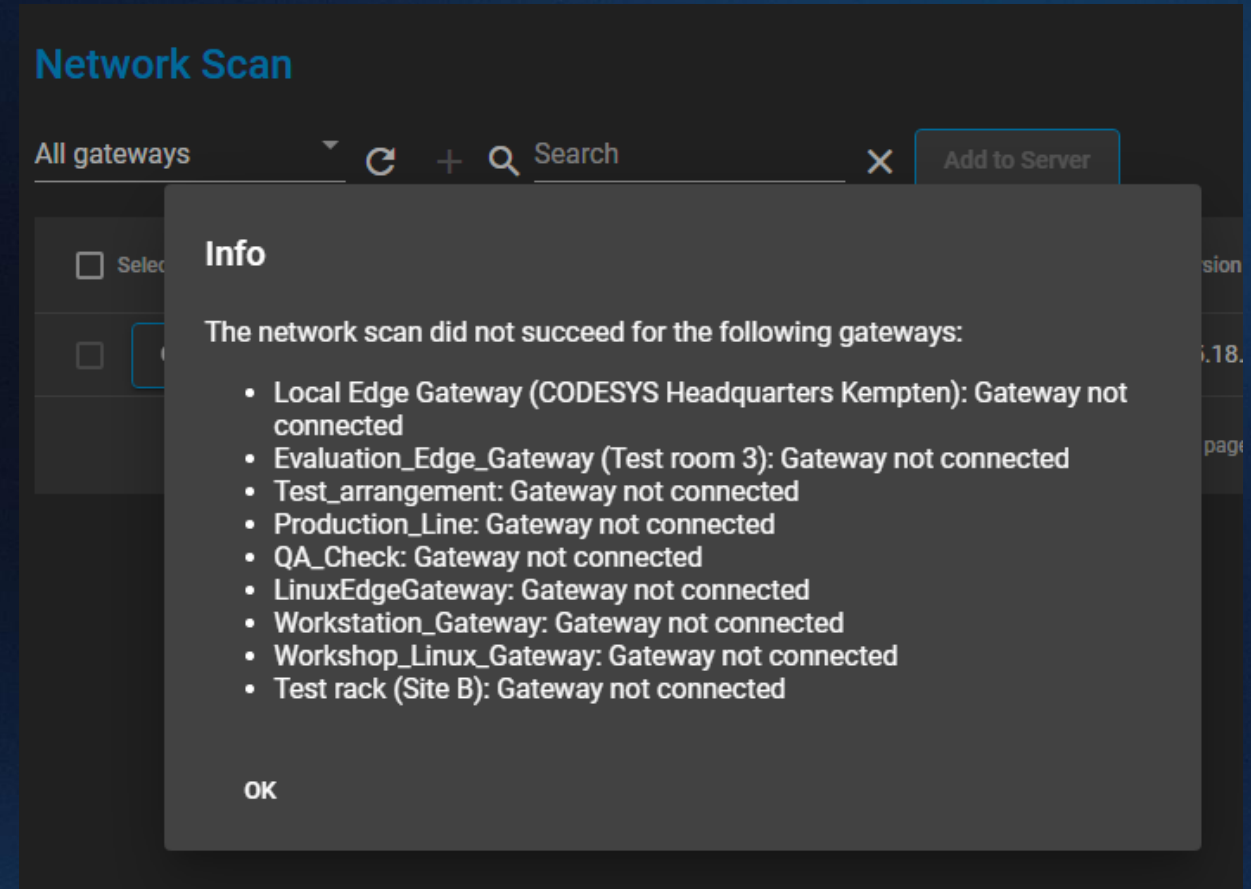
- Fast network scan across all available Edge Gateways

### Solution

- Automatic detection of disconnected edge gateways
- Skipping of the scan process via the respective Edge Gateways

### Benefit

- Fast scan result
- Manual scan configuration not required
- Overview of non-available Edge Gateways



## Force MFA (1.25.0)

### Requirement

- Tenant-wide mandatory multi-factor authentication

### Solution

- MFA enforcement by administrators

### Benefit

- Tenant-wide increased access protection



The screenshot shows the 'User Management' interface of the CODESYS Automation Server. The top navigation bar includes the server name, language (en), and user profile (m.decker). Below the navigation, there are tabs for 'Users', 'Groups', and 'Password Policy'. A search bar contains 'm.decker'. To the right of the search bar, there are checkboxes for 'Show disabled users' (unchecked) and 'Force MFA for all users' (checked). A '+ Add user' button is also visible. Below the search bar is a table with columns: Name ↑, Username, E-Mail, Role, and Kiosk User (?). The table contains two rows of user data.

Name ↑	Username	E-Mail	Role	Kiosk User (?)
Martin	m.decker	m.decker@codesys.com	Administrator	<input type="checkbox"/>
MartinNew	MartinNew	m.decker@codesys.com	Administrator	<input type="checkbox"/>

At the bottom of the interface, there is a pagination control showing 'Items per page 25' and '1 - 2 of 2'.

## Extended multi-edit (1.25.0)

### Requirement

- Change settings of multiple PLCs at the same time

### Solution

- Multi-selection in the list view
- Already available: set notifications, delete PLCs, edit tags
- New: synchronization, permissions

### Benefit

- Time savings through bulk handling
- Easier editing
- Improved overview



CODESYS Automation Server

en m.decker

PLCs / List View

PLCs

Topology Views

List View

Network Scan

Gateways

Applications

Licenses

Template

Tickets

### List View

Search

Name ↑	Version	Status	Notifications	Sync	Tags	Actions
<a href="#">Conveyor 1-7</a>	4.4.0.0	⚠	🔔	🚫	Tags...	⚙️ 📄 🔒 🗑️ ✓
<a href="#">DECKERMNB</a>	3.5.18.0	🟢	🔔	🚫	Tags...	⚙️ 📄 🔒 🗑️ ✓
<a href="#">MotionSite_PLC</a>	4.4.0.0	⚠	🔔	🚫	Tags...	⚙️ 📄 🔒 🗑️ ☐
<a href="#">Portal_control</a>	4.4.0.0	⚠	🔔	🚫	Tags...	⚙️ 📄 🔒 🗑️ ✓
<a href="#">ShopFloorB3</a>	4.4.0.0	⚠	🔔	🚫	Tags...	⚙️ 📄 🔒 🗑️ ☐
<a href="#">WorkshopPiK4</a>	4.4.0.0	⚠	🔔	🚫	Tags...	⚙️ 📄 🔒 🗑️ ✓

Items per page 25 1 - 6 of 6

### Synchronization

Synchronize applications

Synchronize parameters

OK Cancel

Delete the PLC

Disable notifications

Synchronize applications X

Synchronize parameters X

Permit

Edit Tags...

🗑️ 🔔 🚫 🔒 ✎ Edit Tags...



## Configurable password policy (1.25.0)

### Requirement

- Password policy adaptable to company security policies

### Solution

- Configurable password policy for tenant administrators

### Benefit

- Enhanced security
- Conformity of passwords with company specifications

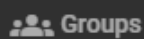




## User Management



Users



Groups



Password Policy

### Mandatory Password Options

These options are mandatory and cannot be changed. They ensure a minimum of password security.

Minimum length

8

Requires unique characters

6

- Requires a digit
- Requires a lower case character
- Requires an upper case character

### Additional Password Options

These options are optional and are additive to the mandatory options. Administrators can change them.

Minimum length \*

8

Blacklist



- Requires a special sign
- Must not contain user name, display name or e-mail
- The last ten passwords must not be reused
- Require password change on next login

Save

Cancel

## Activate device user management (1.26.0)

### Requirement

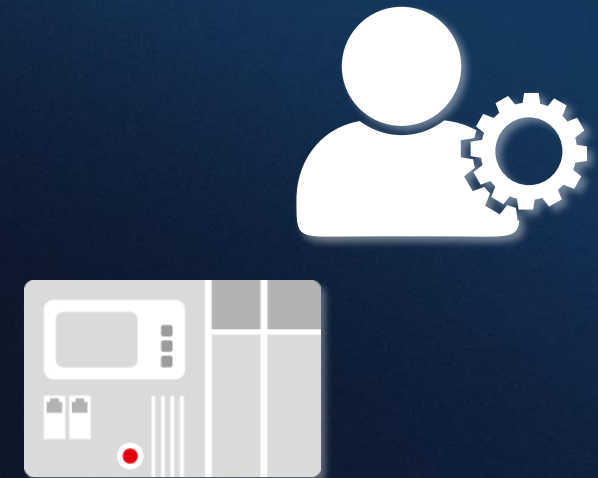
- Activate device user management on PLC
- Create initial administrator user

### Solution

- Automatic check of the device user policy
- Detection of forced device user management
- Possibility to set up an initial admin user

### Benefit

- Straightforward workflow
- Simply secure
- No CODESYS Development System required



CODESYS Automation Server

en m.decker

PLCs / Network Scan

### Add PLC to Automation Server

Search

Name	Status ↓	
CODESYS Control Win		

Device user management needs to be activated. Create an Admin user with credentials.

User name \* Password \* Repeat password \*

Items per page 25 1 - 1 of 1

Confirm Cancel

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CODESYS Group | We software Automation.



## Support secure WebVisu (1.26.0)

### Requirement

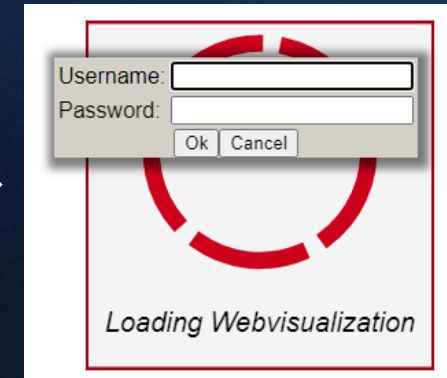
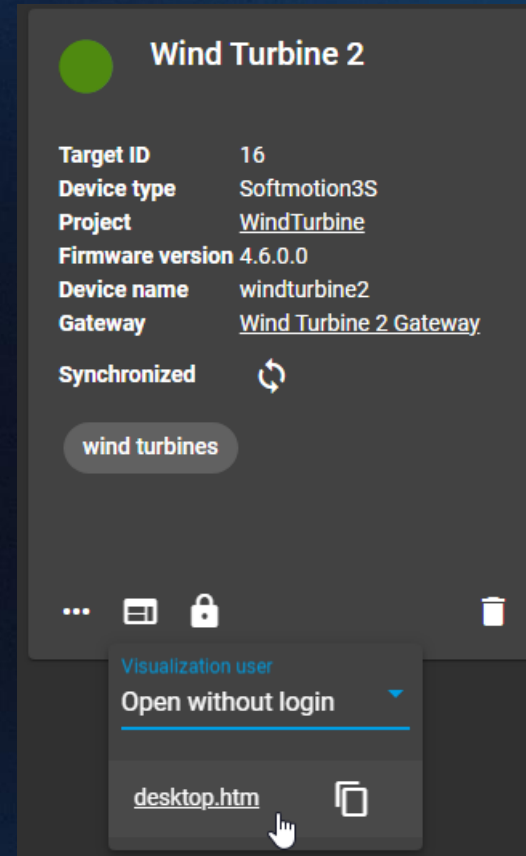
- Support new user management for CODESYS Visualization  $\geq 4.2.0.0$  (based on Toolkit 3.5.18.0) (Runtimes  $\geq 4.5.0.0$  (3.5.18.20))
- Enable automatic login

### Solution

- Automatic detection of active device user management
- Possibility to store credentials of different users
- Preselection of a default user

### Benefit

- No unauthorized access to runtime at administrator level
- Compatibility with new Visu user management
- Convenient login
- Straightforward workflow
- Simply secure



- PLCs / List View
- PLCs
- Applications
- Licenses
- Template
- Tickets

List View / PLC Details: Wind Turbine 2

General State Information Configuration Visualization Analyzer Projects

Visualization Users ? Search X

<input type="checkbox"/>	(0)	ID	Name	Change User	Change Date	Default			
<input type="checkbox"/>	3	Operator	m.decker		1/29/2023, 3:42:35 PM GMT+1	<input type="checkbox"/>			
<input type="checkbox"/>	1	pi	m.decker		12/21/2022, 5:45:42 PM GMT+1	<input checked="" type="checkbox"/>			

Debug mode

New tag: wind turbines X

Visualization Whitelist ?

