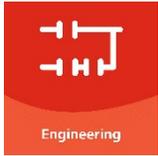




# **CODESYS® V3.5 SP21**

## **Features and Improvements**

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



**ENGINEERING**



**RUNTIME / SAFETY**



**AUTOMATION SERVER**



**VISUALIZATION**



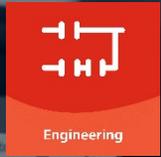
**MOTION CNC ROBOTICS**



**FIELDBUS**



**COMMUNICATION**



# CODESYS ENGINEERING

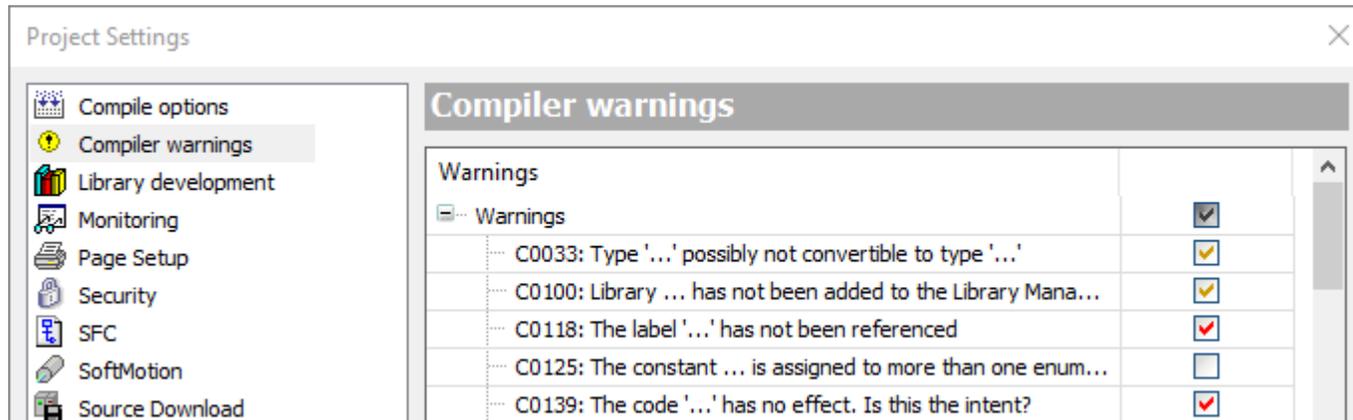


## Overview

- **Compiler updates**
- **Basic libraries delivered with the CODESYS Development System**
- **Scripting for CODESYS Trace**
- **Selection of compiler version for libraries**
- **Reservation of new keywords for the 4th edition of IEC 61131-3**
- **Usability improvements for the Ladder Editor**
- **Improvements to the CODESYS Installer**
- **CODESYS sample projects available in Online Help / as installable package**
- **Option to integrate your own help content into the Offline Help**
- **Licensing update**
- **Improvements to the Professional Developer Edition**

## Compiler: Warnings as errors

- **Ideal: Warning-free projects**
  - Warnings: possible unexpected or unintended behavior
- **Difficult to enforce as a rule in the past**
- **From V3.5 SP21 onwards: Reporting of warnings as compiler errors instead**
- **Configuration per warning possible**



## Update: Basic libraries delivered with the CODESYS Development System

- **Background:**
  - Modularization strategy for CODESYS
  - Six powerful base libraries released as a separate add-on
  - These libraries were already included in the main CODESYS setup and have now been transferred to the add-on format to accelerate the modularization of CODESYS.
- **Key Features:**
  - IP communication
  - Memory management
  - Data structures
  - Asynchronous tasks
  - Multi-cycle activities
- **Benefits:**
  - Now released as an add-on for independent versioning
  - Backward compatibility for older versions (e.g. SP19)
  - Add-ons can now specify minimum required library versions.

## Update: CODESYS Trace

- **Now support of automation workflows using the scripting API within the CODESYS Development System**
- **New scripting driver for Trace available:**
  - Allows creation of trace configurations via script
  - Add variables to traces programmatically
  - Fully automated start/stop recording of traces
- **Additional enhancements:**
  - Adjustments and improvements to the user interface
  - More intuitive and easier for both manual and automated task

```
myTrace = projects.primary.find("Device", "PLC Logic", "Application", "MyTraceObject")[0]

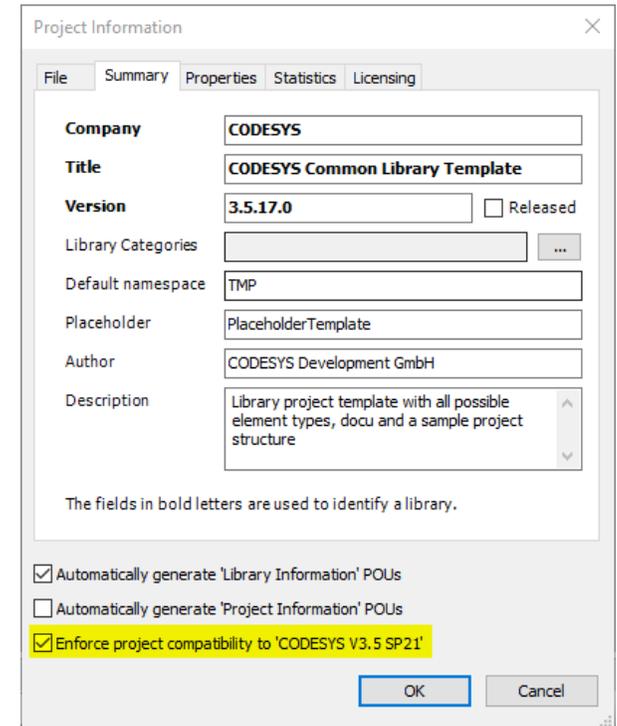
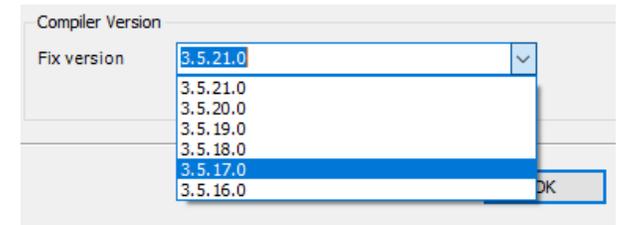
addedVariable = myTrace.add_trace_variable(variableName="PLC_PRG.a1",
    graphColor= 0xff000000,
    graphType=GraphType.LINES,
    activateMaxWarning=True,
    maxWarningArea=9.0,
    maxColor= 0xffff0000)
addedVariable.enabled = False

for i in range(2,11):
    newVariable = myTrace.variable_list.add()
    newVariable.variable_name = "PLC_PRG.a"+str(i)
    newVariable.graph_type = GraphType.LINES_CROSSES

assert len(myTrace.variable_list) == 10
```

## Selection of compiler version for libraries

- **Usage of latest compiler version without compatibility loss**
  - Benefit from all bug fixes and performance improvements
- **Compiler version selection for language version**
  - Supported operators, etc.
  - Unsupported language feature reported as explicit compatibility error
- **Only major versions selectable (Service Packs, not Patches)**
- **Additional project setting required to enable the feature**
  - Not applicable to libraries when containing visualization elements

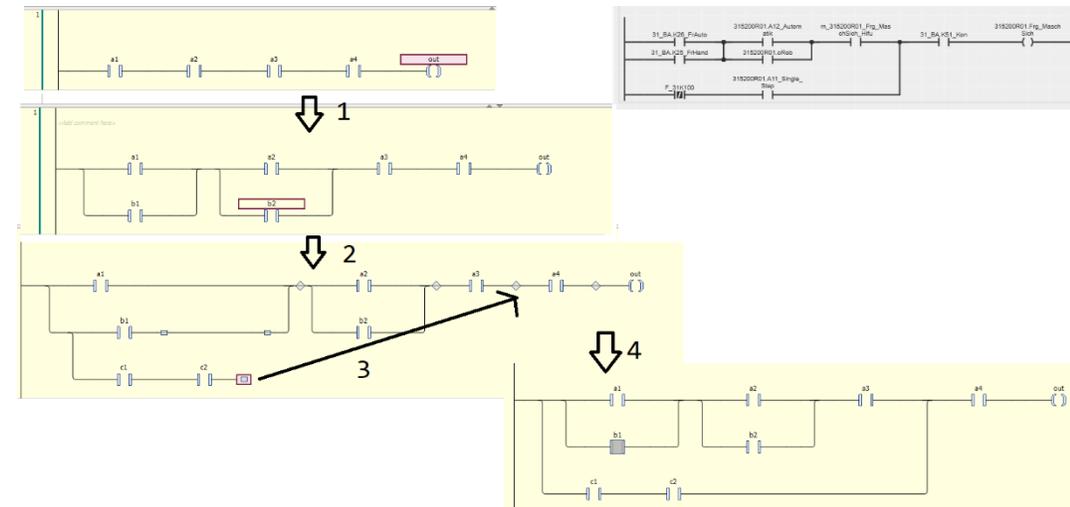
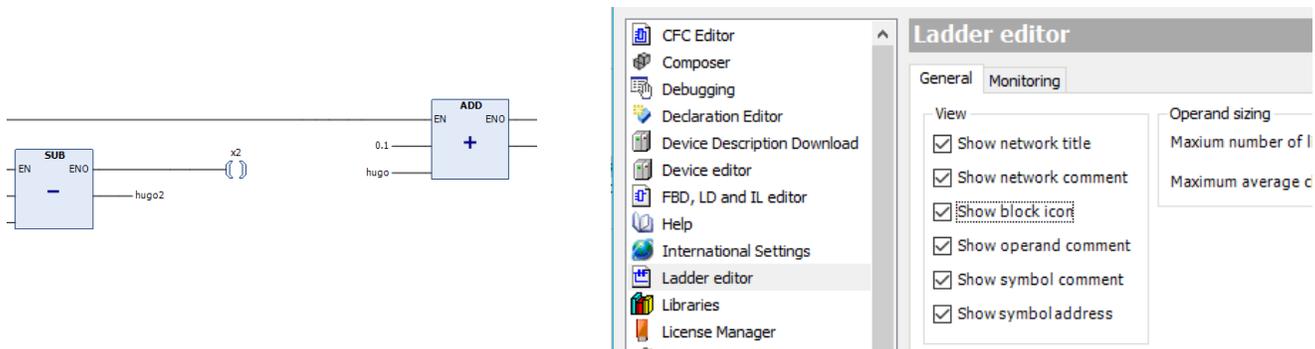


## Reservation of new keywords for the 4th edition of IEC 61131-3

- **List of new keywords**
  - END\_METHOD
  - END\_INTERFACE
  - END\_PROPERTY
  - PROPERTY\_SET
  - PROPERTY\_GET
- **Usage as variable names → compiler errors**

## Update – Ladder Editor

- **Several improvements to the CODESYS Ladder Editor:**
  - Improved usability for connecting parallel branches
  - Easier construction and modification of logic diagrams
- **Online mode improvements:**
  - Double-click function block triggers instant jump to related instance for faster navigation in large projects
- **Function blocks support bitmap graphics in Ladder Diagram:**
  - Visual differentiation and better documentation
  - Enhanced clarity and maintainability



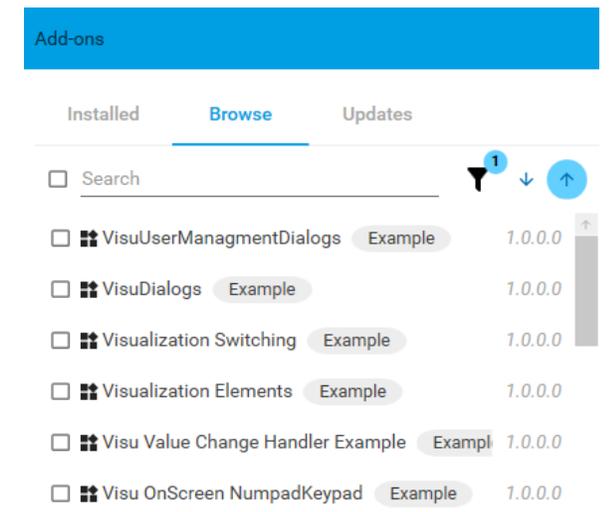
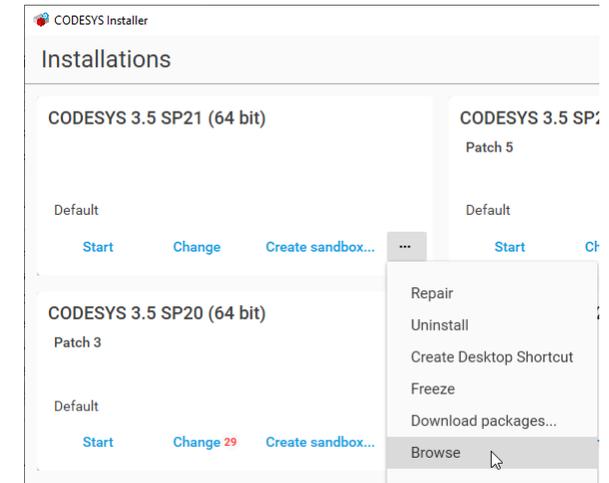
## Improvements to the CODESYS Installer

### Usability improvements

- Installation process:
  - Create separate repositories - This option is now more visible to users.
- Installation path:
  - You can jump to the installation location (explorer) directly from the main tile.

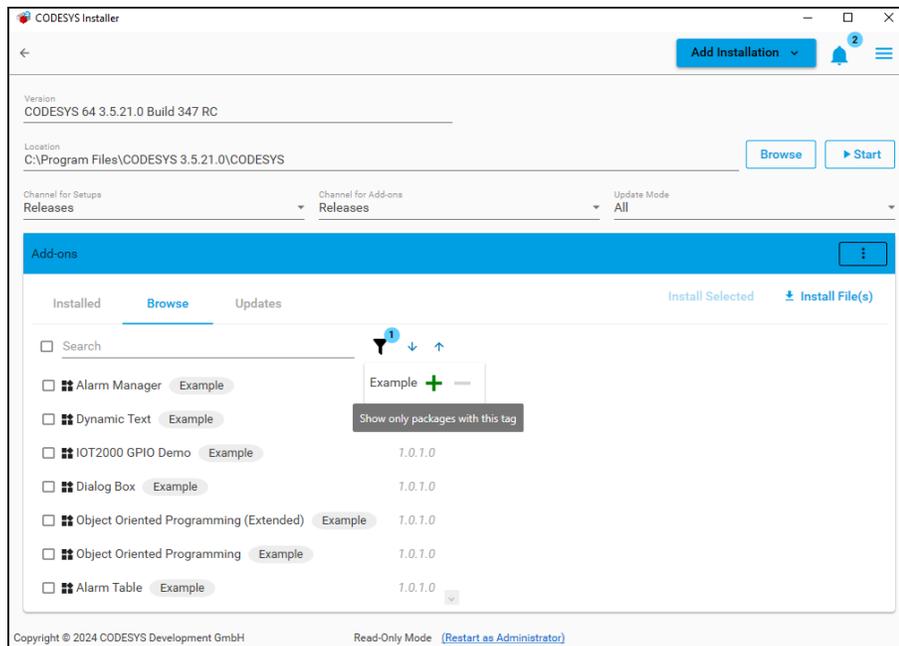
### General improvements

- Clearer display of installed add-ons
- Self-update for CODESYS Installer:
  - When a new version is available, users are notified and can choose
    - Install now
    - Remind later
    - Skip this version
- Add-on filter
  - The "Browse" list can now be filtered by multiple tags.



