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Signaling and Switching via SMS with S7-1200 and CP 1242-7 GPRS V2

S7-1200, CP, SMS

https://support.industry.siemens.com/cs/ww/en/view/58638283

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Table of Contents

1 Task

1.1 Overview

Introduction

The application example shows how to send messages to mobile maintenance staff via the TeleControl CP 1242-7 GPRS V2 by means of a simple SMS-based switching and signaling system.

A beverage vending machine shall serve as an exemplary area of application.

Overview of the automation task

The vending machine regularly checks the following:

- Filling level of the coin box
- Cooling system temperature

In addition, any unauthorized opening of the front door is detected by a sensor.

The vending machine automatically responds to certain events such as limit values being exceeded and informs the maintenance staff.

Regardless of this, the vending machine answers incoming process value requests.

The figure below provides an overview of the automation task.

Figure 1-1
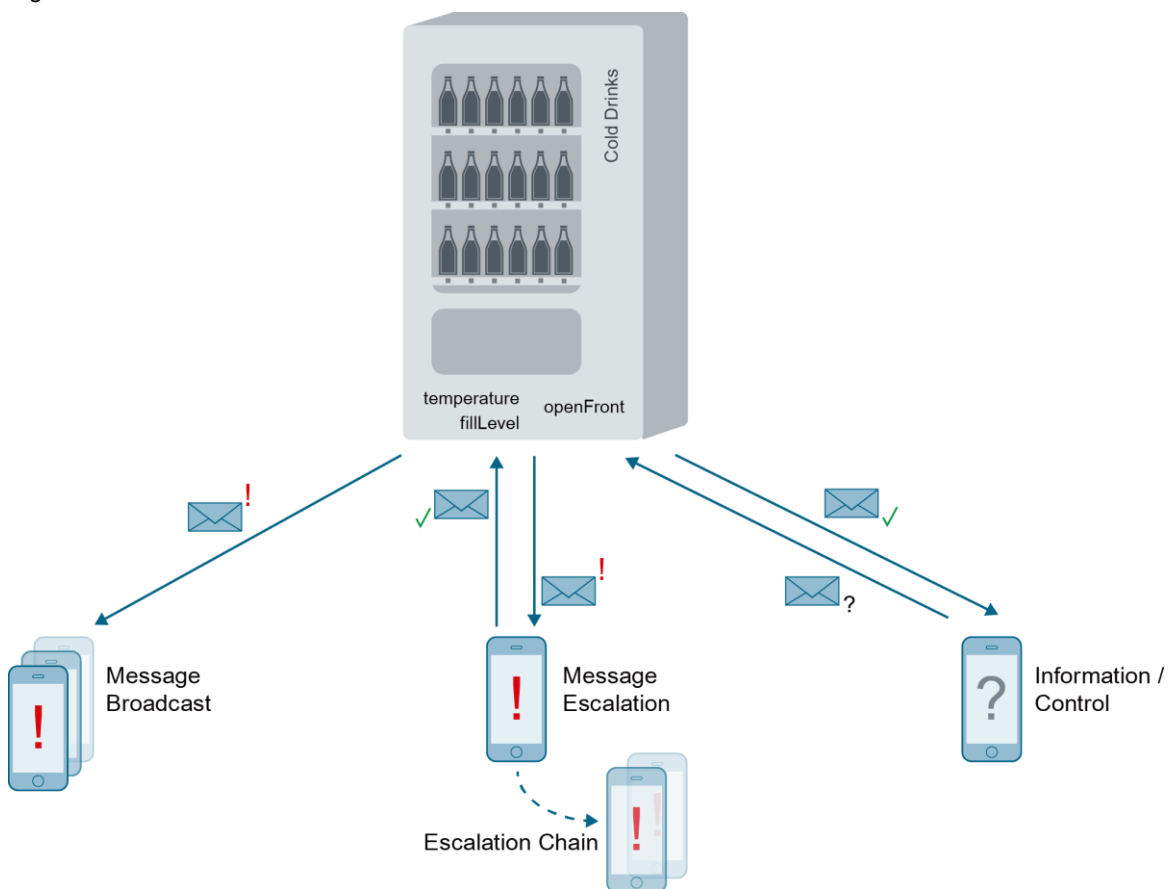
1.2 Requirements

This application example is intended to meet the following requirements:

The S7 station

- sends a message to a configured phone number,

- sends a message to a several users (broadcast),

- sends a message with acknowledgement by one of the configured recipients of the message (escalation),

- receives messages (SetGet). Depending on the message text,
    - requested values are read out of the controller and sent to a cellular phone,
    - received commands are executed in the controller and a confirmation/error message is sent to the cellular phone.

Using visualization software, the simulated process shall be operated and controlled in the S7 station.

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

S7-1200 with
CP 1242-7 V2

Cellular network

Smart phone
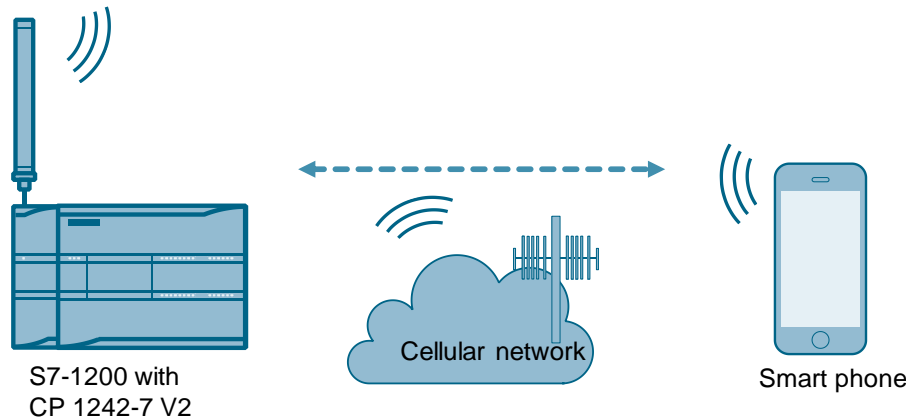
Configuration

A CP 1242-7 V2 is used here to connect the S7-1200 CPU to the GSM network.

The "SndSms" and "RcvSms" user blocks are used to send messages via SMS to a GSM-capable mobile terminal using the CP 1242-7 V2 and to receive messages from this terminal. The underlying blocks are called in the "BroadcastSms", "EscalationSms" and "SetGet" user blocks that coordinate that the message is sent to the maintenance staff.

The application is visualized using WinCC Advanced.

Advantages

The solution presented here offers the following advantages:

- The "SndSms", "RcvSms", "BroadcastSms", "EscalationSMS" and "SetGet" user blocks provide you with immediately usable codes.
- The user blocks can also be used for the CP 1243-7 LTE.
- The "SndSms" and "RcvSms" user blocks can be used for your own developments.

Topics not covered by this application

This application does not contain a description of

- SIMATIC NET S7-1200 - TeleControl CP 1242-7 GPRS V2 (see \3\)
- SIMATIC HMI operator panels
- 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:

Table 2-1

Function	Block	Description
Send a message	"SndSms"	Sending a message to a configured phone number.
Receive a message	"RcvSms"	Receiving a message from an authorized phone number.
Broadcast	"BroadcastSms"	Sending a message to several users.
Escalation	"EscalationSms"	Sending a message with acknowledgement by one of the configured recipients of the message.
SetGet	"SetGet"	Receiving messages. Depending on the message text, • requested values are read out of the controller and sent to a cellular phone, • received commands are executed in the controller and a confirmation/error message is sent to the cellular phone.

Note	For a more detailed description of these functions, please refer to chapter 3 and the following chapters.

NOTE	You can start the SMS text with a defined character string (e. g. "*N#" for Vodafone). You will receive an acknowledgement of receipt from your provider when the SMS has arrived at your partner.
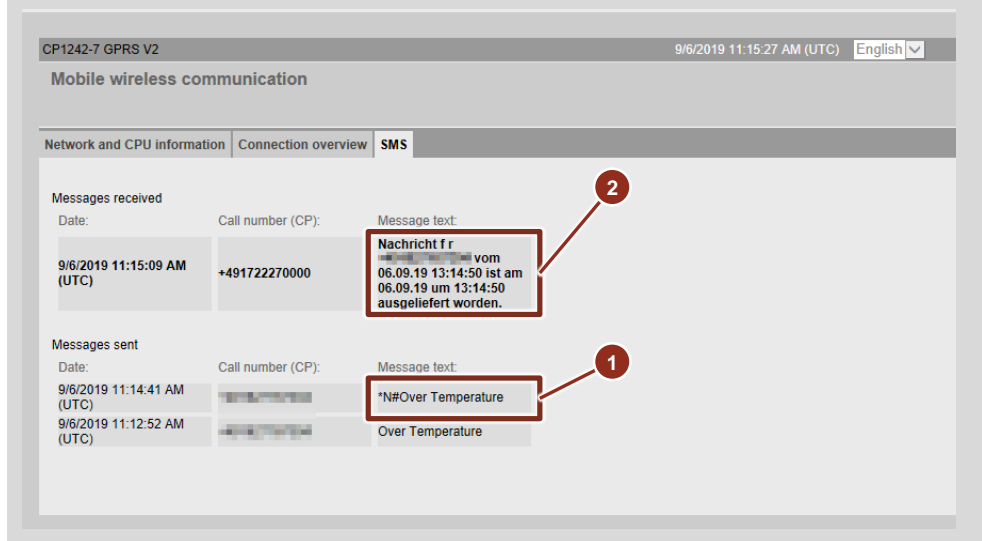
2.3 Overview and description of the user interface

The application example is visualized with WinCC Advanced by means of three configured screens called "Broadcast", "Escalation" and "SetGet". The configuration data of the CP 1242-7 V2 is adjusted via the "Configuration" screen.

"Broadcast"

The "Broadcast" screen visualizes the broadcast process.

Figure 2-2

Table 2-2

No.	Element	Description
1.	"Users"	Input field Number of recipients to whom the alarm SMS message is sent.
2.	"Array of Users"	Input fields • Recipients configured to whom the alarm SMS message is sent. • The recipient to whom the alarm SMS message is currently sent is displayed in green.
3.	"Array of Errors"	Display Indicates whether an error has occurred (flashes red).
4.	"SMS Text"	Input field Alarm SMS message which is sent to the recipients.

2.3 Overview and description of the user interface

Table 2-3

No.	Element	Description
1.	"Users"	Input field Number of recipients to whom the alarm SMS message is sent.
2.	"Array of Users"	Input fields • Recipients configured to whom the alarm SMS message is sent. • The recipient to whom the alarm SMS message is currently sent is displayed in green.
3.	"Array of Errors"	Display Indicates whether an error has occurred (flashes red).
4.	"Alarm Text"	Input field Alarm SMS message which is sent to the recipients.
5.	"Received Acknowledgment"	Display Indicates whether an acknowledgment has been received (green).
6.	"User"	Output field Recipient's phone number from which the acknowledgment has been sent.
7.	"Date and Time"	Output field Time stamp of the received acknowledgment.
8.	"Escalation"	Display Indicates whether the process is active (flashes green).
9.	Change screen	One click on the buttons changes the display of the appropriate screens.

2.3 Overview and description of the user interface

"SetGet"

The "SetGet" screen visualizes the SetGet process.

Figure 2-4

Table 2-4

No.	Element	Description
1.	"Array of Orders"	Input fields List of defined queries and commands.
2.	"Array of Values"	Input fields List of attached coefficients.
3.	"Error"	Display Indicates whether an error has occurred (flashes red).
4.	"Status"	Output field Returns the error message.
5.	"Activate SetGet"	Enables the reception of messages (grayed out).
6.	"Deactivate SetGet"	Disables the reception of messages (grayed out).
7.	Change screen	One click on the buttons changes the display of the appropriate screens.

2.3 Overview and description of the user interface

"Configuration"

Via this screen you can adjust the configuration data of the CP 1242-7 V2.

Figure 2-5

Table 2-5

No.	Element	Description
1.	"PIN"	Input field PIN number of the SIM card created in the CP.
2.	"AccessPointGPRS"	Input field Name of the access point from cellular network to Internet.
3.	"AccessPointUser"	Input field APN user name
4.	"AccessPointPassword"	Input field APN password
5.	"SMSProvider"	Input field User number of the short message service center (SMSC) of the cellular network provider
6.	"AuthorizedPhones"	Input fields List of authorized phone numbers.
7.	"Start Configuration"	Enables the process for changing the configuration data of the CP 1242-7 GPRS V2.
8.	Change screen	One click on the buttons changes the display of the appropriate screens.

2.4 Hardware and software components

2.4.1 Validity

This application is valid for

- CP 1242-7 GPRS V2
- CP 1243-7 LTE
- STEP 7 V15.1 Update 2
- S7-1200 CPU V4.1 or higher

2.4.2 Components used

The application was created using the following components:

Hardware components

Table 2-6

Component	Qty.	Article number	Note
S7-1200 PM1207	1	6EP1332-1SH71	Power supply
SIMATIC S7-1200 CPU 1217C DC/DC/DC	1	6ES7217-1AG40-0XB0	Any S7-1200 CPU as of V4.1 can be used.
COMMUNICATION PROCESSOR CP 1242-7 V2	1	6GK7242-7KX31-0XE0	Alternatively, a CP 1243-7 LTE can also be used: • CP 1243-7 LTE EU (6GK7243-7KX30-0XE0) • CP 1243-7 LTE US (6GK7243-7SX30-0XE0)
ANTENNE ANT794-4MR	1	6NH9860-1AA00	GSM quad band and UMTS
SIMATIC memory card	1	6ES7954-8LF01-0AA0	Memory card for the S7-1200 CPU (optional)
SIM card	1		

Software components

Table 2-7

Component	Qty.	Article number	Note
STEP 7 Professional V15.1 Update 2	1	6ES7822-1AA05-0YA5	STEP 7 Basic can also be used.
WinCC Advanced V15.1 Update 2	1	6AV2102-0AA05-0AA5	WinCC Basic can also be used.

2.4 Hardware and software components

Example files and projects

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

Table 2-8

Component	Note
58638283_S7_1200_SMS_PROJ_V13.zip	This zip file contains the STEP 7 V15.1/ WinCC Advanced project.
58638283_S7_1200_SMS_DOC_V13_en.pdf	This document.

3 Mode of Operation

This application example includes the following key elements:

- The configuration of the S7 station (S7-1200 and CP 1242-7 V2) for sending and receiving SMS messages

- The communication mechanisms in the S7-CPU for sending and receiving SMS messages via the CP 1242-7 GPRS V2:
    - Sending SMS to a recipient
    - Receiving SMS from a recipient
    - Sending SMS to several recipients
    - Sending SMS to several recipients with acknowledgment
    - Receiving SMS commands and a remote request of a value and sending the requested value to the recipient.