Save Reset

Wind Turbine 2

Target ID 16  
 Device type Softmotion3S  
 Project [WindTurbine](#)  
 Firmware version 4.6.0.0  
 Device name windturbine2  
 Gateway [Wind Turbine 2 Gateway](#)

Synchronized

wind turbines

Visualization user: pi

desktop.htm

Wind Turbine 2

Target ID 16  
 Device type Softmotion3S  
 Project [WindTurbine](#)  
 Firmware version 4.6.0.0  
 Device name windturbine2  
 Gateway [Wind Turbine 2 Gateway](#)

Synchronized

wind turbines

Open without login

Name	Default
pi	<input checked="" type="checkbox"/>
Operator	<input type="checkbox"/>

## Multi-app information (1.26.0)

### Requirement

- Clear identification of applications and devices within a project
- Clear assignment to run application and PLC

### Solution

- Display of application name and associated device
- Available in project view and deployment details

### Benefit

- Significantly reduced risk of mix-ups in projects with multiple applications



CODESYS Automation Server

en m.decker

Applications / CODESYS Projects

PLCs

Applications

CODESYS Projects

Licenses

Template

Tickets

## CODESYS Projects

Search




Project

MultipleApplications 9/25/2022, 5:50:36 PM | m.decker

Commit

Added device

Hide commits without applications


  


Application\_1 (Main\_PLC)


Application\_2 (Main\_PLC)


Application\_3 (Main\_PLC)

ApplicationSM (CODESYS\_SoftMotion\_Win\_V3\_x64)









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CODESYS Group | We software Automation.



## Display of licenses (1.26.0)

### Requirement

- Display licenses available on a PLC

### Solution

- Read out license container of a device
- Optionally software container or hardware dongle
- Detailed display of available licenses

### Benefit

- Quick and easy access to license information
- Usable for licensing as well
- Independent from the CODESYS Development System



## Licenses / Bulk Licensing

- PLCs
- Applications
- Licenses
- Bulk Licensing
- Template
- Tickets

## Bulk Licensing

Installed Licenses: DECKERMNB

Dongle: [0]: SN=3-3757964, Ver...



1.

Show installed licenses

State	Name	Description	PLC	Container
Installed PLC	ShopFloorB3			
	DECKERMNB			
	WorkshopPiK2			

## Installed Licenses

State	Name	Description	Firm Code	Product Code	Feature Map	Company
✓	WebClient Library	An IEC Library for web requests in one direction.	5000304	8764		3S-Smart Software Solutions GmbH
✓	CODESYS Static Analysis	Tool for source code check based on pre-defined rules	5000304	1512		3S-Smart Software Solutions GmbH
✓	OPC DA Server SL	Standalone OPC DA Server	5000304	8772	0001	3S-Smart Software Solutions GmbH
✓	CODESYS Profiler (Subscription)	A tool to measure execution times of IEC 61131-3 POU's	5000304	8718	FFFFFFFF	3S-Smart Software Solutions GmbH
✓	CODESYS UML (Subscription)	UML integration (class diagramm & state chart)	5000304	1337		3S-Smart Software Solutions GmbH
✓	CODESYS Static Analysis	Tool for source code check based on pre-defined rules	5000304	1512		3S-Smart Software Solutions GmbH
✓	CODESYS Test Manager (Subscription)	A fully integrated testing environment	5000304	602009		3S-Smart Software Solutions GmbH
✓	CODESYS SVN & Git (Subscription)	A source control integration for SVN & Git	5000304	8747		3S-Smart Software Solutions GmbH
✓	CODESYS SoftMotion SL	Unlimited Motion control tool for controllers with PLCopen functionality and CAMs	5000304	512	0001	3S-Smart Software Solutions GmbH
✓	CODESYS Git	A Git source control integration	5000304	8812		CODESYS GmbH

Close

## Synchronize applications warning (1.26.0)

### Requirement

- Warning about possible overwriting of existing application by the Automation Server

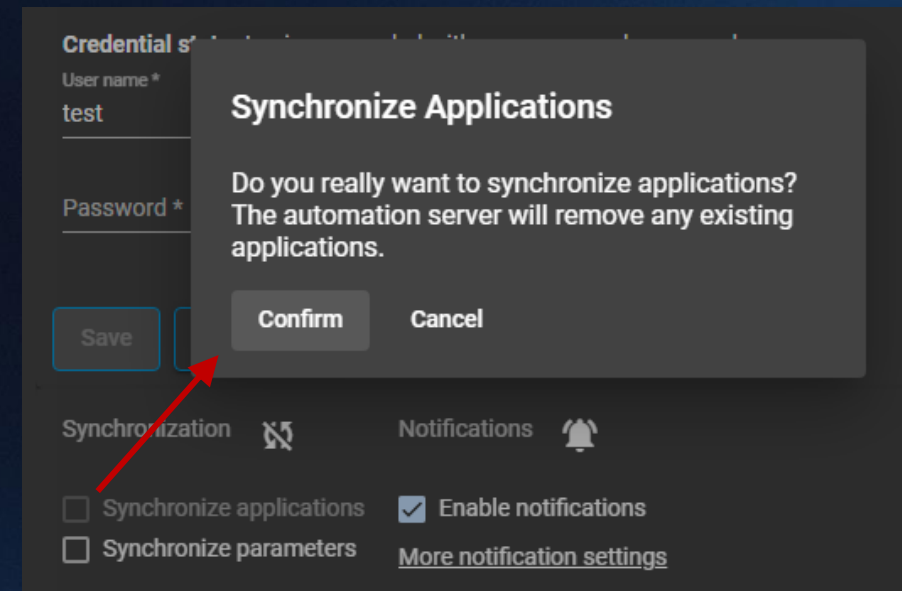


### Solution

- Additional confirmation dialog when activating the "Synchronize applications" option

### Benefit

- Extra protection against accidental deletion/overwriting of existing applications





## Application update scheduler (1.27.0)

### Requirement

- Application updates outside working hours
- Automatic application updates to the latest version
- Rollback in case of an error

### Solution

- Scheduling tool for user-defined application updates

### Benefit

- Full control over application updates
- No overtime, regulated working hours



PLCs

Applications

CODESYS Projects

Schedules

Licenses

Template

Tickets

### Create Schedule

Name \*  
Update Line 4

Description  
Update to V2.5.0

Update time \*  
1/26/2023, 10:00:31 PM GMT+1

MM/DD/YY HH:MM:SS  
 Trigger on commit

Rollback on failure  
 Off  Only failed PLCs  All

Schedule status  
Active

Project: WindTurbine  
 Commit: Added Liveness Probe  
 Application \*: Application (Device)

Search  Filter by tag

<input type="checkbox"/> (2)	Name	Version	Device	Sync
<input checked="" type="checkbox"/>	<u>Wind Turbine 2</u>	4.6.0.0	CODESYS Control for Raspberry Pi SL	
<input type="checkbox"/>	<u>Wind Turbine 3</u>	4.6.0.0	CODESYS Control for Raspberry Pi SL	
<input checked="" type="checkbox"/>	<u>Pumped Storage Power Plant</u>	4.4.0.0	CODESYS Control for Raspberry Pi SL	
<input type="checkbox"/>	<u>Wind Turbine 1</u>	4.2.0.0	CODESYS Control for Raspberry Pi SL	

Items per page 25 1 - 4 of 4

## Configurable in-app messages (1.27.0)

### Requirement (internal)

- Alternative to "Pendo" necessary, which is no longer used
- Ability to show users configurable in-app messages
- Configurable start date and text
- User language recognition
- Remember whether a user already closed the notification

### Solution

- DIY ;)

### Benefit

- Ability to play out content via the web app at any time
- No more dependency on third-party tool



## Password lost guide (1.27.0)

### Requirement

- Instructions for users in case of password loss
- Internal guide

### Solution

- Content for CODESYS Online Help ([link](#))
- Internal work instruction “Tenant admin needs help with access” ([link](#))

### Benefit

- Password reset by users without contacting us
- Internal decision-making basis, if action required

CODESYS Automation Server

## Sign In

User name \*

Password \*

Sign In

Privacy Policy  
Forgot password? Get help...

CODESYS Online Help EN

CODESYS Automation Server • User management  
• Resetting the Server Password

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## Updates highlighting & visibility (1.29.0)

### Requirement

- Prominently visible information about available application updates
- Clear distinguishability: selected vs. running version

### Solution

- Additional configurable columns in the list view
- Update indicator in list view and detail view
- Additional indicators and re-ordered columns in the deployment view

### Benefit

- Information about current version and available updates at one glance



CODESYS Automation Server 34 en j.schuldes

PLCs / List View

PLCs

Topology Views

List View

Network Scan

Gateways

Applications

Licenses

Template

Tickets

## List View

Search

Name ↑	Version	Status	Update available	Project	Application	Commit	Device	Notifications	Sync	Tags	Actions
<a href="#">cas-raspi-01</a>	3.5.15.30						<b>Vendor</b> 3S - Smart Software Solutions GmbH <b>Name</b> CODESYS Control for Raspberry Pi SL			Tags...	
<a href="#">cas-raspi-02</a>	4.2.0.0			<a href="#">CasTestAppSP12</a>	<a href="#">Application_Raspi</a>	v31	<b>Vendor</b> 3S - Smart Software Solutions GmbH <b>Name</b> CODESYS Control for Raspberry Pi MC SL			Tags...	
<a href="#">cas-raspi-03</a>	3.5.15.0						<b>Vendor</b> 3S - Smart Software Solutions GmbH <b>Name</b> CODESYS Control for Raspberry Pi SL			Tags...	
<a href="#">cas-raspi-04</a>	4.2.0.0			<a href="#">WindTurbine</a>	<a href="#">Application</a>	optimized algorithm	<b>Vendor</b> 3S - Smart Software Solutions GmbH <b>Name</b> CODESYS Control for Raspberry Pi MC SL			Tags...	
<a href="#">raspberry-jsch</a>	4.2.0.0			<a href="#">WindTurbine</a>	<a href="#">Application</a>	updated device	<b>Vendor</b> 3S - Smart Software Solutions GmbH <b>Name</b> CODESYS Control for Raspberry Pi MC SL			Tags...	

