

SIEMENS

Ingenuity for life

24/7

Industry Online Support

Home

SIMATIC HMI and OPC UA Part 2: Comfort Panel Server, RT Advanced Client

WinCC Advanced V14, Comfort Panel,
WinCC Runtime Advanced

<https://support.industry.siemens.com/cs/ww/en/view/63481236>

Siemens
Industry
Online
Support



Warranty and Liability

Note

The Application Examples are not binding and do not claim to be complete regarding the circuits shown, equipping and any eventuality. The Application Examples do not represent customer-specific solutions. They are only intended to provide support for typical applications. You are responsible for ensuring that the described products are used correctly. These Application Examples do not relieve you of the responsibility to use safe practices in application, installation, operation and maintenance. When using these Application Examples, you recognize that we cannot be made liable for any damage/claims beyond the liability clause described. We reserve the right to make changes to these Application Examples at any time without prior notice.

If there are any deviations between the recommendations provided in these Application Examples and other Siemens publications – e.g. Catalogs – the contents of the other documents have priority.

We do not accept any liability for the information contained in this document. Any claims against us – based on whatever legal reason – resulting from the use of the examples, information, programs, engineering and performance data etc., described in this Application Example shall be excluded. Such an exclusion shall not apply in the case of mandatory liability, e.g. under the German Product Liability Act ("Produkthaftungsgesetz"), in case of intent, gross negligence, or injury of life, body or health, guarantee for the quality of a product, fraudulent concealment of a deficiency or breach of a condition which goes to the root of the contract ("wesentliche Vertragspflichten"). The damages for a breach of a substantial contractual obligation are, however, limited to the foreseeable damage, typical for the type of contract, except in the event of intent or gross negligence or injury to life, body or health. The above provisions do not imply a change of the burden of proof to your detriment.

Any form of duplication or distribution of these Application Examples or excerpts hereof is prohibited without the expressed consent of the Siemens AG.

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks. In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions only form one element of such a concept.

Customer is responsible to prevent unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

Additionally, Siemens' guidance on appropriate security measures should be taken into account. For more information about industrial security, please visit <http://www.siemens.com/industrialsecurity>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends to apply product updates as soon as available and to always use the latest product versions. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under <http://www.siemens.com/industrialsecurity>.

Table of Contents

	Warranty and Liability	2
1	Task.....	4
2	Solution.....	5
	2.1 Overview.....	5
	2.2 Hardware and software components	6
3	Configuration and Project Engineering.....	7
	3.1 Comfort Panel configuration (server)	8
	3.1.1 OPC UA settings	8
	3.1.2 Creating tags	9
	3.1.3 Creating the connection	9
	3.1.4 Plant screen	10
	3.2 WinCC Runtime Advanced configuration (client)	11
	3.2.1 Creating the OPC UA connection	11
	3.2.2 Online access to the Comfort Panel tags	12
	3.2.3 Plant screen	13
	3.3 Certificate handling.....	14
4	Installation and Startup.....	16
	4.1 Installation	16
	4.2 Startup of the application example	16
5	Operation of the Application Example	17
6	Appendix	20
	6.1 Service and Support.....	20
	6.2 Related literature	21
	6.3 History	21

1 Task

Overview of the automation task

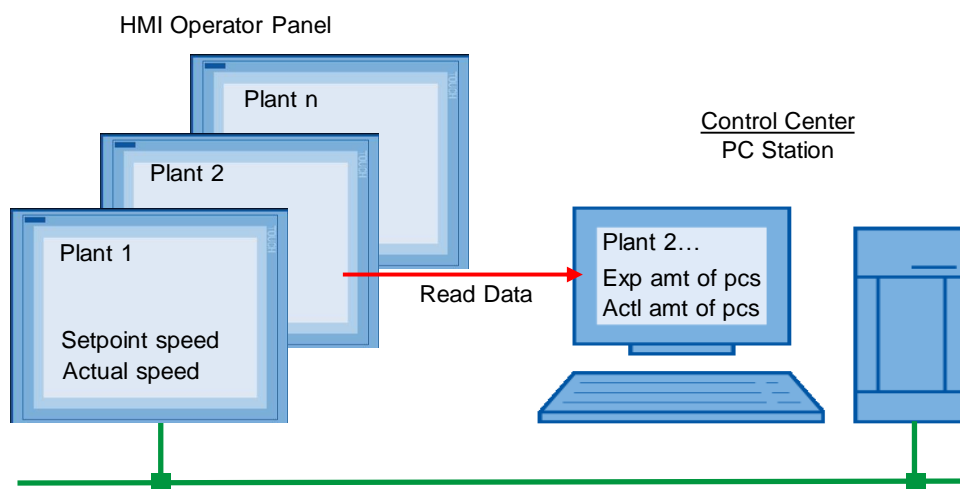
A production plant consists of several plant areas. In each plant area, an HMI operator panel is used to control a machine.

