WinCC Communication to S7-1500, S7-1200 and ET 200SP

SIMATIC WinCC V7.2 or higher

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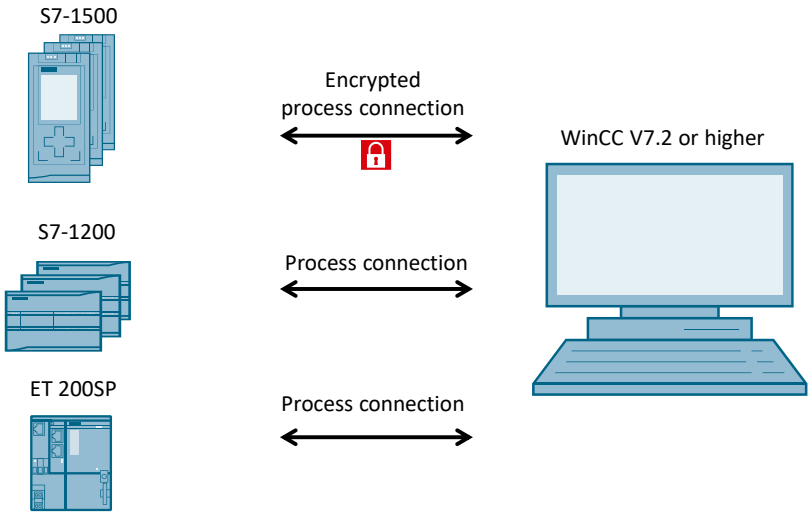
Figure 1-1



Introduction

This application example shows how the S7-1200, S7-1500 and ET 200SP can transfer tags and messages to WinCC. In addition, a secure connection is established between the S7-1500 and the HMI.

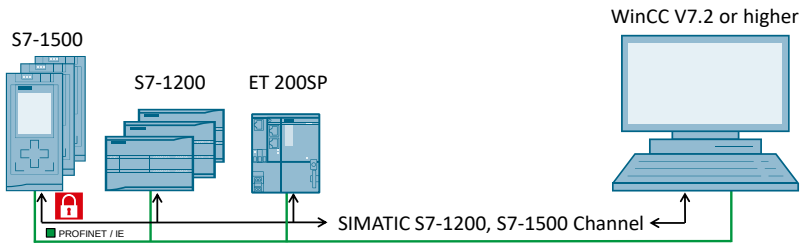
2 Solution

2.1 Overview

Configuration

The diagrammatic representation below shows the most important components of the solution.

Figure 2-1



Description

To communicate with each other, the devices use the "SIMATIC S7-1200, S7-1500 Channel" communication channel. SIMATIC WinCC V7.2 or higher provides this channel. Communication is based on TCP/IP.

Depending on the version used, the channel provides the following functionalities. All lower-version functions are also included in higher versions.

Depending on the WinCC version used, individual dialogs / tabs might have a different appearance.

WinCC V7.2

- Communication of the S7-1200[1], S7-1500 and ET 200SP with WinCC single-user systems.
- Establishment of a secure communication connection between WinCC and the S7-1500 (not possible for S7-1200 and ET 200SP).
- Absolute access to AS symbolic addresses of the automation system.
- Different channel diagnosis options.
- SIMATIC S7-1200: 32 connections
- SIMATIC S7-1500: 16 connections

WinCC V7.3 SE

- Absolute and symbolic access to AS symbolic addresses and messages of the controller (for single-user and multi-user systems).
- "Read from AS" functions that allow the user to read and apply the AS symbols with optimized block access.
- System messages (S7-1500 only)
- Chronological messaging (program alarm)

[1] Firmware version V2.2 or higher

WinCC V7.4

- "Update" function that allows the user to synchronize project changes on the controller side with WinCC.
- "WinCC SysDiagControl" ActiveX control for system diagnostics in Runtime.
- Increases the maximum number of connections possible to:
  - SIMATIC S7-1200: 32 connections
  - SIMATIC S7-1500: 128 connections
- System tag for "Check connection" and "Disconnect connection".
- Raw data communication
  Is raw data supported for communication between WinCC and controllers of the S7-1200 / S7-1500 family?

WinCC V7.4 SP1

- SIMATIC S7-1200: up to 64 connections
- Supports full-text alarms – in the same way as WinCC Runtime Professional V14
- Supports the S7-1500 software controller (S7-1507S)
  For more information, please refer to the following application example:
  Joint Operation of WinCC V7 or WinCC V14/15 RT Prof. and Software Controller
- Offline import of configuration data from TIA Portal for absolute and symbolic addresses
- Setting the prefix / suffix as the default value for tags for each connection
- Automatic update of S7-1500 messages

WinCC V7.5

- System tags are created with a click:
  - "Check connection"
  - "Disconnect connection"
- Direct connection of structured data types (e.g., array)

WinCC V7.5 SP1

- Redundant connection to S7-1500H
- Stopping Logging via System Tags

WinCC V7.5 SP2

- Connecting UDT-Derived DBs Directly as a Structure
- Secure Communication with TLS-protocol (as of update 4)

Special aspects

Optimized access to AS symbolic addresses and controller alarms is provided to you by the online connection to the controller. The offline configuration is possible for absolute addresses. V7.4 SP1 or higher allows 'offline configuration without CPU connection' also for symbolic access.

The maximum number of connections possible is limited by the available system resources and their performance data, particularly CPU, RAM and Ethernet connection.

See FAQ:
Which quantity framework must you pay attention to for communication between an S7-1200 or S7-1500 controller and WinCC Runtime Professional?

Supported data types

The communication channel supports the following data types:

- Binary tag
- Signed 8-bit value
- Unsigned 8-bit value
- Signed 16-bit value
- Unsigned 16-bit value
- Signed 32-bit value
- Unsigned 32-bit value
- IEEE 754 32-bit floating-point number
- IEEE 754 64-bit floating-point number
- Text tag 8-bit character set
- Text tag16-bit character set (V7.3 or higher)
- Date and time format (V7.3 or higher)
- Raw data tag as byte array (V7.4[2] or higher)

Other communication features

- Cyclic reading of tags
- Time synchronization
- Export and import function
  - Export of tags from TIA Portal (for symbolic addressing and messages when running WinCC V7.4 SP1 or higher)
  - Import into WinCC using WinCC Configuration Studio

Scope

This application example does not include a description of:

- Configuration of the S7-1200, S7-1500 and ET 200SP in TIA Portal
- Installation of SIMATIC TIA Portal STEP 7 Professional and WinCC

Basic knowledge of these topics is required.

[2] Maximum data block length: 8000 bytes

Required knowledge

Basic knowledge of SIMATIC WinCC (V7.2 or higher) and
TIA Portal STEP 7 Professional (V13 SP1 or higher) is required.

Sample files and projects

The following table contains all files and projects that are used in this application example.

Table 2-1

Component	Note
101908495_WinCC_S71200_S71500_Channel_V2_en.pdf	This document.

3 Configuration and Project Engineering for WinCC V7.3 SE

This chapter describes how to read AS symbols with symbolic addressing and messages from the controller using WinCC V7.3 SE with the "SIMATIC S7-1200, S7-1500 Channel" and how to apply them to WinCC as tags and messages.

In addition, it illustrates how to handle project changes on the controller side.

Validity

This chapter is valid for:

- STEP 7 V13 or higher
- WinCC V7.3 SE
- S7-1200 (firmware version V2.2 or higher)
- S7-1500
- ET 200SP

Components used

This chapter was created with the following components.

Hardware components

Table 3-1

Component	No.	Order no.	Note
S7-1516-3 PN/DP	1	6AG1516-3AN00-7AB0	Alternatively, you can use a different S7-1500, S7-1200 or ET 200SP.
Development system	1	-	PC to configure the controller and WinCC. The hardware requirements for STEP 7 and WinCC apply.

Software components

Table 3-2

Component	No.	Order no.	Note
WinCC V7.3 SE	1	6AV63.1-....7-3...	-
TIA Portal STEP 7 V14 SP1 Professional	1	6AV2103-0AA04-0AA5	Alternatively, TIA Portal STEP 7 V14 SP1 Basic can be used for an S7-1200.

3.1 Loading AS symbols from an existing S7-1500 program

The following section describes how to establish secure communication with optimized block access with the controller's address range in SIMATIC WinCC using the "SIMATIC S7-1200, S7-1500 Channel" communication channel. To this end, you read and apply the AS symbols (tags) using the new "Read from AS" functionality.

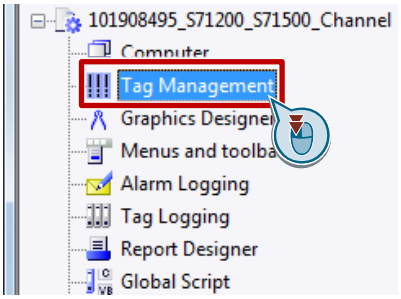
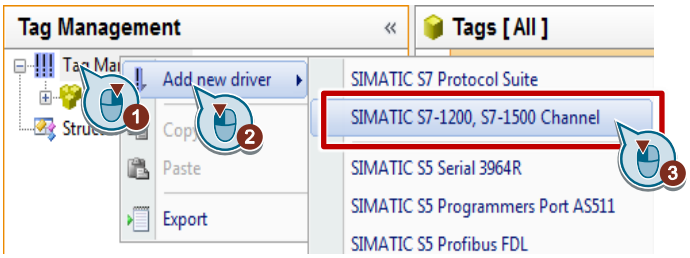
Note

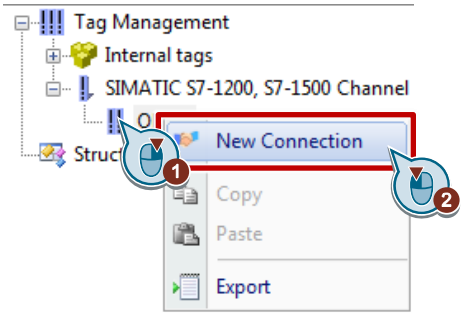
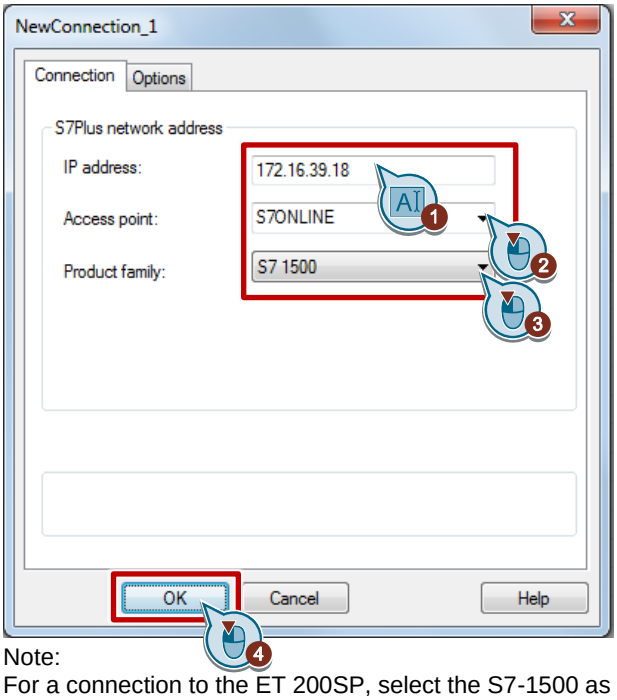
You can only read AS symbols whose access rights are enabled for SIMATIC WinCC. Otherwise, SIMATIC WinCC would not find them.

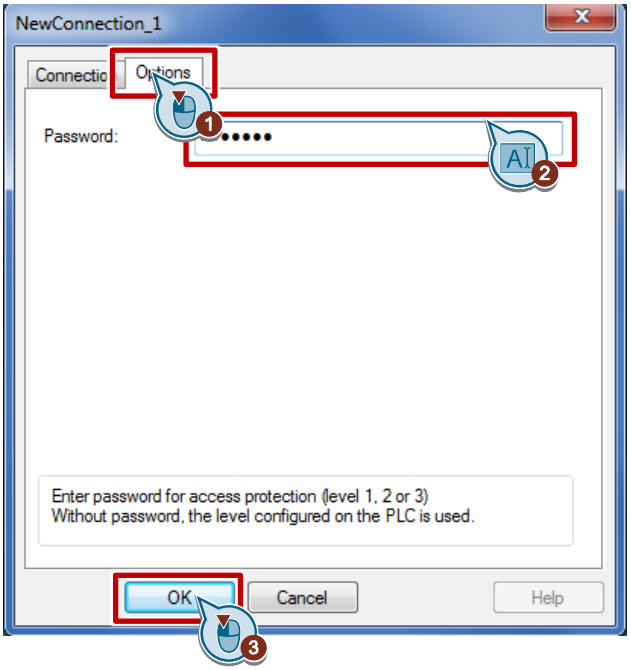
Check your PG/PC interface settings to ensure proper communication. To do this, follow the instructions from the following video:

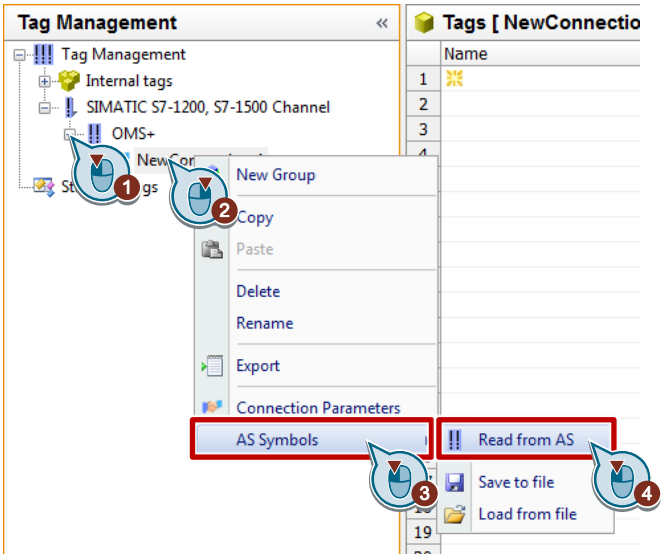
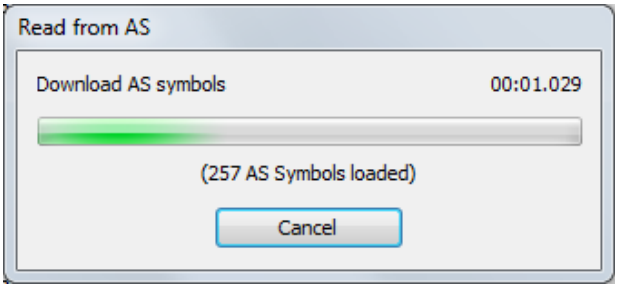
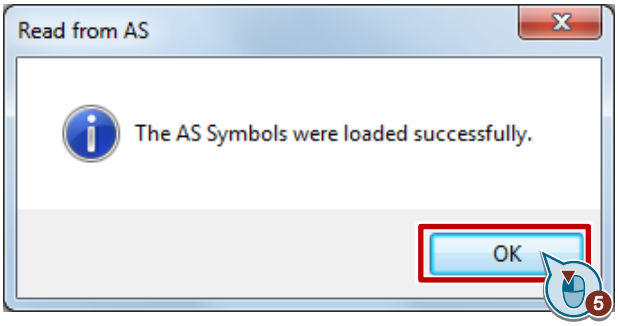
"Why is the connection from WinCC to the S7 controller not established via TCP/IP?"