Items per page 25 1 - 5 of 5

- PLCs
- Applications
- Licenses
- Template
- Tickets

## CODESYS Projects / Application: Application (Device)



Commit  
optimized algorithm

10/5/2021, 12:11:23 PM  
GMT+2 j.schuldes

Delete Application

General	Deployment	Parameters		
Filter by tag <input type="text"/> X Filter by plc <input type="text"/> X Filter by commit <input type="text"/>				
State	PLC	Deployed Commit	<input type="checkbox"/> Deploy (0)	<input type="checkbox"/> Remove (0)
	cas-raspi-04	optimized algorithm 10/5/2021, 12:11:23 PM GMT+2	<input type="checkbox"/>	<input type="checkbox"/>
	raspberry-jsch	updated device 10/5/2021, 11:34:32 AM GMT+2	<input type="checkbox"/>	<input type="checkbox"/>
	cas-raspi-02		<input type="checkbox"/>	<input type="checkbox"/>

Items per page 25 1 - 3 of 3

Apply Changes

## Set default user language (1.29.0)

### Requirement

- Send notifications (email confirmation, reset password) to users in matching language

### Solution

- Language pre-selection by administrators when creating new users

### Benefit

- Notifications to users in appropriate language



## User Management

Users Groups Password Policy

Search Show disabled users Force MFA for all users

Add user

Name ↑	Username	E-Mail
aUser1	readonly	readonly@local
AUser2	commissioningengineer	commissioningengineer@local
B-c22	j.schuldes	j.schuldes@codesys.com
bUser1	fadfaf	gadgag@local
BUser2	operator	operator@local
c-d	developer	developer@local
C-d	visuonly	visuonly@local
test	test	test@local

### Add User

Name \*  
Martin Decker

Username \*  
m.decker

Email \*  
m.decker@codesys.com

Select Role \*  
Administrator

Select Initial Language \*  
Deutsch (de)

Kiosk user

Add user

Kiosk User ?					
<input type="checkbox"/>	⚠	🔑	👤	✎	🔘
<input checked="" type="checkbox"/>	⚠	🔑	👤	✎	🔘
<input type="checkbox"/>	⚠	🔑	👤	✎	🔘
<input type="checkbox"/>	⚠	🔑	👤	✎	🔘
<input type="checkbox"/>	⚠	🔑	👤	✎	🔘
<input type="checkbox"/>	⚠	🔑	👤	✎	🔘
<input type="checkbox"/>	⚠	🔑	👤	✎	🔘
<input checked="" type="checkbox"/>	⚠	🔑	👤	✎	🔘

Items per page 25 1 - 8 of 8



## Access notification in CDS (1.29.0)

### Requirement

- Avoid perceived misbehavior when working with CODESYS on server-connected PLC

### Solution

- Notification in CODESYS Development System

### Benefit

- Awareness of possible “misbehavior”
- Avoided troubleshooting



The screenshot shows the CODESYS software interface for a project named 'WindTurbine.project'. The main workspace displays the 'Automation Server' configuration, including a diagram of a laptop connected to a 'Gateway' and then to a server rack. The configuration details are as follows:

- Gateway: Gateway-1
- IP-Address: localhost
- Port: 1217
- Device Name: raspberry-jsch
- Device Address: 0301.208D
- Target ID: 0000 0011
- Target Type: 1100

A red box highlights the 'Automation Server' message window, which displays the following information:

Messages - Total 0 error(s), 1 warning(s), 1 message(s)

Automation Server: 0 error(s), 0 warning(s), 1 message(s)

Description	Project	Object	Position
An Automation Server is currently connected to your device (device name: raspberry-jsch). Local changes may be overwritten.	WindTu...	Device	
Device 'raspberry-jsch': Serial number '000000007ee1e05c'.	WindTu...	Device	



## Overview

### ▪ **Functional and frontend developments**

- 1.24.0 Replace PLC without ticket | Email address validation | Disabled network scan for offline Edge Gateways | Re-scan for PLCs | Move PLC to new/updated Edge Gateway
- 1.25.0 Force MFA | Extended multi-edit | Configurable password policy
- 1.26.0 Activate device user management | Support secure WebVisu | Multi-app information | Display of licenses | Synchronize applications warning
- 1.27.0 Application update scheduler | Configurable in-app messages | “Password lost” guide
- 1.29.0 Updates highlighting & visibility | Set default user language | Access notification

### ▪ **Backend and infrastructure developments**

- On-premises | EaaS Manager | Edge Communication rework | CML support

### ▪ **Planned developments and activities**

- LDAP support | Deployment log | Enhanced licensing | Encrypted communication | Certificate handling | Virtual Control synergies | Topology view 2.0 | Security audit

## On-premises Automation Server

- Epic: [CAS-3147](#)
- Automation Server services that use AWS services will be reimplemented, e.g. email delivery
- Other topics include
  - Delivery method
  - Licensing
  - Ops guide
  - Security / OSS
  - ...
- Goals
  - Operation of the Automation Server by the customer
  - Quick adaptation of the Automation Server to new environments

## EaaS Manager

- Epic: [CAS-2936](#)
- **Manager = administration tool of Automation Server**
  - Create, modify, delete tenants
  - Store communication
  - Management of Automation Server deployment
- **Generalization of implementation – deployment no longer hard-coded**
- **Ability to use the manager outside of the AWS cloud**
- **Goals**
  - Dealing with (any) other services
  - Use on-premises



## Edge communication rework

- Epic: [CAS-3039](#)
- **Current implementation right from the start of the Automation Server**
  - Lots of decisions were not made when the development started.
  - Contains many shortcut implementations due to lack of time.
- **Goals**
  - Stability
  - Scalability
  - Maintainability
  - Extensibility

## Support CODESYS Mass Licenser

- [CAS-3314](#)
- **Activate device user management by Mass Licenser**
- **Creation of separate NuGet package for Mass Licenser**

## Overview

### ▪ **Functional and frontend developments**

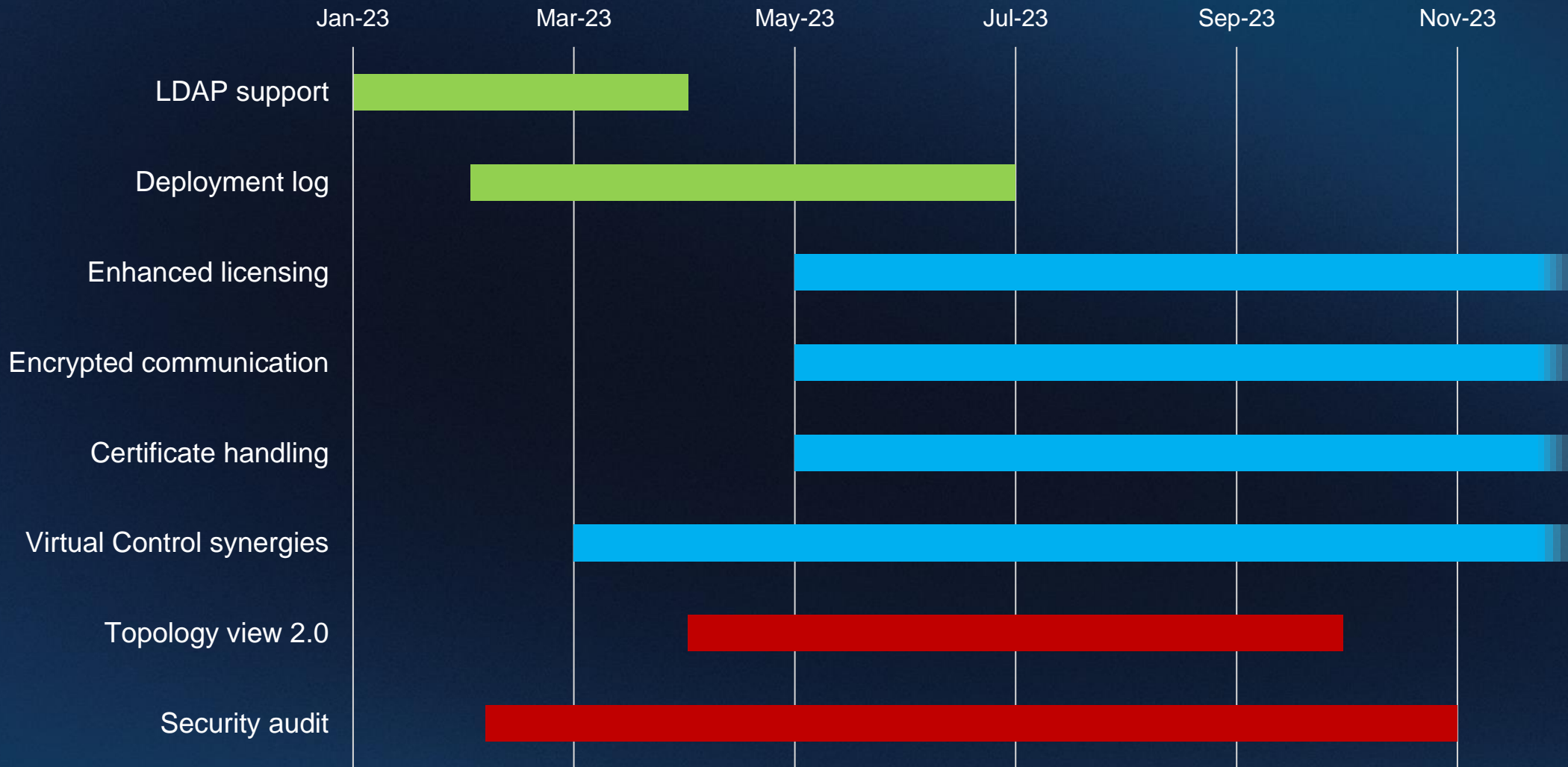
- 1.24.0 Replace PLC without ticket | Email address validation | Disabled network scan for offline Edge Gateways | Re-scan for PLCs | Move PLC to new/updated Edge Gateway
- 1.25.0 Force MFA | Extended multi-edit | Configurable password policy
- 1.26.0 Activate device user management | Support secure WebVisu | Multi-app information | Display of licenses | Synchronize applications warning
- 1.27.0 Application update scheduler | Configurable in-app messages | “Password lost” guide
- 1.29.0 Updates highlighting & visibility | Set default user language | Access notification

