SIMOTION

Version V4.4

What's new in SIMOTION V4.4?

SIEMENS

What's new in SIMOTION V4.4?

1 Overview

SIMOTION V4.4 is available for delivery as of July 2014.

The most important new functions are:

- SIMOTION inside TIA Portal
- A host of rounded-off features in SCOUT V4.4 (e.g. sub-folders in the project navigator, control in LAD/FBD, "Go to" function in all editors, new mode selector switch)
- Expansion of trace functions (e.g. trace to memory card)
- Expansion of runtime functions (e.g. text files on memory card)
- Expansion of handling functions (e.g. path control panel)
- Support for SINAMICS Safety Integrated V4.7
- SIMOTION with performance upgrade for PROFINET
- SIMOTION as shared I-device
- Expansions for Utilities & Applications on the SCOUT DVD *Documentation, Utilities & Applications* (e.g. new version of the SIMOTION easyProject project generator, which can be called direct from SCOUT)

Important information on the update to SIMOTION V4.4 can be found in an *Update* FAQ on the Utilities & Applications DVD.

2 SIMOTION and TIA Portal

Supported operating systems for SCOUT TIA
- Windows 7 Professional/Ultimate 64-bit
- Windows 7 Professional/Ultimate 32-bit

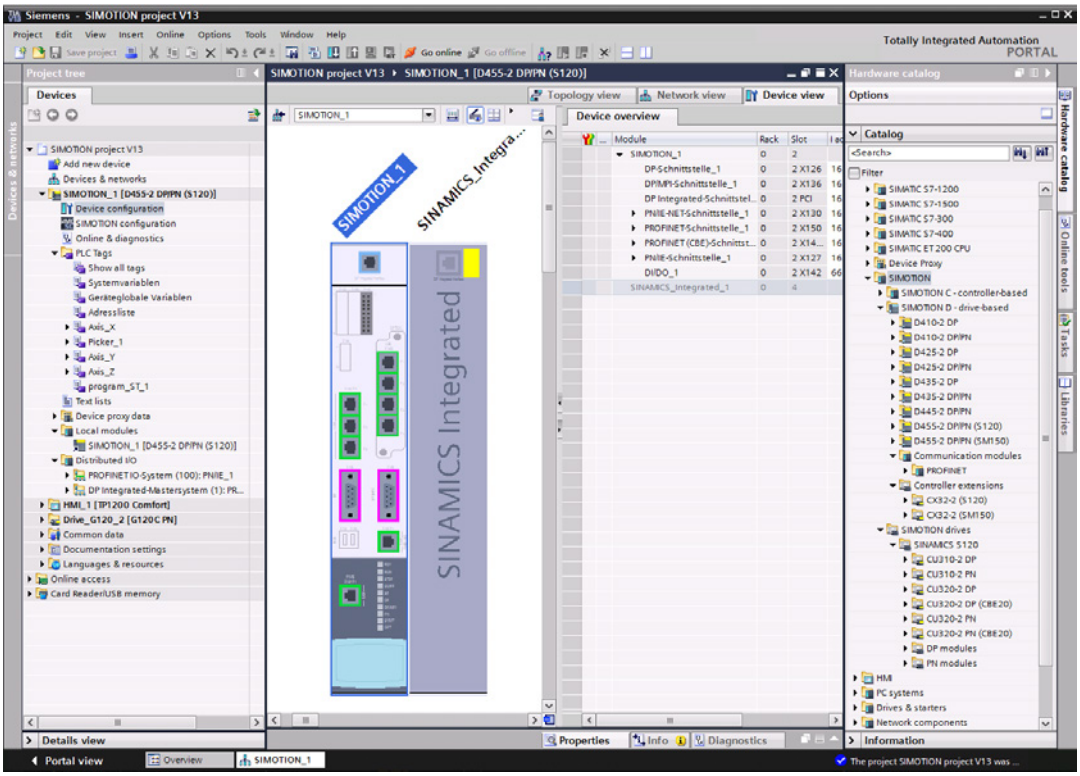
2.1 SIMOTION inside TIA Portal (system changeover to the TIA Portal)

All the automation components are united in the TIA Portal project.
Including SIMOTION modules, SIMATIC modules, Startdrive drives, HMI, etc.
SIMOTION is installed in an existing TIA Portal by means of SIMOTION SCOUT TIA.

You can use the innovative TIA Portal mechanisms like a fully-graphic configuration of the hardware and network in one consistent editor
….and keep the well proven and complete motion control functionality of the SIMOTION system and its deep integration of the drives.

Innovate it!	*Keep it!*
Utilize the significantly improved and simplified TIA Portal mechanisms	**Keep the usual and well-proven motion control engineering**
• Combine hardware and network configuration in a consistent editor • Intuitive and fully-graphic configurators • The convenient way to connect a HMI • Project data management, project management	• Reuse of existing SIMOTION applications (Investment protection) • Complete and overall motion control functionality • Deep integration and automatically configuration and adjustement of the complete drive train • Distributed motion control beyond CPU boundaries • All testing and diagnostic tools (trace, debug)
Quote: Improve “what needs improving” and keep “what is well proven”	

New functions in SIMOTION V4.4



Further information:

- **Promotional video** (INTERNET):

  www.youtube.com/watch?v=bCvuhSzzhi4

- **Slides ; Screen recording of a real engineering session** (MP4) ; … (INTRANET):

  Please contact your SIEMENS sales support for this information.
  They can find it here:

  Select the Folder “SIMOTION in the TIA Portal …”

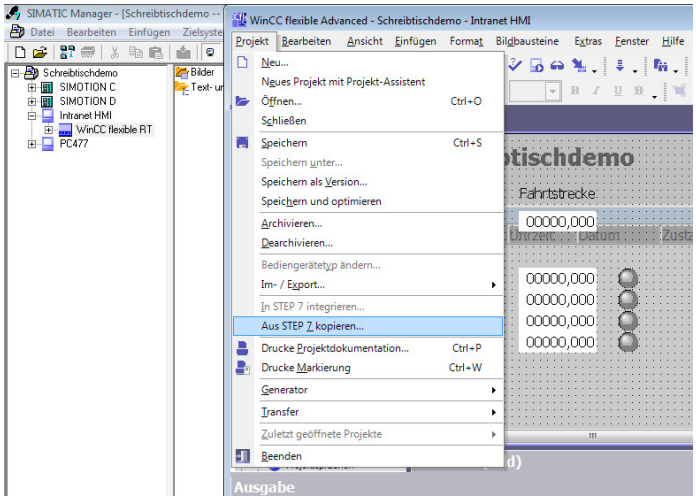
  https://intranet.siemens.com/simotion

2.2 SIMOTION proxy (partial changeover to the TIA Portal)

In the proxy solution, only the HMI part is migrated to a TIA Portal project. The rest is retained as a Classic project. The data connection between a Classic and a TIA Portal project is via a device proxy in the TIA Portal. The database of a controller in the SCOUT project is initialized once from the SCOUT project. Subsequent changes in SIMOTION SCOUT must be updated on the proxy object with the SCOUT project.

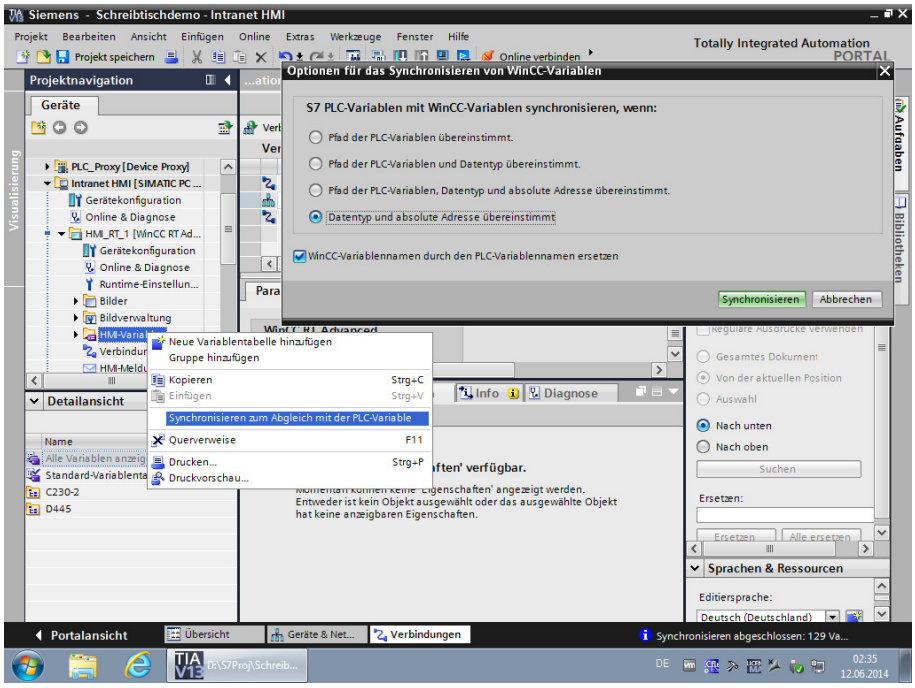
Taking over existing HMI screens

Only stand-alone WinCC flexible 2008 (as of SP3 UPD4) HMI projects can be migrated. With integrated projects, the SCOUT project in which they are contained must first be converted to V4.4 before the HMI project can be copied in accordance with the FAQ:
"How can a project integrated in STEP 7 be migrated from WinCC flexible to WinCC (TIA Portal)?"
http://support.automation.siemens.com/WW/view/en/54695062



The HMI projects are imported in the TIA Portal view with "Migrate project".
A proxy object must be created in accordance with Section 2.2.2 in order to link to the process values and to renew the connection of the HMI tags. In the "Connections" of the panel, the name of the "old" connection must be taken for the "new" connection after the "old" connection has been deleted. The PLC variables must then be synchronized.

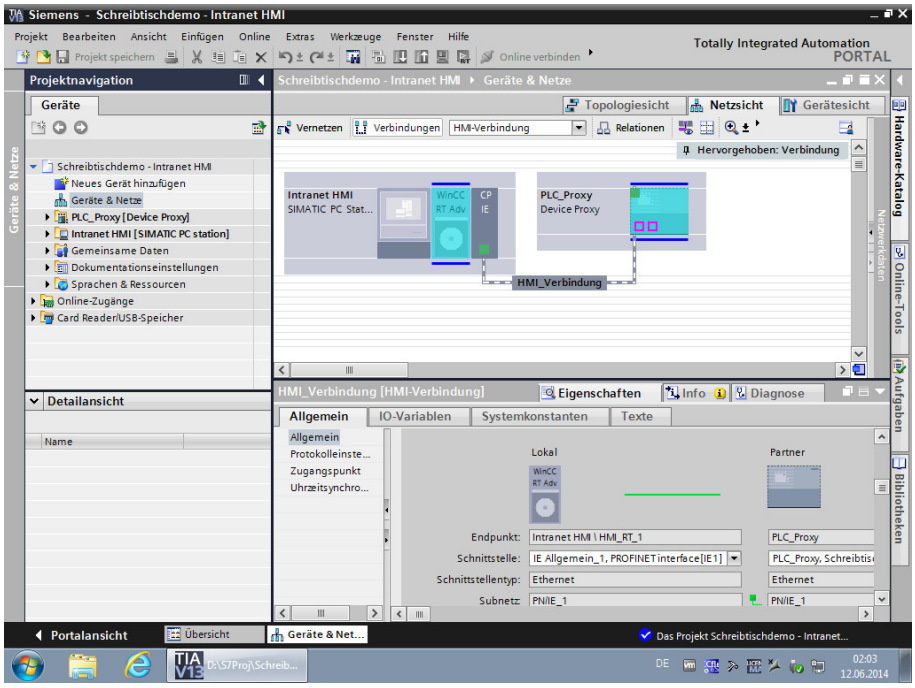
New functions in SIMOTION V4.4



Linking new screens with existing process values

Only process values from SIMOTION SCOUT V4.4 projects can be linked.
SIMOTION Runtime as of version V4.3 must be used.
The proxy object must be initialized from a controller of the SCOUT V4.4 project (U7/PROJECT.MCP).

The connection to the HMI device must be set up under "Devices & networks" at "Connections" (drag).



2.3 Connection of comfort and basic panels

The connection to the process values of the relevant controller is established as described in Section 2.2. The existing panels can be replaced by means of a "Hardware replacement" through basic 2nd generation and comfort panels. Alternatively, these panel types can also be inserted directly in the WinCC project and the graphic elements connected to the process values (tags of the PLC).

3 SIMOTION SCOUT Classic

Supported operating systems
- Windows 7 Professional/Ultimate 64-bit
- Windows 7 Professional/Ultimate 32-bit
- Windows XP SP3

4 SIMOTION SCOUT general

4.1 Program download

Download of a program set (unit-granular download)

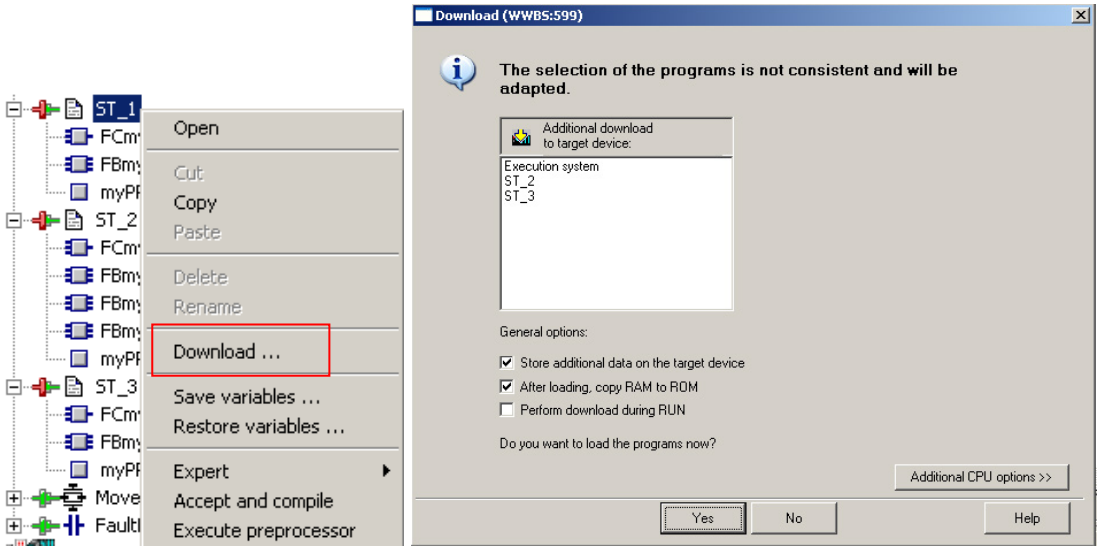
The programs of large projects are created by several authors. There are therefore independent processing units that are edited simultaneously. These units can be downloaded without overwriting other units that are not consistent at the time of the download.

It is possible to download an individual source (unit) or several units via multiple selection (from online-inconsistent programs).
This can be performed in the STOP and RUN operating states.

Subsections of a configuration can be downloaded even when certain units are not yet ready for a download.
Particularly in the multi-user scenario (two SCOUT PCs connected online to the controller) where one user does not want to download all the programs that are inconsistent, rather only those that the user is editing.

The download can be started via the shortcut menu on a unit or on the execution system. The execution system is relevant, for example, when a new unit is to be downloaded that contains a program that has been entered in the execution system. In order that it can be executed, the execution system must also be downloaded.
If several units are to be downloaded, they must be selected via the multiple selection in the project navigator.

After downloading a subset, it is ensured that a consistent state is established again on the target device. To do this, SCOUT checks and visualizes the dependencies to other units which are then also downloaded when required.
With this specification, the user can verify whether the download would cause problems (e.g. that no unit is downloaded outside of its appropriate area).
The download is started after confirmation.



The offline project must be able to be compiled error-free for a selective download.

In addition, SCOUT V4.4 checks the dependencies between the units with significantly higher granularity so that fewer units are affected during the download (see Improvements for a download during RUN).

Multi-user scenarios (e.g. two SCOUT PCs are connected online to one CPU) are supported

- Users can only download those programs that they are editing.
- Online consistency display with automatic update

Improvements for a download during RUN

A connection (dependency) can be programmed to another unit in order to be able to use the published programs, FBs or FCs (POUs) and data of this unit. Units that depend on a changed unit must therefore also be included in the download.

As of SIMOTION SCOUT V4.4, the dependencies between the units are taken into account and a check is made as to whether changes in a unit (with USES) are actually relevant for the considered unit. This reduces the dependencies and therefore the required number of units to be replaced, and also results in significantly fewer dependencies compared to the older SCOUT versions.

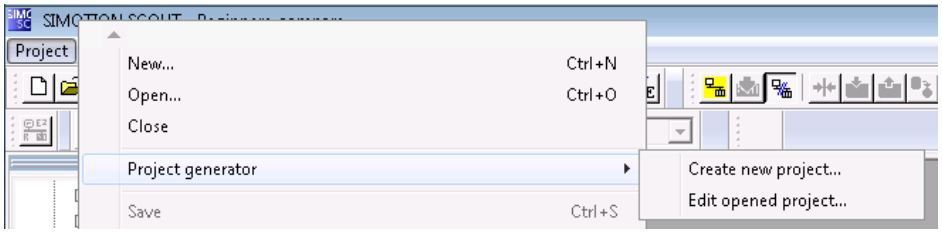
A check is also made in the engineering system as to whether changes in the interface area of a user unit are only relevant for the interfaces of the published programs. Only then is it necessary to download the execution system (no tasks must be active during this download).

This behavior applies to all supported RT versions that are processed with SCOUT V4.4.