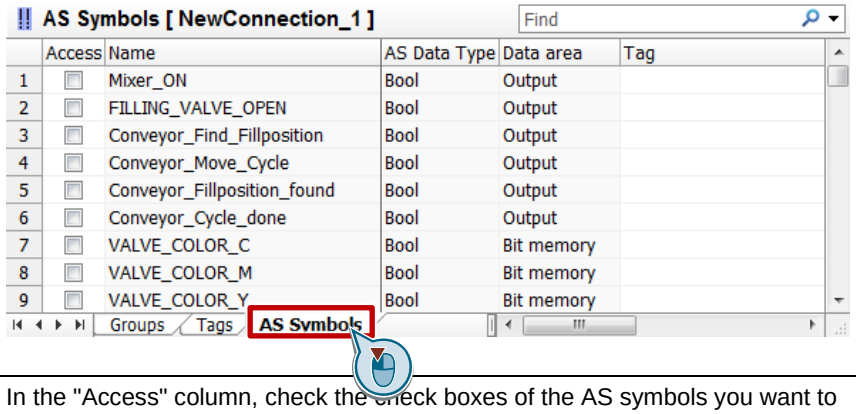
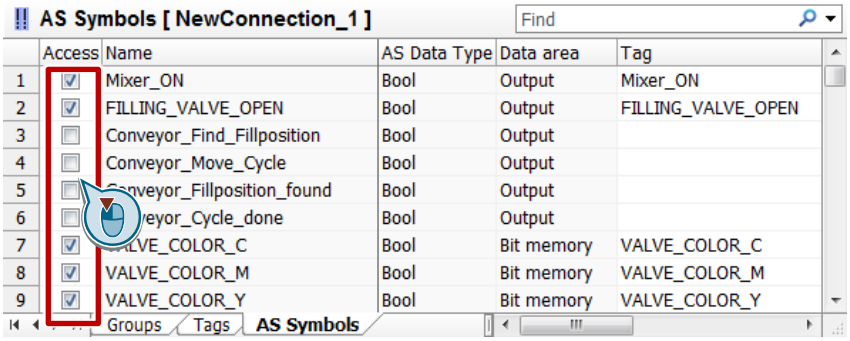
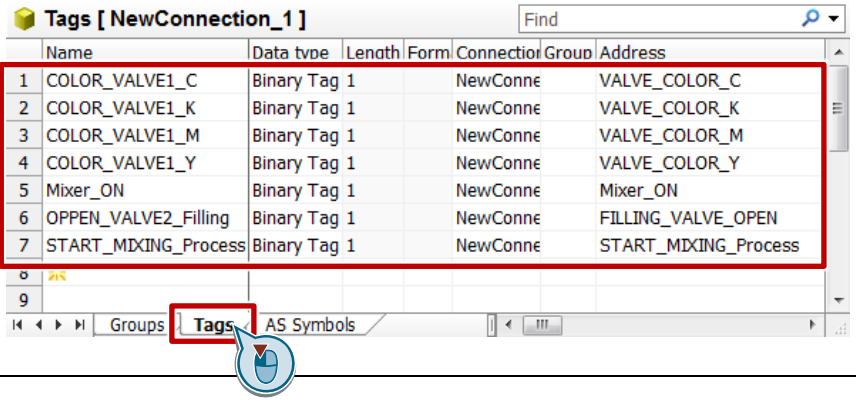
Table 3-3

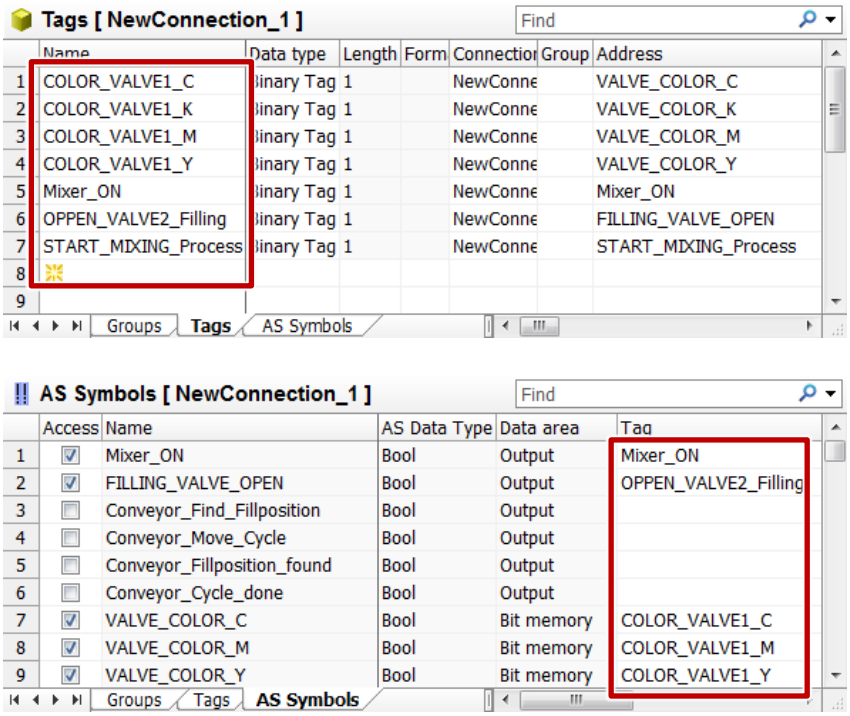
No.	Action
1.	Create a new WinCC project or open an existing one.
2.	In the WinCC Explorer project tree, open Tag Management. 
3.	In the Tag Management context menu, select "Add new driver > SIMATIC S7-1200, S7-1500 Channel" to add a new driver. 

No.	Action
4.	In the OMS+ channel context menu, select the "New Connection" button to add a new connection. 
5.	In the associated context menu, click "Connection Parameters" of the "NewConnection_1" connection. Enter the connection parameters shown below.  Note: For a connection to the ET 200SP, select the S7-1500 as the product family in step 3.

No.	Action
6.	Optional: If you want to establish a secure connection to the S7-1500, add a password in the "Options" tab. In TIA Portal, select the CPU properties, go to "Protection & Security" and specify the password. This is only required for the "No access (complete protection)" setting. **Note** Only the S7-1500 provides access protection. For more information on access protection, please refer to the "Configuring access protection for the CPU" chapter of the "S7-1500 – Getting Started" manual. In TIA Portal, access protection for the CPU is configured in the "Protection & Security" tab of the CPU properties. 
7.	Start WinCC Runtime.

No.	Action
8.	In the connection context menu, select "AS Symbols" > "Read from AS" to read the AS symbols.  The symbols will be read.  After the AS symbols have been successfully read, the following message appears. Select "OK" to confirm. 

No.	Action
9.	Go to the "AS Symbols" tab. This tab lists the AS symbols of the controller that have been read. 
10.	In the "Access" column, check the check boxes of the AS symbols you want to apply to WinCC Tag Management. WinCC automatically creates associated WinCC tags with symbolic addressing. 
11.	The "Tags" tab now displays the WinCC tags and their properties. 

No.	Action
12.	Optional: You can change the tag names of the generated WinCC tags in the "Tags" and "AS Symbols" tabs. 

Tags [NewConnection_1]

	Name	Data type	Length	Form	Connection	Group	Address
1	COLOR_VALVE1_C	inary Tag	1		NewConne		VALVE_COLOR_C
2	COLOR_VALVE1_K	inary Tag	1		NewConne		VALVE_COLOR_K
3	COLOR_VALVE1_M	inary Tag	1		NewConne		VALVE_COLOR_M
4	COLOR_VALVE1_Y	inary Tag	1		NewConne		VALVE_COLOR_Y
5	Mixer_ON	inary Tag	1		NewConne		Mixer_ON
6	OPPEN_VALVE2_Filling	inary Tag	1		NewConne		FILLING_VALVE_OPEN
7	START_MIXING_Process	inary Tag	1		NewConne		START_MIXING_Process
8							
9							

Groups | **Tags** | AS Symbols

AS Symbols [NewConnection_1]

	Access	Name	AS Data Type	Data area	Tag
1	☑	Mixer_ON	Bool	Output	Mixer_ON
2	☑	FILLING_VALVE_OPEN	Bool	Output	OPPEN_VALVE2_Filling
3	☐	Conveyor_Find_Fillposition	Bool	Output	
4	☐	Conveyor_Move_Cycle	Bool	Output	
5	☐	Conveyor_Fillposition_found	Bool	Output	
6	☐	Conveyor_Cycle_done	Bool	Output	
7	☑	VALVE_COLOR_C	Bool	Bit memory	COLOR_VALVE1_C
8	☑	VALVE_COLOR_M	Bool	Bit memory	COLOR_VALVE1_M
9	☑	VALVE_COLOR_Y	Bool	Bit memory	COLOR_VALVE1_Y

Groups | Tags | **AS Symbols**

The tag name is composed as follows:

"DataArea_BlockName_ItemName"

In the table, the separators are converted as follows ("," or "-" in the item name remain unchanged).

Figure 3-1

Access	Name	AS Data	Data area	Tag
☑	Static1	UInt	Data_block_1	Data_block_1_Static1
☑	Static_2	UInt	Data_block_1	Data_block_1_Static_2
☑	Static.3	UInt	Data_block_1	Data_block_1_Static_3
☑	Static,4	UInt	Data_block_1	Data_block_1_Static,4
☑	Static-5	UInt	Data_block_1	Data_block_1_Static-5
☑	Static 6	UInt	Data_block_1	Data_block_1_Static_6

Notes

Execute the "Read from AS" command again if there are any project changes regarding the controller.

If WinCC Runtime is stopped and Tag Management is closed, symbolic addressing and the "AS Symbols" tab will no longer be displayed. To display both again in Tag Management, use the "Read from AS" command.

3.2 What's new for AS messages

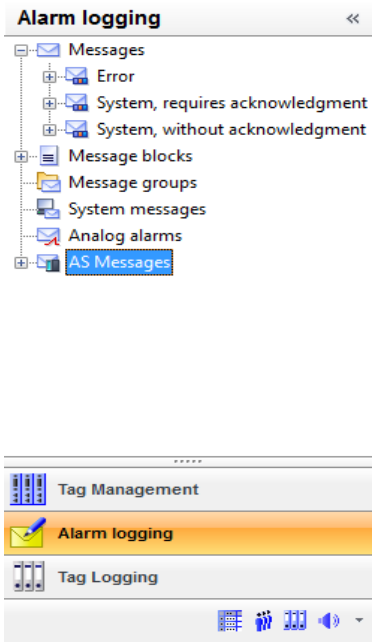
The following section shows you how to read AS messages from the controller and how to apply them to your WinCC project, including the associated message texts.