### ▪ **Backend and infrastructure developments**

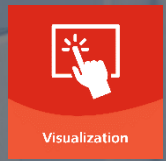
- On-premises | EaaS Manager | Edge Communication rework | CML support

### ▪ **Planned developments and activities**

- LDAP support | Deployment log | Enhanced licensing | Encrypted communication | Certificate handling | Virtual Control synergies | Topology view 2.0 | Security audit







# CODESYS VISUALIZATION



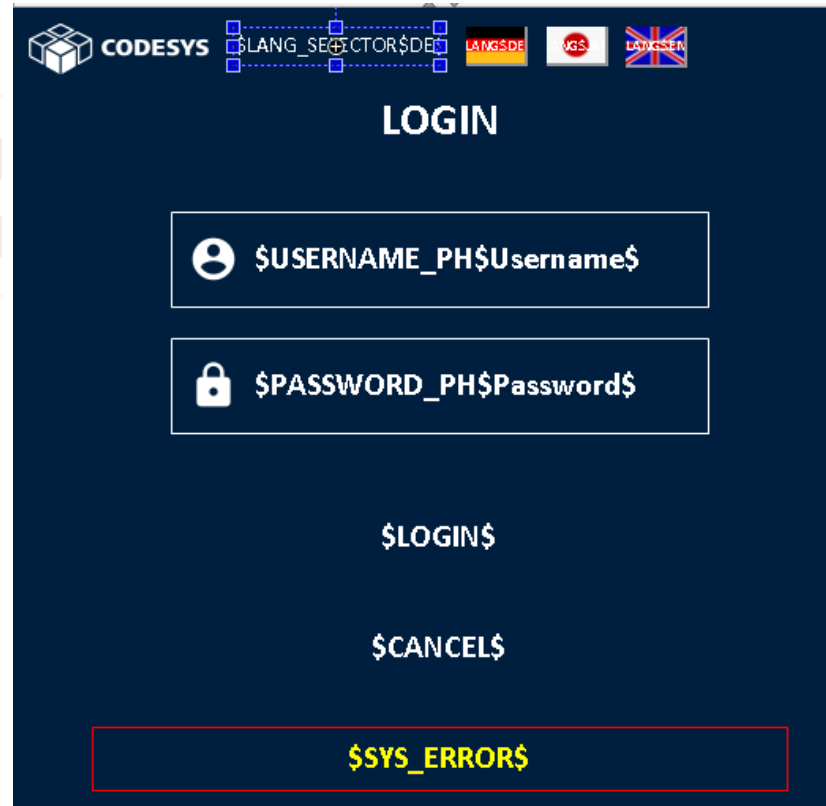
## Overview

- **Customizable dialogs**
- **Improvements in file transfer**
- **Improvements for HTML5 Controls**
- **Further improvements**

## Customizable dialogs

- Possibility to localize the login dialog
  - New placeholders
  - Rectangle + \$LANG\_SELECTOR\$DE\$
  - Button with bitmap info

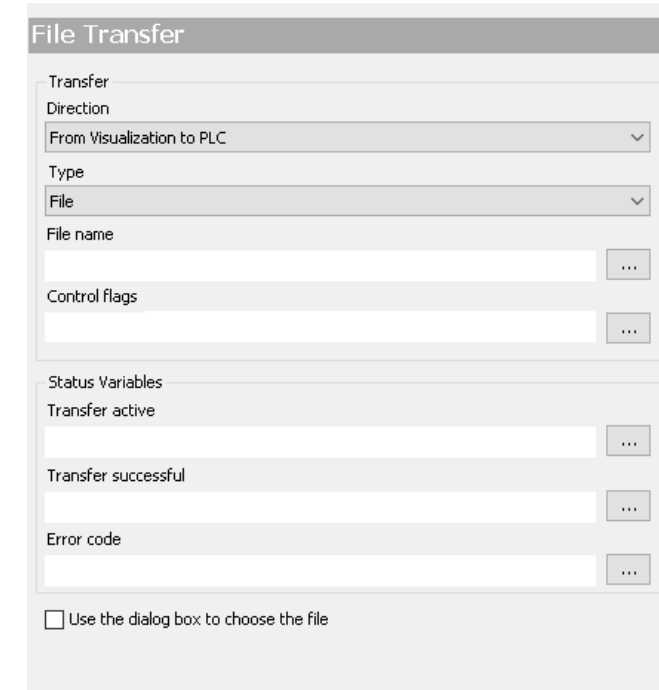
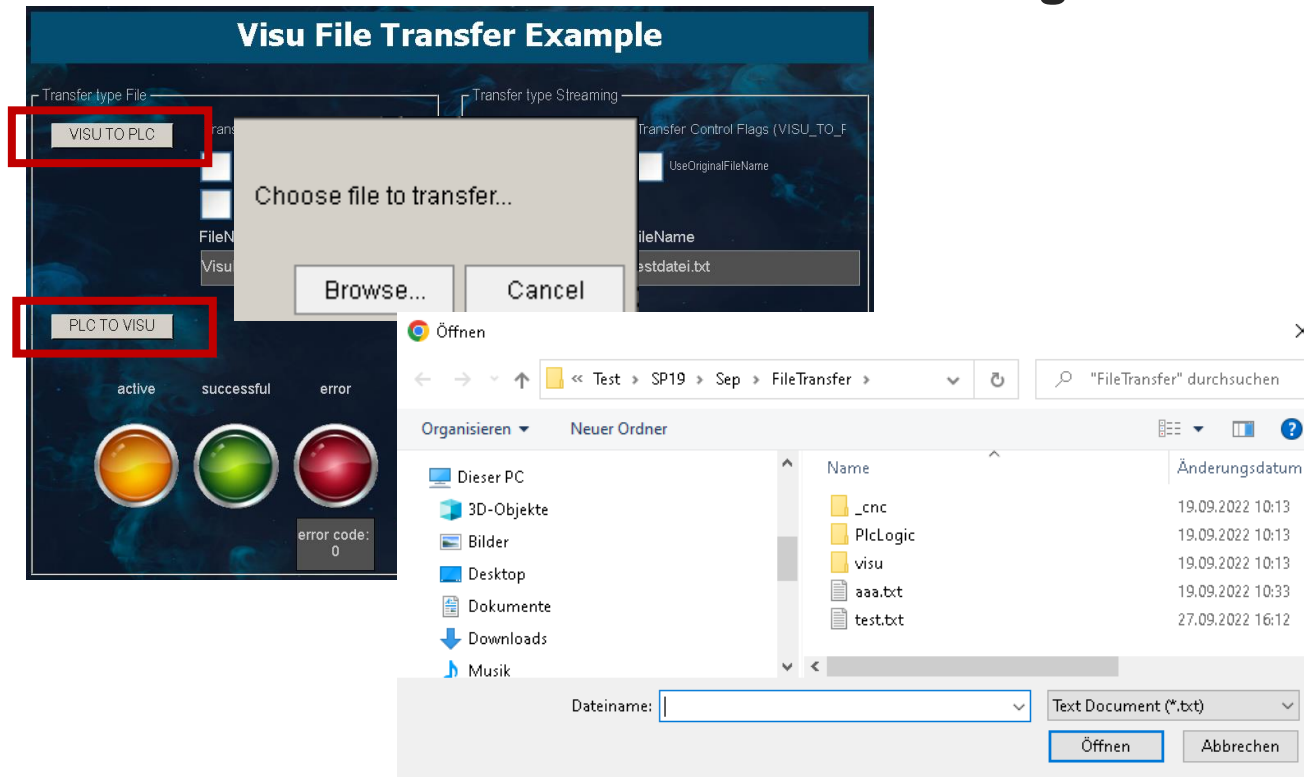
Type of element	Button
[-] Bitmap info	
Static ID	IP_Common.Japan
[-] Texts	
Text	\$LANG\$JAP\$



Use gradient color	
Gradient setting	linear, Black, White
[-] Appearance	
Line width	1
Fill attributes	Filled
Line style	Solid
[-] Texts	
Text	\$LANG_SELECTOR\$DE\$
Tooltip	
[-] Text properties	
Horizontal alignment	Left
Vertical alignment	Centered
Text format	Default
Font	Default
Font color	White
[-] Absolute movement	
[-] Movement	
X	
Y	
Rotation	
Scaling	
Interior rotation	
Use REAL values	
[-] Relative movement	
[-] Text variables	
Text variable	
Tooltip variable	

## Filetransfer improvements

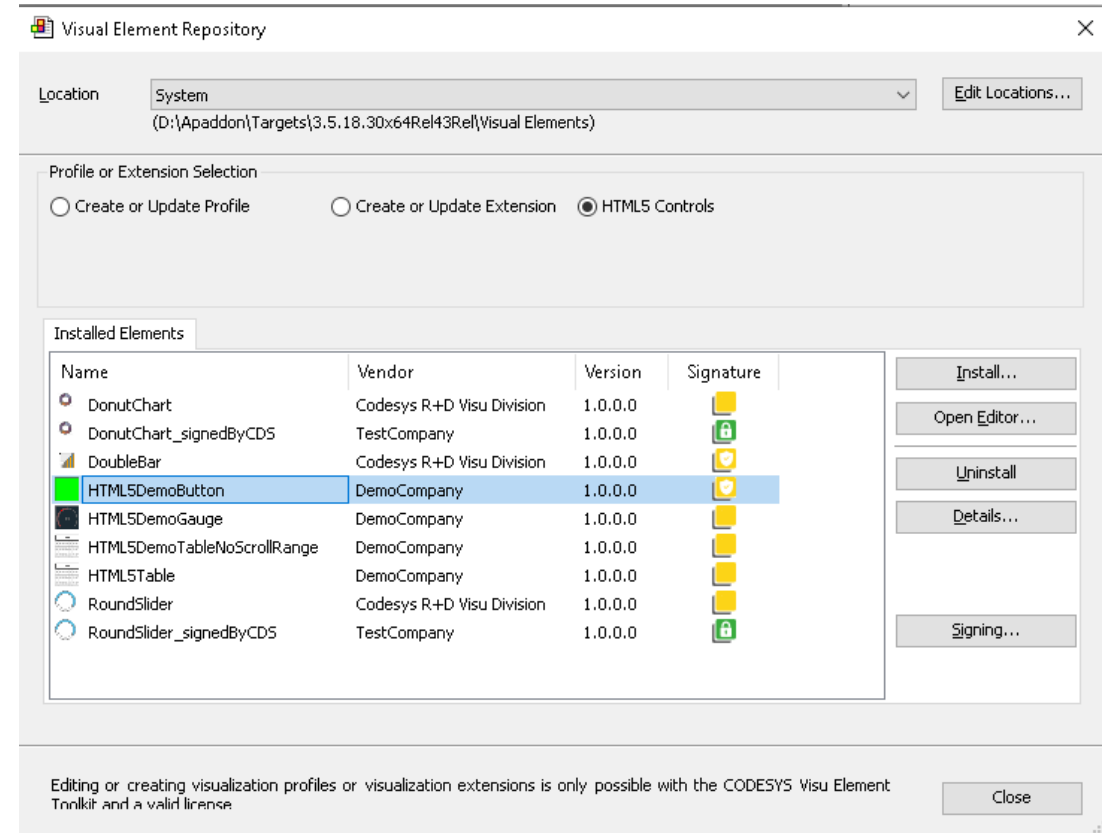
- Download of files without additional dialog



- Overwrite message is shown as standard browser dialog.