3.1 Program overview

The figure below shows the most important elements of the program of the S7 station.

Figure 3-1
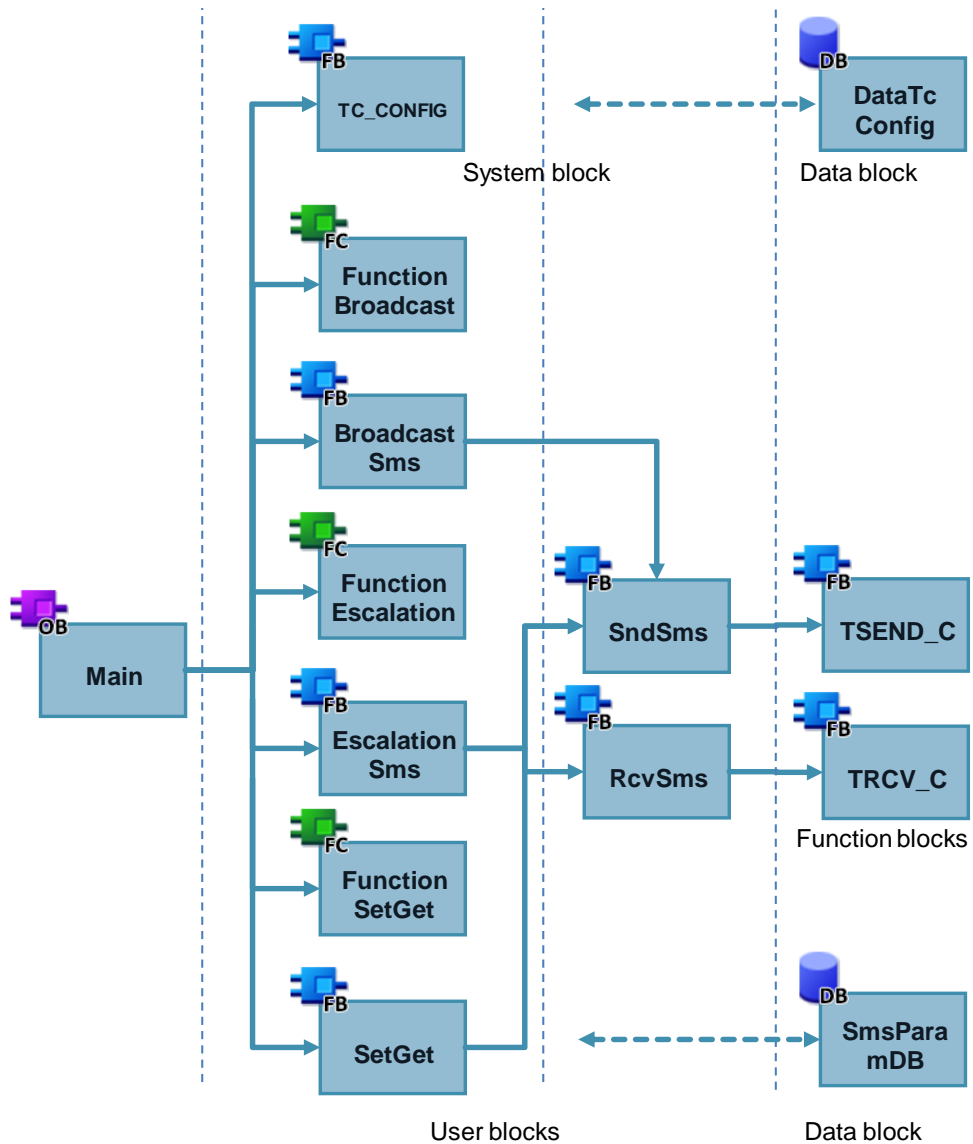
Table 3-1

Element	Symbolic name	Description
OB1	Main	Cyclic OB: Calling the user blocks
FB169	TC_CONFIG	System block for changing the configuration data of the CP 1242-7 GPRS V2.
FC1	FunctionBroadcast	Simulation block that checks the filling level of the coin box as well as the current cooling system temperature of the automatic machine and enables the "BroadcastSms" FB, if limit values are exceeded.

3.1 Program overview

Element	Symbolic name	Description
FB3	BroadcastSms	User block for sending an SMS message to several recipients
FC2	FunctionEscalation	Simulation block that enables the "EscalationSms" FB, if an unauthorized opening of the front of the automatic machine is detected.
FB4	EscalationSms	User block for sending an SMS message to several recipients and subsequent waiting for acknowledgement by one of the configured recipients of the message.
FC3	FunctionSetGet	Command interpreter. It evaluates the output parameters of the "SetGet" FB and sets/resets the HMI parameters.
FB5	SetGet	User block for receiving • SMS commands and their evaluation • Remote queries of a value.
FB1	SndSms	Basic block for sending an SMS message
FB2	RcvSms	Basic block for receiving an SMS message
FB1030	TSEND_C	Sending data via Ethernet
FB1031	TRCV_C	Receiving data via Ethernet
DB7	DataTcConfig	Global data block for • summarizing the configuration data that is to be changed • saving the tags for calling the TC_CONFIG in OB1.
DB1	SmsParamDB	Global data block for saving the data: • Send data • Receive data • Status tags • Trigger signals • HMI tags

Note	Alternatively to the TSEND_C and TRCV_C function blocks, the TCON, TDISCON, TSEND, TRCV communication blocks can be used.

3.2 System block "TC_CONFIG" (FB169)

With the TC_CONFIG program block you can change the parameters of the CP 1242-7 GPRS V2 that are configured in STEP 7:

- PIN number of the SIM card,
- Short message service center (SMSC) of your provider,
- APN settings of your provider,
- authorized phone number.

3.2.1 Call and parameter interface of the "TC_CONFIG" FB

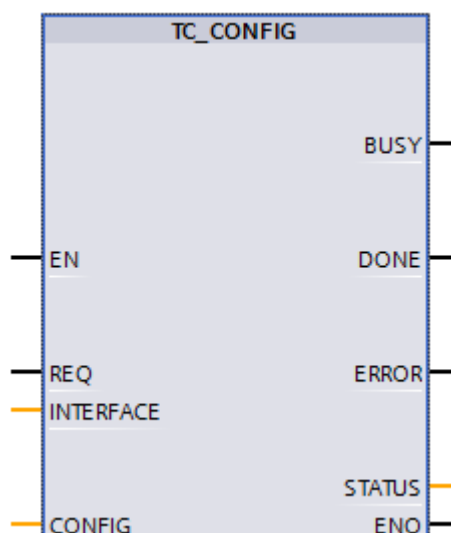The following figure and table shows the call interface of the "TC_CONFIG" system block.

Figure 3-2

Table 3-2

Name	Data type	Description
REQ	Bool	If there is a rising edge, the processing of the block is started and the status displays are initialized.
INTERFACE	HW_Interface (Word)	Reference to the interface of the local CP.
CONFIG	Variant	Reference to the memory area of the configuration data.
BUSY	Bool	Display of the processing status of the block.
DONE	Bool	The status parameter indicates whether the order has been processed without errors. Only valid for one cycle.
ERROR	Bool	Error display. Only valid for one cycle.
STATUS	Word	Status display (see STEP 7 online help)

3.2.2 System data types (SDTs) for the configuration data of the CP 1242-7 GPRS V2

The CONFIG parameter of the TC_CONFIG program block references to the memory area with the configuration data of the CP 1242-7 GPRS V2 that is to be changed. The configuration data stored in the "DataTcConfig" data block is summarized via various "IF_CONF_xyz" SDTs:

- IF_CONF_Header: Total number of the blocks included in the structure
- IF_CONF_APN: APN settings
- IF_CONF_SMS_Provider: User number of the short message service center (SMSC)
- IF_CONF_PIN: PIN of the SIM card inserted in the CP
- F_CONF_WakeupList: Phone number of the authorized users.

Note	For more information, please refer to the manual of the CP 1242-7 GPRS V2 \3\ and in the FAQ for programming the TC_CONFIG \4\.

3.3　Global data block "DataTcConfig" (DB7)

The "DataTcConfig" DB contains:

- The "tcConfigParam" structure with the created blocks:
  - IF_CONF_Header
  - IF_CONF_APN
  - IF_CONF_SMS_Provider
  - IF_CONF_PIN
  - F_CONF_WakeupList
- The PLC tags for calling the TC_CONFIG in OB1.

Figure 3-3

		Name	Data type	Offset	Start value
		DataTcConfig			
1		▼ Static			
2		▼ tcConfigParam	Struct	0.0	
3		▶ Header	IF_CONF_Header	0.0	
4		▶ APN	IF_CONF_APN	6.0	
5		▶ PIN	IF_CONF_Pin	180.0	
6		▶ SMSC	IF_CONF_SMS_Prov...	196.0	
7		▶ AUT_NUMBERS	IF_CONF_WakeupList	224.0	
8		tcConfigTrigger	Bool	470.0	false
9		tcConfigDone	Bool	470.1	false
10		tcConfigBusy	Bool	470.2	false
11		tcConfigError	Bool	470.3	false
12		tcConfigStatus	Word	472.0	16#0
13		posSignalEdge	Bool	474.0	false

3.4 Global data block "SmsParamDB" (DB1)

The "SmsParamDB" DB contains:

- The "Type_SndParam" PLC data type that contains the parameters for sending an SMS message (see chapter 3.5.3),

- The "Type_RcvParam" PLC data type containing the parameters for receiving an SMS message (see chapter 3.6.3),

- the "Type_BroadcastSms" PLC data type that contains the parameters for the broadcast process (see chapter 3.7.4),

- the "Type_EscalationSms" PLC data type containing the parameters for the escalation process (see chapter 3.8.4),

- the "Type_SetGet" PLC data type containing the parameters for the SetGet process (see chapter 3.9.4),

- the PLC tags for calling the functions in OB1:
  - PLC tags for calling the blocks in OB1
  - PLC tags for visualizing the process.

Figure 3-4

			Name	Data type
			SmsParamDB	
1		▼	Static	
2		▶	sndSmsParam	"Type_SndParam"
3			sndSmsOB1	Bool
4			doneSndOB1	Bool
5			busySndOB1	Bool
6			errorSndOB1	Bool
7			statusSndOB1	DWord
8		▶	rcvSmsParam	"Type_RcvParam"
9			activateRcvSms	Bool
10			ndrRcvOB1	Bool
11			errorRcvOB1	Bool
12			statusRcvOB1	DWord
13		▶	broadcastSms	"Type_BroadcastSms"
14		▶	broadcastFC	"Type_FCBroadcast"
15		▶	escalationSms	"Type_EscalationSms"
16		▶	escalationFC	"Type_FCEscalation"
17		▶	SetGet	"Type_SetGet"
18		▶	SetGetFC	"Type_FCSetGet"

3.5 Functionality of "SndSms" FB – sending SMS to a recipient

Introduction

For sending an SMS message to a recipient via the CP 1242-7 GPRS V2, the "SndSms" FB is used.

3.5.1 Call and parameter interface of the "SndSms" FB

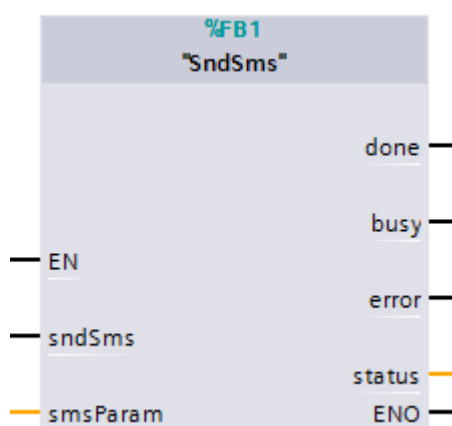The figure and table below show the call interface of the "SndSms" basic block.

Figure 3-5

Table 3-3

	Name	Data type	Description
input	sndSms	Bool	Starts the send process. Responds only to a positive edge.
InOut	smsParam	"Type_SndSms" PLC data type	Parameters required for sending an SMS message (see chapter 3.5.3).
Output	done	Bool	Set when the send process has been completed successfully. Only valid for one cycle. Default value: FALSE.
	busy	Bool	If the "SndSms" block is busy sending, busy=TRUE is set. "busy" is set to FALSE as soon as the above process has been completed successfully or with an error.

3.5 Functionality of "SndSms" FB – sending SMS to a recipient

Name	Data type	Description
error	Bool	Gives feedback if an error occurs while executing a routine. Only valid for one cycle. Default value: FALSE
status	Dword	When error = TRUE: Returns the status to narrow down the cause of the error (see chapter 3.10). Only valid for one cycle.

3.5 Functionality of "SndSms" FB – sending SMS to a recipient

3.5.2 Description of the "Sending SMS to a recipient" function

The following blocks or system data types are required for transmitting SMS messages:

- TSEND_C: Compact block for sending SMS
- TCON_Phone: Connection parameter for transmitting SMS (see chapter 3.5.4)

The "SndSms" block internally calls these blocks.

The figure below shows the program flow of the "Sending SMS to a recipient" function.

Figure 3-6

3.5 Functionality of "SndSms" FB – sending SMS to a recipient

3.5.3   "Type_SndParam" PLC data type

The "Type_SndParam" PLC data type contains the parameters for sending an SMS message.

For commissioning the application, this data type is used in the "SmsParamDB" global data block, which is linked to the "smsParam" InOut parameter of the function block.

Figure 3-7

Table 3-4

Name	Data type	Description
interfaceId	HW_ANY	Hardware ID of the CP 1242-7 GPRS V2
conId	CONN_OUC	Connection ID
phoneNumber	String[22]	SMS message recipient's phone number
smsText	String[160]	SMS message text

3.5.4   "TCON_Phone" connection parameter

The "TSEND_C" or "TRCV_C" requires the "TCON_Phone" SDT type to transfer SMS messages. The SDT is called in the "SndSms" or "RcvSms" block. The "InterfaceId", "ID" and "PhoneNumber" parameters are linked to the parameters of the "Type_SndParam" or "Type_RcvParam" PLC data type.

Table 3-5

Name	Data type	Description
InterfaceId	HW_ANY	Hardware ID of the CP 1242-7 GPRS V2
ID	CONN_OUC	Connection ID
ConnectionType	Byte	Connection type 14=TCON_Phone
ActiveEstablished	Bool	Active / passive connection establishment
PhoneNumber	String[22]	SMS message recipient's phone number

3.6 Functionality of "RcvSms" FB – receiving SMS from a recipient

Introduction

For receiving an SMS message from a recipient via the CP 1242-7 GPRS V2, the "RcvSms" FB is used.