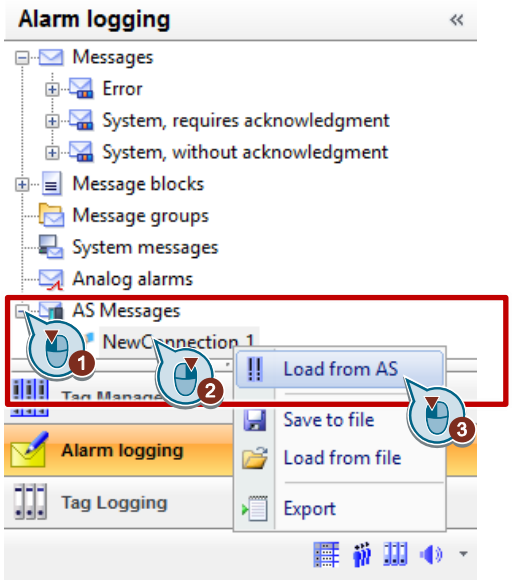
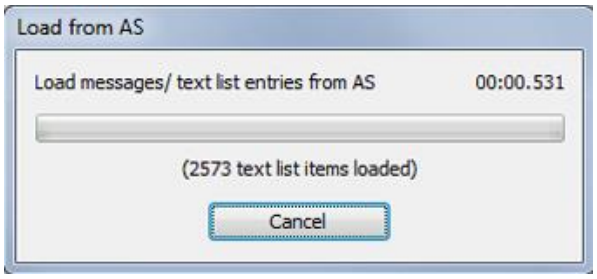
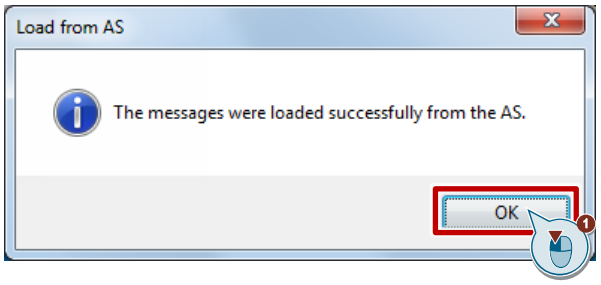
Note

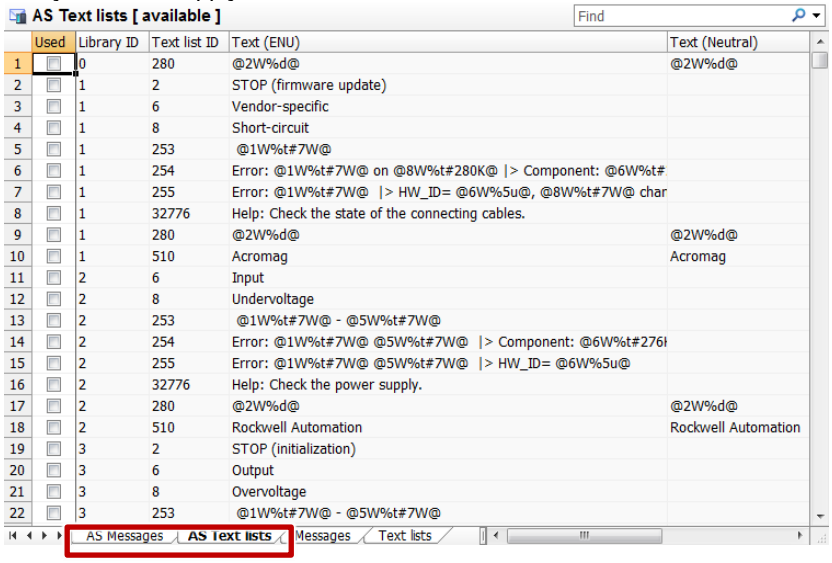
Only the S7-1500 can load AS messages.

The message length must be limited to a maximum of 400 characters.

Table 3-4

No.	Action
1.	Open the "Alarm logging" editor. 

No.	Action
2.	In the project tree, go to "AS Messages and open your S7-1500 connection. Use the "Load from AS" command to import the messages of the CPU. 
3.	 

No.	Action
4.	In the "Used" column, check the check boxes of the AS symbols and text lists you want to apply. 

Alarm class configuration

When loading AS messages of a SIMATIC S7-1500, WinCC automatically assigns the messages to an alarm class/alarm type with an appropriate setting.

Table 3-5

STEP 7		WinCC acknowledgment philosophy		
Acknowledgment		**"incoming" acknowledgment**	"outgoing" acknowledgment	"outgoing" without status
No acknowledgment		"incoming" acknowledgment	"outgoing" acknowledgment	"outgoing" without status
No acknowledgment	**Information only**	"incoming" acknowledgment	"outgoing" acknowledgment	**"outgoing" without status**

Bold = applicable

Not bold = not applicable

Note

The alarm classes in TIA Portal should be matched to the alarm classes in WinCC Configuration Studio, if possible. After importing, this makes it easier to assign them in WinCC Configuration Studio.

It is useful to color code the alarm types ("incoming", "outgoing", ...). As a result, the alarm type can be assigned more quickly and easily, e. g. in the AlarmControl.

3.3 Effects of project changes in the controller

If you modify the project on the controller side, you have to reload the AS symbols and messages using the context menu or the import function. In this case, the properties of the AS symbols and messages are compared to the properties from the WinCC project.

If the AS symbol names or symbolic addresses do not match, the "AS Symbols" tab will be highlighted in red. If the AS messages have changed, they will be silhouetted in red in the "AS Messages" tab. Tooltips with information on possible causes are displayed.

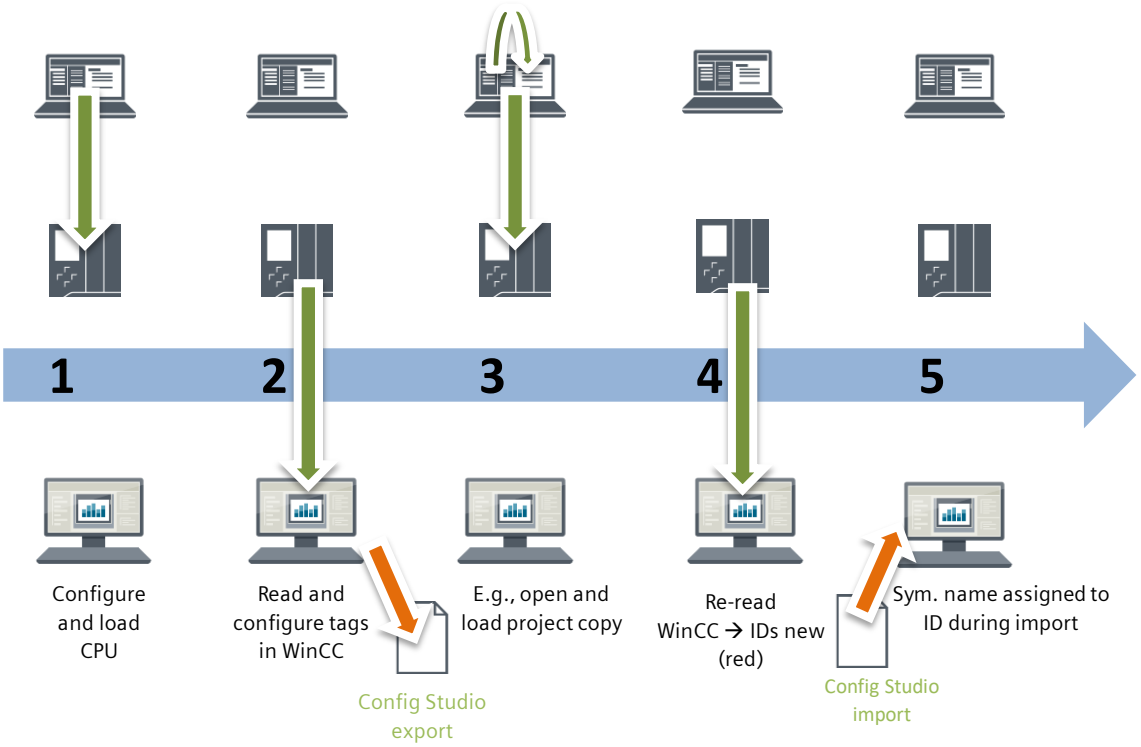
Note TIA Portal automatically generates the symbolic addresses of the AS symbols. They depend on the associated AS symbol properties. Due to symbolic access, address changes in the CPU program do not affect the symbolic address.

Option in the event of a changed tag ID in WinCC V7.3 SE

The "Update" function 4.2 is not available in WinCC V7.3 SE. The assignment can be restored using the "Export / Import" function of WinCC Configuration Studio.

Note This kind of "updating" is only possible if you have performed the export operation before changing the project on the controller side.

Figure 3-2



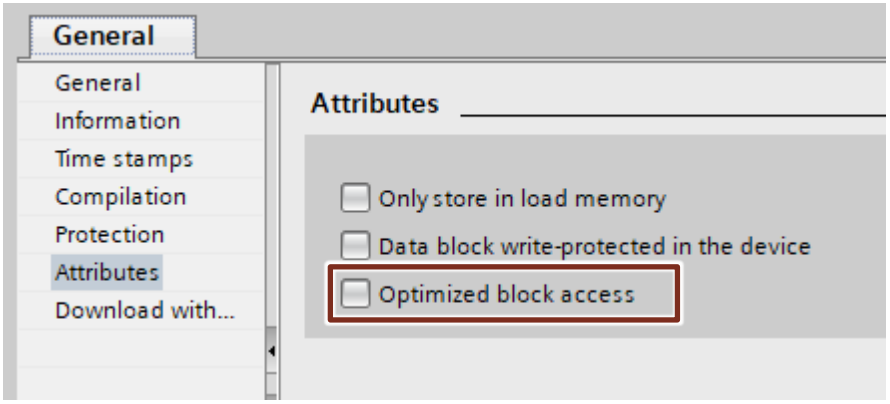
1. The CPU has been configured and loaded.
2. Tags have been read and configured in WinCC. Export created in WinCC Configuration Studio at the connection level or a higher level.
3. Project change on the controller side, e. g. project copy, has been opened and loaded.
4. AS symbols are re-read in WinCC =>IDs are new (red)
5. All symbolic names are assigned to the ID during the import process and thus updated.

3.4 Connection with absolute addressing

WinCC V7.2 or higher allows you to use the "SIMATIC S7-1200, S7-1500 Channel" communication channel to establish communication with non-optimized blocks:

In TIA Portal, go to the block properties and uncheck the "Optimized block access" check box in the "Attributes" tab.

Figure 3-3



To get the absolute address (offset), compile the block in TIA Portal.

Figure 3-4

		Name	Data type	Offset	Start value
1		Static			
2		Static_1	DWord	0.0	16#0
3		Static_2	DWord	4.0	16#0
4		Static_3	DWord	8.0	16#0

Note

As soon as you make changes to the block (e. g., another input), the offset will no longer be displayed. After recompiling, you can read it again.

		Name	Data type	Offset	Start value
1		Static			
2		new_Static	Bool	...	false
3		Static_1	DWord	...	16#0
4		Static_2	DWord	...	16#0
5		Static_3	DWord	...	16#0

For more information on creating tags, please refer to the following manual:

WinCC V7.2: Communication > Configuring the tags

Import / export with TIA Portal

Note

- When running V7.4 SP1 or lower, this operation is only possible with absolute addressing.
- Symbolic addressing can be exported when running V7.4 SP1 or higher.

The following restrictions exist:

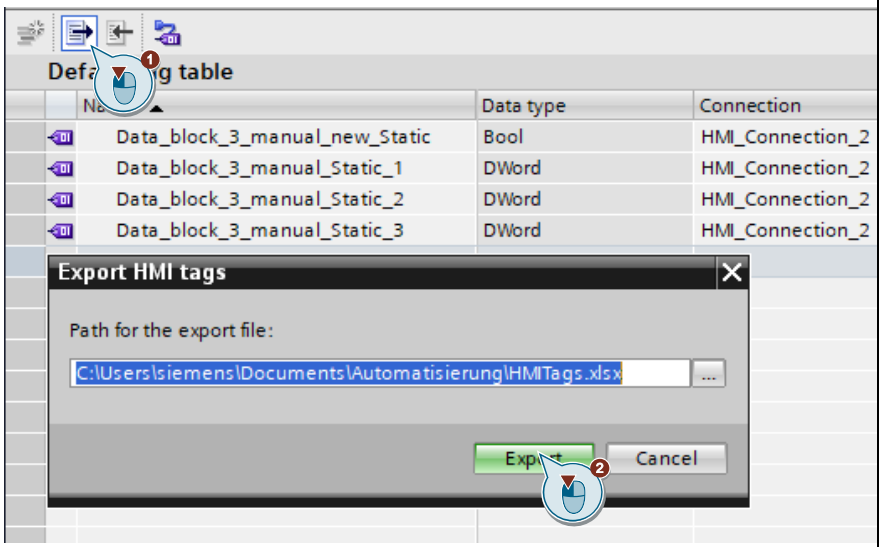
- No side-by-side installation with WinCC Professional (TIA Portal)
- No measurement archives
- No chronological messages

The tag export or import consists of two steps:

- Exporting the tags from TIA Portal
- Importing the data using WinCC Configuration Studio

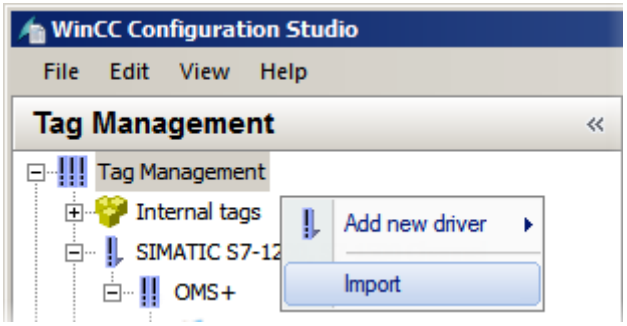
How to export tags

Table 3-6

No.	Description
1.	Create a new DB in TIA Portal and disable optimized block access.
2.	Compile the block to get absolute addressing (offset).
3.	Create a dummy HMI project (e. g., Basic Panel).
4.	Use drag and drop to move the block to a screen and change the access mode from "symbolic" to "absolute".
5.	Click the "Export" button to export the HMI tags. 

How to import tags

Table 3-7

No.	Description
1.	In WinCC Configuration Studio, create an S-1200, S7-1500 channel for your CPU. The connection name must be the same as in the export file.
2.	Import the TIA Portal export file. 

Note

In WinCC V7.3 SE / WinCC V7.4, you should use either "absolute addressing" or "symbolic addressing".

Absolute addressing allows only the offline import / export operation. If the symbolic addresses are read using the "Read from AS" function, you have to create the absolute addresses manually.

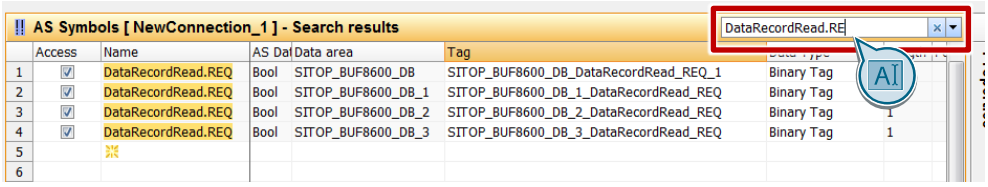
3.5 Better overview of a large number of tags

For a better overview of AS symbols, there are various options to customize the views. The methods described below make it easier to handle AS symbols and tags.
In addition, e.g., prefixes can be used to combine structures.