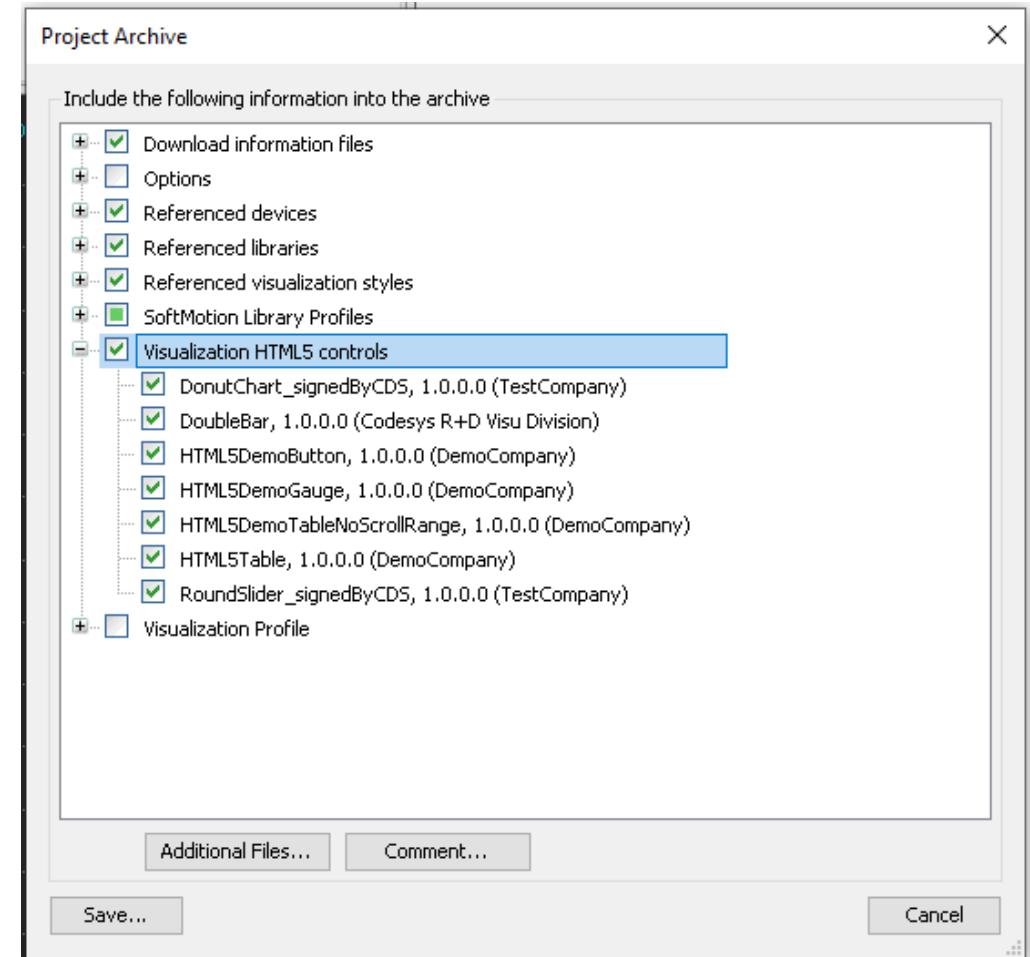
## Signed HTML5 controls

- Signing using CA or self-signed certificates
  - Timestamped certificates supported
  - Signing of HTML5 controls with GUI or scripting
  - Warnings against using HTML5 controls without trusted certificate
- ➔ Security issue to trust the code and all content of HTML5 controls



## HTML5 controls in project archives

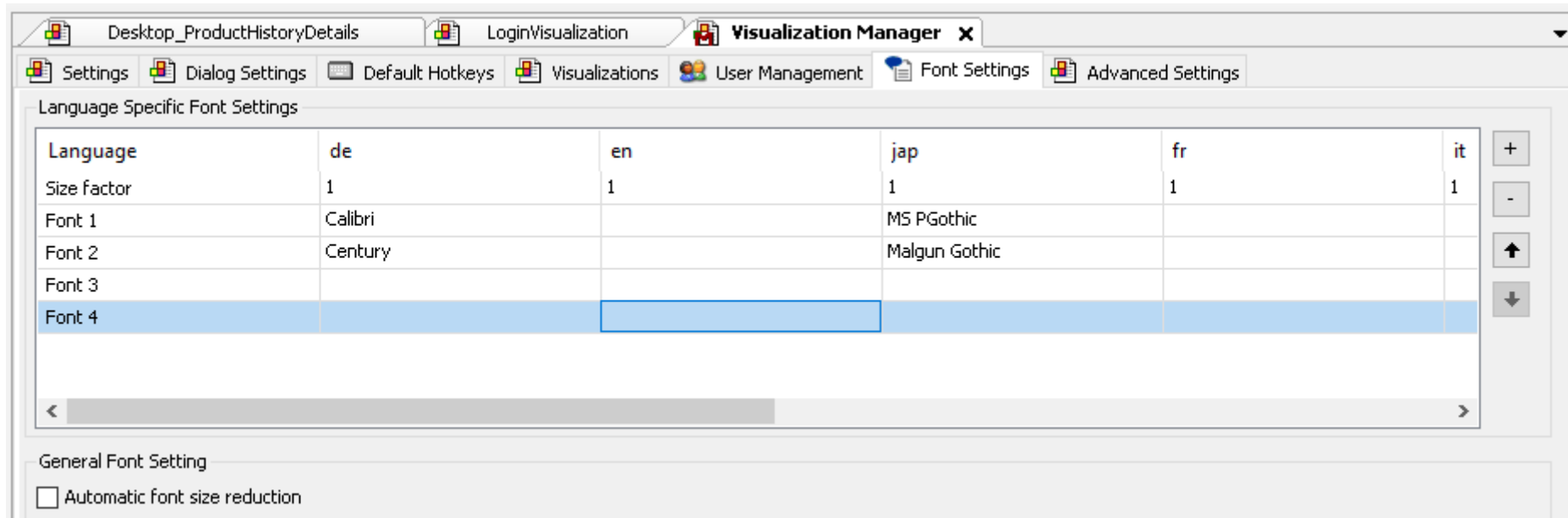
- Include HTML5 controls into project archives
- Common easy way to distribute projects with all components





## More than one language-dependent font

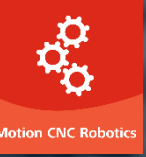
- Important if fonts are not available on all devices
- Only supported for WebVisu
- The first available font is used.



## Usage of UTF8-encoded STRING variables in the visualization

- **Compile options**
- **Support of UTF8-encoded STRING variables**
  - All kind of visualization types
  - Keypad
  - Text field





# CODESYS MOTION CNC ROBOTICS

## **Overview**

- **CNC improvements**
- **Robotics improvements**

## CNC improvements

- Indirect subprogram calls using string variables

- Variables

- G01 X\$varX\$ Y10 F50 E100 E-100

- Subprogram calls

- SUB1(2)

- Indirect subprogram call

- DYNCALL(\$SUBNAME\$, 2)

```
VAR  
  varX: STRING:='100';  
  SUBNAME: STRING:='Move3';  
END_VAR
```

## Robotics improvements

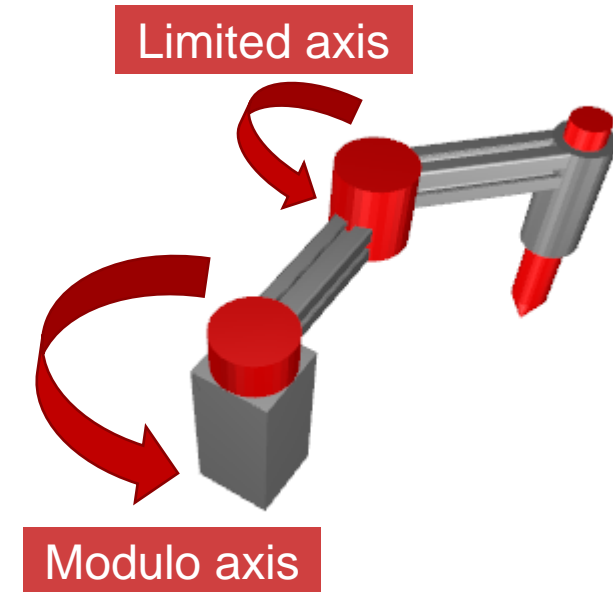
### Continue from stop position

- Similar to MC\_GroupInterrupt
- Command MC\_GroupHalt/GroupStop with input ClearMovements=FALSE
- Save continue data (SMC\_GroupSaveContinueData) once stopped
- Use MC\_GroupContinue to continue the interrupted path
  
- **Advantages over GroupInterrupt**
  - Immediate stop (zero latency)
  - Configurable dynamics for stopping



