

CODESYS® V3.5 SP19

Features and Improvements

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







AUTOMATION SERVER













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 IIoT Libraries SL

Improved usability – Import PLCopen XML

 Set conflict handling for all imported items with just one command

- I S			Rename the new object		
	PLC_PRG PLC_PRG_1		Rename the new object		

 Adaptation of preset for handling of single items

Currently selected target object: Application [Device: PLCLogic]

Contents Additional Information

Please select the items which should be imported.

You can change this selection while this dialog is open. Currently selected target object: Application [Device: PLCLogic]

All items will be imported below the node which is currently selected in the navigator.



Skip the new object (for all conflicts).

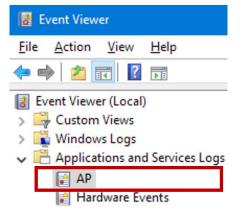
Engineering

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

rc 🚺 Informationen	26.01.2023 15:10:08	CommandManager					
Informationen	26.01.2023 15:10:06	CommandManager					
(i) Informationen	26.01.2023 15:09:48	CommandManager					
 Informationen 	26.01.2023 15:09:48	CommandManager					
(i) Informationen	26.01.2023 15:09:41	CommandManager	~				
<			>				
Ereignis 1, CommandManager		Open project	×				
Allgemein Details Start executing IStandardCommand with Guid={9d09e965-6254-46fd-9c21-b27fd2e97b52}; '_3S.CoDeSys.FileCommands.FileOpenCommand' with 3 params: 'D:\VShare\FeaturePresSP19\CDS-83543_3-Way-Merge_Test.project', '00000000-0000-0000-00000-0000000000', 'False'.							

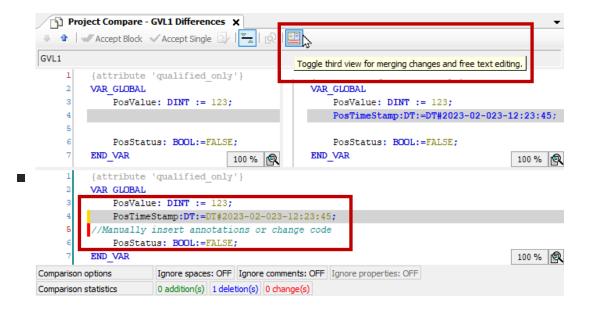
Informationen 26.01.2023 15:10:19 CommandManager Informationen 26.01.2023 15:10:19 CommandManager			
Informationen 26.01.2023 15:10:19 CommandManager Ereignis 1, CommandManager Locin active application	I nformationen	26.01.2023 15:10:54	CommandManager
Ereignis 1, CommandManager Login active application	Informationen	26.01.2023 15:10:19	CommandManager
Login active application	i) Informationen	26.01.2023 15:10:19	CommandManager
	•		



Engineering

Improved usability – Advanced Project Compare

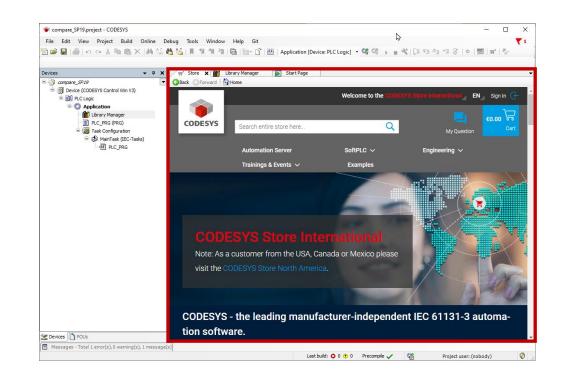
- Compare window: additional 3rd window possible
 - Offers additional commands for more merge options
 - Possibility to edit the changes in text





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)



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<u>0</u>K

Cancel

Engineering

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:

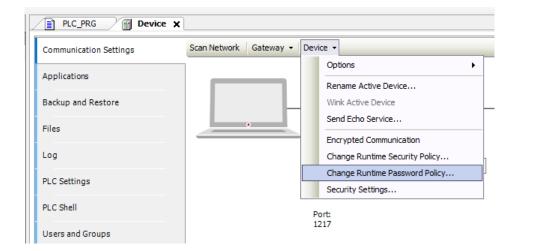
- Installed add-on "CODESYS Security Agent"
- Added menu command "Device security settings"



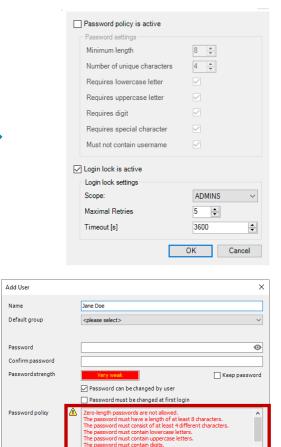
ting	Value	Description
Communication Policy	POLICY_AES128SHA256RSAOAEP	Support for all policies beginning with Aes128Sha256RsaOaep (AES 128 with SHA256)
🔦 CommunicationMode	ALL	Add all available modes. No security, just signed, signed and encrypted
Activation	ACTIVATED	Activates the OPC UA Server. [Default]
🔧 UserAuthentication	ENABLED	Activates the user authenticaiton for the OPC UA Server. [Default]
🔧 AllowUserPasswordOnPlaintext	NO	Forbids to tramsit the password in a plaintext way.
🔦 Application Name	OPCUAServer@WAGNERRONB	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	Mininmal key length for RSA keys.
🛛 🧰 CmpUserMgr		
🔧 UserLogin_AuthenticationType	AUTO_NEGOTIATE	Negotiate authentication algorithm
🔧 UserLogin_RSAKeyLen	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 UserMgmtAllowAnonymous 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.
🛛 🧰 СтрАрр		
🔧 EnforceSignedCode	NO: All applications will be loaded by $$	All applications will be loaded by the PLC.
🛛 🧰 CmpSecureChannel	YES: Enforce that only signed application	s can be loaded by the PLC.
🔧 Communication Mode	NO: All applications will be loaded by the	PLC
🔧 CreateSelfSignedCert	YES	Create a self-signed cert
🛛 🧰 CmpWebServer		
🔧 CommunicationMode	HTTP, HTTPS	HTTP and HTTPS connections supported
CreateSelfSignedCert	NO	Don't create a self-signed cert

Improved security – Password policy settings

Support of runtime feature: Configurable password policy



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



ord must contain special characters

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Cancel

Engineering

Improved License Manager

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

icenses	Name	CODESYS UML	
Local: 3S-Smart Software Solutions Softlicenses [128-26458981]	Company	3S-Smart Software Solutions GmbH	
CODESYS Test Manager	Unit counter	-	
Local: 35-5mart Sortware Solutions Sortlicenses [128-2/92/8/9] CODESYS UML	License quantity		
CODESTS UNIL Local: CODESYS GmbH UFC CmRuntime [130-2588321951]	Usageperiod		
Local: CODESIS GmbH OFC Chikunume [130-2308321951]	Feature map		
Control Performance M	Activation time	-	
Control Performance M	Expiration time		
I/O Channels	Firm code	5000.304	
Visu	Product code		
OPC UA Server	Produce code	1557	
Data Sources	Description		
Dynamic C Code		dass diagramm & state chart)	
Multicore	c. in the ground of the		
Instances of CANopen, Modbus, PROFIBUS			
Instances of EtherCAT, EtherNet/IP, PROFINET			
The license for the product exists on the selected license container.			
📙 The license for the product exists on the selected license container, but is inval	id (e.g. expired).		
The license for the product does not exist on the selected license container.			

Install Licenses Activate a license over the internet					
Specify your ticket ID and select the license server. Both values have been provided to you by the software vendor during the order process.					
Ticket ID	· · · · ·				
License server	CODESYS GmbH (http://license.codesys.com)				
Container	Local: 3S Security Key #1 [2-2699893]				

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

Project Inspection - Add-Ons Project Inspection	_		×			
Project inspection						_
Creating a new installation containing the	ne following add-	ons.		Project Inspection - Missing add-ons — 🗆 🗙	D	Diff
Required Add-On	Status			Project Inspection	7	The
CODESYS Code Generator ARM, 4.0.3.0	Missing			Suitable add-ons are missing.		
CODESYS SoftMotion, 4.14.0.0	Missing				Γ	
				The project contains objects for which no suitable add-ons are installed.		
				How would you like to proceed?		P
Optional Add-On		Status	^			
CODESYS Control SL Extension Pack	age, 4.8.0.0	Missing		Install missing add-ons to this version and restart.		A
CODESYS Control Win 64, 3.5.19.0		Missing				A
CODESYS Core Dump, 4.1.0.0		Missing	~	Continue anyway. The objects cannot be changed.		
Cancel < Back	Next >	Fini		Cancel < Back Next > Finish		

Project Insp	ection - Overview	- 0
Project I	nspection	
The proje	ct has been saved with a different version (CODESYS V3.5 SP19).
	s project is still in a development phase. I v mind that different code may be generated	
	project has already been deployed on a r ctly the same code and hence need the pos	
Cor	sequence: A compatible version will be op	ened or installed if not yet available.
De	ails	
	Cancel <	Back Next > Finish
Differences		- 0
The project	contains the following differences to the cu	rrent installation:
	Project	Installation
Profile	CODESYS V3.5 SP19	CODESYS V3.5 SP19 Patch 1
Add-on	CODESYS Code Generator ARM, 4.0.3.0	missing
Add-on	CODESYS SoftMotion, 4.14.0.0	missing
		0//
		OK

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

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	
lnformationen	18.01.2023 12:32:21	AP Installer	0	Keine	
Ereignis 0, AP Installer					
Allgemein Details					
Category: Microsoft.Hosting.	ifetime				

