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Communication between S7-1200 PLCs and WinCC Professional via TeleControl Server Basic V3.1

CP 1242-7 V2 / CP 1243-1 / TCSB V3.1

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1 Task

Introduction

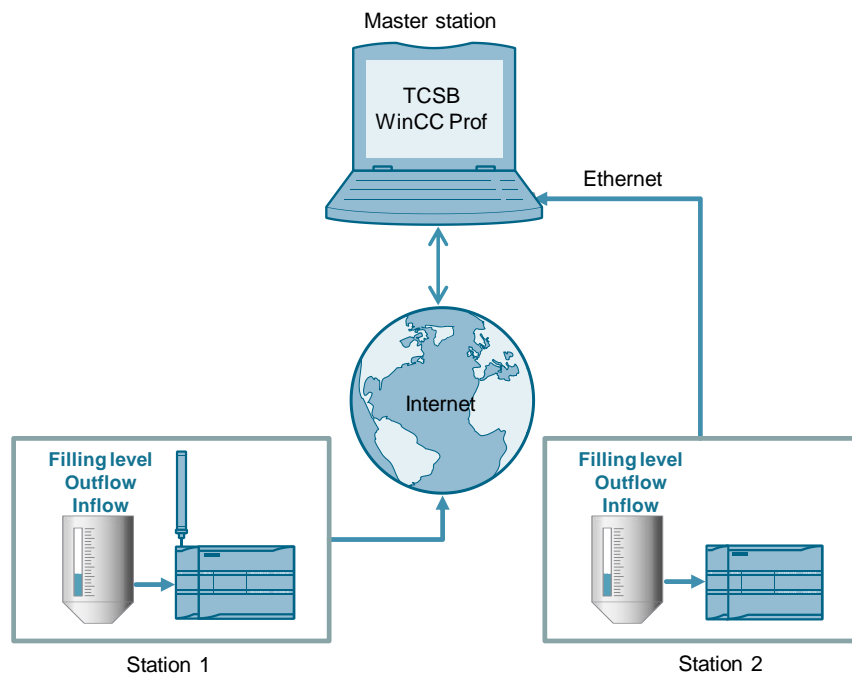
The infrastructure of a wastewater treatment plant comprises two SIMATIC S7-1200 substations. One station is to communicate with a master station via the cellular network and the other station is to communicate via Ethernet.

The TeleControl Server Basic V3.1 software is installed in the master station. Any OPC client, e.g. WinCC Professional RT, can be connected via your OPC interface.

Overview of the automation task

The figure below provides an overview of the automation task.

Figure 1-1



Requirements

This application example is intended to meet the following requirements:

- Both remote stations send some process tags to the master station on a "**threshold-triggered**" basis.
- Both remote stations send important process tags **cyclically** to the master station.
- Both remote stations send some process tags to the master station on an "event-triggered" basis.
- The master station monitors the status of the connected remote stations.

Using visualization software, the simulated process shall be operated and controlled in the remote stations.

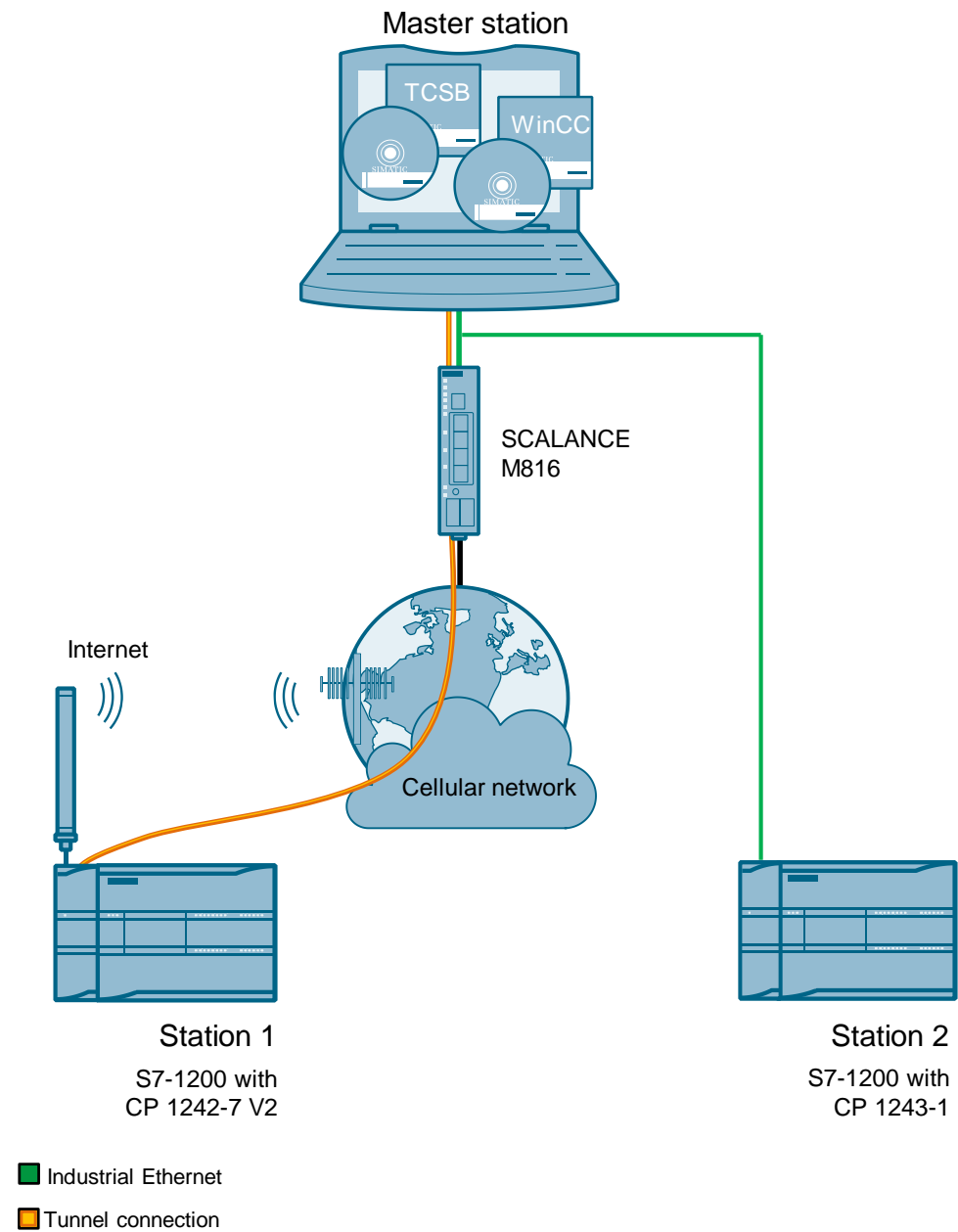
2 Solution

2.1 Overview

Schematic layout

The figure below shows a schematic overview of the most important components of the solution:

Figure 2-1



Configuration

The TeleControl Server Basic V3.1 (TCSB) in the master station allows a direct connection to the S7-1200 stations.

Communication takes place via the following paths and communication modules:

- S7-1200 with CP 1242-7 V2: Communication via the cellular network and the Internet.
- S7-1200 with CP 1243-1: Communication via Ethernet. Here, too, ranges of several kilometers can be achieved using single-mode fiber optics.

Any OPC client visualizes the data via the integrated OPC UA server of TCSB V3.1. In this example, we demonstrate the functions using the WinCC Runtime Professional.

Advantages

The solution presented here offers the following advantages:

- TeleControl Server Basic V3.1 enables economic data communication between remote stations and a master station.
- The core application areas are industrial applications where the objective is to send data in a cost-effective way on a wireless basis, for example in water treatment plants, for water purification or in pumping stations.
- TCSB's OPC UA interfaces provide the data of the connected stations to one or more connected OPC UA clients.
- GPRS and Internet: Always-on functionality.
- To increase reliability, the CPs can, in the event of a connection failure, buffer the data of different event classes and transfer the aggregated data to the TeleControl Server.
- If there is a brief interruption on the connection between the OPC UA client and the TCSB OPC UA server, the data remains available in the data buffer. Once the connection has been re-established, all values that have not been transferred will be sent to the OPC UA client.

Topics not covered by this application

This application does not contain any description of:

- SIMATIC NET TeleControl Server Basic. Please refer to document [\4\](#).
- SIMATIC HMI configuration
- the LAD/ FBD/ STL/ SCL programming languages.

Basic knowledge of these topics is assumed.

2.2 Description of the core functionality

Functions realized

The following core functions have been realized in the application example:

Threshold-triggered

The data is transmitted only, if the current data has changed by a threshold compared to the last data sent.

Time-triggered

The data is transmitted from the CP to the TCSB in a specified time interval.

Event-triggered

The data is transmitted, if a configured trigger signal is triggered. As a signal, the edge change (0 → 1) of a trigger tag will be evaluated which is set by the user program. The trigger tag will be reset upon successful data transmission.

Transmission after call from master station

This data is transmitted on the initiative of the master station.

Status monitoring

The master station monitors the status of the connected remote stations.

Note

For a more detailed description of these functions, please refer to [Chapter 3](#).

2.3 Overview and description of the user interface

The application example is visualized with WinCC Professional using two configured screens: "TCSB Communication" and "S7-1200 Application".

"TCSB Communication"

The "TCSB Communication" screen shows the status of the connection to the two substations. It additionally shows the process data sent from the stations.

Figure 2-2

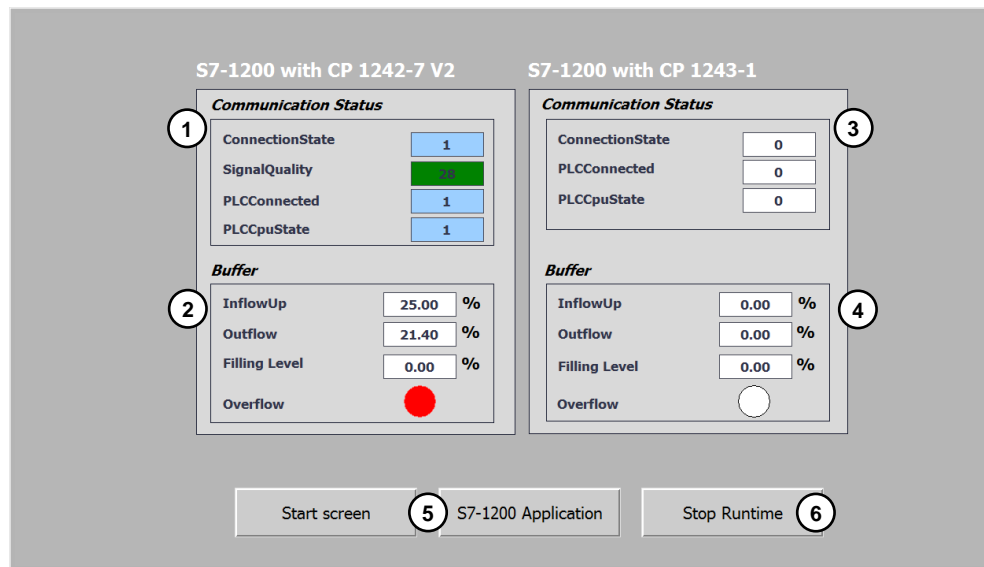


Table 2-1

No.	Element	Description
1.	Communication status: <ul style="list-style-type: none"> • ConnectionState • SignalQuality • PLCCConnected • PLCPLCState 	Information on the communication status of station 1 The values are determined by TCSB itself.
2.	Buffer	Maximum inflow, outflow and filling level of station 1 that are saved in the master station. Overflow alarm: <ul style="list-style-type: none"> - Green: No Overflow - Red: Overflow
3.	Communication status: <ul style="list-style-type: none"> • ConnectionState • PLCCConnected • PLCPLCState 	Information on the communication status of station 2 The values are determined by TCSB itself.
4.	Buffer	Maximum inflow, outflow and filling level of station 2 that are saved in the master station.
5.	Screen change	One click on the buttons changes the display of the appropriate screens.
6.	Stop Runtime	Clicking this button stops Runtime.

“S7-1200 Application”

The "S7-1200 Application" screen visualizes the processes of stations 1 and 2.
Figure 2-3

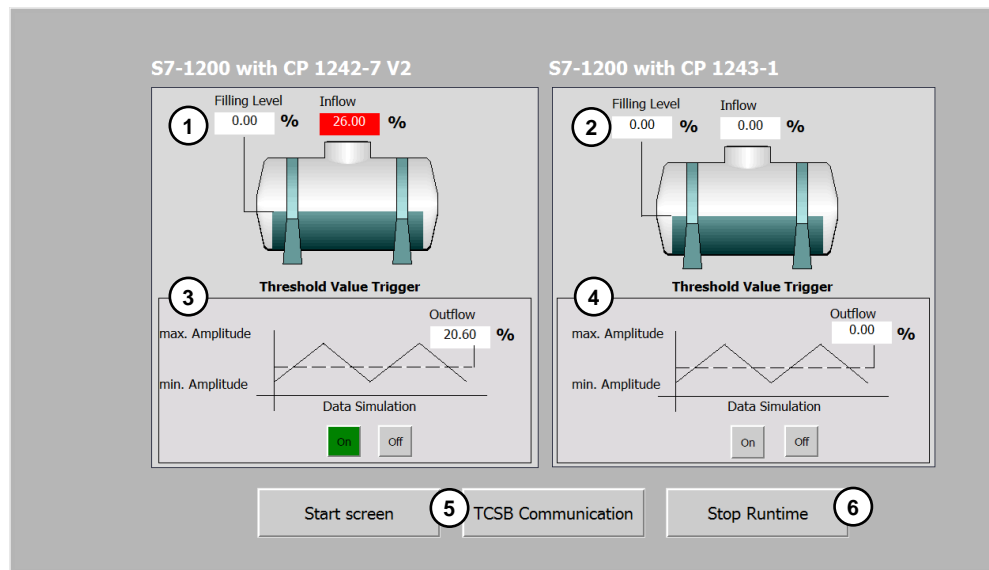


Table 2-2

No.	Element	Description
1.	Filling level and inflow	Current filling level and inflow of station 1.
2.	Filling level and inflow	Current filling level and inflow of station 2.
3.	Parameters for the “threshold-trigger” process of station 1.	<ul style="list-style-type: none"> • Outflow: Current outflow • On: Starts the data simulation • Off: Stops the data simulation
4.	Parameters for the “threshold-trigger” process of station 2.	<ul style="list-style-type: none"> • Outflow: Current outflow • On: Starts the data simulation • Off: Stops the data simulation
5.	Screen change	One click on the buttons changes the display of the appropriate screens.
6.	Stop Runtime	Pressing this button terminates WinCC Runtime.

2.4 Hardware and software components

2.4.1 Validity

This application is valid for

- CP 1242-7 V2 (FW V3.1)
- CP 1243-1 (FW V3.1)
- STEP 7 V15.1
- WinCC Professional V15.1
- S7-1200 PLC V4.1 or higher
- TCSB V3.1.0.1

Note

The STEP 7 V13 SP1 project can be found in the archive on the download page of this entry. (see [2\](#))

The configuration of the SIMATIC CP 1243-1 with STEP 7 V13 SP1 module requires HSP 0170. (see [3\](#))

2.4.2 Components used

The application has been created with the following components:

Hardware components of station 1

Table 2-3

Component	Qty.	Article number	Note
S7-1200 PM1207	1	6EP1332-1SH71	Power supply
SIMATIC S7-1200 PLC 1217C DC/DC/DC	1	6ES7217-1AG40-0XB0	Any S7-1200 PLC as of V4.1 can be used.
COMMUNICATION PROCESSOR CP 1242-7 V2	1	6GK7242-7KX31-0XE0	Firmware V3.1
Antenna ANT794- 4MR	1	6NH9860-1AA00	GSM quadband and UMTS and LTE (Europe)
SIMATIC Memory Card	1	6ES7954-8LF01-0AA0	Memory card for S7-1200 PLC

Hardware components of station 2

Table 2-4

Component	Qty.	Article number	Note
S7-1200 PM1207	1	6EP1332-1SH71	Power supply
SIMATIC S7-1200 PLC 1217C DC/DC/DC	1	6ES7217-1AG40-0XB0	Any S7-1200 PLC as of V4.1 can be used.
COMMUNICATION PROCESSOR CP 1243-1	1	6GK7243-1BX30-0XE0	

Component	Qty.	Article number	Note
SIMATIC Memory Card	1	6ES7954-8LF01-0AA0	Memory card for S7-1200 PLC

Accessories

Table 2-5

Component	Qty.	Article number	Note
SIM card	1	Available from your mobile communications provider	Enabled for data communication
DSL Router & Modem	1	Specialist retailers	SCALANCE M816
Fixed IP address for DSL (broadband) connection or DynDNS	1	Can be requested from your Internet service provider	

Software components

Table 2-6

Component	Qty.	Article number	Note
SIMATIC STEP 7 V15.1	1	6ES7822-1AA05-0YA5	Trial download: The software is subject to export restrictions. The download is only available for registered users. (See \5)
Software TCSB 8 V3.1.0.1 (See \8)	1	6NH9910-0AA31-0AA0	Number of connectable stations: 8. The product is available for further expansion stages and licenses, see document \5 .
SIMATIC WinCC Professional V15.1	1	6AV2103-0AA05-0AA7	Trial download: The software is subject to export restrictions. The download is only available for registered users. (See \5)

Example files and projects

The following list includes all files and projects that are used in this example.

Table 2-7

Component	Note
39863979_S7_1200_WinCC_Prof_PROJ_V20.zip	This zip file includes: <ul style="list-style-type: none"> the STEP 7 / WinCC Professional V15.1 project TCSB project
39863979_S7_1200_WinCC_Prof_DOC_V20_en.pdf	This document.