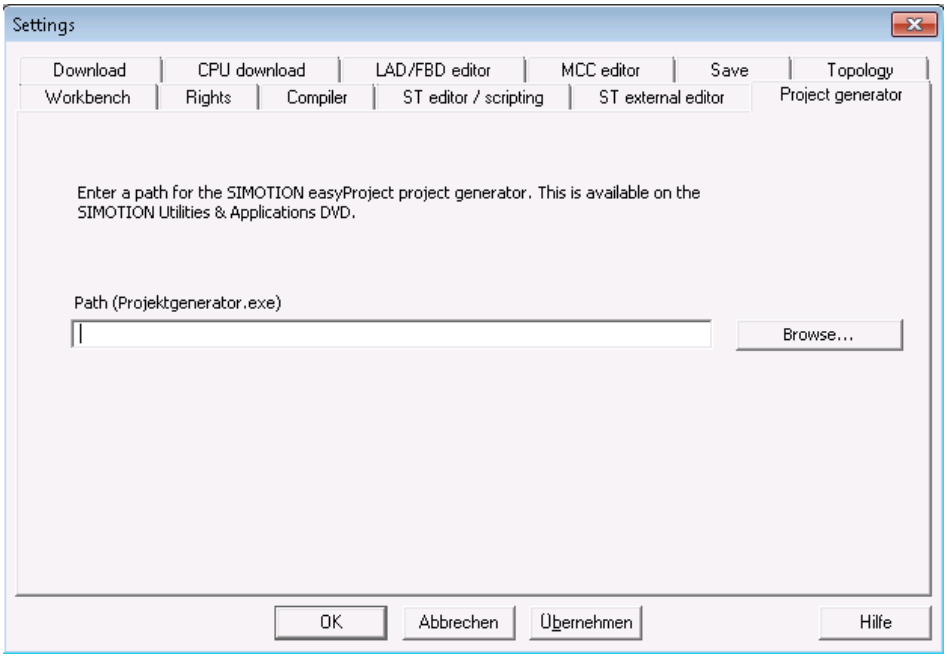
More detailed information on this subject can be found in an FAQ at http://support.automation.siemens.com/WW/view/en/94770057 as well as in the *Basic Technology Functions* Function Manual.

4.2 Connection of the ProjectGenerator

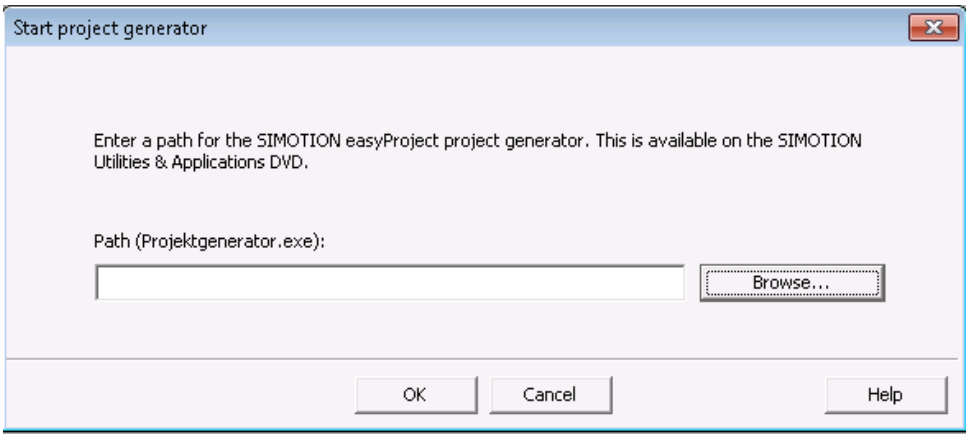
To further simplify the handling, the ProjectGenerator has been connected so that it can be called directly in SCOUT. A new project can be created via SCOUT or the opened project expanded with arbitrary modules of the ProjectGenerator or updated with new versions of the modules.



The ProjectGenerator stored on the hard disk must be sought for the connection in the SCOUT settings on the "ProjectGenerator" tab.
The Windows standard dialog for the search is opened with the "Browse..." button. Navigation is then possible to the corresponding "ProjectGenerator.exe". SCOUT checks whether the selected file is a ProjectGenerator. If this is not the case, the entry is shown with a red background and the appropriate error text displayed when the mouse is positioned on the entry.



If the dialog with the faulty parameterization is closed with OK and the user attempts to start a function for the ProjectGenerator in the menu, SCOUT issues the following error message:



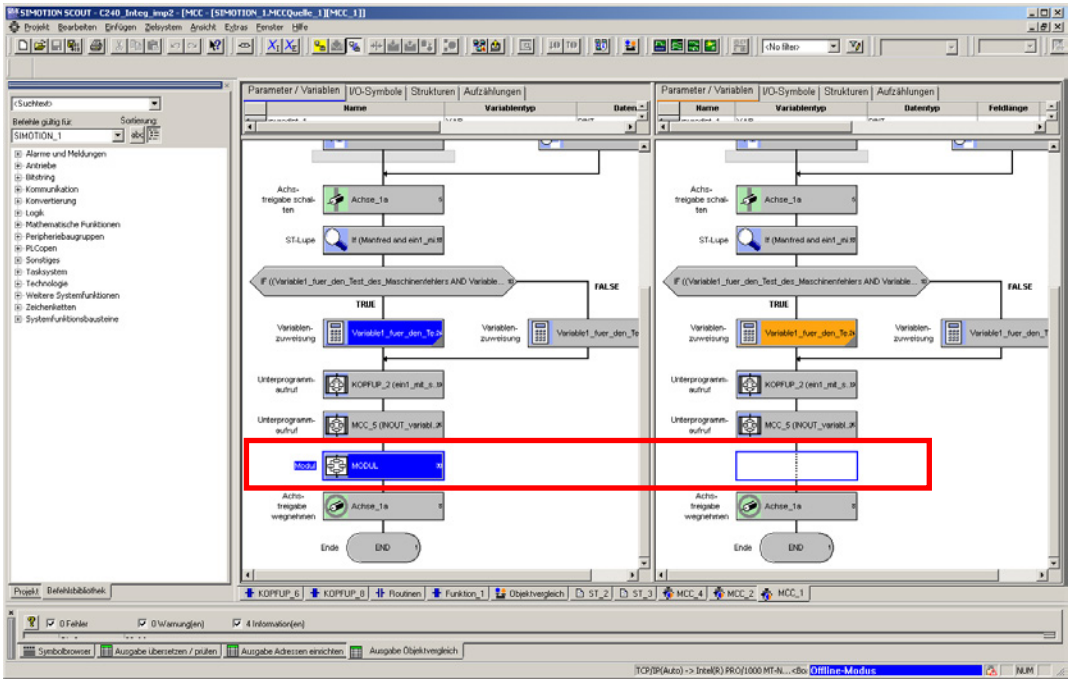
The user can now navigate to the ProjectGenerator.exe again.

The ProjectGenerator is on the Utilities & Applications DVD in a ZIP file and can be transferred to the hard disk of the PC. The ZIP file must be unpacked there for use.

5 Comparison functions

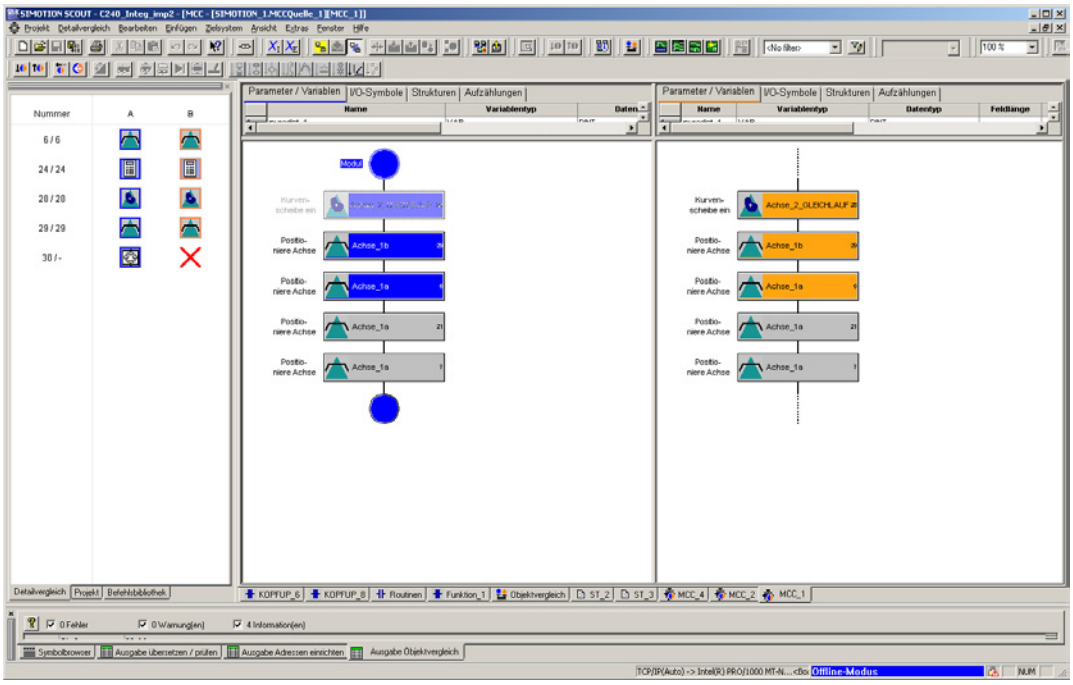
5.1 Revision of the detailed comparison for MCC

The detailed comparison of MCC has been completely revised. Thanks to the revision, various comparison scenarios have been implemented in an optimized form. For example, the detailed comparison for MCC charts that have newly combined modules compared to charts that do not have these modules yet, is performed in the following way: The module is compared in a split box.



By double-clicking the module, SCOUT opens another view level. In this new view level, the module is compared to a section of the chart command sequences (indicated by the dashed lines). The commands can be easily taken over in this state.

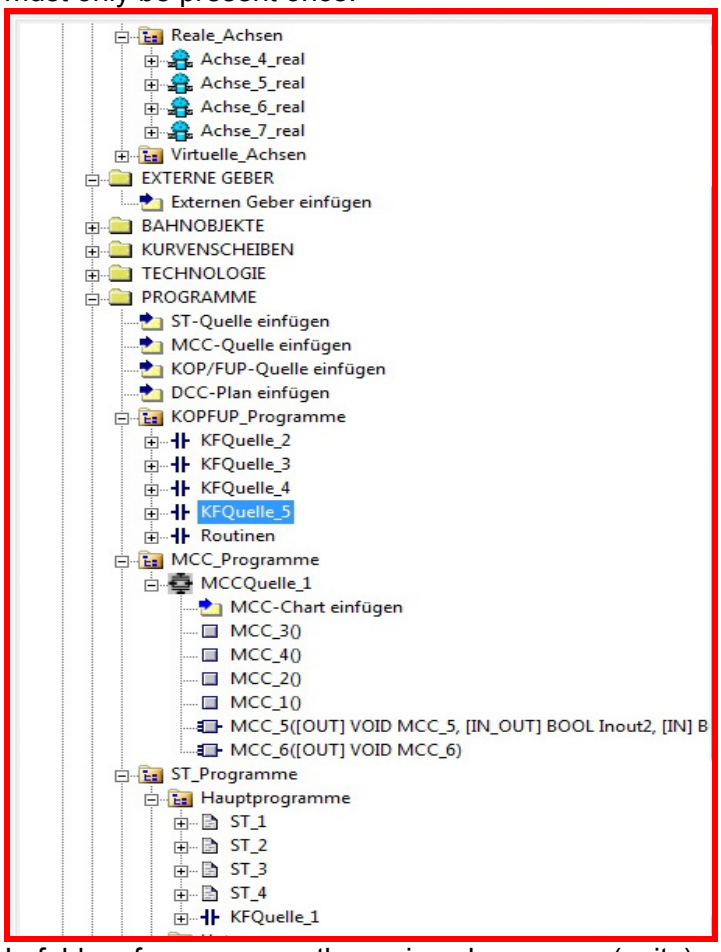
New functions in SIMOTION V4.4



6 Languages and editors

6.1 Subfolders in the project navigator

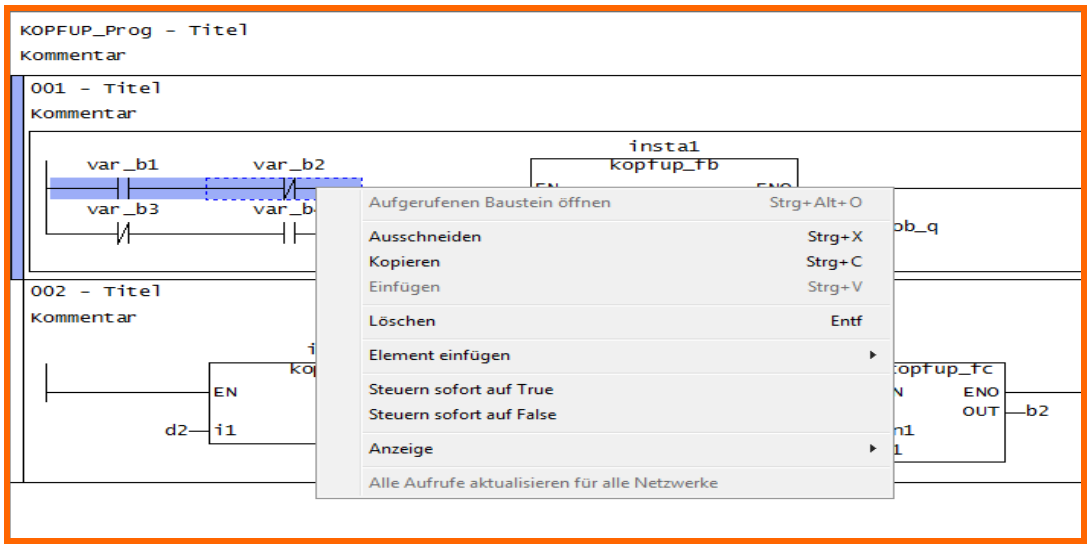
In SCOUT V4.4, the user can insert subfolders below all the main folders of the CPU. The number of folders is not limited. The folders are only part of the structure and do not affect the name. This means that the name assignment of the objects in the main folder must be unique. For example, the axis name "Axis_1" or the unit name "Unit_1" must only be present once.



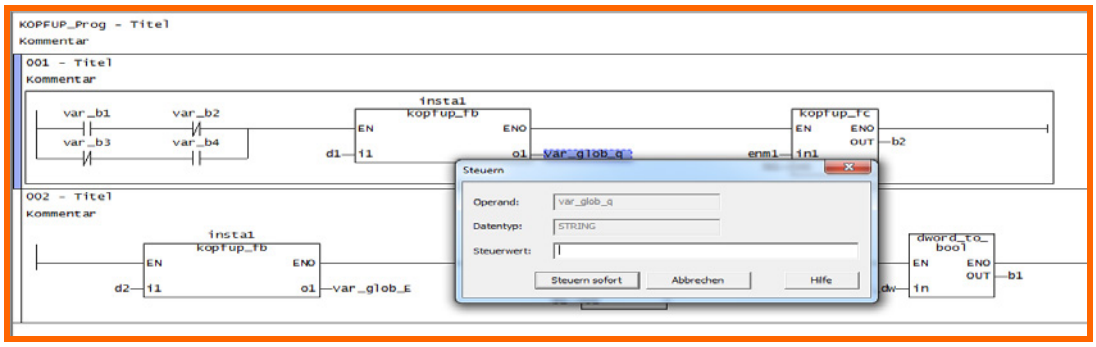
In folders for programs, the various languages (units) may be mixed in a subfolder. The grouping of the POUs in a unit is not affected by this.
Subfolders are also possible in a library and in the monitor for the watch tables. Note that different libraries cannot be combined in one folder. Subfolders are only permitted within a library.

6.2 Control of the contact (LAD/FBD)

In online mode, a selected contact can be switched to TRUE or FALSE via the shortcut menu. Control only functions for variables that have been declared globally. Control of local variables is not possible. The shortcut menu entry shows whether a variable can be controlled. If the entries are grayed-out, control is not possible. Inputs can also not be controlled.



Control also functions for a multiple selection, irrespective of whether the variable name or the contact element has bee selected.



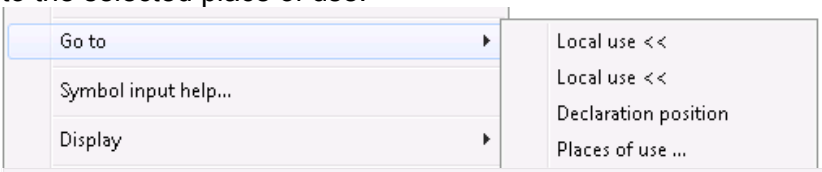
Control is also offered for variables that are not Boolean variables. An input box is displayed in which the user can enter the control value. For enumerators, a drop-down list box is provided with the valid enum values for selection.
Control is performed once by transferring the values to the device. If the running program overwrites the values at a different position, control is only effective up to the time the program makes the change.

6.3 Opening a block for the program status (LAD/FBD)

Up to V4.3, the LAD/FBD editor is disabled during active program status display. As of V4.4, a block can be selected in the editor and the "Open selected block" function selected via the shortcut menu. The block is opened and the user can then also activate the program status for this block.

6.4 "Go to" function in all language editors

In V4.4, the "Go to..." function is available to the user in all editors via the shortcut menu. In this way, it is possible to jump forward and backward for local use. For easier operation, the shortcuts "ALT+arrow left" and "ALT+arrow right" are provided for these two functions.
If "Declaration position" is selected, the editor jumps to the position in the program where the variable was declared.
If "Places of use..." is selected, a brief reference with a list of the places of use of the selected variable opens in the detailed view. The user can select an entry in the detailed view and with the "Go to use" button open the appropriate editor by jumping to the selected place of use.