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

😥 Start Page 🛛 🙀 Package Designer: CODESYS Visualization 🗙	•				
New Open Save Save as Close Check Configure Signing					
Package	TargetFolder %REPOSITORY_LOCATION%\Visual Elements\profiles				
General \$GeneralName	Path C:\Users\m.wagner\AppData\Loca\\Temp\PackageDesigner\Package - ctsw1u1e.2zb\\Visu-Profiles\CODESYS Visualization 4.2.0.0				
Component PlugIns	IanoreArchiveFolder				
b Component Libraries	Annotation				
Component Visualization Profiles	Annotation				
Folder CODESYS Visualization 4.2.0.0					
Folder Visualization Styles					
File CreateVisuRepositoryInfo.bat					
File Visu-3328F7BD-A81C-4F41-8EE9-4D5A588A4882.local.dependencies	TargetFolder Specifies the path to the target folder where the folder should be copied to. If this is a string, that path will be directly used. If this is a \$ followed by an integer				
ExternalCall	value, it is a reference into the target directory table and the user will be able to select the desired target path interactively. You can also use environment				
String Table	variables enclosed in percent signs (%). Beyond the variables provided by the operating system, there are some additional local environment variables: • AP COMMON				
File Table	The location of the Common folder of the Automation Platform installation. • AP PLUGINS:				
Package References	The location of the PlugIns folder of the Automation Platform installation.				
Referenced Package CODESYS, Visualization Support - Newest between 4.0.0.0 - 4.255.255.255	 AP_PROFILES: The location of the Profiles folder of the Automation Platform installation. 				
Referenced Package CODESYS. Trace - Newest between 4.0.0.0 - 4.255.255.255	AP_ROOT: The location of the root folder of the Automation Platform installation.				
Referenced Package CODESYS.Recipes - Newest between 4.0.0.0 - 4.255.255	DESKTOP:				
Referenced Package CODESYS.Communication - Newest between 4.0.0.0 - 4.255.255.255	The logical Desktop rather than the physical file system location • GATEWAYPLC:				
Release Notes	The location of the GatewayPLC folder. Requires at least package manager 3.5.7.0.				
Release Note Neutral	GATEWAYPLC_CFG_CRTWIN:				
	The location of the ControlWin config file. Requires at least package manager 3.5.13.0.				
Third Party Licenses CODESYS Visualization 4.2.0.0.zip	GATEWAYPLC_CFG_GTW: The location of the Gateway config file.				
TargetDirectoryDefinitions	Requires at least package manager 3.5.13.0.				
	GATEWAYPLC_CFG_HMI: The location of the HMI config file.				
	Requires at least package manager 3.5.13.0. • GATEWAYPLC CFG SM:				
	The location of the SoftMotion config file.				
	Requires at least package manager 3.5.13.0. • GATEWAYPLC_CFG_RTV:				
	The location of the RemoteTargetVisualization config file.				
	Requires at least package manager 3.5.13.0. • %PACKAGE_VERSION%				
	* 76PACAGE_VESION76 The version of the package.				
	Requires at least package manager 3.5.17.0.				

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

INT			ర ర ర		
INT			-		
INT					
	(ANY_TO_INT(60) * AN	(ANY_TO_INT(60) * AN	Ŭ	The length of the STRING representin	
INT	60	50	ð	This parameter contains the number o	
INT	420	420		This is a parameter, that will exist in th	
			ð		
			ð		
BOOL	TRUE	TRUE			
INT	10	10			
	BOOL	BOOL TRUE	BOOL TRUE TRUE	Image: Second state Image: Second state	Number Number Number Number

Partial access to bitfields

- Feature of 61131-3 3rd 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	Туре	Value					
byVar1	BYTE	16#F1					
byVar2	BYTE	16#88					
🔷 wVar1	WORD	16#88F1					
1 🕘 by\	/arl 16#F	1:=wVarl.%B0 16#F1;					

2 byVar2 16#88 := wVar1.8B1 16#88 ;

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

grade to SP19 format								
Recent messages						~		
anges made (double-click on object for compare, right-click on object for r	more ope	erations):						
bject U U U U U U U U U U U U U U U U U U		Text status moainea modified modified modified modified modified modified	Property status	Lock s.Deck	Description	^ >		
Select/deselect all			14 ol	ojects sel	ected, 14 obje	cts total	_	
Keep locks 🗌 Keep change lists 🗹 Update after commit (recomme	ended)							

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

SVN Working Copy Explorer: fridge_controller_timing_SP16 - file:///D:/@Proje	kte/DevCon23/SVN-Profile-Con	isistency/SVNRepo23/trunk/DevCon23/	
🛛 Select 🔹 🖌 Update 🔹 👈 Revert 👻 Delete 🔹 🔻 Commit 🔹 🔒 Locks 🗣	▲ Conflicts	ြို Change Location 🌣 Refresh 🛔 Cleanup	
Path in repository	Mark as resolved	t	
E DevCon23	Resolve Conflicts	_timing_SP 16	
😑 🔲 🇀 5ce3da45-db07-42e7-a21c-a00fff4ed8f6_D_rw_temp_kuel	Resolve using mine	42e7-a21c-a00fff4ed8f6 D:\rw_temp\kuehlschrank.jpg	
svnobj	5ce3da45-db07	-42e7-a21c-a00fff4ed8f6 D:\rw_temp\kuehlschrank.jpg	
🖻 🔲 🧰 Device	Device		
svnobj	Device		
🖹 🔲 🚞 Plc Logic	PLC Logic		

CODESYS	3	>
0	This operation will disconnect this project from the SVN repository.	
	How do you want to continue?	
	○ Keep locks and disconnect from SVN repository	
	Release locks and disconnect from SVN repository	
	OK Cancel	

- CODESYS Git
 - License information

		L			
Messages - Total 0 error(s), 0 warning(s), 1 message(s)					
Git Messages	•	O error(s)	😗 0 warning(s)	 1 message(s) 	\times ×
Description					
Valid license found.					

Handling of Git repository in the CODESYS Project Archive

Project A	chive	\times
Include	the following information into the archive	
.	Git	
🕒 🖻 - 🔽	Options	
主 🗹	Referenced devices	
🖻 - 🗹	Referenced libraries	
±	SoftMotion Library Profiles	_
📄 🖻 🔽	Visualization Profile	

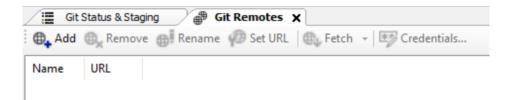
CODESYS Git

Support of "Detached Head"

	it Status &	Staging X												-
Detac	hed Head	Branch (n	o brar	nch) Last o	ommit <u>9176cae</u>							Discard all changes	🗛 Commit complete	U
🖌 Stage	d Changes ((0)												
\$		Object		Details										
—														
¢														
	ged Change	es (0) ——												
+		Object		Details										
\triangleleft														
·														
¢														
42														
;)														
							Las	st build: 😳 0 😷 0	Precompile 🧹	6	Project user: (nob	ody) 🔮 🐼	Detached Head => 91760	tae 🔡

CODESYS Git

Remote commands disabled in case of no remote repository

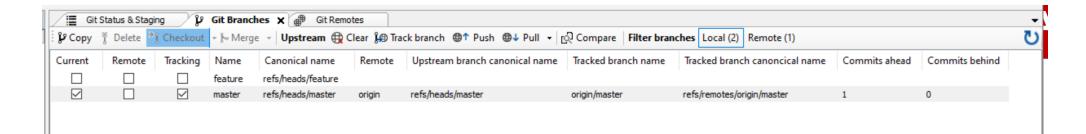


- Improved credential handling
 - Editing credentials of remote repositories inside CODESYS

🕸 Edit Creden	tials	\times
Remote name	origin	\sim
URL	D:\JiraTickets\feature_presentation_2023\vermotes	
User name		
Password		۲
	Save Delete Can	icel

CODESYS Git

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



CODESYS Git

Compare two commits in the Git History view

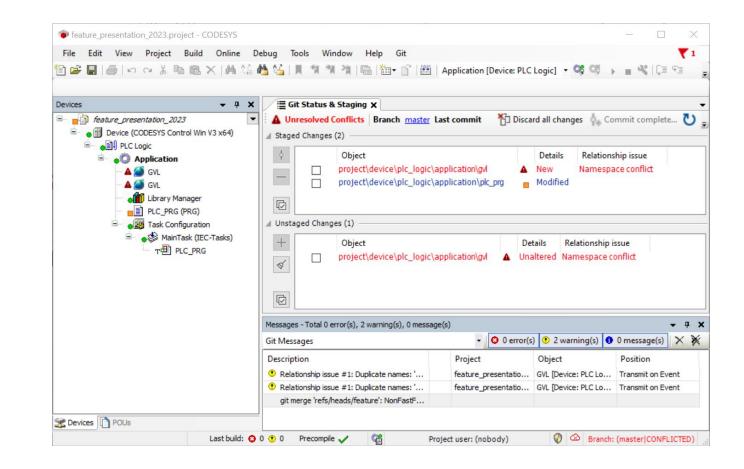
Git Status & Stagir	ng / ∰ Git Remotes / History / 📄 PLC_PRG / ot Block ✓ Accept Single 🔄 / 🛌 ၊ 😥	D Project Comparison - Differences X
4f3c2a738543a895819c62	347bb2e99c54d404d0	9176cae2ae2b3b23df5ab5e9424a6230574a3132
Device	y Manager P <mark>RG</mark>	Device Device Application Device Application Dibrary Manager Devery Manager Task Configuration Project Settings
Comparison options	Ignore spaces: OFF Ignore comments: OFF Ignore properties:	OFF
Comparison statistics	0 addition(s) 0 deletion(s) 1 change(s)	

refs/heads/feature		ref	s/heads/master		
🗏 📶 Device			f Device		
🖃 📑 PLC Logic			PLC Logic		
😑 👹 Applicatio	n		C Application		
👘 Libra	ry Manager		🞁 Library	Manager	
PLC_	PRG		PLC_P	RG	
🗉 🧾 Task	Configuration		🌃 Task C	onfiguration	
Project Settings			🚱 Project Settings		

Compare two branches in the Git Branches view

CODESYS Git

Merge: Handling "Relationship Issues"