3 Mode of Operation

This Application Example includes the following key elements:

- Configuration of a S7-1200 station with CP 1242-7 V2 for data communication with the master station via mobile communications network and the Internet
- Configuration of a S7-1200 station with CP 1243-1 for data communication with the master station via Ethernet
- Configuration of TeleControl Server Basic in the master station
- Data exchange between the stations and the master station

3.1 General overview for configuration

With the CP, it is not necessary to program program blocks in order to transfer data to the master station. The data areas in the memory of the S7-1200 PLC intended for communication with the master station are configured in the CP with reference to data points. In this configuration, each data point is linked to a PLC tag in the PLC.

In this example, the current filling level, outflow value and inflow of the station are read and transferred to the master station via the CP. The following transmission modes are specified in the STEP 7 data configuration:

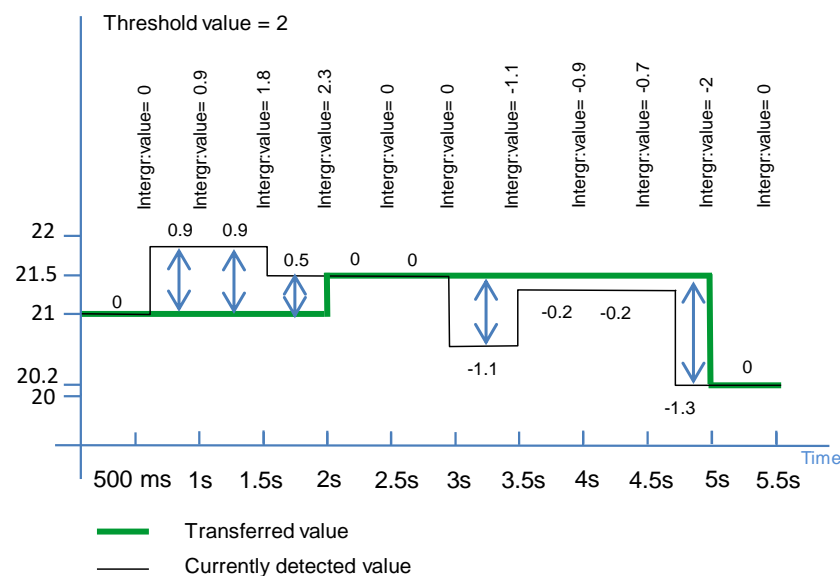
Threshold-triggered

The current outflow is transmitted to the master station, if it has changed by a threshold compared to the last outflow sent.

For the threshold calculations, not the total amount of the deviation of the current outflow value from the last saved outflow value is evaluated, but the amount of the integrated deviation.

Deviations in the current outflow value are added in every calculation cycle (500 ms). Only when the cumulated value reaches the configured value of the threshold value trigger (here 2) is the trigger set and the current outflow transferred.

Figure 3-1



Time-triggered

The current filling level is transmitted cyclically (here: 30s) to the master station.

Event-triggered

The inflow alarm bit (overflow) is transmitted to the master station, if the trigger signal is triggered. The trigger signal is set by the user program, if the current inflow is higher than the limit value. This transfer of the alarm bit resets the trigger signal.

The following figure shows the configuration of the S7-1200 stations for data communication with the master station.

Figure 3-2

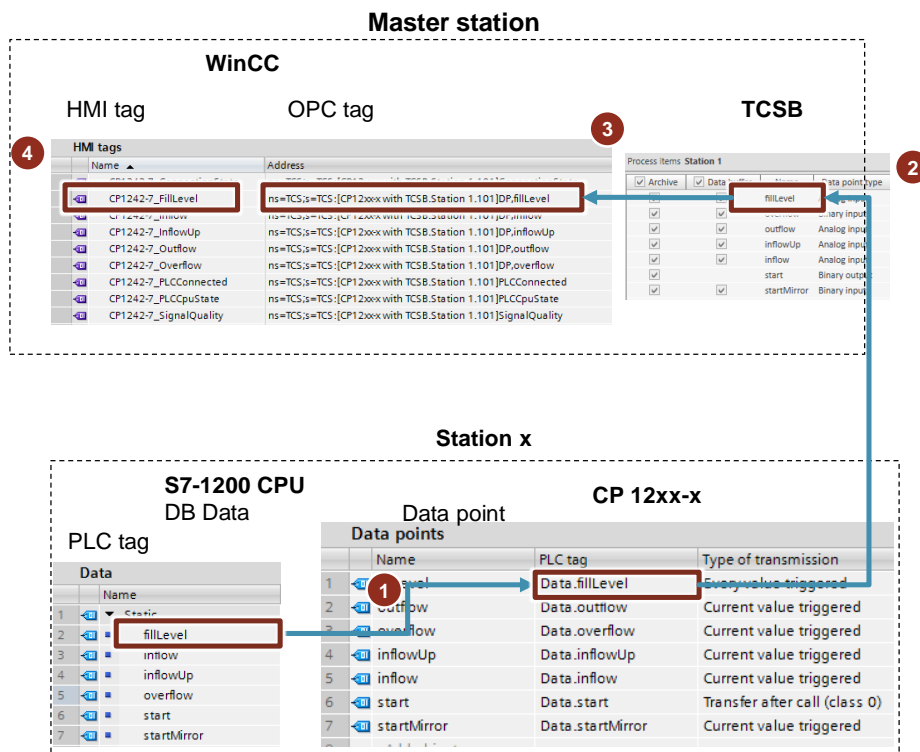


Table 3-1

No.	Station 1	Station 2
1.	In the CP, the "Data.fillLevel" PLC tag is used to configure the "FillLevel" data point.	
2.	The data point is sent to the master station when the transmission criteria are met.	
3.	It is then passed on to the WinCC OPC client as an OPC tag.	
4.	The OPC tag is used to configure the HMI tag.	

Program overview of station 1 / station 2

The structure for the simulation program is identical for both stations. The figure below shows the most important elements.

Figure 3-3

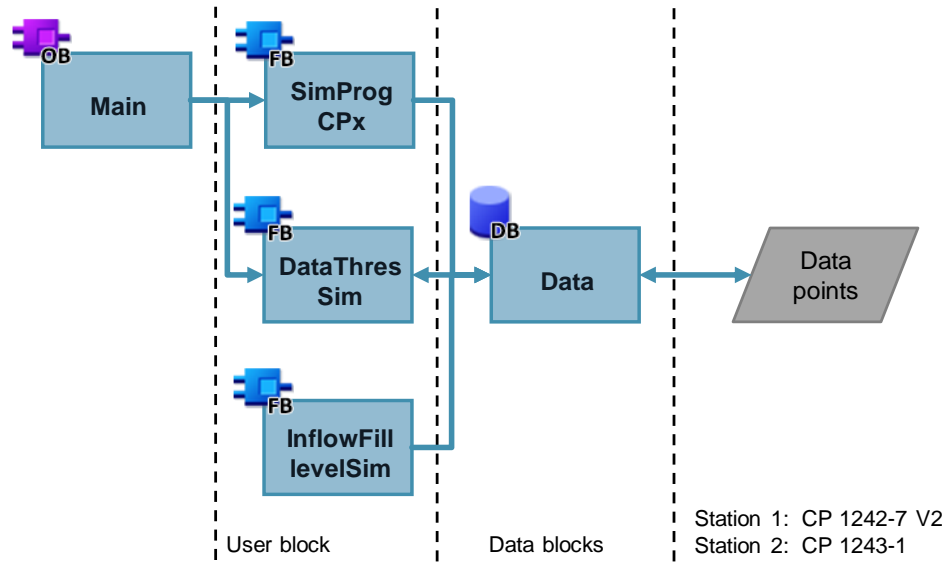


Table 3-2

Element	Symbolic name	Description
OB1	Main	Cyclic OB: Calling the user program
FB1	SimProgCPx	The "SimProgCPx" FB contains the simulation for the event-triggered process (Table 3-1 , Step 4).
FB2	DataThresSim	The "DataThresSim" FB simulates the "outflow" for the threshold-triggered process.
FB3	InflowFilllevelSim	The "InflowFilllevelSim" FB simulates the "inflow" and "filllevel" parameters.
DB1	Data	Global data block for saving the data: <ul style="list-style-type: none"> • Send data • Status tags • Tags for the data simulation
Data points	Configured data points for data exchange between a station and the master station.	

Global data block: "Data" (DB1)

The "Data" DB contains:

- the PLC tags required for the data configuration of the CP12xx-x,
- the PCL tags used for the data simulation of the threshold-triggered process,
- the status tags.

The structure of the global data block is identical for both stations.

Figure 3-4

Data			
	Name	Data type	Start value
1	Static		
2	fillLevel	Real	0.0
3	inflow	Real	0.0
4	inflowUp	Real	25.0
5	overflow	Bool	false
6	start	Bool	false
7	startMirror	Bool	false
8	maxAmplitude	Real	22.0
9	minAmplitude	Real	20.0
10	period	Time	T#16s
11	outflow	Real	21.0
12	done	Bool	false
13	partnerStatus	Word	16#0
14	networkStatus	UInt	0
15	triggerDiag	Bool	true

Table 3-3

Name	Data type	Description
fillLevel	Real	Current fill level of station 1 or station 2.
inflow	Real	Current inflow of station 1 or station 2.
inflowUp	Real	Limit value of the inflow of station 1 / station 2. Start value: 25.0
overflow	Bool	Display of the status of the current inflow. True: Current inflow has exceeded the limit value. False: Current inflow is lower than the limit value.

3 Mode of Operation

Name	Data type	Description
start	Bool	True: The data simulation is active. False: The data simulation has been ended.
startMirror	Bool	Mirrors the "start" tag.
maxAmplitude	Real	Maximum value for the implemented function in the simulation program, "DataThresSim" (triangle function) Start value: 22.0
minAmplitude	Real	Minimum value for the implemented function in the simulation program, "DataThresSim" (triangle function) Start value: 20.0
period	Time	Duration of the implemented function (start value: 16 s)
outflow	Real	Current value of the outflow of station 1 or station 2. Start value: 21.0
done	Bool	Data have been transmitted successfully to the CP
partnerStatus	Word	Status of the connection to TCSB (see Chapter 3-3).
networkStatus	UInt	Status of the connection to the data service of the mobile communications network (see Chapter 3-4). Only relevant for CP1242-7 V2.
triggerDiag	Bool	Diagnostics trigger tag. Is set when starting the example plant for the first time in order to activate the advanced diagnostics (networkStatus) of the CP 1242-7 V2. Only relevant for CP1242-7 V2.

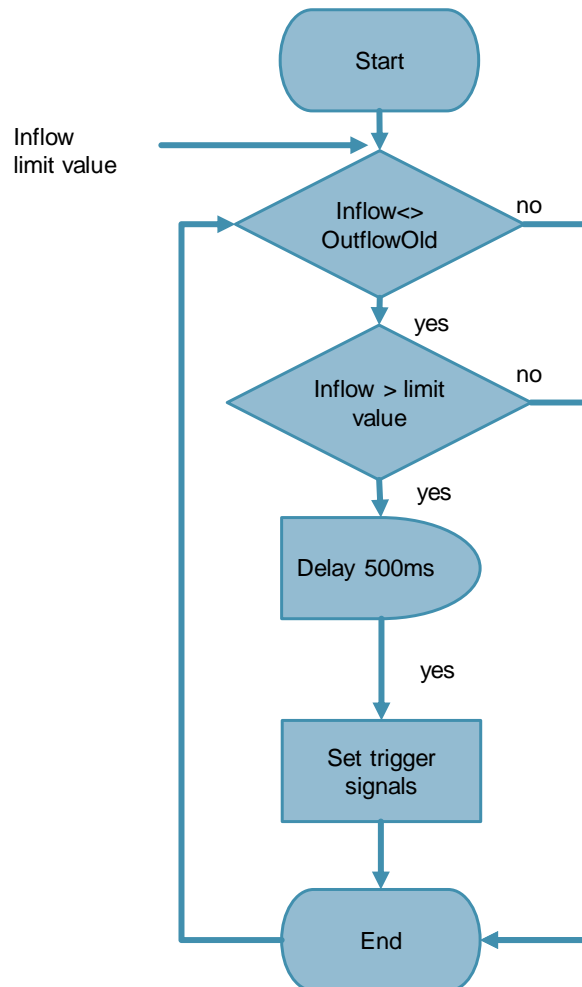
3.2 Functionality of station 1 / station 2

3.2.1 Program details about the "SimProgCP12xx" FB

The "SimProgCPxx" function block sets the trigger signal for sending an alarm bit ("overflow") to the master station if the current inflow of station 1 or station 2 is greater than the limit value (inflowUp).

The trigger signal is automatically reset when the data is transmitted to the CP.

Figure 3-5



If the inflow of station 1 or station 2 is greater than the limit value (inflow > inflowUp), a timer is started in the user program. When the time (500ms) has elapsed, the "statTriggerOverflow" trigger signal is set in the user program and the inflow status (Overflow) is sent to the master station.

Note

It is recommended to set the trigger signal for the event-triggered process with a time delay of approx. 500 ms in order to make sure that the value change of the PLC tag has been reliably accepted for the corresponding data point.

Note The trigger signal should be linked with a **static** tag in the instance data block in the PLC each.

If the trigger signal is interconnected with a global tag, it is possible that the trigger signal may not be automatically reset. This is due to the runtime differences between the PLC cycle and the CP cycle.

The following figure and table show the call interface of user block, FB "SimProgCP12xx" (FB1). It is identical for both stations.

Figure 3-6

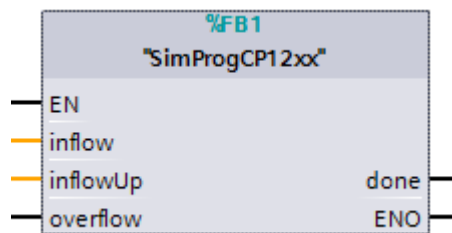


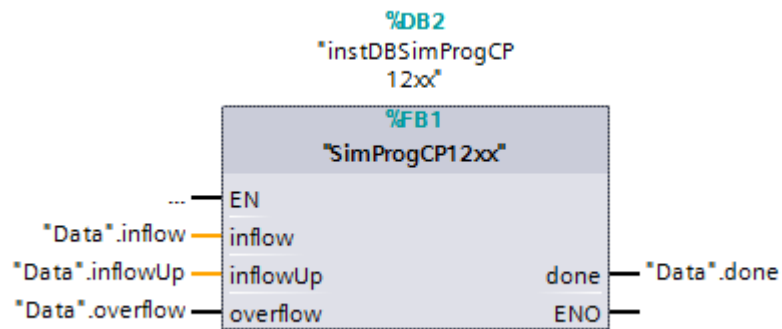
Table 3-4

Name		Data type	Description
Input	inflow	Real	Current inflow of station 1 or station 2.
	inflowUp	Real	Limit value of the inflow of station 1 / station 2. Entered manually by the user. Start value: 25 %.
InOut	overflow	Bool	Display of the status of the current inflow. True: Current inflow has exceeded the limit value. False: Current inflow is lower than the limit value.
Out	done	Bool	True: Data have been transmitted successfully to the CP (only for one cycle)

3.2.2 Call of the "SimProgCP12xx" FB in OB1

The "SimProgCP12xx" FB (FB1) is called cyclically in OB1. The input and output parameters are stored in the global data block, "Data".

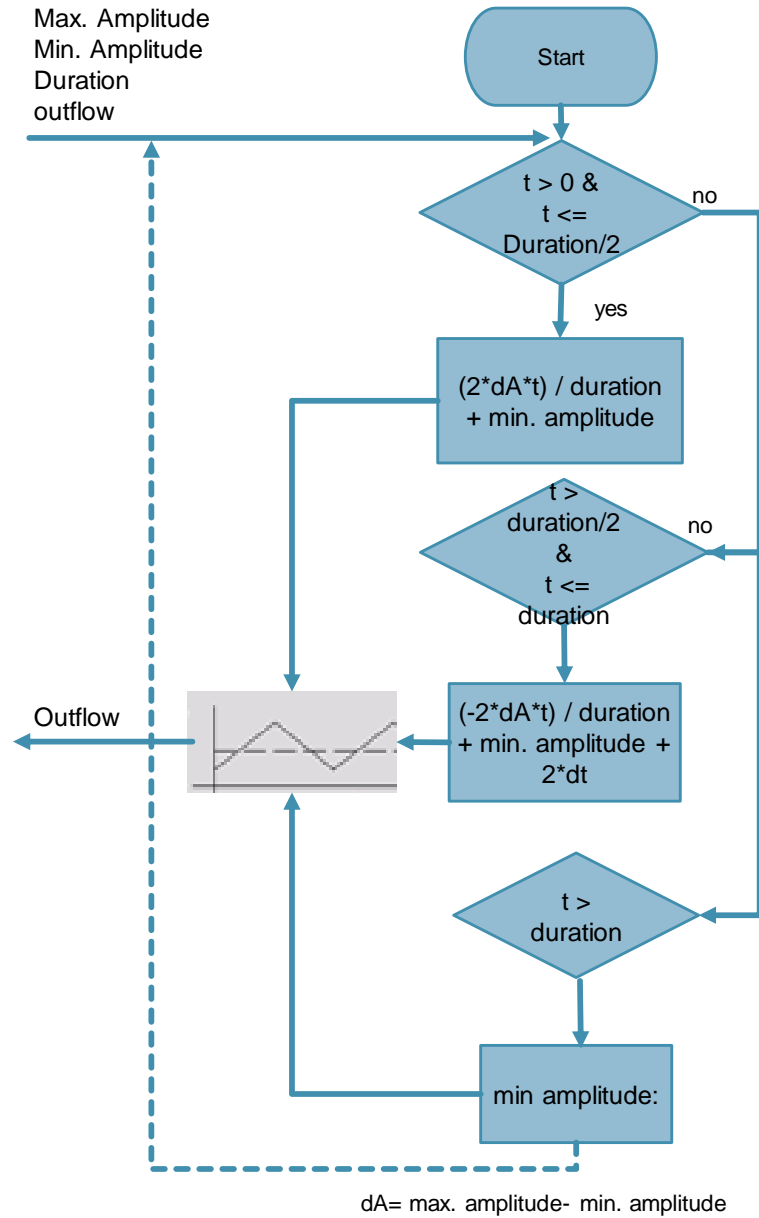
Figure 3-7



3.2.3 Program details about the "DataThresSim" FB

Using a cyclic triangle function, the "DataThresSim" function block simulates the "outflow" of the process.