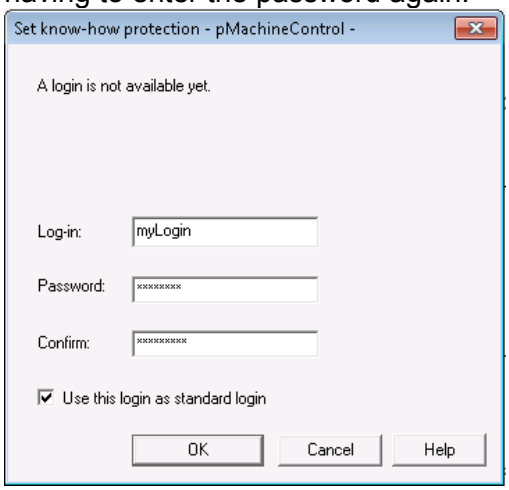
Go to application | Find... | Determine program line...

gboAxesHomed

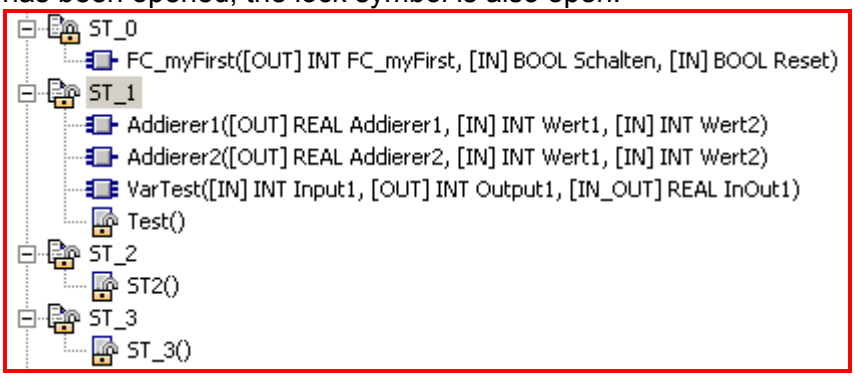
	Name	Type	Declaration	Application	Path specification	Range	Language	Line/block
1	gboAxesHomed	BOOL	dGlobalVars (UNIT)	VAR_GLOBAL	myD445\dGlobalVars	INTERFACE	ST	35
2	gboAxesHomed	BOOL	dGlobalVars (UNIT)	W	myD445\pMachineControl	PROGRAM pMachineControl - Block 61	MCC	12
3	gboAxesHomed	BOOL	dGlobalVars (UNIT)	W	myD445\pMachineControl	PROGRAM pMachineControl - Block 93	MCC	13
4	gboAxesHomed	BOOL	dGlobalVars (UNIT)	R	myD445\pMain	PROGRAM pMain	ST	28
5	gboAxesHomed	BOOL	dGlobalVars (UNIT)	R	myD445\pMain	PROGRAM pMain	ST	35
6	gboAxesHomed	BOOL	dGlobalVars (UNIT)	R	myD445\pMain	PROGRAM pMain	ST	45
7	gboAxesHomed	BOOL	dGlobalVars (UNIT)	R	myD445\pMain	PROGRAM pMain	ST	49

6.5 Revision of the know-how protection

The know-how protection manager has been revised in V4.4. The user can save the login as standard login. With this selection, know-how protected sources with the same login and password can be opened automatically by double-clicking without having to enter the password again.

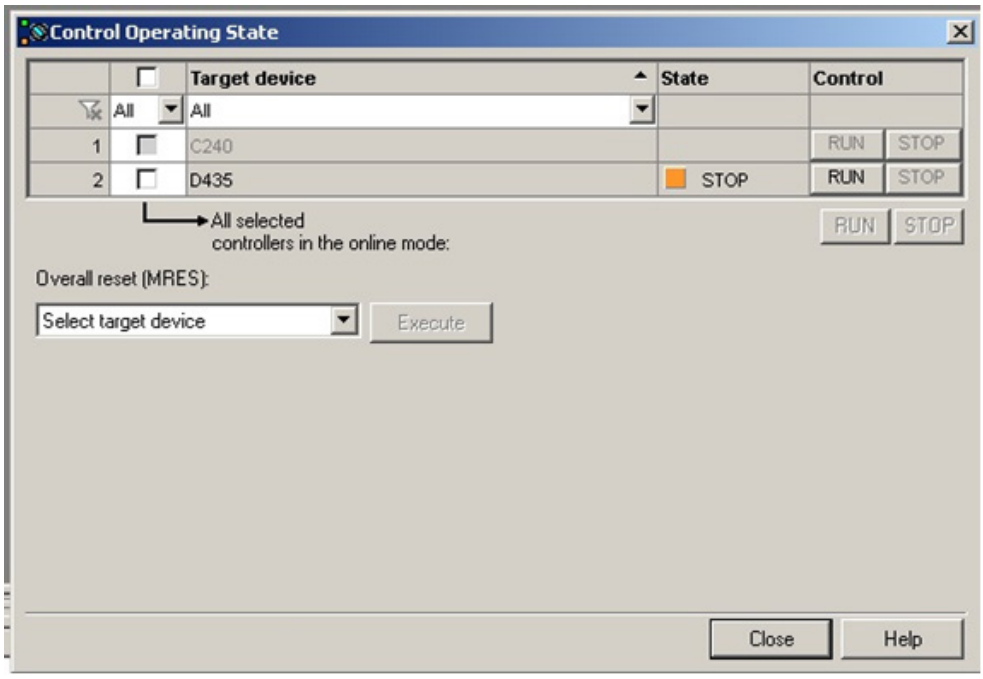


The display in the project navigator has also been adapted for protected sources. All know-how protected sources are displayed with a lock symbol (previously grayed-out source name). If the source is closed, the lock symbol is also closed. If the source has been opened, the lock symbol is also open.



6.6 New mode selector switch

In SCOUT V4.4, a new mode selector switch is available to the user to control the operating state of the SIMOTION devices. The mode selector switch is displayed in the menu bar via the corresponding button  . Click the button to open the mode selector switch. The function is only available online. The button is grayed-out offline.

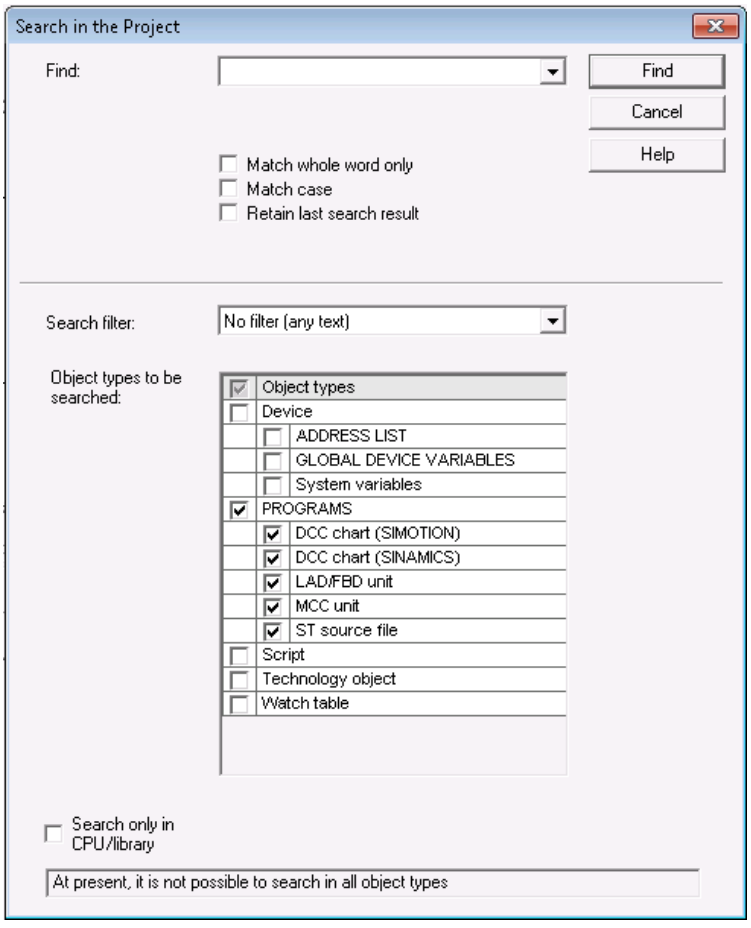


All the CPUs available in the project are displayed in the selector switch when opened. Grayed-out CPUs are offline. The user can change the display of the CPUs with filter functions. For example, offline CPUs can be hidden. When a new connection is established to a SIMOTION device, the mode selector switch automatically enters the CPU in online mode.
Only RUN and STOP are offered for the selection of the operating states. STOPU is no longer available. Of course, the mode selector switch displays all operating states of the SIMOTION CPUs (and therefore also STOPU). The CPU automatically

switches to the STOPU state when control priority is assumed by the axis control panel (up to firmware V4.3). As of firmware V4.4, the CPU remains in the RUN state when working with the control panels.
In order to start and stop several CPUs simultaneously, the user can activate the required CPUs via checkboxes. The corresponding function is initiated for all selected controllers with the RUN/STOP buttons.
The memory reset must be performed for the specific CPU via the list box.

6.7 Revision of the search dialog

The dialog for the global project Find & Replace has been revised. The elements to be searched are selected via the corresponding checkboxes. In this way, combinations of the elements to be searched can be controlled significantly better as with the previous list box.



The selection made is retained for the session. When new projects are opened, the default state is assumed.
The search has been optimized in V4.4 according to performance aspects. In a lengthier search, the user can terminate the search with the Cancel button. The list of search terms that have already been found is retained.

6.8 Unions

With V4.4, various data definitions can be made over a memory area in SIMOTION. In this way, various views can be defined on a data area and can be subsequently accessed more easily from programs. Several overlaps are possible.

Example:

```
mystruct : STRUCT OVERLAP
  a AT %B0 : INT; // Warning: Not visible for OPC-XML
  b AT %B6 : INT; // Warning: Not visible for OPC-XML
  c AT %B8 : INT; // Visible
  ar AT %B0 : ARRAY [0..7] OF BYTE; // Visible
END_STRUCT
```

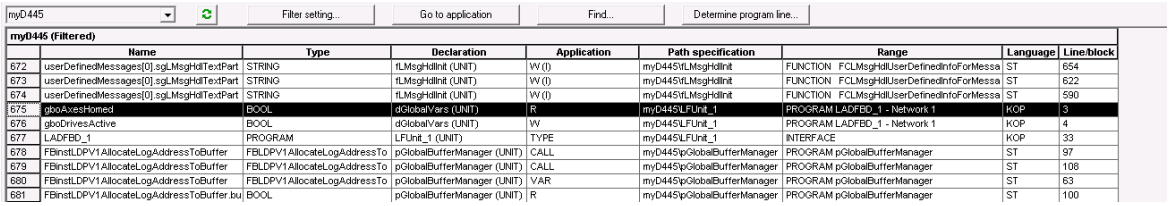
A structure with three INT variables has been created here and a byte array at the same time. If the memory areas overlap, the keyword OVERLAP must be used in the declaration. For an OPC export, it is important that the definition written last is always visible.

```
mystruct : STRUCT OVERLAP
  ar AT %B0 : ARRAY [0..7] OF BYTE; // Warning: Not
  visible for OPC-XML
  a AT %B0 : INT; // Visible
  b AT %B6 : INT; // Visible
  c AT %B8 : INT; // Visible
END_STRUCT
```

If the programming sequence is changed, the array is not visible, but the defined INT variables are.
That the array is no longer visible is indicated by the compiler with a corresponding warning in the output window during compilation.
Only elementary data types must be used for the definition of variables. The data types STRING and ANY_OBJECT are not permitted. If this is not taken into account, the compiler issues error message 4105.

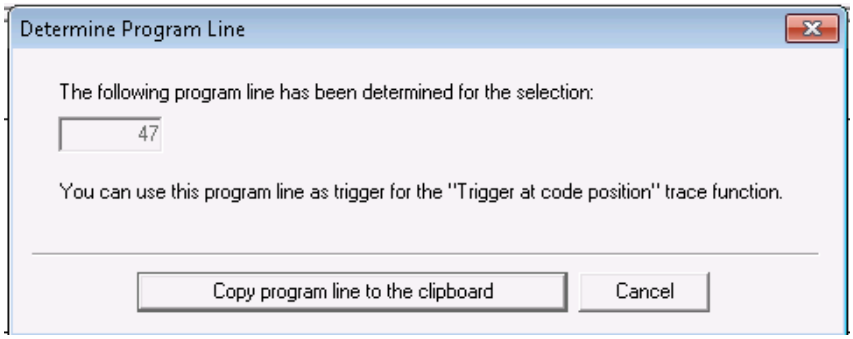
6.9 Determining the program line

After generation of the cross-references, the detailed view shows various information. This also includes the code line in the Line/block column for each entry. In ST source files, this corresponds to the actual code line of the entire source file. However, in graphic-based programming languages this only corresponds to the relative code line in relation to the block (MCC) or the network (LAD/FBD).



	Name	Type	Declaration	Application	Path specification	Range	Language	Line/block
672	userDefinedMessages[0].sgLMsgHdlTextPart	STRING	fLMsgHdlInit (UNIT)	W (I)	myD445\fLMsgHdlInit	FUNCTION FCLMsgHdlUserDefinedInfoForMessa	ST	654
673	userDefinedMessages[0].sgLMsgHdlTextPart	STRING	fLMsgHdlInit (UNIT)	W (I)	myD445\fLMsgHdlInit	FUNCTION FCLMsgHdlUserDefinedInfoForMessa	ST	622
674	userDefinedMessages[0].sgLMsgHdlTextPart	STRING	fLMsgHdlInit (UNIT)	W (I)	myD445\fLMsgHdlInit	FUNCTION FCLMsgHdlUserDefinedInfoForMessa	ST	590
675	gboAxesHomed	BOOL	dGlobalVars (UNIT)	R	myD445\LFUnit_1	PROGRAM LADFBD_1 - Network 1	KOP	3
676	gboDrivesActive	BOOL	dGlobalVars (UNIT)	W	myD445\LFUnit_1	PROGRAM LADFBD_1 - Network 1	KOP	4
677	LADFBD_1	PROGRAM	LFUnit_1 (UNIT)	TYPE	myD445\LFUnit_1	INTERFACE	KOP	33
678	FBinstLDPV1.AllocateLogAddressToBuffer	FBLDPV1.AllocateLogAddressTo	pGlobalBufferManager (UNIT)	CALL	myD445\pGlobalBufferManager	PROGRAM pGlobalBufferManager	ST	97
679	FBinstLDPV1.AllocateLogAddressToBuffer	FBLDPV1.AllocateLogAddressTo	pGlobalBufferManager (UNIT)	CALL	myD445\pGlobalBufferManager	PROGRAM pGlobalBufferManager	ST	108
680	FBinstLDPV1.AllocateLogAddressToBuffer	FBLDPV1.AllocateLogAddressTo	pGlobalBufferManager (UNIT)	VAR	myD445\pGlobalBufferManager	PROGRAM pGlobalBufferManager	ST	63
681	FBinstLDPV1.AllocateLogAddressToBuffer.bu	BOOL	pGlobalBufferManager (UNIT)	R	myD445\pGlobalBufferManager	PROGRAM pGlobalBufferManager	ST	100

By selecting an entry in the cross-reference list, the user can determine the actual absolute code line with the button. Clicking the button opens the following dialog box with specification of the absolute program line.

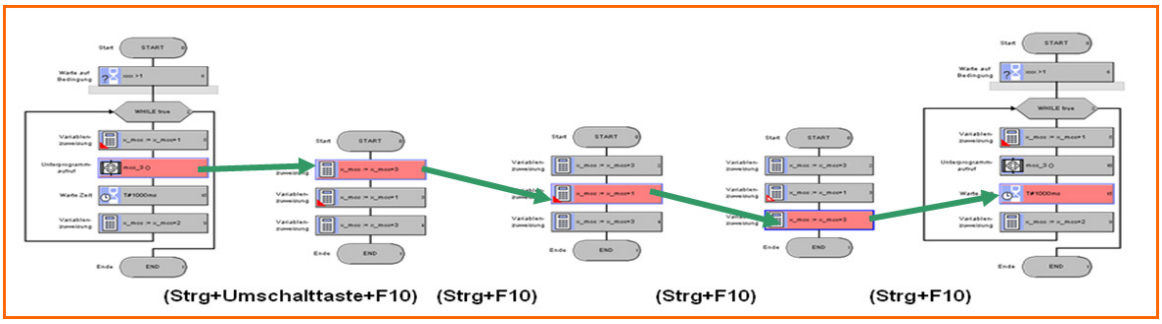


The code line can be copied to the clipboard and is then available for the parameterization of the "Recording at code position" trace function. The user then has all the information for the correct parameterization of the "Recording at code position" for the device and TO trace.

7 Diagnostics and testing

7.1 New stepping in MCC (debug mode)

An additional "Stepping" test option has been integrated in MCC. In addition to the previous single step, this stepping is available in the debug mode only for the runtime version as of V4.4. The previous single step cannot be selected when debug mode is activated.



A breakpoint can be set in MCC when debug mode is activated. The program runs up to the breakpoint. When the breakpoint is reached, the program can be stepped. To do this, SCOUT automatically sets further breakpoints for the next program steps. When a subprogram is reached, the user can decide whether the subprogram is to be executed as a step or whether a jump is to be made into the subprogram. Stepping can then be performed through the subprogram. At the end of the subprogram, a jump is made back to the calling program to the command following the subprogram call.