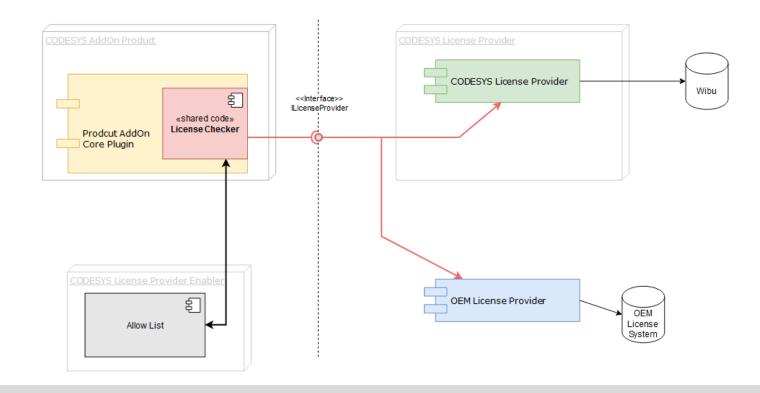
CODESYS Git

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

🏷 Merge Branch			\times
Branch to merge	feature		\sim
▲ Git Merge Option	ns —		
Merge Conflict Stra	itegy	Apply automatic mergers (as available)	~
Fast Forward Strate	egy	Use fast forward if possible	~
		Commit On Success	
		ОК	Cancel

"Automatic Mergers" supported if available

- 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









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Runtime

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 <u>"Password Policy Settings"</u> (Engineering) for further information

tting	Value	Description
CmpOPCUAServer		
CmpOpenSSL		
🗀 CmpUserMgr		
UserLogin_AuthenticationType	AUTO_NEGOTIATE	Negotiate authentication algorithm
UserLogin_RSAKeyLen	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 UserMgmtAllowAnonymous is set)
UserMgmtAllowAnonymous	NO	No anonymous login is allowed when user management is activated.
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 aga
UserMgmt.PasswordPolicy	DISABLED	User management password policy is disabled
UserMgmt.PasswordPolicy.Length	8	Minimum length
UserMgmt.PasswordPolicy.UniqueCharacters	4	Minimum number of unique characters
UserMgmt.PasswordPolicy.Characters.Lowercase	YES	User management passwords have to contain lowercase letters.
UserMgmt.PasswordPolicy.Characters.Uppercase	YES	User management passwords have to contain uppercase letters.
UserMgmt.PasswordPolicy.Characters.Digits	YES	User management passwords have to contain digits.
UserMgmt.PasswordPolicy.Characters.Special	YES	User management passwords have to contain special characters.
🔧 UserMgmt.PasswordPolicy.Characters.NoUsername	YES	User management passwords must not contain the usemame.
🔧 UserLogin.Lock	ENABLED	User login lock enabled.
UserLogin.Lock.Scope	ADMINS	User login lock scope for admins.
UserLogin.Lock.MaxRetries	5	After how many tries of invalid credentials the login user is locked
UserLogin.Lock.TimeoutSec	3600	After how many seconds a locked user is released
A Password.Expiration	DISABLED	Check password expiration disabled.
Password.Expiration.Scope	ADMINS	Password expiration scope for admins.
Password.Expiration.TimeoutDays	100	After how many days a new password is required [11000]
🔄 СтрАрр		
CmpSecureChannel		
🛙 🧰 CmpWebServer		

Change Runtime Password Policy

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

Runtime

Improvements in Device User Management

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





	Add/Remove	Modify	View
Administrator		+	4
Administrator-Op		-	_
Developer		-	-
Operator		-	-
Service		-	_
Watch		-	_

⇒ UserManagement					
	Acc	Access Rights			
. ⊜ ⇒	Gro	oups			
	•	Administrator			
	• 🔿	Administrator-Operator			
-	•	Developer			
		Operator			
-	• 🔿	Service			
		Watch			
- L., 🔿	Use	ers			

	Add/Remove	Modify	View
Administrator		dþ	da.
Administrator-Op		_	_
Developer		_	_
Operator		+	+
Service		_	_
Watch		_	_

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	⇒	Acc	ess Rights
-	⇒	Gro	ups
		⇒	Administrator
		⇒	Administrator-Operator
		⇒	Developer
		⇒	Operator
		⇒	Service
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	Add/Remove	Modify	View
Administrator		4	÷
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 Basic S	1 MB 128 IO Basic M	3 MB 256 IO Basic L	3 MB 256 IO Standard S	5 MB 1.024 IO Standard M	6 MB 2.048 IO Standard L	8 MB 4.096 IO Performance M	10 MB 8.192 IO Performance L
	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":

Metric	Value in Project	Max. allowed by License	Value on Device
😑 🔘 Size of User Code	12.528 Byte	3.145.728 Byte	12.528 Byte
🧔 Арр2	n/a		
🜍 Application	12.528 Byte		12.528 Byt
📮 🦆 Communication			
🖹 🛆 Number of OPC UA tags	11	unlimited	
🖃 💿 Application	11		
Symbol Configuration	11		
🔘 App2	0		
🔍 🖷 Variables used in visualizations	1 Variables	not yet supported	not yet supporte
💮 App2	n/a		not yet supporte
Application	1 Variables		not yet supporte
🗐 🗊 Fieldbus			
🖣 🔟 IO Channels	1 Channel(s)	512 Channel(s)	1 Channel(s
🦾 🧔 Application	1 Channel(s)		1 Channel(s
Instances of EtherCAT, EtherNet/IP, PROFIN	1 Instance(s)	1 Instance(s)	1 Instance(s

- 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:

Further improvements

- New SysSocket interface function: SysSockRecvMsg():
 - Detection of unicast and broadcast UDP messages
 - Details see documentation in SysSocketItf.h

CODESYS Control Win - SysEthernet:

- WinPcap:
 - Integration in Control Win::SysEthernetWin32
 - WinPcap out of maintenance!
 - Usage: Ethernet-based fieldbuses
- Porting from WinPcap => <u>Npcap</u>
 - Npcap: already included in wireshark network analyzer
 - Comparison Npcap vs. WinPcap: <u>https://npcap.com/vs-winpcap.html</u>



WinPcap has been the de facto standard library for packet capture and link-layer packet injection for over a decade. Many open source and commercial network tools use WinPcap for network access and filtering, but it has been unmaintained since 2013 and is <u>no longer supported</u>.

Npcap is the exciting and feature-packed update to the venerable WinPcap packet capture library. Building on the successful WinPcap legacy, Npcap brings increased speed, security, and Windows 10 support. All of WinPcap's packet capture and injection features are included, with a few great additions like raw 802.11 frame capture. Still wondering if Npcap is right for you? Check out this comparison of features:

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

Runtime Toolkit support for new platforms

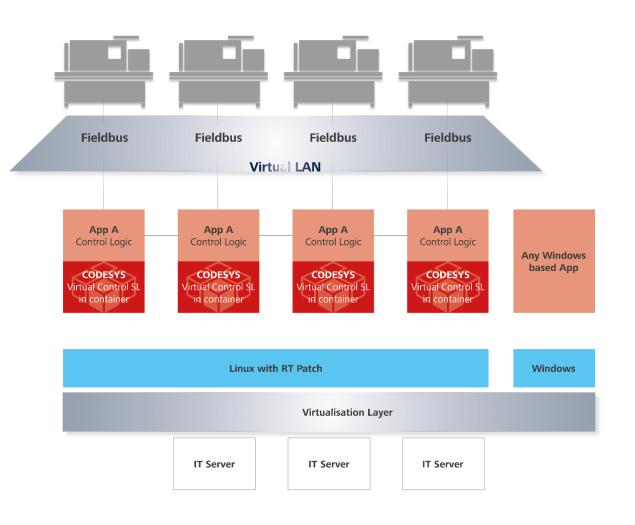
- Support of DragonCore (Loongson) platform
 - Integrated compiler
 - Support of add-on functions, e.g.
 - Fieldbus, e.g., EtherCAT, PROFINET, EtherNet/IP
 - Visualization, e.g., WebVisu, TargetVisu
 - Motion / CNC / Robotics
- Support of VxWorks/ARM64 platform
 - All known CODESYS features



WNDRVR

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

CODESYSMassLicense	er				03.01.2023 09:39:02
WARNING: only 5 li	cense(s)	remaining in C:\Users\1.z	ickl\AppData\Roaming\CODES	/S CML\licenses\CML	. TestA LicenseA.txt
PLC Name	DeviceI	d SN	Status	Online	Step/total
******	********	**********************	***********************	******	*********************
CODESYSControl-4	22022	RTS-00000000ec86d893	Dene	Taua	2/2
	32833		Done	True	2/2
CODESYSControl-6	32833	RTS-0000000753d8f46	Done	True	2/2
CODESYSControl-1	32833	RTS-00000003fe15b9d	Done	True	2/2
CODESYSControl-2	32833	RTS-0000000a8a838c2	ConnectingToPLC	True	1/2
CODESYSControl-7	32833	RTS-000000069a4d874	WaitingInQueue	True	1/2
CODESYSControl-3	32833	RTS-0000000525dfa8a	WaitingInQueue	True	1/2
CODESYSControl-5	32833	RTS-00000000c411b29e	WaitingInQueue	True	1/2
CODESYSControl-0	32833	RTS-000000000425caa	WaitingInQueue	True	1/2

Runtime / Safety

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





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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

 \succ A PLC needs to be replaced with a spare device.