Figure 3-8



The following figure and table show the call interface of the user block, FB "DataThresSim" (FB2). It is identical for both stations.

Figure 3-9

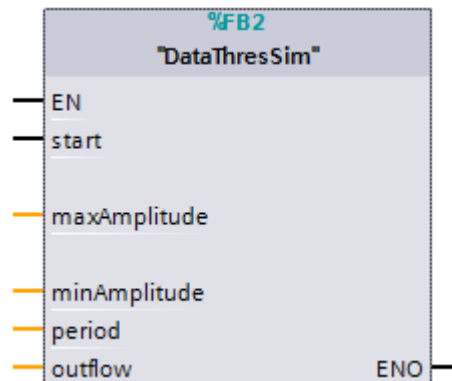


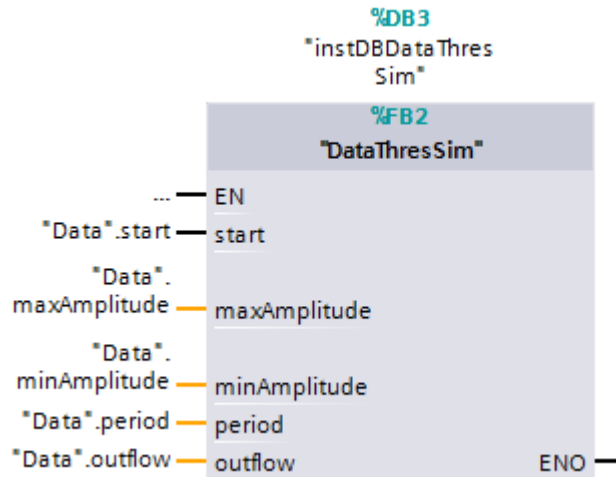
Table 3-5

Name		Data type	Description
Input	start	Bool	True: The data simulation for the threshold-triggered process is active. False: The data simulation for the threshold-triggered process was terminated.
	maxAmplitude	Real	Maximum value for the implemented function in the simulation program, "DataThresSim" (triangle function) Start value: 22.0
	minAmplitude	Real	Minimum value for the implemented function in the simulation program, "DataThresSim" (triangle function) Start value: 20.0
	period	Time	Duration of the implemented function (start value: 16 s)
InOut	outflow	Real	Current value of the outflow of station 1 or station 2. Start value: 21.0

3.2.4 Call of the "DataThresSim" FB in OB1

The "DataThresSim" FB (FB2) is called cyclically in OB1. The input and output parameters are stored in the global data block "Data".

Figure 3-10

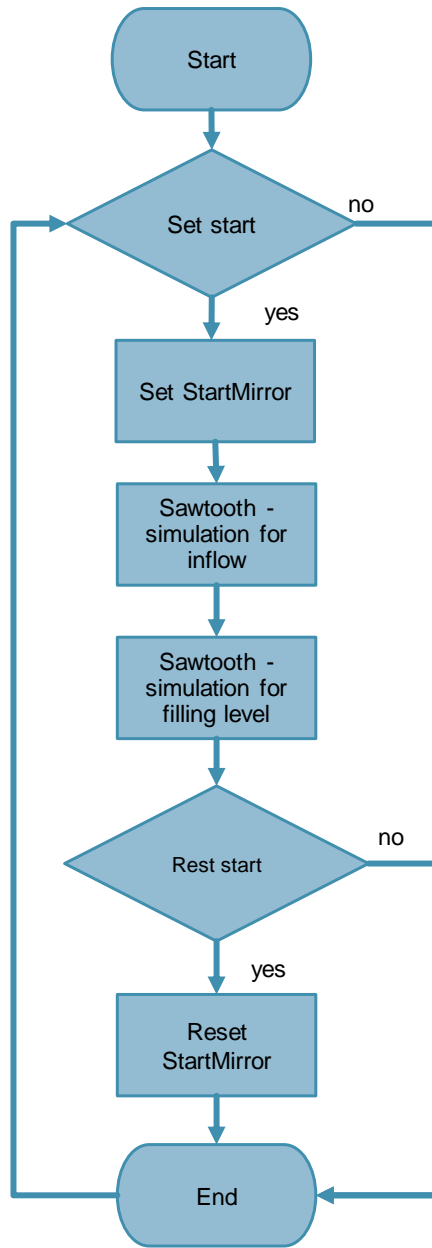


3.2.5 Program details about the "InflowFilllevelSim" FB

The "InflowFilllevelSim" function block simulates the values for the "Inflow" and "Filllevel" tags. The "LGF_Sawtooth" function block from the "LGF_Library" was used to generate a sawtooth signal.

In addition to this, the "Start" tag sent from the master station is relocated to the "StartMirror" tag and then sent back to the master station. As an acknowledgment mechanism, this procedure ensures that the values sent from the master station have been written in the PLC.

Figure 3-11



The following figure and table show the call interface of the user block, FB "DataThresSim" (FB2). It is identical for both stations.

Figure 3-12

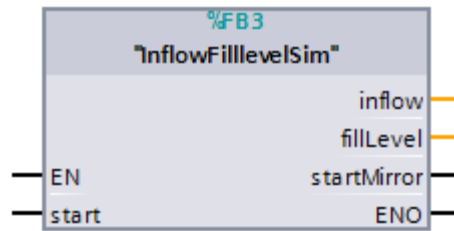


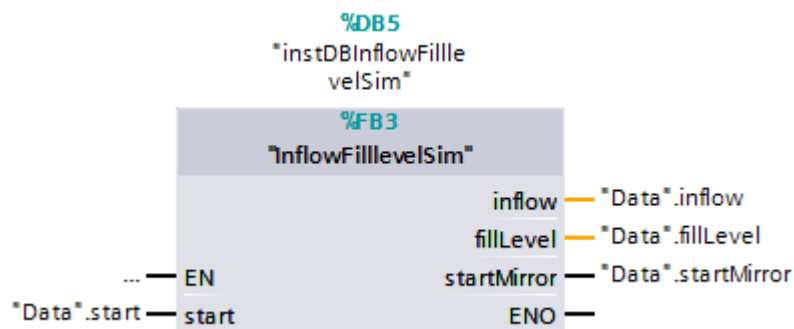
Table 3-6

Name		Data type	Description
Input	start	Bool	True: The data simulation for the inflow and the filling level is active. False: The data simulation for the inflow and the filling level has been ended.
	inflow	Real	Current value of the inflow of station 1 or station 2.
Output	fillLevel	Real	Current value of the filling level of station 1 or station 2.
	startMirror	Bit	Mirrors the "start" tag.

3.2.6 Call of the "InflowFilllevelSim" FB in OB1

The "InflowFilllevelSim" FB (FB3) is called cyclically in OB1. The input and output parameters are stored in the global data block "Data".

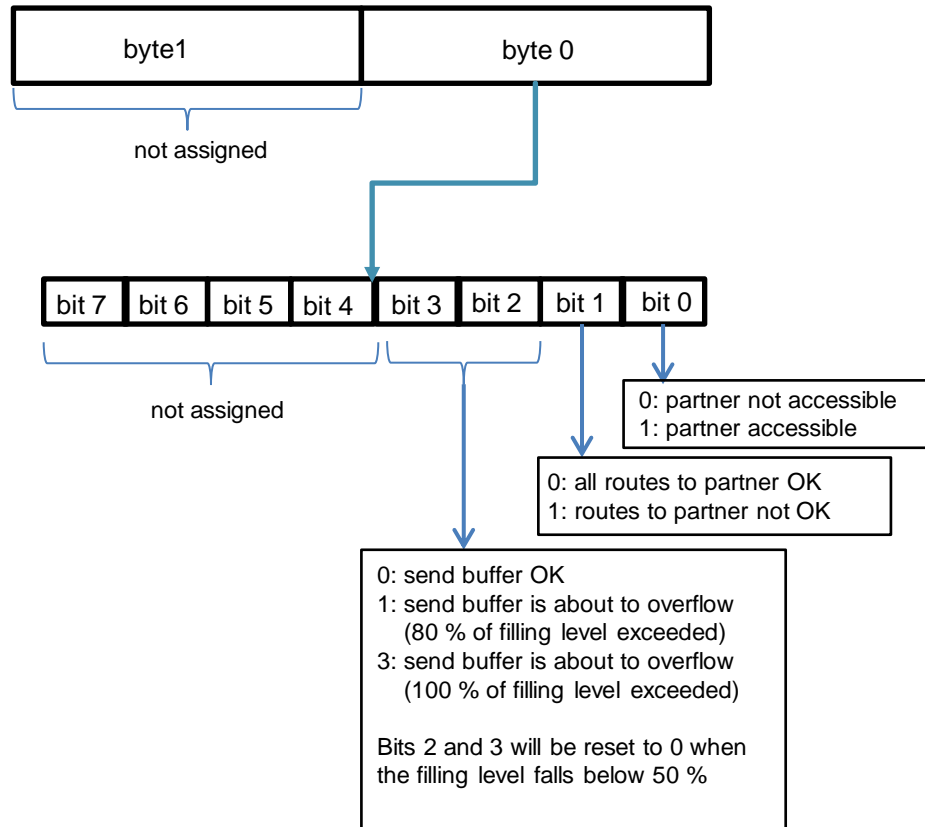
Figure 3-13



3.3 Partner status

Using the "Report partner status" function in the CP configuration, the CP signals the status of the connection to TCSB to the PLC. This information is written to the "partnerStatus" PLC tag in the "Data" DB.

The following figure shows the bit assignment of the "partnerStatus" tag (Word).
Figure 3-14



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3.4 CP diagnostics

With the advanced "CP diagnostics" being activated in the CP 1242-7 configuration (see [5](#)), the status of the connection to the data services in the mobile communications network can be read out from the CP.

This information is written to the "networkStatus" PLC tag (UInt) in the "Data" DB.

Table 3-7

networkStatus	Meaning
0	Status of the mobile communications network: not connected
1	Wrong PIN number
2	Missing or defective SIM card
3	Waiting for PIN entry
4	Status of the mobile communications network: connected

4 Configuration and Settings

Note The configuration and settings are fully implemented in the project. This chapter is for information only.

The configuration is performed using the following configuration tools:

- STEP 7 V15.1:
 - Configuring station 1 (S7-1200 PLC with CP 1242-7 GPRS V2)
 - Configuring station 2 (S7-1200 PLC with CP 1243-1)
 - Configuring the data points for both stations
- TeleControl Server Basic V3.1:
 - Creating and configuring a project
 - Creating and configuring connections
 - Configuring general parameters
- WinCC Professional V15.1:
 - Establishing the connection to the server
 - Configuring OPC items

4.1 IP addresses in the application example

This application example uses the IP addresses shown in the following table.

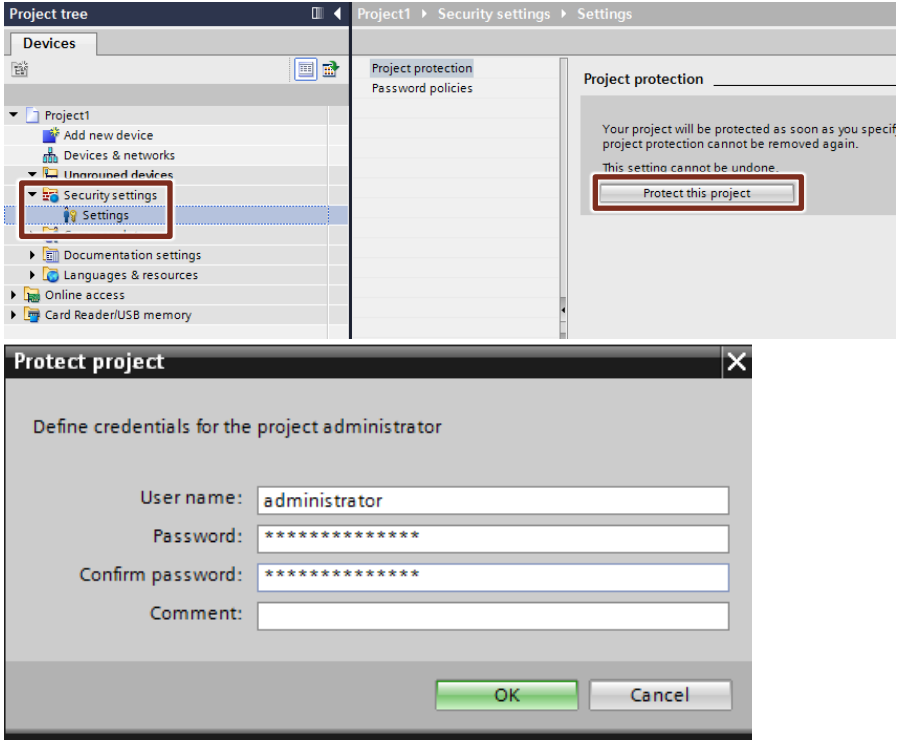
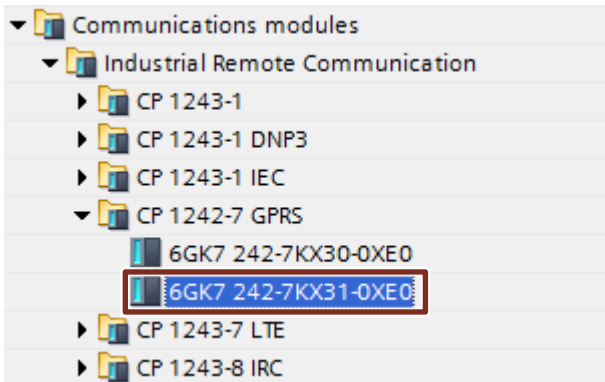
Table 4-1

Station	Module	IP address	
		Internal	External
Master station	PG/PC	172.16.62.100/16	
Engineering station	PG/PC	192.168.0.100/24 (for loading the stations)	
DSL router	SCALANCE M816	172.16.0.1/16	Static IP address from provider or DynDNS
Station 1	CP 1242-7 V2	Dynamic IP address	
	PLC	192.168.0.1/24	
Station 2	CP 1243-1	172.16.62.1/16	
	PLC	192.168.0.2/24	

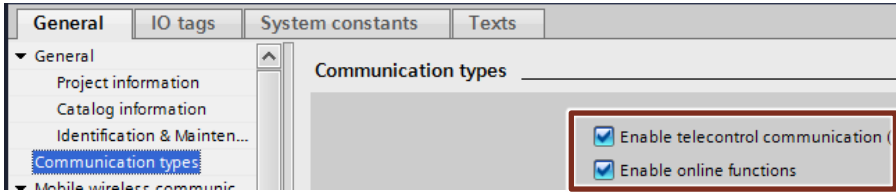
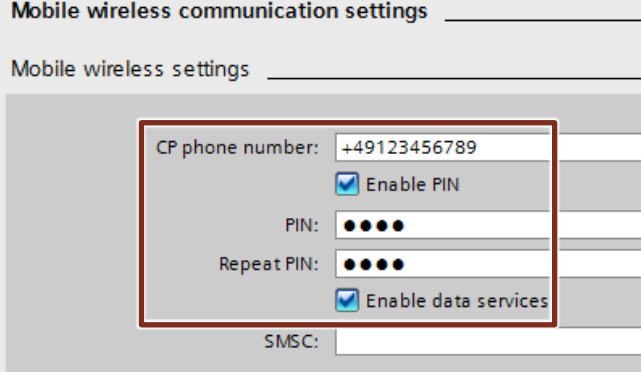
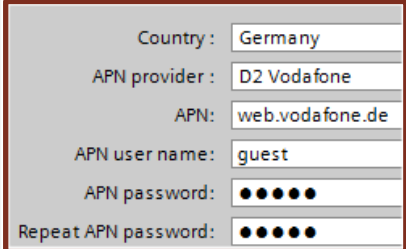
4.2 Configuration of station 1

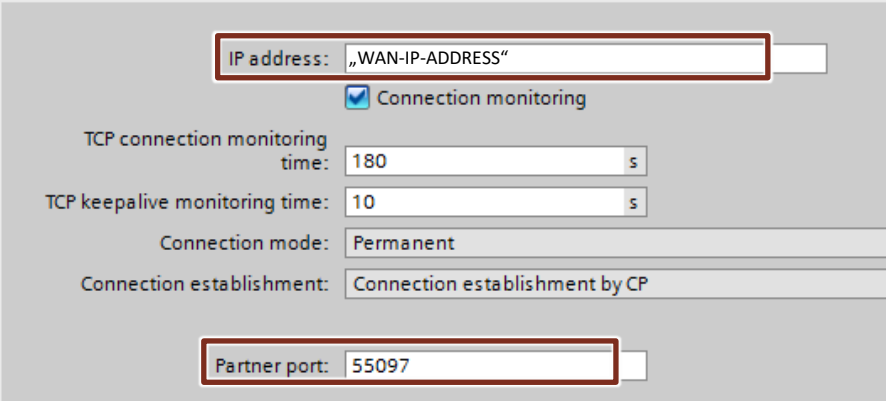
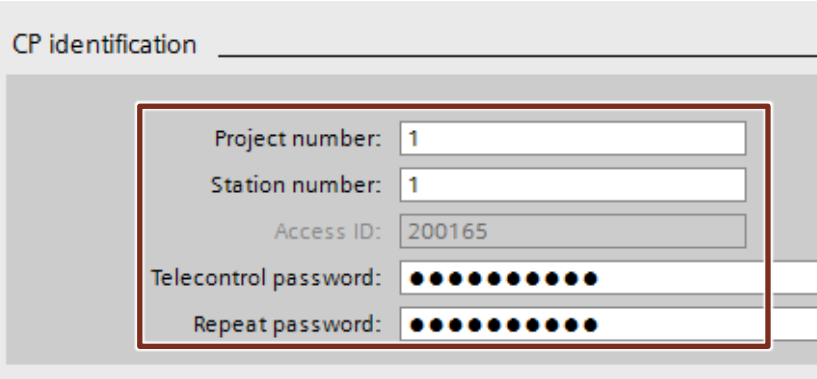
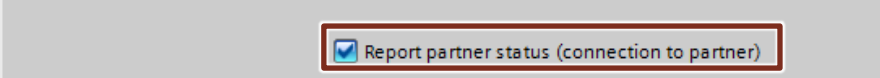
The following table shows you how to configure an S7-1200 station using the CP 1242-7 GPRS V2 for the data communication with the master station via the mobile network and the Internet.