## Improvements to the CODESYS Installer

- **Help for all CODESYS Examples available in the Help Portal**
- **50% of all examples provided as package (SP21)**
  - ➔ **Example packages can be installed via the CODESYS Installer**



## Option to integrate your own help content into the Offline Help

- **Functionality to add customer help files to the CODESYS Offline Help**
  - Add new publication to the Overview page
  - Add new help pages to TOC
  - Search in new help pages
  - Support of multiple languages
- **Description of how to add pages available in the SP21 Help**  
[https://content.helpme-codesys.com/en/CODESYS%20Development%20System/cds\\_extending\\_offlinehelp.html](https://content.helpme-codesys.com/en/CODESYS%20Development%20System/cds_extending_offlinehelp.html)

## Licensing improvements

### ▪ **Licensed Software Metrics:**

- Display of MultiCore Task Pinning usage in the "Licensed Software Metrics" window for improved visibility of licensed features
- Display of all required sub-licenses for application-based licenses (e.g. for Visualization) in the License Finder
- Selection of the preferred CODESYS Store (International or North America) in the License Finder dialog for control over license sourcing and validation
- Display of a new warning if additional licenses (such as SoftMotion Light or IIoT) are required but not currently shown, including a reference to further online documentation

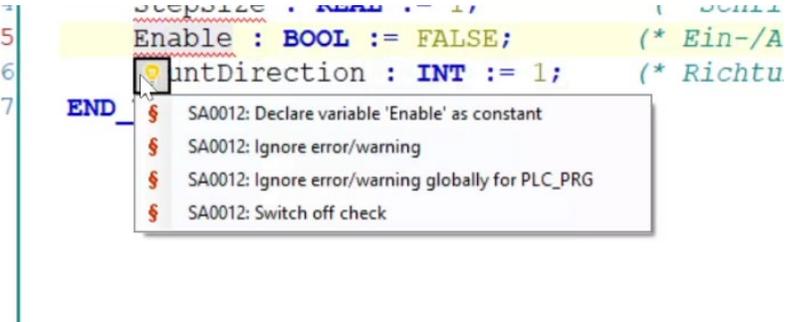
### ▪ **CODESYS License Manager Enhancements:**

- Support for the addition, removal, and display of license servers
- Direct activation of licenses on license servers from the License Manager
- Display of all relevant information about containers and licenses within the interface

## Professional Developer Edition: Static Analysis

- **Early detection of code issues directly during editing**
  - Prevents code smells and expensive late-stage debugging
  - No need to compile for most rule checks – faster feedback loop
- **One-click quick fixes for many rule violations**
  - Saves time, ensures consistent code style
- **New “cognitive complexity” metric**
  - Helps keep logic understandable and maintainable
- **Fewer false positives due to variable value prediction**
- **New rules for:**
  - Safe use of arrays, pointers, references, interfaces
  - Automatic detection of division by zero

```
5 Enable : BOOL := FALSE; (* Ein-/A  
6 CountDirection : INT := 1; (* Richtu  
7 END
```



```
CountDirection := -1; (* Richtung auf abwärts se  
ELSI The variable 'CountDirection' is assigned but its value is never used  
CountDirection := 1; (* Richtung auf aufwärts s
```



## Professional Developer Edition: Git

- **Access data now managed hierarchically (per hostname)**
  - Less manual configuration, fewer connection errors
- **Manual conflict resolution via right-click menu**
  - More control in resolving merge situations
- **Clear warnings for unmergeable changes**
  - Prevents confusion; recommends correct workflow via “Git Branches”
- **Local Git config prioritized, with new UI for simple setup**



Runtime



Safety

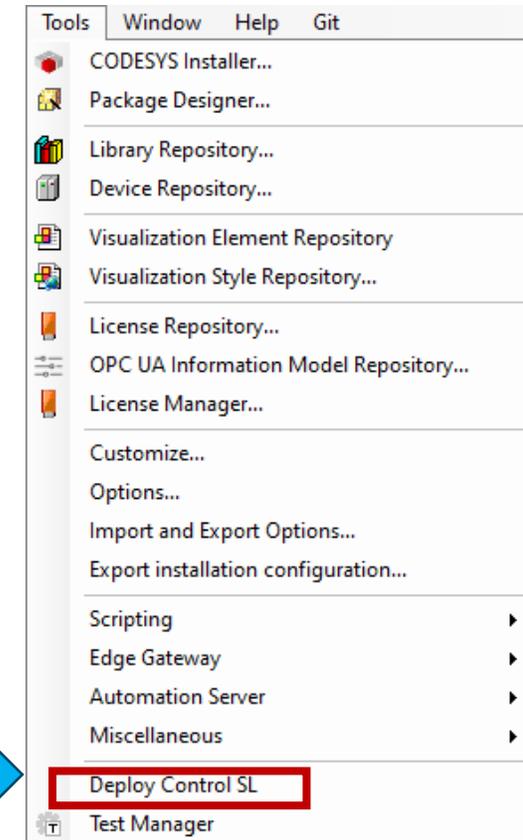
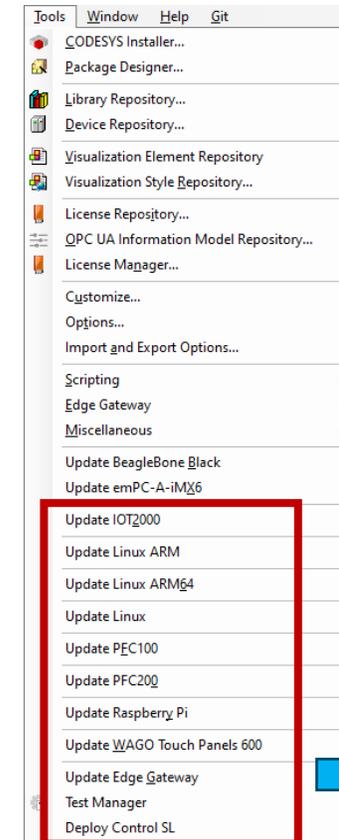
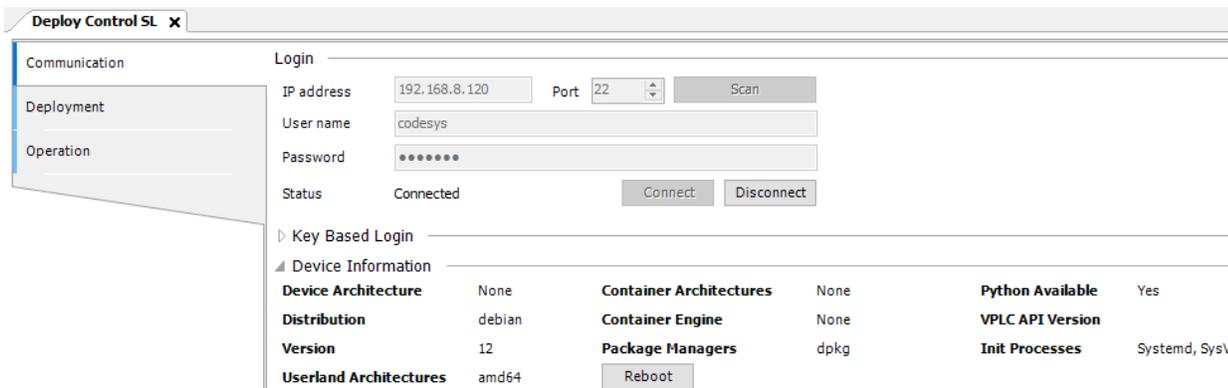
# CODESYS RUNTIME CODESYS SAFETY

## Overview

- **Completely revised Deploy Tool now in one interface for all Control SL products**
- **New: Certified, hardware-independent virtual SIL3 safety controller**
- **Release of CODESYS Virtual Control SL**
- **CODESYS Safety Extension – more flexibility and independence**
- **CODESYS Virtual Control SL – Virtual PLCs for flexible automation**
- **General improvements to CODESYS Control SL**
- **Password policy for device user administration**
- **CODESYS Redundancy: New interface for data synchronization and further improvements**
- **Numerous detail improvements in the Runtime Toolkit and in Control SL products**
- **Device manufacturer: Updates for various products**

## Completely revised Deploy Tool for all Control SL products

- Complete overhaul of the CODESYS Control SL Deploy Tool
  - Migration of all CODESYS Control SL products
  - Central management of all runtimes and services on a target device
  - Smart recognition of supported options



## Completely revised Deploy Tool for all Control SL products

- Deployment and operation of all runtime products

Communication

Deployment

Operation

Install and Deploy Product

Product: CODESYS Virtual Control for Linux SL

Version: 4.13.0.0 (arm64)

Install

Installed Packages

Product	Version
CODESYS Edge Gateway for Linux	4.13.0.0-b.trunk.48
CODESYS TargetVisu for Linux SL	4.13.0.0-b.trunk.48
CODESYS LicenseServer for Linux SL	4.13.0.0-b.trunk.48

Installed Images

Product	Image Version	Architecture	Used by
CODESYS Virtual Control for Linux SL	4.13.0.0-b.trunk.48	armhf	
CODESYS Virtual Control for Linux SL	4.13.0.0-b.trunk.48	arm64	Runtime, first
CODESYS Virtual Edge Gateway for Linux	4.13.0.0-b.trunk.48	arm64	
CODESYS Virtual Edge Gateway for Linux	4.13.0.0-b.trunk.48	armhf	edge

Communication

Deployment

Operation

Services

Start All Stop All System Information

Product	State	Action
CODESYS Edge Gateway for Linux	Running	⏸
CODESYS TargetVisu for Linux SL	Running	⏸
CODESYS LicenseServer for Linux SL	Running	⏸

VPLCs

Start All Stop All Runtime Log

Instance	State	Product	Dependencies	Action
Runtime	Running	Runtime		⏸
edge	Running	Gateway		⏸
first	Stopped	Runtime		▶

Settings

Instance

Autostart: False

Capabilities: cap\_chown, cap\_ipc\_lock, cap\_kill, cap\_net\_admin, cap\_net\_raw

Dependencies:

Genericcommands:

Hostname: first

Image: codesyscontrol\_virtuallinuxarm64:4.13.0.0-b.trunk.48

Ipc:

Licenseserver:

Mounts: /var/opt/codesyscontrol/instances/first/conf/codesyscc

Network:

Nic:

Ports:

Producttype: Runtime

Technology: Docker

Capabilities

The capabilities you want the instance to have. Write as: cap\_chown, cap\_net\_raw

Save

# Certified, hardware-independent virtual safety controller: CODESYS Virtual Safe Control SL

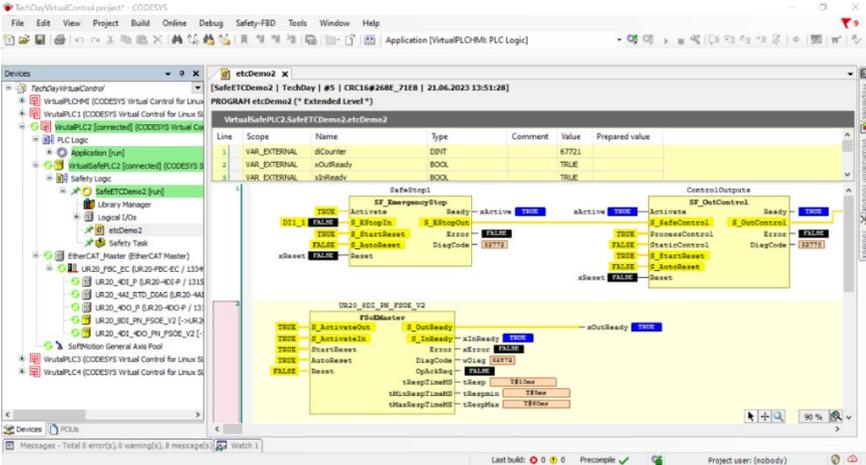
- Hardware-independent SIL3 safety solution
- Available as native or containerized variant
- Convenient setup and configuration with Control SL Deploy Tool
- Certified by TÜV Süd
- Application-based licensing model
- PROFIsafe 2.6 conformance test succeeded
- FSoE up coming in Q3/2026



**SAFETY**

4 Connections Standard Lib PLCopen Safety Lib	8 Connections Standard Lib PLCopen Safety Lib	16 Connections Standard Lib PLCopen Safety Lib	64 Connections Standard Lib PLCopen Safety Lib	194 Connections Standard Lib PLCopen Safety Lib

**Safety without compromise:**  
With CODESYS Virtual Safe Control SL, you get a certified SIL3 controller without any special hardware requirements.



## CODESYS Safety Extension – More flexibility and independence

- **Now fully independent from CODESYS Essentials version**
  - Can be installed on any 64-bit CODESYS Essentials version
  - Enables fast updates and compatibility with other add-ons
- **Remains SIL3-qualified according to IEC 61508**
  - Safety projects benefit from maximum flexibility and future-proof integration

## CODESYS Virtual Control SL – Virtual PLCs for flexible automation

- **Deploy multiple, independent virtual PLCs on a single standard hardware platform**
  - Reduces hardware and installation costs significantly
  - Ideal for scalable and adaptable plant architectures
- **Seamless integration into existing IT infrastructures**
  - Benefit from IT-standard orchestration for simplified management and automated firmware updates
- **Licensing now supports network licenses bound to host hardware**
  - Flexible scaling and straightforward license administration via CODESYS Store

## General improvements to CODESYS Control SL

- **CODESYS Control for Raspberry Pi SL**
  - GPIO support for Raspberry Pi 5
  - Compute Module 4 for industrial applications now supported
- **CODESYS Control Linux SL / CODESYS Control Linux ARM SL**
  - RPM support
- **Real-Time Ethernet (only x86 and EtherCAT; PROFINET not supported yet):**
  - XDP technology for high-performance real-time communication
  - “Zero copy” support – no kernel adaptation required
  - Substantially reduced cycle times, even under heavy load
- **Linux Integration:**
  - Runtime and Gateway configuration files now organized in dedicated /etc subfolders for easier management
  - Full user management integration with Linux PAM
    - Centralized authentication and rights assignment using system users and groups
    - Enables enterprise-grade access management

## CODESYS Control SL – Default security settings

- **Password policy now enabled by default after updates**
  - Increased baseline security for all user accounts
- **Default password requirements:**
  - Minimum length: 8 characters
  - At least 4 different character types
    - Must include lowercase and uppercase letters
    - Must include numbers and special characters
    - Username cannot be part of the password
- **Recommended to keep this default for optimal security**
  - Policy can be disabled if needed in security settings or via configuration:  
[CmpUserMgr] SECURITY.UserMgmt.PasswordPolicy=DISABLED

## **CODESYS Redundancy:**

### **New interface for data synchronization and further improvements**

- **Performance improvement for cyclically synchronized data**
- **New interface for acyclic data synchronization**
- **Bug fixes for dual-link redundancy systems**
- **Synchronization of PLC states**
  - Certificates
  - Configurations
  - User management

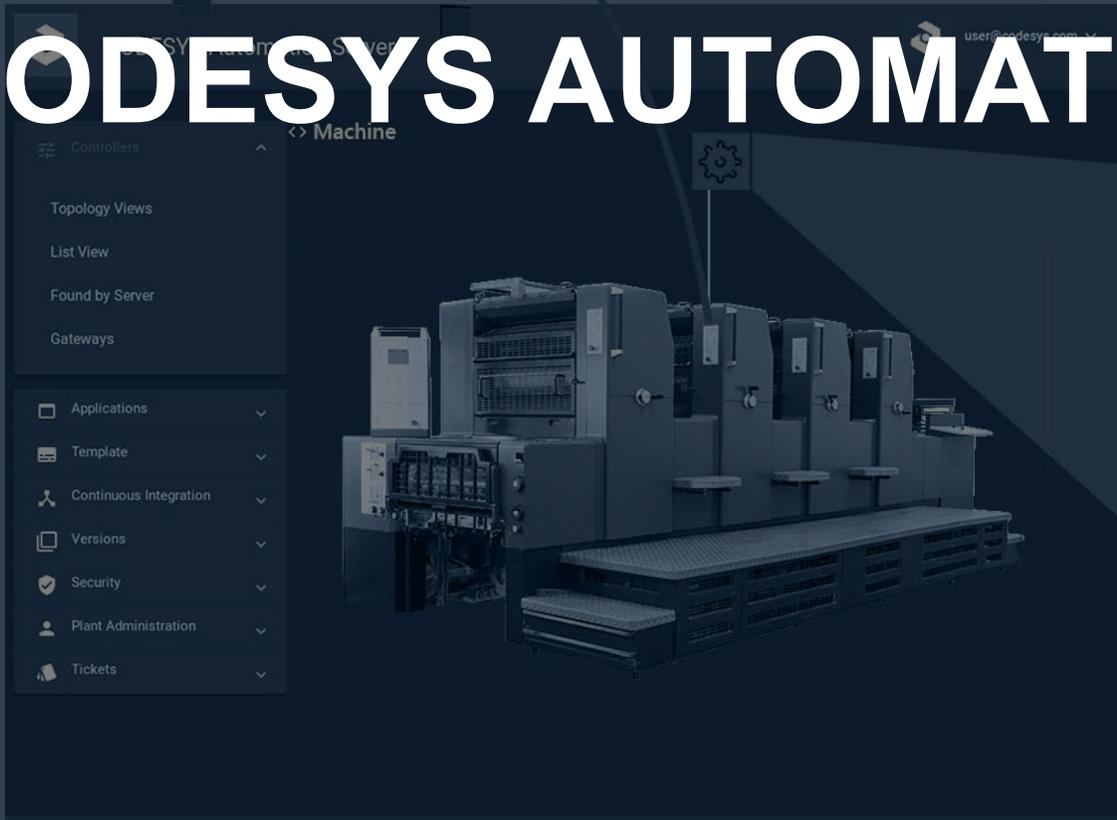
## Device manufacturer: Updates for various products

- **PLCHandler: Support for ARM64 access on Windows systems**
- **Support of application-based licensing for device manufacturers with customized runtime systems**
- **Numerous detail improvements to the Runtime Toolkit**



# CODESYS AUTOMATION SERVER

# CODESYS AUTOMATION SERVER



© 2018 SS-Smart Software Solutions GmbH | A member of the CODESYS Group

CODESYS Group | We software Automation.