Solution

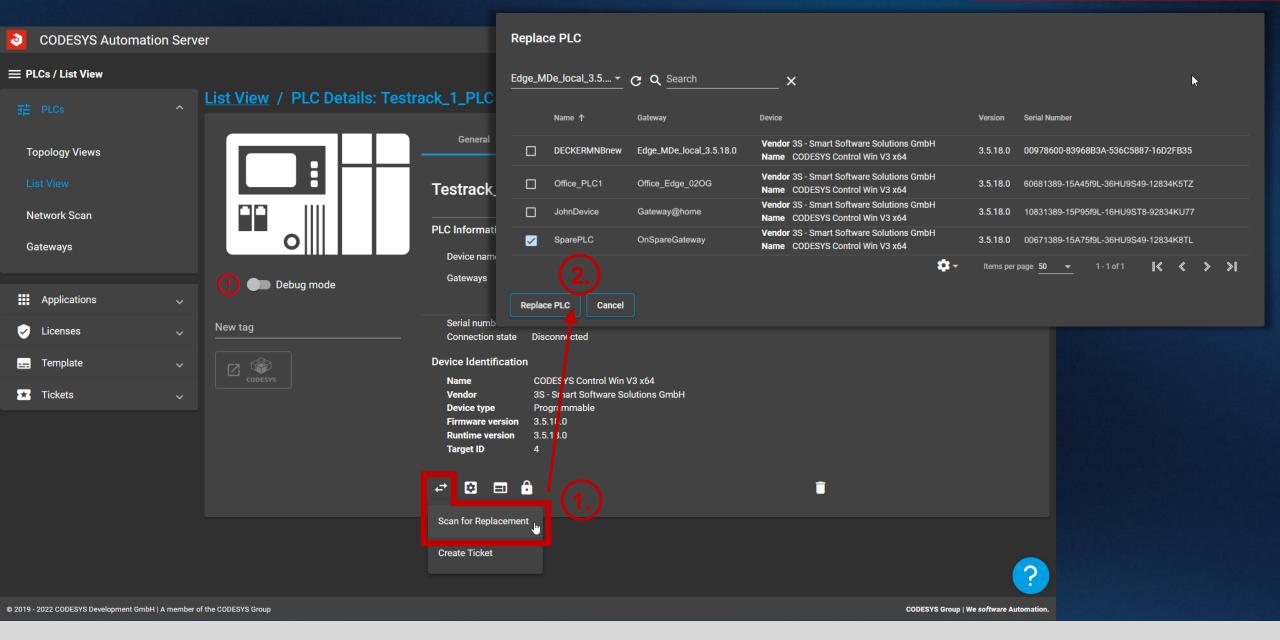
- Already possible: replacement ticket
- New: scan for a replacement device

- 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.





Visible developments



Re-scan for PLCs (1.24.0)

Move PLC to new/updated Edge Gateway (1.24.0)

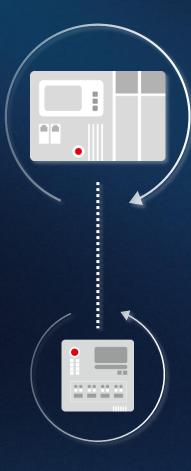
Requirements

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

Solution

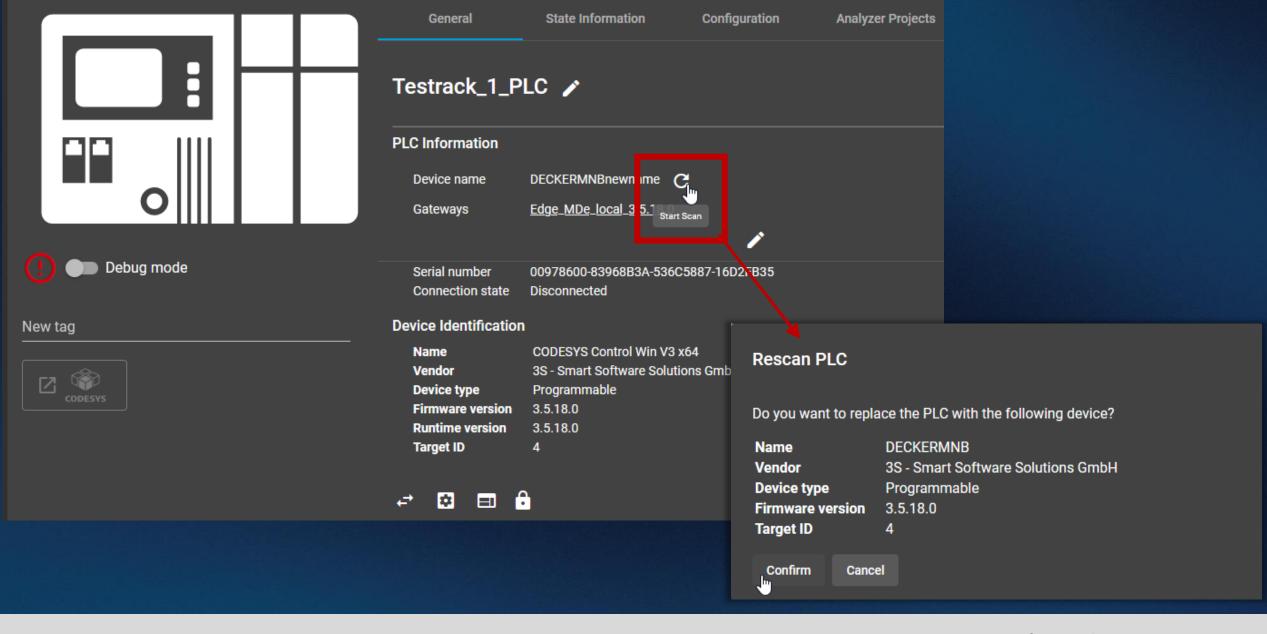
- Rescanning with automatic recognition of the changed PLC
- Editable PLC names
- Edge Gateway change via drop-down menu

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



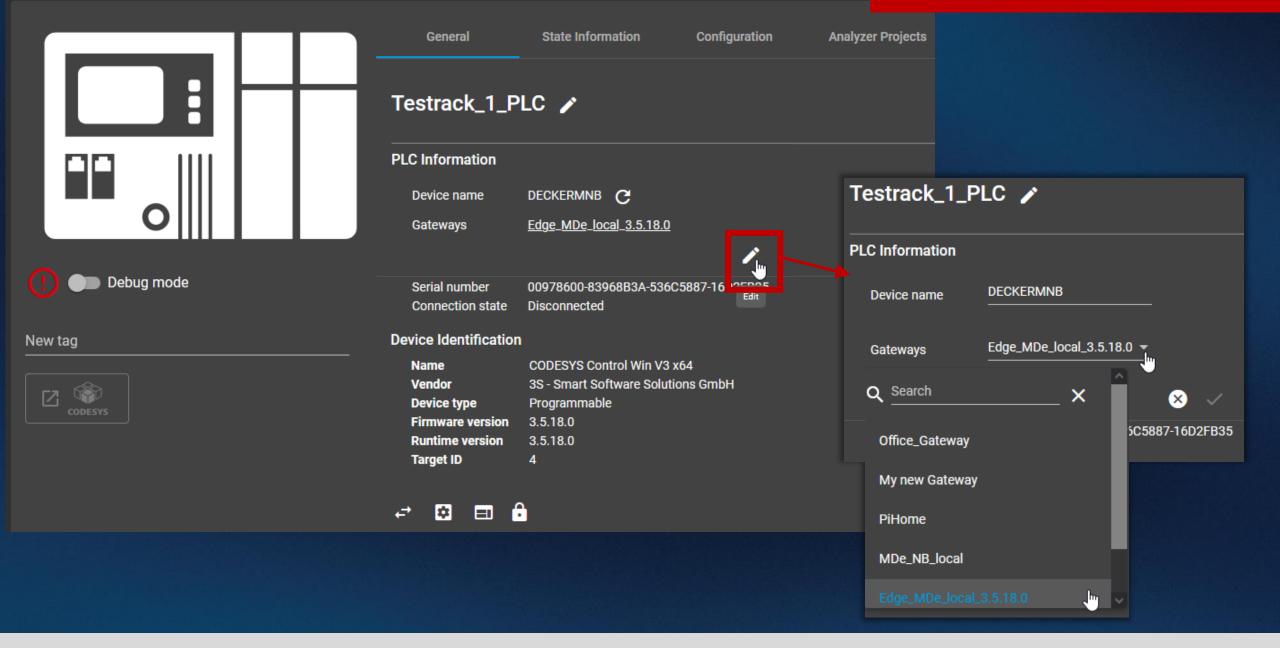
<u>List View</u> / PLC Details: Testrack_1_PLC

CODESYS Automation Server



List View / PLC Details: Testrack_1_PLC

CODESYS Automation Server



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

Please verify your email address

NS noreply@automation-server.com An Martin Decker



🛐 Nachricht übersetzen in: Deutsch 🛛 Nie übersetzen aus: Englisch

Englisch Übersetzungseinstellungen

Hello MartinNew,

Your e-mail address in the CODESYS Automation Server 'myautomationserver' has been changed or been registered as a contact.

If you would like to receive future notifications to this e-mail address, please click on the following link. Otherwise, no messages will be sent to this address. <u>https://myautomationserver.eu.automation-</u> <u>server.com/api/db/User/confirmEmail/xOAllJWqVhdygyOMsGi9_KeTLU9HGMpM3WfQABNbJjCY</u> The link is valid for 24 hours.

Your CODESYS team

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

CODESYS Automation Server



Network Scan

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		Evaluat Test_ar Produc: QA_Che LinuxEc Worksta Worksh Test rac	ion_Edg rangen tion_Lir eck: Ga IgeGate ation_G op_Lin	hent: Gatewa he: Gateway teway not co eway: Gatew Gateway: Gat ux_Gateway	ay not connecte not connecte	cted ed ected nnected it connected	not connected	F
	OK							

Force MFA (1.25.0)

Requirement

Tenant-wide mandatory multifactor authentication

Solution

MFA enforcement by administrators

Benefit

Tenant-wide increased access protection



2	CODE	ESYS Auto	omation Server				Ļ	en 👻		۹	m.dec	ker 🗸
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	Name 个	Username	E-Mail		Role	Kiosk User 🥐						
	Martin	m.decker	m.decker@codesys.com	Ø	Administrator			£ ()	<u>*</u>	/	•
	MartinNew	MartinNew	m.decker@codesys.com		Administrator			A ()	.	/ =	
					ltems per pa	age 25 🔻	1 - 2 of	2	≪	۲	>	>I

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

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



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O- Licenses	~	Portal_control	I	4.4.0.0		٢	×۵	Tags	٥	∎ 🔒	Î		
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Configurable password policy (1.25.0)

Requirement

Password policy adaptable to company security policies

Solution

 Configurable password policy for tenant administrators

- Enhanced security
- Conformity of passwords with company specifications



CODESYS Automation Server



User Management

👤 Users

Q Password Policy

Mandatory Password Options

: Groups

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

Minimum length

8

Requires unique characters

6

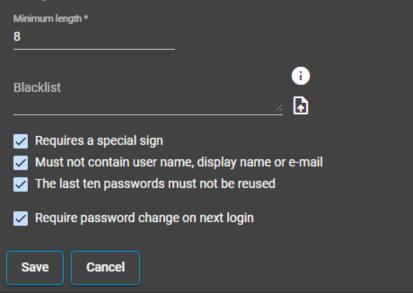
Requires a digit

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.