3.6.1 Call and parameter interface of the "RcvSms" FB

The figure and table below show the call interface of the "RcvSms" basic block.

Figure 3-8
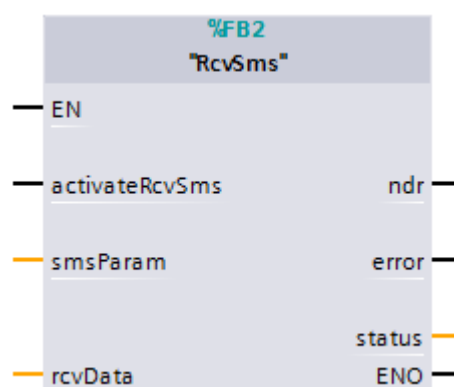
Table 3-6

	Name	Data type	Description
Input	activateRcvSms	Bool	True: enables the reception of SMS messages False: Disables the reception of SMS messages
InOut	smsParam	"Type_RcvParam" PLC data type	Parameters required for receiving an SMS message (see chapter 3.6.3).
InOut	rcvData	Variant	Structure containing the received data: • dateAndTime • rcvTelNo • rcvSms • statusSms

3.6 Functionality of "RcvSms" FB – receiving SMS from a recipient

<table>
<tr><th colspan="2">Name</th><th>Data type</th><th>Description</th></tr>
<tr><td rowspan="3" style="writing-mode: vertical-lr">Output</td><td>ndr</td><td>Bool</td><td>Signals that a new SMS message has been received.
Only valid for one cycle.</td></tr>
<tr><td>error</td><td>Bool</td><td>Gives feedback if an error occurs while executing a routine.
Only valid for one cycle.
Default value: FALSE</td></tr>
<tr><td>status</td><td>Dword</td><td>When error = TRUE: Returns the status to narrow down the cause of the error (see chapter 3.10).
Only valid for one cycle.</td></tr>
</table>

Note	Messages can only be received if the "RcvSms" is enabled upon their arrival. Otherwise, the message will be lost. It is not possible to browse the memory subsequently.

3.6 Functionality of "RcvSms" FB – receiving SMS from a recipient

3.6.2 Description of the "Receiving SMS from a recipient" function

The following blocks or system data types are required for receiving SMS messages:

- TRCV_C: Compact block for receiving SMS message
- TCON_Phone: Connection parameter for transmitting SMS (see chapter 3.5.4)

The "RcvSms" block internally calls these blocks.

If SMS reception is enabled with "activateRcvSms = True", the communication connection to the CP will be established once and then maintained until it is disconnected with "activateRcvSms = false". Thus, "RcvSms" is ready to receive further SMS messages. The communication connection is disconnected, if the "activateRcvSms" signal is reset.

Figure 3-9

3.6 Functionality of "RcvSms" FB – receiving SMS from a recipient
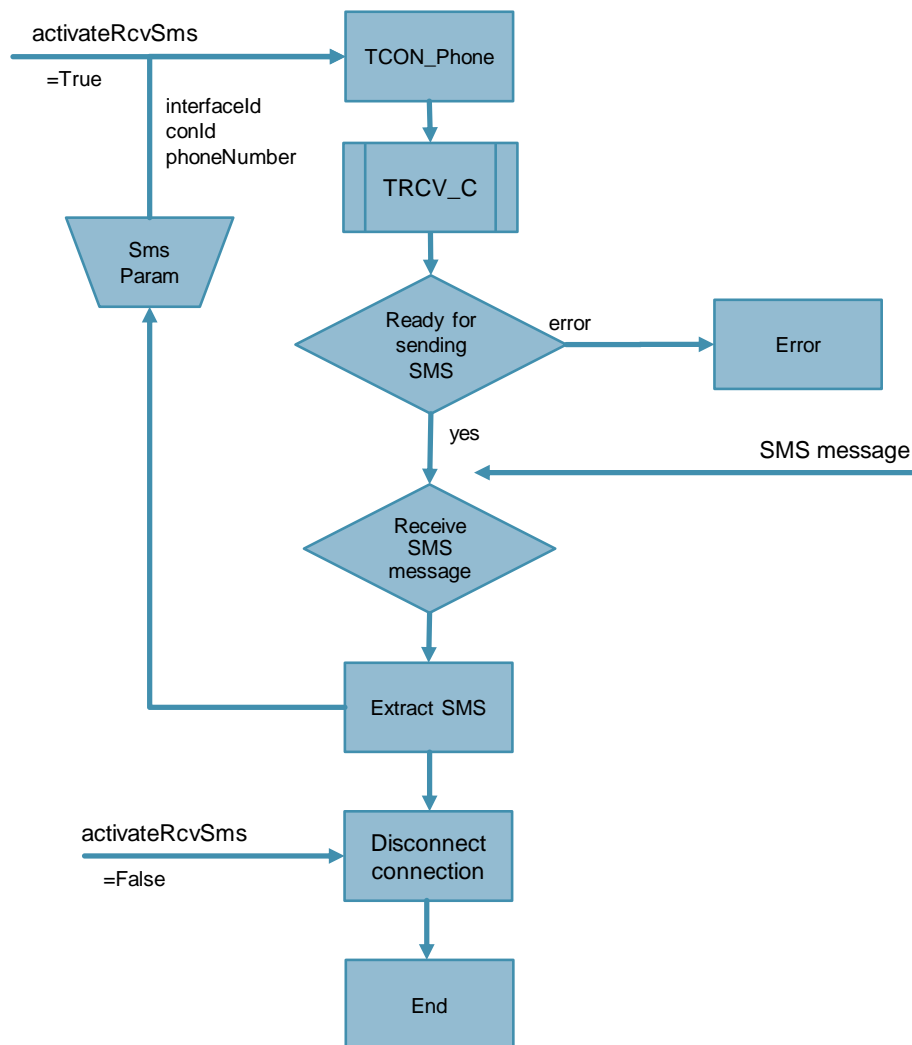
3.6.3 "Type_RcvParam" PLC data type

The "Type_RcvParam" PLC data type contains the parameters for receiving an SMS message.

For commissioning the application, this data type is used in the "SmsParamDB" global data block, which is linked to the "smsParam" InOut parameter of the function block.

Figure 3-10

		Name	Datentyp
1		interfaceId	HW_ANY
2		conId	CONN_OUC
3		phoneNumber	String[22]
4	▼	rcvData	Array[1..10] of Struct
5	▼	rcvData[1]	Struct
6	▶	dateAndTime	DTL
7		rcvTelNo	String[22]
8		rcvSms	String[160]
9		statusSms	Byte
10	▶	rcvData[2]	Struct
11	▶	rcvData[3]	Struct
12	▶	rcvData[4]	Struct
13	▶	rcvData[5]	Struct
14	▶	rcvData[6]	Struct
15	▶	rcvData[7]	Struct
16	▶	rcvData[8]	Struct
17	▶	rcvData[9]	Struct
18	▶	rcvData[10]	Struct

3.6 Functionality of "RcvSms" FB – receiving SMS from a recipient

Table 3-7

Name	Data type	Description
interfaceId	HW_ANY	Hardware ID of the CP 1242-7 GPRS V2
conId	CONN_OUC	Connection ID
phoneNumber	String[22]	Phone number of the sender **Note:** • If you enter an empty string into this parameter, you will receive SMS messages from all authorized phone numbers. • If you enter an asterisk (*) after the phone number base (for example, +4917*) into this parameter, the asterisk will act as a placeholder for all authorized phone numbers with the same phone number base. • If you enter "SMSSTORE" into this parameter, you can output up to 10 received SMS messages from the "RcvSms". The phone numbers authorized for access to the CP can be configured in STEP 7 in the "Security" parameter group of the CP (see chapter 4).

rcvData	Struct	Structure containing the received data:
		• dateAndTime:
		  Time stamp of the received SMS message
		• rcvTelNo:
		  Phone number of the sender of the received SMS message
		• rcvSms:
		  Received SMS message
		• statusSMS:
		  Status of the received SMS message

3.7 Functionality of the "BroadcastSms" FB – sending SMS to several recipients

Introduction

For sending an SMS message to several recipients via the CP 1242-7 GPRS V2, the "BroadcastSms" FB is used.

Figure 3-11

3.7 Functionality of the "BroadcastSms" FB – sending SMS to several recipients
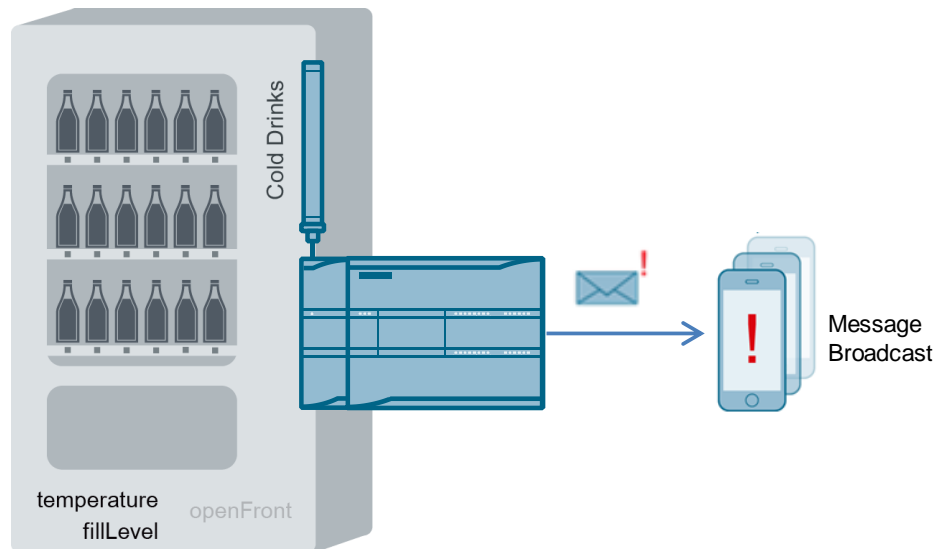
3.7.1 Call and parameter interface of the "BroadcastSms" FB

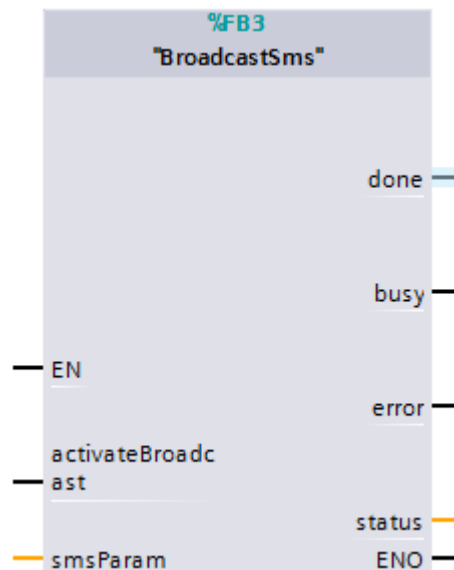The figure and table below show the call interface of the "BroadcastSms" basic block.

Figure 3-12

Table 3-8
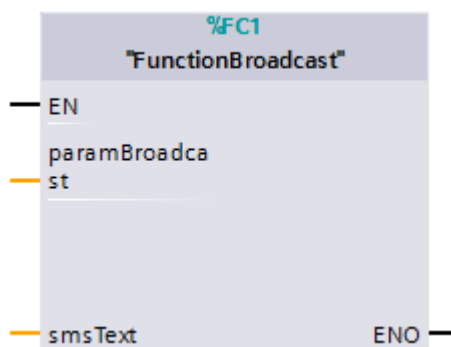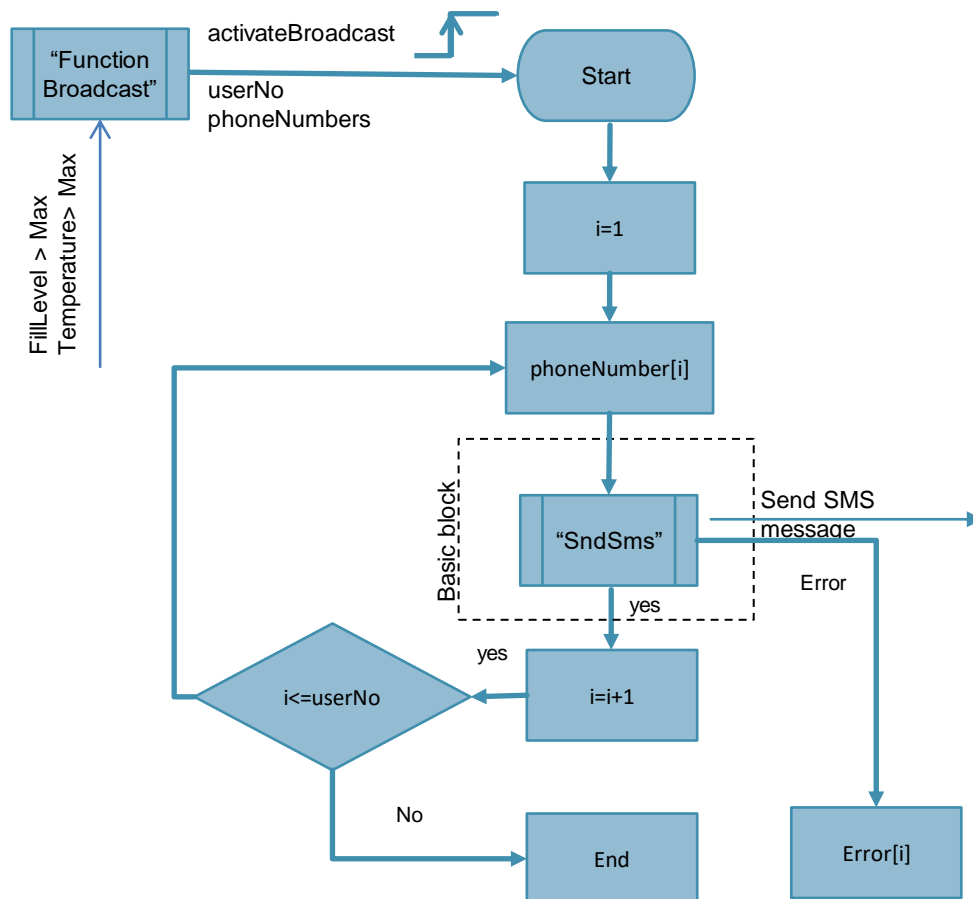
	Name	Data type	Description
Input	activateBroadcast	Bool	Starts sending the SMS message to several recipients (Broadcast). Responds only to a positive edge.
InOut	smsParam	"Type_BroadcastSms" PLC data type	Parameters required for the broadcast process (see chapter 3.7.4).
Output	done	Bool	Set when the broadcast process has been completed successfully. Only valid for one cycle. Default value: FALSE.
Output	busy	Bool	If the "BroadcastSms" block is busy sending, busy = TRUE. "busy" is set to FALSE as soon as the above process has been completed successfully or with an error.