In a control center, a PC station summarizes and outputs the information of the individual HMI operator panels. The PC station has direct access to the tags of the HMI operator panels.

For security reasons, communication between the HMI operator panel and the PC station must be encrypted.

The following figure provides an overview of the application example.

Figure 1-1



2 Solution

2.1 Overview

SIMATIC Comfort Panels are used to control the plant areas. A PC station with WinCC Runtime Advanced installed on it is used as a control center.

The devices are parameterized as follows:

- The Comfort Panels are parameterized as an OPC UA server.
- The PC station is parameterized as an OPC UA client.
- The PC station and the HMI operator panel communicate via the OPC UA interface.

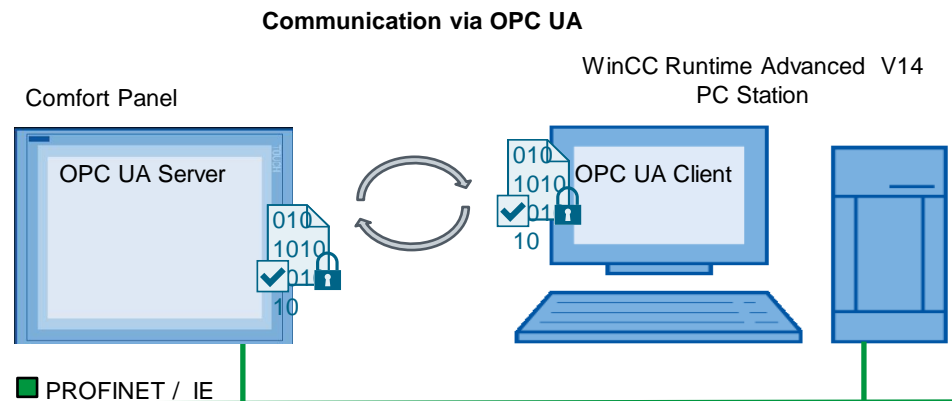
The Comfort Panel (server) provides the process data. The PC station (client) accesses the data (tags) of the Comfort Panel.

The OPC UA communication interface supports data integrity through encryption and digital signatures.

Diagrammatic representation

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

Figure 2-1



Configuration

All devices are integrated into a PROFINET network. The devices communicate with each other via the OPC UA interface.

The following devices are used as hardware:

- SIMATIC HMI TP900 Comfort
- Standard PC with WinCC Runtime Advanced V14 (PC station)

2.2 Hardware and software components

Validity

The application example is valid for:

- WinCC Advanced V14 or higher
- All Comfort Panels

Hardware components

Table 2-1

Component	No.	Article number	Note
SIMATIC HMI TP900 COMFORT	1	6AV2124-0JC01-0AX0	-
Standard PC	1	-	-
CPU 1516-3 PN/DP	1	6AG1516-3AN00-7AB0	Optional

Software components

Table 2-2

Component	No.	Article number	Note
SIMATIC WinCC Advanced V14	1	6AV2102-0AA03-0AA5	-
SIMATIC WinCC Runtime Advanced V14	1	6AV2104-0...-.....	-

Sample files and projects

The following table contains the names of the sample files that are used in this application example.

Table 2-3

Component	Note
63481236_Part2_CODE_Panel Server und RT Adv Client.zip	Contains the WinCC Advanced V14 project.
63481236_Part2_Panel Server und RT Adv Client_en.pdf	This document.

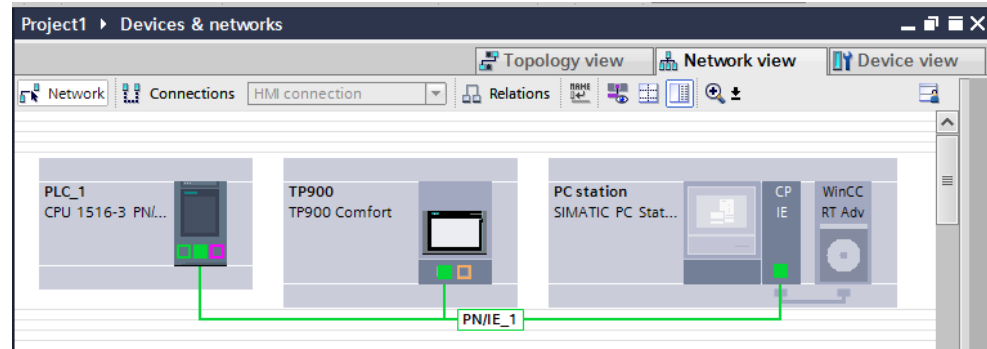
3 Configuration and Project Engineering

General

The application example comes with a sample project. The sample project includes a TP900 Comfort Panel, a WinCC Runtime Advanced PC station and a CPU 1516-3PN/DP. The STEP 7 program only contains a data block.