Notes and conditions

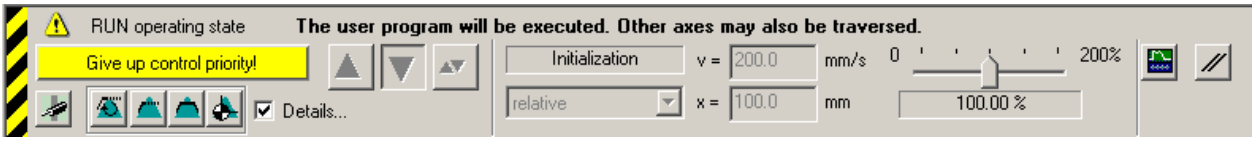
- When using stepping, the conditions of the debug mode with regard to debug task groups, stop conditions and monitoring functions apply as when using normal breakpoints.
- Single step and stepping cannot be used together.
- Stepping is not possible in RT versions up to V4.3. The single step function is available here as previously.
- The single step function can be used in process mode and test mode in RT versions as of V4.4. Stepping is available in debug mode.
- Stepping also functions for subprograms which were programmed in LAD/FBD. Stepping is performed network-by-network.
- The step mode is canceled with the Continue button of the breakpoint control.
- When stepping in a subprogram, Continue only cancels the stepping in the subprogram, and a stop is made in the calling program at the next command after the subprogram call. If Continue is actuated here, the program runs to the next active breakpoint. If this program is also a subprogram, Continue results in a jump back to the calling program.
- In debug mode, it does not make sense to use the program status function because the program status is only updated in a cyclically run program. The CPU stops at a breakpoint and cannot provide status values because the program sequence is not executed.

7.2 Axis control panel

Axis control panel is possible in the RUN operating state

Controller in STOPU:
As previously, the control priority is assumed for the selected axes.

Controller in RUN:
The control priority can only be assumed by the control panel when the axis is deactivated or, if activated, when the axis is not in motion.
There is no canceling of active motions or an automatic shutdown of the axis.
It is possible to control a leading axis with connected following axes.
The axis is not implicitly deactivated when control priority is given up:
If the axis was activated when control priority was assumed, it remains activated when control priority is given up if it was not explicitly deactivated first.
If the axis was deactivated when control priority was assumed, it remains deactivated when control priority is given up.



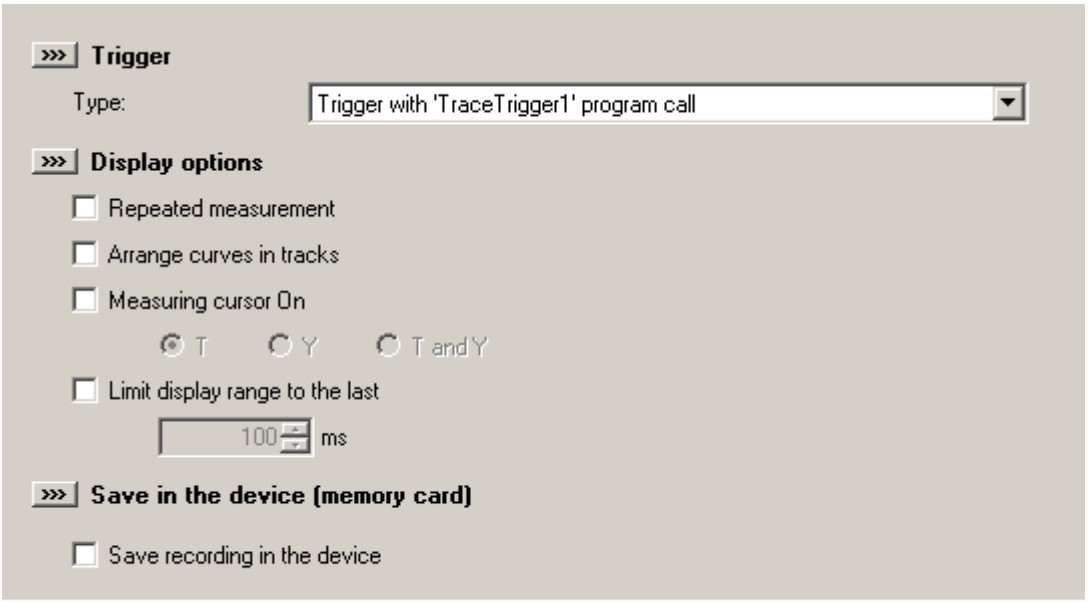
7.3 Trace

Trace for Servo$_{Fast}$ / IPO$_{Fast}$

- Isochronous recording is also possible for the Servo_fast and IPO_fast cycle clocks with the device and system trace.

Saving the trace retentively (optional)

- For device trace and TO trace.
- Trace parameter "Save recording in the device" activates the storing of the trace parameterization including the startup activation and storing of the measurement results on the memory card.
- Always only one trace result is stored on the card. Existing data is overwritten.
- At the next activation, the trace is active again with the stored parameterization.
- The trace parameterization and the measurement are stored on the memory card under /USER/SIMOTION/HMI/TRACE
  It is possible to access these files (without SCOUT) via FTP or a card adapter.



When troubleshooting, there is often no SCOUT on the local machine or no operator with SCOUT experience.
With the following procedure, the trace can be created at another location (laboratory), loaded locally, and the results sent back for evaluation:

Requirement:
- The same project must be present locally and in the laboratory (online consistency must be assured)

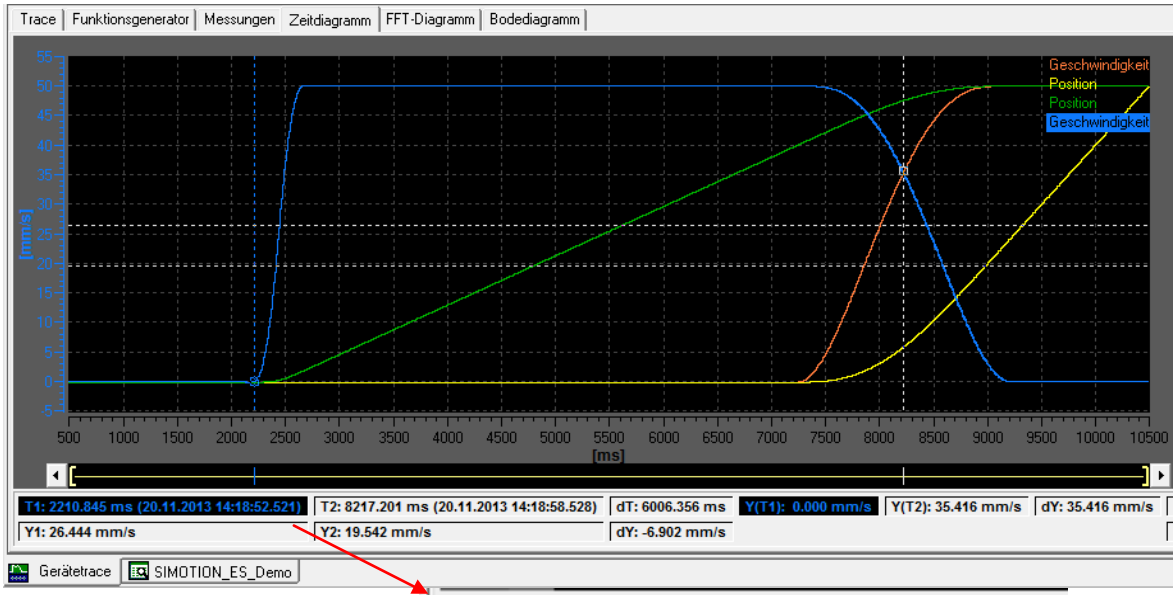
Laboratory:
- Create a trace parameterization
- Load it to the controller (do not start the trace)
- Save the trace parameterization in the catalog
- Fetch the \USER\SIMOTION\HMI\TRACE\ directory with FTP from the controller
- and send it to the machine

Local machine:
- Load the directory to the card using FTP
- Switch the controller off and on: The trace is then started automatically
- As soon as the Result.ydb file is present in the Measurements directory (trace recording has been performed), fetch the directory from the card using FTP
- and send it to the laboratory
- Delete the \USER\SIMOTION\HMI\TRACE directory on the card (otherwise the trace remains active and will start again with each restart)

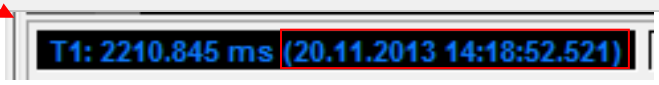
Laboratory:
- Go online with SCOUT
- In SCOUT: Fetch the trace parameterization from the catalog and load it to the controller (if necessary, change the trigger condition, for example, so that it can be triggered through the control of a variable)
- Start the trace and trigger the trigger condition
- If the trace has been completed (status display: Recording completed): Load the \USER\SIMOTION\HMI\TRACE directory to the card using FTP
- Upload and display the trace

Additional display of the PLC time for the device trace and the system trace

- In the time display on the measuring cursor for the device and system trace, the associated PLC time is displayed in addition to the time in relation to the starting time of the trace.
- If several TO traces and several system/device traces are open, the assignment of the traces to one another is easier with an absolute time.
- The display format corresponds to that of the TO trace.



PLC time in brackets



Display of the time in the TO trace relative to a reference time

In the TO trace, the PLC time is displayed for the trace events up to now. A relative display to a reference time can be activated for the analysis of related trace events. An additional input field is available in which a time can be set to which the display of the trace events is to be relative. The relative display can be activated and deactivated via a checkbox.

TO trace with alarms

- TO alarms can also be recorded in the TO trace.
- This is particularly useful for the analysis of fault scenarios.
- A new "Alarms" tab is available for the event selection. The alarms to be traced can be selected there.

Displaying measurement results of the Web trace in the SCOUT trace
- The import and the display of the Web trace is now also possible in SCOUT.
- Additional Web traces (*.wtrc) can be selected in the "Open File" trace dialog.

7.4 Optimization of restoring non-volatile SIMOTION data

With SIMOTION D, there are two ways to save non-volatile SIMOTION data to the CF card:
❶ using the system function (_savePersistentMemoryData)
❷ manually using the service selector switch / Web server / DIAG button
Whereby, the storage locations on the CF card are different.

Previously with SIMOTION D, the data that was stored using the system function ❶ was restored with position "1" of the service selector switch.
Only when this data was not available was the manually saved data ❷ restored.

As of V4.4, position "A" of the service selector switch restores the manually saved data ❷ preferentially.

7.5 General

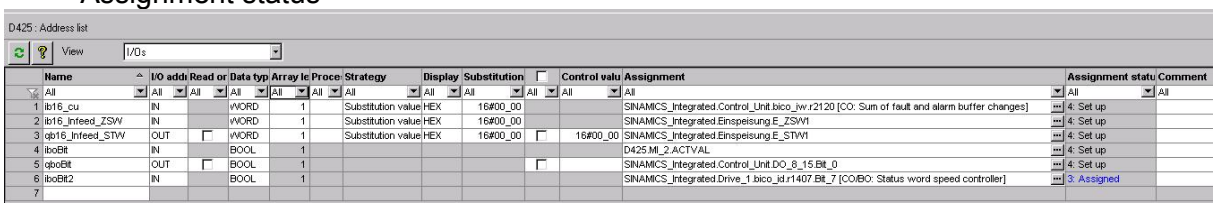
Additional information in the diagnostic buffer for the "STOP" operating state
For the diagnostic buffer entry "Operating state STOP reached", additional information is output about the cause of the "STOP" operating state (error, stop through user request, etc.).
In this way, the diagnostic buffer can be used to determine why a controller went into the "STOP" operating state.

8 Scripting

Modular machine @ engineering by means of scripting

- Global project symbolic assignment can be set.
  Extension of the scripting functionality with the methods that are also possible via the SCOUT menu.
  - Activate/deactivate "Use symbolic assignment"
  - "Set up communication for symbolic assignment"

- Configuration of the address list and the symbolic connection.
  The new columns added to the address list (formally I/O symbol browser) since SCOUT version V4.2 can be influenced or queried by means of scripting.
  Extension of the I/O object with new properties and methods:
  - Control value
  - Control
  - Read out and set assignment
  - Assignment status



	Name	I/O addr	Read or	Data typ	Array le	Proce	Strategy	Display	Substitution		Control valu	Assignment	Assignment statu	Comment
	All	All	All	All	All	All	All	All	All	All	All	All	All	All
1	ib16_cu	IN		WORD	1		Substitution value	HEX	16#00_00			SINAMICS_Integrated.Control_Unit.bico_jw.r2120 [CO: Sum of fault and alarm buffer changes]	4: Set up	
2	ib16_Infeed_ZSW	IN		WORD	1		Substitution value	HEX	16#00_00			SINAMICS_Integrated.Einspeisung.E_ZSW1	4: Set up	
3	qb16_Infeed_STW	OUT		WORD	1		Substitution value	HEX	16#00_00		16#00_00	SINAMICS_Integrated.Einspeisung.E_STW1	4: Set up	
4	iboBit	IN		BOOL	1							D425.MI_2.ACTVAL	4: Set up	
5	qboBit	OUT		BOOL	1							SINAMICS_Integrated.Control_Unit.DO_8_15.Bit_0	4: Set up	
6	iboBit2	IN		BOOL	1							SINAMICS_Integrated.Drive_1.bico_id.r1407.Bit_7 [CO/BO: Status word speed controller]	3: Assigned	
7														

  Extension of the TO object with same new properties and methods:
  - Read out and set assignment (actuator and encoder separately)
  - Assignment status

- TO interconnections
  By means of scripting, the input interface / the inputs and the output interface / the outputs (if available) of
  - Axis object (motion profile, force/pressure profile, valve characteristic, etc.),
  - Following object (partly master value interface),
  - Path object (path axes, etc.),
  - Addition object (motion input),
  - Formula object,
  - Fixed gear,
  - Controller object,
  - Sensor,
  - Temperature channel

  can be selectively interconnected.
  An existing interconnection can be queried or canceled.

  Changes compared to previous versions:
  - When creating an interconnection (e.g. on the source TO), an "inverse" interconnection of the partner TO must also be created.

  - When creating an interconnection for the synchronous operation, the gearings collection must also be extended.

- Configuration of the onboard I/Os (interface X142) of the SIMOTION D4x5-2.
  The inputs and outputs of interface X142 of the SIMOTION D4x5-2 can be parameterized by means of scripting.

- Export/import function via script of LAD/FBD units and USES interconnection.
  The already available "ImportLadFbdEXP" function has been extended with an optional parameter of the string type: List of the units that are to be included in the USES list. In this list, the blank is used as separator.
  If this parameter is not specified, then the original USES list (contained in the EXP file) is used.
  Example:
  Call PROJ.Devices("D425").Units("LFUnit_1").ImportLadFbdEXP("C:\ LFUnit_2.exp"," LFUnit_3 LFUnit_4")

9 Technology functions

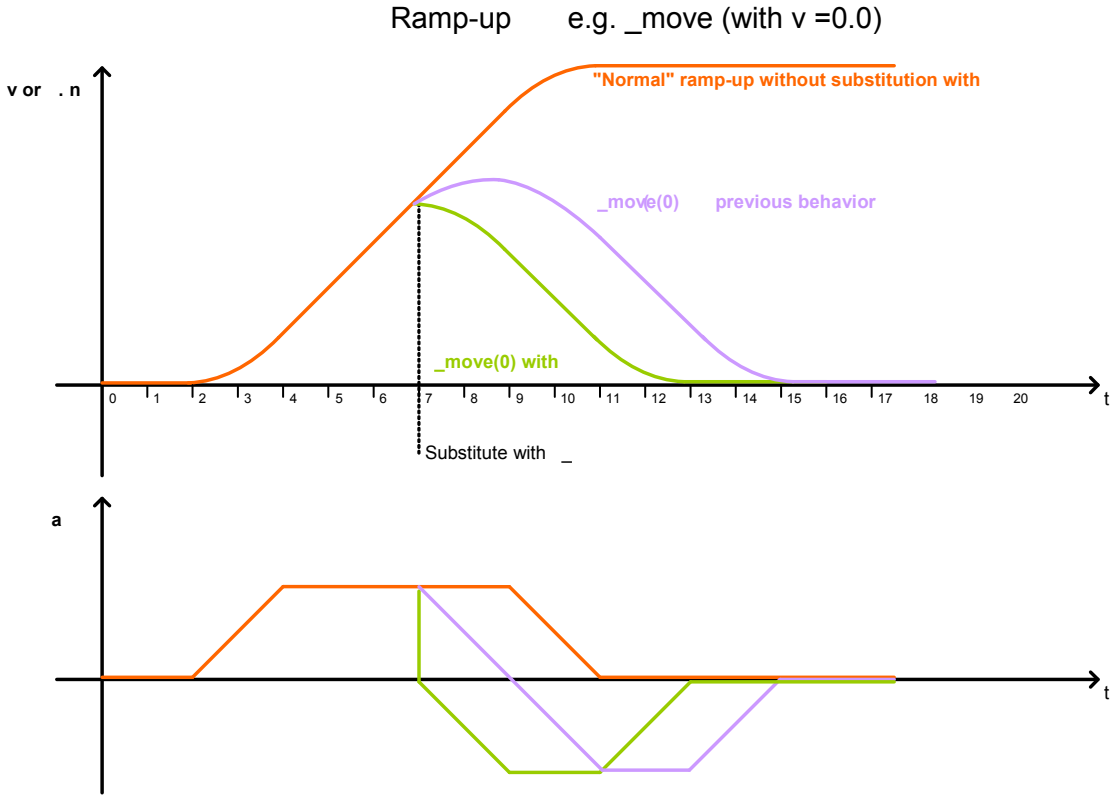
9.1 General

Access to system variables and configuration data from synchronous user tasks
As of SIMOTION Kernel V4.4, access is possible from synchronous user tasks to system variables and configuration data of the TOs.