Search

The "Search" function allows you to limit the displayed AS symbols or tags to desired areas.

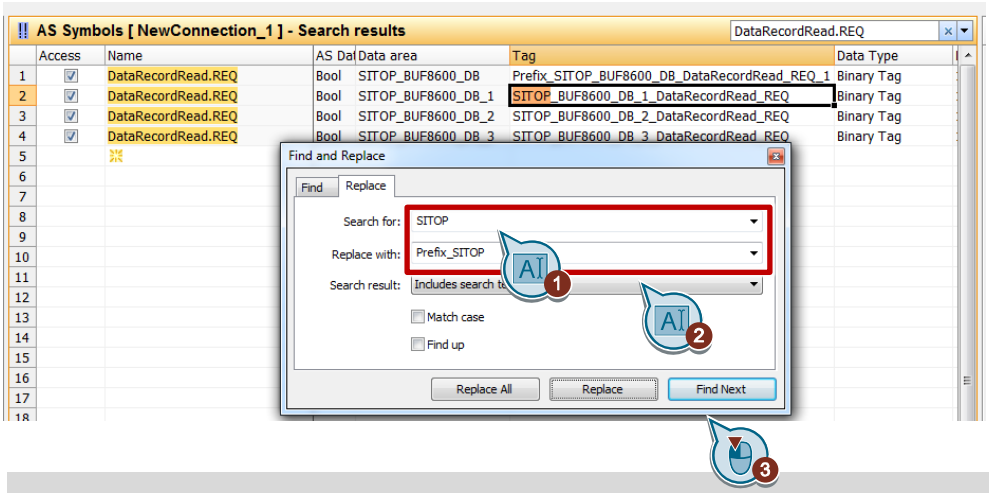
Figure 3-5



Find & Replace

The "Find and Replace" function allows you to include, e.g., prefixes for certain blocks or structures in the name. As a result, you can define new search terms that you can use to create your desired overviews for each search.

Figure 3-6



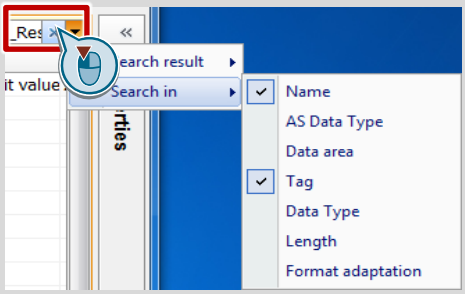
Note

After re-reading the tags, all the changes made by the "Find and Replace" function have been overwritten and may have to be made again.

When running WinCC V7.4 SP1 or higher, you can set Prefix / suffix for tags 5.1 as the default value instead of the "Find & Replace" function.

Note

The default setting of the search in WinCC Configuration Studio is limited to the "Name" column. "Search in" allows you to customize the settings.



4 Configuration and Project Engineering for WinCC V7.4

This chapter shows system diagnostics and the "update" options when project changes are made on the controller side.

You can still use the procedures for AS symbols and AS messages described in WinCC V7.2 and V7.3 SE.

Validity

This chapter is valid for:

- STEP 7 V13 or higher
- WinCC V7.4
- S7-1200 (firmware version V2.2 or higher)
- S7-1500
- ET 200SP

Components used

This chapter was created with the following components.

Hardware components

Table 4-1

Component	No.	Order no.	Note
S7-1516-3 PN/DP	1	6AG1516-3AN00-7AB0	Alternatively, you can use a different S7-1500, S7-1200 or ET 200SP.
Development system	1	-	PC to configure the controller and WinCC. The hardware requirements for STEP 7 and WinCC apply.

Software components

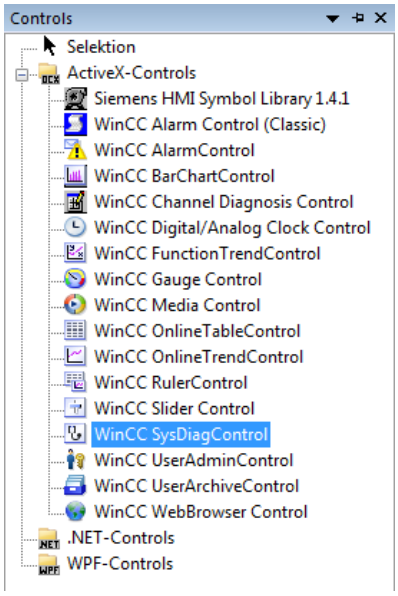
Table 4-2

Component	No.	Order no.	Note
WinCC V7.4	1	6AV63.1-....7-4...	-
TIA Portal STEP 7 V14 SP1 Professional	1	6AV2103-0AA04-0AA5	Alternatively, TIA Portal STEP 7 V14 SP1 Basic can be used for an S7-1200.

4.1 System diagnostics

SIMATIC WinCC V7.4 or higher provides the "WinCC SysDiagControl" ActiveXControl for system diagnostics. You will find this control in the Graphics Designer's "Controls" toolbar.

Figure 4-1



For more information on the configuration, please refer to the WinCC V7.4: Communication manual.

The "WinCC SysDiagControl" shows faults and errors of the SIMATIC S7-1200 and S7-1500 controllers. It provides an overview, which enables you to quickly locate error sources.

The ActiveXControl provides the following views:

- Diagnostic overview
  Shows the status of the controller and its submodules for all available SIMATIC S7-1200/S7-1500 channels.
- Detail view
  Displays information about the selected controller.
- Diagnostic buffer view
  Displays current data from the controller's diagnostic buffer. Messages are only displayed if the AS messages are loaded from the controller and applied to WinCC.

Figure 4-2

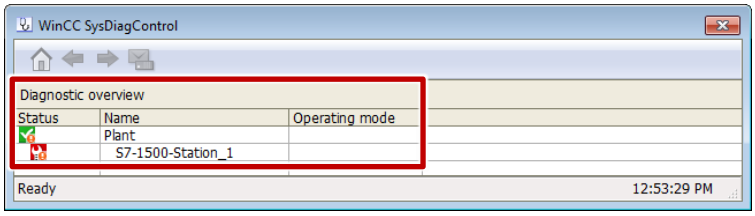
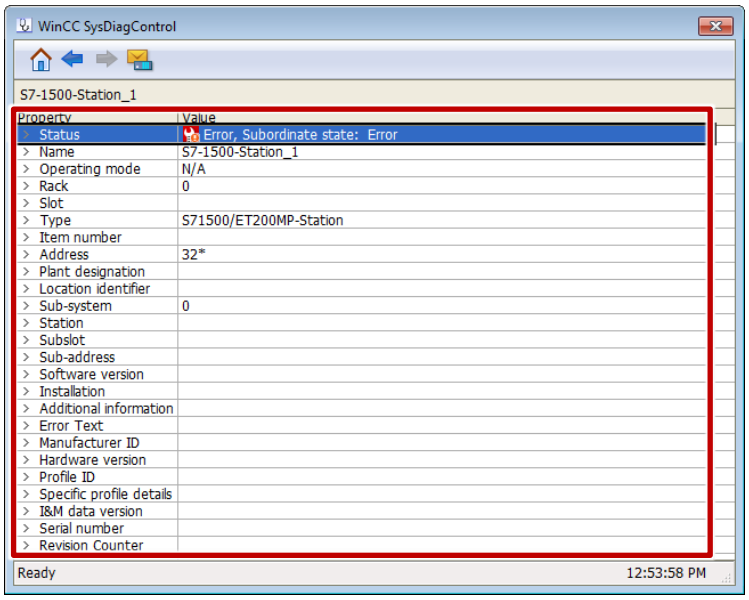


Figure 4-3



Note

The current data from the diagnostic buffer must be loaded using the "Diagnostic buffer" menu item ( ). The buffer is not loaded automatically.

C or VBScript (run, e.g, by clicking a button) allows you to jump from an AS message selected in the WinCC AlarmControl to the WinCC SysDiagControl. To do this, the AS message must already have been loaded from the controller and applied to WinCC as messages.

```
In C:
SetPropChar(lpszPictureName,"<Name_SysDiaControl>").","NavigateTo",
GetPropChar(lpszPictureName,"<Name_AlarmControl>","DiagnosticsContext"));

In VBS:
ScreenItems("<Name_SysDiaControl>").NavigateTo =
ScreenItems("<Name_AlarmControl>").").DiagnosticsContext
```

Note

Toggling between the controls using a script is only possible for system messages.

For more information on this and on how to configure the control, please refer to the WinCC V7.4: Communication manual.

4.2 "Update" function

SIMATIC WinCC V7.4 provides the "Update" function. After project changes on the controller side, symbolic addresses can change. The "Update" function re-reads the AS configuration. In addition, it restores consistency by reassigning the symbolic addresses to the AS symbol names. The AS symbol name is used as a reference.
To use the function, the AS symbols and messages must already have been read and applied as a WinCC tag or WinCC messages.

Note

"Update" function not possible

Access rights changed
If you disable the access rights of AS symbols, they can no longer be accessed by WinCC. As a result, "updating" is no longer possible. If you subsequently re-read the AS configuration, the WinCC tags will be silhouetted in red.

Tags_CMYK_RGB_Convert

		Name	Datentyp	Adresse	Rema...	Sichtbar in HMI	Erreichba...
1		RECIPE_RGB_CONVERT_R	Int	%MW48			
2		RECIPE_RGB_CONVERT_G	Int	%MW44			

AS symbol name changed
The "Read AS symbols" function is based on the AS symbol name. If you change the AS symbol name and then re-read the AS configuration, "updating" is no longer possible.
The changed AS symbol name is available in WinCC as a new AS symbol and you have to apply it as a new WinCC tag. Delete the unused WinCC tag in the "Tags" tab.

For the following project changes on the controller side, the symbolic addresses of the AS symbols will change. Use the "Update" function.

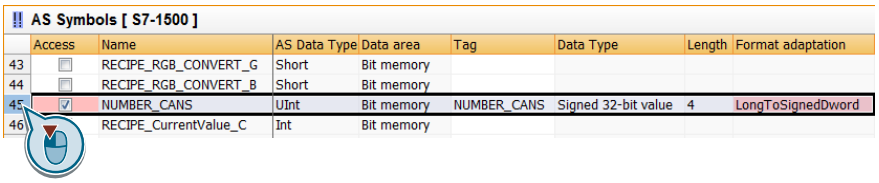
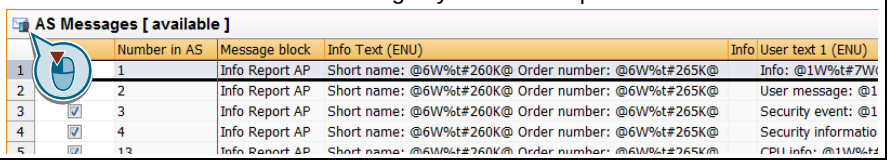
- The current CPU program has been replaced by an identical CPU program (or parts of it) from the reference project (project copy) and reloaded to the controller.
- Change of the data type of a CPU tag (also in the DB).

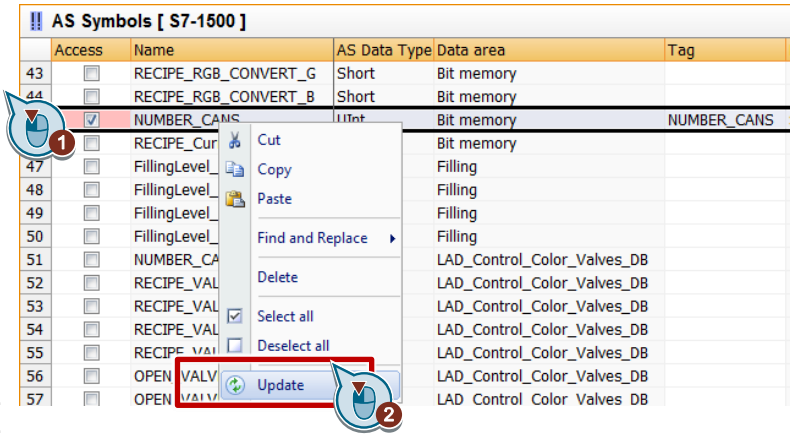
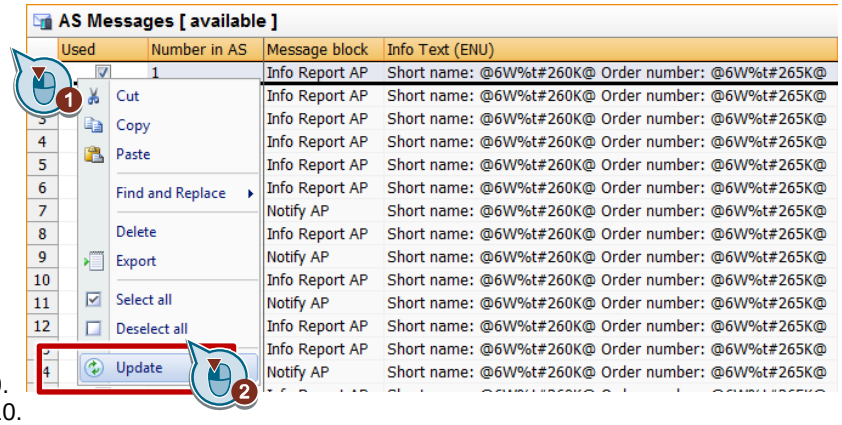
Note

WinCC performs automatic data type formatting between CPU data types and HMI data types. If you change the data type of a CPU tag, a data type change might affect the tag's points of use. Make sure to make any necessary changes.