A WinCC (TIA Portal) configuration with the above device is the basis. All devices are connected to each other.

Figure 3-1



The application example describes all the settings that are required for OPC UA communication between the Comfort Panel and the WinCC Runtime Advanced station.

- Parameterizing the TP900 Comfort Panel as a server.
- Parameterizing the WinCC Runtime Advanced station as a client.
- OPC UA tag connection.
- Handling the certificates.
- CPU for data exchange with the TP900 Comfort Panel.

IP addresses

Define the IP addresses for the individual hardware components.

The following table shows the IP addresses used in the sample project:

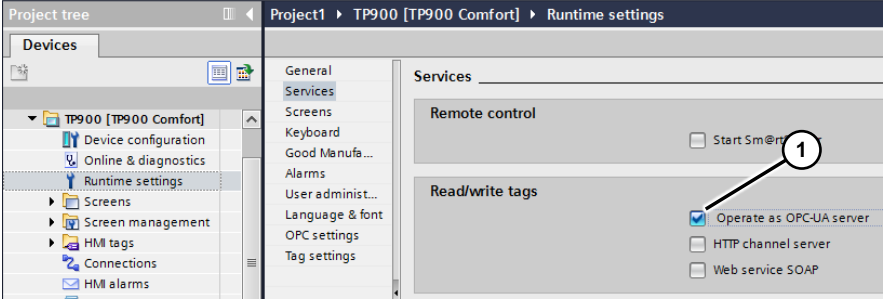
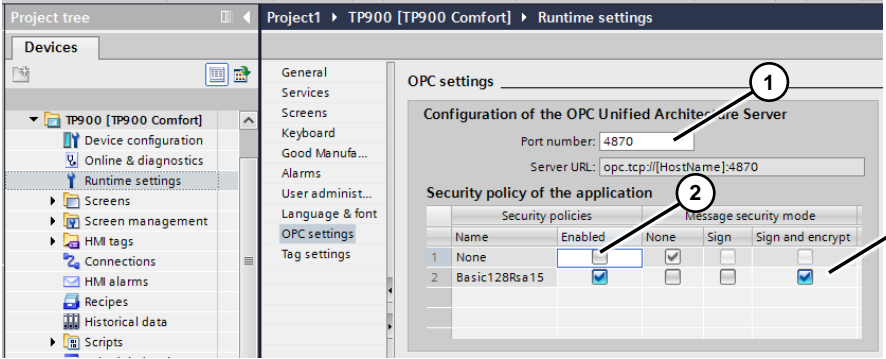
Table 3-1

Hardware	IP address	Subnet
SIMATIC HMI TP900 Comfort Panel	172.16.34.210	255.255.0.0
WinCC Runtime Advanced (PC station)	172.16.34.5	255.255.0.0

3.1 Comfort Panel configuration (server)

3.1.1 OPC UA settings

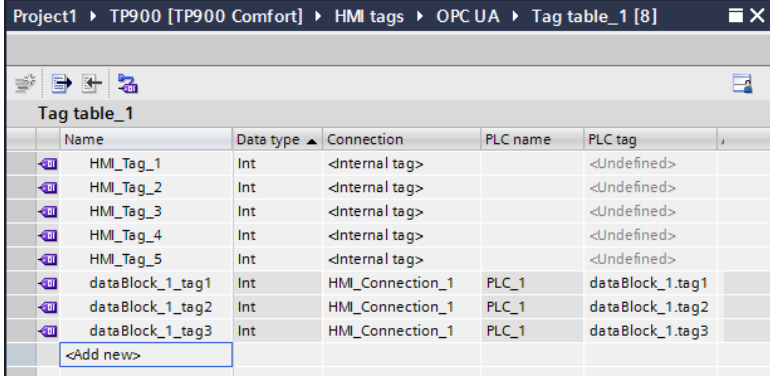
Table 3-2

No.	Action
1.	<p>Enabling OPC UA</p> <ul style="list-style-type: none"> In the project tree, open the "Services" for the Comfort Panel "Project tree > Runtime settings > Services". In the "Read/write tags" section, check the "Operate as OPC-UA server" check box (1). 
2.	<p>OPC settings</p> <ul style="list-style-type: none"> In the project tree, open the OPC settings for the Comfort Panel "Project tree > Runtime settings > OPC settings". Specify the port number. You can specify a value between 1024 and 49151. The application example uses the default address, "4870", (1). In "Security policy of the application", uncheck the "None" check box in the "Security policies" table column (2). This enables the encryption. In the second row, specify the encryption type. The application example uses the default setting, "Basic128Rsa15" and "Sign and encrypt", (3). 