9.2 Axis

Brake control / system-supported shutdown
It is possible to set on the axis that shutdown of the drive is to be via OFF3 (quick stop) as default. OFF2 (pulse inhibit) is therefore only set for the drive when, for example, the brake is closed.
This setting is also the default setting on newly created axes and is independent of the configuration of a brake control on the drive.
This function is also effective when the enables are removed via the axis control panel. It is therefore no longer necessary to consider the brake control separately in the program when switching the axis on and off.

In substituting motions with constant velocity profiles, the acceleration can be optionally set to zero.
When stopping with the _stop() and _stopEmergency() commands or substituting a motion with the _pos() and _move() commands, an existing acceleration or deceleration can be immediately set to zero (function parameters on the command). The existing acceleration or deceleration is not first reduced via the jerk.



Substituting motion at low dynamic response values

In axis superimposition with constant velocity profiles, the acceleration can be optionally set to zero

It is possible to use the *DecodingConfig.blendingAcceleration* configuration data to set that the acceleration at the transition to the new motion command is not zeroed if not necessary for the overall motion.

As of V4.4, it is the default setting for a newly created axis.

Dynamic response planning in the axis superimposition via three blocks

In versions earlier than SIMOTION V4.4, the dynamic response is planned via two traversing blocks.

As of SIMOTION V4.4, the dynamic response is planned via three traversing blocks (current, next and next but one) for a newly created axis. It is therefore possible to plan a higher velocity if necessary for axis motion in the same direction. The setting is stored in the *DecodingConfig.commandsForAxisDynamics* configuration data.

DSC with spline

In the DSC with spline function, polynomial functions are used in the drive to

form intermediate setpoints in the speed controller cycle clock with regard to position, speed and torque. The intermediate setpoints can be used to precisely simulate highly dynamic motions up to the current controller cycle clock and precisely precontrol the speed or even the torque.
DSC with spline as well as torque precontrol and speed precontrol are possible.
The setpoints are fine-interpolated in the following way:

- Position setpoint - cubic fine interpolation
- Speed setpoint - quadratic fine interpolation
- Acceleration setpoint/torque setpoint - linear fine interpolation

DSC with spline provides the following advantages and functionality:

- Linear fine interpolation and precontrol of the torque
- Extended support for highly dynamic motions
- Process response is determined by the lower current controller equivalent time

If "DSC with spline" is activated on the drive (function module selection) as well as on the TO ("Closed-loop Control" axis configuration dialog), as of V4.4, SIMOTION generates PROFIdrive telegram125 or 126 for the axis and drive when "Symbolic assignment" is activated in the project.

System variable for actual value before the position filter
New system variable *sensordata[n].positionIncoming* for the actual value before the position filter for TO axis and TO externalEncoder. This system variable can be used, for example, in the trace and also in conjunction with measuring inputs.

System variable for effective setpoint in the drive
New system variable *controlDifferenceCommandPosition* for balanced setpoint with DSC which displays the setpoint present in the drive (setpoint delayed by the signal propagation delays and output times).
In this way (e.g. in the trace), the setpoint in the drive, the system deviation in the drive and the displayed actual value then match (as they refer to the same time).

Setting of the alarm response "Motion_Emergency_Abort" for alarms with the alarm response "Feedback_Emergency_Stop"
Alarms on the TO axis that have "Feedback_Emergency_Stop" as alarm response can also have "Motion_Emergency_Abort" set as alarm response.
With the "Feedback_Emergency_Stop" alarm response, switchover is made to the actual value of the axis. As there is normally a setpoint-actual-value difference at this time, this response results in a speed and position jump for coupled axes (e.g. synchronous axes, gantry axes).
This can be avoided with the "Motion_Emergency_Abort" alarm response because the motion stop is based on the current setpoint.

Extension of the command buffer for superimposed commands
The following applies to SIMOTION < V4.4:
The buffer has an entry. These commands overwrite each other if they are issued within one IPO cycle clock.
As of SIMOTION V4.4, the following applies:
A maximum of ten command entries are possible in the command buffer for superimposed commands. The number can be set in the configuration data *DecodingConfig.lengthOfBufferForSuperimposedCommands*. With the creation of a new axis, five command entries are preset by the system.

9.3 Output cam / cam track

Actual value reference can be configured
New setting option in the configuration screen form for calculation of the cam switching times.

- Reference to the actual position in the controller before the position filter.
- Reference to the actual position in the controller after the position filter.
- Reference to the actual position on the encoder module / drive. The transmission time Ti from the encoder module / drive to the controller is taken into account by the system.

Setpoint reference can be configured
New setting option in the configuration screen form for calculation of the cam switching times.

- Reference to the setpoint in the controller before the fine interpolator (e.g. for virtual axes).
- Reference to the setpoint in the controller after the fine interpolator.
- Reference to the setpoint on the drive.

9.4 Measuring input

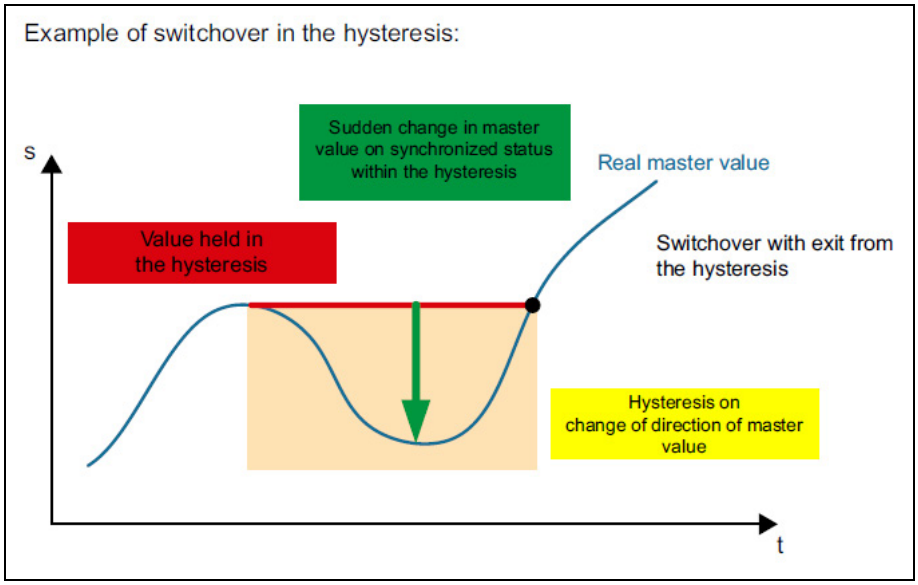
Actual value reference can be configured
New setting option in the configuration screen form.

- Reference to the actual position in the controller before the position filter.
- Reference to the actual position in the controller after the position filter.
- Reference to the actual position on the encoder module / drive. The transmission time Ti from the encoder module / drive to the controller is taken into account by the system.

9.5 Synchronous operation

Synchronous operation does not go into the 'synchronous' status as long as the master value is in the hysteresis
If a direction reversal of the master value is based on fluctuations in a standstill position that are tolerable and usually cannot be influenced, the abort of the synchronization

can be prevented by specifying a tolerance band for the master value reversal (master value hysteresis).
The effective hysteresis freezes the master value in the reversal point during direction reversal and thus simulates a still-standing master value for synchronization.
As of V4.4, there is an optional setting (configuration data syncingMotion.enableSyncWithinTolerance) that the synchronous operation does not go into synchronous status and therefore refers to the current position of the master value using the synchronous operation rule as long as the master value is in the hysteresis as a result of a change of direction (system setting when creating a new synchronous axis). In this way, the difference that results from the synchronous operation rule and the position of the master value at the start of the hysteresis and the current position, is no longer traversed with the maximum dynamic response of the following axis.



Synchronous status only when leaving the hysteresis

Effective direction of the hysteresis
The effective direction of the hysteresis is automatically determined by the system and is maintained by the permanent functionality that is also outside of synchronization.
As of V4.4, you can specify the effective direction of the tolerance band of the master value via the "syncingMotion.toleranceDirection" configuration data.

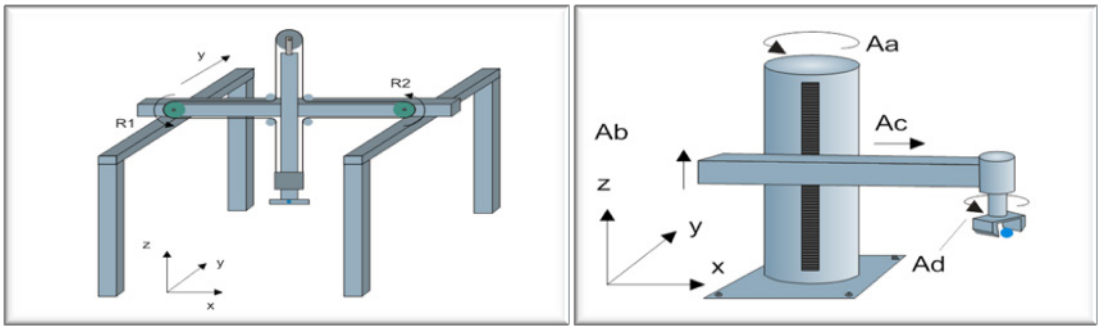
10 SIMOTION handling

10.1 Function extensions

The functionality for handling applications has been extended further with SIMOTION Version 4.4.

Rounding off of the system-side standard kinematics

The transformation equations for the "3D roll picker" and "Cylindrical robot" types have been added to the kinematic types available in the system.

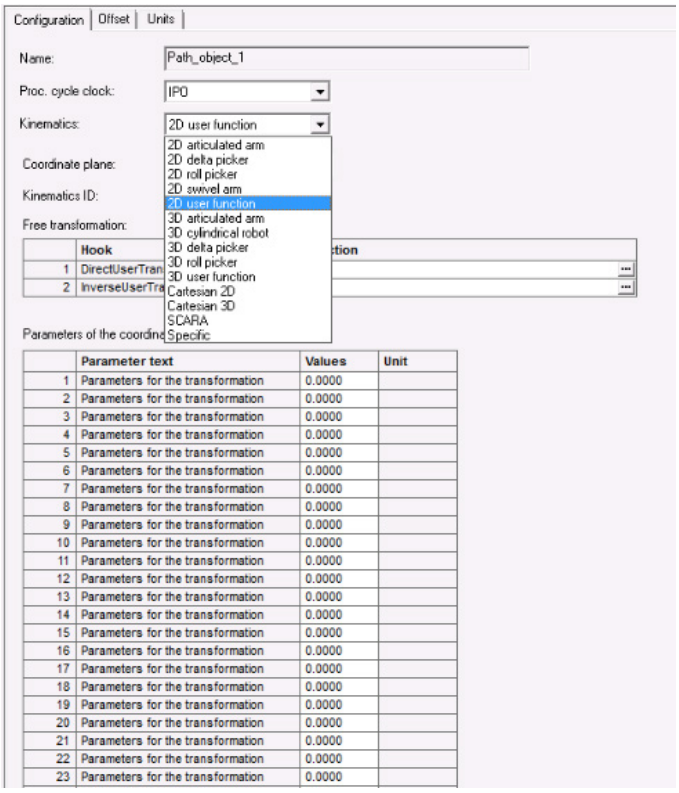


Individual kinematics can also be integrated in the system via the "Free transformation interface". The transformation equations must be provided by the user.

Free transformation interface for customer-specific kinematics

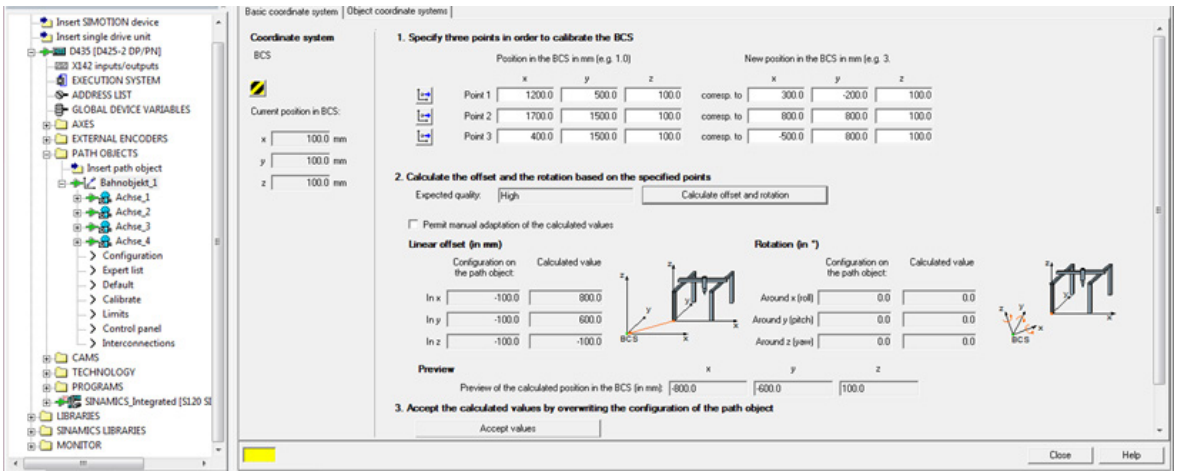
Transformation equations can be loaded to the system via the free transformation interface. In this way, customer-specific kinematics can be supported by the system and therefore can be configured, in addition to the standard kinematics.
Note:
Previously this was only possible in an application with the aid of the standard library ("Kinematic transformation").

New functions in SIMOTION V4.4



Calibration of coordinate systems

Coordinate systems can be calibrated quickly and easily with the new SCOUT screen form. The basic coordinate system can be aligned with the kinematic zero point or an object coordinate system with the
basic coordinate system.



Increase in efficiency through

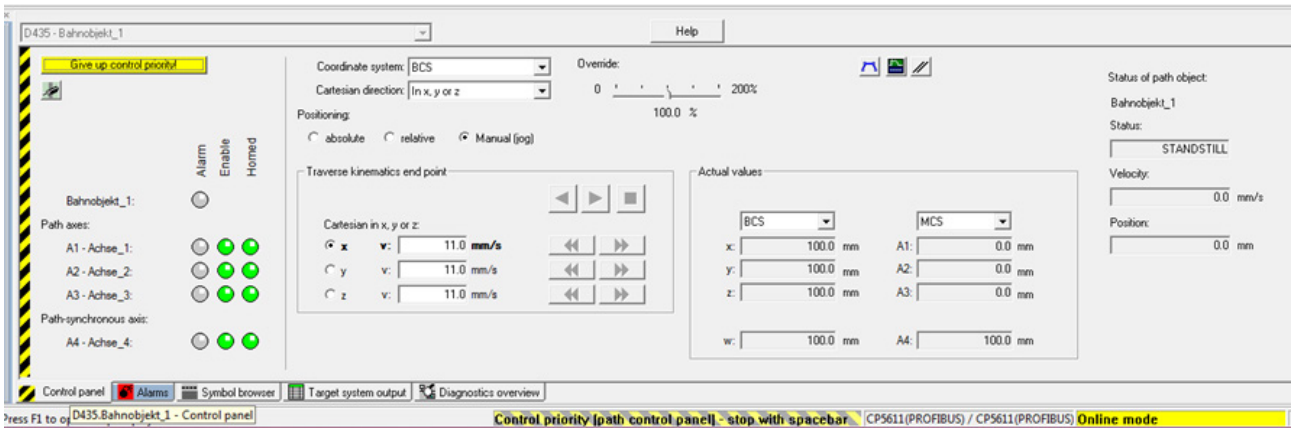
- Intuitive engineering with the SCOUT screen form
- Simple calibration with three points

- System-side quality check to select the three points
- Simplified operation through system-side calculation of the offset
- Simple acceptance of the calculated values in the project

10.2 Path control panel

The path control panel is used to commission kinematics. The control and monitoring of path objects is therefore also possible without a user program. Applications include the following:

- Enabling and disabling all connected axes
- Function test of path objects and the connected axes
- Commissioning and setting up the kinematics
- Cartesian traversing in the BCS or in an OCS
- Traversing in machine axes
- Monitoring axis positions and Cartesian coordinates



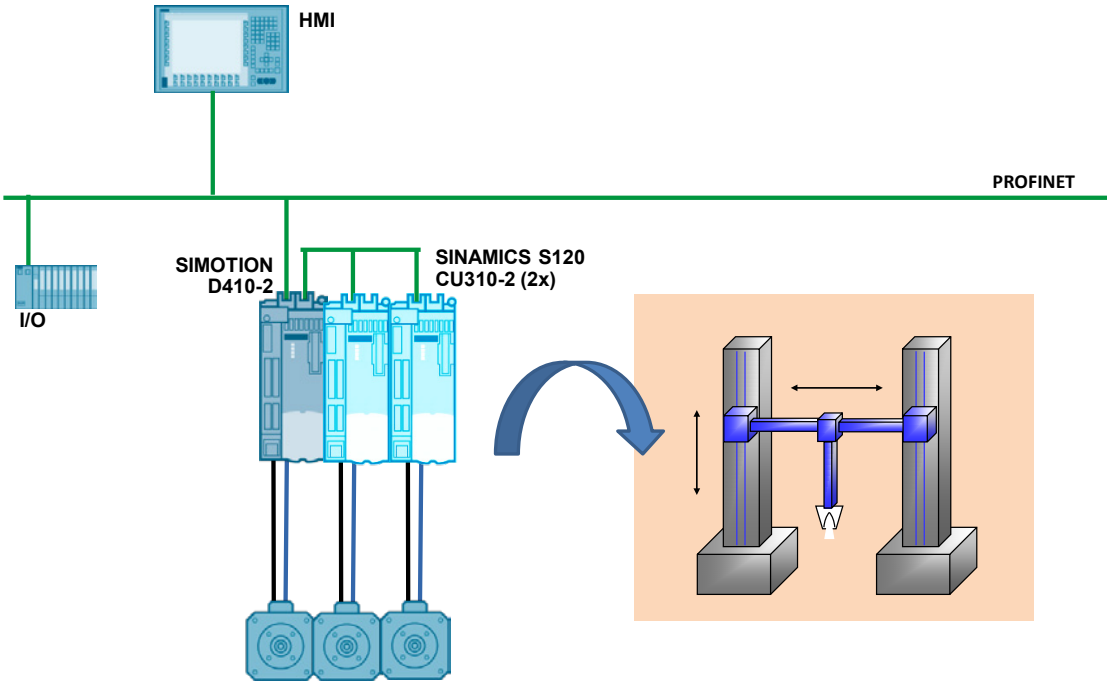
Increase in efficiency through

- Status display of the path axes
- Traversing in different coordinate systems
- Accustomed operating modes: Absolute, relative, manual (jog)
- Automatic adaptation of the display depending on the operating state
- Traversing with the aid of icons
- Display of the current position

10.3 Path interpolation with SIMOTION D410-2

As of V4.4, SIMOTION D410-2 also supports path interpolation.