The following table shows how to update your WinCC tags and WinCC messages.

Table 4-3

No.	Action
1.	**For AS symbols:** Open Tag Management and re-read the AS symbols. Then go to the "AS Symbols" tab. **For messages:** Open "Alarm logging" and re-read the AS messages. Then go to the "AS Messages" tab.
2.	**For AS symbols:** 1. Select the rows of the AS symbols you want to update.  **For messages:** 2. Select the rows of the AS messages you want to update. 

No.	Action
3.	**3. For AS symbols:** 4. Update the AS symbol using the "Update" button in the associated context menu.  5. 6. **7. For messages:** 8. Update the AS message using the "Update" button in the associated context menu.  9. 10.

4.3 Connection-specific tags

In order to monitor the state of the connection to the S7-1500, the following two @system tags are available.

- "@<ConnectionName>@ForceConnectionState"
- "@<ConnectionName>@ConnectionState"

"@<ConnectionName>@ForceConnectionState" tag

In the connection, create the "@<ConnectionName>@ForceConnectionState" tag to define the connection state between a WinCC station and S7-1200 / S7-1500:

- "1": Connecting.
  If you configure "1" as the start value, starting Runtime establishes the connection to the S7-1200 / S7-1500.
- "0": Disconnecting.

For the tag to be initialized when starting Runtime, assign an "absolute address" to the tag. In addition, this tag must not be a binary tag.

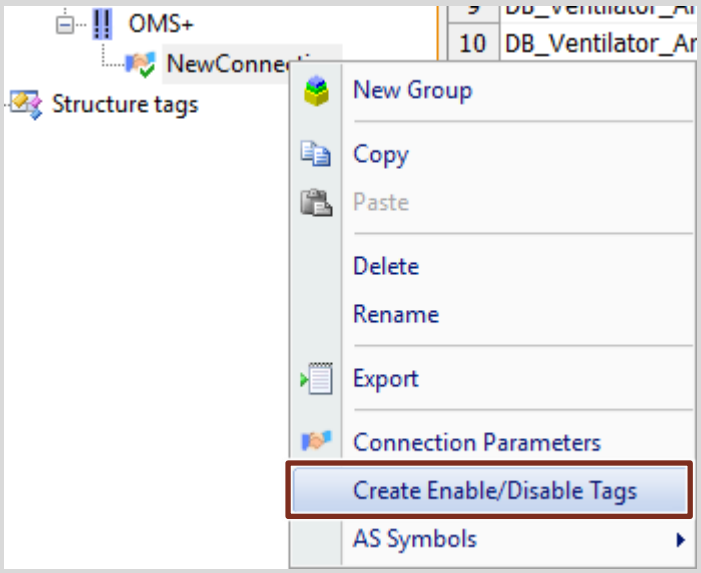
"@<ConnectionName>@ConnectionState" tag

Use the connection-specific "@<ConnectionName>@ConnectionState" tag to determine the current connection state:

- "1": The connection is ready.
- "0": The connection is interrupted or disconnected.

Note

WinCC V7.5 or higher allows you to create these tags with a click in the context menu of each connection.



5 Configuration and Project Settings for WinCC V7.4 SP1

This chapter describes how to import configuration data offline and how to specify the prefix / suffix as the default value.

You can still use the procedures for AS symbols and AS messages described in WinCC V7.2, V7.3 SE and V7.4.

Validity

This chapter is valid for:

- STEP 7 V14 or higher
- WinCC V7.4 SP1
- S7-1200 (firmware version V2.2 or higher)
- S7-1500
- ET 200SP

Components used

This chapter was created with the following components.

Hardware components

Table 5-1

Component	No.	Order no.	Note
S7-1516-3 PN/DP	1	6AG1516-3AN00-7AB0	Alternatively, you can use a different S7-1500, S7-1200 or ET 200SP.
Development system	1	-	PC to configure the controller and WinCC. The hardware requirements for STEP 7 and WinCC apply.

Software components

Table 5-2

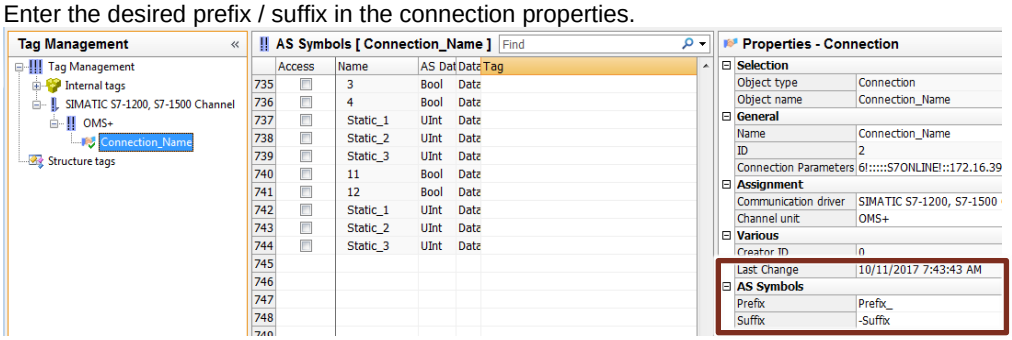
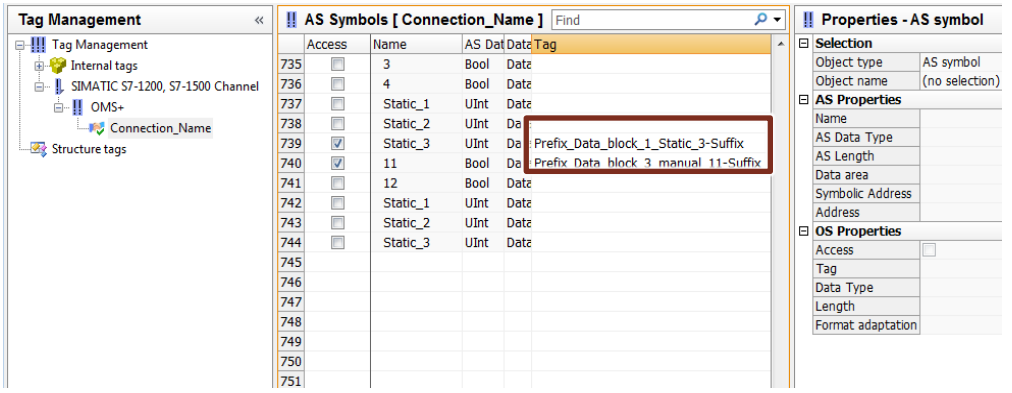
Component	No.	Order no.	Note
WinCC V7.4 SP1	1	6AV63.1-....7-4...	-
TIA Portal STEP 7 V14 SP1 Professional	1	6AV2103-0AA04-0AA5	Alternatively, TIA Portal STEP 7 V14 SP1 Basic can be used for an S7-1200.

5.1 Prefix / suffix for tags

This section describes how to set the prefix/suffix as the default value for tags for each connection.

Procedure

Table 5-3

No.	Action
1.	In Configuration Studio, go to Tag Management and select the connection for which you want to create a prefix or suffix.
2.	Enter the desired prefix / suffix in the connection properties.  The prefix / suffix will be displayed exactly like you specify it, i.e., it must include the desired separators.
3.	Now go to "AS Symbols" > "Read from AS" to read the AS symbols.
4.	Check the "Access" check box to create a tag with a prefix and/or suffix. 

Note

If you want to subsequently use a prefix or suffix for tags that have already been used, you have to uncheck the "Access" check box and check it again.

Alternatively, you can use the "Find & Replace" function to assign prefix and suffix.

Notes

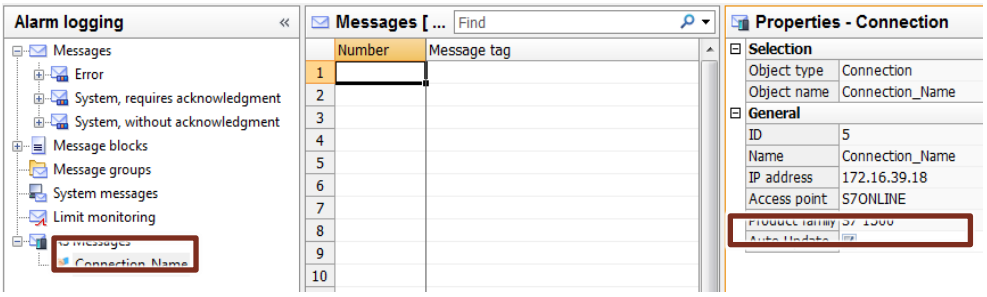
If changes are made to the controller, it is absolutely necessary to execute the "Read from AS" command again.

If WinCC Runtime is stopped and Tag Management is closed, symbolic addressing and the "AS Symbols" tab will no longer be displayed. To display both again in Tag Management, use the "Read from AS" command.

5.2 What's new for AS messages

When running WinCC V7.4 SP1 or higher, S7-1500 messages can be applied automatically after message changes. To enable this, check the "Auto Update" check box at the connection level in "Alarm logging".

Figure 5-1



Note

If you have already read the AS messages manually using "Read from AS", first delete the read messages in WinCC. Then you can check the "Auto Update" check box to ensure that the messages are not duplicated.

5.3 Offline import of configuration data for absolute and symbolic addresses

When running WinCC V7.4 SP1 or higher, the "SIMATIC SCADA Export for TIA Portal" tool allows you to perform an offline import of AS tags and AS messages from TIA Portal to WinCC.

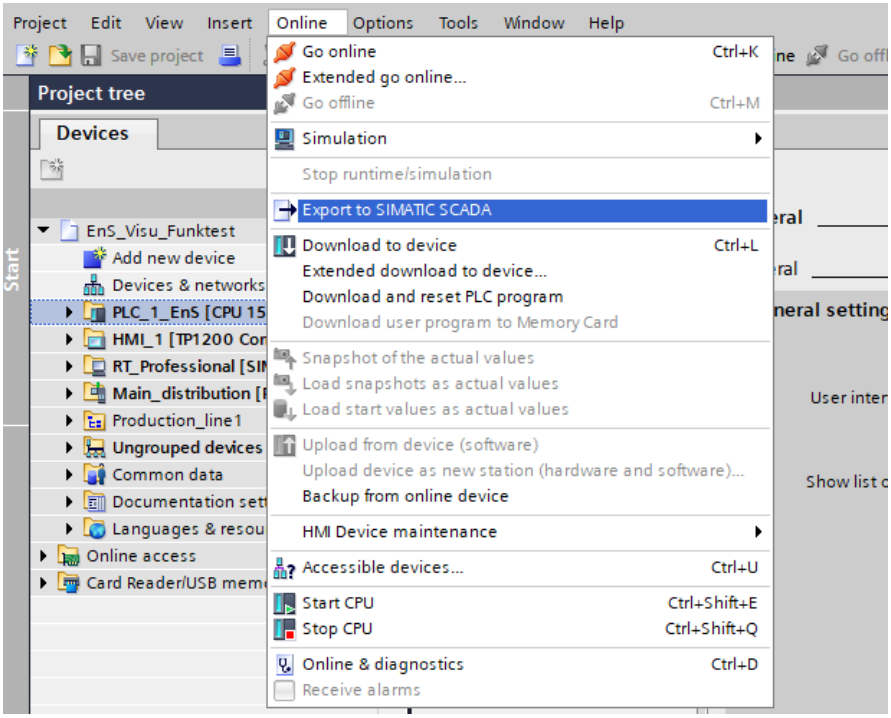
This tool is not part of the general setup. You can download the version-specific version in the following entry:

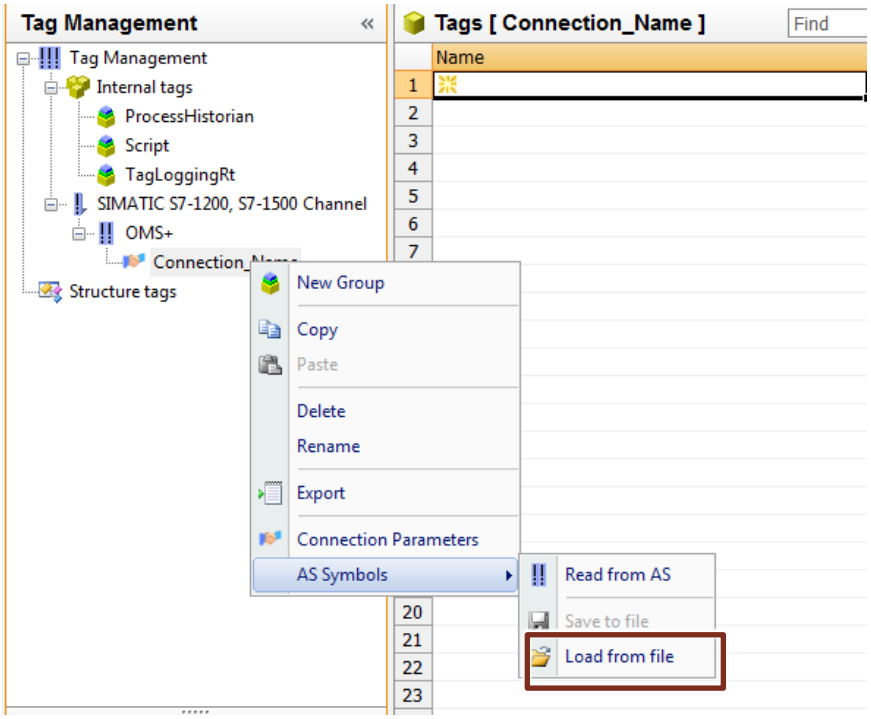
SIMATIC SCADA Export for TIA Portal

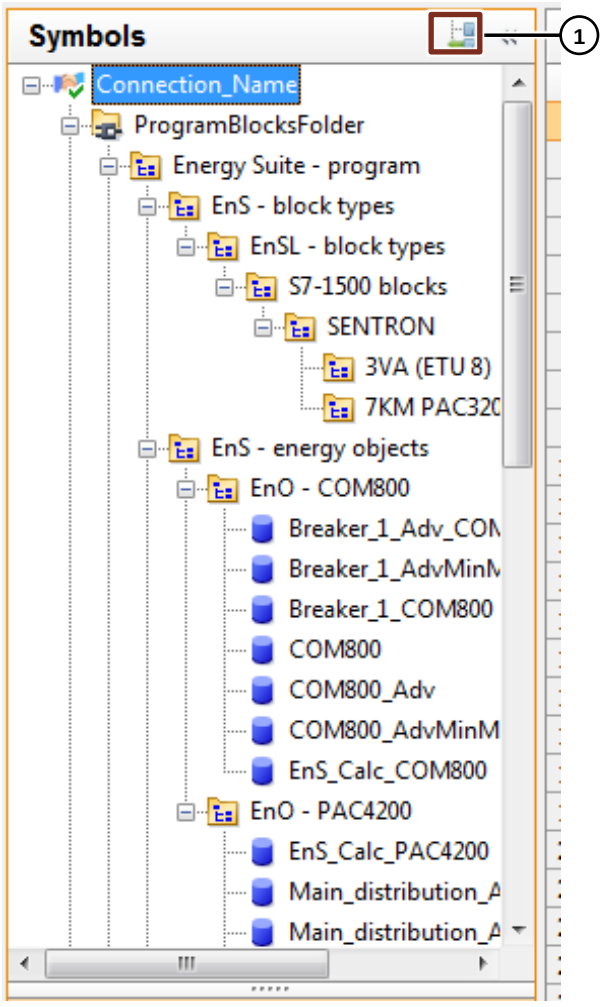
Note This tool exports and imports all AS tags and AS messages. It is not possible to select single tags and/or messages.