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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





CODES	YS Automation Server					, 🌲	en - 🏭 🌘	🌒 m.decker 🗸
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	Add PLC to Automation Server	r						
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© 2019 - 2022 CODESY	'S Development GmbH A member of the CODESYS Group					(CODESYS Group W	le software Automation.

Support secure WebVisu (1.26.0)

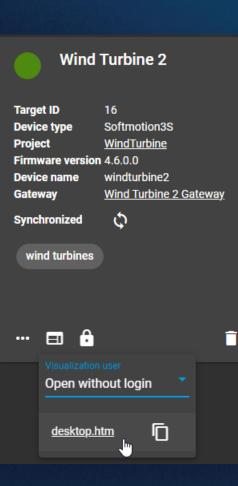
Requirement

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

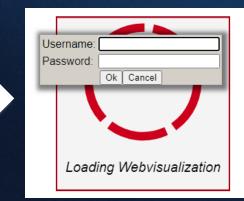
Solution

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

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

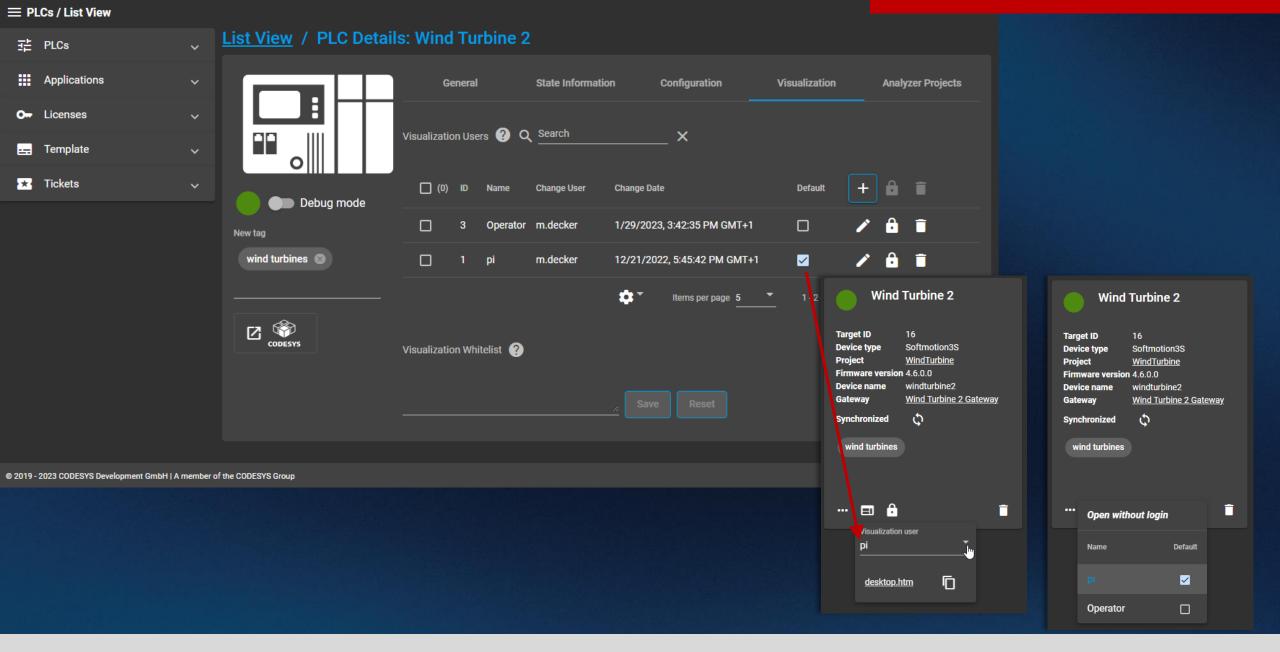






CODESYS Automation Server

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Multi-app information (1.26.0)

Requirement

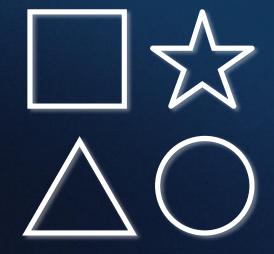
- Clear identification of applications and devices within a project
- Clear assignment to run application and PLC

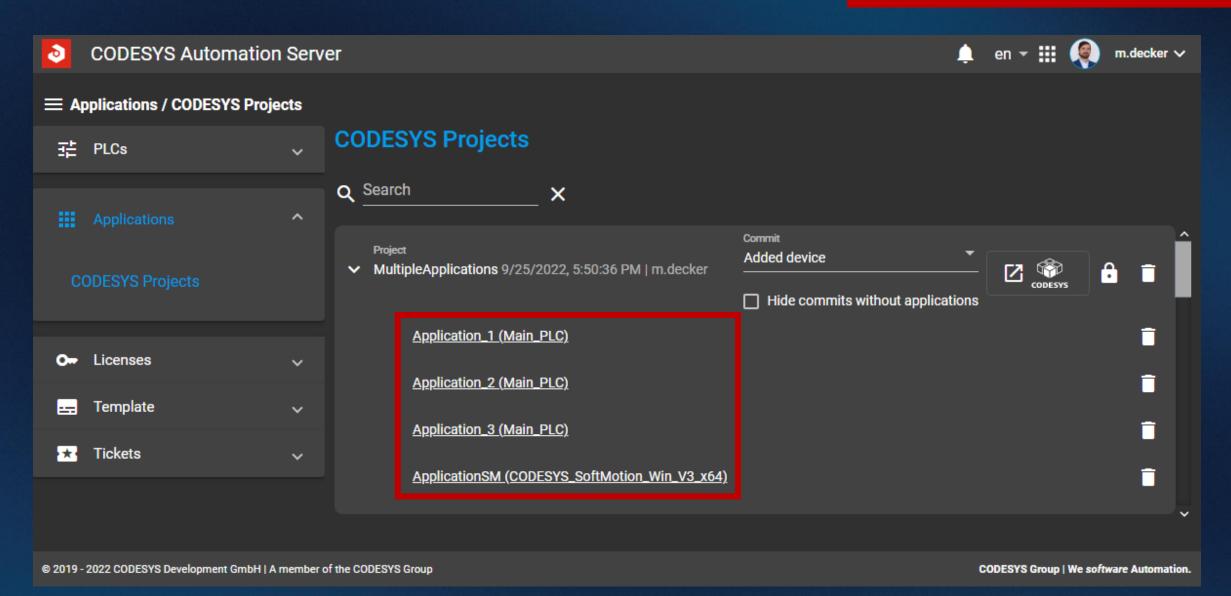
Solution

- 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





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

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



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\equiv Licenses / Bulk Licensing					
랴 PLCs ∽	Bulk Licensing				
Applications ~	Installed Licenses: DEC				
O- Licenses	Q Search	×	Show installed licenses		
	sta - Installed PLC	Softcontainer: [2]: SN=	128-9759689, PLU Container		
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·★· Tickets ~	WorkshopPiK2	Installed Licenses			
		State Name	Description	Firm Code Product Code Feature Ma	ap Company
© 2019 - 2022 CODESYS Development GmbH A membe	r of the CODESYS Group	VebClient 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 POUs	5000304 8718 FFFFFFF	- 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			
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### Synchronize applications warning (1.26.0)

#### Requirement

Warning about possible overwriting of existing application by the Automation Server

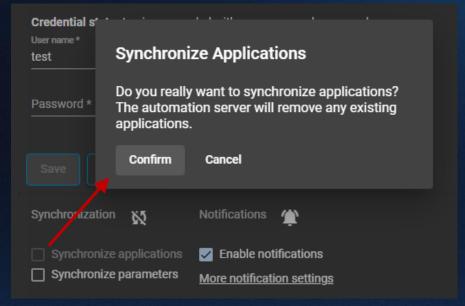
### Solution

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

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



— Anr		ions /	Sen	odu	
	7 II G G G				

#### 主 PLCs

### **CODESYS** Automation Server

Create Schedule

Schedule status

Save

Active

CODESYS Projects	_{Name} * Update Line 4
Schedules	Description Update to V2.5.0
O- Licenses	
💶 Template	Update time * 1/26/2023, 10:00:31 PM
📩 Tickets	MM/DD/YY HH:MM:SS
	Rollback on failure
	🔿 Off 💿 Only faile

ne 4	Project WindTurbine	Commit Added Liveness Probe	Application * Application (Device)	
V2.5.0	Q Search	× Filter by tag		
3, 10:00:31 PM GMT+1 🖻	<mark>–</mark> (2) Name	Version	Device	Sync
IH:MM:SS r on commit	Wind Turbine 2	4.6.0.0	CODESYS Control for Raspberry Pi SL	φ
on failure	Wind Turbine 3	4.6.0.0	CODESYS Control for Raspberry Pi SL	Φ
Only failed PLCs O All	Pumped Storage	Power Plant 4.4.0.0	CODESYS Control for Raspberry Pi SL	¢
<b>▼</b>	Wind Turbine 1	4.2.0.0	CODESYS Control for Raspberry Pi SL	¢
		ttems per pa	age 25 ▼ 1-4 of 4 🛛 🕻 🔍	«
e Cancel				