3.7 Functionality of the "BroadcastSms" FB – sending SMS to several recipients

Name		Data type	Description
	error	Bool	Gives feedback if an error occurs while executing a routine. Only valid for one cycle. Default value: FALSE
	status	Dword	When error = TRUE: Returns the status to narrow down the cause of the error (see chapter 3.10). Only valid for one cycle.

3.7.2 Call and parameter interface of the "FunctionBroadcast" FC

The figure and table below show the call interface of the "FunctionBroadcast" simulation block.

Figure 3-13

Table 3-9

Name	Data type	Description
ParamBroadcast	Type_FCBroadcast	Parameters required for the broadcast process (see chapter 3.7.5).
smsText	String[160]	Alarm SMS

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3.7.3 Description of the "Sending SMS to several recipients" function

The "FunctionBroadcast" FC checks the current filling level of the coin box as well as the current cooling system temperature of the beverage vending machine and enables the "BroadcastSms" FB, if these values exceed the limit values.

The "BroadcastSms" FB sends the "Over FillLevel" or "Over Temperature" alarm SMS to up to 10 recipients. In the "Broadcast" FB, "SndSms" calls (see chapter 3.5.2) are executed one after another for each configured recipient.

Figure 3-14

"Function Broadcast"
activateBroadcast
userNo
phoneNumbers
Start
FillLevel > Max
Temperature> Max
i=1
phoneNumber[i]
Basic block
"SndSms"
Send SMS message
Error
yes
yes
i<=userNo
i=i+1
No
End
Error[i]

3.7.4 "Type_BroadcastSms" PLC data type

The "Type_BroadcastSms" PLC data type contains the parameters for sending an SMS message to several recipients.

For commissioning the application, this data type is used in the "SmsParamDB" global data block, which is linked to the "smsParam" InOut parameter of the function block.

Figure 3-15

		Name	Datentyp
1	▸	smsParam	"type_SndParam"
2		usersNo	Int
3	▸	phoneNumbers	Array[1..10] of String[22]
4	▸	errors	Array[1..10] of DWord

Table 3-10

| Name	Data type	Description
smsParam	"Type_SndParam" PLC data type	Contains the parameters for sending an alarm SMS (see chapter 3.5.3).
usersNo	Int	Number of recipients to whom the alarm SMS message is sent. The maximum value in this example is "10".
phoneNumbers	Array[1..10] of String[22]	Configured recipients to whom the alarm SMS message is sent. **Note:** - The number of configured recipients must match the "usersNo". - If the "phoneNumber[i], i<=userNo" parameter contains an empty string, the process will be stopped with an error.
errors	Array[1..10] of DWord	Error result (status DWORD) for each "SndSms" call. Thus, it is possible to determine subsequently which messages have been sent and which errors have occurred. **Note:** The "errors" parameter keeps the values until the next order is started.

3.7.5 "Type_FCBroadcast" PLC data type

The "Type_FCBroadcast" PLC data type contains

- the parameters required for the "FunctionBroadcast" FC simulation block:
  - current filling level of the coin box
  - maximum filling level value of the coin box
  - current cooling system temperature
  - maximum cooling system temperature
- PLC tags for calling the blocks in OB1

For commissioning the application, this data type is used in the "SmsParamDB" global data block, which is linked to the "paramBroadcast" InOut parameter of the "FunctionBroadcast" simulation block.

Figure 3-16

		Name	Data type
1		fillLevel	Int
2		overFillLevel	Int
3		temperature	Int
4		overTemp	Int
5		activateBroadcastOB1	Bool
6		busyBroadcastOB1	Bool
7		negativeEdgeBusy	Bool
8		doneBroadcastOB1	Bool
9		errorBroadcastOB1	Bool
10		statusBroadcastOB1	DWord

3.8 Functionality of the "EscalationSms" FB – sending SMS with acknowledgment to several recipients

Introduction

For sending an SMS message to several recipients and for receiving an acknowledgment from one of the configured recipients of the SMS message via the CP 1242-7 GPRS V2, the "EscalationSms" FB is used.

Figure 3-17
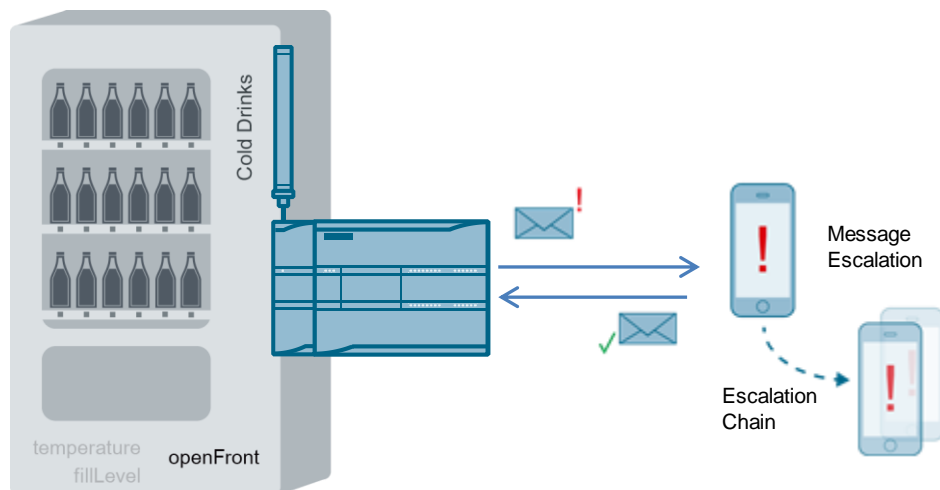
3.8 Functionality of the "EscalationSms" FB – sending SMS with acknowledgment to several recipients

3.8.1 Call and parameter interface of the "EscalationSms" FB

The figure and table below show the call interface of the "EscalationSms" basic block.
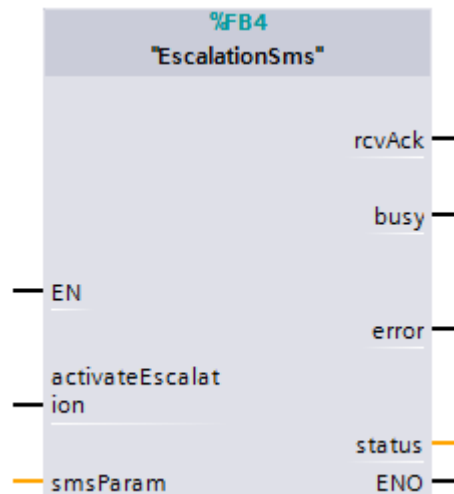
Figure 3-18

Table 3-11

	Name	Data type	Description
Input	activateEscalation	Bool	Starts the escalation process. Responds only to a positive edge.
InOut	smsParam	"Type_EscalationSms" PLC data type	Parameters required for the escalation process (see chapter 3.8.4)
Output	rcvAck	Bool	Signals that an acknowledgment has been received. Only valid for one cycle.
Output	busy	Bool	If the "EscalationSms" block is busy sending, busy = TRUE. "busy" is set to FALSE as soon as the above process has been completed successfully or with an error.
Output	error	Bool	Gives feedback if an error occurs while executing a routine. Only valid for one cycle. Default value: FALSE
Output	status	Dword	When error = TRUE: Returns the status to narrow down the cause of the error (see chapter 3.10). Only valid for one cycle.

3.8 Functionality of the "EscalationSms" FB – sending SMS with acknowledgment to several recipients

3.8.2 Call and parameter interface of the "FunctionEscalation" FC

The figure and table below show the call interface of the "FunctionEscalation" simulation block.
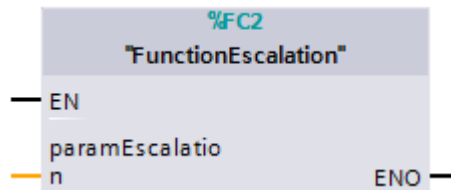
Figure 3-19

Table 3-12

Name	Data type	Description
ParamEscalation	Type_FCEscalation	Parameters required for the escalation process (see chapter 3.8.5).

3.8.3 Description of the "Sending SMS to several recipients with acknowledgment" function

The "FunctionEscalation" FC enables the "EscalationSms" FB, if unauthorized opening of the front of the beverage vending machine is detected.
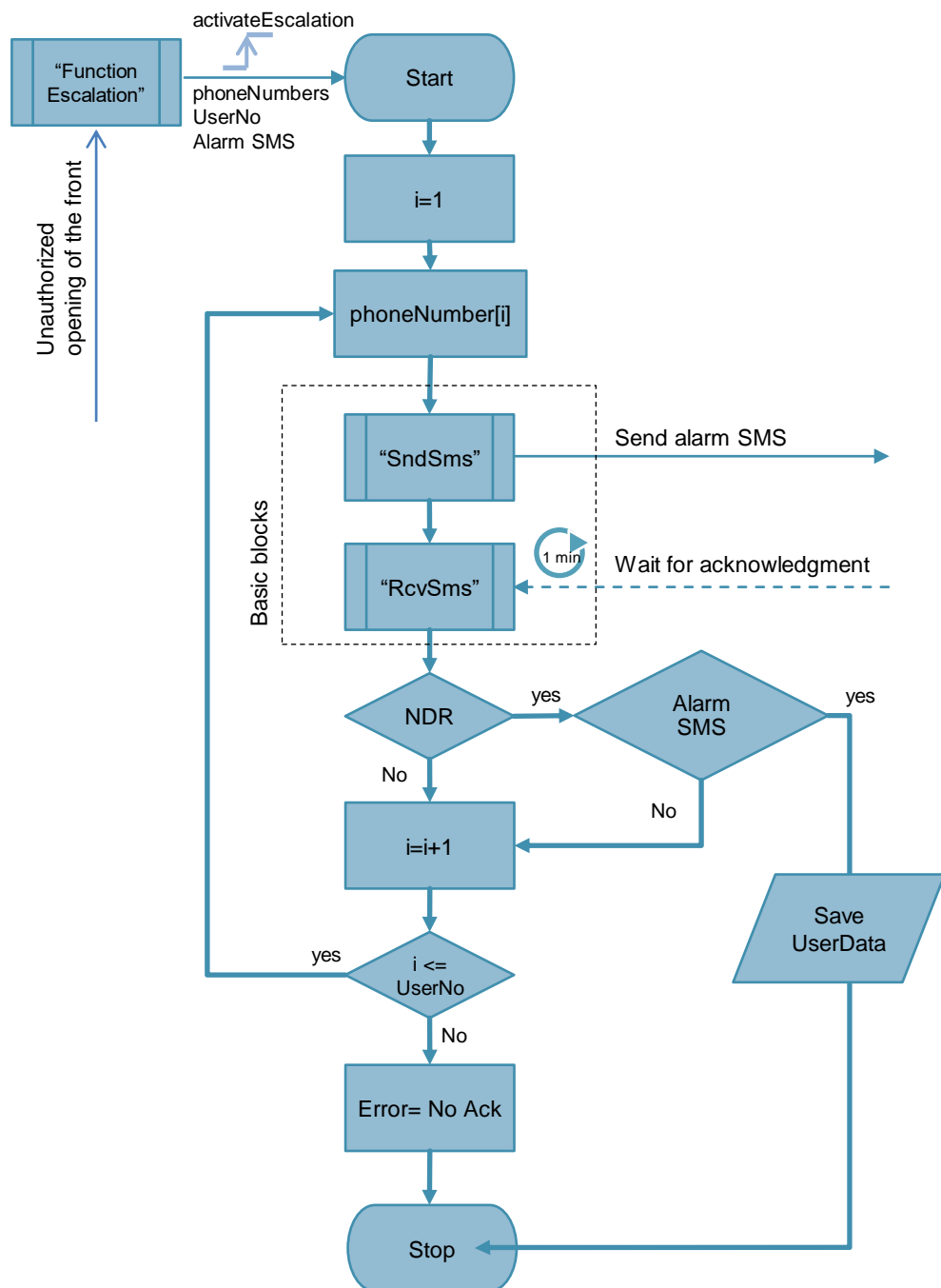
The "EscalationSms" FB

- sends the alarm SMS message to the first recipient,

- waits for a configured time for this recipient's acknowledgment SMS message,

- sends the message to the next recipient if no acknowledgment has been received within this time,

- repeats this procedure with up to 10 recipients,

- saves the information of who has acknowledged the alarm SMS message,

- terminates the process with an error if no recipient has acknowledged the alarm SMS message.

It is possible to configure up to 10 recipients.

In the "EscalationSms" FB, the calls "SndSms" and "RcvSms" (see chapter 3.5.2 and chapter 3.6.2) are successively executed for each configured recipient.

3.8 Functionality of the "EscalationSms" FB – sending SMS with acknowledgment to several recipients

Figure 3-20

Note	The acknowledgment SMS message must match the outgoing alarm SMS message.

3.8 Functionality of the "EscalationSms" FB – sending SMS with acknowledgment to several recipients

3.8.4 "Type_EscalationSms" PLC data type

The "Type_EscalationSms" PLC data type contains the parameters for the escalation process.

For commissioning the application, this data type is used in the "SmsParamDB" global data block, which is linked to the "smsParam" InOut parameter of the function block.

Figure 3-21

	Name	Datentyp
1	▶ smsSndParam	"type_SndParam"
2	▶ smsRcvParam	"type_RcvParam"
3	usersNo	Int
4	▶ phoneNumbers	Array[1..10] of String[22]
5	▶ errors	Array[1..10] of DWord

Table 3-13

Name	Data type	Description
smsSndParam	"Type_SndParam" PLC data type	Contains the parameters for sending the alarm SMS message (see chapter 3.5.3).
smsRcvParam	"Type_RcvParam" PLC data type	Contains the parameters for sending an alarm SMS message (see chapter 3.6.3).
usersNo	Int	Maximum number of recipients to whom the alarm SMS message is sent. The maximum value in this example is "10".
phoneNumbers	Array[1..10] of String[22]	Configured recipients to whom the alarm SMS message is sent. **Note:** • The number of configured recipients must match the "usersNo". • If the "phoneNumber[i], i<=usersNo" parameter contains an empty string, the process will be stopped with an error.
errors	Array[1..10] of DWord	Error result (status DWORD) for each "SndSms" or "RcvSms" call. Thus, it is possible to determine subsequently which messages have been sent and which errors have occurred. **Note:** The "errors" parameter keeps the values until the next order is started.