Procedure

Table 5-4

No.	Action
1.	In TIA Portal, open your project with the S7-1500 CPU to be exported.
2.	Select your CPU and select "Online" > "Export to SIMATIC SCADA". 
3.	Enter a name for the file to be exported and specify the storage path.
4.	Click the "Export" button. The file is exported.
5.	In WinCC Explorer, open your project into which you want to import the S7-1500 CPU data.
6.	In WinCC Configuration Studio, open "Tag Management".
7.	If a connection does not yet exist for the CPU, create the channel and the connection. See Chapter Loading AS symbols from an existing S7-1500 program 3.1

No.	Action
8.	Select the connection. In the context menu, select "Load from file" to import the data. 
9.	Open he storage path of the export file and select the "TIA Portal Export File (*.zip)" format so that you can select the "*.zip" file.

No.	Action
10.	Then click the "Load from file" button. The AS symbols are displayed and the button (1) allows you to return to the tags. 

6 Configuration and Project Engineering for WinCC V7.5

You can still use the procedures for AS symbols and AS messages described in WinCC V7.2, V7.3 SE, V7.4 and V7.4 SP1.

Validity

This chapter is valid for:

- STEP 7 V15 or higher
- WinCC V7.5
- S7-1200 (firmware version V2.2 or higher)
- S7-1500
- ET 200SP

Components used

This chapter was created with the following components.

Hardware components

Table 6-1

Component	No.	Order no.	Note
S7-1516-3 PN/DP	1	6AG1516-3AN00-7AB0	Alternatively, you can use a different S7-1500, S7-1200 or ET 200SP.
Development system	1	-	PC to configure the controller and WinCC. The hardware requirements for STEP 7 and WinCC apply.

Software components

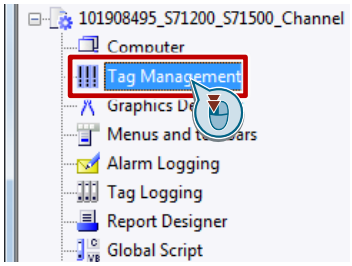
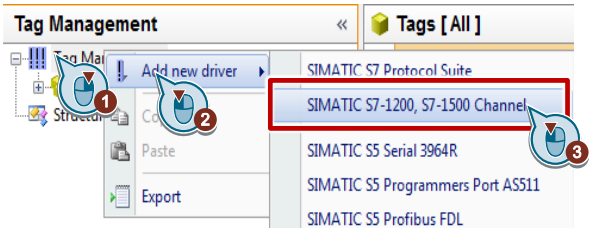
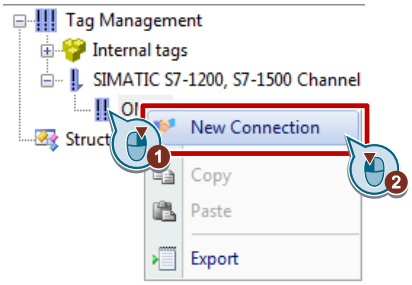
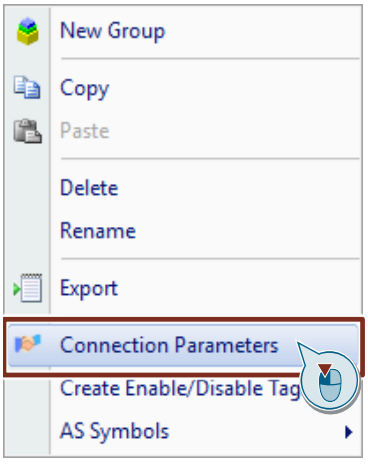
Table 6-2

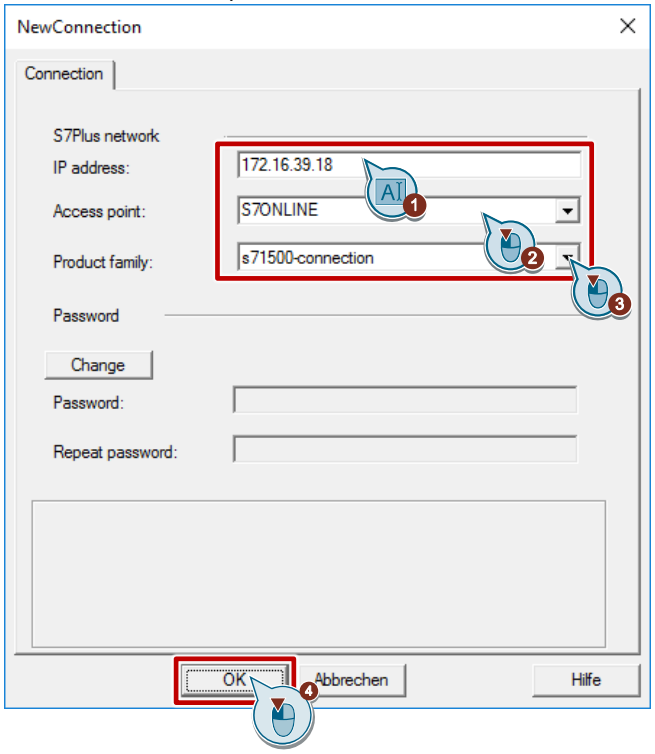
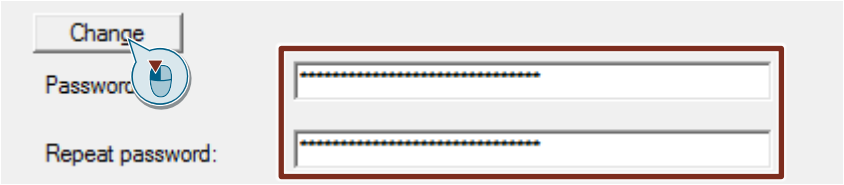
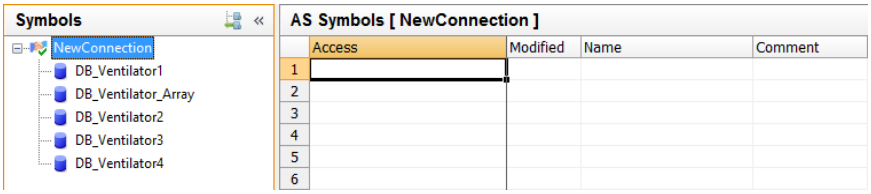
Component	No.	Order no.	Note
WinCC V7.5	1	6AV63.1-....7-5...	-
TIA Portal STEP 7 V15.1 Professional	1	6ES7822-1..05-..	Alternatively, TIA Portal STEP 7 V15.1 Basic can be used for an S7-1200.

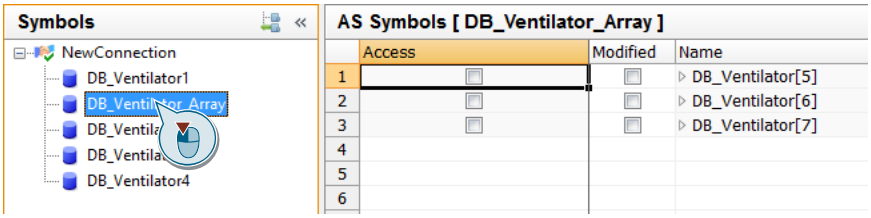
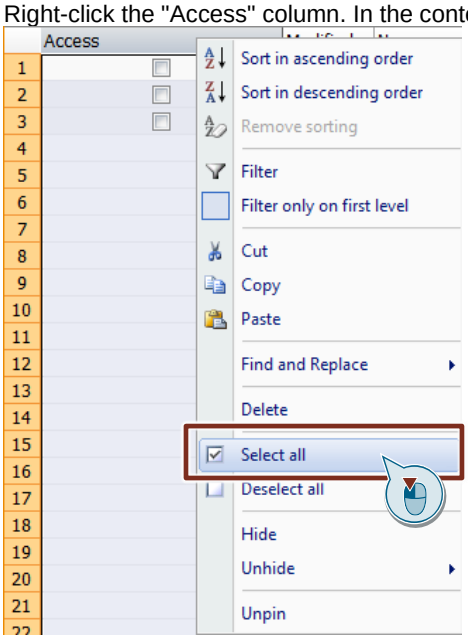
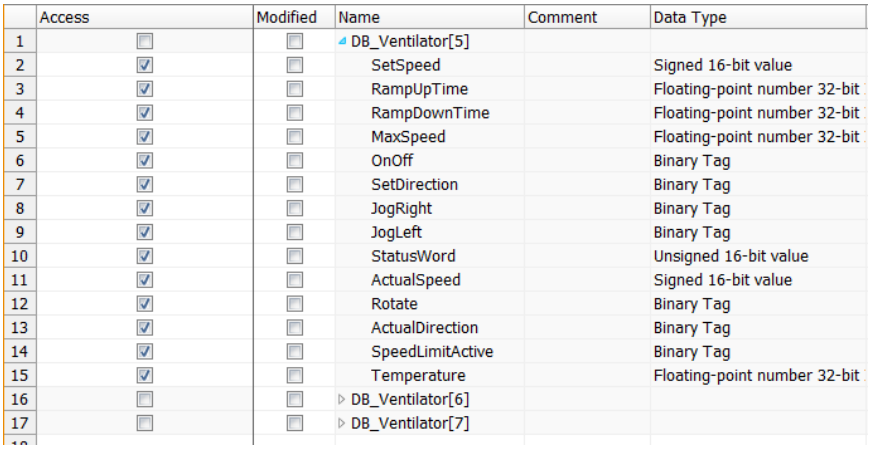
6.1 Using tags from array-type "program blocks"

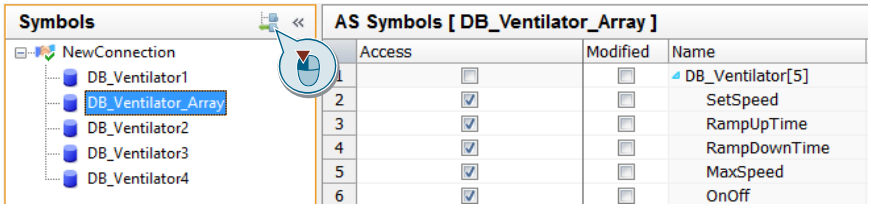
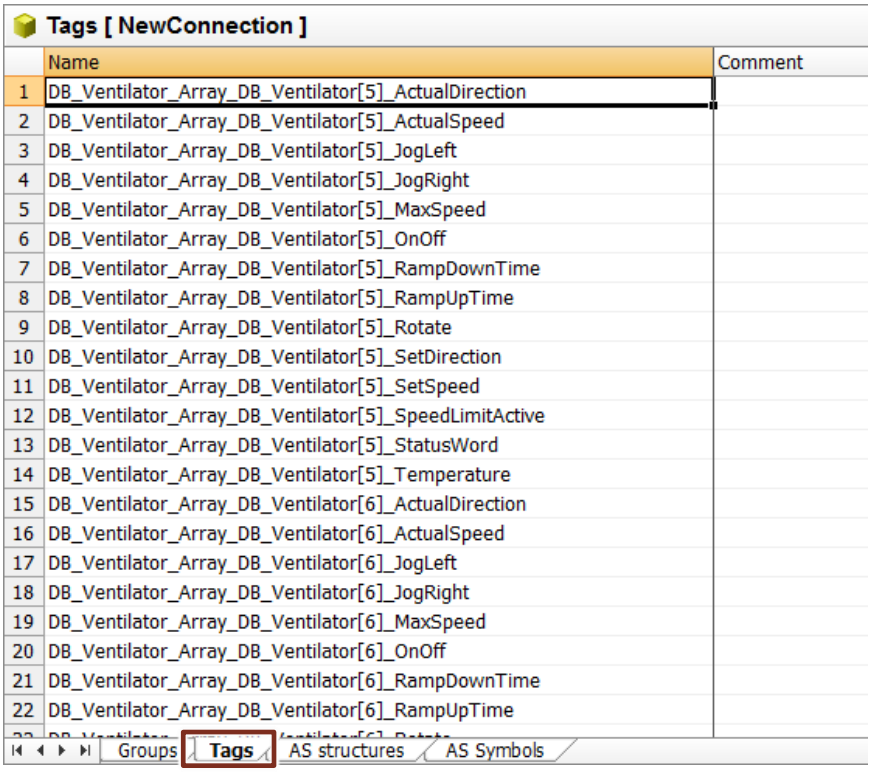
WinCC V7.5 allows you to import structured data types (array) directly from TIA Portal into WinCC Configuration Studio. They are no longer listed separately.