- Use of the integrated drive of the SIMOTION D410-2
- Further drives via external CUs (e.g. SINAMICS S120 CU310-2)



11 Drive connection

S7 communication for SINAMICS G120
As of FW 4.7, SINAMICS G120 supports the S7 communication.
This enables routing from SCOUT via a SIMOTION CPU to a SINAMICS G120.

S120M
As of SIMOTION V4.4, SINAMICS S120M can also be operated on the SIMOTION D4x5-2/CX32-2.

PM240-2
PM240-2 can be operated with the SIMOTION D410-2 or SIMOTION D4x5-2/CX32-2 (via CUA31/32).

CU250S-2
CU250S-2 can be configured with SCOUT V4.4 and can be operated on SIMOTION.

12 Safety Integrated functions with SINAMICS V4.7

Support for SINAMICS Safety Integrated V4.7

- Introduction of the Drive Safety Data Block (DSDB). The DSDB enables an exchange of safety-relevant information between SINAMICS and SIMOTION. The DSDB replaces the previous Safety Information Data Block (SIDB) in the default setting. Information of the basic functions is now also transferred in the DSDB. The DSDB can be generically extended. In the future, new SINAMICS functions will be supported automatically.
- Safe Brake Test (SBT) with control by the TO. Up to two brakes can be tested in succession with a parameterizable test torque.
- Safely-Limited Position (SLP) also for SINAMICS Integrated. For SLP, a delay time can now be set between the selection and the activation of the function.
- Transfer of the safe actual position values via PROFIsafe to the F-CPU (Safe Position; SP) also for SINAMICS Integrated.

  Note: Safe homing is required for the SLP and SP functions. Homing in the motion is not yet supported with SIMOTION V4.4.

13 Runtime system functions

Save text file on card
Text files can be written and read on the memory card or RAM disk from the SIMOTION user program. The text files are stored in selected directories which can be selected via symbolic names.
The function blocks are available in the command library under the 'File access' folder in the 'Further system functions' folder.

- _filehandle
- _fileOpen
- _fileClose
- _fileSetPosition
- _fileRead
- _fileWrite
- _fileReadLn
- _fileWriteLn
- _fileDelete
- _fileRename
- _fileCopy
- _getStateOfFile
- _directoryPathDelete

The text files can be used, for example, to save and read traversing programs, packing patterns for pallets, recipes or log files.

TO name as STRING
The name of a technology object can be determined via the new _getObjectName information function.
The system function provides the name of the technology object directly as a STRING in the return value. When the function is called in the TechnologicalFaultTask, TSI#toInst can be transferred directly to the ToInst input parameter from the TaskStartInfo of the TechnologicalFaultTask.

Improvement in the usability when downgrading via the service selector switch
Simpler handling of the downgrade for SIMOTION D via the switch operation. The downgrade operation is started with the "Reset of the service selector switch" to "0". (Previously the switch had to be reset in good time during the downgrade.)

Acknowledgement of Alarm_SQ via user program
Messages that require acknowledgement (Alarm_SQ) output on a connected display device can now be acknowledged via the user program.
The _acknowledgeAlarmSqId function acknowledges a single message that requires acknowledgement.
The _acknowledgeAllAlarmSqId function acknowledges all messages that require acknowledgement.

TSI extension
Query of the configured cycle time of the current task in µs.
The Taskstartinfos of the user program tasks have been extended with the date.
TSI#cycleTime_us (UDINT).
TSI#cycleTime still returns the cycle time of the calling task in whole ms.
TSI#cycleTime_us and TSI#cycleTime return the value 0 for sequential tasks and non-isochronous cyclic tasks.

Parameterizable timeout for _activateDpSlave and _deactivateDpSlave
The time for the timeout of the two system functions can be specified via the additional function parameter **timeToWaitForStationAlarm**.
Supplement to the documentation with regard to function parameter timeToWaitForStationAlarm:

_activateDpSlave
This system function establishes cyclic communication for the entire DP station (slave) or the PROFINET station (device).

The system function waits for the time (in seconds) specified on the input parameter for the station recovery alarm to arrive. Generally, waiting only occurs when a switchover via the system function to the opposite state (activated to deactivated, deactivated to activated) is to be performed and a value > 0 is specified on the timeToWaitForStationAlarm input parameter.

After this time, the processing of the system function is stopped.
The system function returns the current state, i.e. either 16#00000005 or 16#00000006.
This also applies when wait time 0 has been specified.

Behavior when the 'timeToWaitForStationAlarm' input parameter (wait time) is set to the following values:
- 16#0: The system function does not wait for a station recovery alarm.
- 16#60 (default setting): Behavior as in version < V4.4; the system waits for the station recovery alarm for up to 60 seconds.
- > 16#0: The system function waits for the station recovery alarm for up to the specified number of seconds.
- The version V4.3 value is applied as the default setting.

_deactivateDpSlave
This system function aborts the cyclic communication for the entire DP station (slave) or the PROFINET station (device).

The system function waits for this time (in seconds) for the station failure alarm to arrive.
After this time, the internal processing is stopped.
The system function returns the current state, i.e. either 16#00000005 or 16#00000006.
This also applies when wait time 0 has been specified.

Behavior when the timeToWaitForStationAlarm input parameter (wait time) is set to the following values:
- 16#0 (default setting): The system function does not wait for a station failure alarm.
- 16#60: The system function waits 60 seconds for the station failure alarm. This is the maximum value.
- > 16#0: The system function waits for the station failure alarm for up to the specified wait time in seconds.
- The version V4.3 value applies by default.

Access possible to configuration data and system variables from synchronous user tasks
Access is now possible to configuration data and system variables of the TOs from synchronous user tasks via direct access and via "_getsafevalue" and "_setsafevalue". Notation and functional behavior is as for access outside of synchronous tasks. Troubleshooting is performed according to the available system mechanisms.

Retention of retentive variables after an upgrade / project update (without SCOUT)
If it is necessary to re-initialize retentive variables (retain data) during an upgrade / project update (e.g. because of an extension of the variable blocks or new user data types and system data types), then the current values of the retain data can be saved and set active again after the update using the SCOUT functions "Save variables" and "Restore variables".

For upgrade / project update scenarios
- Device update tool
- Web pages of SIMOTION IT
- Save in project format (on card) or
- Configuration server (replace the active configuration by another one whose card image is available on the memory card via the user program)

SCOUT is not available locally.
The retain data values are retained automatically for the above scenarios as of Runtime V4.4.
Requirement: The "Enable OPC-XML (load symbols to RT)" checkbox has been activated for the compiler option on the units already loaded to the device.

New system functions for setting the IP address
Uniform user view for PN-IE and PN-IO interfaces in the engineering and in the runtime. Using the new system functions _setPnIPConfig and _getPnIPConfig, the IP address of a PROFINET interface can be set/read by specifying the diagnostic address (also for interfaces with PROFINET basic services). An additional parameter is still available to distinguish between temporary/permanent setting of the IP address.

Extension of the system function in the NameOfStation/ProfinetPortNeighbour environment
Extension of the system functions so that they can be used for all Ethernet interfaces (standard and PROFINET).
The NameOfStation can be set directly via system function without the _activateNameOfStation system function then having to be called to initiate a restart.

The following three new system functions have been introduced with SIMOTION V4.4:
- _setPnNameOfStation: Sets the device name of a PN-IO or PN-IE interface. The device name no longer has to be activated. After error-free execution of the system function, the device name is active.
- _getPnNameOfStation: Reads the device name of a PN-IO or PN-IE interface.
- _getPnPortNeighbour: Determines the device name, port and slot number of a neighbor connected directly next to a separate port of a PN-IO or PN-IE interface.

The functionality of the existing _setNameOfStation, _getActiveNameOfStation, _activateNameOfStation and _getPnInterfacePortNeighbour system functions remains unchanged and they can still be used as before.

As of V4.4, the new system functions should be used instead of the old functions:
- _setPnNameOfStation instead of _setNameOfStation/_activateNameOfStation
- _getPnNameOfStation instead of _getActiveNameOfStation
- _getPnPortNeighbour instead of _getPnInterfacePortNeighbour

The functionality of the old system functions remains unchanged and they can still be used as before.

Extension of the _getPnInterfacePortNeighbour system function for detection of multiple neighbors
The _getPnInterfacePortNeighbour system function has been extended so that several neighbor ports connected to one port are detected and reported via an error return value.

Extension of system variable _cpuData

System variable	Supported HW	Function
_cpuData.fanRpm	P350 D410-2 (new)	Fan speed
_cpuData.moduletemperature	P3xx C240/C240PN (new) D4xx-2 (new)	Module temperature

System variable _automaticRestart and system function _restart
The system variable _automaticRestart is intended for applications in which an automatic restart is mandatory after a crash caused by an extreme situation, e.g. wind generators after a lightning strike.
The system variable is used to specify how many restart attempts are to be made.

The system function _restart enables a response to non-acknowledgeable drive errors with an OFF2 response, which result in the inability of the drive to move. These drive errors can only be exited via a restart or by power off/on.

The system variable _automaticRestart and the system function _restart are only available for SIMOTION D410-2 Control Units.

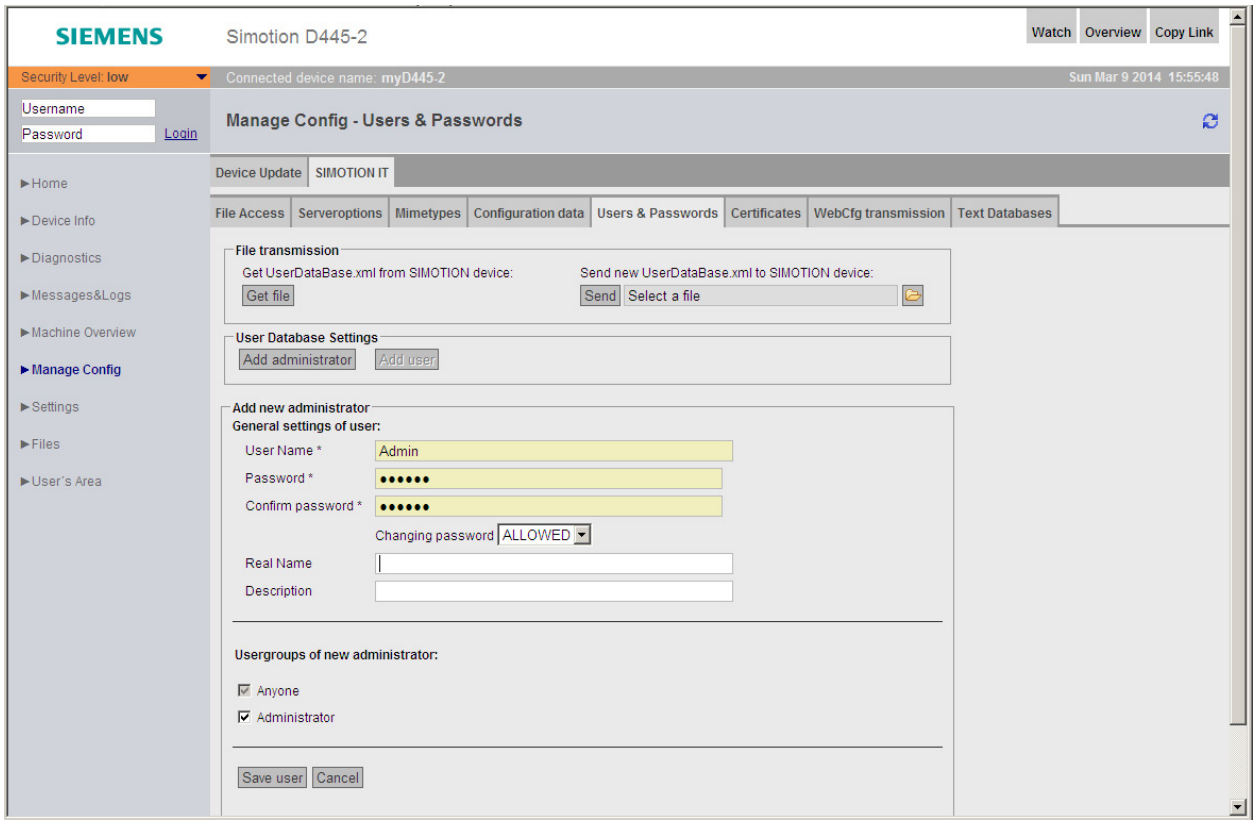
14 Diagnostics and service with SIMOTION IT

- Security concept (security level)
- Revised login administration
  Separate storage of the user data in the UserDataBase.xml file.
  New Users & Passwords page for the processing of user data.
- Output of messages by the messaging system on the SIMOTION IT pages without impairing the processing.
- New display formats for floating-point numbers in the watch table.
- New variables provider.
- Traces (WTRC files) can now be loaded and displayed in SIMOTION SCOUT.

For details, see *SIMOTION IT Diagnostics and Configuration* Diagnostics Manual

14.1 New user administration

SIMOTION IT uses a user database called UserDataBase.xml
to control access to the device.
If no user database is found on the device, then
an empty user database is created when the controller powers up. Logging on
is only possible after a user has been created.



14.2 UserDataBase.xml

```
<?xml version="1.0" encoding="UTF-8" ?>
- <UserDataBase>
  <!--  passwords will be replaced by A1-hash on startup  -->
  - <!--
      <USER NAME="simotion" PASSWORD="simotion" CHANGEPASSWORD="allowed"
    DESCRIPTION="administrator with all rights" REAL_NAME="">
        <GROUP NAME="Anyone"/>
        <GROUP NAME="Administrator"/>
      </USER>

  -->
  - <USER NAME="Admin" PASSWORD="123456" DESCRIPTION="Administrator
    Description" REAL_NAME="Administrator" CHANGEPASSWORD="ALLOWED">
    <GROUP NAME="Anyone" A1="e360bb38b6f97c78cdfa1c01ffaa335f" />
    <GROUP NAME="Administrator" A1="1b874fa8a1bb471bb7fb4d62f5f50f40" />
  </USER>
  - <USER NAME="simotion" PASSWORD="123456" DESCRIPTION="simotion description"
    REAL_NAME="simotion" CHANGEPASSWORD="ALLOWED">
    <GROUP NAME="Anyone" A1="8ac02e7f5970e82ffabb47c8d474cf0f" />
  </USER>
</UserDataBase>
```

Storage location on the memory card:
\USER\SIMOTION\HMICFG\UserDataBase\UserDataBase.xml

14.3 Updating the firmware to V4.4

When updating the firmware to Version 4.4, an attempt is made to convert the WebCfg.xml configuration file to the new format. A UserDataBase.xml is created and filled with user data of the old WebCfg.xml. If there is a 'simotion' user and the 'simotion' password, this entry is not taken over.
The original file is renamed to WebCfg.xml.deprecated

This conversion might fail for the following reasons:

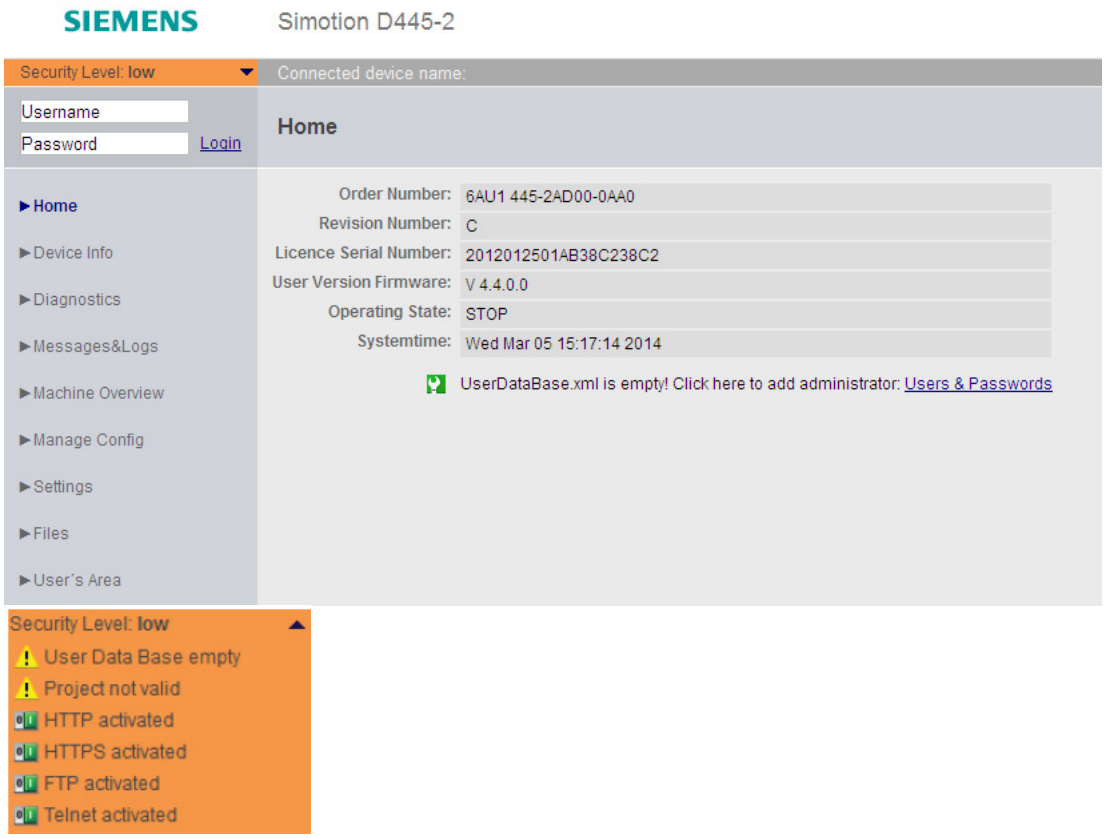
a) The version of the WebCfg.xml is for firmware before V4.2, which cannot be updated.
b) An error occurred during an attempt to apply individual user settings.