Table 4-2

No.	Action
1.	Create a STEP 7 project.
2.	<p>In the security settings, create a user with "administrator rights".</p>  <p>The screenshot shows the SIMATIC Manager interface. On the left, the 'Project tree' is expanded to 'Security settings' > 'Settings'. The 'Settings' dialog box is open, showing 'Project protection' options. A 'Protect this project' button is highlighted. Below it, the 'Protect project' dialog box is shown, where the 'User name' is set to 'administrator', and the 'Password' and 'Confirm password' fields are filled with asterisks. The 'OK' button is highlighted.</p>
3.	Add the S7-1200 PLC (V4.1 or higher) for the SIMATIC station 1.
4.	<p>Add the CP 1242-7 GPRS V2 to the station.</p>  <p>The screenshot shows the 'Communications modules' list in SIMATIC Manager. The 'CP 1242-7 GPRS' folder is expanded, and the '6GK7 242-7KX31-0XE0' module is highlighted with a red box.</p>

4 Configuration and Settings

No.	Action
5.	<p>Enable the telecontrol communication and S7 communication: "Properties > General > Communication types".</p> 
6.	<p>Make the required mobile communication settings: "Properties > Mobile wireless communications settings":</p> <ul style="list-style-type: none"> • Enable PIN • Enable data services • Make the APN settings / depend on the provider. <p>Mobile wireless communication settings</p> <p>Mobile wireless settings</p>  <p>SMSC:</p> <p>APN settings</p> 
7.	<p>Enable the security functions. "Properties > Security > Security properties"</p>

No.	Action
8.	<p>Configure the CP parameters required to configure the TeleControl Server: "Properties CP 1242-7 GPRS V2 > Partner stations > Connection to partner"</p> <ul style="list-style-type: none"> • Partner IP address (static IP address / depends on the provider) • Partner port <p>> Connection to partner</p>  <p>"Properties > Security > CP identification"</p> <ul style="list-style-type: none"> • "Project number" • "Station number" • "Telecontrol password" (here: "CP1242-7") <p>CP identification</p>  <p>The parameters assigned here must be identical to the parameters in TCSB.</p>
9.	<p>Enable the partner status: "Properties > Partner stations > Advanced settings"</p> <p>> Advanced settings</p>  <p>Link a PLC tag you have created in the user program.</p>

No.	Action
10.	<p>Enable the advanced CP diagnostics: "Properties > Communication with the PLC > CP diagnostics".</p> <div style="border: 1px solid #ccc; padding: 10px; background-color: #f0f0f0;"> <p>CP diagnostics</p> <div style="border: 1px solid #ccc; padding: 5px; background-color: #e0e0e0;"> <p><input checked="" type="checkbox"/> Enable advanced CP diagnostics</p> <p>Diagnostics trigger tag: "CP1242-7_with_TCSB_DB".statDiagosticTrigger ...</p> <p>PLC tag for send buffer overflow warning: "CP1242-7_with_TCSB_DB".statBufferOverflow ...</p> <p>Send buffer level: ...</p> <p>Current IP address: ...</p> <p>Mobile wireless signal quality (LED): ...</p> <p>Mobile wireless signal quality (dBm): ...</p> <p>'NETWORK' LED: "CP1242-7_with_TCSB_DB".statNetworkStatus ...</p> <p>Date of last successful logon to network: ...</p> <p>Date of last unsuccessful logon to network: ...</p> <p>Date of last successful logon to TCSB: ...</p> <p>Date of last unsuccessful logon to TCSB: ...</p> </div> </div> <p>Link the "diagnostics trigger tag" and the PLC tags you want to read out of the CP 1242-7 GPRS V2.</p>
11.	Configure the desired data points (see Chapter 4.2).

4.3 Configuring the data points for station 1 / station 2

With the CP 1242-7 GPRS V2 or CP 1243-1, it is not necessary to program program blocks in order to transfer user data between station and master station.

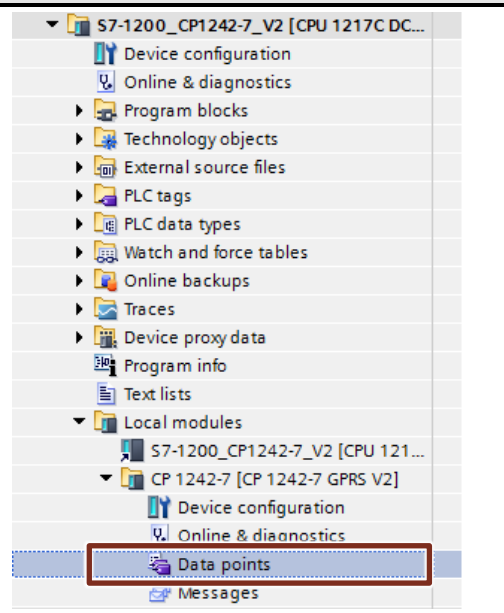
The data areas in the memory of the PLC intended for communication with the master station are configured in the CP 1242-7 GPRS V2 or CP 1243-1 on a data point-related basis. In this configuration, each data point is linked to a PLC tag in the PLC (see [Figure 3-2](#)).

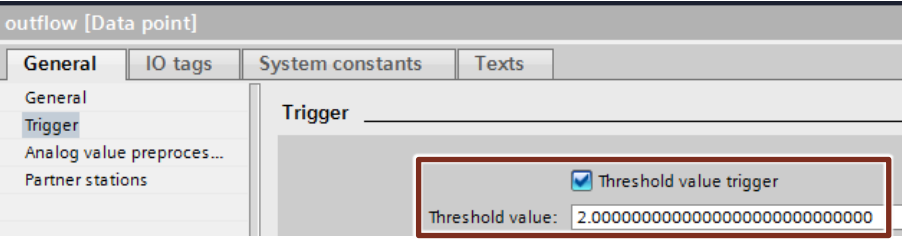
Threshold trigger

The value of the data point is transmitted when it reaches a certain threshold.

For the threshold calculations, not the total amount of the deviation of the process value from the last saved value will be evaluated, but the amount of the integrated deviation (see [Figure 3-1](#)).

Table 4-3

No.	Action																
1.	Open the data point configuration editor. 																
2.	Insert the "outflow" data point as an analog input and link it to the "Data.outflow" PLC tag. <table border="1" data-bbox="486 1464 1321 1630"> <thead> <tr> <th></th> <th>Name</th> <th>PLC tag</th> <th>Data point type</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>fillLevel</td> <td>Data.fillLevel</td> <td>Analog input</td> </tr> <tr> <td>2</td> <td>outflow</td> <td>Data.outflow</td> <td>Analog input</td> </tr> <tr> <td>3</td> <td>overflow</td> <td>Data.overflow</td> <td>Digital input</td> </tr> </tbody> </table>		Name	PLC tag	Data point type	1	fillLevel	Data.fillLevel	Analog input	2	outflow	Data.outflow	Analog input	3	overflow	Data.overflow	Digital input
	Name	PLC tag	Data point type														
1	fillLevel	Data.fillLevel	Analog input														
2	outflow	Data.outflow	Analog input														
3	overflow	Data.overflow	Digital input														
3.	Set the transfer method for this data point (here: Current value triggered). <table border="1" data-bbox="486 1666 906 1756"> <thead> <tr> <th>Transfer method</th> </tr> </thead> <tbody> <tr> <td>Current value triggered</td> </tr> </tbody> </table>	Transfer method	Current value triggered														
Transfer method																	
Current value triggered																	
4.	Define the data point index. <table border="1" data-bbox="486 1792 1091 1908"> <thead> <tr> <th>Transfer method</th> <th>Data point index</th> </tr> </thead> <tbody> <tr> <td>Current value triggered</td> <td>0</td> </tr> <tr> <td>Current value triggered</td> <td>1</td> </tr> </tbody> </table> <p>Note: The index of an input-type data point has to be clear for all data point types (digital inputs, analog inputs, etc.).</p>	Transfer method	Data point index	Current value triggered	0	Current value triggered	1										
Transfer method	Data point index																
Current value triggered	0																
Current value triggered	1																

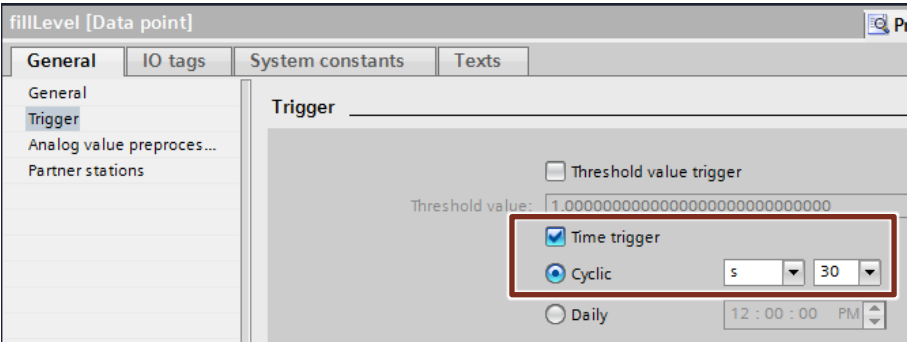
No.	Action						
5.	<p>As the communication partner, select "Telecontrol server".</p> <table border="1"> <thead> <tr> <th>Data point index</th> <th>Partner of data point</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Telecontrol server</td> </tr> <tr> <td>1</td> <td>Telecontrol server</td> </tr> </tbody> </table>	Data point index	Partner of data point	0	Telecontrol server	1	Telecontrol server
Data point index	Partner of data point						
0	Telecontrol server						
1	Telecontrol server						
6.	<p>Configure the "threshold trigger": "Properties > General > Trigger > Threshold value trigger"</p> 						

Time trigger

The data point value is transmitted cyclically (30 s).

Table 4-4

No.	Action																
1.	<p>In the data point configuration editor, insert the "fillLevel" data point as an analog input and link it to the "Data.fillLevel" PLC tag.</p> <table border="1"> <thead> <tr> <th></th> <th>Name</th> <th>PLC tag</th> <th>Data point type</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>fillLevel</td> <td>Data.fillLevel</td> <td>Analog input</td> </tr> <tr> <td>2</td> <td>outflow</td> <td>Data.outflow</td> <td>Analog input</td> </tr> <tr> <td>3</td> <td>overflow</td> <td>Data.overflow</td> <td>Digital input</td> </tr> </tbody> </table>		Name	PLC tag	Data point type	1	fillLevel	Data.fillLevel	Analog input	2	outflow	Data.outflow	Analog input	3	overflow	Data.overflow	Digital input
	Name	PLC tag	Data point type														
1	fillLevel	Data.fillLevel	Analog input														
2	outflow	Data.outflow	Analog input														
3	overflow	Data.overflow	Digital input														
2.	<p>Set the transfer method for this data point (here: Current value triggered).</p> <table border="1"> <thead> <tr> <th>Transfer method</th> </tr> </thead> <tbody> <tr> <td>Current value triggered</td> </tr> </tbody> </table>	Transfer method	Current value triggered														
Transfer method																	
Current value triggered																	
3.	<p>Define the data point index.</p> <table border="1"> <thead> <tr> <th>Transfer method</th> <th>Data point index</th> </tr> </thead> <tbody> <tr> <td>Current value triggered</td> <td>0</td> </tr> </tbody> </table> <p>Note: The index of an input-type data point has to be clear for all data point types (digital inputs, analog inputs, etc.).</p>	Transfer method	Data point index	Current value triggered	0												
Transfer method	Data point index																
Current value triggered	0																
4.	<p>As the communication partner, select "Telecontrol server".</p> <table border="1"> <thead> <tr> <th>Data point index</th> <th>Partner of data point</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Telecontrol server</td> </tr> <tr> <td>1</td> <td>Telecontrol server</td> </tr> </tbody> </table>	Data point index	Partner of data point	0	Telecontrol server	1	Telecontrol server										
Data point index	Partner of data point																
0	Telecontrol server																
1	Telecontrol server																

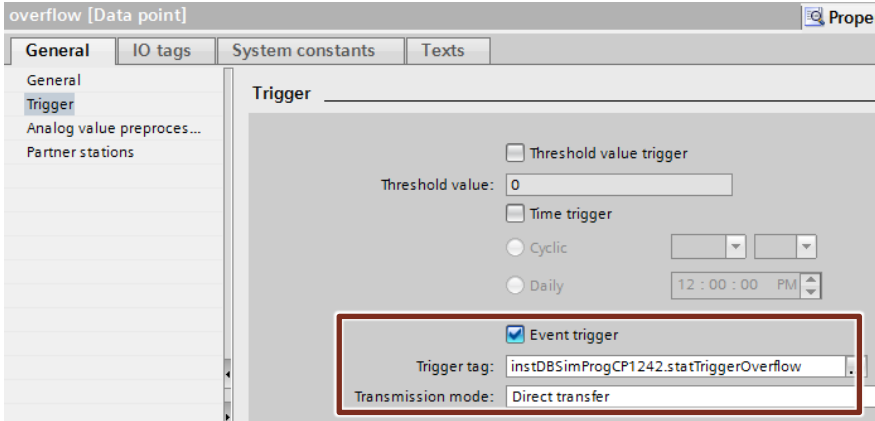
No.	Action
5.	<p>Configure the "time trigger": "Properties > General > Trigger > Time trigger"</p> 

Event trigger

The data point value is transmitted when a configured trigger signal is triggered.

Table 4-5

No.	Action												
1.	<p>In the data point configuration editor, insert the "overflow" data point as digital input and link it to the "Data.overflow" PLC tag.</p> <table border="1" data-bbox="486 987 1114 1146"> <thead> <tr> <th></th> <th>Name</th> <th>PLC tag</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>fillLevel</td> <td>Data.fillLevel</td> </tr> <tr> <td>2</td> <td>outflow</td> <td>Data.outflow</td> </tr> <tr> <td>3</td> <td>overflow</td> <td>Data.overflow</td> </tr> </tbody> </table>		Name	PLC tag	1	fillLevel	Data.fillLevel	2	outflow	Data.outflow	3	overflow	Data.overflow
	Name	PLC tag											
1	fillLevel	Data.fillLevel											
2	outflow	Data.outflow											
3	overflow	Data.overflow											
2.	<p>Set the transfer method for this data point (here: Current value triggered).</p> <table border="1" data-bbox="486 1182 890 1272"> <thead> <tr> <th>Transfer method</th> </tr> </thead> <tbody> <tr> <td>Current value triggered</td> </tr> </tbody> </table>	Transfer method	Current value triggered										
Transfer method													
Current value triggered													
3.	<p>Define the data point index.</p> <table border="1" data-bbox="486 1308 1082 1467"> <thead> <tr> <th>Transfer method</th> <th>Data point index</th> </tr> </thead> <tbody> <tr> <td>Current value triggered</td> <td>0</td> </tr> <tr> <td>Current value triggered</td> <td>1</td> </tr> <tr> <td>Current value triggered</td> <td>2</td> </tr> </tbody> </table> <p>Note: The index of an input-type data point has to be clear for all data point types (digital inputs, analog inputs, etc.).</p>	Transfer method	Data point index	Current value triggered	0	Current value triggered	1	Current value triggered	2				
Transfer method	Data point index												
Current value triggered	0												
Current value triggered	1												
Current value triggered	2												
4.	<p>As the communication partner, select "Telecontrol server".</p> <table border="1" data-bbox="486 1608 1050 1778"> <thead> <tr> <th>Data point index</th> <th>Partner of data point</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Telecontrol server</td> </tr> <tr> <td>1</td> <td>Telecontrol server</td> </tr> <tr> <td>2</td> <td>Telecontrol server</td> </tr> </tbody> </table>	Data point index	Partner of data point	0	Telecontrol server	1	Telecontrol server	2	Telecontrol server				
Data point index	Partner of data point												
0	Telecontrol server												
1	Telecontrol server												
2	Telecontrol server												

No.	Action
5.	<p>Configure the "event trigger": "Properties > General > Trigger > Event trigger"</p>  <p>In the user program, create a trigger tag and link it to the "event trigger".</p>

Note It is recommended to set the trigger tag with a time delay of approx. 500 ms in order to make sure that the value change of the inflow has been reliably accepted for the corresponding data point.