3.8 Functionality of the "EscalationSms" FB – sending SMS with acknowledgment to several recipients

3.8.5 "Type_FCEscalation" PLC data type

The "Type_FCEscalation" PLC data type contains

- the parameters required for the "FunctionEscalation" FC simulation block,
- PLC tags for calling the blocks in OB1
- PLC tags for visualizing the process.

For commissioning of the application, this data type is used in the "SmsParamDB" global data block, which is linked to the "paramEscalation" InOut parameter of the "FunctionEscalation" simulation block.

Figure 3-22

		Name	Data type
1		frontOn	Bool
2		possitiveEdgeFrontOn	Bool
3		activateEscalationOB1	Bool
4		positEdgeActivateOB1	Bool
5		busyEcalationOB1	Bool
6		negEdgeBusy	Bool
7		errorEscalationOB1	Bool
8		statusEscalationOB1	DWord
9		rcvAckOB1	Bool
10		positEdgeAckOB1	Bool
11		rcvAckHmi	Bool
12		errorEscalationOB2	Bool
13		statusEscalationOB2	DWord

3.8 Functionality of the "EscalationSms" FB – sending SMS with acknowledgment to several recipients

3.8.6 Functionality of the "SetGet" FB – control and remote request of values

Introduction

In the "SetGet" FB, the "Receive control commands" function and the remote request of values are implemented. The FC3 "FunctionSetGet" block is the command interpreter.

Figure 3-23
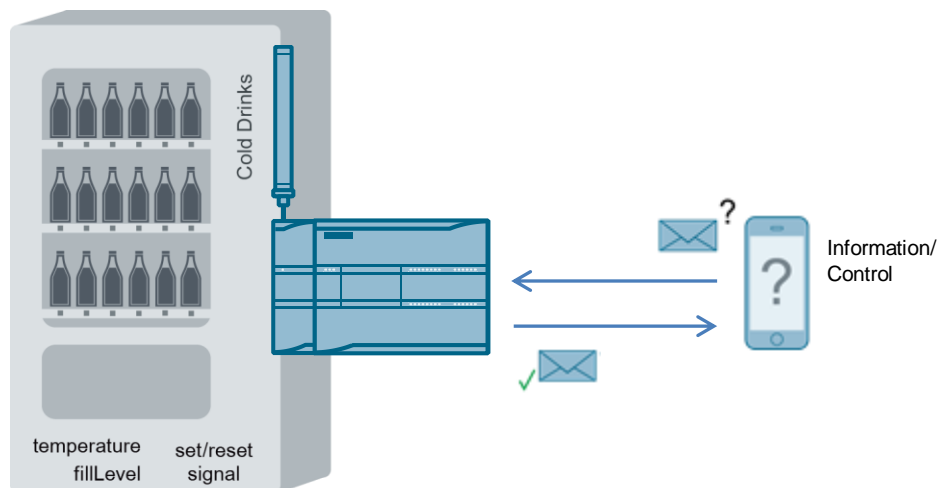
3.8 Functionality of the "EscalationSms" FB – sending SMS with acknowledgment to several recipients

3.8.7   Call and parameter interface of the "SetGet" FB

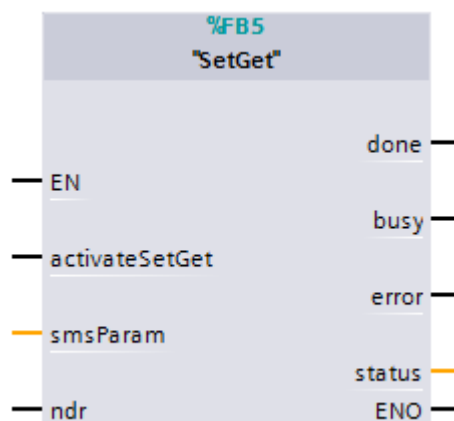The figure and table below show the call interface of the "SetGet" basic block.

Figure 3-24

Table 3-14

Name	Data type	Description
activateSetGet	Bool	True: enables the SetGet process False: disables the SetGet process
smsParam	"Type_SetGet" PLC data type	Parameters required for the SetGet process (see chapter 3.9.4).
ndr	Bool	Signals that a new SMS message has been received. Only valid for one cycle.
done	Bool	Set when the send process has been completed successfully. Only valid for one cycle. Default value: FALSE.
busy	Bool	If the "SetGet" block is busy sending, busy = TRUE is set. "busy" is set to FALSE as soon as the above process has been completed successfully or with an error.
error	Bool	Gives feedback if an error occurs while executing a routine. Only valid for one cycle. Default value: FALSE
status	Dword	When error = TRUE: Returns the status to narrow down the cause of the error (see chapter 3.10). Only valid for one cycle.

3.8 Functionality of the "EscalationSms" FB – sending SMS with acknowledgment to several recipients

3.8.8 Call and parameter interface of the "FunctionSetGet" FC

The figure and table below show the call interface of the "FunctionSetGet" simulation block.
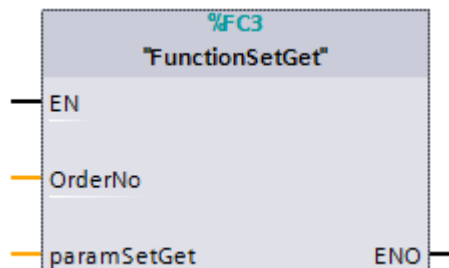
Figure 3-25

Table 3-15

Name	Data type	Description
OrderNo	Int	Placeholder for the received command or for the received remote request
paramSetGet	Type_FCSetGet	Parameters required for the SetGet process (see chapter 3.9.5).

3.8.9 Description of the "Control and remote request of values" function

With the "SetGet" FB, you can receive

- Commands for setting and resetting signals and
- Requests of values from the process (filling level, temperature).

In addition, it is possible to send the requested values to the recipient.

Commands

- Commands always end with the "=" symbol, for example, "SetM=".
- Commands are answered with "OK", if no error occurs during processing. Signals are controlled by means of the FC3 "FunctionSetGet".
- Commands are answered with the "Unknown Command" string, if the command is unknown.

Remote request of values

- Requests of values always end with the "?" symbol, for example, "Temp?"
- Requests are always answered with the currently stored values, for example, "Temp: 25 C"
- Requests are answered with the "Unknown Command" string, if the request is unknown.

The "SetGet" FB is provided with 3 additional storage locations for incoming SMS messages. If a new request arrives while the block is busy, this request will be stored in one of the storage locations and will be processed later.

3.8 Functionality of the "EscalationSms" FB – sending SMS with acknowledgment to several recipients

Note	If the SetGet process is disabled, the received requests (max. 3) are buffered and will only be answered when SetGet is enabled.

Note	The commands and requests of values must be known to the system. They are stored in a specific data area.
	The text of the incoming SMS message must match the known commands / requests.

Figure 3-26
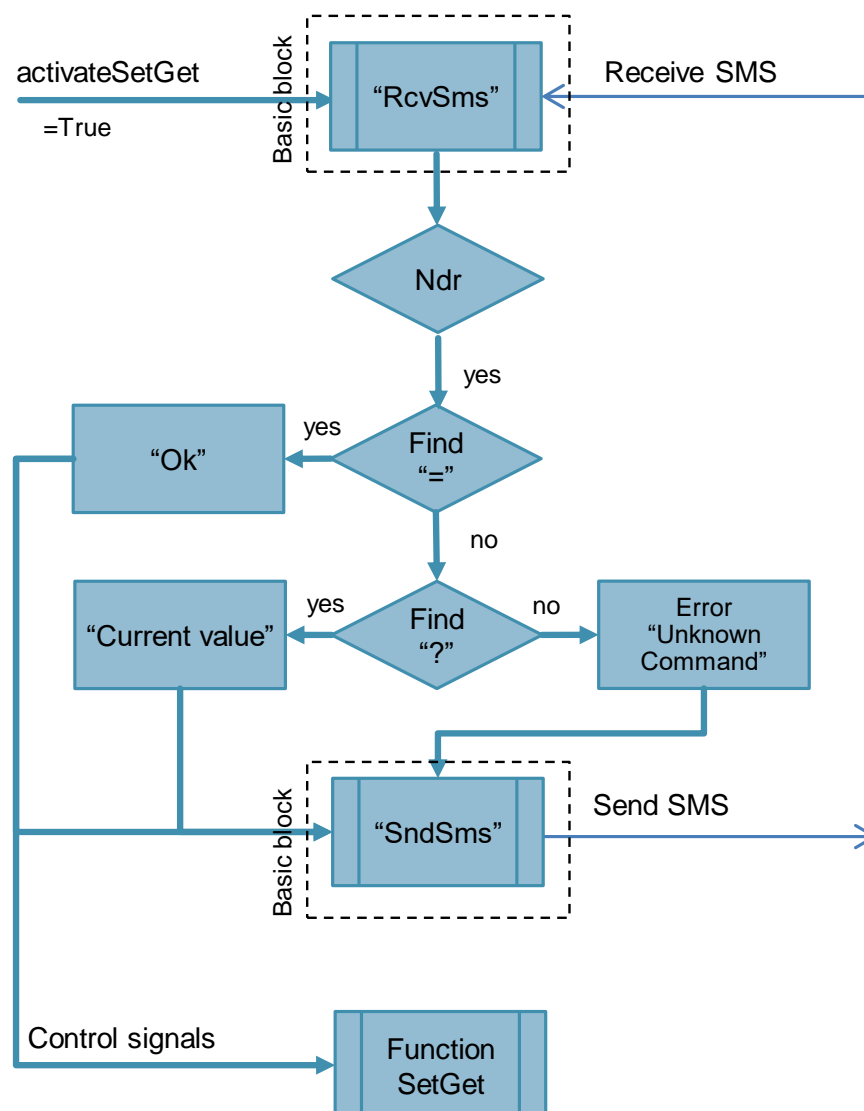
3.8 Functionality of the "EscalationSms" FB – sending SMS with acknowledgment to several recipients

3.8.10 "Type_SetGet" PLC data type

The "Type_SetGet" PLC data type contains the parameters for the SetGet process.

For commissioning the application, this data type is used in the "SmsParamDB" global data block, which is linked to the "smsParam" InOut parameter of the function block.

Figure 3-27

		Name	Datentyp
1	▶	smsSndParam	"type_SndParam"
2	▶	smsRcvParam	"type_RcvParam"
3	▶	orders	Array[1..10] of String[10]
4	▶	reiceivedOrders	Array[1..3] of String[10]
5	▶	sndValues	Array[1..10] of String[10]

Table 3-16

Name	Data type	Description
smsSndParam	"Type_SndParam" PLC data type	Contains the parameters for sending the alarm SMS message (see chapter 3.5.3).
smsRcvParam	"Type_RcvParam" PLC data type	Contains the parameters for sending an alarm SMS message (see chapter 3.6.3).
orders	Array[1..10] of String[10]	List of known commands/requests
receivedOrders	Array[1..3] of String[10]	Data buffer for incoming SMS messages, if the block is busy
sndValues	Array[1..10] of String[10]	List of currently stored values. The value must have the same index as the request of this value, for example: Orders[3]:=Temp? sndValues[3]:=25 C

3.8 Functionality of the "EscalationSms" FB – sending SMS with acknowledgment to several recipients

3.8.11 "Type_FCSetGet" PLC data type

The "Type_FCSetGet" PLC data type contains

- the parameters required for the "FunctionSetGet" FC simulation block,
- PLC tags for calling the blocks in OB1
- PLC tags for visualizing the process.

For commissioning the application, this data type is used in the "SmsParamDB" global data block, which is linked to the "paramSetGet" InOut parameter of the "FunctionSetGet" simulation block.

Figure 3-28

		Name	Data type
1		activateSetGet	Bool
2		ndrSetGetOB1	Bool
3		busySetGetOB1	Bool
4		doneSetGetOB1	Bool
5		errorSetGetOB1	Bool
6		errorSetGetHmi	Bool
7		statusSetGetOB1	DWord
8		statusSetGetHmi	DWord
9		setResetSignalOB1	Bool
10		posSignalEdgeError	Bool
11		posSignalEdgeNdr	Bool
12		negEdgeSetGet	Bool

3.9 Status and error displays

For error diagnostics, the function blocks have a "status" output. By reading the "status" output of the function block, you are provided with information on logical errors and error messages that may occur during communication.

The error message structure is such that the first word indicates the block that triggered this message. For example, error message 16#**0001**80A3 was triggered by TSEND_C. The following tables provide a list of possible error messages.

Table 3-17

Status	Meaning	Remedy / notes
16#0001xyzx	TSEND_C error messages	For a description of the communication errors, please refer to the STEP 7 Online Help.
16#0011xyzx	TRCV_C error messages	
16#00008101	Previous order not yet completed. (You have started a new send operation, although busy was still active.)	
16#00008102	The timer for establishing the connection has expired.	Check the CP connection.
16#00008103	The list of recipient data is incomplete.	Enter the recipient data into the list. Note: If usersNo=5, enter the data for 5 recipients.
16#00008104	The escalation process is complete without acknowledgment.	
16#00008105	Unknown command has been received.	• Check the list of commands and adjust it Or Send a command / request that is included in the list. • Stop the escalation process and restart the SetGet process.