Table 6-3

No.	Description / or action….
1.	Create a new WinCC project or open an existing one.
2.	In the WinCC Explorer project tree, open Tag Management. 
3.	In the Tag Management context menu, select "Add new driver > SIMATIC S7-1200, S7-1500 Channel" to add a new driver. 
4.	In the OMS+ channel context menu, select the "New Connection" button to add a new connection.  Tip: You can now enter a unique connection name.
5.	In the associated context menu, click "Connection Parameters" of the "NewConnection_1" connection. 

No.	Description / or action….
6.	Enter the connection parameters shown below. 
7.	Optional: If you want to establish a secure connection to the S7-1500, use the "Change" button to add a password. In TIA Portal, select the CPU properties, go to "Protection & Security" and specify the password. This is only required for the "No access (complete protection)" setting.  **Note** Only the S7-1500 provides access protection. For more information on access protection, please refer to the "Configuring access protection for the CPU" chapter of the "S7-1500 – Getting Started" manual. In TIA Portal, access protection for the CPU is configured in the "Protection & Security" tab of the CPU properties.
8.	Start WinCC Runtime.
9.	In the connection context menu, select "AS Symbols" > "Read from AS" to read the AS symbols. 

No.	Description / or action….
10.	Click the structures you want to use. 
11.	Right-click the "Access" column. In the context menu, choose "Select all".  This selects all lower-level items.  **Note:** You can also select individual items and check the appropriate check boxes in the "Access" column.

No.	Description / or action….
12.	From the Symbols view, return to Tag Management. 
13.	The "Tags" tab displays the automatically generated tags. 

7 Configuration and Project Engineering for WinCC V7.5 SP1

The procedures described in WinCC V7.2, V7.3 SE, V7.4, V7.4 SP1, and V7.5 regarding AS symbols and AS alarms are still possible.

Validity

This chapter is valid for:

- STEP 7 as of V15
- WinCC V7.5 SP1
- S7-1200 (as of firmware version V2.2)
- S7-1500
- ET 200SP

7.1 Redundant system S7-1500R/H

With WinCC V7.5 SP1, it is possible to establish a connection to a redundant S7-1500 system. The procedure for this is described in the WinCC Information System:

SIMATIC HMI WinCC V7.5 SP1 WinCC Information System > Communication > SIMATIC S7-1200, S7-1500 Channel > Channel configuration

7.2 Software redundancy for S7-1500R/H

Starting with WinCC V7.5 SP1, it is possible to build up a "software redundancy" with a S7-1500R/H CPU by means of system tags and script. The procedure is described here:

SIMATIC HMI WinCC V7.5 SP1 WinCC Information System > Communication > SIMATIC S7-1200, S7-1500 Channel > Channel configuration

7.3 Stopping Logging via System Tags

You can use the system tags from Section 1 to selectively remove connections. If you set the value of the "ForceConnectionStateEx" tag to "0", then the logging of the associated process tag is stopped.

If you set the value to "1", the process tags of the corresponding communication channel are logged again.

8 Configuration and Project Engineering for WinCC V7.5 SP2

The procedures described in WinCC V7.2, up to V7.5 SP1 regarding AS symbols and AS alarms are still possible.

Validity

This chapter is valid for:

- STEP 7 as of V15
- WinCC V7.5 SP2
- S7-1200 (as of firmware version V2.2)
- S7-1500
- ET 200SP

Recommendation

Use the "SIMATIC SCADA Export for TIA Portal" and "Load from file", as this procedure offers more functionalities:

- Structure of the blocks as in the TIA Portal
- Readout of structures with names

8.1 Connecting UDT-Derived DBs Directly as a Structure

With WinCC V7.5 SP2, you can export UDTs with the "SIMATIC SCADA Export for TIA Portal" and create and use a WinCC structure via import. In this way, you do not create single tags, but instead the whole structure variable with one click.

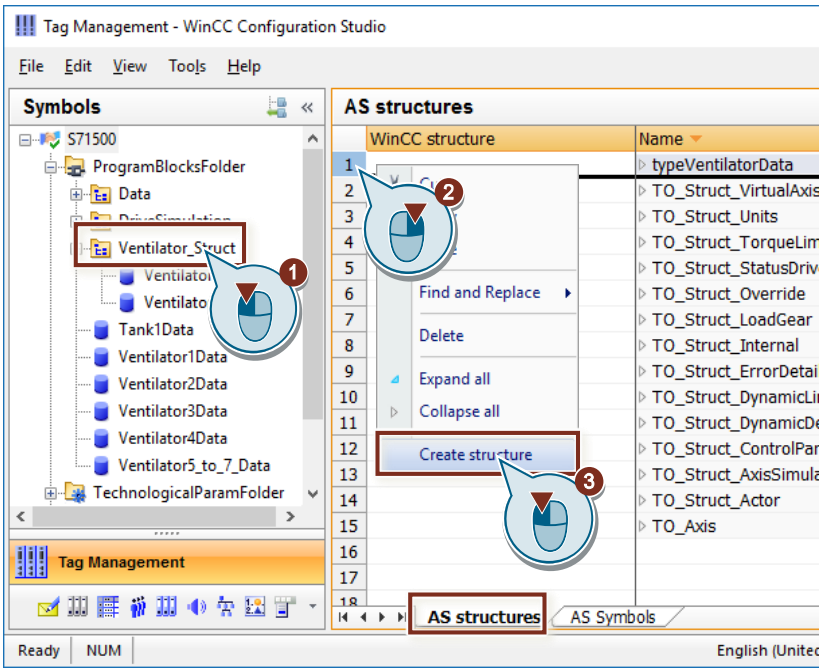
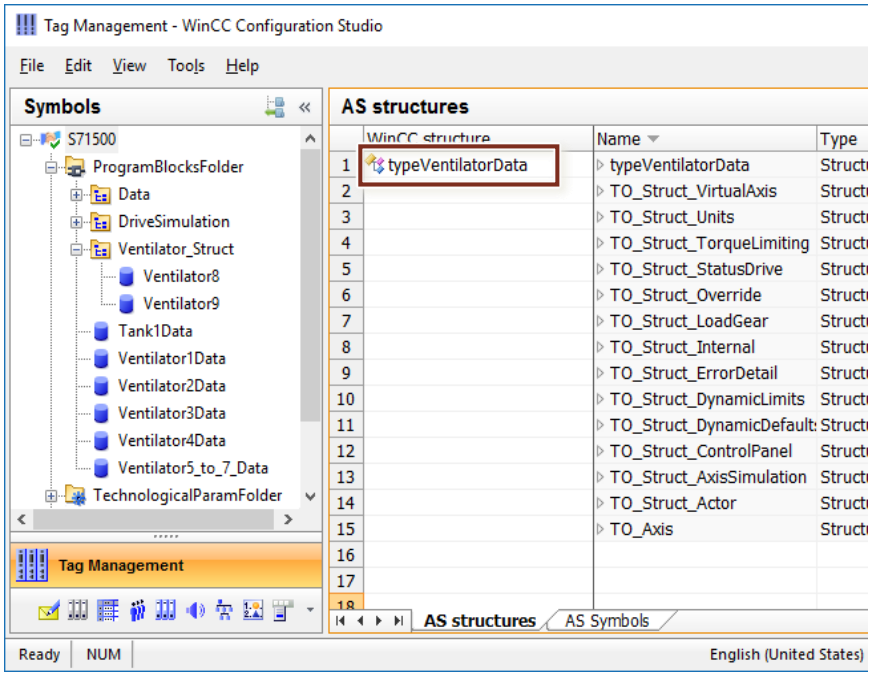
8.1.1 SIMATIC SCADA Export for TIA Portal

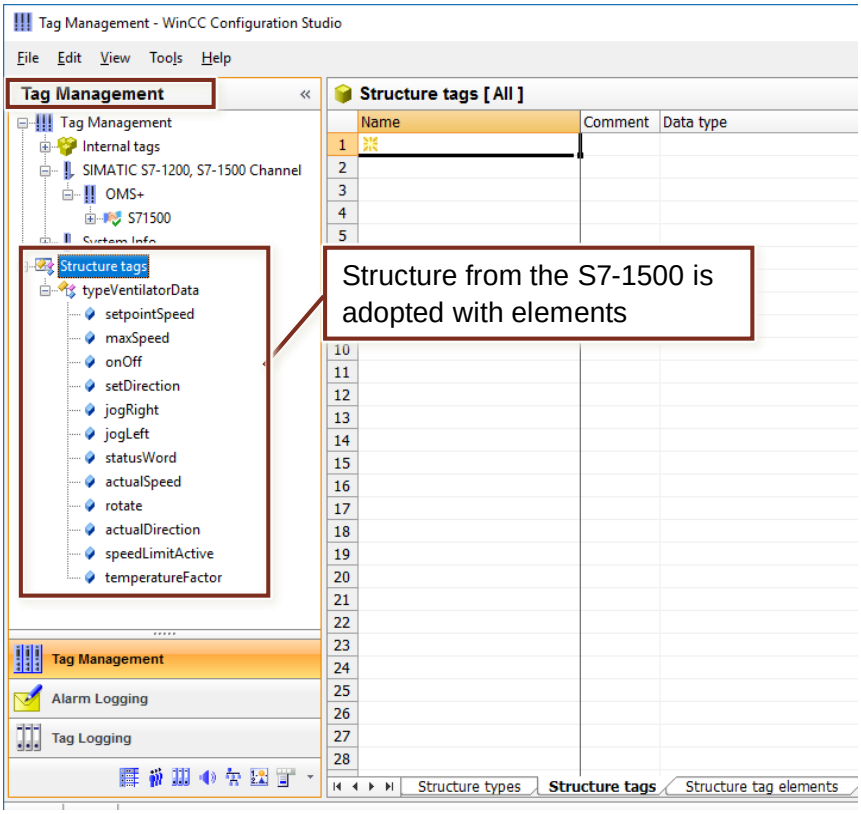
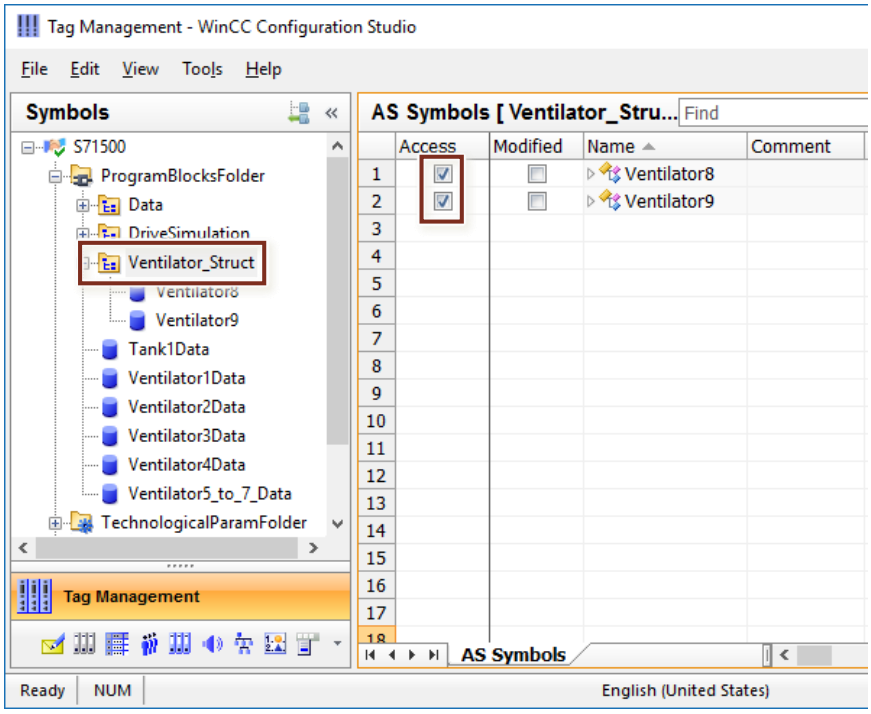
This tool is available for download in the Industry Online Support via this link.