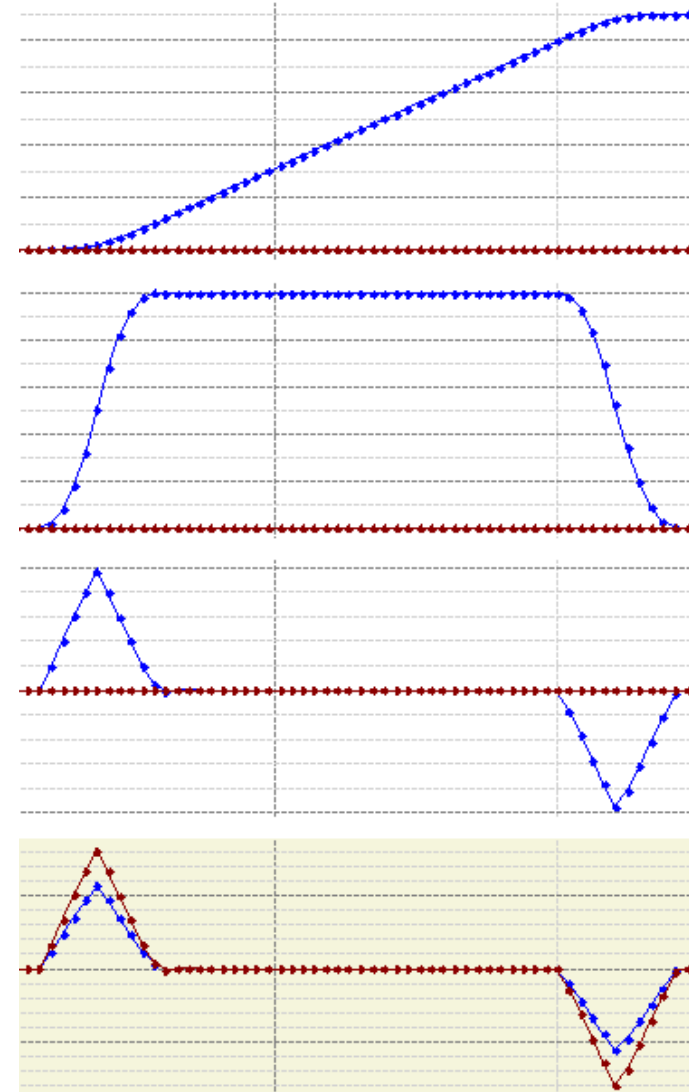
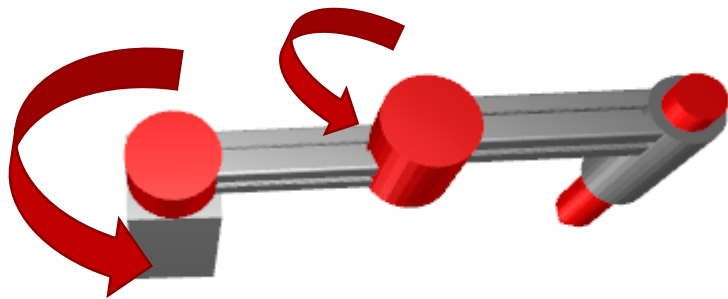
## Robotics Improvements

- **Support for modulo-axes**
  - Rotary axes with period  $360^\circ$
  - Any unlimited rotary joint of a kinematics
  - Only mode „shortest“



## Robotics improvements

- **Torque limitation**
  - Dynamic model required
  - Limit torques directly
  - Account for coupling
    - One axis moves
    - Other axes must generate a torque.





# CODESYS FIELDBUS

## Overview

- **General improvements**
- **Specific improvements:**
  - EtherNet/IP
  - CANopen
  - EtherCAT
  - PROFINET
  - Ethernet Adapter
  - IO-Link

## General improvements

- Go to Definition for Symbolic Access I/Os

The screenshot illustrates the 'Go to Definition' feature in CODESYS. It shows a context menu over a variable declaration in a PLC program, with the 'Go to Definition' option highlighted. Below, the 'UPT\_6011' object is shown in the 'Properties' window, displaying a table of variables and their mappings.

Variable	Mapping	Channel	Address	Type	Unit	Description
Exclusive Owner						Exclusive Owner
		Actual temperature	%IW0	INT	°C	Actual temperat
		Status - RA	%IX2.0	BOOL		Status informati
		Status - TO	%IX2.1	BOOL		Status informati
		Status - TE	%IX2.2	BOOL		Status informati
		Status - AL	%IX2.3	BOOL		Status informati
		Status - AG	%IX2.4	BOOL		Status informati
		Status - AA	%IX2.5	BOOL		Status informati
		Status - WA	%IX2.6	BOOL		Status informati
		Status - IA	%IX2.7	BOOL		Status informati
		Status - SA	%IX3.0	BOOL		Status informati
		Status - CH	%IB4	USINT		Status informati
		reserved_Status	%IW3	WORD		reserved
		Alarmcode	%IW4	UINT		Alarmcode of th
		Setpoint	%QW0	UINT	°C	Setpoint heats

## General improvements

- Detection of metrics for application-based licensing

Device x

Read current metrics from device

Metric	Value in Project	Max. allowed by License	Value on Device
<ul style="list-style-type: none"> <li>Size of User Code                             <ul style="list-style-type: none"> <li>Application</li> </ul> </li> </ul>	<p><b>72 Byte</b></p> <p>72 Byte</p>	n/a	0
<ul style="list-style-type: none"> <li>Communication                             <ul style="list-style-type: none"> <li>Number of OPC UA tags                                     <ul style="list-style-type: none"> <li>Application</li> </ul> </li> </ul> </li> </ul>	<p><b>0</b></p> <p>0</p>	n/a	0
<ul style="list-style-type: none"> <li>Variables used in visualizations                             <ul style="list-style-type: none"> <li>Application</li> </ul> </li> </ul>	<p><b>0 Variables</b></p> <p>n/a</p>	not yet supported	not yet supported
<ul style="list-style-type: none"> <li>Fieldbus                             <ul style="list-style-type: none"> <li>IO Channels                                     <ul style="list-style-type: none"> <li>Application</li> </ul> </li> </ul> </li> </ul>	<p><b>26 Channel(s)</b></p> <p>26 Channel(s)</p>	n/a	0
<ul style="list-style-type: none"> <li>Instances of CANopen, Modbus, PROFIBUS                             <ul style="list-style-type: none"> <li>Application</li> </ul> </li> </ul>	<p><b>1 Instance(s)</b></p> <p>1 Instance(s)</p>	n/a	0
<ul style="list-style-type: none"> <li>Instances of EtherCAT, EtherNet/IP, PROFIN...                             <ul style="list-style-type: none"> <li>Application</li> </ul> </li> </ul>	<p><b>1 Instance(s)</b></p> <p>1 Instance(s)</p>	n/a	0







Navigation menu:

- Communication Settings
- Applications
- Backup and Restore
- Files
- Log
- PLC Settings
- PLC Shell
- Users and Groups
- Access Rights
- Symbol Rights
- Licensed Software Metrics
- IEC Objects
- Task Deployment
- Status
- Information









## General improvements

- **Performance**
  - Project loading
  - Device Object Serialization
- **Usability**
  - Improved display of unused I/O channels

Variable	Mapping	Channel	Address	Type	Current Value
  		Holding Registers	%IW0	ARRAY [0..9] OF WORD	Not updated
  		Input Registers	%QW0	ARRAY [0..499] OF WORD	Not updated

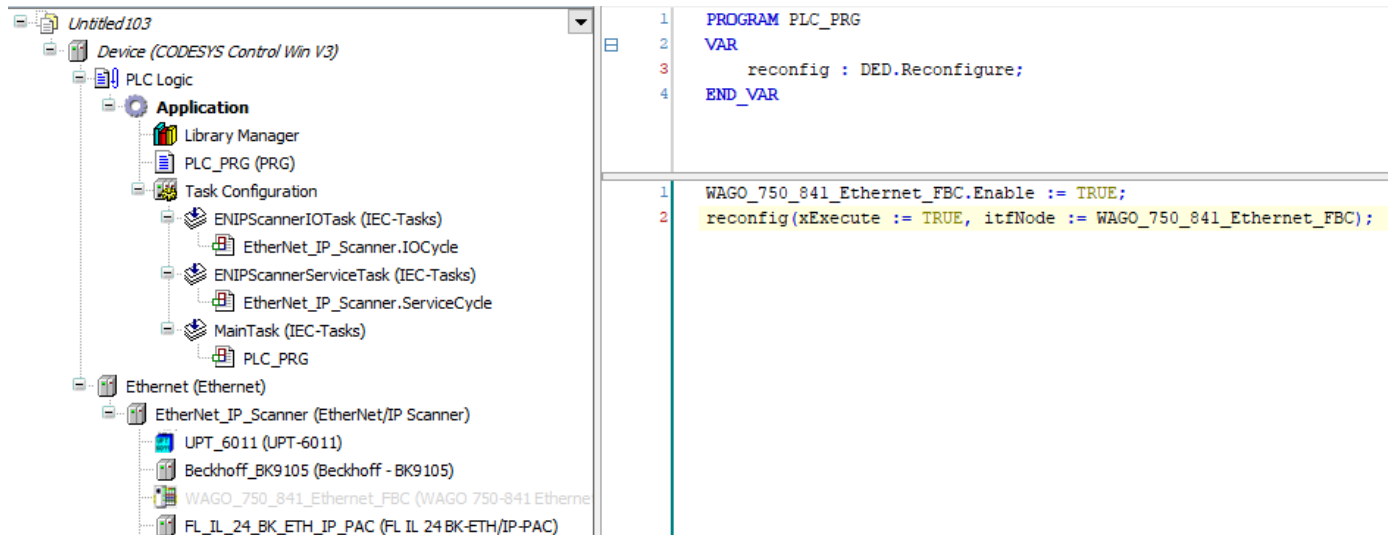


Variable	Mapping	Channel	Address	Type	Current Value	Prepared Value	Unit	Description
  		Holding Registers	%IW0	ARRAY [0..9] OF WORD	Not updated (check tooltip)			
  		Input Registers	%QW0	ARRAY [0..499] OF WORD	Not updated (check tooltip)			

Value is not being updated, because it is not used in code nor the setting "Always update variables" is enabled.

## EtherNet/IP improvements

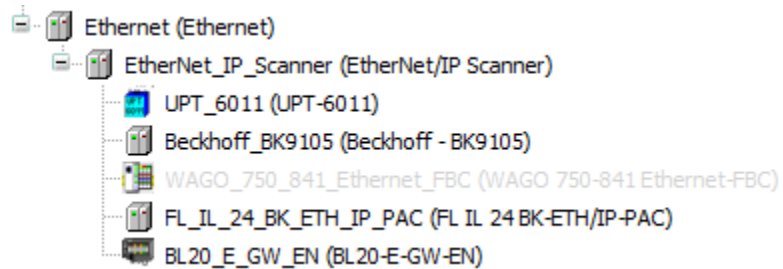
- LLDP
- **Support of CT 18.1 and CT 19**
  - Certification on CODESYS Control RTE possible with runtime version  $\geq 3.5.18.40$
- **Reconfigure for Remote Adapter**
  - Possibility of enabling/disabling a remote adapter without restarting the complete stack



The screenshot displays the CODESYS IDE interface. On the left, the project tree shows a device named 'Device (CODESYS Control Win V3)' containing a 'PLC Logic' application. Under 'Task Configuration', several tasks are listed, including 'EtherNet\_IP\_Scanner.IOCycle', 'EtherNet\_IP\_Scanner.ServiceCycle', and 'MainTask'. The 'Ethernet (Ethernet)' section shows a configuration for 'EtherNet\_IP\_Scanner (EtherNet/IP Scanner)' with various hardware components like 'UPT\_6011', 'Beckhoff\_BK9105', and 'WAGO\_750\_841\_Ethernet\_FBC'. On the right, the ladder logic editor shows a program 'PLC\_PRG' with a variable 'reconfig' of type 'DED.Reconfigure;'. The program body contains two lines of code: 'WAGO\_750\_841\_Ethernet\_FBC.Enable := TRUE;' and 'reconfig(xExecute := TRUE, itfNode := WAGO\_750\_841\_Ethernet\_FBC);'.