4 Configuration and Settings of the CP 1242-7 GPRS V2
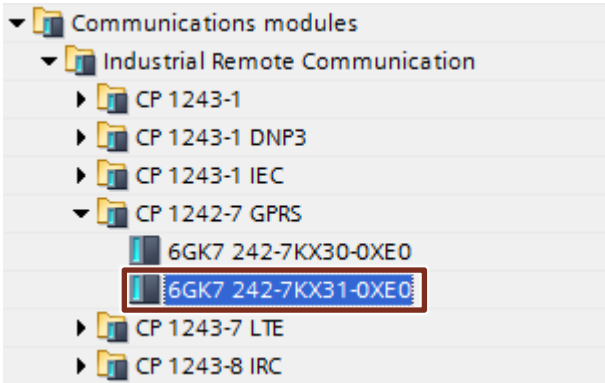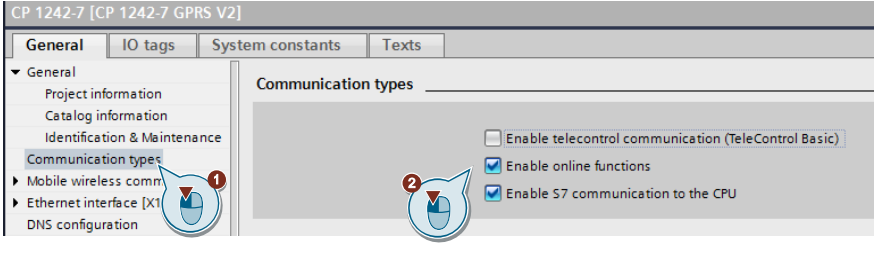
Note	The configuration and settings are fully implemented in the project. This chapter is for information only.
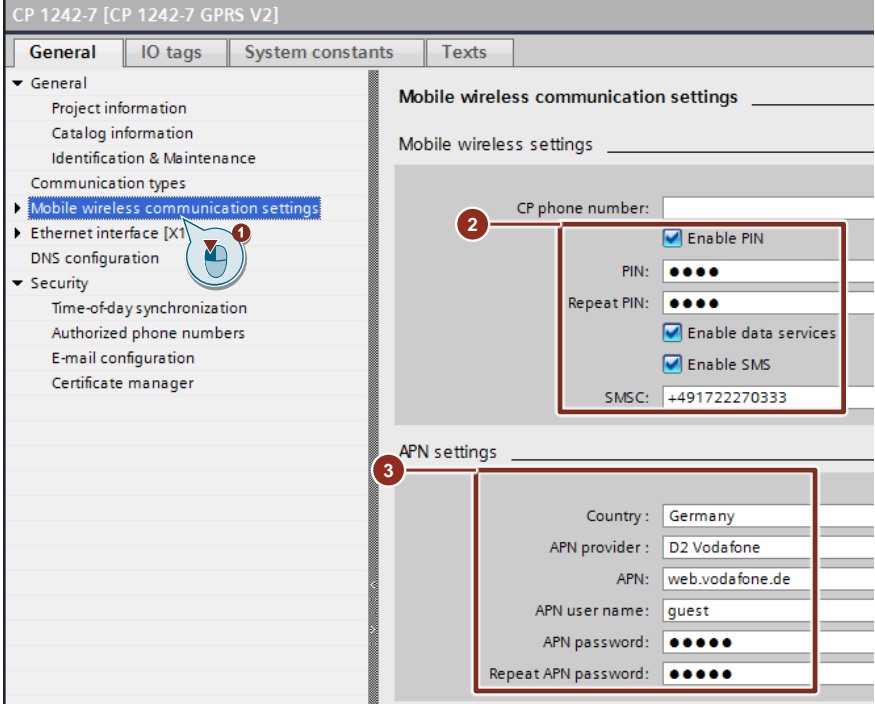
In order to ensure that the CP 1242-7 V2 is able to send or to receive SMS messages, you have to
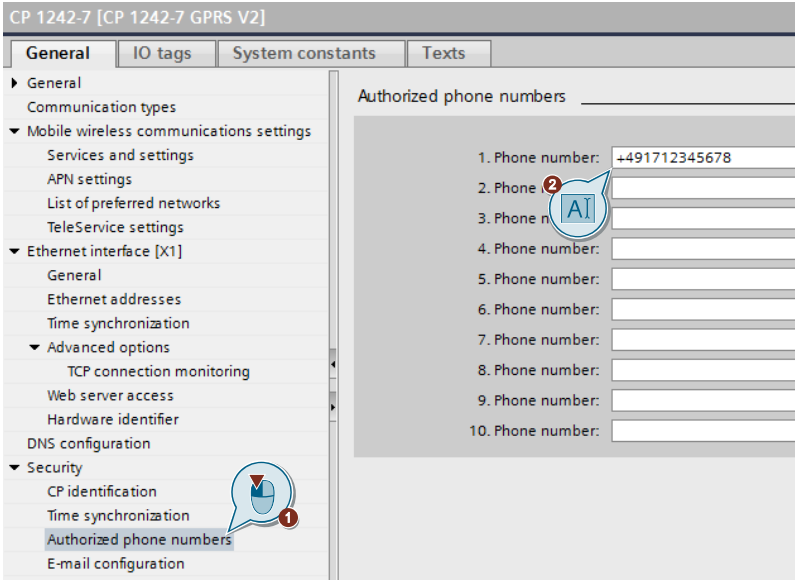
- set the mobile communication,
- make APN settings,
- enter authorized phone numbers.

The table below shows how to configure a S7-1200 station with the CP 1242-7 GPRS V2 for sending/receiving SMS messages.

Table 4-1

No.	Action
1.	Create a STEP 7 V15.1 project.
2.	Add the S7-1200 CPU (as of V4.1) for the SIMATIC station 1.
3.	Add the CP 1242-7 GPRS V2 to the station.
4.	Activate the online functions and enable S7 communication: "Properties of the CP 1242-7 GPRS V2 > General > Communication types".

No.	Action
5.	Make the required mobile communication settings: "Properties of the CP 1242-7 GPRS V2 > Mobile wireless communications settings": • Enable the PIN number • Enable data services and SMS • Make APN settings / depending on provider CP 1242-7 [CP 1242-7 GPRS V2] General | IO tags | System constants | Texts ▼ General 　Project information 　Catalog information 　Identification & Maintenance 　Communication types ▶ Mobile wireless communication settings ① ▶ Ethernet interface [X1] 　DNS configuration ▼ Security 　Time-of-day synchronization 　Authorized phone numbers 　E-mail configuration 　Certificate manager Mobile wireless communication settings Mobile wireless settings CP phone number: ② ☑ Enable PIN PIN: ● ● ● ● Repeat PIN: ● ● ● ● ☑ Enable data services ☑ Enable SMS SMSC: +491722270333 APN settings ③ Country : Germany APN provider : D2 Vodafone APN: web.vodafone.de APN user name: guest APN password: ● ● ● ● ● Repeat APN password: ● ● ● ● ●
6.	Activate the global security settings and create a user with "NET Standard" or "NETAdministrator" rights. Then activate the security functions of the CP 1242-7 GPRS V2. "Properties of the CP 1242-7 GPRS V2 > Security".

No.	Action

7.	Enter the authorized phone number for receiving SMS messages.
	"Properties of the CP 1242-7 GPRS V2 > Security > Authorized phone numbers".
	
	CP 1242-7 [CP 1242-7 GPRS V2]
	
	General IO tags System constants Texts
	
	▶ General
	Communication types
	▼ Mobile wireless communications settings
	  Services and settings
	  APN settings
	  List of preferred networks
	  TeleService settings
	▼ Ethernet interface [X1]
	  General
	  Ethernet addresses
	  Time synchronization
	  ▼ Advanced options
	    TCP connection monitoring
	  Web server access
	  Hardware identifier
	DNS configuration
	▼ Security
	  CP identification
	  Time synchronization
	  Authorized phone numbers
	  E-mail configuration
	
	Authorized phone numbers
	1. Phone number: +491712345678
	2. Phone number:
	3. Phone number:
	4. Phone number:
	5. Phone number:
	6. Phone number:
	7. Phone number:
	8. Phone number:
	9. Phone number:
	10. Phone number:

8.	Load the project data into the station.

5 Installation and Commissioning

5.1 Installing the hardware

The required hardware components are listed in chapter 2.4.2.

Note	Always observe the installation guidelines for all components.

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

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

Figure 5-1

Industrial Ethernet
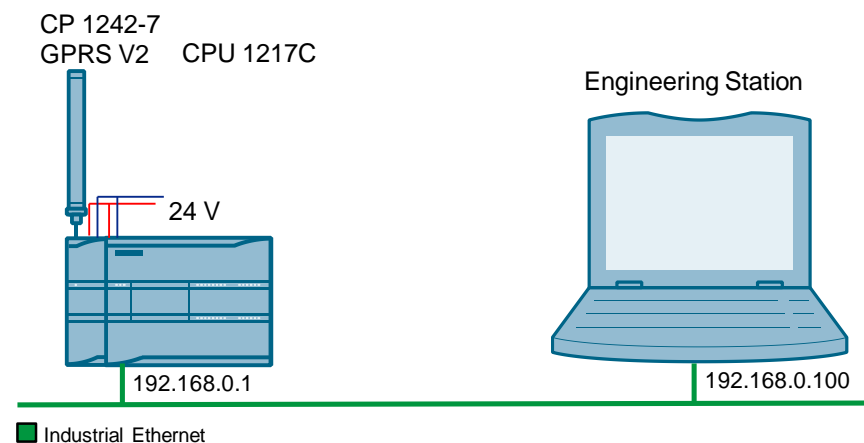
Table 5-1

No.	Action
1.	Insert your SIM card into the CP 1242-7 GPRS V2.
2.	Connect the individual modules to a suitable module rack.
3.	Connect the CPU with the CP 1242-7 GPRS V2.
4.	Connect the antenna to the CP 1242-7 GPRS V2.
5.	Connect the engineering PG to the PROFINET interface of the S7-CPU.
6.	Connect the CPU 1217C and the CP 1242-7 GPRS V2 to a 24 V DC power source.
7.	Connect the DC power source to the power grid (220 / 230 V AC).

5.2 Installing the software

Engineering PC / PG

Table 5-2

No.	Action	Remark
1.	Install STEP 7 V15.1 Update 2	Follow the instructions of the installation program.
2.	Install WinCC Advanced.	

Application software

Unzip the "58638283_S7_1200_SMS_PROJ_V13.zip" file. This folder contains the STEP 7 project with the

- "S7-1200_CP1242-7" project and the

- WinCC project "SMS Application".

5.3 Commissioning

5.3.1 Setting the IP addresses

Table 5-3
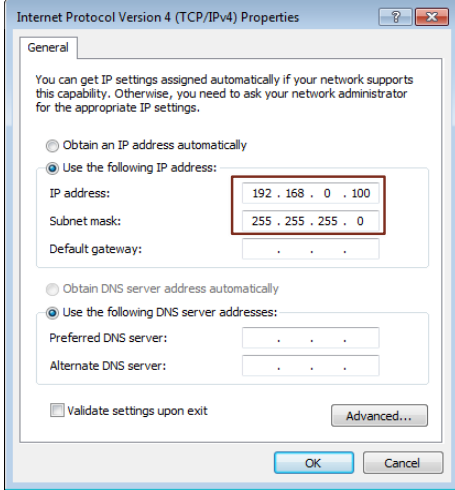
Module	IP address	Subnet mask
Station CPU 1217C DC/DC/DC	192.168.0.1	255.255.255.0
Engineering PC/PG	192.168.0.100	255.255.255.0
KTP1000 Basic color PN	192.168.0.3	255.255.255.0

5.3.2 Assigning the IP address to the engineering station

The following table shows the network settings to which you have to change the engineering station.

Table 5-4

No.	Action
1.	Open the Internet Protocol (TCP/IP) Properties: "Start > Settings > Network Connections > Local Connections"
2.	In the open window, select the Internet Protocol (TCP/IP) and open Properties.

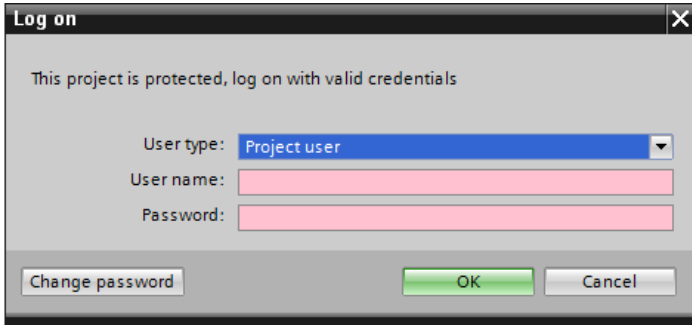| No.	Action
3.	Select the option box "Use the following IP address" and fill in the box as shown in the figure. Close the dialog boxes with "OK".
4.	If your PG has an IWLAN interface, disable it.
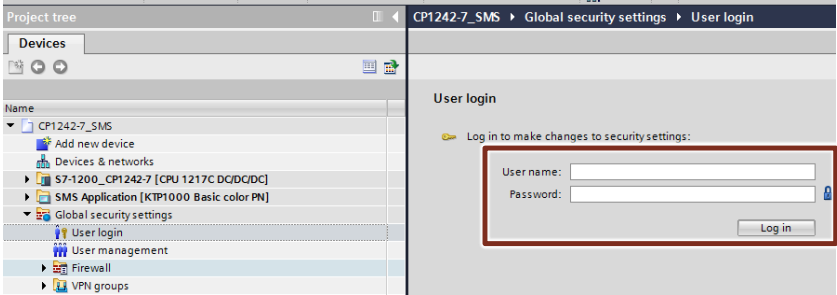
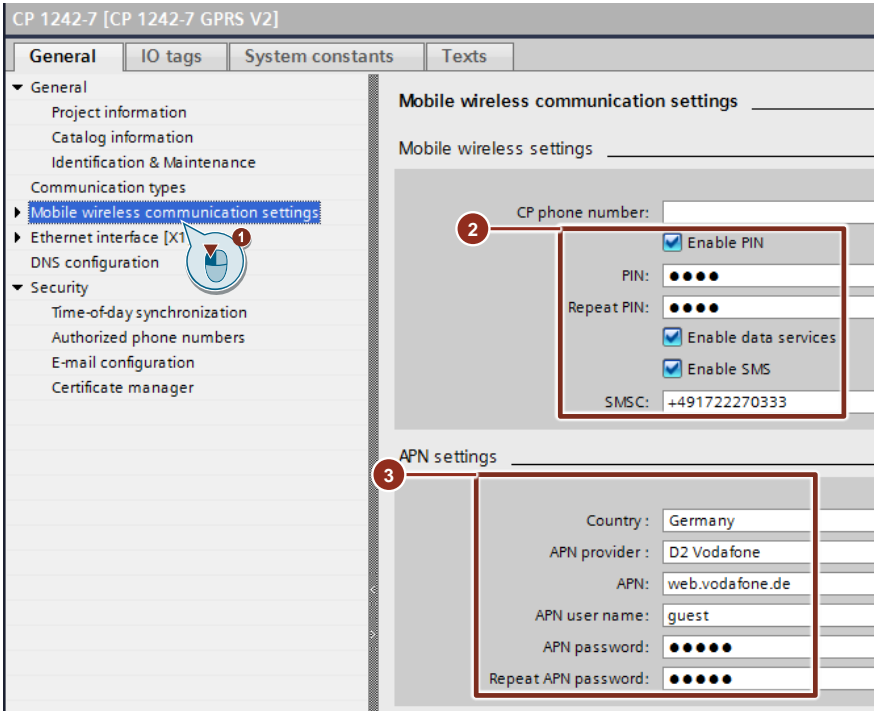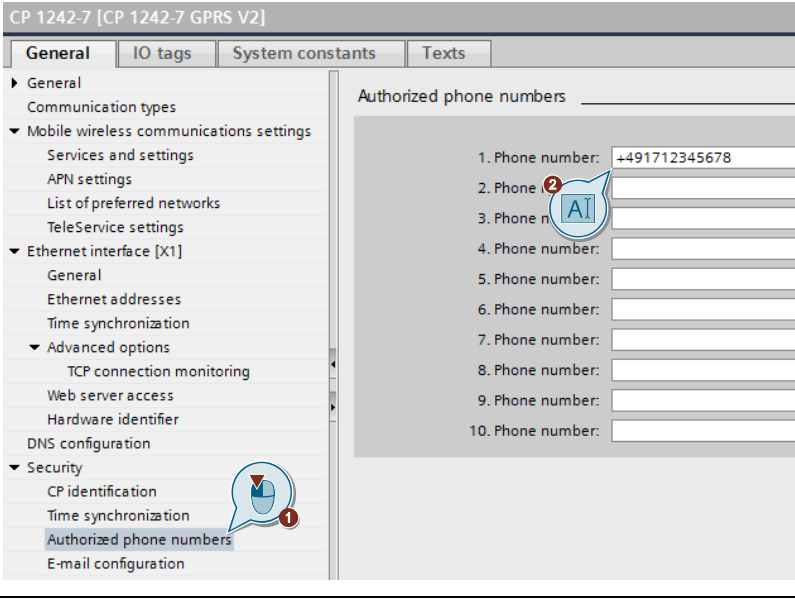### 5.3.3 Adjusting the configuration of the CP 1242-7 V2

To be able to work with the project, you have to adjust the following parameters:

* PIN number of the SIM card
* Short message service center (SMSC) of your provider
* APN settings of your provider
* authorized phone number.