© Siemens AG 2017. All rights reserved

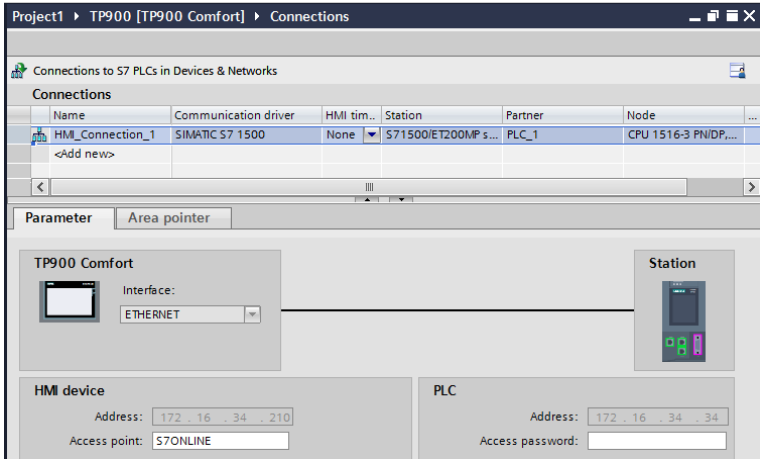
3.1.2 Creating tags

Table 3-3

No.	Action
1.	<p>Insert all required tags. You can use internal HMI tags and tags with a PLC connection.</p> <p>Five internal tags and three tags with a PLC connection were created for the application example.</p> <p>The application example does not provide a detailed description of how to create a tag.</p> 

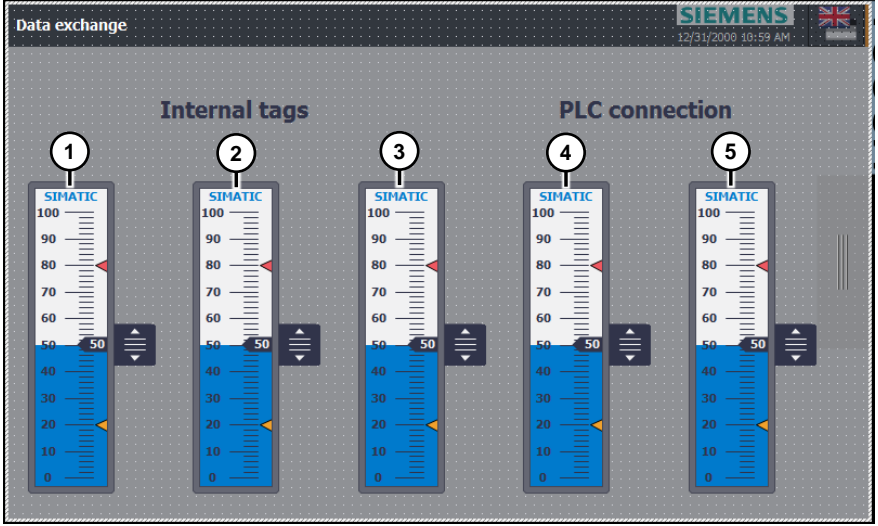
3.1.3 Creating the connection

Table 3-4

No.	Action
1.	<p>In the "Connections" menu, no OPC UA communication settings need to be made. The required communication settings are made when configuring the "client" (see Chapter 3.2 "WinCC Runtime Advanced configuration").</p> <p>The configured SIMATIC S7-1500 connection is used to test communication between the Comfort Panel and the WinCC Runtime Advanced station. The application example does not provide a detailed description of how to create a SIMATIC S7-1500 connection.</p> 

3.1.4 Plant screen

Table 3-5

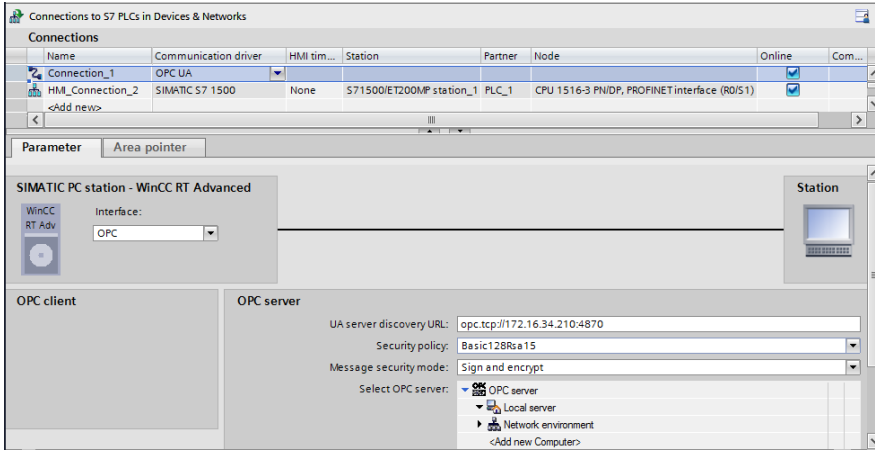
No.	Action
1.	<p>A screen provides five sliders to test data exchange between the Comfort Panel and the WinCC Runtime Advanced station. The sliders are used to simulate "process values".</p> <p>The first three sliders each use an internal tag.</p> <p>Sliders 4 and 5 each use a tag with a PLC connection.</p> 

3.2 WinCC Runtime Advanced configuration (client)

3.2.1 Creating the OPC UA connection

A WinCC Runtime Advanced configuration is the basis. The WinCC Runtime Advanced station is connected to the Comfort Panel.