### 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)

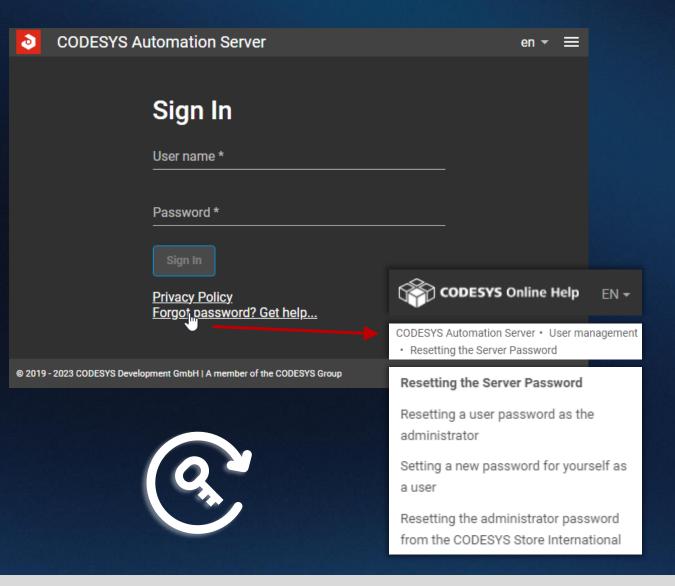
#### Requirement

- 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)

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



### 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



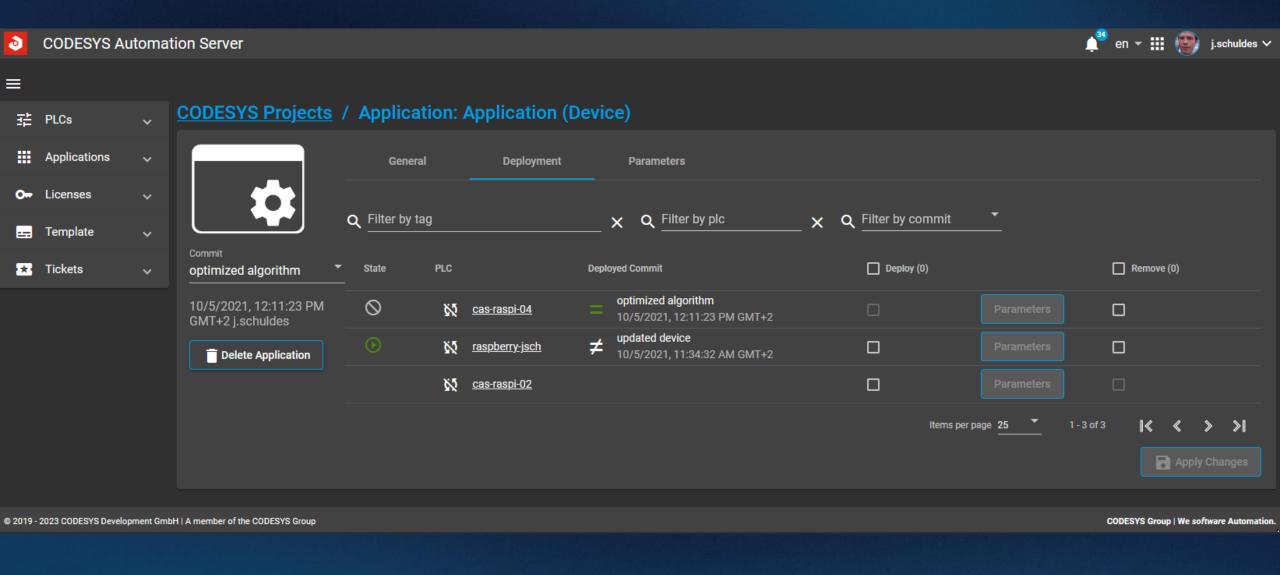
#### **CODESYS** Automation Server

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Т	opology Views			Q ras		×												
	ist View		Name 🛧	Version Sta	atus	Update available	Project	Application	Commit	Device	Notifications	Sync	Tags	Actions				
	etwork Scan		<u>cas-raspi-01</u>	3.5.15.30						Vendor 3S - Smart Software Solutions GmbH Name CODESYS Control for Raspberry Pi SL	٢	Φ	Tags	۵		÷	Ī	
G	ateways		<u>cas-raspi-02</u>	4.2.0.0			CasTestAppSP12	Application_Raspi	v31	Vendor 3S - Smart Software Solutions GmbH Name CODESYS Control for Raspberry Pi MC SL	٢	<b>M</b>	Tags	۵		÷	Î	
	Applications		<u>cas-raspi-03</u>	3.5.15.0						Vendor 3S - Smart Software Solutions GmbH Name CODESYS Control for Raspberry Pi SL	٢	<i>8</i> 2	Tags	۵		÷	Ī	
		* •	<u>cas-raspi-04</u>	4.2.0.0			<u>WindTurbine</u>	<u>Application</u>	optimized algorithm	Vendor 3S - Smart Software Solutions GmbH Name CODESYS Control for Raspberry Pi MC SL	٢	85	Tags	۵		÷	Ī	
	Template	~	<u>raspberry-jsch</u>	4.2.0.0		U	<u>WindTurbine</u>	<u>Application</u>	updated device	Vendor 3S - Smart Software Solutions GmbH Name CODESYS Control for Raspberry Pi MC SL	٢	Ņ	Tags	۵		÷	Ī	
*	Tickets	~								¢.	<ul> <li>Items per</li> </ul>	page <u>25</u>	•	l - 5 of 5	I«	«	>	>I

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#### **CODESYS** Automation Server



#### 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



#### **CODESYS** Automation Server

🛕 🤲 en 🔻 🏭 💿 j.schuldes 🗸

#### ODESYS Automation Server

#### User Management

💄 Users	📇 Groups 💿 Password	d Policy			
Q Search	🗙 🗌 Show disabled users	🗋 Force MFA for all users 🛛 🗸			+ <u>•</u> Add user
Name 个	Username	E-Mail	Add User	Kiosk User 🥐	
aUser1	readonly	readonly@local 🧧 🔀	Name * Martin Decker		🔺 or 🚈 🧪 🥌
AUser2	commissioningengineer	commissioningengineer@local 🧧 🔀	Username * m.decker		🔺 or 🚈 🧪 🥌
B-c22	j.schuldes	j.schuldes@codesys.com 🧧 🚩	Email *		🔺 or 🚈 🧪 🥌
bUser1	fadfaf	gadgag@local 🧧 🔛	m.decker@codesys.com		🛕 or 🚈 🧪 💶
BUser2	operator	operator@local 🛑 🔛	Select Role * Administrator		🔺 or 🚈 🧪 🥌
c-d	developer	developer@local 🛑 🔛	Select Initial Language * Deutsch (de)		🛕 or 🚈 🧪 💶
C-d	visuonly	visuonly@local 🏮 🚩	☐ Kiosk user		🔺 or 🚈 🌶 💶
test	test	test@local  🖂	Add user		🛕 o <del>r</del> 🚲 🎤 💶
				Items per page 25 🔻 1 - 1	3 of 8 🛛 🔍 🔦 义 🔊 🛛

CODESYS Group | We software Automation.

### 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



### **CODESYS** Automation Server

WindTurbine.project - CODESYS						-	· 🗆	×
File Edit View Project Build Online Debug To	ools Window Help							<b>T</b> 1
🖹 🖆 🔚   😂   🗠 🖂 🛝 🛍 🛍 🗙   🖊 🍪 🍪	I 🤋 🏋 🎢  🛅 🕇 🛗 I	Application [Device: PLC Logic] 🝷 😋 🤇	ğ 🕞 📲 💐 (Çil 🕫 diş Hali)	\$   \$   <b>1</b>	2			
Devices 👻 🕈 🗙	Visualization Manager	Device 🗙 🎢 Library Manager	🚹 Library Manager					-
WindTurbine  WindTurbine  Device (CODESYS Control for Raspberry Pi MC SL)	Communication Settings	Scan Network Gateway - Device -						^
PLC Logic     Application	Applications			-				
	Backup and Restore		- · · · · · · · · · · · · · · · · · · ·					
···· □ LivenessProbe (FB) ···· □ PLC_PRG (PRG)	Files		Gateway		•			
···· ···· ···· ···· ··· ··· ··· ··· ··	Log	Gateway-	-	raspberry-jsch (act	ive)		~	
च-∰ Task Configuration □-∰ MainTask (IEC-Tasks)	PLC Settings	IP-Address localhost	5:	Device Name: raspberry-jsch				
PLC_PRG	PLC Shell	Port: 1217		Device Address: 0301.208D				
VisuElems.Visu_Prg	Users and Groups			Target ID: 0000 0011				
HindTurbine	Access Rights			Target Type:				<b>.</b>
SoftMotion General Axis Pool	• • • •			4100				
GPIOS_A_B (GPIOS A/B)	Messages - Total 0 error(s), 1 warning(s),						•	<b>д X</b>
Onewire	Automation Server	▼ 0 error(s) 10	warning(s) 🟮 1 message(s) 🗙	*				
🗷 🍐 Camera device	Description				Project	Object	Position	
SPI	-	nnected to your device (device name: raspberry	y-jsch). Local changes may be overwri					
	Device 'raspberry-jsch': Serial number	r '000000007ee1e05c'.			WindTu	Device		
C > C C C C C C C C C C C C C C C C C C								
		Lasthu	ild: 😳 0 🕐 0 🛛 Precompile 🧹	Crean Proj	ect user: (	a bady)	G	•

#### **Overview**

#### Functional and frontend developments

- I.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: <u>CAS-3147</u>
- 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: <u>CAS-2936</u>
- 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: <u>CAS-3039</u>
- 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**