## EtherNet/IP improvements

- API for accessing I/O Assembly data



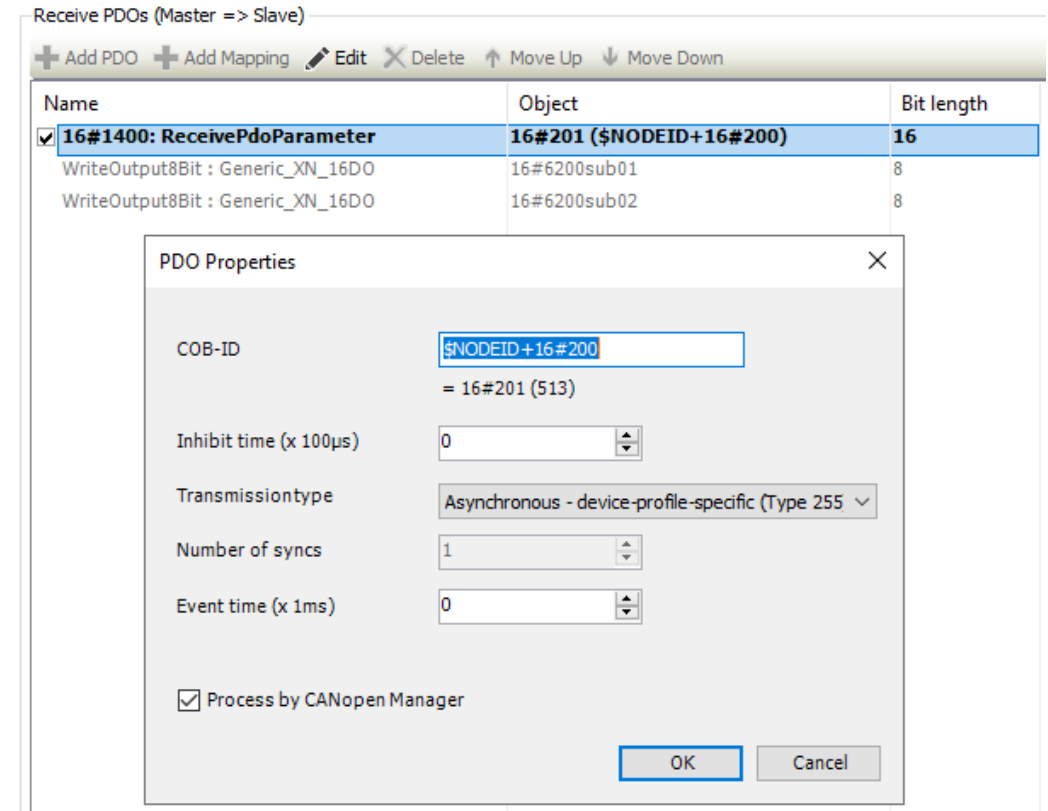
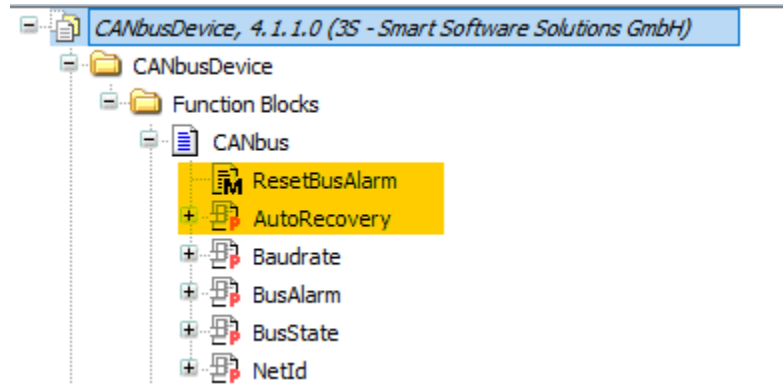
```
1 PROGRAM PLC_PRG
2 VAR
3     itfProducingAssembly : CIP_Object.IAssembly;
4     pbyAssemblyData : POINTER TO BYTE;
5     udiAssemblySize : UDINT;
6 END_VAR

1 itfProducingAssembly := UPT_6011.GetAssemblyByID(100);
2 IF itfProducingAssembly <> 0 THEN
3     pbyAssemblyData := itfProducingAssembly.Data;
4     udiAssemblySize := itfProducingAssembly.Datasize;
5 END_IF
```

- Possibility to deactivate the creation of I/O channels

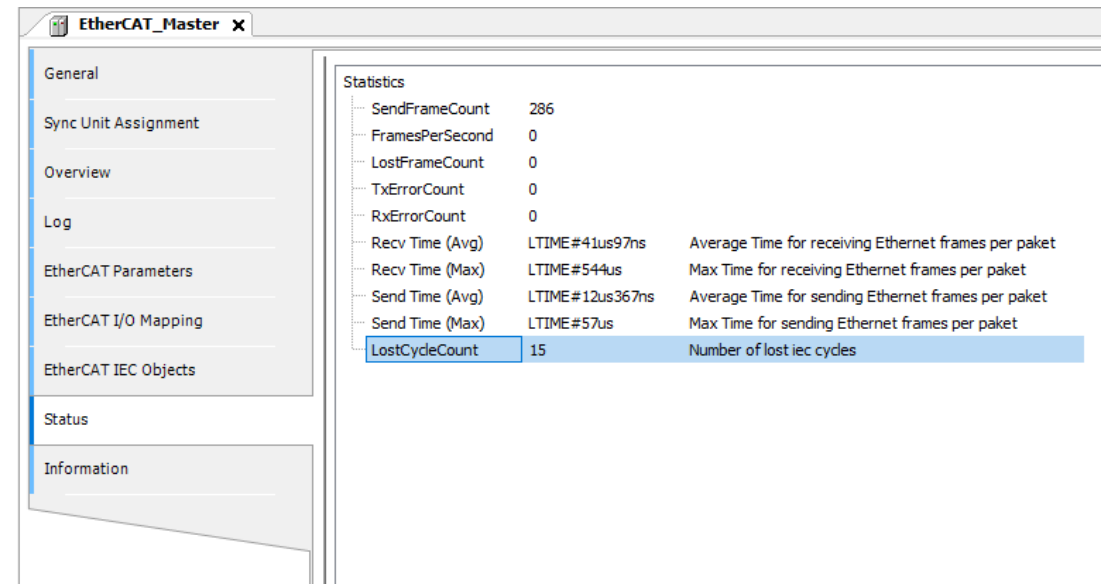
## CANopen improvements

- Event time for RPDOs
- Deactivation of auto recovery for CAN stacks possible
  - Required in rough environments



## EtherCAT improvements

- Support for KEBA DA33x\_SDC drive
- SafetyESIConverter: Support of ETG.6100.3 (generic Safety drive profile) communication objects
- Diagnosis counter for lost cycles



The screenshot shows the 'EtherCAT\_Master' application window. On the left is a navigation pane with the following items: General, Sync Unit Assignment, Overview, Log, EtherCAT Parameters, EtherCAT I/O Mapping, EtherCAT IEC Objects, Status, and Information. The 'Statistics' section is active, displaying the following data:

Statistic	Value	Description
SendFrameCount	286	
FramesPerSecond	0	
LostFrameCount	0	
TxErrorCount	0	
RxErrorCount	0	
Recv Time (Avg)	LTIME#41us97ns	Average Time for receiving Ethernet frames per paket
Recv Time (Max)	LTIME#544us	Max Time for receiving Ethernet frames per paket
Send Time (Avg)	LTIME#12us367ns	Average Time for sending Ethernet frames per paket
Send Time (Max)	LTIME#57us	Max Time for sending Ethernet frames per paket
LostCycleCount	15	Number of lost iec cycles

## EtherCAT improvements

- **GetStatistics: Return of average and maximum send and receive time**

**IoDrvEtherCAT.GetStatistics (METH)**

METHOD GetStatistics

Reads the statistics data and copies it to the output values. The number of sent frames or TX error counts could be then used within the application. The statistic information could be reset by calling ClearStatistics In a well working runtime system the values of udiLostFrameCount, udiTxErrorCount and udiRxErrorCount should be always zero. The same information is also shown at the status page of each EtherCAT master.

InOut:

Scope	Name	Type	Comment
Output	udiSendFrameCount	UDINT	Number of total EtherCAT frames sent
	udiFramesPerSecond	UDINT	Number of frames per second
	udiLostFrameCount	UDINT	Number of total lost frames. A frame is lost due to EMC, connection or other hardware problems for example. In addition, if the CRC does not match then this counter is increased as the network driver skips the frame.
	udiTxErrorCount	UDINT	Number of frames that could be not sent as the runtime function sendethframe returns not ERR_OK.
	udiRxErrorCount	UDINT	Number of missing received frames. Each sent frame must be also received at least in the next IEC cycle. If the runtime system (TCP-IP stack) is busy or the priority is low then frames could be delayed for sending or receiving and this counter will increase.
	udiLostCyclesCount	UDINT	Number of lost iec cycles. If the EtherCAT Stack is not called for a complete cycle then this counter will be increased by one.
	ltRecvAvg	LTIME	Average time for receiving Ethernet frame per packet (EnableTimeMeasurements must be set to true otherwise values are zero)
	ltRecvMax	LTIME	Maximum time for receiving Ethernet frame per packet
	ltSendAvg	LTIME	Average time for sending Ethernet frame per packet
	ltSendMax	LTIME	Maximum time for sending Ethernet frame per packet