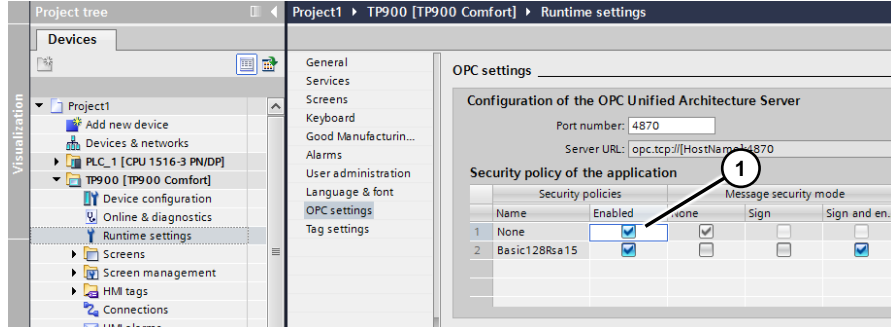
Table 3-6

No.	Action
1.	<p>Creating the OPC UA connection</p> <ul style="list-style-type: none"> • In the project tree, open the "Connections" folder. • Create a new connection. • In "Communication driver", select "OPC UA". <p>- "OPC server" (settings used in the application example)</p> <p>UA server discovery URL: opc.tcp://172.16.34.210:4870 Security policy: Basic128Rsa15 Message security mode: Sign and encrypt.</p>  <p>The screenshot shows the 'Connections to S7 PLCs in Devices & Networks' window. It contains a table with columns: Name, Communication driver, HMI tim..., Station, Partner, Node, Online, and Com... The table lists 'Connection_1' with 'OPC UA' as the communication driver and 'HMI_Connection_2' with 'SIMATIC S7 1500'. Below the table, the 'Parameter' tab is active, showing the 'SIMATIC PC station - WinCC RT Advanced' configuration. The 'Interface' is set to 'OPC'. The 'OPC server' section is expanded, showing the 'UA server discovery URL' as 'opc.tcp://172.16.34.210:4870', the 'Security policy' as 'Basic128Rsa15', and the 'Message security mode' as 'Sign and encrypt'. The 'Select OPC server' dropdown is set to 'OPC server'.</p>

3.2.2 Online access to the Comfort Panel tags

From the WinCC Runtime Advanced station's tag editor, you can access the Comfort Panel tags (online). This requires a configured "[Comfort Panel configuration \(server\)](#)", see Chapter 3.1.

Table 3-7

No.	Action																				
1.	<p>OPC settings</p> <p>For online access to the tags of the Comfort Panel (server), disable the "encryption". To do this, it is not necessary to disable the set "security policies".</p> <ul style="list-style-type: none"> In the Comfort Panel configuration, use the project tree to open the OPC settings. "Project tree > Runtime settings > OPC settings". For the period during which you browse to the Comfort Panel tags, check the "None" check box (1). Transfer the configuration to the Comfort Panel.  <table border="1" data-bbox="925 1048 1369 1205"> <thead> <tr> <th colspan="2">Security policies</th> <th colspan="3">Message security mode</th> </tr> <tr> <th>Name</th> <th>Enabled</th> <th>None</th> <th>Sign</th> <th>Sign and en...</th> </tr> </thead> <tbody> <tr> <td>1 None</td> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>2 Basic128Rsa15</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </tbody> </table>	Security policies		Message security mode			Name	Enabled	None	Sign	Sign and en...	1 None	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2 Basic128Rsa15	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Security policies		Message security mode																			
Name	Enabled	None	Sign	Sign and en...																	
1 None	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																	
2 Basic128Rsa15	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>																	
2.	<p>Adding tags (figure on the next page)</p> <ul style="list-style-type: none"> Open the WinCC Runtime Advanced station's tag editor. Insert a new tag and in the "Address" column, open the drop-down list (1). A dialog opens (2). In the dialog, click the arrow next to the "server object". Navigate to the "Root > WinCC RT Comfort Panel > Tags" folder. The folder displays the Comfort Panel's tags. <p>Note The path may differ depending on the project.</p> <ul style="list-style-type: none"> Double-clicking a single tag applies the tag to the HMI project. 																				