If one of these errors occurs, the configuration files have to be corrected manually.

14.4 New security concept

Security Level low
The device is supplied with an empty user database. No projects exist yet. The security level is low to allow configuration of the device.

- In this state, access to the Web server as an anonymous user is possible to enable use of functions such as the project and firmware update or OPC XML.
- Access to the FTP and Telnet is also possible.
- New users can be entered in the empty user database.

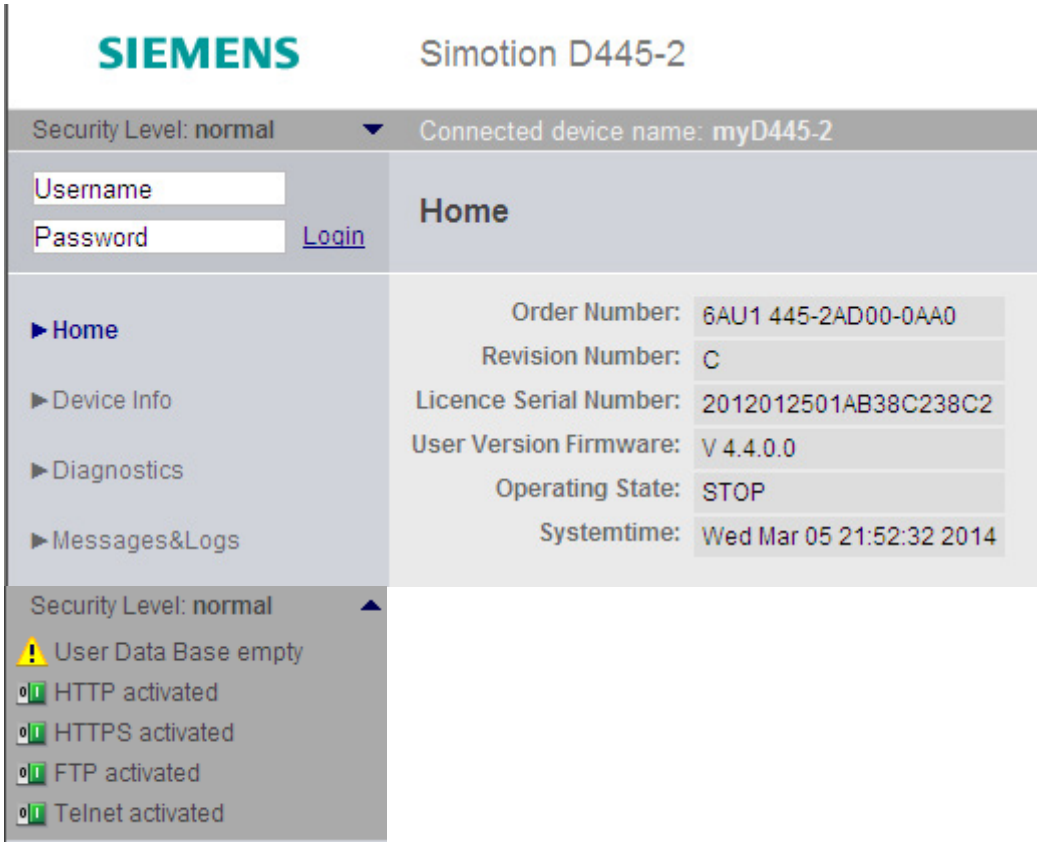


A user with the administrator group can be added to the Manage Config > SIMOTION IT > Users & Passwords page. As soon as the user is saved, the Web server switches to the Security Level normal state because the user database now contains a valid entry.

Security Level normal

The controller has a user database. There is a project on the controller and HTTP, HTTPS, FTP and Telnet have been activated in the HW Config.

→User password authentication is required for access to websites with sensitive contents (e.g. firmware update, watch table, ...), FTP and Telnet.



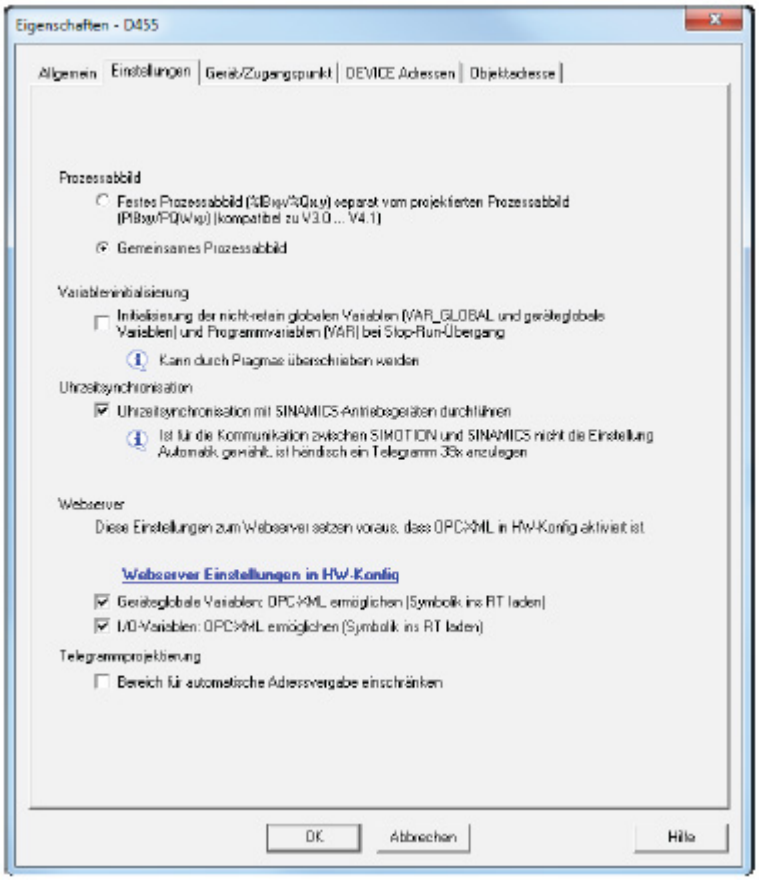
Setting the service selector switch to position "8" and an empty user database restores Security Level low. Using this method, the device can always be reset to Security Level low by hardware means.

Security Level high
High security with maximum access protection:
HTTP, HTTPS, FTP and Telnet have been deactivated via the project in the HW Config. Access to Ethernet via the various ports of the services is then no longer possible. The Web server cannot be used.

14.5 Calling HW Config from SCOUT

In SCOUT, you can go to the settings in HW Config via Device > Properties > Settings with the link Web server settings in HW Config.

New functions in SIMOTION V4.4



14.6 Summary of the changes

Standard websites / FTP / Telnet (TCI)

- There is no longer a standard password for HTTP(S), FTP and Telnet. If users and passwords have not been created, authentication via these services is not possible.
- The UserDataBase.xml file no longer contains any plain text passwords after power-up.
- The UserDataBase.xml files and the SSL key files are available as separate files.
- The "FTPUser" user group has been replaced by "Administrator".
- A user in the "Administrator" group is no longer affected by any restrictions set up below V4.4 (REALMs, BROWSABLE="false", ...). An administrator now always has full access to all data. With versions below 4.4, administrator group users could only access the data released for each user.

User-defined pages / JavaScript

- Standard pages have the file extension .mwsl, for example
  - Old: "INDEX.MBS"
  - New: "INDEX.MWSL"
- The HTTP authentication method is "Form-based authentication". The "Basic authentication" method is only used for backward compatibility reasons.
  - For all *.mbs and *.mcs files
  - For OPC XML-DA
- The applications for access to the file system via GET and POST requests (e.g. GET http://<IP>/FILES/myfiles.mwsl) and SERVERPAGES react to unauthorized access with the HTTP response "302 Object Moved" + login page instead of "401 Unauthorized".
- Changes in the WebCfg.xml file
  - Attribute "LOCALLINK" has been replaced by "ALIAS"
  - Complete files can no longer be stored in the WebCfg.xml in the form of the XML file system.
  - The "FILTER" attribute has been removed at the MIME_TYPES node.
- During the HTTP communication, an automatically selected BOUNDARY header must not contain a semicolon. The "945637143527273; charset=UTF-8" boundary used in the standard pages must be changed if it is used in user pages.
- If the BROWSEABLE attribute is set to "FALSE" for a directory, a user of the "Administrator" group can still "browse" the contents.

For standard websites / FTP / Telnet (TCI)

What do I do if I have not loaded a user administration to the controller before the project?

The simplest way with SIMOTION D is to activate the "Security Level low" with the service selector switch position 8 (see above).
A user administration can then be created or adapted with the standard website.
If this is not possible, the storage medium (CF card / MMC card) should be withdrawn and a suitable user administration stored on it with a USB reader.
For example, there is a commented-out user entry after the first power-up:
/USER/SIMOTION/HMICFG/UserDataBase/UserDataBase.xml

See Section 14.2

How do I create a user administration?
The simplest way is to create a user administration with the standard website.
It can then be loaded from the SIMOTION controller to the browser PC and therefore used several times.

See Section 14.2

For user-defined pages / JavaScript

Which files do I load to the memory card and where by means of FTP or a USB reader?
The files must be saved to the CF card as described in the "SIMOTION IT Virtual Machine and Servlets" Manual:

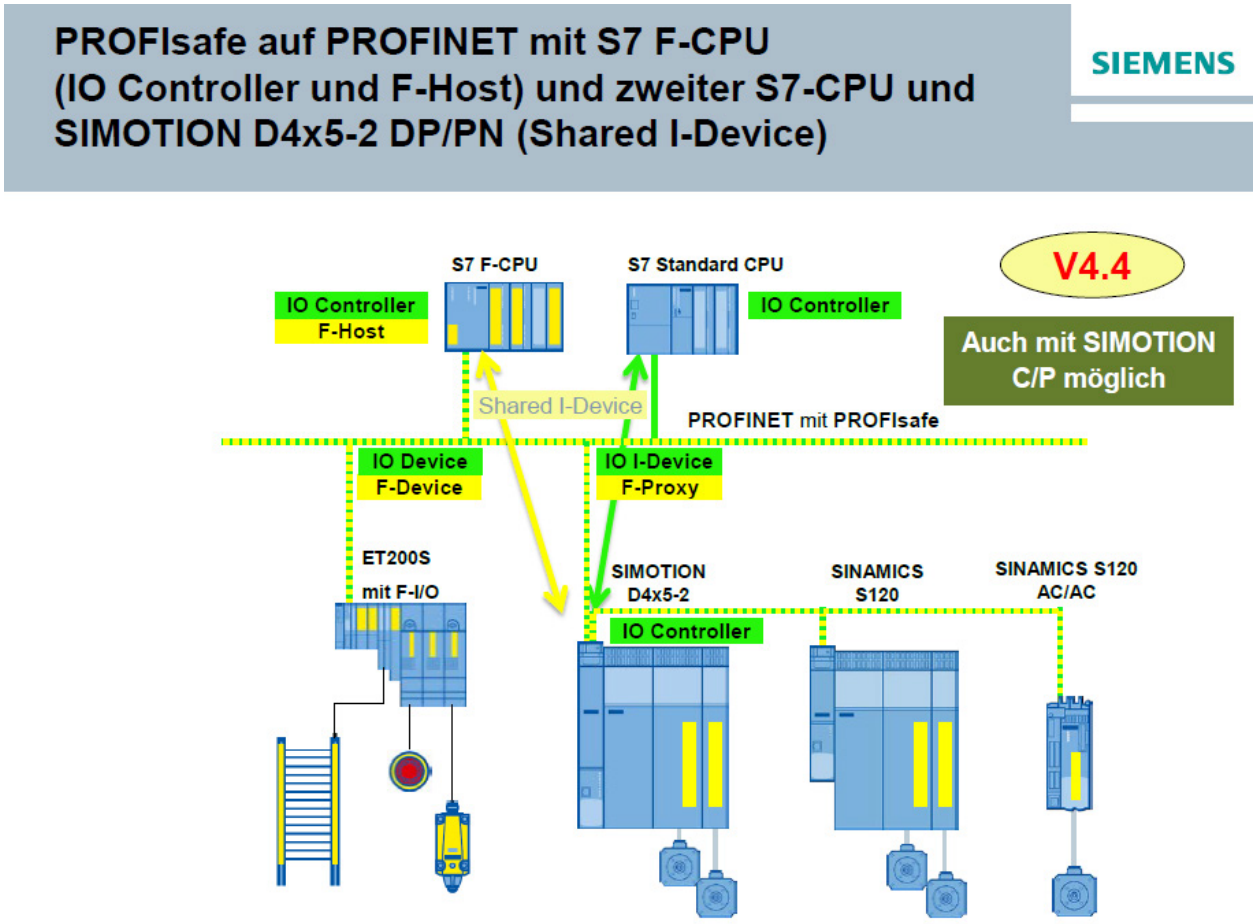
Page 14 - 3.2 SIMOTION IT servlets
/SIEMENS/SIMOTION/svltapi.jar
/SIEMENS/SIMOTION/svltimpl.jar
Page 15 - 4.1 SIMOTION IT virtual machine
/SIEMENS/SIMOTION/SIMOTION.JAR
Page 47 - 4.1.8.2 JamaicaVM configuration (VMCONFIG.INI)
/USER/SIMOTION/HMICFG/ VMCONFIG.INI
Page 65 - 4.2.5 Configuration file (JSERVER.XML)
/JSERVER.XML

What support is available when developing Java programs?
Page 18 - 4.1.5.8 Debugging Java programs
As of SIMOTION V4.2, remote debugging of Java programs is possible on the target system.
Page 60 - 4.1.15 Restart of JamaicaVM
http://<host>/JApp/jvmRestart
Page 70 - 4.2.7 Restart of the servlet container
http://<host><simotion-servlet-prefix>/admin?Action=StopContainer
http://<host>/JApp/jvmRestart

What happens if I have stored complete files in the WebCfg.xml?
At the first power-up of the Web server with the WebCfg.xml in the old format (V4.2/V4.3), the files are automatically written to the file system of the memory card and deleted from the WebCfg.xml. (/USER/SIMOTION/HMI)

15 PROFINET

Shared I-device



The I-device interface of SIMOTION can be defined as I/O device simultaneously on two higher-level PROFINET IO controllers (e.g. S7 CPUs). During the configuration, the I-device submodules of SIMOTION can be assigned separately to the respective higher-level CPU.
An important UseCase is the PROFINET IO communication of SIMOTION simultaneously with a standard automation CPU and a fail-safe CPU. SIMOTION as PROFIsafe proxy functions in the same way within a shared I-device configuration.

SIMOTION as PROFIenergy device
For all SIMOTION devices that have an I-device interface, there is an application interface available for the I-device interface with which Read/Write Data Record can be handled from the user program on the I-device.
A SIMOTION I-device can receive a data record via the user program from a higher-level controller and, upon request, send a data record to the higher-level controller.
The SIMOTION system function blocks _receiveRecord() and _provideRecord() are (for uniform appearance) based on the available SIMOTION system functions for

reading/writing data records (e.g. _readVariableRecord) and on the corresponding system function blocks of the SIMATIC SFB73 and SFB74.
The system function blocks are stored in the SCOUT command library in the Communication > Data transfer folder.

Odd send cycles for all RT devices
If previously there were I/O devices with RT class "RT" in an IRT sync domain, it was only possible to set "even" send cycles: 0.25, 0.5, 1, 2, 4 [ms].

Now "odd send cycles" can be configured in the IRT sync domain when RT devices are also connected. This function is only possible for SIMOTION D4x5-2 DP/PN IRT controllers on the integrated PN interface. Odd send cycles: 0.25, 0.5, 0.75, 1, 1.25 [ms] etc.

I&M data records 1 - 4
In addition to I&M data record 0 (electronic rating plate), SIMOTION now supports data records 1-4 as PROFINET I-device. Access to the user program via the SIMOTION user interface is not possible. The I&M data is defined for a device (I-device in this case) and is readable and writable when the I-device is used by a higher-level controller.
I&M data records:
- I&M0: Electronic rating plate
- I&M1: Location designation / higher level designation
- I&M2: Installation date
- I&M3: Description
- I&M4: Signature / additional information

The contents of I&M data records 1-4 can be configured in the I-device interface of SIMOTION via HW Config.