#### ➢ <u>CAS-3314</u>

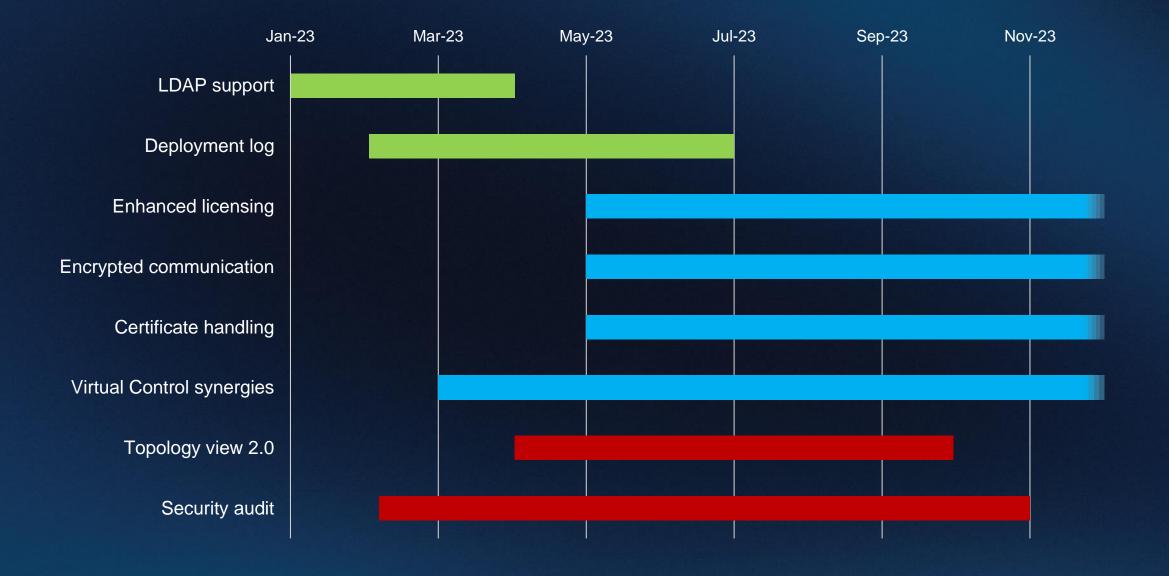
- Activate device user management by Mass Licenser
- Creation of separate NuGet package for Mass Licenser

#### **Overview**

#### Functional and frontend developments

- I.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
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#### **CODESYS Automation Server**







# **CODESYS VISUALIZATION**



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pro-M

#### **Overview**

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

#### **Customizable dialogs**

- Possibility to localize the login dialog
  - New placeholders

8

- Rectangle + \$LANG_SELECTOR\$DE\$
- Button with bitmap info

			Gradient setting	linear, Black, White	
			Appearance		
Type of element	Button	LOGIN	Line width	1	
		LOGIN	Fill attributes	Filled	
Bitmap info			Line style	Solid	
Static ID	IP_Common.Japan		🖃 Texts		
Texts			Text	\$LANG_SELECTOR\$DE\$	
		SUSERNAME_PH\$Username\$	Tooltip		
Text	\$LANG\$JAP\$		🖃 Text properties		
			Horizontal alignment	Left	
			Vertical alignment	Centered	
		\$PASSWORD_PH\$Password\$	Text format	Default	
			Font	Default	
			Font color	White	
			Absolute movement		
			E Movement		
		\$LOGIN\$	X		
		\$E0/01113	Y		
			Rotation		
			Scaling		
		\$CANCEL\$	Interior rotation		
			Use REAL values		
			Relative movement		
			🖃 Text variables		
		\$SYS_ERROR\$	Text variable		
			Tooltip variable		

Use gradient color

#### **Filetransfer improvements**

Download of files without additional dialog

Visu File T	ransfer Examp	le		
Transfer type File	o transfer	Transfer Control Flags (VISU_TO_F UseOriginalFileName ileName estdatei.bd		
PLC TO VISU active successful error active function for the successful error active function for the successful error error code: 0	Organisieren Veuer Or Dieser PC 3 3D-Objekte Bilder Desktop	And Sp19 > Sep > FileTransfer >	<ul> <li>✓ Ŭ</li> <li></li> </ul>	FileTransfer" durchsuchen EEE  Anderungsdatum 19.09.2022 10:13 19.09.2022 10:13 19.09.2022 10:13 19.09.2022 10:13 19.09.2022 10:33
	<ul> <li>Dokumente</li> <li>Downloads</li> <li>Musik</li> <li>Dateinarr</li> </ul>			27.09.2022 16:12 ocument (*.bxt) ~ fnen Abbrechen

Transfer Direction	
From Visualization to PLC	
Type File	
File name	
Control flags	
Status Variables	
Transfer active	
Transfer successful	
Error code	
Use the dialog have to shappe the file	
Use the dialog box to choose the file	

 $\times$ 

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

ocation	System				✓ Edit Locations
	(D:\Apaddon\Targets\3.5	5.18.30x64Rel43Rel\Visual Eleme	nts)		
Profile or E	xtension Selection				
🔿 Create	or Update Profile	O Create or Update Extension	• HTMLS C	Controls	
Installed E	lements				
Name		Vendor	Version	Signature	Install
Donui	tChart	Codesys R+D Visu Division	1.0.0.0		Open Editor
Donui	tChart_signedByCDS	TestCompany	1.0.0.0	<b>B</b>	Open Eator
🚺 Doubl	leBar	Codesys R+D Visu Division	1.0.0.0		Uninstall
HTML	5DemoButton	DemoCompany	1.0.0.0		
🕒 HTML	5DemoGauge	DemoCompany	1.0.0.0	_	<u>D</u> etails
HTML	5DemoTableNoScrollRange	DemoCompany	1.0.0.0		
HTML	.5Table	DemoCompany	1.0.0.0	_	
📿 Roun	dSlider	Codesys R+D Visu Division	1.0.0.0	_	
🔘 Roun	dSlider_signedByCDS	TestCompany	1.0.0.0	<b>B</b>	<u>Sig</u> ning
S Roun	ubilider_signedbycbb	rescompany	1.0.0.0		29.0.9.0

Editing or creating visualization profiles or visualization extensions is only possible with the CODESYS Visu Element Toolkit and a valid license

#### HTML5 controls in project archives

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

Project Archive	×
Include the following information into the archive	
Image: Construct of the second sec	
Save	Cancel

#### 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.

🕘 Desktop_ProductHistoryDetails 📳 LoginVisualization 🖓 Visualization Manager 🗙 🗸 🗸									
🖶 Settings 🖷 Dialog Settings 📼 Default Hotkeys 🚇 Visualizations 🧟 User Management 😭 Font Settings 🖶 Advanced Settings									
-Language Specific Font Settings -									
Language	de	en	jap	fr	it +				
Size factor	1	1	1	1	1				
Font 1	Calibri		MS PGothic						
Font 2	Century		Malgun Gothic		+				
Font 3					+				
Font 4									
<					>				
General Font Setting									
Automatic font size reduction									

#### 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 callsSUB1(2)
- Indirect subprogram callDYNCALL(\$SUBNAME\$, 2)

VAR

varX: STRING:='100'; SUBNAME: STRING:='Move3'; END VAR

#### **Robotics improvements**

#### **Continue from stop position**

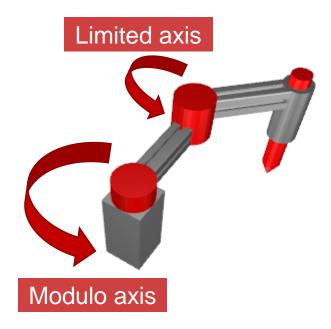
- Similar to MC_GroupInterrupt
- Command MC_GroupHalt/GroupStop with input ClearMovements=FALSE
- Save continue data (SMC_GroupSaveContinueData) once stopped
- Use MC_GroupContinue to continue the interrupted path

#### Advantages over GroupInterrupt

- Immediate stop (zero latency)
- Configurable dynamics for stopping

#### **Robotics Improvements**

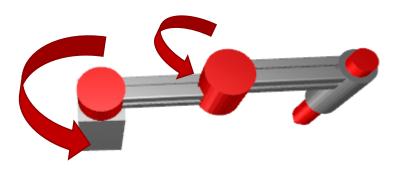
- Support for modulo-axes
  - Rotary axes with period 360°
  - Any unlimited rotary joint of a kinematics
  - Only mode "shortest"

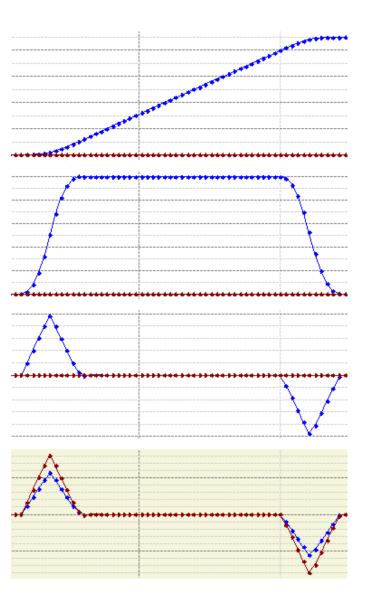


#### **Motion CNC Robotics**

#### **Robotics improvements**

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









Fieldbus

## **CODESYS FIELDBUS**



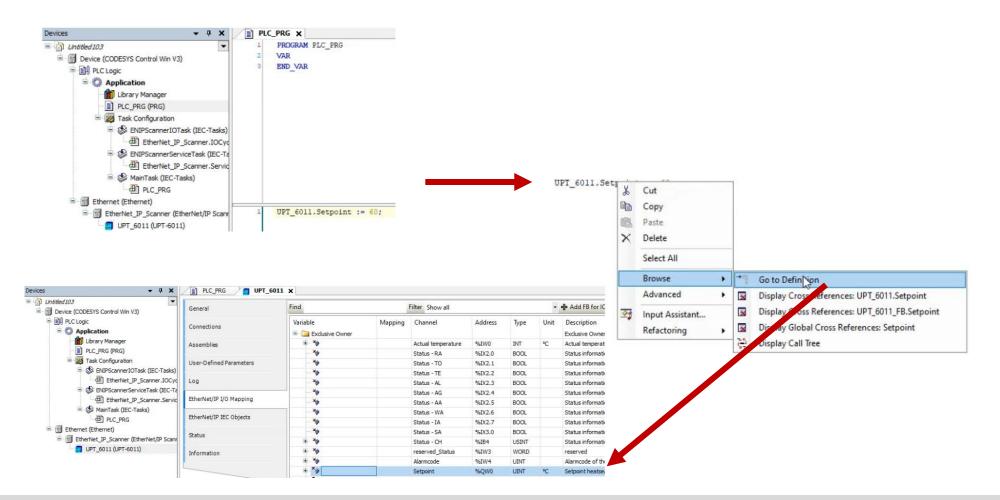
#### **Overview**

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

#### Fieldbus

#### **General improvements**

Go to Definition for Symbolic Access I/Os



#### **General improvements**

Detection of metrics for application-based licensing

Applications Backup and Restore	Metric	Value in Project		
···			Max. allowed by License	Value on Device
Backup and Restore	📮 🔘 Size of User Code	72 Byte	n/a	(
	Application	72 Byte		
	🖹 🏠 Communication			
Files	🖹 🛆 Number of OPC UA tags	0	n/a	(
	Application	0		
.og	Variables used in visualizations	0 Variables	not yet supported	not yet supported
	Application	n/a		not yet supported
PLC Settings	Fieldbus			
PLC Shell	IO Channels	26 Channel(s)	n/a	(
Ee onen	Application	26 Channel(s)		
Jsers and Groups	Instances of CANopen, Modbus, PROFIBUS	1 Instance(s)	n/a	(
	Application	1 Instance(s)		
Access Rights	Instances of EtherCAT, EtherNet/IP, PROFIN	1 Instance(s)	n/a	(
	Application	1 Instance(s)		
Symbol Rights				
icensed Software Metrics				
EC Objects				
Fask Deployment				
Status				
information				