No.	Action
	<p>Note: If you apply a tag of the "String" type, you must enter the "string's" "length" in the tag properties. For the "length", refer to the "original application".</p>
3.	To add another tag, repeat the step from table section 2.

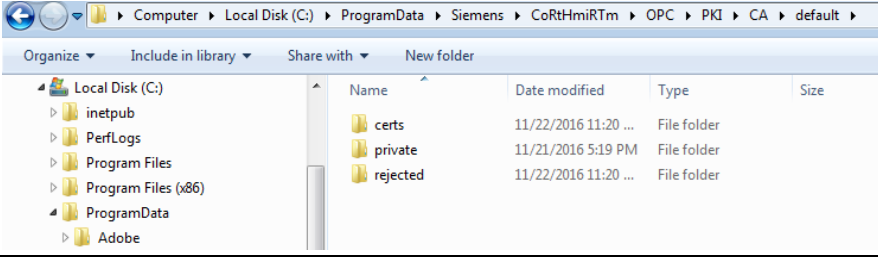
3.2.3 Plant screen

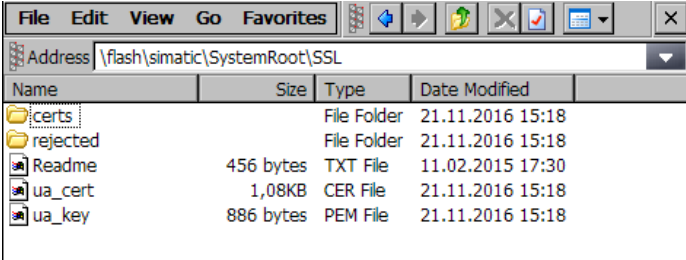
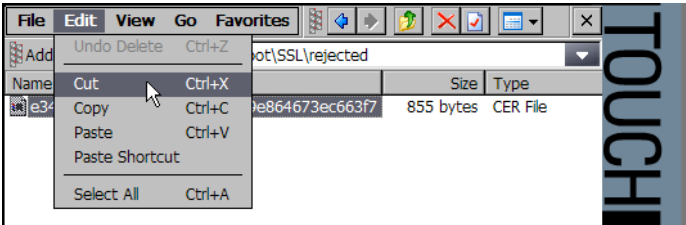
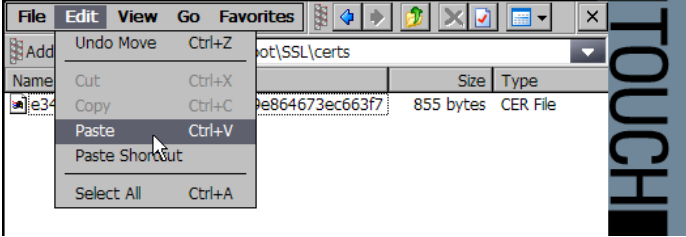
Table 3-8

No.	Action
1.	<p>For illustration purposes, the plant screen contains five symbolic containers to test data exchange between the Comfort Panel and the WinCC Runtime Advanced station.</p> <p>The tags for outputting the values match the tags from Chapter 3.2.2 "Online access to the Comfort Panel tags".</p> <p>In addition, a message view was added to the top section.</p>

3.3 Certificate handling

Table 3-9

No.	Action
1.	<p>Starting WinCC Runtime Advanced</p> <ul style="list-style-type: none"> • Make sure that the Comfort Panel is connected to the WinCC Runtime Advanced station. • Make sure that the date and time are synchronized on both devices. • Start the WinCC Runtime Advanced station runtime.
2.	<p>Starting the Comfort Panel runtime</p> <ul style="list-style-type: none"> • Start the Comfort Panel "runtime" and wait until the start screen appears on the Comfort Panel. • The Comfort Panel transfers its certificate to the WinCC Runtime Advanced station via the existing network connection. On the PC station, the certificate is saved to the "rejected" file folder. • Stop the Comfort Panel runtime.
3.	<p>Copying the WinCC Runtime Advanced station certificate</p> <ul style="list-style-type: none"> • On the PC where the WinCC Runtime Advanced station is running, navigate to the "rejected" folder. "C:\ProgramData > Siemens > CoRtHmiRTm > OPC > PKI > CA > default" <p>Note: If the "ProgramData" folder is not displayed, check "Folder Options" on the installation drive (Tools > Folder Options...). In "Hidden files and folders", check "Show hidden files, folders and drives".</p> <ul style="list-style-type: none"> • In the "rejected" folder, select the existing certificate and cut the certificate using the system function. • In the same folder tree, open the "certs" folder and paste the certificate you have just cut into this folder. 
4.	<p>Starting and stopping the Comfort Panel runtime</p> <ul style="list-style-type: none"> • Start the Comfort Panel "runtime". • Wait until the start screen appears on the Comfort Panel. • The WinCC Runtime Advanced station transfers its certificate to the Comfort Panel via the existing network connection. On the Comfort Panel, the certificate is saved to the "rejected" file folder. • Stop the Comfort Panel runtime.