## Overview

- Remote application control
- Edge Gateway replacement
- File management I
- Renewal of expired Edge Gateway certificates
- Certificate management
- Encrypted communication



CODESYS Automation Server  
versions 1.33.0.0 – 1.35.0.0

## Remote control: start, reset, stop applications

### Solution

- Control panel to start, stop, and reset applications in defined ways directly from the browser
- Remote change of the execution state of a PLC
- Display of applications on the PLC
- No need for the CODESYS Development System
- No need to log in to a PLC
- Application control by any device with a browser
- High time savings

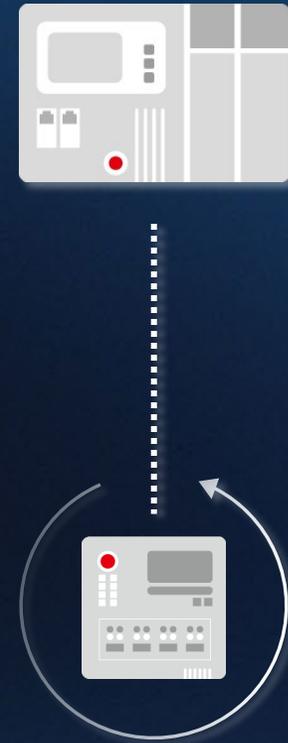




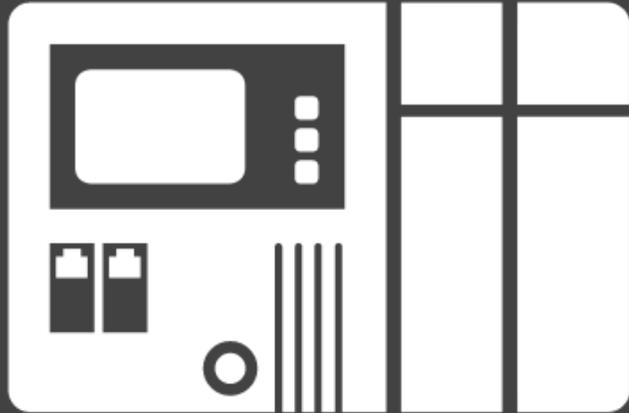
## CODESYS Edge Gateway replacement

### Solution

- Edge Gateway change via drop-down menu
- Move PLC to another or new Edge Gateway
- Keep existing PLCs despite changes to connection or name
- Easy transition from test to productive operation



## List View / PLC Details: Testrack\_1\_PLC



  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-536C5887-16D2FB35  
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

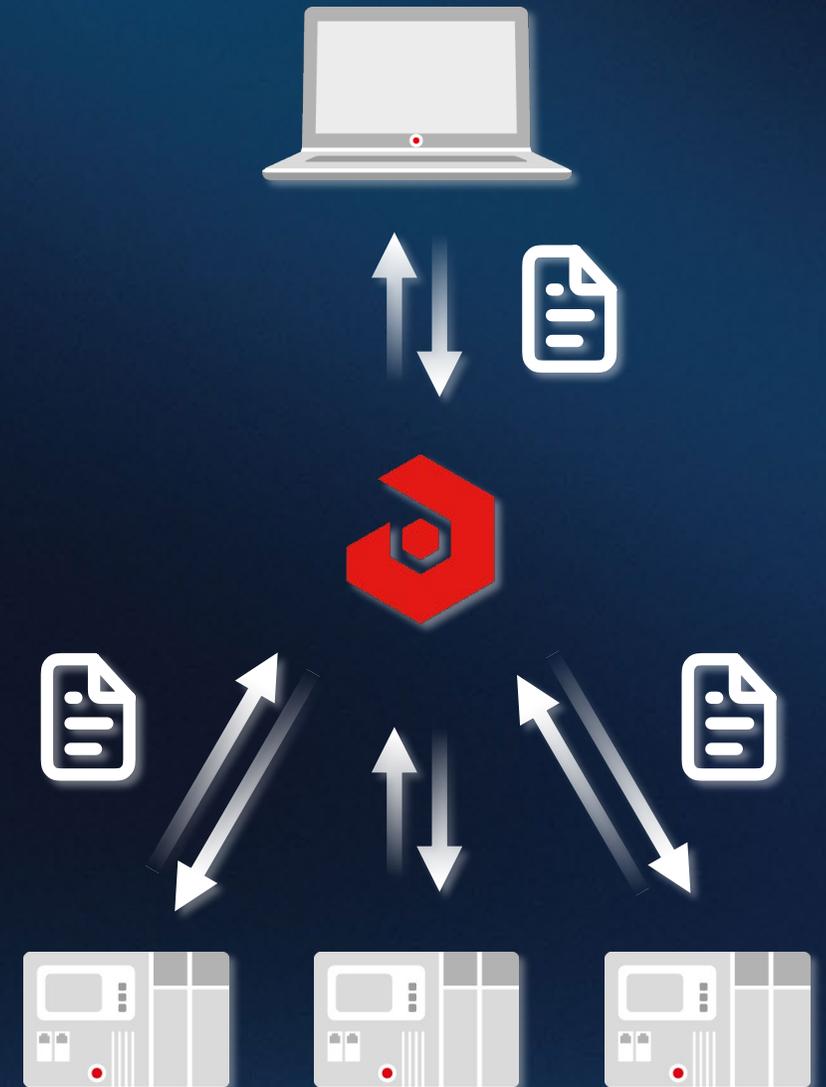
Device name   DECKERMNB  
Gateways   Edge\_MDe\_local\_3.5.18.0

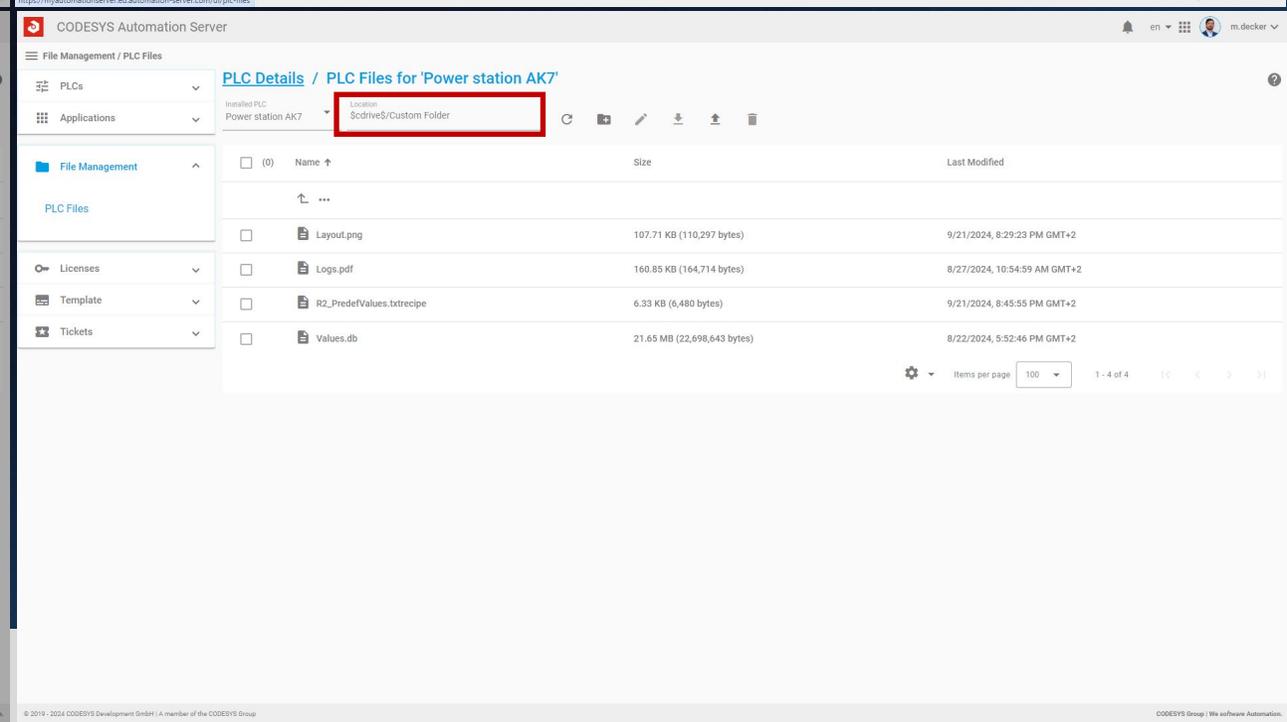
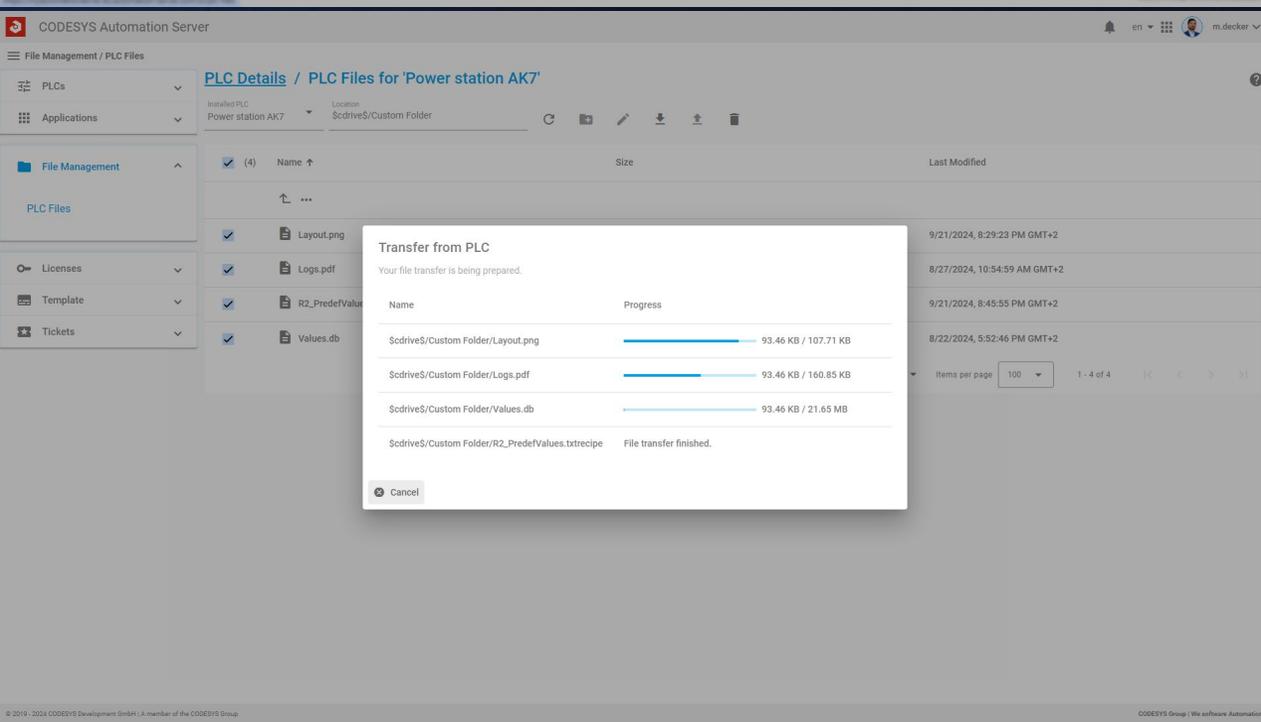
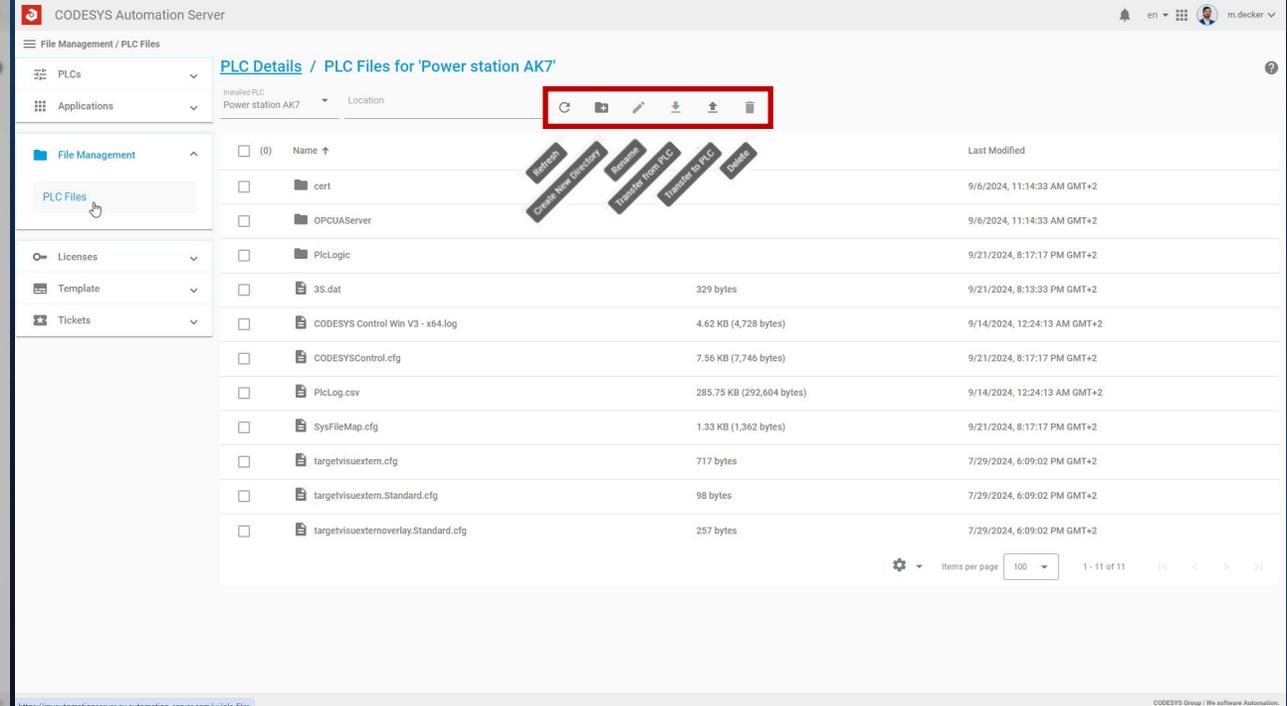
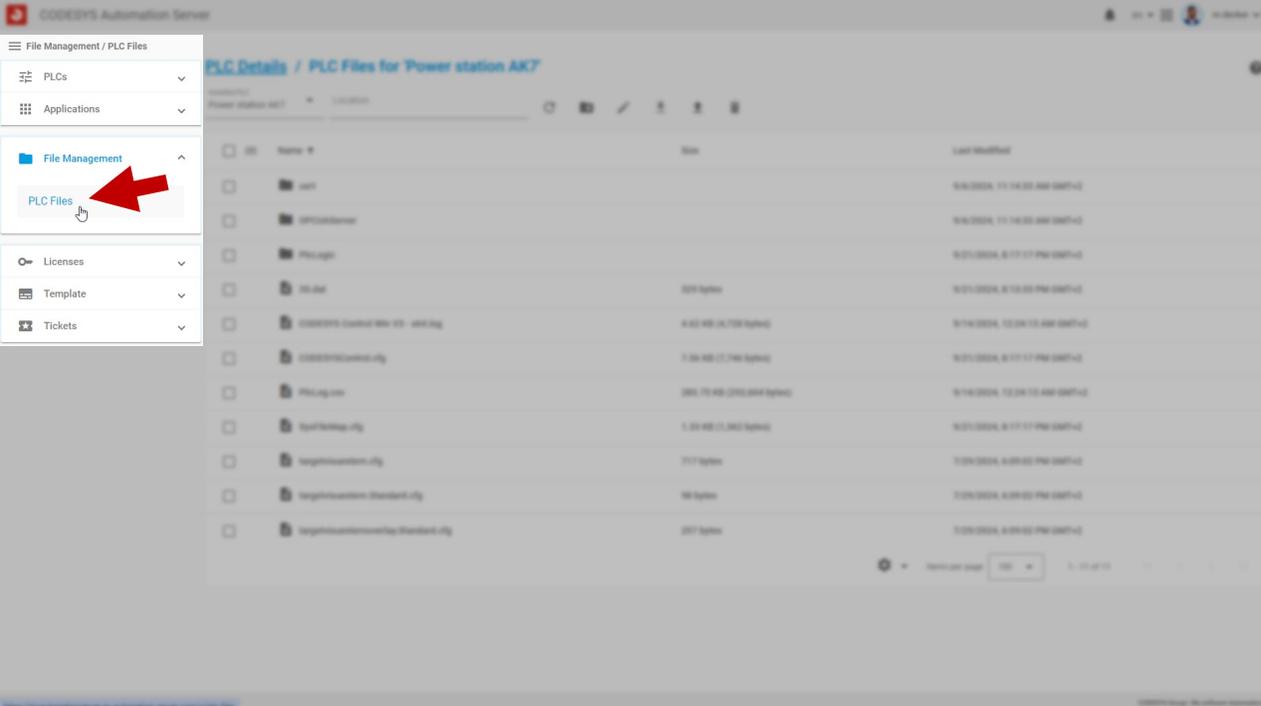
- Search
- Office\_Gateway
  - My new Gateway
  - PiHome
  - MDe\_NB\_local
  - Edge\_MDe\_local\_3.5.18.0

## File management

### Solution:

- Extensive remote file management possibilities
- Development in three stages
  - I) File transfer to PLCs
  - II) *Deployment of additional files & central file management*
  - III) *Backup & restore of files*
- ✓ Access to the PLCs file system via browser – no CODESYS Development System needed
- ✓ Control of recipe management from the browser
- ✓ Enhanced capabilities through support of user-defined files on PLCs





## Renew expired Edge Gateway certificates

### Solution:

Temporary, functionally restricted connection, only for renewing the certificate

- ✓ Full functionality with new certificate
- ✓ “Old” Edge Gateways (shelf life > 6 months) still usable



## Gateways

### Connection logs for 'Edge'

Message	Timestamp	Edge Certificate Thumbprint
 Edge gateway connected successfully.	4/8/2024, 10:07:53 AM GMT+2	C054D35248F21...
 Edge connected with expired certificate. Only renewal of certificate is allowed.	4/8/2024, 10:07:23 AM GMT+2	E408D1D99D761...
 The edge certificate is configured in the Automation Server but expired.	4/8/2024, 10:06:52 AM GMT+2	E408D1D99D761...
 The edge certificate is configured in the Automation Server but expired.	4/8/2024, 10:06:22 AM GMT+2	E408D1D99D761...
 The edge certificate is configured i		9D761...
 The edge certificate is configured i		9D761...
 The edge certificate is configured i		9D761...
 The edge certificate is configured i		9D761...
 The edge certificate is configured in the Autom... Server but expired.	4/8/2024, 10:03:52 AM GMT+2	E408D1D99D761...