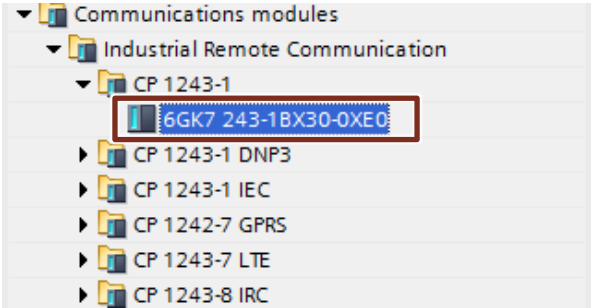
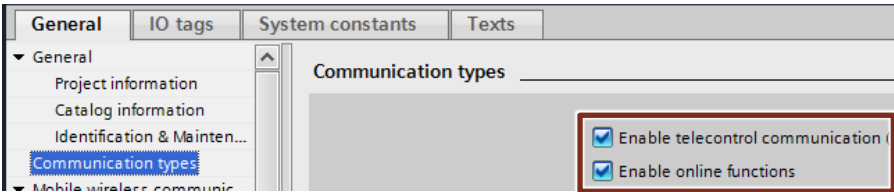
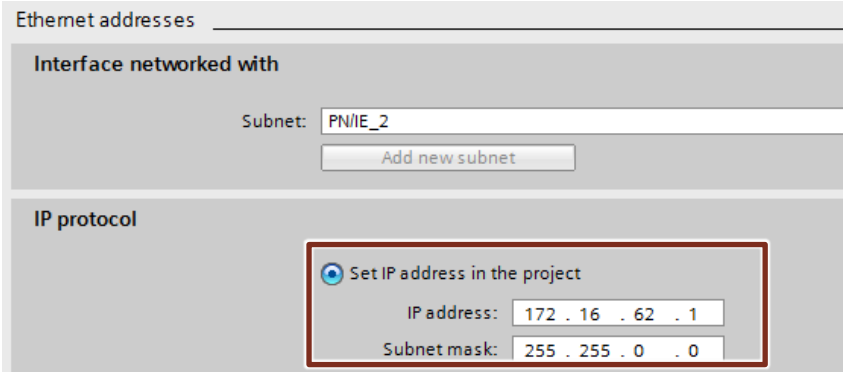
Note The trigger signal should be linked with a static tag in the instance data block in the PLC.

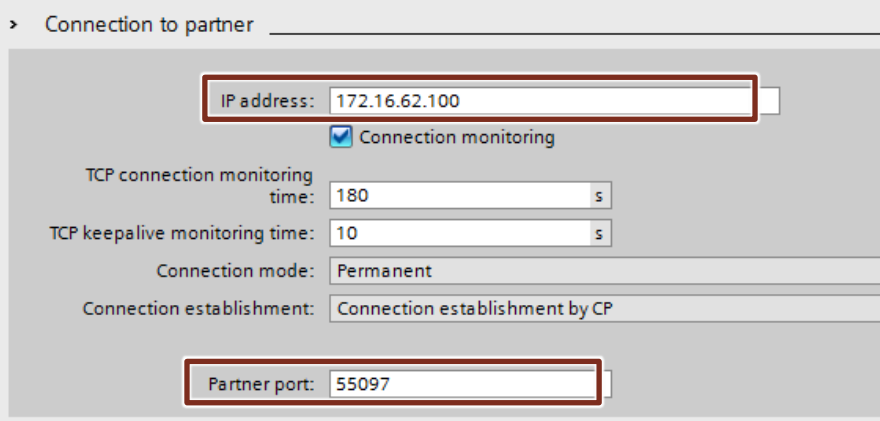
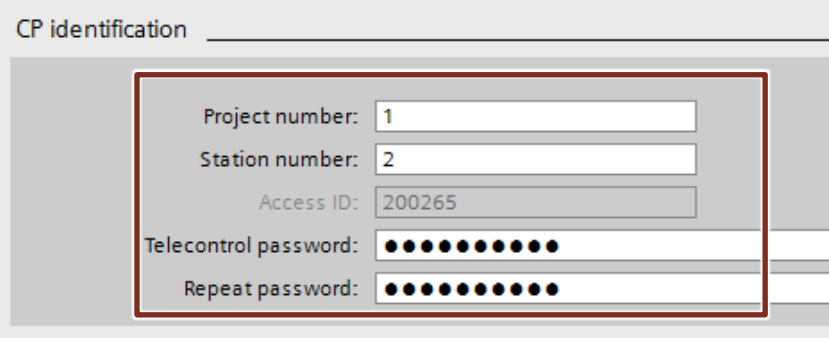
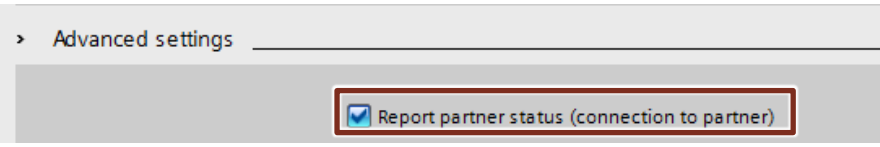
If the trigger signal is interconnected with a global tag, it is possible that the trigger signal may not be automatically reset. This is due to the runtime differences between the PLC cycle and the CP cycle.

4.4 Configuration of station 2

The following table shows you how to configure an S7-1200 station with the CP 1243-1 for data communication with the master station via Ethernet.

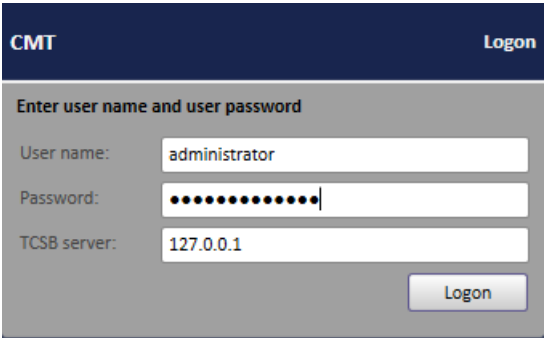
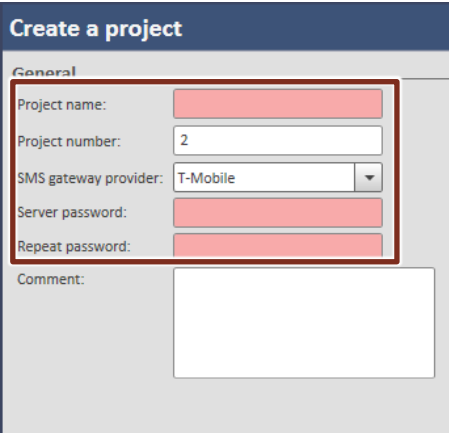
Table 4-6

No.	Action
1.	Add a second S7-1200 PLC (V4.0 or higher) for SIMATIC station 2.
2.	Insert the CP 1243-1 (V3.1) into the station. 
3.	Enable the telecontrol communication and S7 communication: "CP 1243-1 Properties > General > Communication types" 
4.	Create an Ethernet network and connect the CP to the Ethernet network. "Properties of the CP 1243-1 > Properties > Ethernet interface". 
5.	Enable the security functions. "Properties of the CP 1243-1 > Security > Security properties".

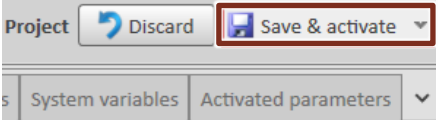
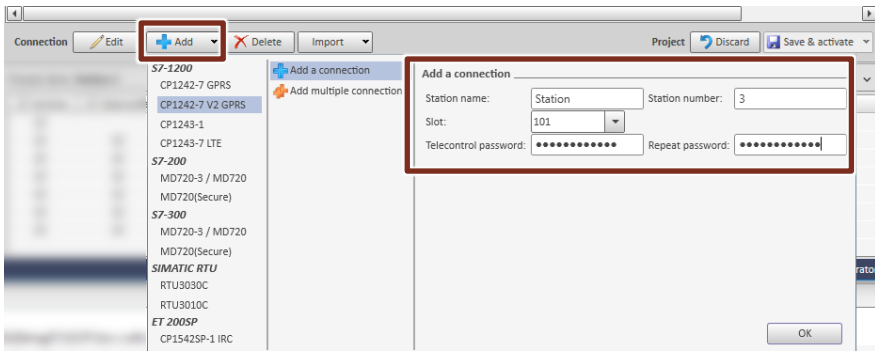
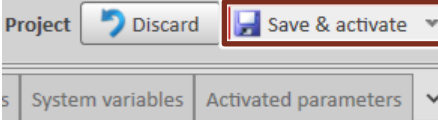
No.	Action
6.	<p>Configure the CP parameters required to configure the TeleControl Server: "CP 1243-1 Properties > Partner stations > Connection to partner"</p> <ul style="list-style-type: none"> Partner IP address Partner port  <p>> Connection to partner</p> <p>IP address: 172.16.62.100</p> <p><input checked="" type="checkbox"/> Connection monitoring</p> <p>TCP connection monitoring time: 180 s</p> <p>TCP keepalive monitoring time: 10 s</p> <p>Connection mode: Permanent</p> <p>Connection establishment: Connection establishment by CP</p> <p>Partner port: 55097</p> <p>"CP 1243-1 Properties > Security > CP identification"</p> <ul style="list-style-type: none"> "Project number" "Station number" "Telecontrol password" (here: "CP1243-1")  <p>CP identification</p> <p>Project number: 1</p> <p>Station number: 2</p> <p>Access ID: 200265</p> <p>Telecontrol password: ●●●●●●●●</p> <p>Repeat password: ●●●●●●●●</p> <p>The parameters assigned here must be identical to the parameters in TCSB.</p>
7.	<p>Enable the partner status: "CP 1243-1 Properties > Partner stations > Advanced settings"</p>  <p>> Advanced settings</p> <p><input checked="" type="checkbox"/> Report partner status (connection to partner)</p> <p>Link a PLC tag you have created in the user program.</p>
8.	<p>Configure the desired data points (see Chapter 4.2). The configuration is identical to that of Station 1.</p>
9.	<p>Download the project data to the station.</p>

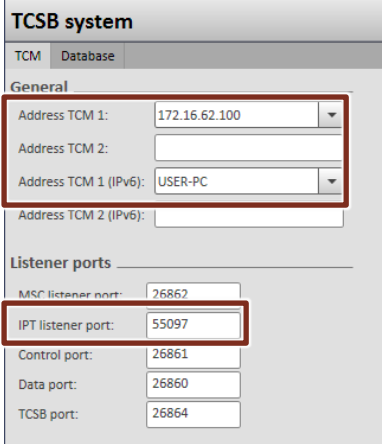
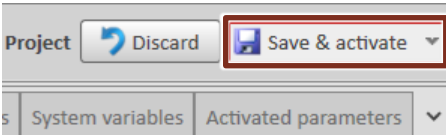
4.5 Configuration of TeleControl Server Basic (TCSB)

Table 4-7

No.	Action
1.	<p>Start the configuration and monitoring user interface of TCSB (CMT):</p> <p>"Windows Start menu > All Programs > Siemens Automation > SIMATIC > TCS Basic > Config and Monitoring Tool"</p>
2.	<p>After starting the program, the CMT Logon window opens.</p>  <p>Enter a configured user name or keep the default user name.</p> <ul style="list-style-type: none"> • Enter the respective password. • Enter the IP address or the TeleControl server name resolved by DNS: <ul style="list-style-type: none"> - computer name or - IP address (default IP address: 127.0.0.1) <p>Default logon data:</p> <p>User name: administrator Password: 0000</p>
3.	<p>Create a new project:</p> <ul style="list-style-type: none"> • In the navigation pane, select the entry "Projects". • In the commands bar, click on the "Add" button. <p>The new project appears in the navigation pane and in the object area.</p>
4.	<p>Configure the new project:</p> <p>In the navigation pane or object pane, select the project and click the "Settings" tab.</p>
5.	<p>Enter the following project parameters: "Project name", "Project number", "Server password". Click "Create".</p> 

4 Configuration and Settings

No.	Action
6.	<p>"Save & activate" the configuration to activate the configuration data for connection establishment.</p> 
7.	<p>Create a new connection for Station 1:</p> <ul style="list-style-type: none"> In the navigation pane, select a project for which a new connection shall be established. In the command bar, select the required connection type from the "Connection type" drop-down list. In the object pane, select the "Add" button from the command bar. Select the desired CP. Enter the "Station name". Enter the "Station number". Enter the "Telecontrol password". <p>Note: The parameters assigned here must be identical to the parameters in the STEP 7 project.</p> <ul style="list-style-type: none"> Click on the OK button.  <p>The new connection appears in the object pane.</p>
8.	<p>Save the changes and enable the project.</p> 
9.	<p>Repeat steps 7 and 8 for Station 2.</p>

No.	Action
10.	<p>Configure the IP address and the ports of the TeleControl server:</p> <p>“TCSB system > "TCM" tab > General > Address TCM 1”</p> 
11.	<p>Save the changes and enable the project.</p> 

Note Once the stations have established a connection to TeleControl Server Basic, the configured data points are known to the server. Only then can you assign the "Archive" and "Data buffer" attributes to the data points. Both attributes are necessary for this application.

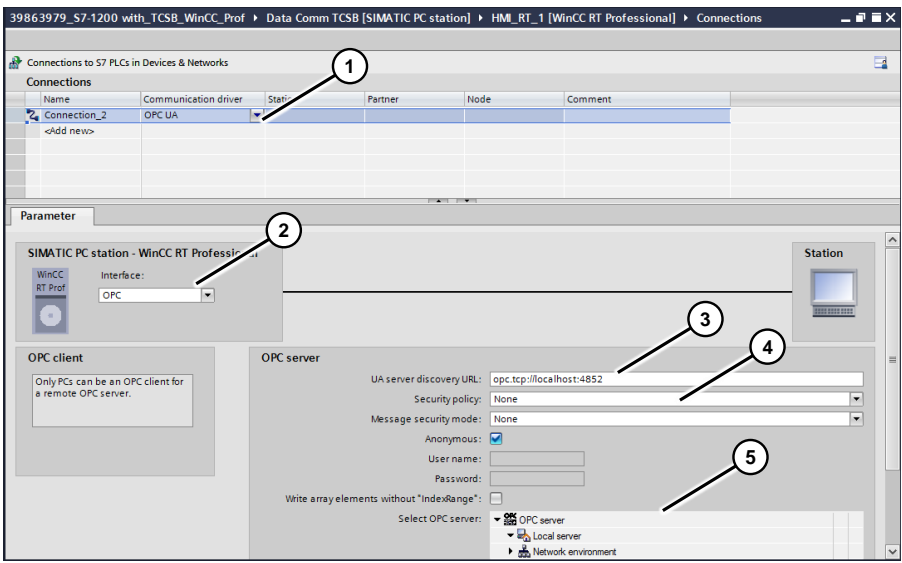
Note When creating a new TCSB project for this Application Example, you have to adjust the affected HMI tags in the visualization software.

4.6 Configuration of WinCC Professional

The TCSB data can be polled from any OPC client, also from the WinCC Runtime Professional.

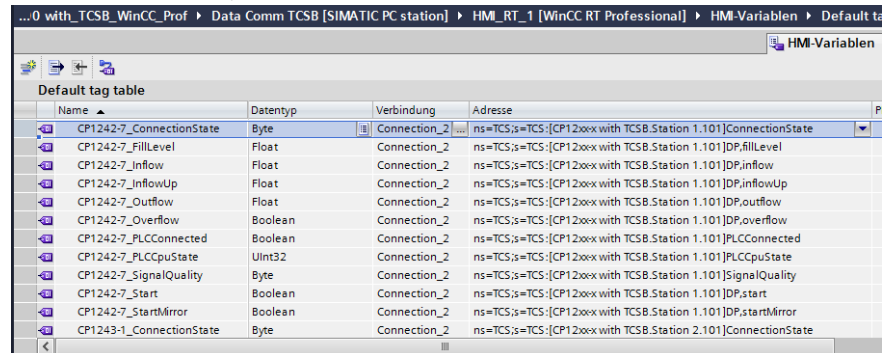
To establish the connection between WinCC and the TCSB, proceed as follows:

Table 4-8

1.	Open TIA Portal and create a new PC station using WinCC RT Professional.
2.	<p>Create a new connection and configure it as follows:</p> <ul style="list-style-type: none"> • Communication driver (1): "OPC UA" • Interface (2): "OPC" 
3.	<p>Enter the address of the TCSB-OPC UA server as "URL UA server discovery URL". (3)</p> <p>Set each, the "Security policy" und "Message security mode" to the value "none". (4)</p> <p>Note</p> <p>Note that the TCSB must also allow free access by clients. The corresponding setting is made in CMT in "TCSB-System -> OPC -> Security policy for OPC UA -> Supported security profiles". Note that if you set a higher security level here, you must also ensure that the certificate exchange between server and client is correct. Details for the configuration of OPC UA communication with SIMATIC HMI devices can be found in 19.</p>
4.	<p>If the server is located on the same computer as the WinCC Runtime, the address is as follows "opc.tcp://localhost:4852"</p> <p>If the server is located on another computer which can be reached in the network, select the server in "Select OPC Server" (5).</p>

5. Go to the tag table and enter the addresses of the tags transmitted by the stations that you want to monitor using the runtime.