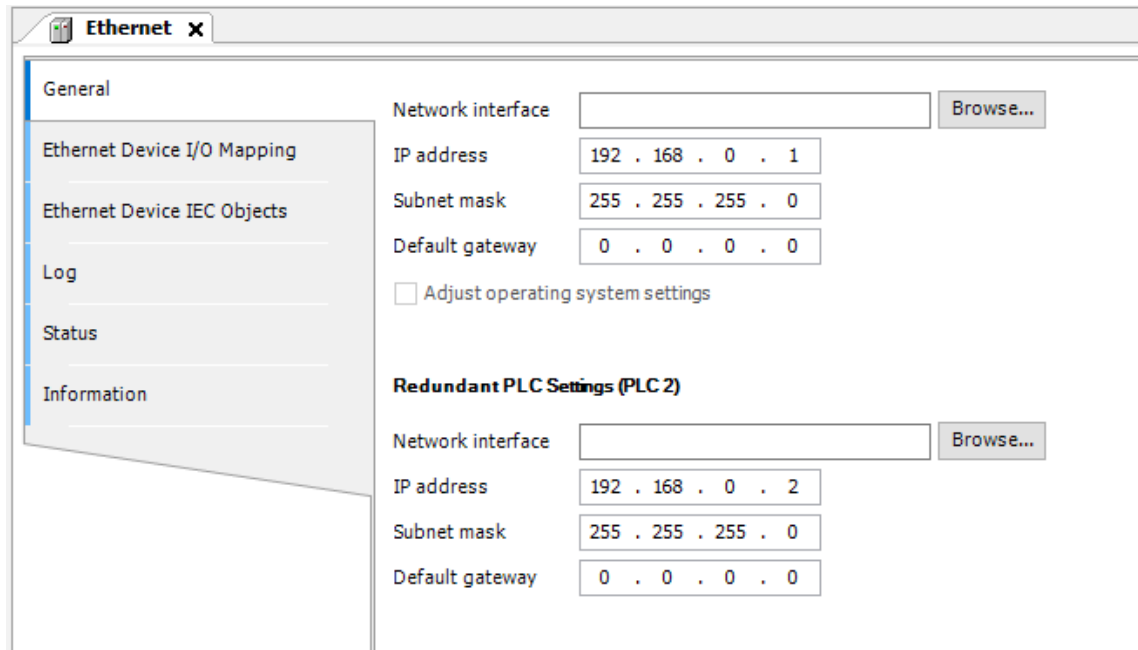


## PROFINET improvements

- **MRP Client for device and controller**
  - Dual port interface required!
- **System redundancy S2 for PROFINET Controller**

## Ethernet adapter improvements

- Support of PLC redundancy



## IO-Link improvements

- Support of multiple IO-Link instances



# CODESYS COMMUNICATION

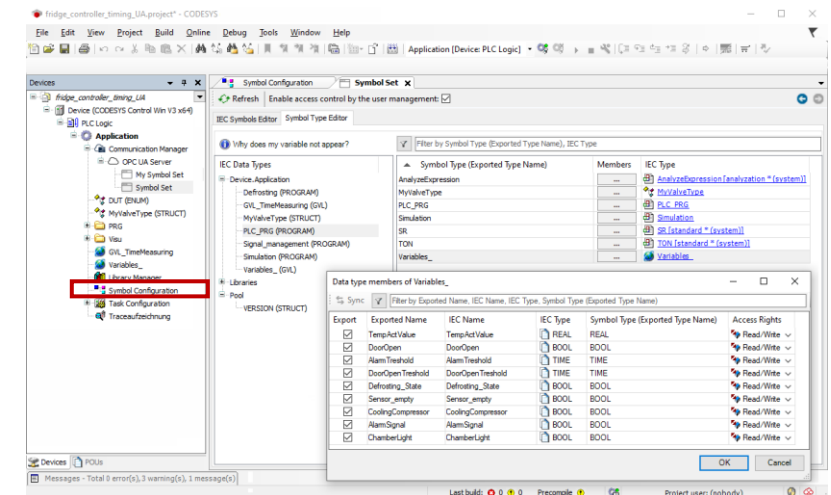
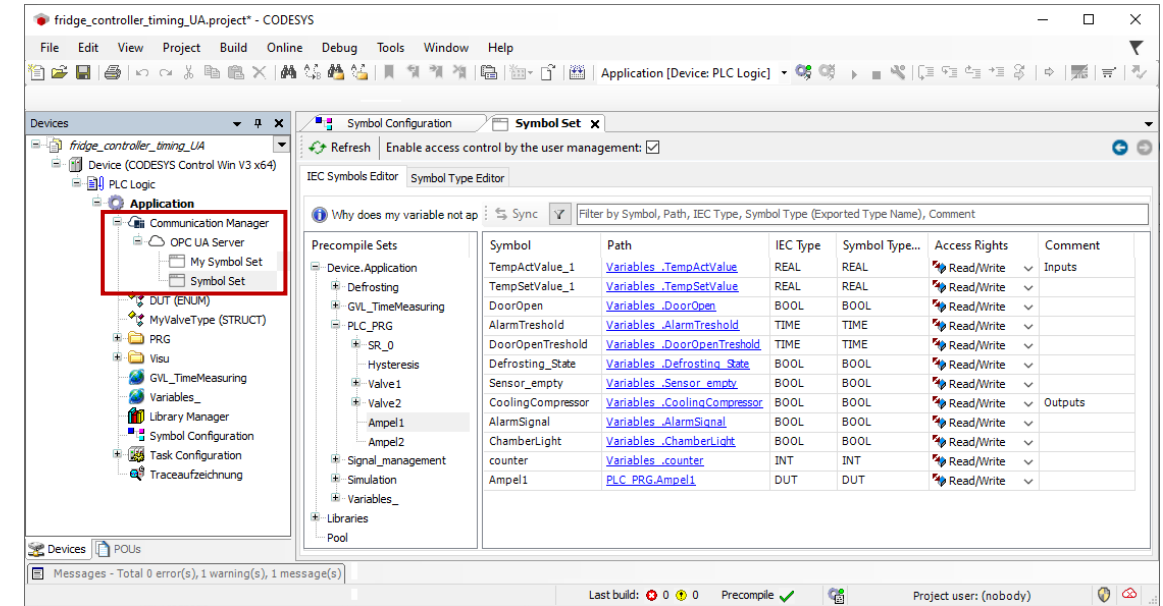


## Overview

- **OPC UA improvements**
- **Certification of the CODESYS OPC UA Server**
- **BACnet improvements**

## OPC UA improvements

- New editor for symbol configuration**
  - Usage by „OPC UA Server“ object below Communication Manager
  - New workflow
    - ➔ No compilation of application necessary
- Support of independent symbol sets**
- Legacy symbol configuration**
  - Usage in parallel to latest editor possible
  - Only support of PLCopen information model
  - Support of PLC Handler





## OPC UA improvements

- **New metrics and statistics**
  - Metrics in core dialog
  - Detailed statistics for new editor

Read current metrics from device

Metric	Value in Project
<b>Size of User Code</b>	<b>1.249.616 Byte</b>
Communication	
<b>Number of OPC UA tags</b>	<b>1.818.917</b>
Application	1.818.917
Data Sources Manager	52
Symbol Configuration	1.817.524
Symbol Set	1.341
<b>Number of Information Models</b>	<b>1</b>
Application	1
<b>Variables used in visualizations</b>	<b>0 Variables</b>
Fieldbus	

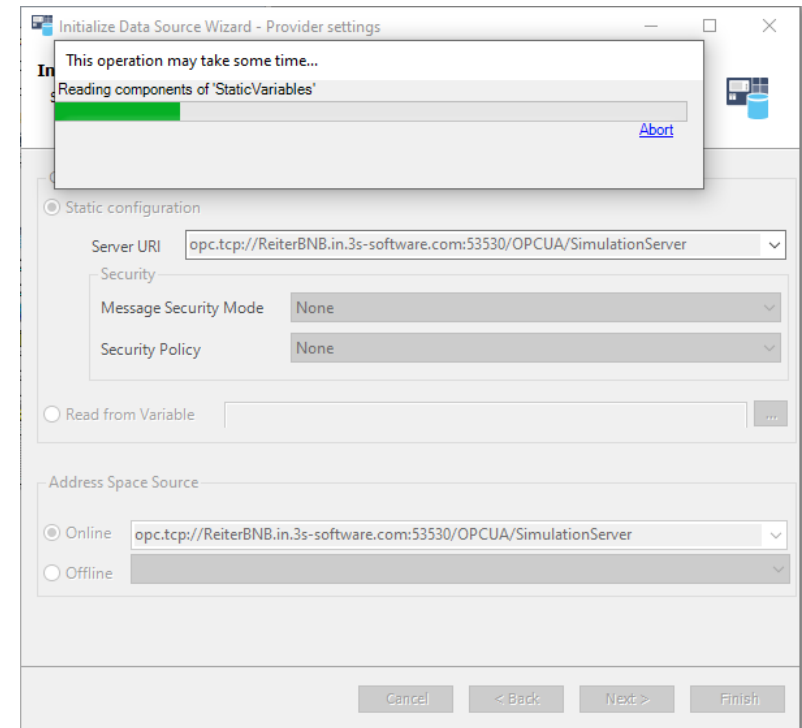
IEC Symbols Editor | Symbol Type Editor | Symbol Set Result

Number of exported symbols: 1.246.810

Exported Symbols	Number of Symbols	Symbol Type (Exported Type Name)
GVL_IO	1.341	<a href="#">GVL_IO</a>
PersistentVars	1.245.469	<a href="#">PersistentVars</a>
ProcessParams	209.000	<a href="#">TParametersUnitsArray</a>
ProcessParamsManage	5	<a href="#">TParameterSetManage</a>
RecipeParams	836.002	<a href="#">TMtpProduct_Parameters</a>
RecipeManage	6	<a href="#">TProductsParameterSetManage</a>
Bars	172.666	<a href="#">TBars</a>
FullProducts	861	<a href="#">TFullProducts</a>
CurrProduct	214	<a href="#">TProduct</a>
ProductsList	21.402	<a href="#">TProductsList</a>
UnitsWorkprograms	5.202	<a href="#">TUnitsWorkprograms</a>
Shifts	108	<a href="#">TShifts</a>
IcsProfileLevel	1	BYTE
IcsUserName	1	STRING

## OPC UA improvements

- **Usability improvements of OPC UA Datasource**
  - Improved usability of wizard and browsing of server
  - Access to OPC UA options for more fine-grained control of data exchange
    - Publishing interval for variables
  - Connection to servers requiring authorization



## Certification of the CODESYS OPC UA Server

- **Micro Embedded Device Profile completed**
- **Certification passed**
- **Specifications:**
  - Micro Embedded Device 2017 Server Profile
  - Method Server Facet
  - SecurityPolicy [B] - Basic256Sha256
  - SecurityPolicy [A] - Aes128-Sha256-RsaOaep
  - SecurityPolicy - Aes256-Sha256-RsaPss
  - User Token - Anonymous Server Facet
  - User Token - User Name Password Server Facet
- **Listed as certified on OPC Foundation website:**  
<https://opcfoundation.org/products/view/codesys-opc-ua-server/>



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## BACnet improvements

- **Support of BACnet protocol revision 23**
  - Required for certification of new devices from 2024 onwards
  - Incompatible changes in new revision
    - Existing projects cannot be updated.
    - However, both revisions can be mixed in projects.





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