**Allow Temporary Connection**

Do you really want to allow an edge with expired certificate to connect temporarily, so it can renew its certificate?  
This operation may take a few minutes.

Certificate thumbprint: E408D1D99D...

 Refresh  Allow Temporary Connection

 Items per page 25 1 - 25 of 30

5

2

1

3

4

## Certificate management

### Solution:

- Overview of existing certificates and important details
  - Central location for common actions with certificates
  - Wide range of search and filter possibilities
  - Browser-based certificate management
  - Multi-edit possibilities for certificates and devices
- 
- ✓ Certificates of all devices always in view
  - ✓ Automatic notification before certificate expiration
  - ✓ Clear handling and workflow



CODESYS Automation Server

Security / Device Certificates

Device Certificates

PLCs Edge Gateways Search Trust level Expires before GMT+1

Virtual\_Control, FactoryFloorPLC (4)

Virtual\_Control FactoryFloorPLC Assembly\_Line\_PLC Motion\_PLC

Device Name	Thumbprint	Valid Until	Use Cases	Trust Level	Actions
Virtual_Control	BE198281697C0DC2A9DFB9C923DD0DC75A5	11/29/2024, 12:37:25 PM GMT+1		Own	[Download] [Refresh] [Play] [Trash]
FactoryFloorPLC	1FC37449835D4A07D338415FF567217E588	1/14/2026, 3:16:46 PM GMT+1		Own	[Download] [Refresh] [Play] [Trash]
FactoryFloorPLC	0640687F000164C23BEB16CF75358E73E9DAD	1/14/2026, 3:17:43 PM GMT+1	Web Server	Own	[Download] [Refresh] [Play] [Trash]
FactoryFloorPLC	A7DE026A6A81EA69E5051D2DB60A2083C89	2/13/2025, 3:45:25 PM GMT+1		Own	[Download] [Refresh] [Play] [Trash]
Virtual_Control	8F3E3CB9EBB7B3EFA4F05C5360527070E1C1E55	1/14/2026, 3:13:39 PM GMT+1	Encrypted Communication	Own	[Download] [Refresh] [Play] [Trash]
FactoryFloorPLC	DD97937AD08BF0FD0B50AFFA66B773C143F5969A	11/29/2024, 12:58:37 PM GMT+1		Own	[Download] [Refresh] [Play] [Trash]
FactoryFloorPLC	99D8544C38EE291F5FCBDC2D08A41D8D5C70472	1/14/2026, 3:13:34 PM GMT+1	Encrypted Communication	Own	[Download] [Refresh] [Play] [Trash]
FactoryFloorPLC	CC92869F4F58860CBEAD08E40AFB146B890EC8DE	1/14/2026, 3:17:38 PM GMT+1	Web Server	Own	[Download] [Refresh] [Play] [Trash]
Assembly_Line_PLC	2339331636EEF8995A6775D8BD03C304E724FAE	10/11/2023, 11:46:36 AM GMT+2		Own	[Download] [Refresh] [Play] [Trash]
Assembly_Line_PLC	A93C9C22F2AAB2C94C3B88158DCB5A3C134D64	5/25/2023, 1:42:56 PM GMT+2		Own	[Download] [Refresh] [Play] [Trash]
Assembly_Line_PLC	D268E7B1308A5B183E71AA6932EA6EC1F59CC698	12/11/2025, 10:46:35 AM GMT+1		Own	[Download] [Refresh] [Play] [Trash]
Assembly_Line_PLC	846A9A38EB7A8CFBEA06822B810F30C9C1DCA2B	1/14/2026, 3:17:22 PM GMT+1	Web Server	Own	[Download] [Refresh] [Play] [Trash]

© 2019 - 2024 CODESYS Development GmbH | A member of the CODESYS Group

Device Certificates

Create Certificate

This operation creates a self signed certificate.

User Chosen\* OPC UA Server

Days of validity\* 365

Key length (bit)\* 2048

Device Name Status ↑

Virtual\_Control

FactoryFloorPLC

Assembly\_Line\_PLC

Motion\_PLC

Create Certificate Close

Trust level Expires before GMT+1

MM/DD/YYYY, hh:mm AM/PM

Encoding for transfer .pem

Transfer Certificate from Device

Device Name	Thumbprint	Valid Until	Use Cases	Trust Level	Actions
Virtual_Control	ECBE198281697C0DC2A9DFB9C923DD0DC75A5	11/29/2024, 12:37:25 PM GMT+1		Own	[Download] [Refresh] [Play] [Trash]
FactoryFloorPLC	331FC37449835D4A07D338415FF567217E588	1/14/2026, 3:16:46 PM GMT+1		Own	[Download] [Refresh] [Play] [Trash]
FactoryFloorPLC	0640687F000164C23BEB16CF75358E73E9DAD	1/14/2026, 3:17:43 PM GMT+1	Web Server	Own	[Download] [Refresh] [Play] [Trash]
FactoryFloorPLC	69A7DE026A6A81EA69E5051D2DB60A2083C89	2/13/2025, 3:45:25 PM GMT+1		Own	[Download] [Refresh] [Play] [Trash]
Virtual_Control	E3CB9EBB7B3EFA4F05C5360527070E1C1E55	1/14/2026, 3:13:39 PM GMT+1	Encrypted Communication	Own	[Download] [Refresh] [Play] [Trash]
FactoryFloorPLC	797937AD08BF0FD0B50AFFA66B773C143F5969A	11/29/2024, 12:58:37 PM GMT+1		Own	[Download] [Refresh] [Play] [Trash]
FactoryFloorPLC	8544C38EE291F5FCBDC2D08A41D8D5C70472	1/14/2026, 3:13:34 PM GMT+1	Encrypted Communication	Own	[Download] [Refresh] [Play] [Trash]

© 2019 - 2024 CODESYS Development GmbH | A member of the CODESYS Group

Device Certificates

Move Certificate in Certificate Store

Trust level\* Untrusted

Device Name	Thumbprint	Trust Level	Status ↑
Virtual_Control	5320640687F000164C23BEB16CF75358E73E9DAD	Own	
Virtual_Control	8F3E3CB9EBB7B3EFA4F05C5360527070E1C1E55	Own	
FactoryFloorPLC	99D8544C38EE291F5FCBDC2D08A41D8D5C70472	Own	
Assembly_Line_PLC	846A9A38EB7A8CFBEA06822B810F30C9C1DCA2B	Own	

Move Close

## Encrypted communication

### **Solution:**

- Fully encrypted connection – end-to-end or via CODESYS Automation Server
- Simple workflow thanks to quick setup
- Mandatory encryption possible for all PLCs connected with a specific Edge Gateway
- Options for connection testing
- Bulk operations





**OR**



CODESYS Automation Server

PLCs / List View

List View / PLC Details: FactoryFloorPLC

General State Information Configuration Visualization Logs Data Analyzer Projects

Credentials

Credential state Login succeeded with username and password.

User name\*

Password\*

Save Reconnect

Synchronization

Synchronize applications

Synchronize parameters

Save Configuration Reset

Encrypted Communication

Encrypted communication

Test Encrypted Connection

Quick Setup

Notifications

Enable notifications

More notification settings

Enables encrypted communication between the Edge Gateway and the PLC. The communication between the Edge Gateway and the Automation Server is always encrypted.

For this option to work, the Edge Gateway needs to trust the certificate for encrypted communication of the PLC.

CODESYS Automation Server

PLCs / List View

List View / PLC Details: FactoryFloorPLC

Topology Views

List View

Network Scan

Gateways

Applications

File Management

Security

Licenses

Template

Tickets

Encrypted Communication Quick Setup

Retrieves the certificates that are used for encrypted communication. Creates a new certificate, if no valid certificate is found.

Installed PLC Status

FactoryFloorPLC

Items per page 25 1 - 1 of 1

Prepare Certificates Close

Encrypted Communication Quick Setup

Copies the selected certificates to the corresponding edge gateways and enables encrypted communication on the PLC afterwards.

<input checked="" type="checkbox"/>	(1) Installed PLC	Thumbprint	Status	Actions
<input checked="" type="checkbox"/>	FactoryFloorPLC	FCF04A0AF9B9498A2AC3C9267A9BA1876E3E382	<span style="color: green;">●</span>	

Items per page 25 1 - 1 of 1

Enable Encrypted Communication Close

CODESYS Automation Server

PLCs / List View

List View

Search

<input type="checkbox"/>	Name	Status	Update available	Project	Commit	Sync	Actions
<input type="checkbox"/>	Virtual_Control	<span style="color: green;">●</span>		ChromaticDemo	Compatibility changes ...		
<input type="checkbox"/>	FactoryFloorPLC	<span style="color: green;">●</span>		ChromaticDemo	CDS 3.5.20.30, RT in project 4.13.0.0, target PI SC ...		
<input type="checkbox"/>	Assembly_Line_PLG	<span style="color: green;">●</span>		ChromaticDemo	Compatibility changes ...		
<input type="checkbox"/>	Motion_PLG	<span style="color: green;">●</span>		ChromaticDemo	Bugfixes in PLC_PRG ...		
<input type="checkbox"/>	ShopFloorB3	<span style="color: red;">●</span>		Multitouch	Bugfixes ...		
<input type="checkbox"/>	Portal_Control	<span style="color: green;">●</span>		Multitouch	Bugfixes ...		
<input type="checkbox"/>	Conveyor-1-7	<span style="color: green;">●</span>		MotionControl	Improved acceleration behavior ...		
<input type="checkbox"/>	WorkshopPIK4	<span style="color: red;">●</span>		PowerPlant	OPC UA added ...		
<input type="checkbox"/>	BGH-IMX6_PMar	<span style="color: red;">●</span>		dc2004_SP17_	New text list ...		
<input type="checkbox"/>	RevPI	<span style="color: green;">●</span>		RevPI_Motor	Commit 4.10.0.0 ...		
<input type="checkbox"/>	Raspl_Touch_PMar	<span style="color: green;">●</span>		PanelPI	Initial ...		
<input type="checkbox"/>	UniPI	<span style="color: green;">●</span>		Assembly4B	Test run local ...		

Items per page 25 1 - 25 of 33

CODESYS Automation Server

PLCs / Gateways

Gateways

SmartConnect Munich | Germany Version: 4.13.0.0 based on 3.5.20.20

Automation Edge Hu Beverly | USA

Encrypted communication

Industrial Cloud Gateway Canberra | Australia Version: 4.13.0.0 based on 3.5.20.20

Lunar Link Crater Grimaldi | Moon Version: 4.13.0.0 based on 3.5.20.20

GrandPLC-01-Gateway Version: 4.13.0.0 based on 3.5.20.20

GrandPLC-02-Gateway Version: 4.13.0.0 based on 3.5.20.20

GrandPLC-03-Gateway Version: 4.13.0.0 based on 3.5.20.20

GrandPLC-04-Gateway Version: 4.13.0.0 based on 3.5.20.20

CODESYS Headquarters Version: 3.5.20.0

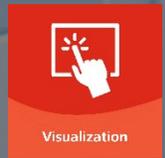
MO\_Gateway Version: 4.13.0.0 based on 3.5.20.20

CODESYS Headquarters CAS-Demo Version: 4.11.0.0 based on 3.5.19.61

FactoryEdgeGateway Version: 3.5.20.20

GW\_AK

MESSEFELDBUS Version: 3.5.20.30



# CODESYS VISUALIZATION



## Overview of the improvements

- Responsive design
- Client-specific localization
- Alarm management
- XY chart / trend
- Python scripting
- TargetVisu overlay
- WebVisu
- Visu dialog optimizations
- Alarms and trends
- Date and time

## Responsive design: Positioning of elements depending on the client size

- Use of Container.Size and Visu.Size

Absolute movement	
Movement	
X	Container.Width-Visu.Width
Y	

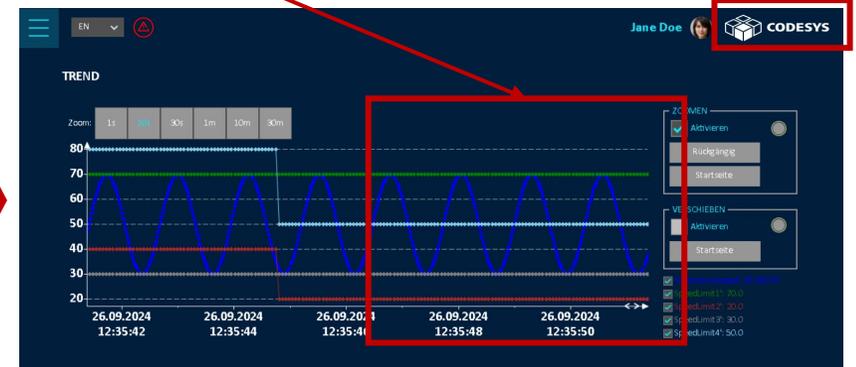
- Container.Size is the client size on each main page.

- Possibilities

- Alignment
- Filling of areas

CODESYS logo aligned on the right  
Trend graph fills the area

Relative movement	
+ Movement top-left	
- Movement bottom-right	
X	Container.Width-Visu.Width
Y	Container.Height-Visu.Height



## Responsive design: Positioning of elements depending on the client size

- Wrap content dynamically, scroll bar appears

EN  Jane Doe  CODESYS

**SETTINGS**

**INFEED**

Velocity: 5 sec  
Quantity: 1586 pieces  
Direction:  Left  Right

**GRADING & SENSORS**

Sensor type: Camera  
Intensity: 1586 %  
Position: X 627 Y 411

**PACKING**

Paper type: Cardboard  
Paper thickness: 1586 g/m<sup>2</sup>  
Tape: Universal  
Packet height: 60 cm  
Packet width: 45 cm  
Packet depth: 21 cm  
Quantity per box: 54 Pieces  
Quantity per layer: 12 Pieces

**SPEED**

Velocity: 5 sec  
Quantity: 1586 pieces  
Pieces per second: 3 pieces

EN  Jane Doe  CODESYS

**SETTINGS**

**INFEED**

Velocity: 5 sec  
Quantity: 1586 pieces  
Direction:  Left  Right

**GRADING & SENSORS**

Sensor type: Camera  
Intensity: 1586 %  
Position: X 627 Y 411

**SPEED**

Velocity: 5 sec  
Quantity: 1586 pieces  
Pieces per second: 3 pieces

**PACKING**

Paper type: Cardboard  
Paper thickness: 1586 g/m<sup>2</sup>  
Tape: Universal  
Packet height: 60 cm

## Client-specific localization

- **Each visualization client: own language possible**
- **Client: Start with browser language (de, en, ...)**
  - Browser language codes: de, en, ... text list entry necessary
  - Otherwise: Usage of standard language
- **Language switching only takes place in the current client.**

## Alarm management - new features

- **Online change in most common use cases possible**
  - Add/remove/modify alarms in alarm group
  - Add/remove/modify alarm instances in alarm configuration
- **Possibility to define Alarm Group Templates for types that come from another library**
- **Possibility to call alarm events from the instance of a function block**

Alarmmanager.AlarmGlobals.g\_AlarmHandler.RaiseEventAlarmInstance(THIS, Alm\_AGT\_MyFB\_Alarm\_IDs.ID\_0)

The screenshot displays two overlapping windows from the SIMATIC Manager software. The top window, titled 'AGT\_MyFB', is in the 'Alarm Configuration' state. It features a 'Text list' dropdown menu currently set to 'AGT\_MyFB', a 'Deactivation' field, and a 'Type for alarm definition' field set to 'inst'. Below these fields is a table with columns for 'ID', 'Observation Type', 'Details', and 'Deactivation'. The table contains one entry with ID '0' and 'Event' as the observation type.