Make sure that the syntax of the addresses is correct.



Note

Do not use the drop-down list to select the OPC UA addresses, otherwise unexpected errors may occur.

5 Installation and Commissioning

5.1 Installing the hardware

The necessary hardware components are listed in [Chapter 2.4](#).

Note Always observe the installation guidelines for all components.

NOTICE Before you switch on the power supply, complete and check the installation!

5.1.1 Hardware setup of station 1

The figure below shows the hardware setup of station 1: S7-1200 PLC with the CP 1242-7 GPRS V2.

Figure 5-1

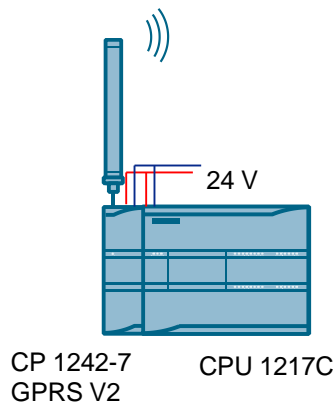


Table 5-1

No.	Action
1.	Insert your SIM card into the CP 1242-7 GPRS V2.
2.	Insert the SIMATIC Memory Card into the PLC.
3.	Connect the PLC with the CP 1242-7 GPRS V2 via the rear bus.
4.	Connect both modules to a suitable module rack.
5.	Connect the antenna to the CP 1242-7 GPRS V2.
6.	Connect the PLC and the CP 1242-7 GPRS V2 to a 24 V DC power source.
1.	Connect the DC power source to the power grid (220 / 230 V AC).

5.1.2 Hardware setup of station 2

The figure below shows the hardware setup of station 2: S7-1200 PLC with the CP 1243-1.

Figure 5-2

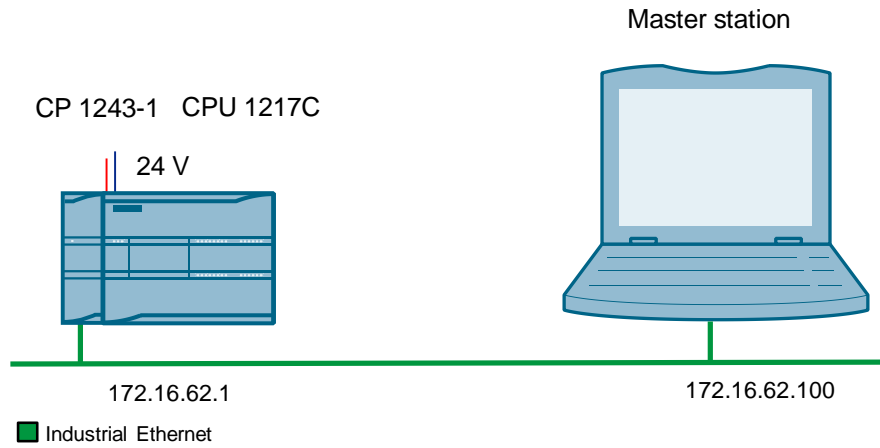


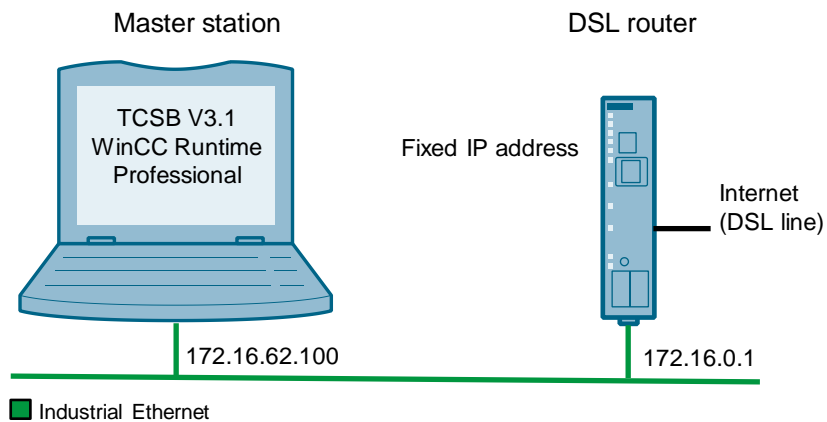
Table 5-2

No.	Action
1.	Insert the SIMATIC Memory Card into the PLC.
2.	Connect the PLC with the CP 1243-1 via the rear bus.
3.	Connect both modules to a suitable module rack.
4.	Connect all corresponding components to a 24 V DC power source.
5.	Connect the DC power source to the power grid (220 / 230 V AC).
6.	Connect the master station to the Ethernet interface of the CP 1243-1.

5.1.3 Hardware setup of master station

The figure below shows the hardware configuration of the master station.

Figure 5-3



Note The TCSB and WinCC RT Prof can also be installed on different PCs as long as the TCSB is accessible from Runtime. In this case the configuration of WinCC RT Prof (Chapter 4.6) has to be adjusted accordingly.

Table 5-3

No.	Action
1.	Connect your PC on which the TeleControl Server Basic runs to the router via Ethernet.
2.	If the DSL modem is not integrated in the router, connect the router to the DSL modem.

5.2 Installing the software

Engineering PC/PG

Table 5-4

No.	Action	Remarks
1.	Install STEP 7 V15.1.	Follow the instructions of the installation program.
2.	Install WinCC Professional V15.1.	

PC/PG as the master station

Table 5-5

No.	Action	Remarks
1.	Install TeleControl Server Basic V3.1.0.1	Follow the instructions of the installation program.
2.	Install WinCC Runtime Professional V15.1.	

5.3 Installing the application software

Unzip the file "39863979_S7-1200_WinCC_Prof_PROJ_V20.zip". This folder contains:

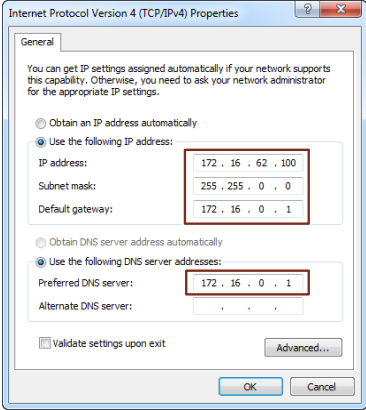
- the archived TIA portal project "39863979_S7-1200_WinCC_Prof_CODE_V20.zip15_1":
 - "S7-1200_CP1242-7" Station 1 project
 - "S7-1200_CP1243-1" Station 2 project
 - "DATA Comm TCSB" WinCC project
- "39863979_S7-1200_with_TCSB.bak" TCSB configuration file

5.4 Commissioning

5.4.1 Assigning the IP address to the master station

The following table shows the network properties you must set for the master station.

Table 5-6

No.	Action	
1.	Open the Internet Protocol (TCP/IP) Properties: "Start > Control Panel > Network and Internet > Network Connections > Local Connections"	
2.	In the open window, select the Internet Protocol (TCP/IPv4) and open Properties.	
3.	Enter the IP address for your master station. In the "Default gateway" and "Preferred DNS server" fields, enter the DSL router's internal IP address. Select "OK" to close the window.	
4.	If your PG has a WLAN interface, disable it.	

5.4.2 Configuring the DSL router

For the configuration, no specific router will be discussed as the screen forms will differ from router to router.

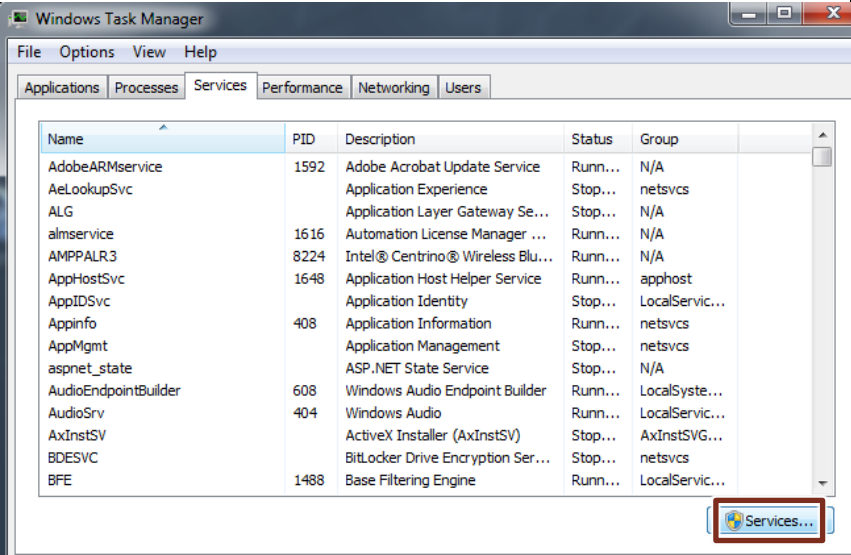
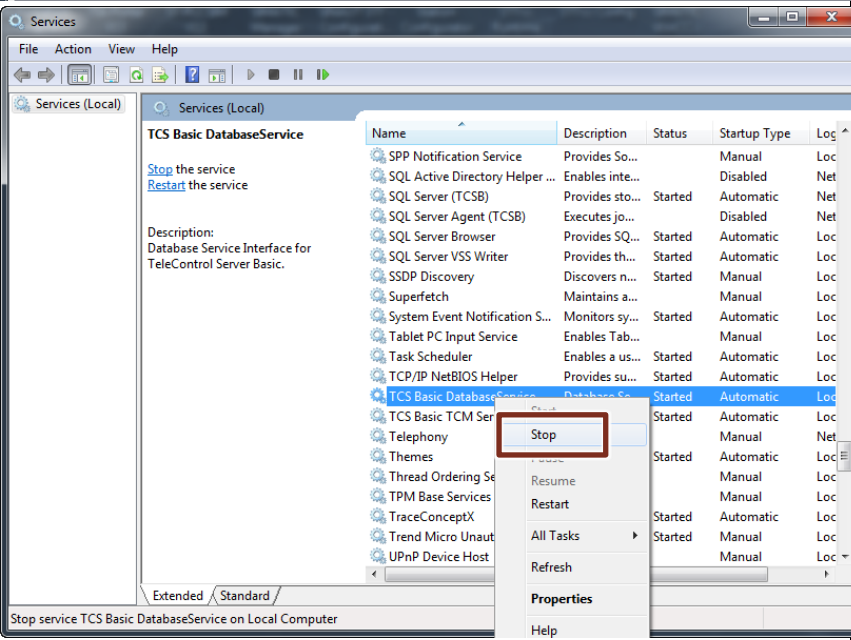
Table 5-7

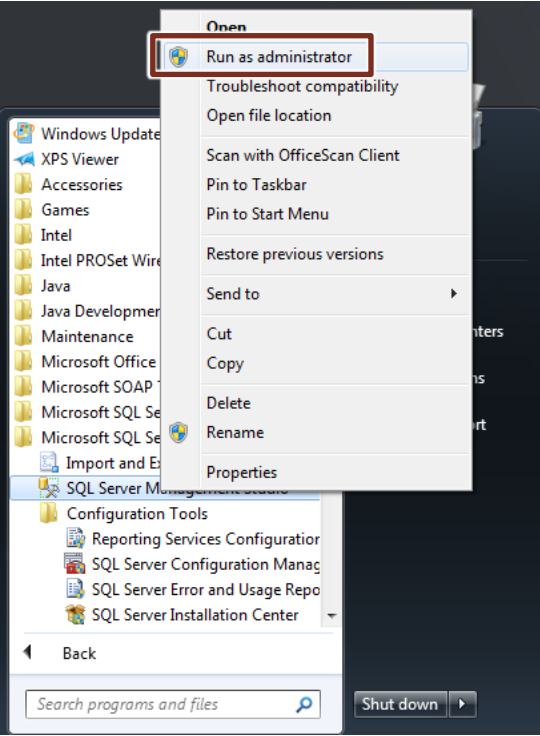

No.	Action
1.	Open the configuration user interface of the router. This can be additional software, "Telnet" or a Web page.
2.	Enter the connection data for your Internet connection. Login, password, etc. you received from your provider.
3.	Enter your DNS server. You will receive the address together with your access data.
4.	Specify a LAN IP address for the router. In this example: 172.16.0.1.
5.	Forward the partner port. TCP port 55097 to port 55097 of 172.16.62.100.

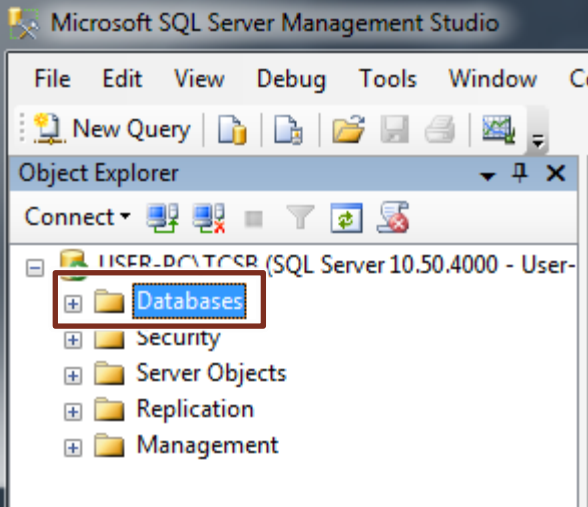
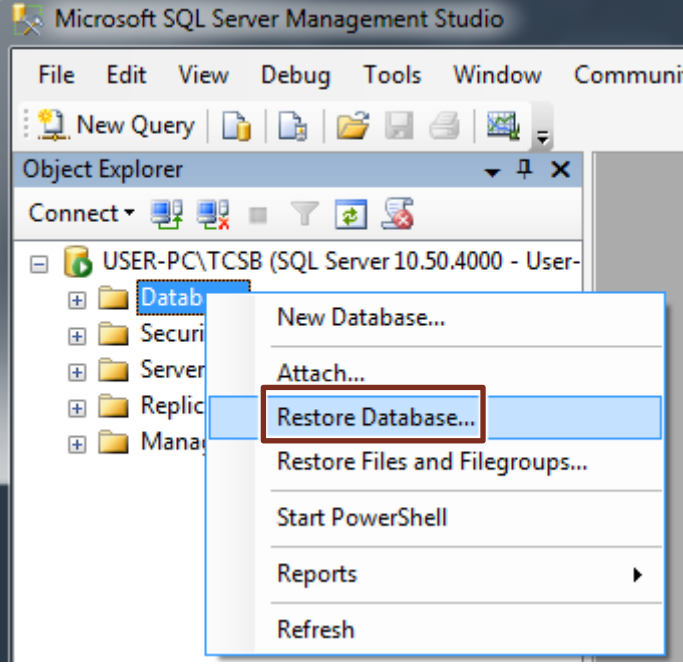
Note To configure the router, you have to assign an IP address to your PG/PC that is in the router's internal network.

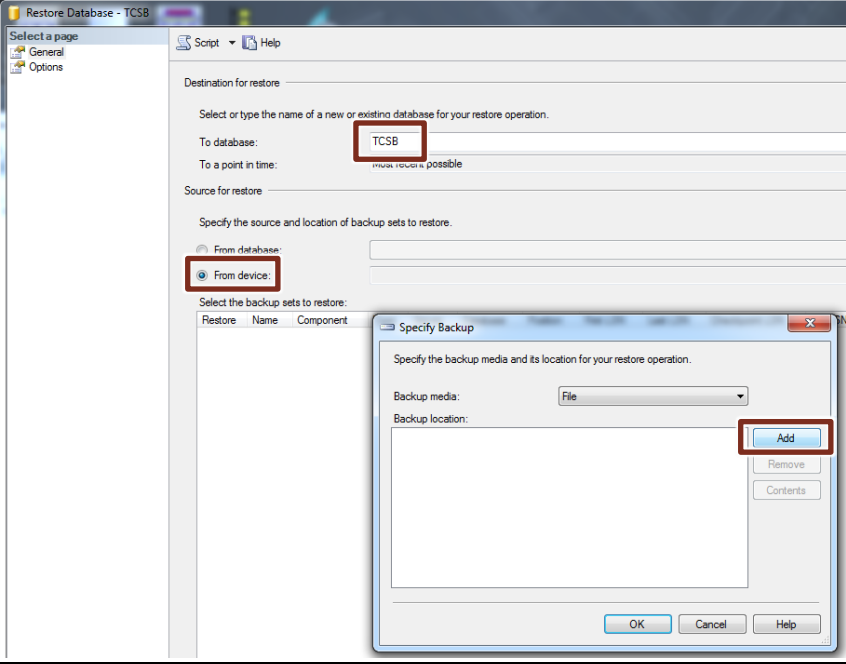
5.4.3 Inserting the "39863979_S7-1200_with_TCSB.bak" database backup copy into TCSB V3.1

Table 5-8

No.	Action
1.	<p>Stop the existing database by selecting "Windows Task Manager" > "Services" tab > "Services" button > "TCS Basic Database Service" (right-click) > "Stop".</p>  