No.	Action
5.	<p>Copying the Comfort Panel certificate</p> <ul style="list-style-type: none"> On the Comfort Panel, navigate to the "rejected" file folder "My Computer\flash\simatic\SystemRoot\SSL".  <ul style="list-style-type: none"> Open the "rejected" folder and cut (do not copy) the certificate (Edit > Cut).  <ul style="list-style-type: none"> In the same folder tree, open the "certs" folder and paste the certificate you have just cut into this folder.  <p>The "copy certificate" settings on the Comfort Panel are now complete.</p> <ul style="list-style-type: none"> Close the Comfort Panel file system. Start the Comfort Panel runtime.

4 Installation and Startup

4.1 Installation

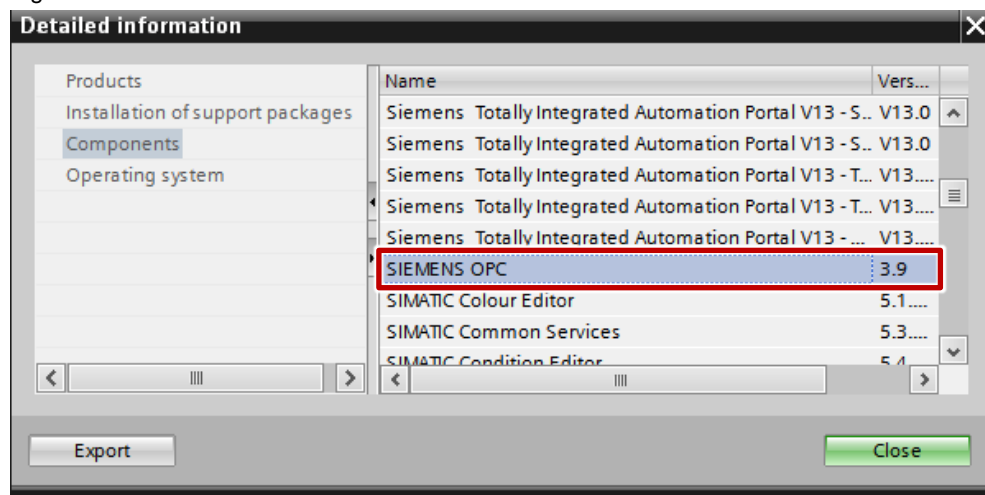
Requirement

- The software listed in Chapter [2.2](#) must be installed.
- For communication between the Comfort Panel and the WinCC Runtime Advanced station, the "SIEMENS OPC" option must be installed on the PC station.
Make sure to enable the "SIEMENS OPC" option before installing WinCC Runtime Advanced. You can install this option at a later time. To do this, insert the installation CD again and follow the instructions.

The online help allows you to check whether the "SIEMENS OPC" option is installed on the PC station: **Help > Installed software... > Detailed information about installed software > Components**".

Online help view when the "SIEMENS OPC" option is installed.

Figure 4-1



4.2 Startup of the application example

Table 4-1

No.	Description
1.	Unzip the supplied application example to a folder and open the configuration.
2.	Make sure that all devices are on and connected to each other.
3.	Transfer the configuration to the Comfort Panel and start the WinCC Runtime Advanced station runtime.
4.	For the next steps, see Chapter 3.3 "Certificate handling" . When you have copied the certificates, startup is complete.

5 Operation of the Application Example


The application example shows how communication works between a Comfort Panel and a WinCC Runtime Advanced station via an OPC UA connection.