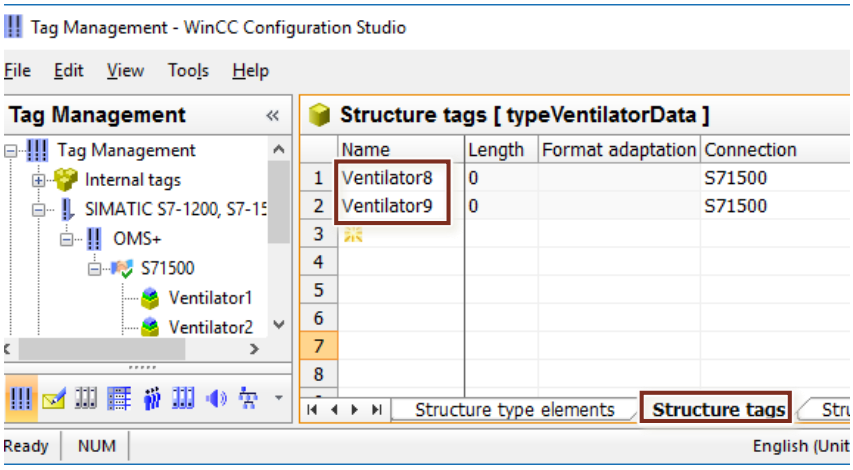
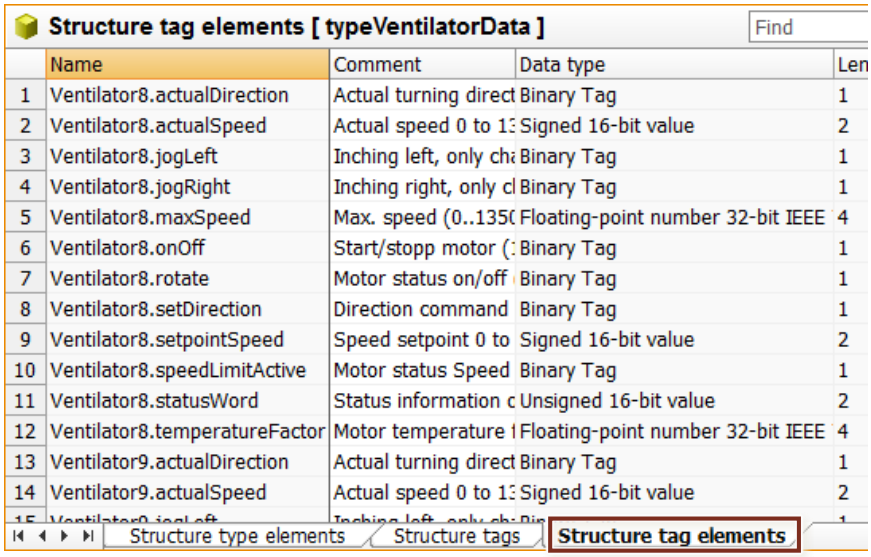
Note The tool is linked to the respective TIA Portal version and can be loaded separately for the respective version.

8.1.2 Importing a Structure and Creating WinCC Structure Tags

Table 8-1

No.	Procedure
1.	Import a structure. In the tag management, in the shortcut menu of "Structure tags" the new structure types can be defined. For a PLC UDT from a S7-1500, you can create a WinCC structure type with the button "Create structure" in the context menu of the AS structures. 
2.	Result: 

No.	Procedure
3.	The structure type and its elements are displayed in the Tag Management. 
4.	Create a structure tag After the structure has been defined, the structure tags can be created in the "AS Symbols" tab. When the box is checked, the structure tags are created. 

No.	Procedure
5.	The structure tags are automatically created by WinCC. 
6.	The individual structure tag elements are also created in the Tag Management. 

8.1.3 Secure Communication with TLS Protocol

As of version V7.5 SP2 Update 4, WinCC supports the secure communication by STEP 7 for the channel "SIMATIC S7-1200, S7-1500 Channel", which is available with the TIA Portal as of V17.

STEP 7 components configured for "Secure Communication" use an asymmetric key procedure with a public key and a private key. TLS (Transport Layer Security) is used as the encryption protocol.

To use the "Secure Communication" of the TIA Portal V17 in the WinCC project, import the data records from a TIA Portal project with the corresponding settings.

Procedure

How to use the TLS protocol is described in this entry:

Industry Online Support: WinCC V7 - Secure Communication
(https://support.industry.siemens.com/cs/ww/en/view/109798498)

9 General

9.1 Creating a new connection with its own name at runtime

When WinCC Runtime is activated, the name of a connection cannot be changed. If you create a new connection, it is automatically named "NewConnection_x".

The following description shows you how to create a new S7-1500 connection with WinCC Runtime activated and specify a connection name of your choice.

Table 9-1

No.	Description
1.	In Tag Management, go to "SIMATIC S7-1200, S7-1500 Channel" and select the "OMS+" object.
2.	Select the "Connections" tab.
3.	In the "Name" column, directly enter the name of the new connection and press "Return" to confirm it.
4.	Now you can specify the connection parameters for the CPU.

Note The description is not valid for WinCC V7.5.

9.2 Update function overview table

This table shows the project changes after which you should use the "Update" function.

Table 9-2

Description	The address changes	DB relevant to HMI	Update function
Data type of tags relevant to HMI changed in DB and symbols reloaded from AS	Old address becomes red, tag gets new address	Yes	Necessary
CPU from backup project loaded with identical DB structure	Old address becomes red, tag gets new address	Yes	Necessary
DB between two CPUs replaced	Old address becomes red, DB gets new address	Yes	Necessary
DB from reference project added	Old address becomes red, DB gets new address	Yes	Necessary
Change of data type on CPU	Old address becomes red, tag gets new address	Yes	Necessary
Tag name already exists, AS symbols are read and selected to be applied	A new tag with the tag name of the AS symbol + _1 is created	Yes	Not necessary
DBs from global library added to project	Addresses have not changed	No	Not necessary
CPU firmware upgrade	Addresses have not changed	-	Not necessary
Device change of CPU	Addresses have not changed	Yes	Not necessary
Change of symbol name on CPU	Yes	Yes	AS symbol must be re-read, re-applied and re-connected.

9.3 "SIMATIC S7-1200, S7-1500 Channel" channel diagnosis

For the channel diagnosis of the "SIMATIC S7-1200, S7-1500 Channel" communication channel, WinCC provides the following tools:

- "Status - Logical Connections" function
- "WinCC Channel Diagnosis Control" ActiveXControl
- "Channel Diagnosis" program

The channel diagnosis allows you to query the status of the current connections.

"Status - Logical Connections" tool

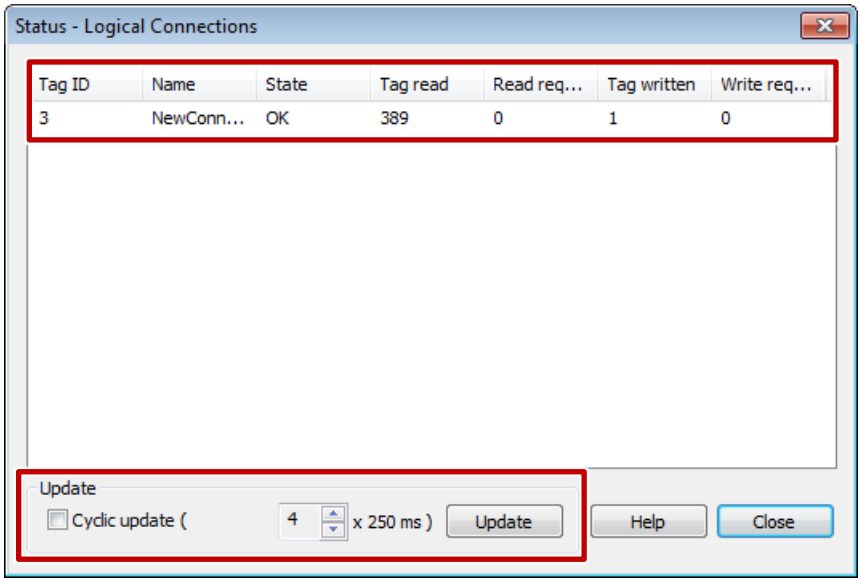
The "Status - Logical Connections" function is a tool integrated in SIMATIC WinCC. To use it, you must start Runtime. Select "Tools > Connection Status" to access the function.

The tool displays the most important parameters of all the connections that have been created. This includes the following connection parameters:

- Connection ID
- Connection name
- Current connection state
- Number of tags read
- Number of read requests
- Number of tags written
- Number of write requests

You can cyclically update the connection parameters. You will find the "Cyclic update" setting in the bottom part of the dialog.

Figure 9-1

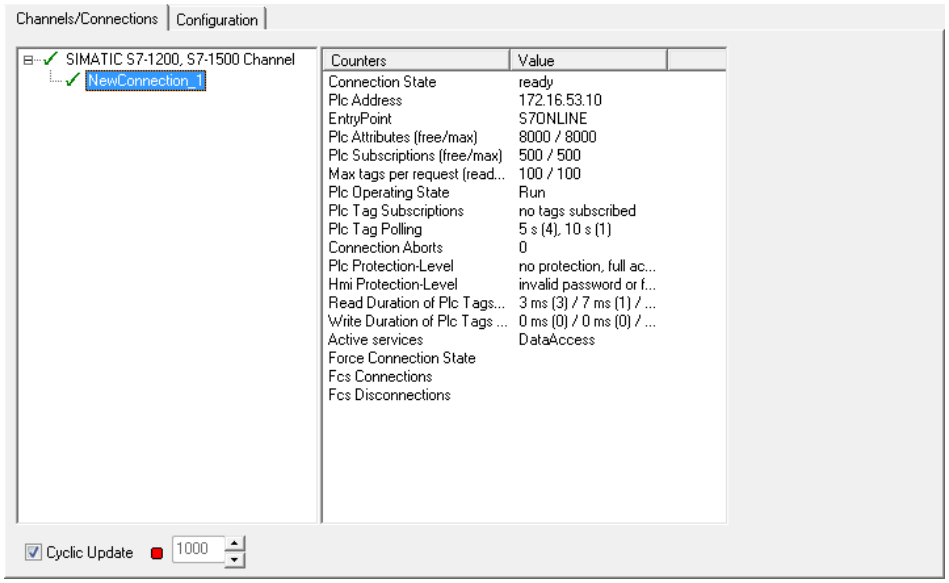


"WinCC Channel Diagnosis Control" ActiveXControl

For the channel diagnosis in Runtime, SIMATIC WinCC provides the "WinCC Channel Diagnosis Control" ActiveXControl.

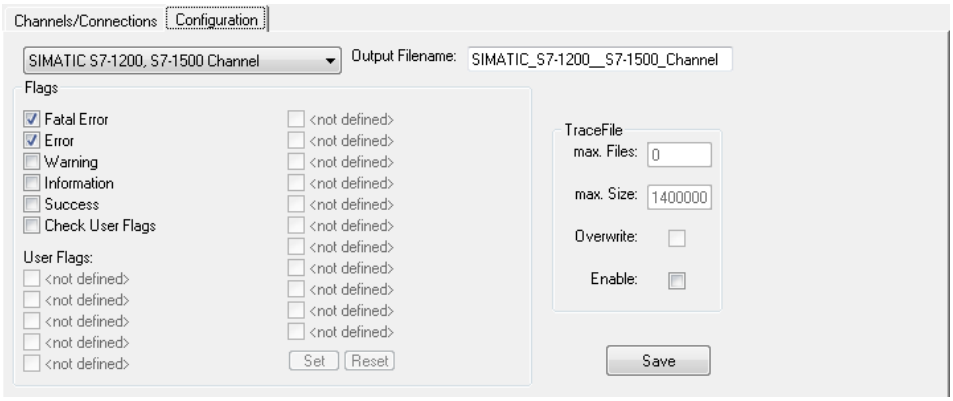
Just like the "Status - Logical Connections" tool, it displays the most important connection parameters of all the connections that have been created. Use the "Controls" toolbar to add the control to your Runtime screen.

Figure 9-2



In addition, the ActiveXControl provides a trace function. This function allows you to trace the behavior of a channel in a trace file. Moreover, the connection parameters are recorded in a log file.

Figure 9-3



"Channel Diagnosis" tool

The "Channel Diagnosis" tool is a program that works independently of SIMATIC WinCC. To analyze the connections, Runtime must be active. It reflects the structure and functionality of the "WinCC Channel Diagnosis Control" ActiveXControl. To find the tool, enter the term "Channel Diagnosis" in the Windows search box.

Note

For more information on channel diagnosis, please refer to the "Channel Diagnosis" chapters of the following manuals:

WinCC V7.3: Communication

WinCC V7.4: Communication

WinCC V7.5: Communication

10 Appendix

10.1 Service and Support

Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks at:
https://support.industry.siemens.com

Technical Support

The Technical Support of Siemens Industry provides you with fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts.

You send queries to Technical Support via Web form:
siemens.com/SupportRequest

SITRAIN – Digital Industry Academy

With our globally available training courses for our products and solutions, we help you achieve with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

For more information on our offered trainings and courses, as well as their locations and dates, refer to:
siemens.com/sitrain

Service offer

Our service offer includes the following services:

- Product training
- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog:
https://support.industry.siemens.com/cs/sc

Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for iOS and Android:
https://support.industry.siemens.com/cs/ww/en/sc/2067

10.2 Links & Literature

Table 10-1

	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to this entry https://support.industry.siemens.com/cs/ww/en/view/101908495
\3\	SIMATIC S7-1500 Getting Started https://support.industry.siemens.com/cs/ww/en/view/71704272
\4\	"WinCC V7.2: Communication" manual https://support.industry.siemens.com/cs/ww/en/view/73568736
\5\	"WinCC V7.3: Communication" manual https://support.industry.siemens.com/cs/ww/en/view/102691766
\6\	"WinCC V7.4: Communication" manual https://support.industry.siemens.com/cs/ww/en/view/109736225
\7\	Which quantity framework must you pay attention to for communication between an S7-1200 or S7-1500 controller and WinCC Runtime Professional? https://support.industry.siemens.com/cs/ww/en/view/98699910
\8\	Compatibility Tool for Automation and Drive Technology https://support.industry.siemens.com/kompatool
\9\	Why is the connection from WinCC to the S7 controller not established via TCP/IP? https://support.industry.siemens.com/cs/ww/en/view/79689088
\10\	Joint Operation of WinCC V7 or WinCC V14/15 RT Prof. and Software Controller https://support.industry.siemens.com/cs/ww/en/view/109750290

10.3 Change documentation

Table 10-2

Version	Date	Modifications
V1.0	10/2014	First version
V1.1	06/2015	CPU ET 200SP added.
V1.2	06/2016	Chapter 4 "Better overview of a large number of tags" added.
V2.0	01/2018	Document revised regarding new functions with V7.4 SP1. Several chapters added.
V2.1	04/2019	Document revised for WinCC V7.5.
V2.2	07/2021	Document revised for WinCC V7.5. SP1 and WinCC V7.5. SP2
V2.2	10/2022	Note for ET 200SP added