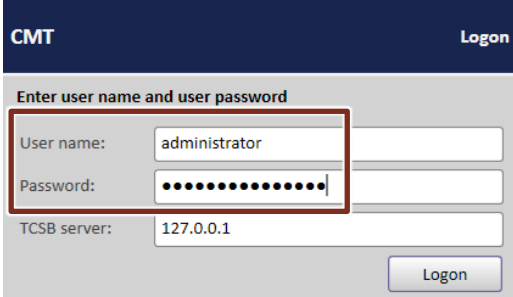
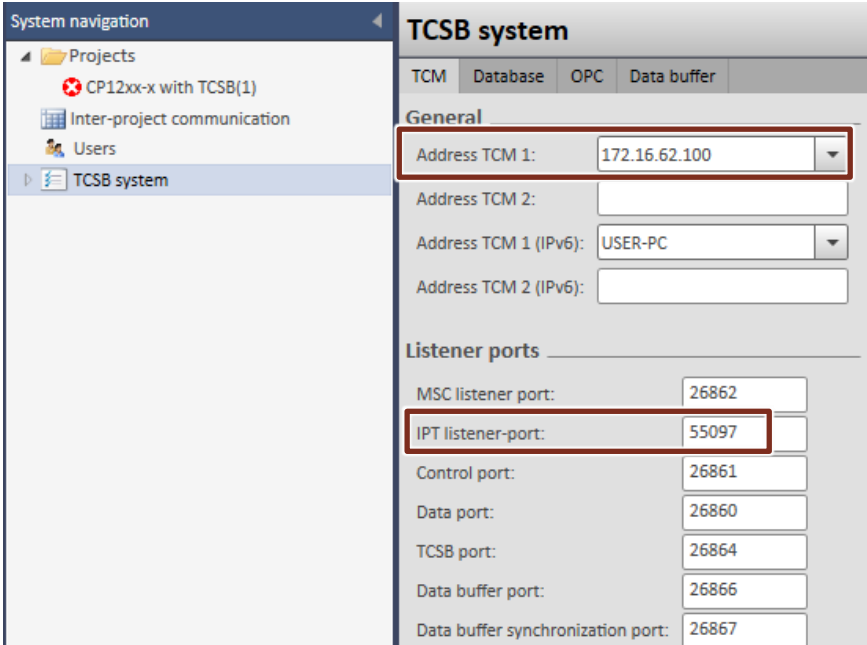
No.	Action
2.	<p>Start SQL Server Management Studio as an administrator: "Start > All programs > Microsoft SQL Server 2008 R2 > SQL Server Management Studio (right-click) > Run as administrator"</p>  <p>The "Connect to Server" dialog opens with the following settings:</p> <ul style="list-style-type: none"> • Server type: Database Engine • Server name: <PC name>\TCSB • Authentication: Windows Authentication
3.	<p>Verify the server name; it must be as follows: "<PC name>\TCSB". Then click "Connect".</p>  <p>The SQL Server Management Studio opens with the object navigation of the database.</p>

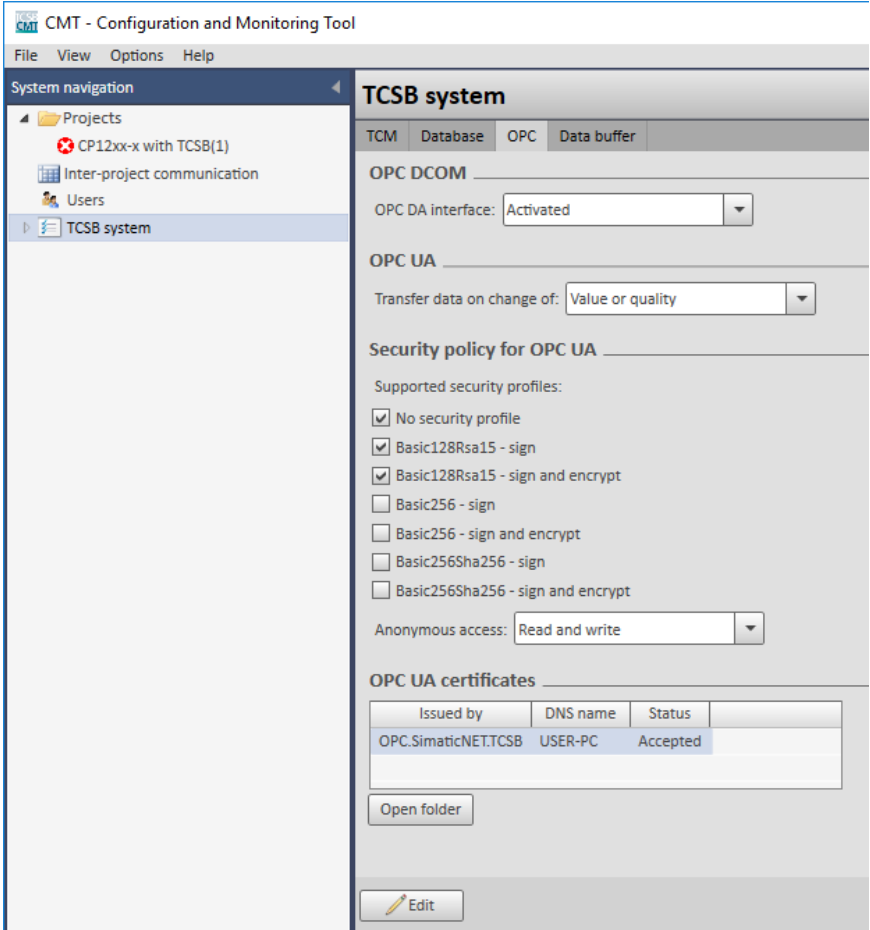
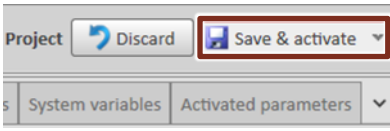
No.	Action
4.	<p>Select the "Databases" item.</p> 
5.	<p>Select the context menu (right-click) "Restore Database...".</p>  <p>The "Restore Database..." dialog opens.</p>

No.	Action
6.	<ul style="list-style-type: none"> In the "Destination for restore" field, select the "TCSB" database ("To database"). In the "Source for restore" field, select the "From device" option and use the "..." button to open the "Specify Backup" dialog. Select the "39863979_S7-1200_with_TCSB.bak" backup copy by first opening the file browser using the "Add" button. 
7.	In the "Restore Database - TCSB" dialog, select the selected "backup set" in the "Restore" column and click "OK".
8.	Click "OK" to close Management Studio.
9.	Restart the computer.

5.4.4 Configuring the IP address and the ports of TeleControl Server Basic V3.1

Table 5-9

No.	Action
1.	<p>Start the configuration and monitoring user interface of TCSB (CMT):</p> <p>"Windows Start menu > All Programs > Siemens Automation > SIMATIC > TCS Basic > Config and Monitoring Tool".</p>
2.	<p>After starting the program, the CMT Logon window opens.</p>  <ul style="list-style-type: none"> • User name: administrator • Password: administrator • Enter the IP address or the TeleControl server name resolved by DNS: <ul style="list-style-type: none"> – computer name or – IP address (default IP address: 127.0.0.1)
3.	<p>Configure the Telecontrol server's IP address by selecting: "TCSB system > Edit > Address TCM 1". Set "IPT listener-port" to 55097.</p> 

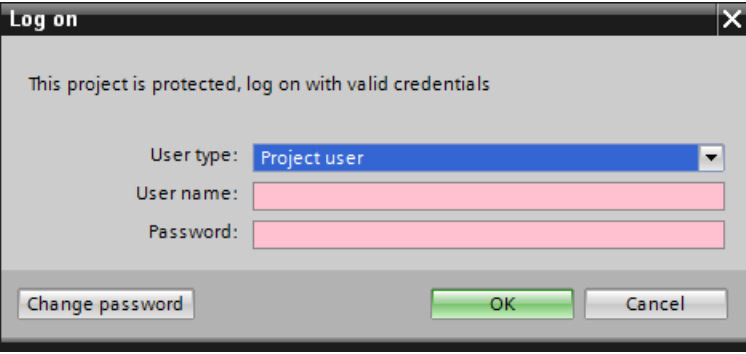
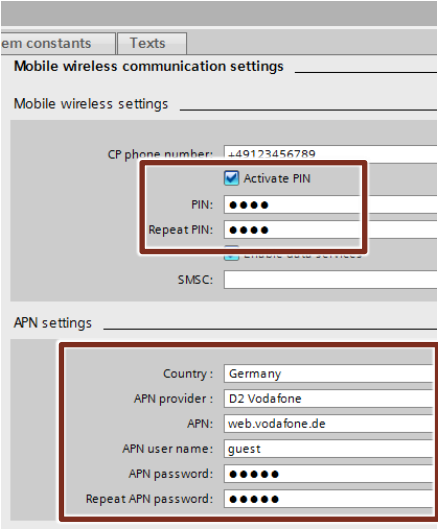
No.	Action
4.	<p>Configure the settings for the integrated OPC server.</p> 
5.	<p>Save the changes and enable the project.</p> 
6.	<p>Restart the computer.</p>

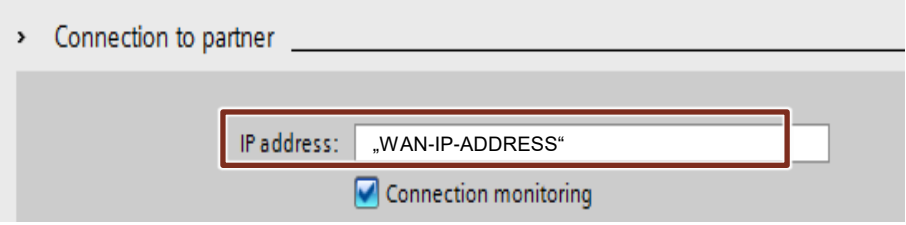
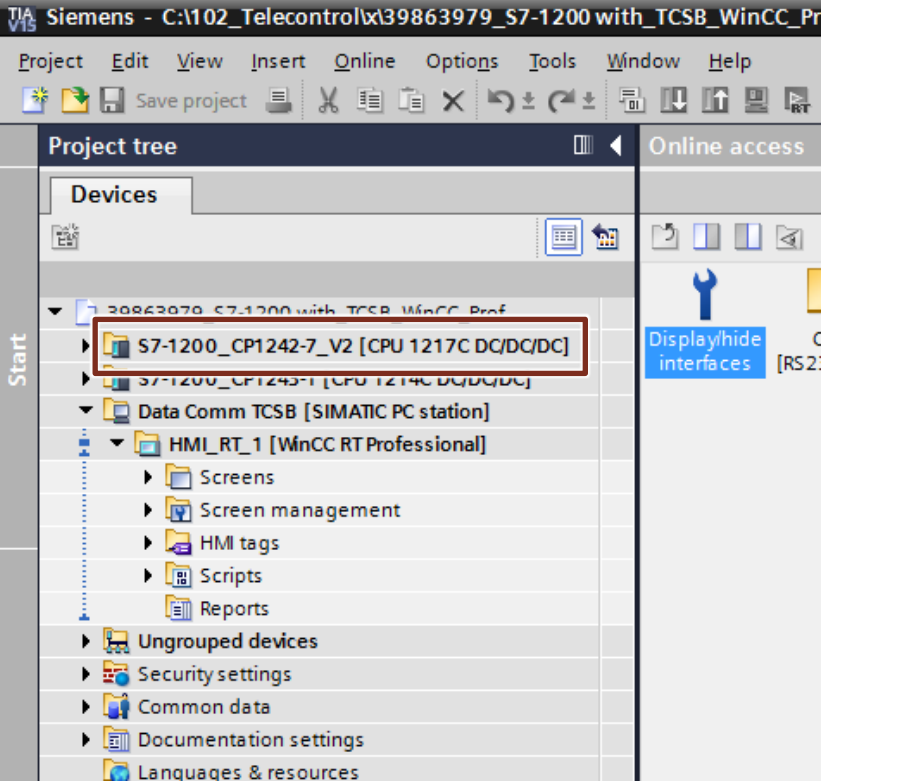
5.4.5 Loading station 1 or station 2

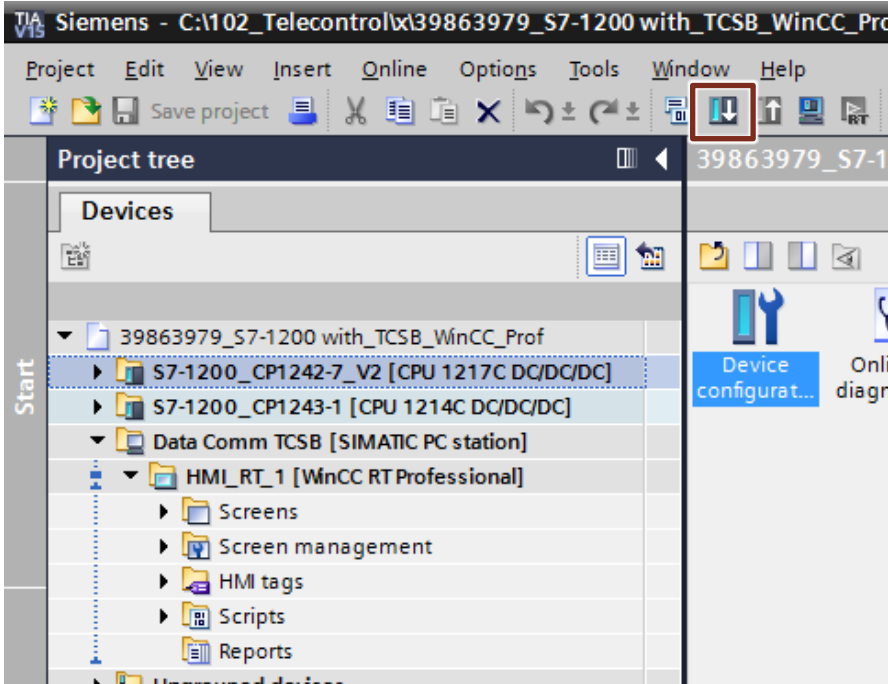
Prerequisites

- Connect your PG to the PLC.
- The PLC must be in a mode that allows loading.
- Before downloading the user program, a general reset of the PLC should be performed to ensure that no "old" blocks are on the PLC.

Table 5-10

No.	Action
1.	Connect the engineering PG to the PROFINET interface of the S7-PLC.
2.	Unzip the "39863979_S7-1200_WinCC_Prof_PROJ_V20.zip" archive.
3.	Retrieve and open the TIA Portal V15 project "39863979_S7-1200_WinCC_Prof_CODE_V20.zap15_1".
4.	<p>Log on:</p>  <p>User name: administrator Password: administrator</p>
5.	<p>Adjust the mobile communication settings of the CP 1242-7 GPRS V2: "Properties > Mobile wireless communications settings":</p> <ul style="list-style-type: none"> • Activate and enter the PIN • Change the APN settings <p>Note: This step is only required for the CP 1242-7 GPRS V2.</p> 

No.	Action
6.	<p>Change the partner IP address (static IP address of your DSL router) required for the connection to the TeleControl server in the master station:</p> <p>"Properties CP 1242-7 GPRS V2 > Partner stations > Connection to partner"</p>  <p>Note: This step is only required for the CP 1242-7 GPRS V2.</p>
7.	<p>Compile and save the project.</p>
8.	<p>Select station "S7-1200_CP1242-7" or "S7-1200_CP1243-1".</p> 

No.	Action
9.	<p>Download the project to Station 1 or Station 2.</p> 
10.	Configure the hardware as described in chapter 5.1.

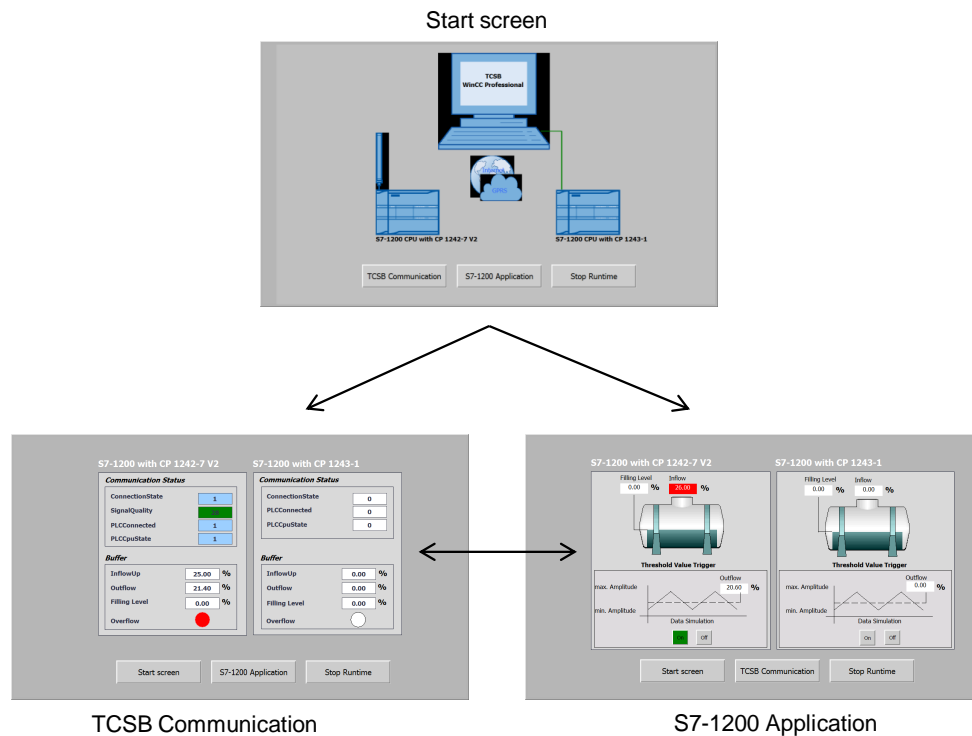
6 Operating the Application

6.1 Overview

Menu navigation of the HMI

The application is visualized with WinCC Professional using two configured screen forms: "TCSB Communication" and "S7-1200 Application".

Figure 6-1



"Start screen" main menu

The "Start screen" main menu allows you to open the application example and toggle between "TCSB Communication" and "S7-1200 Application".

"TCSB Communication" screen

The "TCSB Communication" screen shows the status of the connection to the remote stations. It additionally provides information about data traffic. You can toggle between "Start screen" and "S7-1200 Application".