#### **General improvements**

- Performance
  - Project loading
  - Device Object Serialization
- Usability

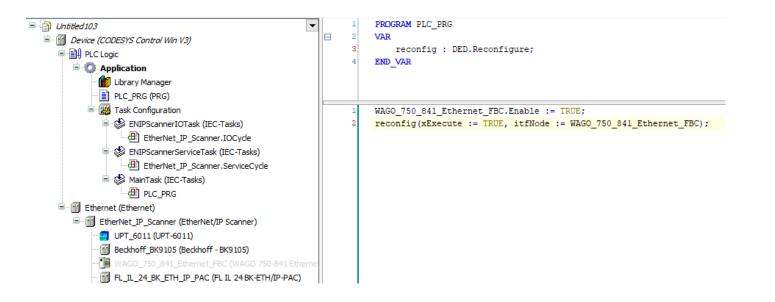
Variable ⊕...¥≱ ⊕...≮∳

Improved display of unused I/O channels

	Vari	iable	Mapping Channe	el l	Address	Туре		Curr	rent Value	
	<b>.</b>		Holding F	Registers	%IW0	ARRAY [09] OF	WORD Not	updated		
	<u>ن</u>	<b>*</b> @	Input Re	gisters	%QW0	ARRAY [0499]	OF WORD Not	updated		
						•				
						•				
 Mapping	Channel	Address	Туре			Current Value	Prepared Value	e Unit	Description	 
Mapping	Channel Holding Registers	Address %IW0	Type ARRAY [09] OF WO	RD Notu	updated (check too		Prepared Value	e Unit	Description	 
Mapping					updated (check too	oltip)	Prepared Value	e Unit	Description	 

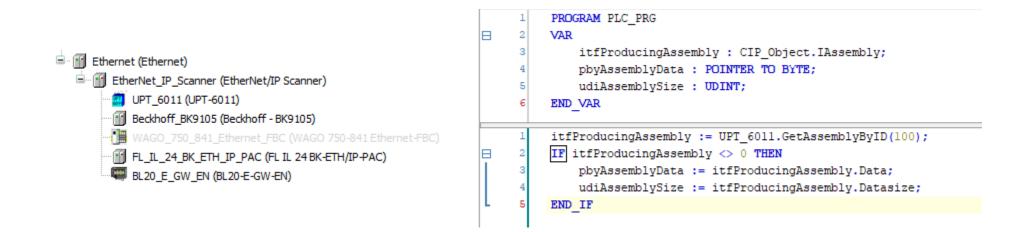
#### **EtherNet/IP improvements**

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



#### **EtherNet/IP improvements**

API for accessing I/O Assembly data



Possibility to deactivate the creation of I/O channels

#### Fieldbus

#### **CANopen improvements**

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

CANbusDevice, 4.1.1.0 (35 - Smart Software Solutions GmbH)							
🖨 🛅 CANbusDevice							
🖻 🗀 Function Blocks							
CANbus							
ResetBusAlarm							
🖻 🔁 AutoRecovery							
🗉 🔁 Baudrate							
🖻 🔁 BusAlarm							
🗉 🔁 BusState							
😐 🔁 NetId							

eceive PDOs (Master => Slave)		
Add PDO 🕂 Add Mapping 💉 Edit 🗙	Delete 🛧 Move Up 🤍 Move Down	
Name	Object	Bit length
16#1400: ReceivePdoParameter	16#201 (\$NODEID+16#200)	16
WriteOutput8Bit : Generic_XN_16D0	16#6200sub01	8
WriteOutput8Bit : Generic_XN_16D0	16#6200sub02	8
PDO Properties		×
COB-ID	\$NODEID+16#200	
	= 16#201 (513)	
Inhibit time (x 100µs)	0	
	-	
Transmissiontype	Asynchronous - device-profile-specific (Type 25	55 ~
Number of syncs	1	
Event time (x 1ms)	0	
Process by CANopen Ma	anager	
	OK Can	cel

#### **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

General	Statistics		
Sync Unit Assignment	SendFrameCount	286	
Syne onie Assignmene	FramesPerSecond	0	
Overview	···· LostFrameCount	0	
	TxErrorCount	0	
Log	RxErrorCount	0	
	Recv Time (Avg)	LTIME#41us97ns	Average Time for receiving Ethernet frames per paket
EtherCAT Parameters	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
EtherCAT I/O Mapping	Send Time (Max)	LTIME#57us	Max Time for sending Ethernet frames per paket
	LostCycleCount	15	Number of lost iec cycles
EtherCAT IEC Objects			
<b>.</b> .			
Status			
Information			
anomation			

#### **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	Туре	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 onee.
	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

General			
	Network interface		Browse
thernet Device I/O Mapping	IP address	192 . 168 . 0 . 1	
thernet Device IEC Objects	Subnet mask	255 . 255 . 255 . 0	
	Default gateway	0.0.0.0	
.og	Adjust operating		
		system settings	
Status	Aujust operating	system settings	
Status	Redundant PLC Se	-	
		-	Browse
	Redundant PLC Se	-	Browse
	Redundant PLC Se	ttings (PLC 2)	Browse

#### **IO-Link improvements**

Support of multiple IO-Link instances



60,000

# CODESYS COMMUNICATION

1110101110100101010

10001111010010110

21001 2000

0110010100111001011010101



1001100

101011011001

•@

#### **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

	ne Debug Tools Window							
	44 446 444 (비지 위기 위기 위기		Application [Device: PLC ]	Logic] 🝷 🕵 🛇	§ → = ¾ [0	,		≓'   ∛
<b>-</b> ∓ X	Symbol Configuration	Symbol Set	×					
controller_timing_UA		control by the user man						0
vice (CODESYS Control Win V3 x64)		ontrol by the user man	agement. 🕑					
PLC Logic	IEC Symbols Editor Symbol Typ	e Editor						
O Application								
Communication Manager	Why does my variable not a	ap 🕾 Sync 🛛 🖓 Fil	ter by Symbol, Path, IEC Type	, Symbol Type (Ex	ported Type Name)	, Comment		
OPC UA Server	Precompile Sets	Symbol	Path	IEC Type	Symbol Type	Access Rights	Comment	
My Symbol Set		TempActValue_1	Variables .TempActValue		REAL	-	<ul> <li>Inputs</li> </ul>	
Symbol Set	Device.Application				REAL			
DUT (ENUM)	Defrosting	TempSetValue_1 DoorOpen	Variables .TempSetValue Variables .DoorOpen	BOOL	BOOL		~	
MyValveType (STRUCT)	GVL_TimeMeasuring					+ record, rine	~	
E D PRG	PLC_PRG	AlarmTreshold	Variables .AlarmTreshold		TIME	- Tready Time	~	
🖲 🧰 Visu		DoorOpenTreshold	Variables .DoorOpenTres		TIME	*	~	
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Devices

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#### **OPC UA improvements**

#### New metrics and statistics

- Metrics in core dialog
- Detailed statistics for new editor

Metric	Value in Project
🗉 🔘 Size of User Code	1.249.616 Byte
🚊 🏠 Communication	
🖹 🛆 Number of OPC UA tags	1.818.917
🖃 🧑 Application	1.818.917
🔤 🌌 Data Sources Manager	52
	1.817.524
Symbol Set	1.34
🖻 💼 Number of Information Models	1
Application	1
🖳 📳 Variables used in visualizations	0 Variables
🗄 🕤 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)
⊞ প 🕏 GVL_IO	1.341	GVL IO
😑 প 🕏 PersistentVars	1.245.469	PersistentVars
🗉 প 🕏 ProcessParams	209.000	TParametersUnitsArray
🗄 প 🕏 ProcessParamsManage	5	TParameterSetManage
🗄 প 🕏 RecipeParams	836.002	TMtpProduct Parameters
🗉 প 🕻 RecipeManage	6	TProductsParameterSetManage
🗄 🔶 😫 Bars	172.666	TBars
🗉 প 🕏 FullProducts	861	TFullProducts
🗉 প 🕏 CurrProduct	214	TProduct
🗈 প 🕏 ProductsList	21.402	TProductsList
UnitsWorkprograms	5.202	TUnitsWorkprograms
🗉 প 🕏 Shifts	108	TShifts
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

							<u>Abort</u>	
• Static c	configuration							
Ser	ver URI 0	pc.tcp://Rei	terBNB.in.	3s-software.co	m:53530/OPC	UA/Simula	tionServer	
Se	ecurity							
М	1essage Secu	rity Mode	None					
Se	ecurity Policy	,	None					
	rom Variable Space Source							
Online		/ReiterBNB.	in.3s-softw	are.com:5353	)/OPCUA/Sim	ulationServ	/er	
Offline								
Online	opc.tcp://		in.3s-softw	vare.com:5353	)/OPCUA/Sim	ulationServ	/er	

#### **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: <u>https://opcfoundation.org/products/view/codesys-opc-ua-server/</u>



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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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