Table 5-5

No.	Action
1.	Unzip the "58638283_S7_1200_SMS_PROJ_V13.zip" project.
2.	Open the STEP 7 V15.1 project "58638283_CP1242-7_SMS_PROJ_V13.ap15_1".

No.	Action	
3.	**Valid until TIA V14 SP1:** Enable the security functions of the CP: "CP1242-7_SMS > Global security settings > User login" User name: administrator Password: administrator **Valid for TIA V15 and higher:** While opening the project the following dialog appears: Enter the following User data: User name: administrator Password: administrator	

No.	Action
4.	Open the Device configuration of the project.
5.	Open the Properties of the CP 1242-7 V2 by double-clicking the CP 1242-7 V2. 1. Open "Properties of the CP 1242-7 GPRS V2 > Mobile wireless communications settings" 2. Enable the PIN number ("Enable PIN") and enter the PIN number of your SIM card. Enable data services and SMS. Enter the short message service center (SMSC) of your provider. 3. Enter the APN settings of your provider.
6.	Enter the authorized phone number for receiving SMS messages. "Properties of the CP 1242-7 GPRS V2 > Security > Authorized phone numbers".
7.	Save and compile the project.

5.3 Commissioning

NOTICE	If you are using the CP in a different location from the sample project, you must adjust the hardware ID in the project. To do this, open the DB "SmsParamDB" and adjust the hardware ID at the following locations:

5.3.4 Loading the station

Prerequisites

- There is a connection between your engineering station and the CPU (for example, via PROFINET interface).

- The CPU must be in a mode that allows loading.

- Prior to loading the user program, a general reset of the CPU should be performed to ensure that none of the "old" blocks still exist on the CPU.

Table 5-6

No.	Action
1.	Select the "S7-1200_CP1242-7" station and load the project to the station.
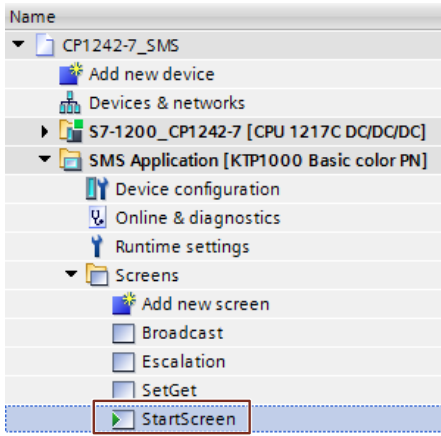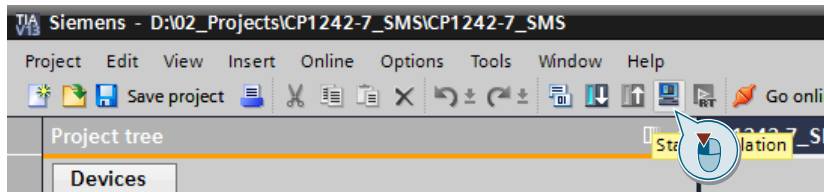
5.3.5 Changing the configuration data of the CP 1242-7 GPRS V2 with TC_CONFIG

With the TC_CONFIG program block you can change the parameters of the CP 1242-7 GPRS V2 that are configured in STEP 7:

- PIN number of the SIM card
- Short message service center (SMSC) of your provider
- APN settings of your provider
- authorized phone number.

An instruction can be found in the following table.

Table 5-7

No.	Action
1.	Open the "StartScreen".
2.	Start the WinCC Advanced simulation by clicking the "Start simulation" icon.

5.3 Commissioning

No.	Action
3.	Open the "Configuration" screen and change the configuration data of the CP. Start the process by clicking "Start Configuration".

6 Operating the Application

6.1 Overview

6.1.1 Menu navigation of the HMI

The application is visualized with WinCC Advanced by means of three configured operating screens called "Broadcast", "Escalation" and "SetGet" (see chapter 2.3).

Figure 6-1
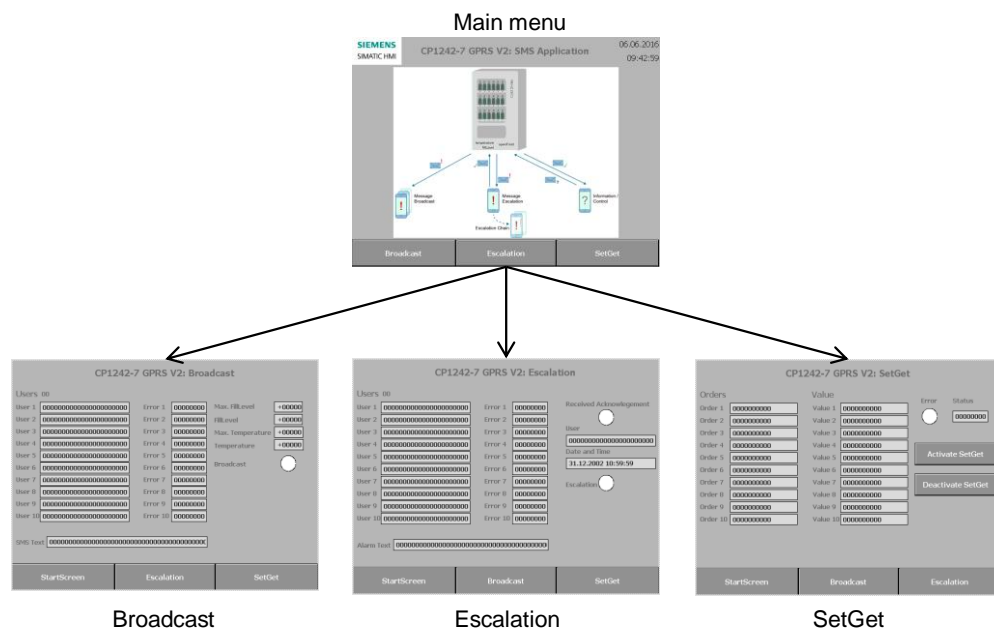
Main menu

The application can be opened via the main menu and toggled between "Broadcast", "Escalation" and "SetGet".

"Broadcast" screen

The "Broadcast" screen visualizes the broadcast process. It can be toggled between "Main menu", "Escalation" and "SetGet".

"Escalation" screen

The "Escalation" screen visualizes the escalation process. It can be toggled between "Main menu", "Broadcast" and "SetGet".

"SetGet" screen

The "SetGet" screen visualizes the SetGet process. It can be toggled between "Main menu", "Broadcast" and "Escalation".

6.1.2 "WT_Sms" watch table

As an alternative to the HMI, you can use the "WT_Sms" table to monitor or control the tags of the "SmsParamDB" data block.

Figure 6-2

Table 6-1

Name	Data type	Description
"SmsParamDB".broadcast FC.overFillLevel	Int	Limit value of the filling level of the coin box. Start value: 25 %
"SmsParamDB".broadcast FC.overTemp	Int	Limit value of the cooling system's temperature. Start value: +4°C
"SmsParamDB".broadcast FC.fillLevel	Int	Current filling level value of the coin box
"SmsParamDB".broadcast FC.temperature	Int	Current cooling system temperature
"SmsParamDB".broadcast FCactivateBroadcastOB1	Bool	The broadcast process is automatically enabled by the "FunctionBroadcast" FC, if the current filling level value or temperature exceeds the limit value.
"SmsParamDB".broadcsat FCbusyBroaddcastOB1	Bool	True: Broadcast process is active.
"SmsParamDB".escalation FC.frontOn	Bool	True: Unauthorized opening of the front of the automatic machine **Note:** In this example, it is set by the user and automatically reset by the program when the correct acknowledgment has been received.
"SmsParamDB".escalation FC.activateEscalationOB1	Bool	The escalation process is activated automatically by the "FunctionEscalation" FC, if unauthorized opening of the front of the automatic machine is detected.

6.1 Overview
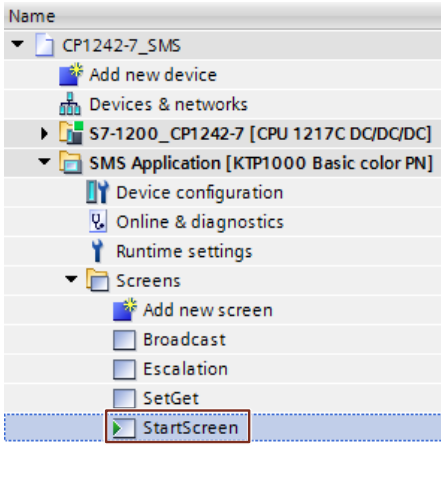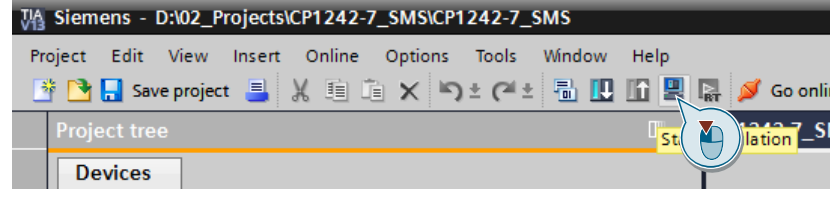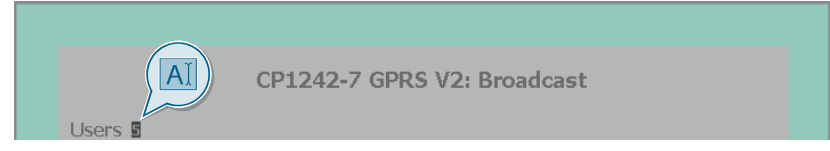
Name	Data type	Description
"SmsParamDB".escalation FC.busyEscalationOB1	Bool	True: Escalation process is active.
"SmsParamDB".escalation FC.rcvAckHmi	Bool	True: An acknowledgement has been received. It remains set to "true" until the next escalation process is activated.
"SmsParamDB".SetGetFC. activateSetGet	Bool	True: Enables the SetGet process False: Disables the SetGet process
"SmsParamDB".SetGetFC. errorSetGetHmi	Bool	True: An error has occurred during the SetGet process. It remains set to "true" until the next SetGet process is activated.
"SmsParamDB".SetGetFC. statusSetGetHmi	DWord	Returns the status to narrow down the cause of the error. Is reset when a new SetGet process is activated.
"SmsParamDB".SetGetFC. setResetSignalOB1	Bool	True: The command "SetM=" has been received. False: The command "ResetM=" has been received.

6.2 Sending SMS to several recipients – Broadcast

The "FunctionBroadcast" FC checks the current filling level of the coin box as well as the current cooling system temperature of the beverage vending machine and enables the broadcast process, if these values exceed the limit values. The following tables provide instructions for this order.
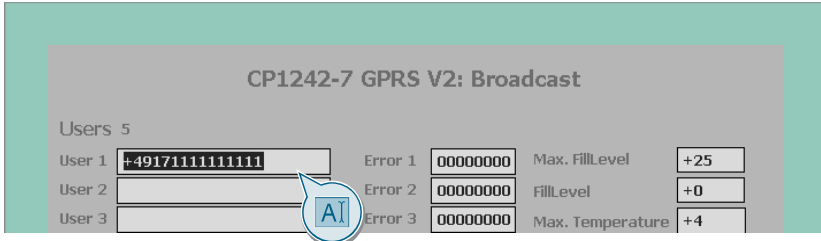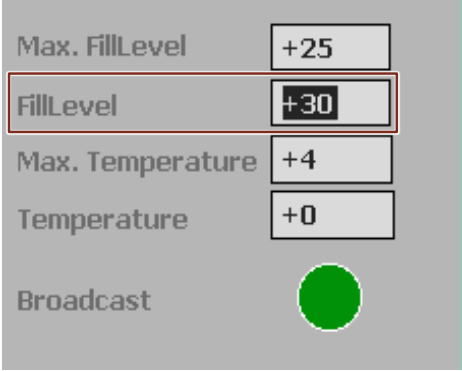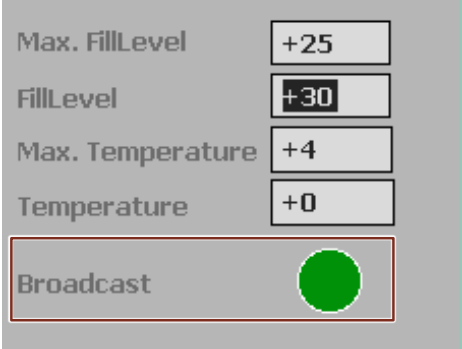
6.2.1 Filling level of the coin box exceeds the limit value

Table 6-2

No.	Action	
1.	Open the "StartScreen".	Name ▼ 🗋 CP1242-7_SMS 　　📲 Add new device 　　🖧 Devices & networks 　▶ 🖳 S7-1200_CP1242-7 [CPU 1217C DC/DC/DC] 　▼ 📁 SMS Application [KTP1000 Basic color PN] 　　🔧 Device configuration 　　📊 Online & diagnostics 　　🔨 Runtime settings 　▼ 📁 Screens 　　📲 Add new screen 　　⬜ Broadcast 　　⬜ Escalation 　　⬜ SetGet 　　▶ StartScreen
2.	Start the WinCC Advanced simulation by clicking the "Start simulation" icon. 🔲 Siemens - D:\02_Projects\CP1242-7_SMS\CP1242-7_SMS Project Edit View Insert Online Options Tools Window Help 📄 📄 💾 Save project 📧 ✂ 📋 📄 ✕ ↰± ↱± 🔳 🔃 🔲 🔳 🔳 🔵 Go onlin Project tree St　lation _S Devices	
3.	Open the "Broadcast" screen and enter the number of recipients ("Users") to whom the SMS message will be sent. A🔲 CP1242-7 GPRS V2: Broadcast Users 5	

6.2 Sending SMS to several recipients – Broadcast

No.	Action
4.	Enter the phone numbers of the recipients into the list of recipients ("Users"). **Note:** The number of recipients you have to enter into the list depends on the number of "Users".
5.	Enter a filling level value which exceeds the "Max. FillLevel" limit value (for example, 30 %). Note: When starting the simulation, the limit value is set to 25 %. You can change this value as needed.
6.	The broadcast process will be activated automatically and the "Over FillLevel" SMS message will be sent to all configured recipients.