"S7-1200 Application" screen

The "S7-1200 Application" screen visualizes the processes of stations 1 and 2. You can toggle between "Start screen" and "TCSB Communication".

Watch table of station 1 or station 2

The "WT_SetResetParameter" watch table also allows you to monitor or modify the tags of the "Data" DB directly in the PLC.

A description of the tags is available in [Table 3-3](#).

Figure 6-2

	Name	Address	Display format
1	"Data".fillLevel	%DB1....	Floating-point number
2	"Data".inflow	%DB1....	Floating-point number
3	"Data".inflowUp	%DB1....	Floating-point number
4	"Data".overflow	%DB1....	Bool
5	"Data".outflow	%DB1....	Floating-point number
6	"Data".start	%DB1....	Bool
7	"Data".startMirror	%DB1....	Bool

Note

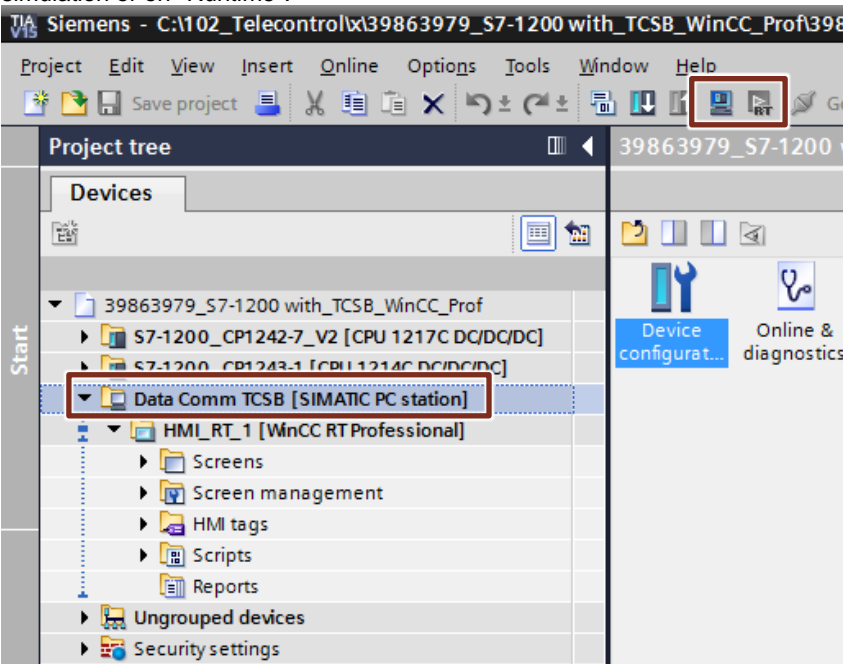
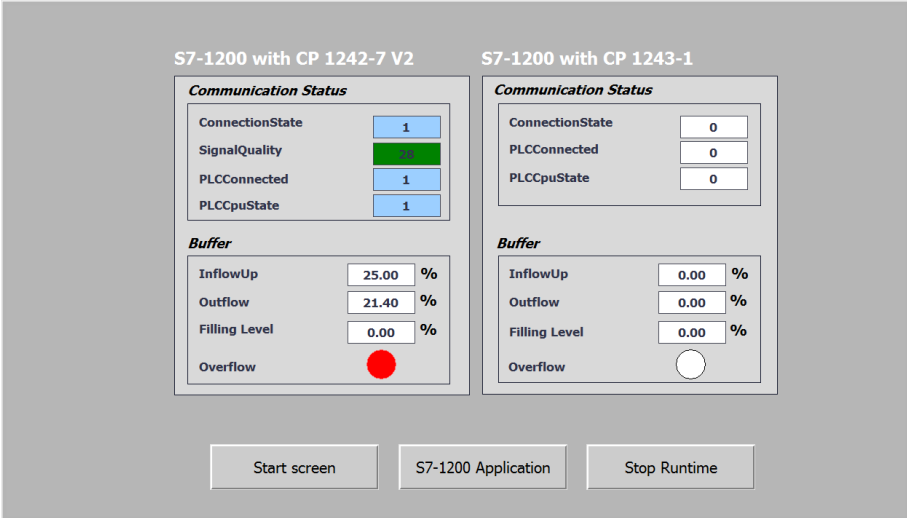
For station 1 (CP 1242-7 GPRS), the Teleservice function needs to be activated in order to be able to monitor or control the tags of the table, since master station and CP are not in the same IP net (see [17](#))

The TeleService function is not necessary for Station 2 as the master station and the CP are in the same IP network.

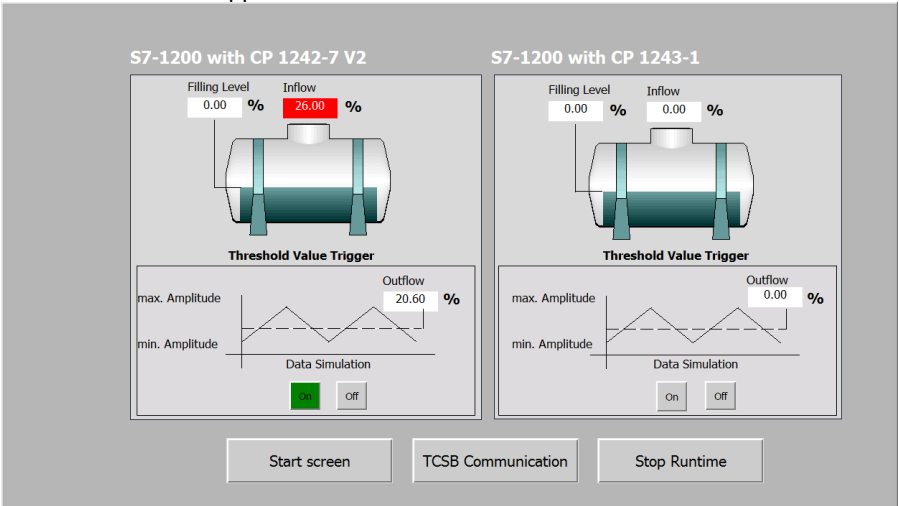
6.2 Starting or stopping WinCC Runtime

To start or stop WinCC Runtime, proceed as follows:

Table 6-1

No.	Action
1.	<p>Select the WinCC Professional Station in the project navigation of the TIA Portal and compile and start the WinCC Runtime Professional by clicking on the icon for simulation or on "Runtime".</p> 
2.	<p>Go to the "TCSB Communication" screen.</p>  <p>Verify that both nodes have established a connection ("ConnectionState = 1"). If this is not the case, check the hardware configuration and the configuration of both stations.</p> <p>In the above example the connection to station 2 is not established.</p>

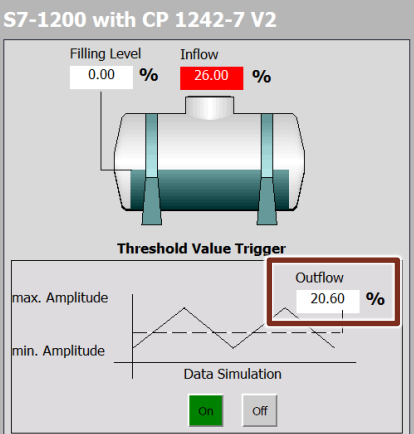
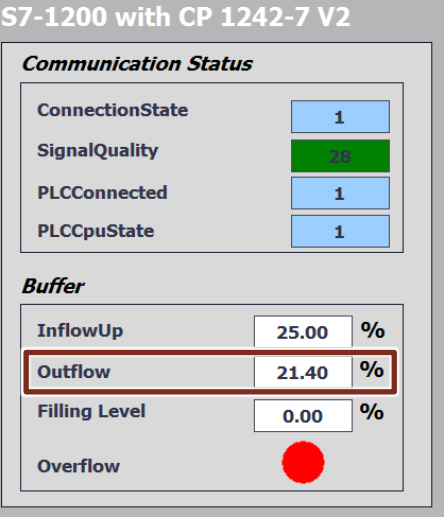
6 Operating the Application

3.	<p>Go to the "S7-1200 Application" screen.</p>  <p>The screenshot displays two side-by-side panels for different S7-1200 stations. The left panel is for 'S7-1200 with CP 1242-7 V2' and shows a 'Filling Level' of 0.00% and an 'Inflow' of 26.00%. The right panel is for 'S7-1200 with CP 1243-1' and shows a 'Filling Level' of 0.00% and an 'Inflow' of 0.00%. Both panels feature a 'Threshold Value Trigger' section with a graph showing 'max. Amplitude' and 'min. Amplitude' over 'Data Simulation', and an 'Outflow' indicator. The 'On' button in the first station is highlighted in green. At the bottom of the screen are three buttons: 'Start screen', 'TCSB Communication', and 'Stop Runtime'.</p>
4.	<p>Use the "On" button to start the data simulation for the respective station. The master station therefore sends a 'start data simulation' command to the station. The station reports that the data simulation has started. In the HMI system, the "On" button is displayed in green.</p>
5.	<p>To stop the data simulation, click the "Off" button.</p>
6.	<p>To stop WinCC Runtime, click "Stop Runtime".</p>

6.3 Station 1 or station 2 sends data to the master station ("threshold-triggered")

Station 1 or station 2 sends its outflow value to TeleControl Server Basic in the master station on a threshold-triggered basis.

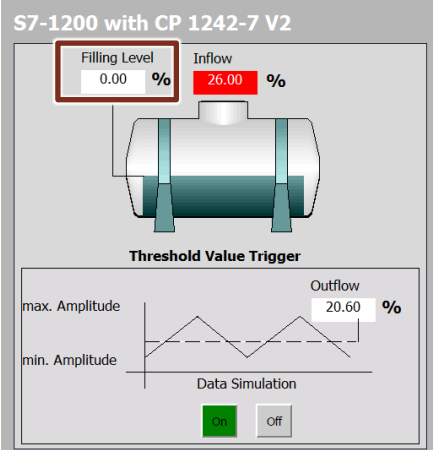
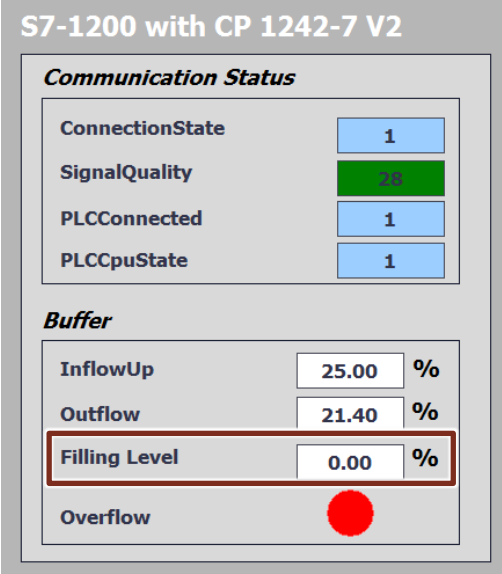
Table 6-2

No	Action
<p>1.</p> <p>If the threshold value "2" is reached (see Figure 3-1), the outflow value is sent to the master station.</p> <p>In the "S7-1200 Application" screen, the "Outflow" field displays the value the master station has received.</p>	
<p>2.</p>	<p>Go to the "TCSB Communication" screen. The outflow value received by the master station can also be monitored in this screen; it is displayed in the "Outflow" field.</p>  <p>Note: "Threshold trigger" = 2 was configured in the data point configuration (see Chapter 4-2).</p>
<p>3.</p>	<p>Repeat the steps for Station 2.</p>

6.4 Station 1 or station 2 sends data cyclically to the master station

Station 1 or station 2 sends its filling level value to the TeleControl Server Basic in the master station in a fixed time interval. The following table provides instructions for this order.

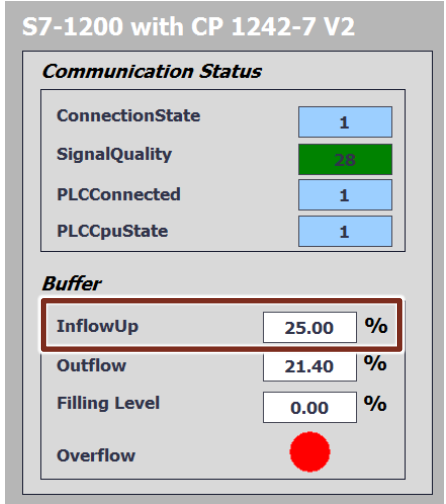
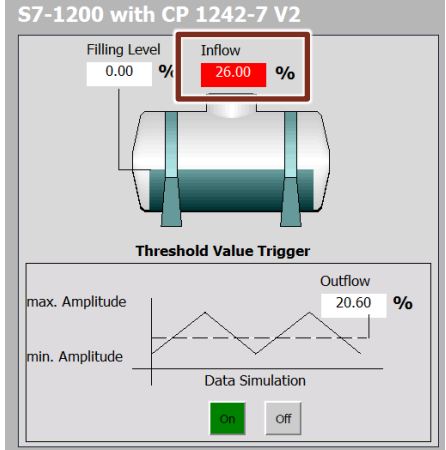
Table 6-3

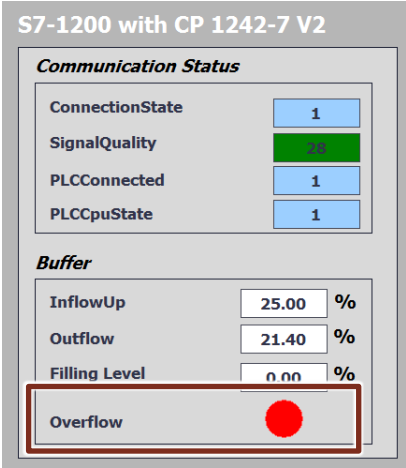
No.	Action
1.	<p>Open the "S7 1200 Application" screen and monitor the current fill level value. The fill level value is updated after 30 seconds.</p> 
2.	<p>Go to the "TCSB Communication" screen. In this screen, you can also monitor the fill level value.</p> 
3.	Repeat the steps for Station 2.

6.5 Station 1 or station 2 sends data to the master station on an "event-triggered" basis

If the inflow of station 1 or station 2 exceeds a maximum value, the inflow value is sent to the master station. The following table provides instructions for this order.

Table 6-4

No	Action
1.	Open the "TCSB Communication" screen.
2.	The "InflowUp" field displays the maximum inflow value. In the application example, the value in the program is set to 25%. 
3.	Open the "S7-1200 Application" screen The "inflow" field displays the current inflow value. If this value exceeds the maximum inflow value (InflowUp) (e.g., 25 %), an overflow alarm is sent to the master station. 

No	Action
4.	<p>The overflow alarm is displayed in the "TCSB Communication" screen.</p> 
5.	Repeat the steps for station 2.

7 Appendix

7.1 Service and Support

Industry Online Support

Do you have any questions or need support?

Siemens Industry Online Support offers access to our entire service and support know-how as well as to our services.

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

Product information, manuals, downloads, FAQs and application examples – all information is accessible with just a few mouse clicks at:

<https://support.industry.siemens.com/>

Technical Support

Siemens Industry's Technical Support offers quick and competent support regarding all technical queries with numerous tailor-made offers – from basic support right up to individual support contracts.

Please address your requests to the Technical Support via the web form:

<https://www.siemens.en/industry/supportrequest>

SITRAIN – Training for Industry

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

More information on the training courses offered as well as on locations and dates is available at:

<https://www.siemens.en/sitrain>

Service offer

Our service offer includes the following:

- Plant Data Services
- Spare Parts Services
- Repair Services
- On Site and Maintenance Services
- Retrofit and Modernization Services
- Service Programs and Agreements

Detailed information on our service offer is available in the Service Catalog:

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

Industry Online Support app

Thanks to the "Siemens Industry Online Support" app, you will get optimum support even when you are on the move. The app is available for Apple iOS, Android and Windows Phone:

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

8 Links & Literature

Table 8-1

	Topic
\1\	Siemens Industry Online Support http://support.industry.siemens.com
\2\	Download page of the entry https://support.industry.siemens.com/cs/ww/en/view/39863979
\3\	Support packages for the hardware catalog in the TIA Portal (HSP) https://support.industry.siemens.com/cs/ww/en/view/72341852
\4\	SIMATIC NET Industrial Remote Communication - TeleControl TeleControl Server Basic - Version V3.1 https://support.industry.siemens.com/cs/ww/en/view/109476153
\5\	SIMATIC STEP 7 V15.1 and WinCC V15.1 TRIAL Download https://support.industry.siemens.com/cs/ww/en/view/109752566
\6\	How do you read out advanced diagnostics data from the CP 1242-7 GPRS V2? https://support.industry.siemens.com/cs/ww/en/view/109480967
\7\	TeleService of an S7-1200 station via mobile network (Set 33) https://support.industry.siemens.com/cs/ww/en/view/56720905
\8\	Sales and delivery release TeleControl Server Basic V3.1 + Update 1 (V3.1.0.1) https://support.industry.siemens.com/cs/ww/en/view/109757071
\9\	Communication via OPC UA with SIMATIC HMI systems (Comfort Panels, Runtime Advanced, Runtime Professional) https://support.industry.siemens.com/cs/ww/en/view/63481236

9 History

Table 9-1

Version	Date	Modification
V1.0	05/2016	First version
V1.1	02/2018	<ul style="list-style-type: none"> Upgraded to STEP 7 V14 New block and data point link for the simulation and transfer of fill level and inflow.
V1.2	06/2018	<ul style="list-style-type: none"> Upgraded to STEP 7 V15. New TCSB functions added. OPC Scout replaced by UaExpert.
V2.0	09/2019	Upgraded to STEP 7 V15.1.