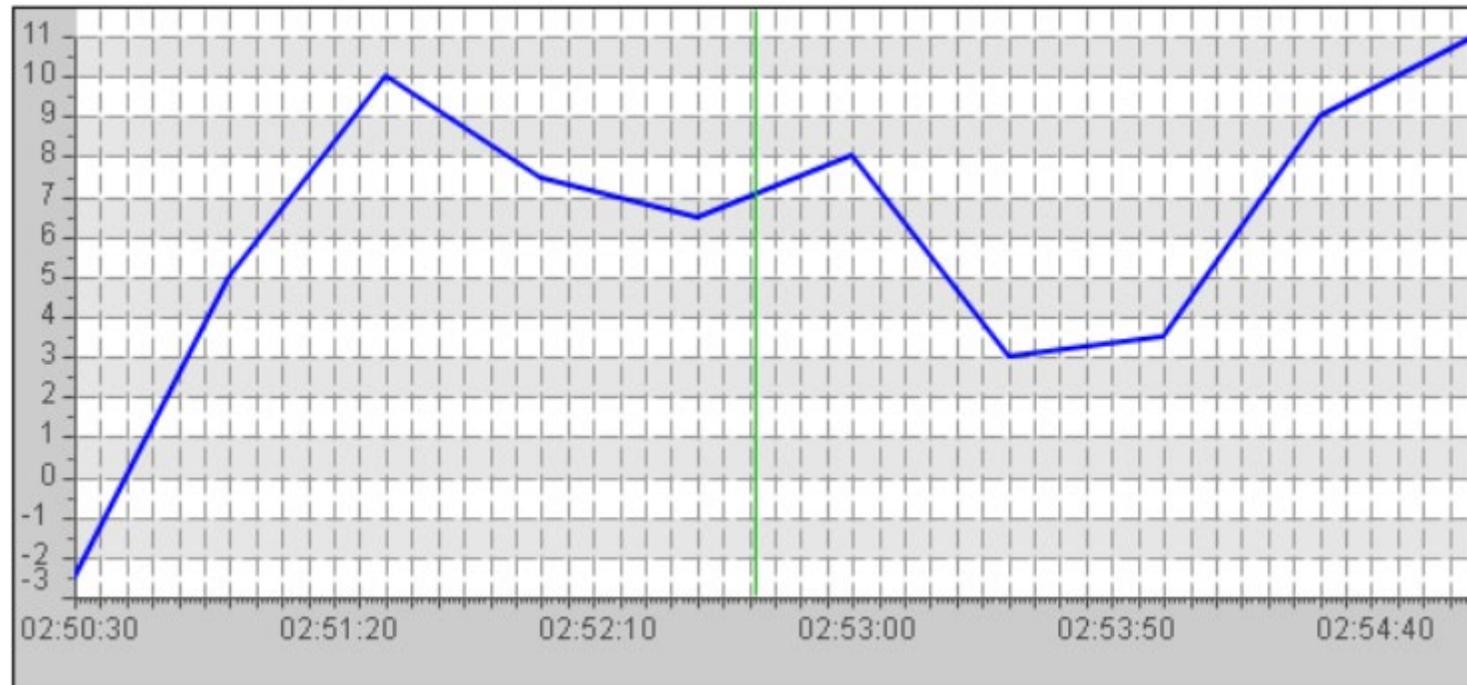
The bottom window, also titled 'AGT\_MyFB', is in the 'Alarm Instances' configuration state. It has a 'Settings' button and a table with columns for 'Variable', 'Alarm Group Template', 'Alarm Group', and 'Create'. The table lists two instances: 'PLC\_PRG.inst1' and 'PLC\_PRG.inst2', both using the 'AGT\_MyFB' template and 'AlarmGroupInstance' group, with 'Create' checkboxes checked.

Variable	Alarm Group Template	Alarm Group	Create
PLC_PRG.inst1	AGT_MyFB	AlarmGroupInstance	<input checked="" type="checkbox"/>
PLC_PRG.inst2	AGT_MyFB	AlarmGroupInstance	<input checked="" type="checkbox"/>

## XY chart / trend - support of time data types

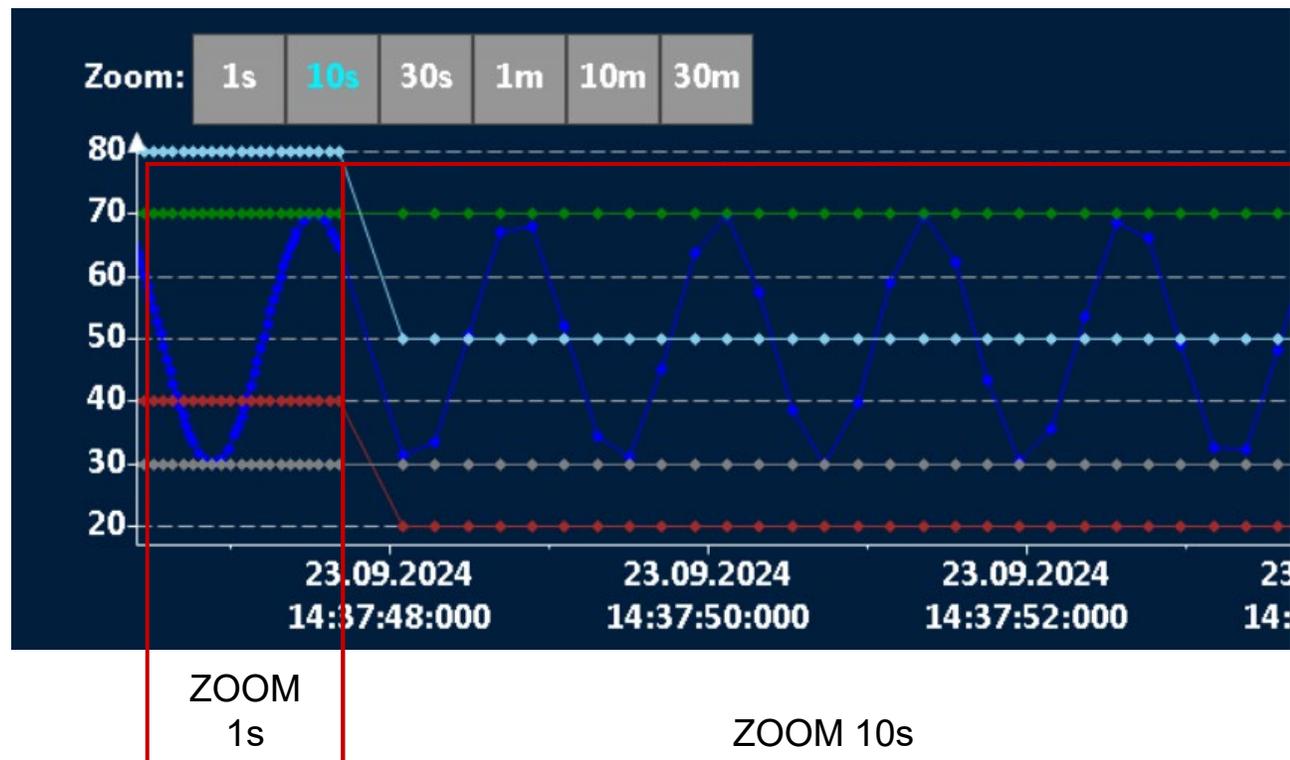
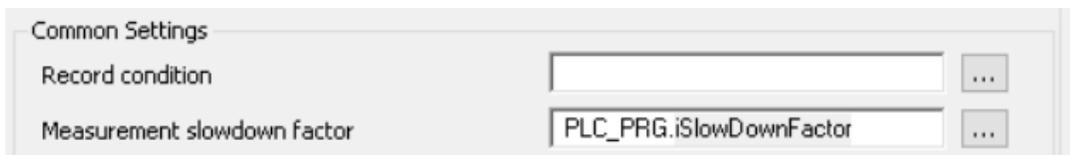
- Time-dependent data can now be displayed in the XY Chart.
- Arrays of the following types can now be used:
  - TIME / LTIME
  - DATE / LDATE
  - TOD / LTOD
  - DT / LDT
- Format strings can be specified.

Format string	dd:MM:yyyy HH:mm:ss
Format string	HH:mm:ss



## XY chart / trend - dynamic recording interval

- Use case: Adjustment of the trend recording speed of during runtime
- New configuration option in the trend: "Measurement slowdown factor"
- Slowdown of the recording by a factor possible



## CODESYS Python scripting: Creating or modifying visualizations

- Creation of visualization objects
- Adding, removing, or modification of elements
- Setting of properties
- Example code:

```
proj = projects.primary
app = findApplication(proj)
visuDemo = app.create_visualobject("VisuDemo");
elementList = visuDemo.visual_element_list;
newElem = elementList.add_element(VisualElementType.Rectangle)
newElem.set_property("Position.X", 10);
newElem.set_property("Position.Y", 20);
```

## TargetVisu Overlay - performance optimizations

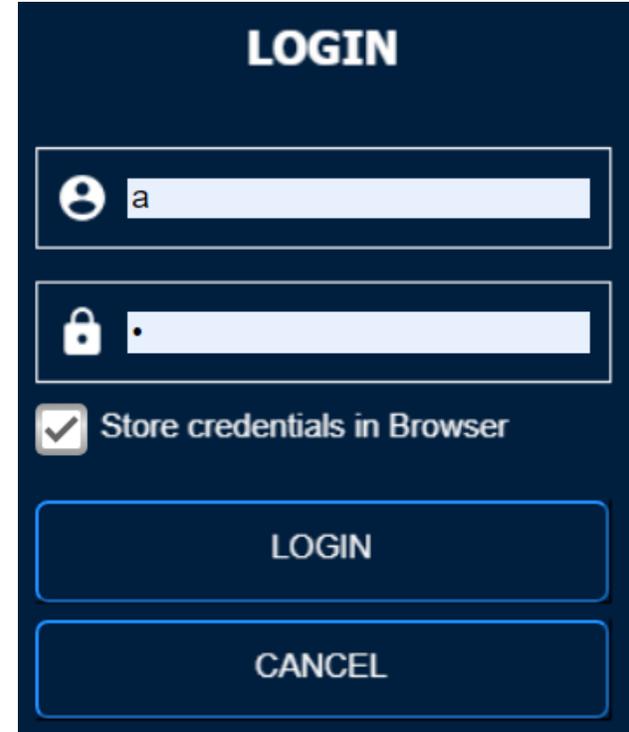
- Optimized drawing of background images
- Caching and faster creation of client elements
- Specialized objects for special features, like static and client-animated elements
- Visu changes twice as fast

## TargetVisu Overlay - scrolling frames with multitouch

- Correct handling of elements with tap or toggle function in combination with multitouch
- Scrolling start on elements without input configuration

## WebVisu - password manager

- **Possibility to use the browser password manager**
  - Store your credentials
  - Automatic login with the stored credentials



**LOGIN**

Store credentials in Browser

LOGIN

CANCEL

## Alarms and trends - optimizations and extensions

- New alarm observation type "Alarm (API)" – Setting alarm states by calling the API

Text list: AGT\_POU Deactivation: [ ] ...

Type for alarm definition: inst : POU ...

ID	Observation Type	Details	Deactivation	Class	Message
1	Alarm (API)			Error	POU alarm <LATCH1>

```
METHOD ActivateAlarm : BOOL
VAR_INPUT
END_VAR

AlarmManager.AlarmGlobals.g_AlarmHandler.ActivateAlarmInstance (THIS, Alm_AGT_POU_Alarm_IDs.ID_1);

METHOD DeactivateAlarm : BOOL
VAR_INPUT
END_VAR

AlarmManager.AlarmGlobals.g_AlarmHandler.DeactivateAlarmInstance (THIS, Alm_AGT_POU_Alarm_IDs.ID_1);
```

POU (FB)

- ActivateAlarm
- DeactivateAlarm

- Loading alarm and trend history stepwise to reduce CPU load

## Date and time - display options

- **Localizable date and time format**
  - Format string in text list, translatable
- **Possibility to switch the displayed time zone**
  - For all elements displaying timestamps or time values
  - Alarm table
  - Trend
  - Clock, Date / Time Picker, ...

	Timestamp	Message
0	24.02.2025 13:32:48:Z	Alarm1
	Timestamp	Message
0	24.02.2025 14:32:48:+01:00	Alarm1
	Timestamp	Message
0	24.02.2025 21:32:48:+08:00	Alarm1



# CODESYS MOTION CNC ROBOTICS

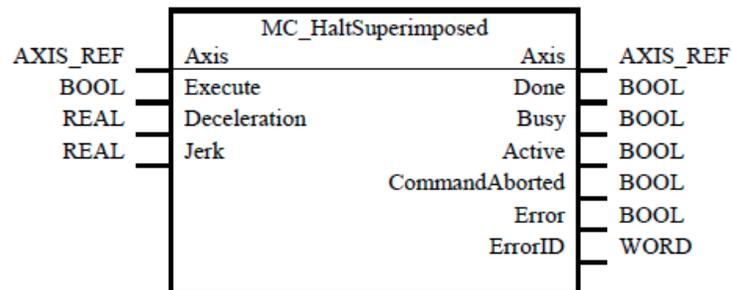
## Overview

- **Improved Basic Motion**
  - MC\_HaltSuperimposed
  - New driver for Mitsubishi Melservo
  - Improved ramp in with new inputs
  - Polynomials of degree 7
  - Additional cam segment types
- **Improved Robotics**
  - Improved aborting
  - Improved logging

## New PLCopen function block MC\_HaltSuperimposed

### 3.9. MC\_HaltSuperimposed

FB-Name		MC_HaltSuperimposed	
This Function Block commands a halt to all superimposed motions of the axis. The underlying motion is not interrupted.			
VAR_IN_OUT			
B	Axis	AXIS_REF	Reference to the axis
VAR_INPUT			
B	Execute	BOOL	Start the action at rising edge
E	Deceleration	REAL	Value of the deceleration [u/s <sup>2</sup> ]
E	Jerk	REAL	Value of the Jerk [u/s <sup>3</sup> ]
VAR_OUTPUT			
B	Done	BOOL	Superimposed motion halted
E	Busy	BOOL	The FB is not finished and new output values are to be expected
E	CommandAborted	BOOL	'Command' is aborted by another command
B	Error	BOOL	Signals that an error has occurred within the Function Block
E	ErrorID	WORD	Error identification
-			