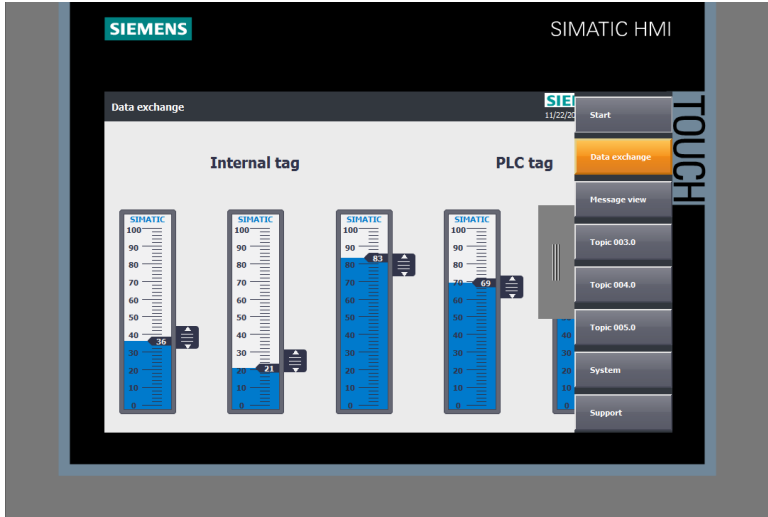
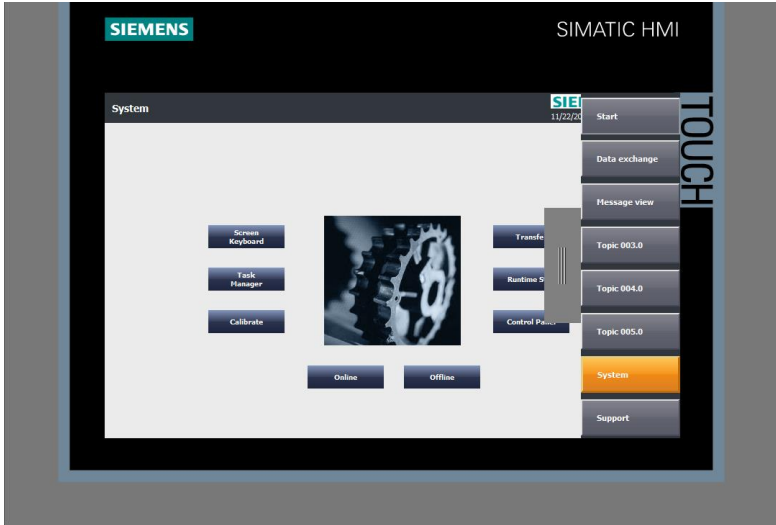
Overview and description of the Comfort Panel user interface

The following sections provide a brief description of the three most important screens:

- Start screen.
- Data exchange.
- System screen.

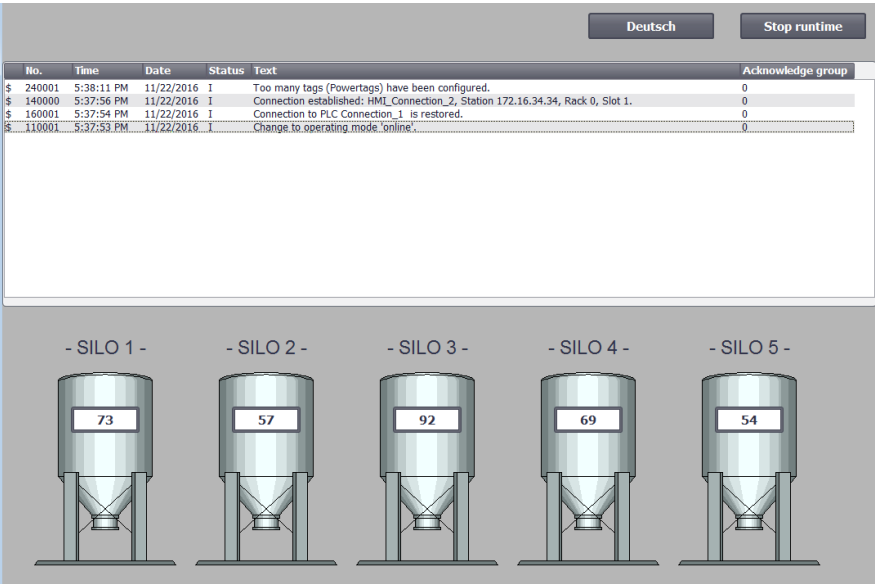
Table 5-1

No.	Action
1.	<p>Start screen</p> <ul style="list-style-type: none"> • After starting the Comfort Panel runtime, the following screen opens. • To navigate through the project, open the right-hand "slide-in screen". 

No.	Action
2.	<p>Data exchange</p> <ul style="list-style-type: none"> • Select the "Data exchange" button. The screen allows you to test communication between the Comfort Panel and the WinCC Runtime Advanced station. • To simulate process values, you can specify values using the sliders. 
3.	<p>System screen</p> <ul style="list-style-type: none"> • Select the "System" button. The screen allows you to execute the system functions shown on the screen, for example "Runtime Stop". 
4.	<p>Other screens</p> <p>The "Message view" screen is used to open the message history. The "Support" screen provides you with related online support information.</p>

Overview and description of the WinCC Runtime Advanced station user interface

Table 5-2

No.	Action
1.	<p>Start screen</p> <ul style="list-style-type: none"> Starting the runtime opens the following screen on the WinCC Runtime Advanced station. The screen displays the "process values" specified by the Comfort Panel. 

6 Appendix

6.1 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.

The 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 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:

www.siemens.com/industry/supportrequest

Service offer

Our range of services includes, inter alia, the following:

- Product trainings
- 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 Apple iOS, Android and Windows Phone:

<https://support.industry.siemens.com/cs/ww/en/sc/2067>

6.2 Related literature

Table 6-1

	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	https://support.industry.siemens.com/cs/ww/en/view/63481236

6.3 History

Table 6-2

Version	Date	Modifications
V1.0	04/2017	First version