Increase in the PN-IO interface submodule size for SIMOTION D4x5-2 DP/PN and D410-2 DP/PN to 1024 bytes (consistent data)
In PROFINET, data for devices (and I-devices) and the controller-controller data exchange broadcast is structured as submodules. Only data from a submodule can be read or written consistently when "non-synchronized" with PROFINET RT or IRT. The maximum size for SIMOTION has been increased from 254 bytes to 1024 bytes. The size of the submodule depends on the hardware. The submodule size of 1024 bytes is only supported by the integrated PROFINET interface of SIMOTION D4x5-2 DP/PN (X150) and D410-2 DP/PN. The maximum submodule size of 254 bytes is retained for the C240 PN, P320-3, P350-3 and on the CBE30(-2).

IRT without isochronous mode
For SIMOTION, IRT is generally used with the isochronous mode. The engineering also permits IRT to be used on a network without isochronous data for the SIMOTION being exchanged on this network via the PN-IO interface.

Deactivation of Ethernet ports via HW Config

Individual ports of PN interfaces can be set to "Disable" in the engineering to prevent the impermissible connection of devices. The engineering system and the PN stack currently ensure that at least one port on each interface is not set to "Disable" to prevent the users locking themselves out.

PROFINET V2.3: Optimized data transfer / 125 µs PROFINET send cycle

All SIMOTION controllers with V4.4 Runtime support PROFINET according to PI specification PN V2.3.
For SIMOTION D455-2 DP/PN, the optional Performance Upgrade functionality is also available, which provides the following functional scope:

- Reduction of the minimum PROFINET send cycle of 250 µs to 125 µs (isochronous)
- Optimization of the data transfer (e.g. through Dynamic Frame Packing - DFP)
  Through optimized data transfer:
  – More devices can be operated with the same cycle time or
  – The cycle time can be reduced for the same number of devices

The following supplementary conditions must be satisfied to use the 125 µs send cycle:

- The 125 µs send cycle is only supported by the onboard PROFINET interface X150 in conjunction with Servo_fast/IPO_fast
- Only X150 port 1 can be used; ports 2 and 3 are deactivated (also for TCP/IP and UDP communication)
- X150 can only be used as a PROFINET IO controller (not as an I-device)
- No media redundancy MRP/MRPD (only one port is available on X150)
- The 125 µs send cycle is only supported by selected PROFINET nodes

Note
The "Performance Upgrade" functionality is available after SIMOTION release V4.4. It requires at least STEP 7 V5.5 SP4 and depending on the SCOUT version, an activation. PROFINET IO devices that support the Performance Upgrade for PROFINET with 125 µs cycle time will be available soon. The release of the functionality is planned for SIMOTION D455-2 DP/PN, as soon as the release for the ET200SP I/O system and the SINAMICS S120 drive system (CU320-2 with CBE25) is complete.

16 Hardware

16.1 SIMOTION D

The following new functions affect mainly the SIMOTION D and are described elsewhere in this document:

- Path interpolation for SIMOTION D410-2, see link
- SIMOTION D in the TIA Portal, see link
- Trace also for $Servo_{Fast}$/IPO_{Fast} (D435-2 DP/PN to D455-2 DP/PN), see link
- Optimization of restoring non-volatile SIMOTION data (flexible selection of data to be backed up), see link
- Improvement in the usability when downgrading via the service selector switch, see link
- New drive-based functions
  - S120M on D4x5-2/CX32-2, see link
  - PM240-2 for D410-2 and D4x5-2/CX32-2 via CUA31/32, see link
  - Support for SINAMICS Safety Integrated V4.7, see link
- New system variables / system functions (only for SIMOTION D410-2)
  - _cpuData.fanRpm / _cpuData.moduletemperature, see link
  - System variable _automaticRestart and system function _restart, see link
- Increase in the PN-IO interface submodule size for SIMOTION D4x5-2 DP/PN and D410-2 DP/PN, see link
- PROFINET V2.3: Optimized data transfer / 125 µs PROFINET send cycle for D455-2 DP/PN, see link

New CF cards

For reasons of availability, new 1 GB CF cards will be introduced with V4.4 for SIMOTION D410-2 and D4x5-2. The new CF cards are compatible with the previous CF cards.

CF card	Order number	
	Previously	As of V4.4
1 GB CF for D410-2	6AU1400-1PA22-0AA0	6AU1400-1PA23-0AA0
1 GB CF for D4x5-2	6AU1400-2PA22-0AA0	6AU1400-2PA23-0AA0

Supplementary interconnection options for X142 I/Os

ACTVAL
For digital outputs, ACTVAL corresponds to the **actual** terminal state of the digital output. If the terminal state differs from the **controlled** terminal state, there may be a short-circuit or fault of the output driver.
→ Such discrepancies can be detected via ACTVAL.

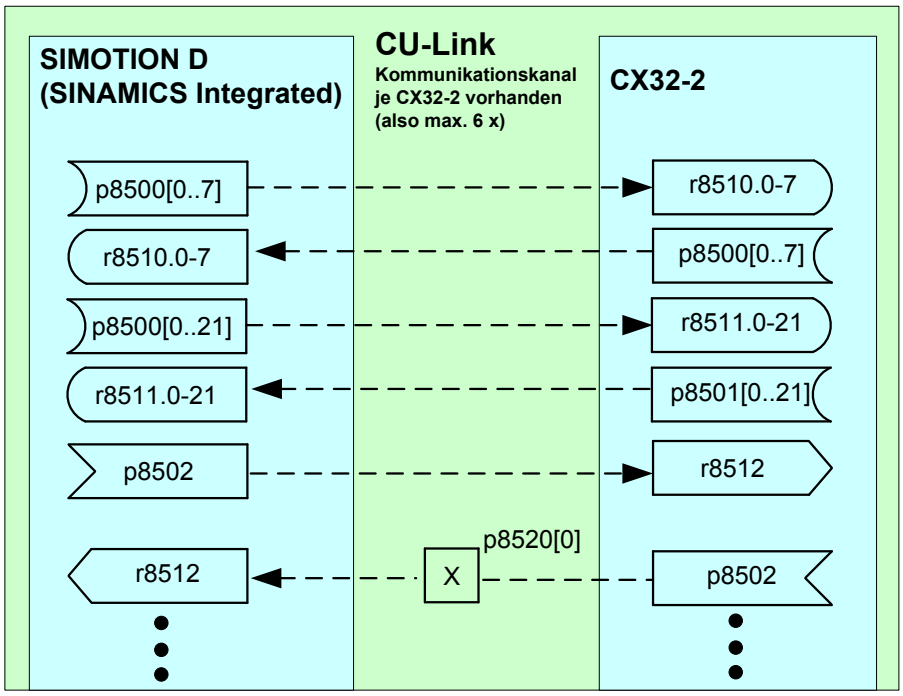
LEC
The LEC (Lost Edge Counter) counts the lost edges at a measuring input input.
If the capacity of the measuring input input (two edges per servo cycle or per measurement job) is exceeded, edges are lost.
Lost edges are edges that have to be measured according to the measurement job, i.e. the measurement job is active and the edge corresponds to the edge selection.
Lost edges can indicate that the measurement is faulty (contact bounce, faults, etc.).
Measurements can be checked for plausibility via LEC and, if required, rejected.

CU-Link

For communication between Control Unit SIMOTION D4x5−2 and Controller Extension CX32−2, not only PROFIBUS Integrated, but also a further fast communication channel is available.
This communication channel is called CU−Link. The data transfer is typically in the 125 µs cycle.
Previously, the CU-Link functionality was permanently set. For example, the Ready signal of an infeed on the SINAMICS Integrated was provided to a SIMOTION D on the CX32-2 Controller Extensions.
As of V4.4, the CU-Link can be parameterized individually. In this way, it is now possible to also provide the Ready signal of an infeed connected to a CX32-2 to the SINAMICS Integrated or another CX32-2.

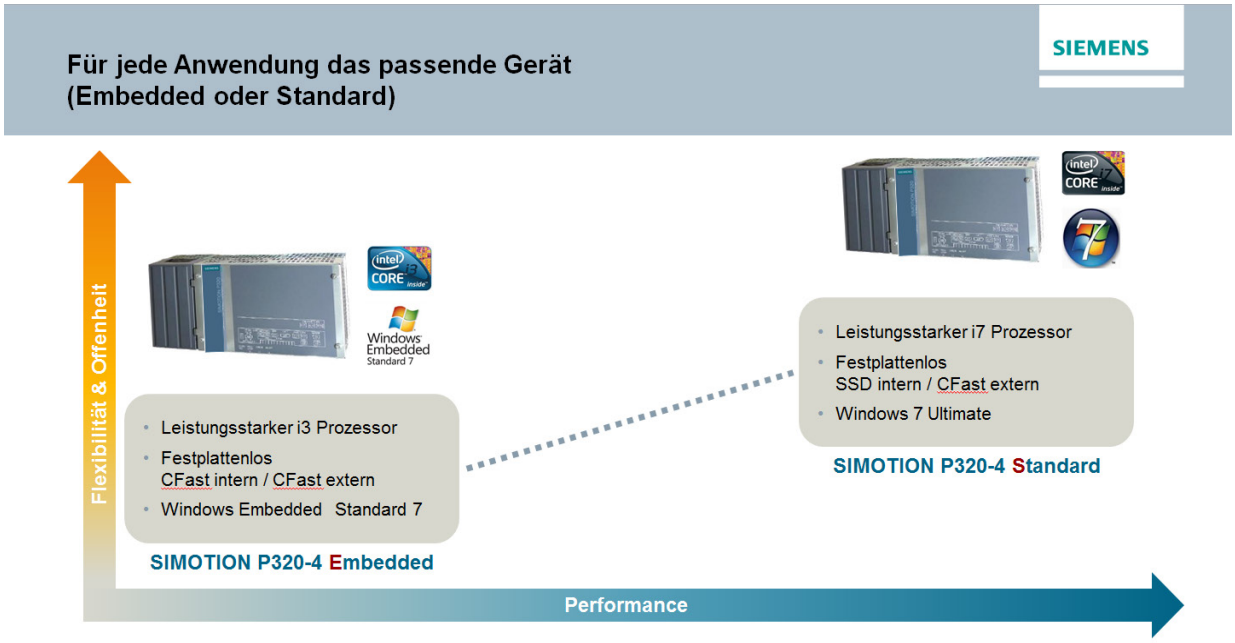
For further information, see the SIMOTION D4x5-2 Commissioning and Hardware Installation Manual 04/2014.

- Section 7.5.9 CU-Link (data transfer via DRIVE-CLiQ)
- Section 7.8.3 Using one infeed for several CUs



16.2 SIMOTION P320-4

With a subsequent hotfix of Version V4.4, the new SIMOTION PC-based hardware versions P320-4 Embedded and P320-4 Standard are released. The two versions replace the SIMOTION P320-3 and the P350-3. Depending on the box, the operating system is either Windows Embedded Standard 7 or Windows 7 Ultimate. Compared to the P350-3, the processor performance factor is at least 2 or 2.8.
Three PROFINET ports (onboard) are integrated in both versions. The IsoProfibus board can also be installed and operated for the appropriate applications. Each box has an extended PCI slot which can be used for extensions when required. The PCI slot is occupied when the IsoProfibus board is used.
The boxes can be used versatilely in cabinet installation. They are suitable for industrial use, are maintenance-free and have no moving parts such as hard disks or fans.



The P320-4 Embedded has two memory cards (CFAST→ successor to the CF card). One card can be accessed externally.
The P320-4 Standard has a Solid State Disk (SSD) as internal memory which significantly improves the performance of the box with the Intel i7 processor.
Both boxes can be operated headless (without a display). A wide range of SIMATIC panels is available for the visualization tasks.

17 ProjectGenerator SIMOTION easyProject

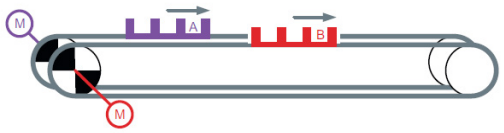
Basic functionalities required in practically every application can be integrated quickly and easily in a new or existing project with the aid of SIMOTION ProjectGenerator.

The ProjectGenerator can be found on the Utilities & Applications DVD (in the SCOUT V4.4 bundle).

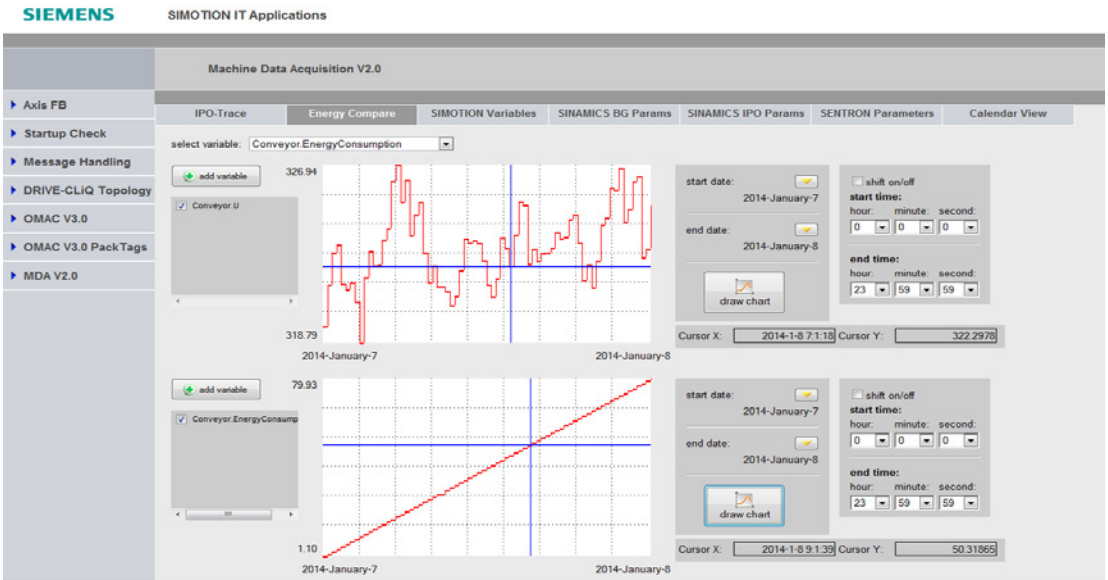
ProjectGenerator SIMOTION easyProject V1.3

Extensions:

- Integrated call in SCOUT V4.4
  New projects can be generated directly from SCOUT using the ProjectGenerator or arbitrary modules of the ProjectGenerator added to existing projects in SCOUT or updated with new versions of the modules.
- Multilingual dialogs in the ProjectGenerator
- Axis FB with TO-DO assignment on SINAMICS Integrated
- *Intelligent Belt V2* module with several belts and several stations



- *Machine data acquisition* module for recording of SIMOTION, SINAMICS and SENTRON parameters and long-term archiving on the memory card. Visualization via Web pages.



18 SIMOTION Utilities & Applications

The free-of-charge SIMOTION Utilities & Applications provide important information about SIMOTION, tools, special functions, blocks and SIMOTION sample projects as well as ready-to-use standard applications for demonstration purposes or use in your projects.

New contents of the SIMOTION Utilities & Applications V4.4

Applications

ProjectGenerator

The ProjectGenerator SIMOTION easyProject has been significantly extended and is now available in Version 1.3.

Converting

The sample applications for Flying saw, Cross cutter, Winder and Traversing drive have been updated.

Packaging

The Carton packer and Intelligent belt applications have now been completely integrated in the ProjectGenerator SIMOTION easyProject. The integration in a project is performed completely by the ProjectGenerator and therefore the individual packages are no longer available separately. The associated documentation is still available on the respective linked information pages.
In this context, the documentation for the LPac packaging library and for the Weihenstephaner Standards is also available for the production data acquisition.

Industry-wide solutions

The LCom library has been updated to Version 1.2.3.

The applications Axis function block, DPV1 services, Message handling, Modular machine, Cam creation, OMAC V3.0, SIMOTION run-up test and Machine energy acquisition have now been completely integrated in the ProjectGenerator SIMOTION easyProject. The integration in a project is performed completely by the ProjectGenerator and therefore the individual packages are no longer available separately. The associated documentation is still available on the respective linked information pages.

Examples

The Getting Started sample projects have been revised.

The programming examples for various SIMOTION functions and system functions have been updated.

FAQs

The FAQ for upgrading to a new SIMOTION version has been updated.

The FAQ for Going ONLINE and the FAQ for Torque coupling with SIMOTION/SINAMICS have been revised.

The FAQ for Scripting under Windows 64-bit has been included.

Scripts

Remarks and notes on the procedure for scripting with SIMOTION SCOUT TIA have been included.

Scripts for the commissioning support of SINAMICS drives in Version V1.0.1 have been added.

The Activate/deactivate axis simulation script has been extended and is available in Version 1.1.2. A brief description is also available for this script.

The report scripts have been corrected and extended and are available in Version 1.3.0.

The "Export/import of selected project data" script has been updated to Version 1.1.1 to correct errors.

The script for testing the Ethernet connection to a SIMOTION device has been corrected to Version V2.1.0.

The script libraries have been supplemented:

- New: ConversionLibrary with methods for data conversion.
- New: EnvironmentLibrary to identify the system environment.
- New: FileSystemLibrary with simple file system operations.
- The DialogLibrary has been extended.
- The HasPropertyLibrary has been extended.
- The IsTypeOfLibrary has had errors corrected.
- The LoggingLibrary has been changed and extended.
- The SortingLibrary has been extended.

SIMOTION IT

The Web Trace Viewer has been updated to Version 2.3.

In the SIMOTION IT example for the data exchange via OPC XML, the link to the required WSDL file has been added.

Siemens AG
Industry Sector
I DT MC PMA
Frauenauracher Str. 80
D-91056 Erlangen, Germany
Fax: +49-9131-98-1297
E-mail:
tech.team.motioncontrol@siemens.com