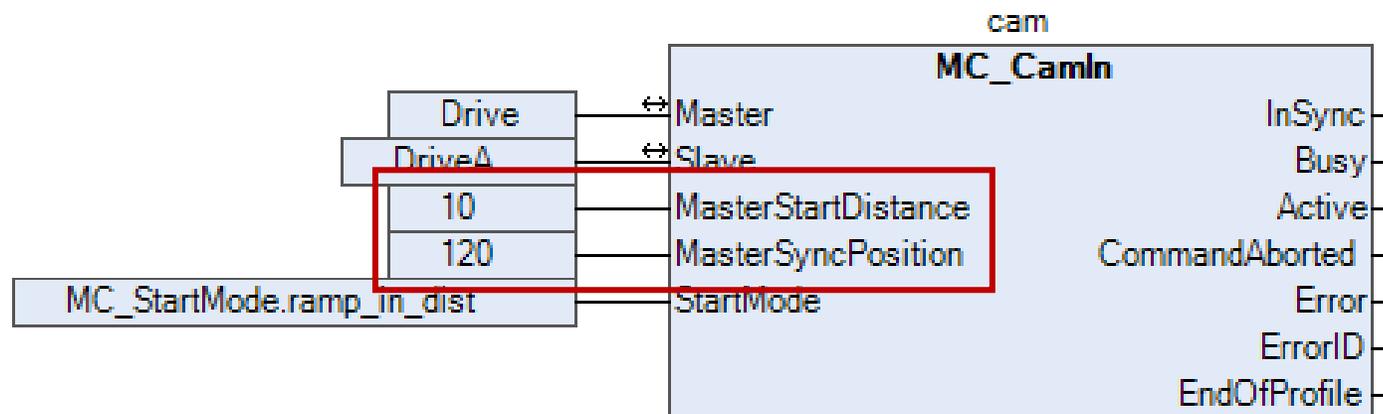


## New driver for Mitsubishi Melservo series

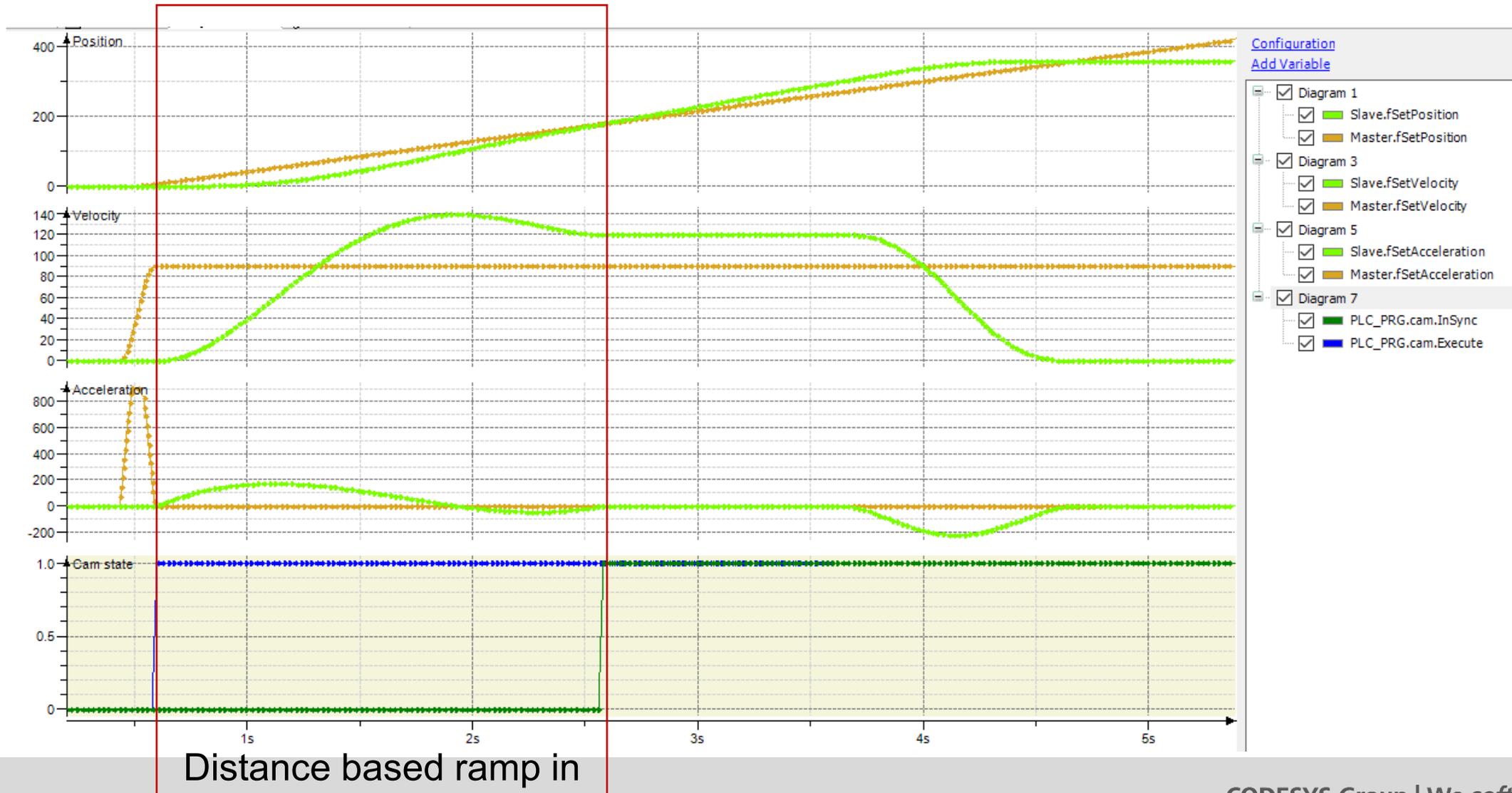


## Improved ramp in with new inputs for function block MC-CamIn

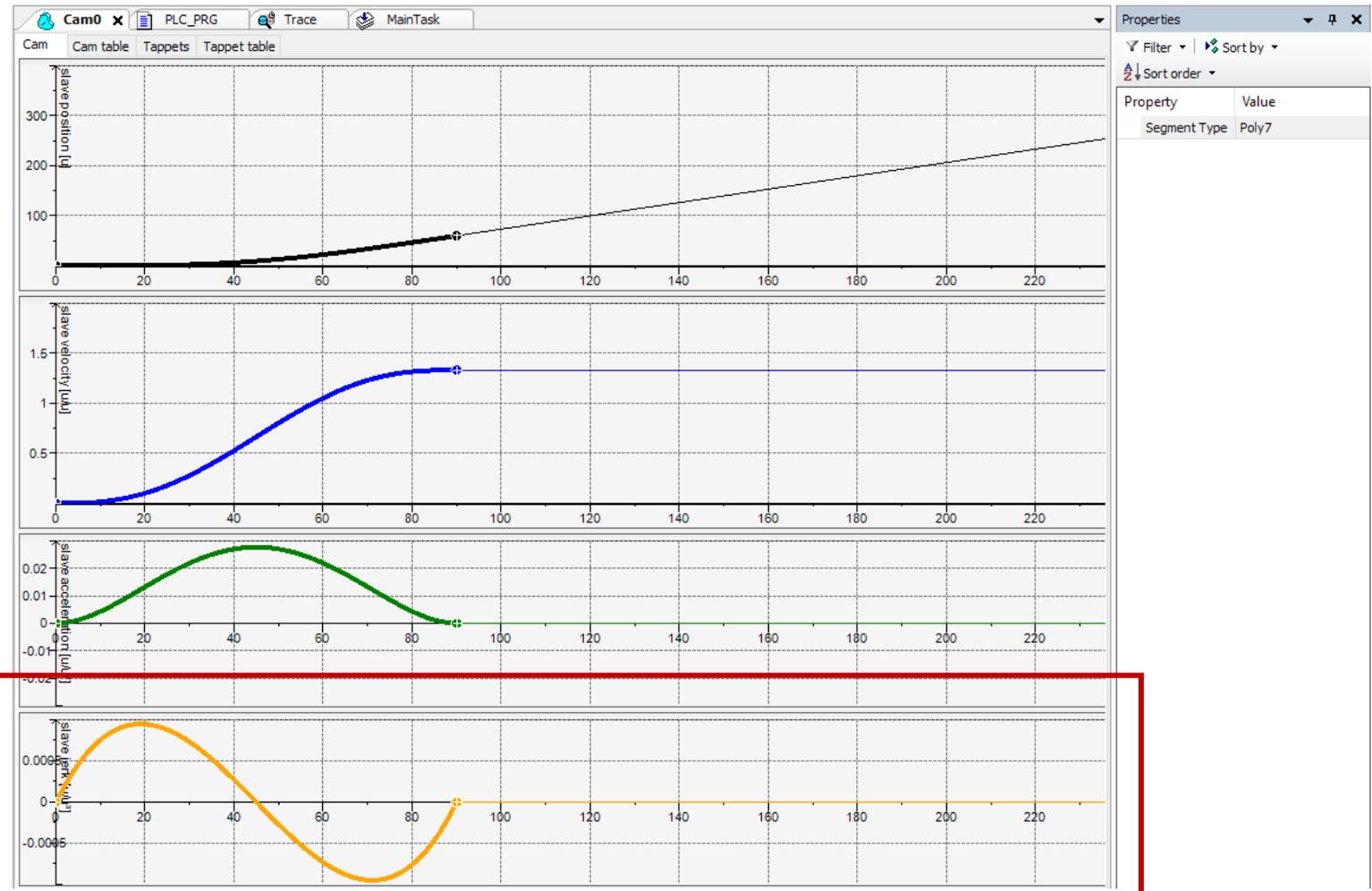
New inputs MasterStartDistance and MasterSyncPosition



## Improved ramp in with new inputs for function block MC-CamIn



## Polynomials of degree 7



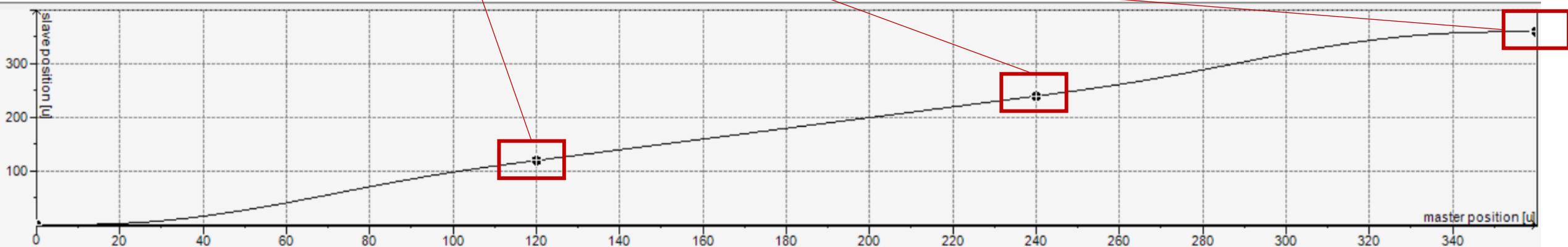
Smoother movement of cam due to polynomials of degree 7

## Improved usability with CamBuilder API - easier cam generation

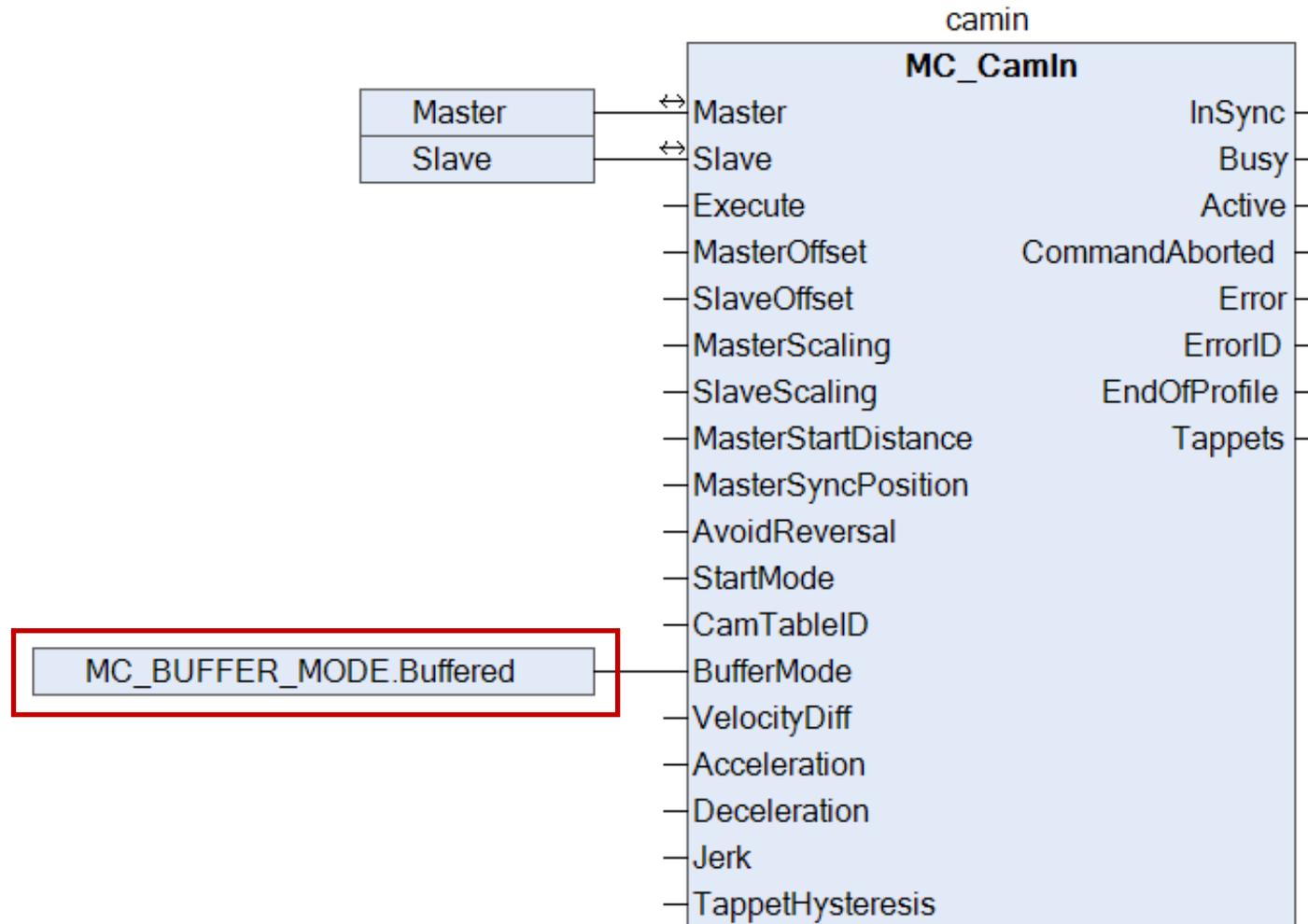
```

camBuilder.Init();

camBuilder.Append(
    SMCB.Poly5(
        SMCB.BoundImplicit(),
        SMCB.Bound(120, 120, 1));
camBuilder.Append(
    SMCB.Poly5(
        SMCB.BoundImplicit(),
        SMCB.Bound(240, 240, 1));
camBuilder.Append(
    SMCB.Poly5(
        SMCB.BoundImplicit(),
        SMCB.Bound(360, 360));
    
```

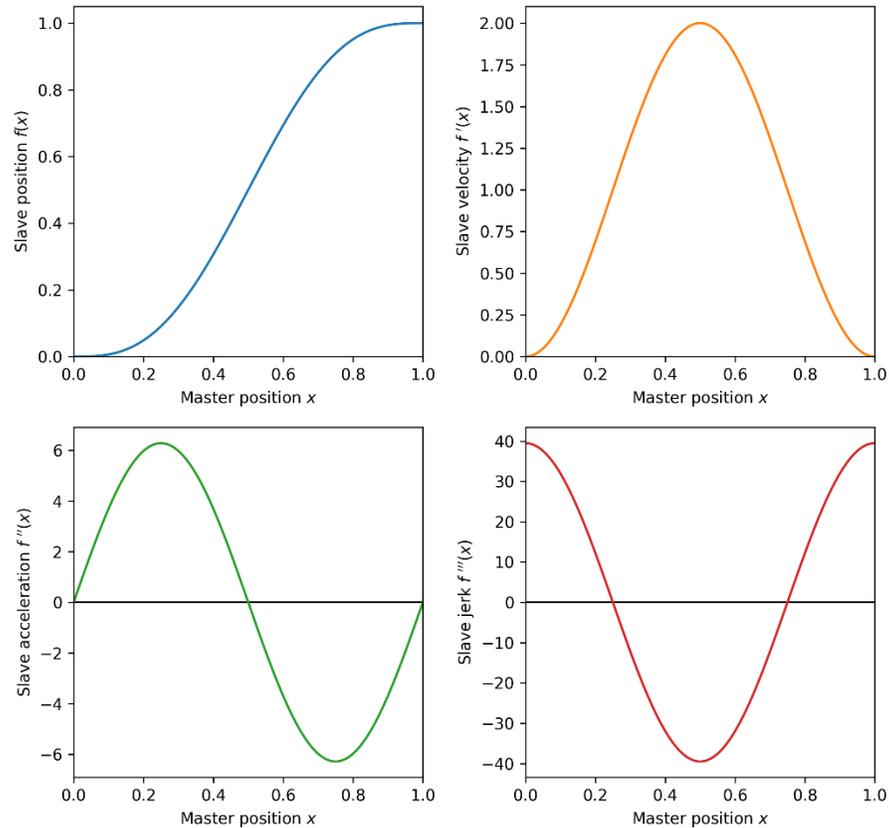


## Smooth switching cams using buffer modes

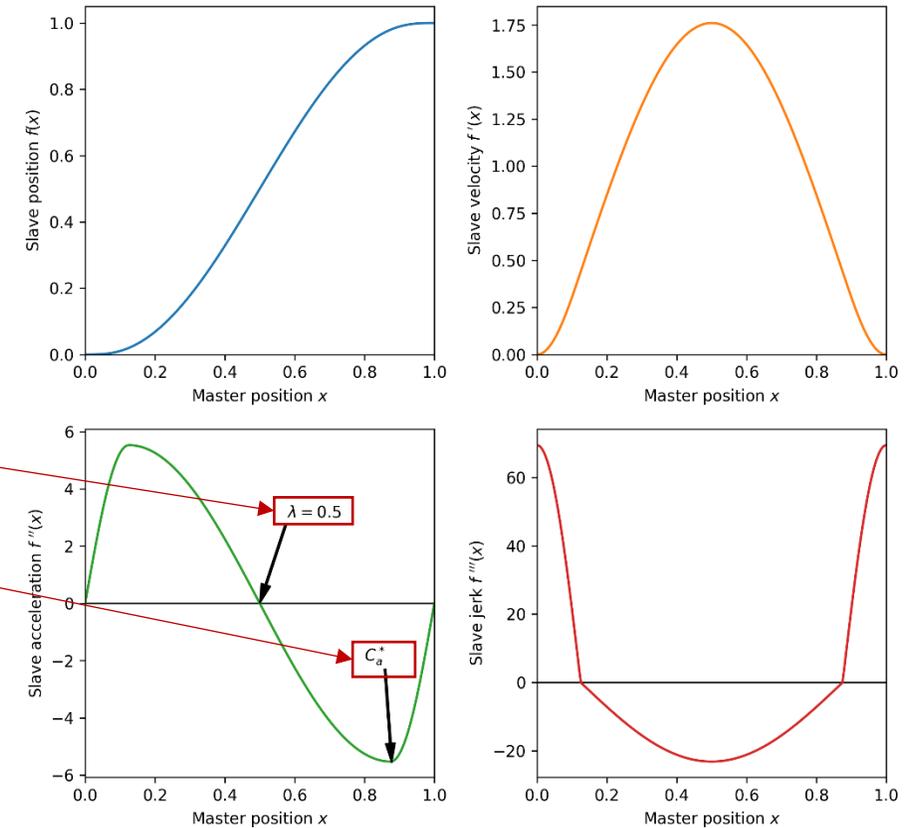


## Additional cam segment types Inclined sine and modified sine

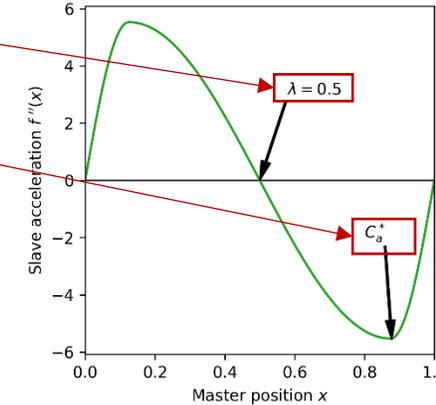
### Inclined sine



### Modified sine



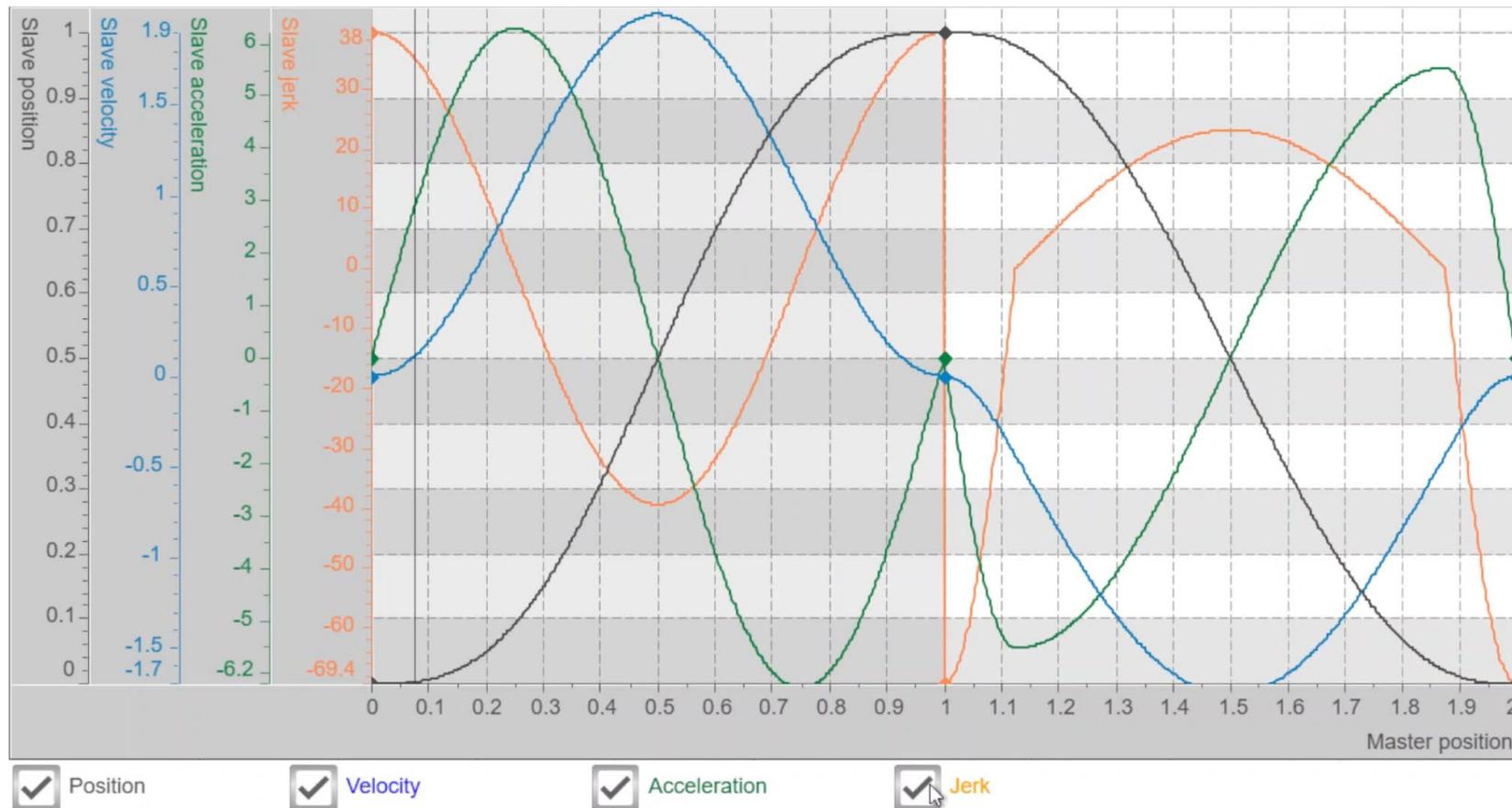
Inflection point  
Max. deceleration point



Velocity = 0 at both boundaries,  
For dwell - dwell movements

Different velocities at boundaries  
Finetuned by inflection point and max.  
deceleration point

## Cam displayer to view position, velocity, acceleration, and jerk at your user interface



## Cam editor – change cam during runtime in the visualization

Load cams

Save segment

Use it in your application

The screenshot displays the Cam editor interface. At the top, there are two buttons: "Load Cam" and "Save Cam". A red box labeled "Load cams" points to the "Load Cam" button, and another red box labeled "Save segment" points to the "Save Cam" button. The main area is a graph with "Slave position" on the y-axis (ranging from 0 to 2) and "Master position" on the x-axis (ranging from 0 to 2). A smooth curve is plotted, with two points marked: one at approximately (1.0, 1.0) and another at approximately (1.55, 2.0). Below the graph, there are four checkboxes: "Position" (checked), "Velocity", "Acceleration", and "Jerk".

On the right side, there is a control panel for segment editing. It features a dropdown menu currently set to "Poly7". Below this are input fields for parameters X, Y, V, A, J, and Lambda. The X field has values 1.500000 and 2.000000. The Y field has values 2.000000 and 0.000000. The V field has values 1.000000 and 0.000000. The A field has values 0.000000 and 0.000000. The J field has values 0.000000 and 0.000000. The Lambda field contains "--". At the bottom of the panel are "Split" and "Delete" buttons. Red boxes on the right side label these controls: "Select segment" (pointing to the dropdown), "Create/delete segment" (pointing to the Split/Delete buttons), "Change boundary values" (pointing to the X, Y, V, A, J input fields), and "Change segment types" (pointing to the dropdown).

## High precision digital cam switch – new function block

**Problem:** Glue gun delay of -50 ms

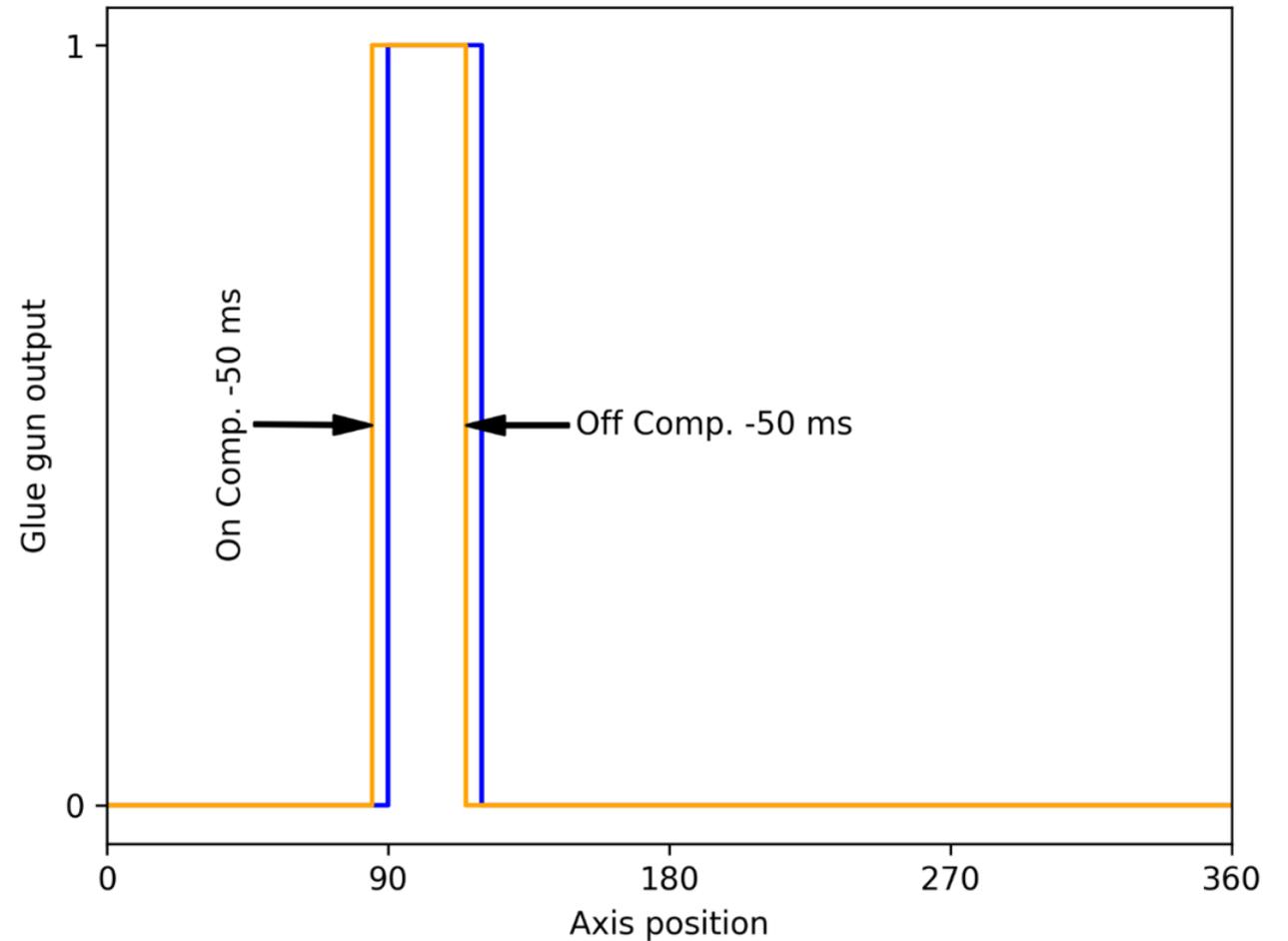
**Existing solution:**

MC\_DigitalCamSwitch precision is limited by bus cycle time

SMC\_GetTravelTime programming in application code necessary

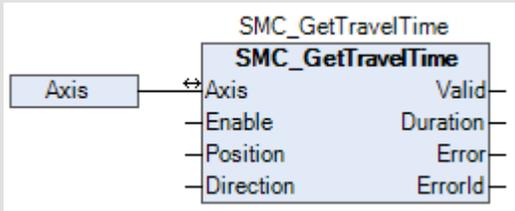
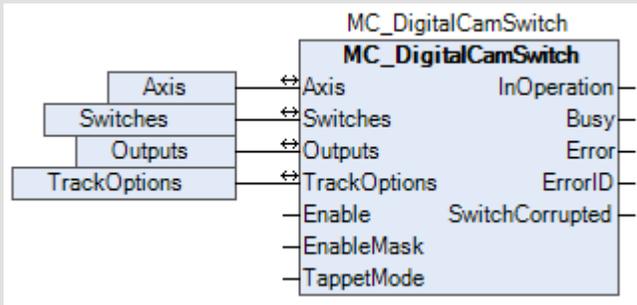
**NEW solution:**

**SMC\_DigitalCamSwitch\_HighPrecision**

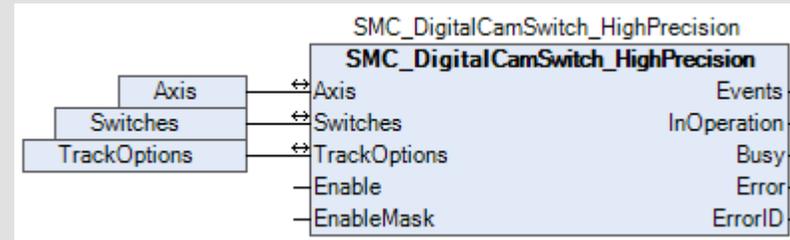


## High precision digital cam switch

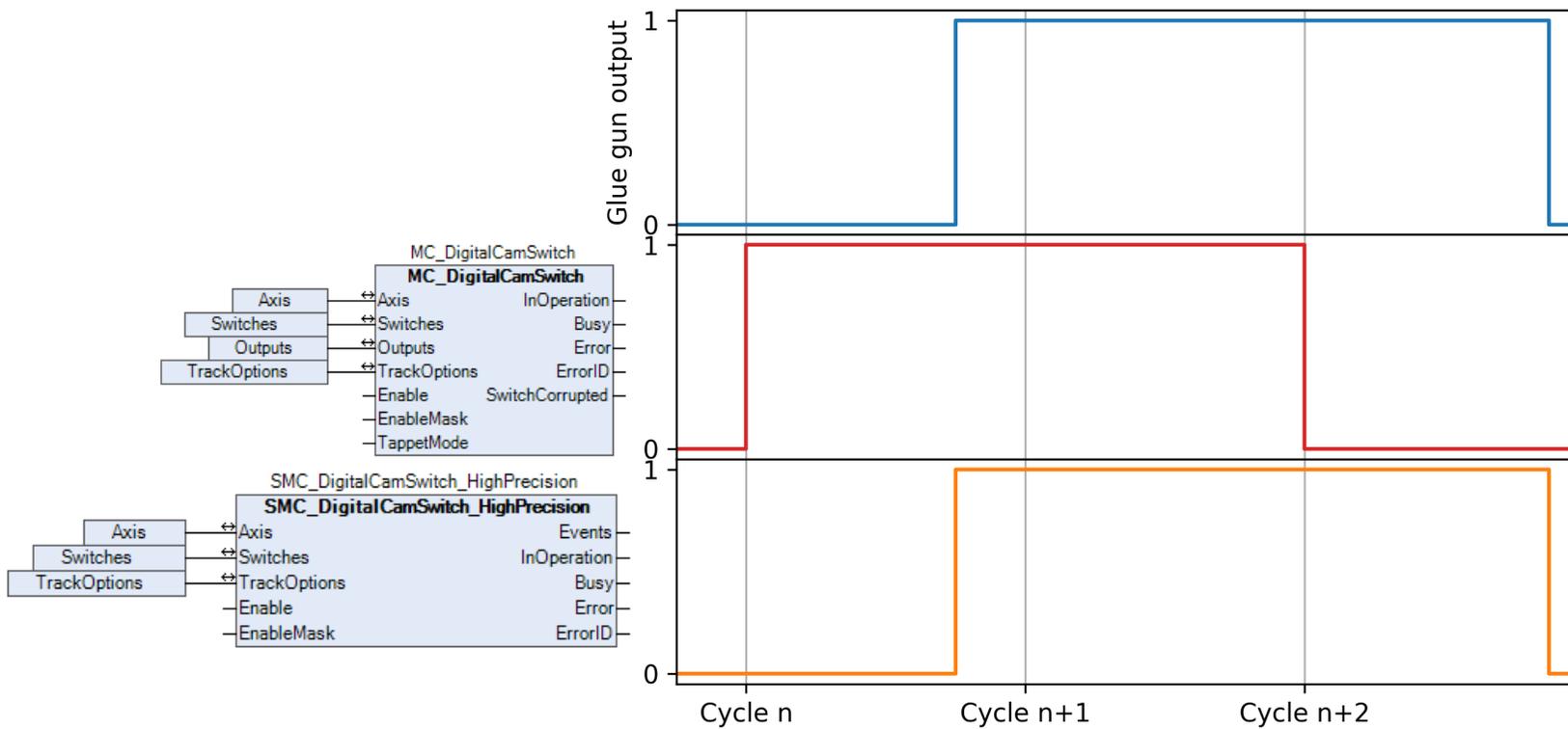
### Existing solutions



### New with SoftMotion 4.18.0.0

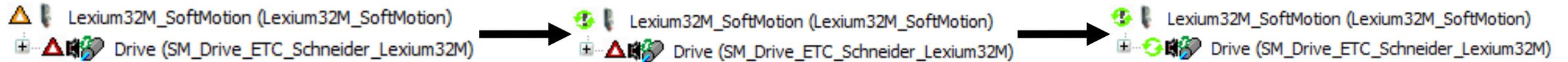


# High precision digital cam switch

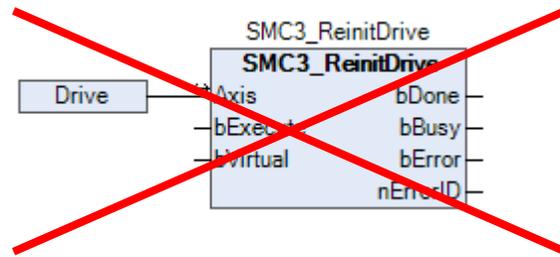
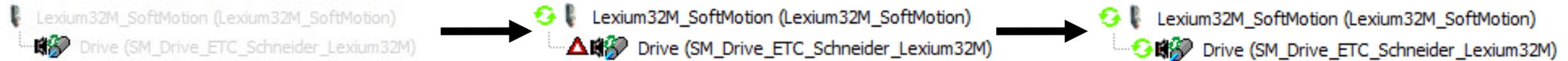


## Automatic ReinitDrive

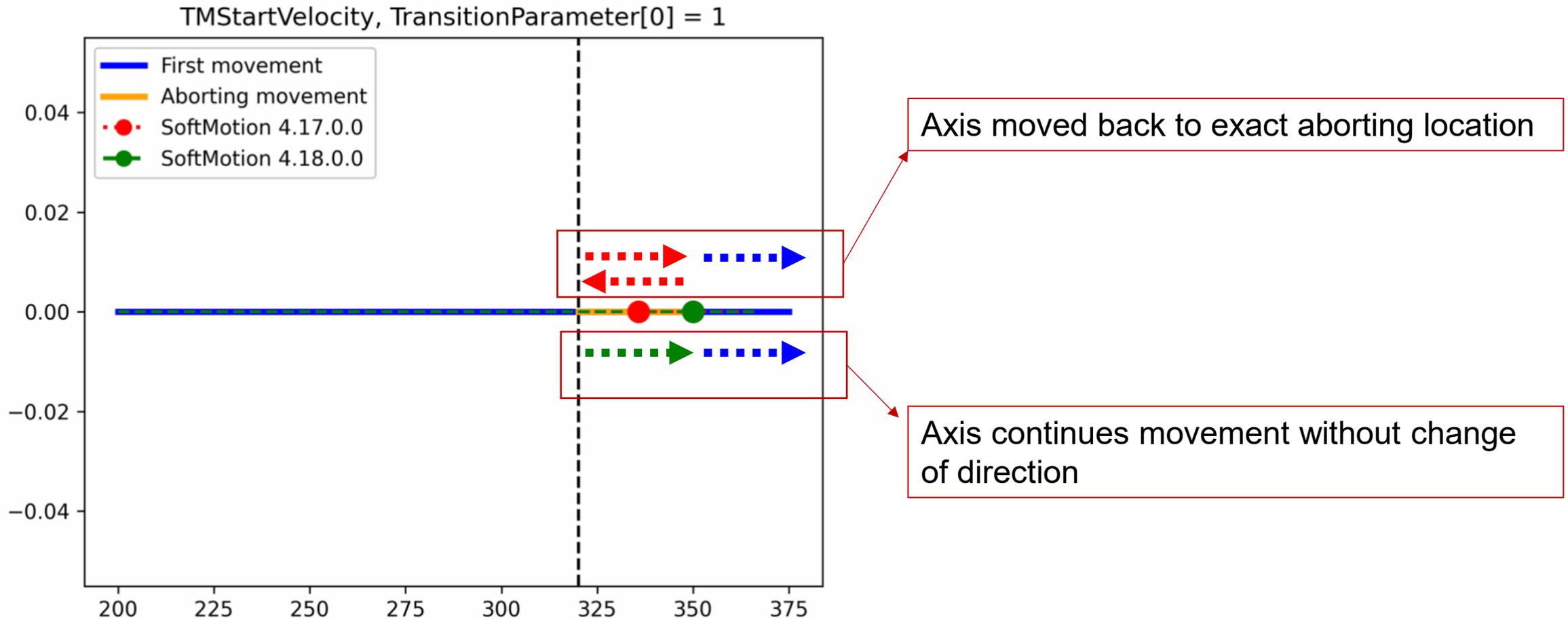
- Automatic initialization after slave becomes operational again



- Automatic initialization after slave gets enabled

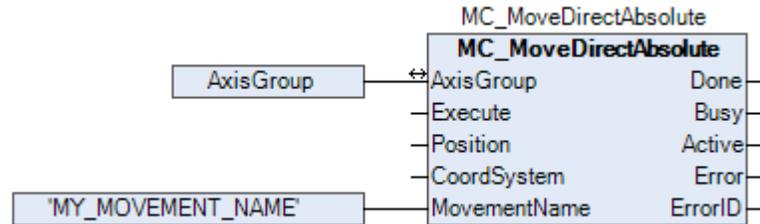


## Improved aborting



## Improved logging

- Specify custom names for movements



- Get more detailed log messages for certain errors

✖	* InstancePath: Device.Application.PLC_PRG.mda
✖	* While creating movement MY_MOVEMENT_NAME (id=1)
✖	* Axis #0, pos=-5.0 outside limits [0.0, 180.0]
✖	Error 12008: The given axis position exceeds the position limits of an axis.



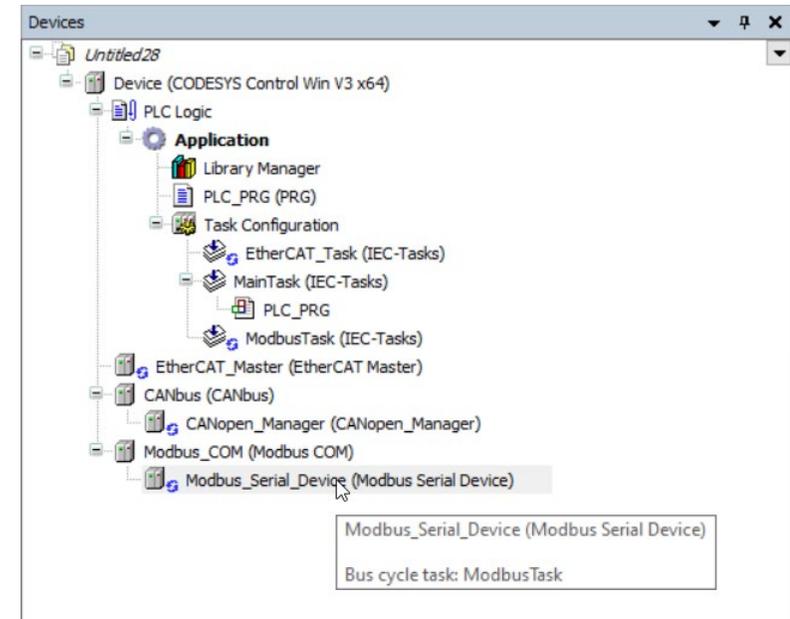
# CODESYS FIELDBUS

## Overview

- **General improvements**
- **Specific improvements**
  - CAN (CANopen/SAE J1939)
  - IO-Link
  - Modbus
  - EtherNet/IP
  - PROFINET/PROFISAFE
  - EtherCAT

## General improvements

- Device tree shows bus cycle task



## Improvements for CAN

- **CAN FD for CAN communication**
  - Support of CAN FD for CODESYS communication protocol (engineering system ↔ runtime)
  - Layer2 application library
  - Not for CANopen!
  - However:
    - Preview of CAN FD with full functionality
    - Textual configuration for gateways
    - Limited test coverage
- **EDS import updated**
- **SAE J1939 graphical signal and data layout editor**

The screenshot shows the CODESYS Data Layout Editor for a CAN FD signal. The main window displays a table of signal parameters with columns for Enable, PGN/SPN, Name, Bit Position, Length, and Type. Below this, a detailed bit layout editor shows the mapping of signals to specific bits within a 64-bit frame. The bit layout editor is titled "Data Layout Editor: TCO1\_TCO (J1939\_ECU)" and shows a grid of bits from 7 to 64. Signals are mapped to specific bit ranges: DriveRecognize (bits 7-5), Driver2WorkingState (bits 5-2), Driver1WorkingState (bits 2-0), Overspeed (bits 15-14), DriverCardDriver1 (bits 13-12), Driver1TimeRelatedStates (bits 11-8), DriverCardDriver2 (bits 23-22), Driver2TimeRelatedStates (bits 19-16), DirectionIndicator (bits 31-30), TachographPerformance (bits 29-28), HandlingInformation (bits 27-26), SystemEvent (bits 25-24), TachographOutputShaftSpeed (bits 39-38), TachographVehicleSpeed (bits 47-46), and TachographVehicleSpeed (bits 53-52).

Enable	PGN/SPN	Name	Bit Position	Length	Type
<input checked="" type="checkbox"/>	61440 (16#F000)	ERC1_RD	8 Bytes	Broadcast	
<input checked="" type="checkbox"/>	61441 (16#F001)	EBC1_EBS	8 Bytes	Broadcast	
<input checked="" type="checkbox"/>	61444 (16#F004)	EBC1_EMS	8 Bytes	Broadcast	
<input checked="" type="checkbox"/>	64953 (16#FDB9)	TPRL_TPMS	8 Bytes	Broadcast	
<input checked="" type="checkbox"/>	65132 (16#FE6C)	TCO1_TCO	8 Bytes	Broadcast	

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
7	6	5	4	3	2	1	0
15	14	13	12	11	10	9	8
23	22	21	20	19	18	17	16
31	30	29	28	27	26	25	24
39	38	37	36	35	34	33	32
47	46	45	44	43	42	41	40
55	54	53	52	51	50	49	48
63	62	61	60	59	58	57	56
71	70	69	68	67	66	65	64

## Improvement for IO-Link

- **Gateway functionality for external tools that enables the reading and writing of IO-Link parameters**

## Improvement for Modbus

- **Network redundancy**
  - Required: Server devices supporting two parallel IP connections
  - MODBUS client: Two parallel connections can be set up to each server
  - In case one connection fails: use of the other one
  - Option to define the preferred line
  - FBs to monitor the status of each line
- **System redundancy support**
  - Integration in CODESYS Redundancy

## Improvement for EtherNet/IP

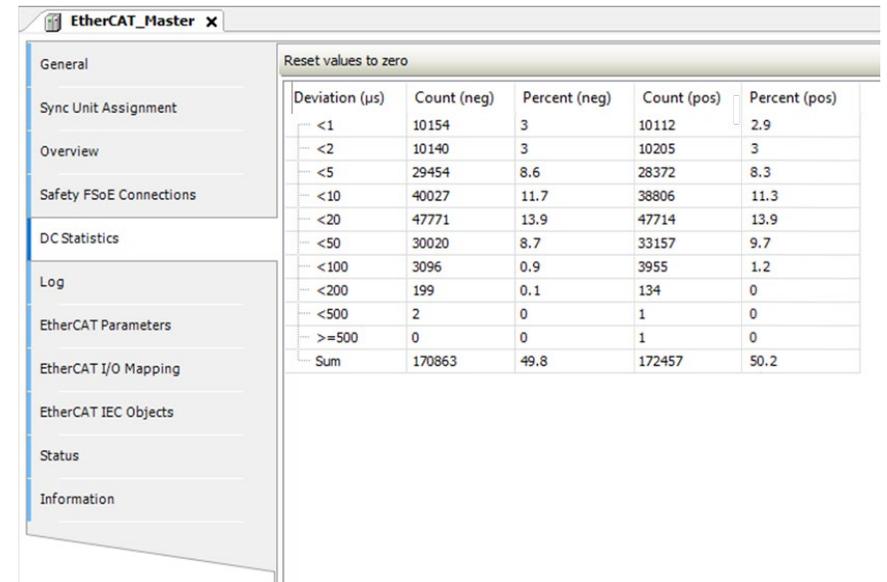
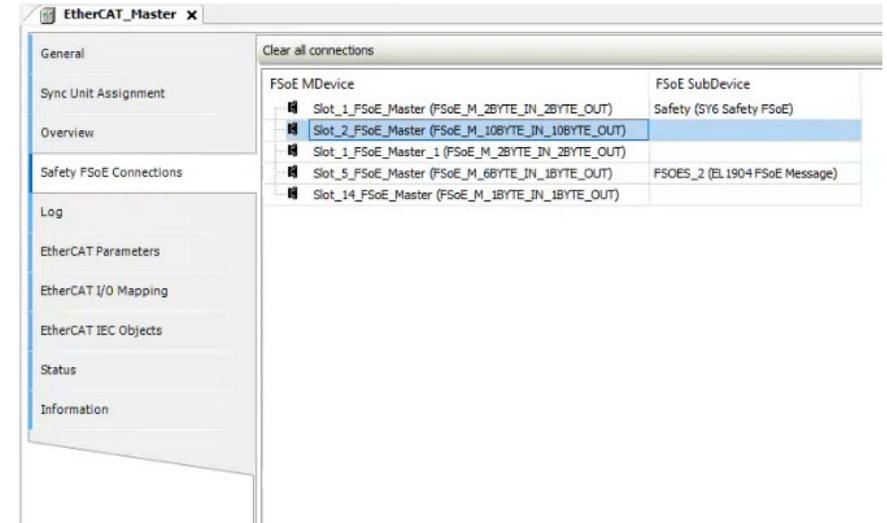
- **Support of Conformance Test 20**
- **Connection API**
- **Improved runtime performance**
  - Depending on I/O layout - highest gain with I/O data in series
  - Up to twice as fast

## Improvement for PROFINET/PROFISAFE

- **TCI support**
  - Execution of external manufacturer-specific configuration tools directly from CODESYS to enable the configuration of special security settings
- **Support of GSDML schema V2.44:  
Allows 2-port devices to pass the conformance test**
- **Pass new version V2.45 of PROFINET test specification**
- **PROFISAFE diagnosis**
- **Certification for virtual controls**
- **Function blocks for reading and writing I&M records**

## Improvement for EtherCAT

- Support of SCI import files
- Support by CODESYS Control Embedded
- New configuration editor “Safety FSoE Connections”
  - For non-CODESYS FSoE Main Device
  - Copies safe data between FSoE Main Device and FSoE Sub Devices
- ETC mailbox gateway implementation
  - Possibility for other tools to access data of Sub Devices by offering a routing channel
- Diagnosis page for distributed clocks
- Support of EtherCAT IO-Link Gateways  
Festo CPX-AP-I-4IOL and CPX-AP-A-4IOL





# CODESYS COMMUNICATION



## Overview

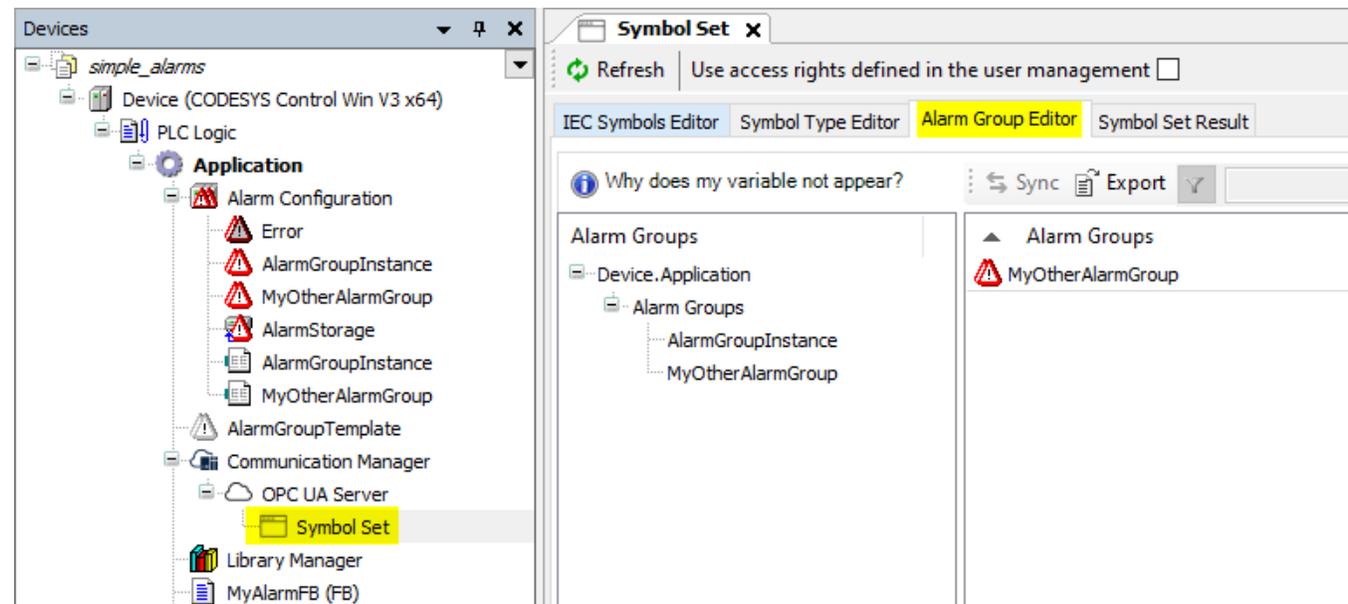
- **OPC UA Server: Certification of Embedded UA Server Profile**
- **OPC UA Alarms and Conditions**
- **OPC UA Client**

## OPC UA Server: Certification of Embedded UA Server Profile

- Release and certification according to OPC UA 1.04 (pending)  
<https://opcfoundation.org/products/?search=codesys>
- Communication add-on V4.6 and appropriate runtime version required (V3.5 SP21 or 4.15.0.0 for SL-runtimes from the CODESYS Store)
- New feature support
  - Data change filters
  - Monitoring triggers

## OPC UA Alarms and Conditions

- **Alarms & Conditions in OPC UA based on the Alarm Manager**
  - New configuration workflow in Communication Manager
- **Implementation compliant to OPC UA standard**
  - Note: Usage of custom alarm definitions from companion specifications not part of initial compliance



## CODESYS OPC UA Client API

- **IEC library “OPC UA Client”**
  - For the convenient use of the runtime’s OPC UA Client functionality
  - Function blocks for connection management and client services for data access
  - Based on the specifications of the “PLCopen OPC-UA Client for IEC61131-3” but offer a simplified interface.
- **Access to complex, nested data structures, e.g. structures or arrays, within the V1.0 Data Access Services (subscribe, read, write)**



# Thank you for your attention!

Follow us. Stay up to date!



[codesys.com/YouTube](https://codesys.com/YouTube)



[codesys.com/LinkedIn](https://codesys.com/LinkedIn)

CODESYS® is a registered trademark. Technical specifications are subject to change.  
Errors and omissions excepted. No reproduction or distribution, in whole or in part, without prior permission.

Note: Not all CODESYS features are available in all territories.

For more information on geographic restrictions, please contact [sales@codesys.com](mailto:sales@codesys.com).