Note If the "User[i], i<=Users" parameter contains an empty string, the process will be stopped with the error 16#00008103.
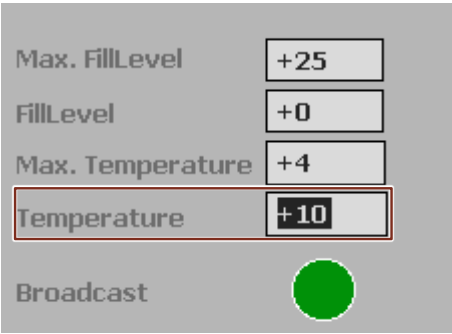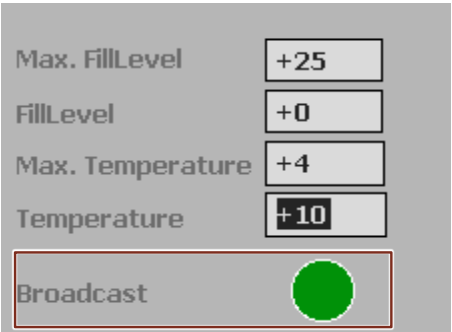
6.2.2 Cooling system temperature exceeds the limit value

Table 6-3

No.	Action
1.	Open the "StartScreen". Name ▼ 📄 CP1242-7_SMS 　　📷 Add new device 　　📊 Devices & networks 　▶ 📦 S7-1200_CP1242-7 [CPU 1217C DC/DC/DC] 　▼ 📁 SMS Application [KTP1000 Basic color PN] 　　📋 Device configuration 　　🔍 Online & diagnostics 　　🔧 Runtime settings 　　▼ 📁 Screens 　　　📷 Add new screen 　　　⬜ Broadcast 　　　⬜ Escalation 　　　⬜ SetGet 　　　▶⬜ StartScreen
2.	Start the WinCC Advanced simulation by clicking the "Start simulation" icon.
3.	Open the "Broadcast" screen and enter the number of recipients ("Users") to whom the SMS message will be sent. CP1242-7 GPRS V2: Broadcast Users 5
4.	Enter the phone numbers of the recipients into the list of recipients ("Users"). CP1242-7 GPRS V2: Broadcast Users 5 User 1 +491711111111111　Error 1 00000000　Max. FillLevel +25 User 2 　　　　　　　　　Error 2 00000000　FillLevel +0 User 3 　　　　　　　　　Error 3 00000000　Max. Temperature +4 **Note:** The number of recipients you have to enter into the list depends on the number of "Users".

6.2 Sending SMS to several recipients – Broadcast

No.	Action	
5.	Enter a temperature that exceeds the "Max.Temp" limit value (for example, 10 C). Note: When starting the simulation, the limit value is set to +4. You can change this value as needed.	
6.	The broadcast process will be activated automatically and the "Over Temperature" SMS message will be sent to all configured recipients.	

Note	If the "User[i], i<=Users" parameter contains an empty string, the process will be stopped with the error 16#00008103.

6.3 Sending SMS to several recipients with acknowledgment – Escalation
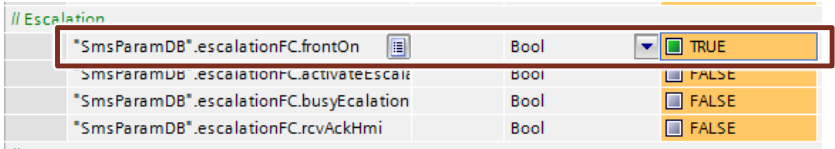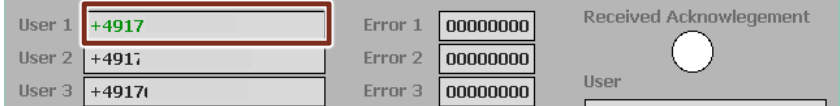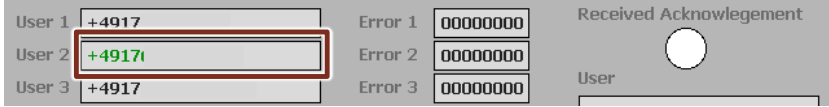
The "FunctionEscalation" FC enables the escalation process, if unauthorized opening of the front of the beverage vending machine is detected. The following table provides instructions for this order.

Table 6-4

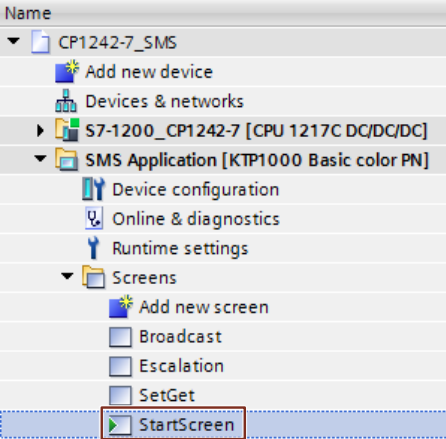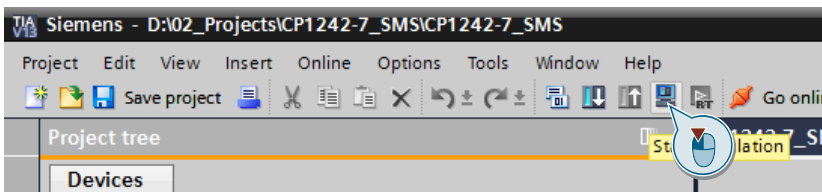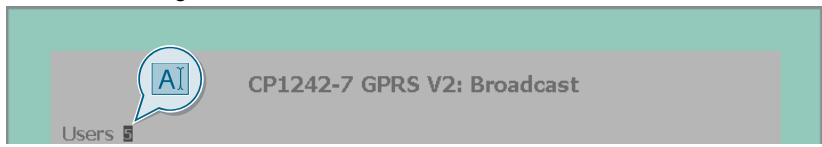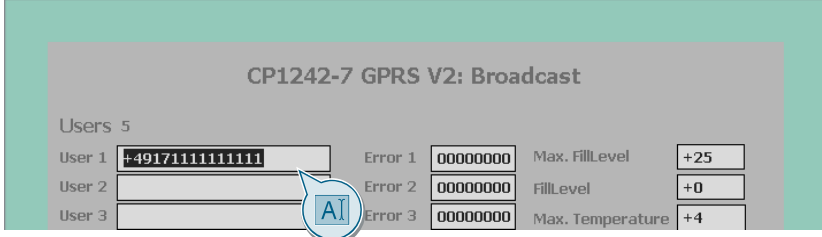| No.	Action
1.	Open the "StartScreen".
2.	Start the WinCC Advanced simulation by clicking the "Start simulation" icon.
3.	Open the "Escalation" screen and enter the number of recipients ("Users") to whom the SMS message will be sent.
4.	Enter the phone numbers of the recipients into the list of recipients ("Users"). **Note:** The number of recipients you have to enter into the list depends on the number of "Users".

6.3 Sending SMS to several recipients with acknowledgment – Escalation

No.	Action
5.	Enter any alarm text, for example, "Alarm101". Alarm Text **Alarm101**
6.	In the "WT_Sms" watch table, set "SmsParamDB".escalationFC.frontOn. // Escalation "SmsParamDB".escalationFC.frontOn Bool TRUE SmsParamDB .escalationFC.activateEscala Bool FALSE "SmsParamDB".escalationFC.busyEcalation Bool FALSE "SmsParamDB".escalationFC.rcvAckHmi Bool FALSE
7.	The escalation process will be activated automatically and the SMS message will be sent to the first recipient. User 1 +4917 Error 1 00000000 Received Acknowlegement User 2 +4917 Error 2 00000000 User 3 +4917(Error 3 00000000 User
8.	The SMS message has been sent to the second recipient, because no acknowledgment has been received within the time (1 min). User 1 +4917 Error 1 00000000 Received Acknowlegement User 2 +4917(Error 2 00000000 User 3 +4917 Error 3 00000000 User
9.	From your mobile device with the phone number of the second recipient, send an SMS message with the text "Alarm101". **Note:** The alarm SMS message ("Alarm101") and the acknowledgment SMS message ("Alarm101") must match.

No.	Action
10.	The station receives the acknowledgment from the second recipient, saves the recipient's data, resets the "SmsParamDB".escalationFC.frontOn" and terminates the process. Received Acknowlegement 🟢 User +4917 Date and Time 31.05.2016 12:07:45 Escalation ⚪ // Escalation "SmsParamDB".escalationFC.frontOn Bool ▼ ☐ FALSE

Note   If no recipient sends an acknowledgment within the configured time, the escalation process will be stopped with the error 16#00008104.

6.4 Control and remote request of values – SetGet

With the "SetGet" FB, you can receive

- Commands for setting and resetting signals and
- Requests of values from the process (filling level, temperature).

In addition, it is possible to send the requested values to the recipient.
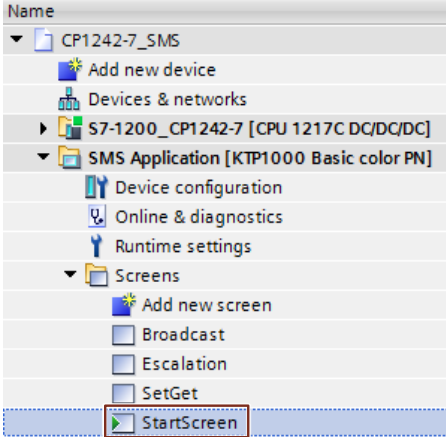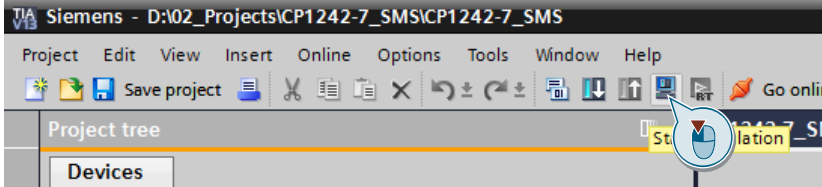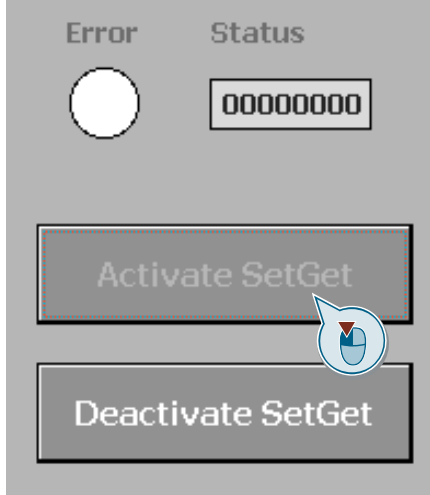
The following tables provide instructions for this order.

Note   The SetGet process must not be started when the escalation process is active. If the SetGet process is already active when an acknowledgment is being received, the process will be stopped with the error 16#00008105.

6.4 Control and remote request of values – SetGet
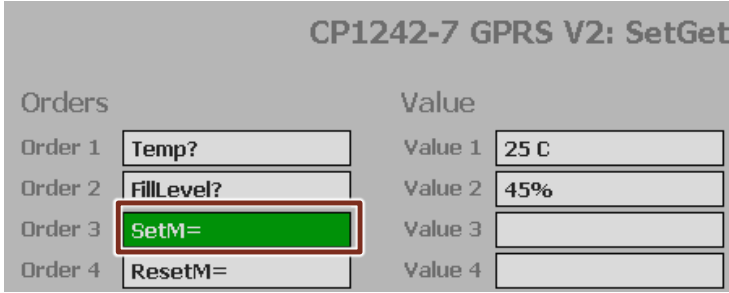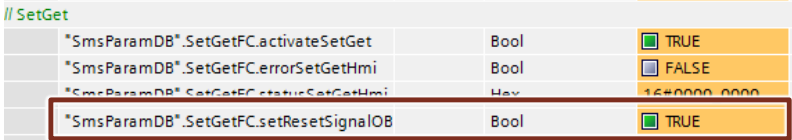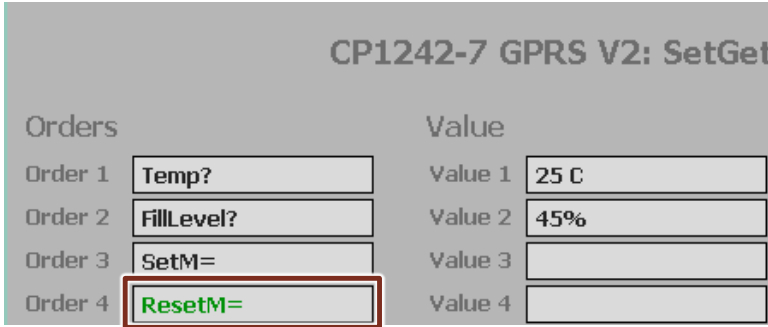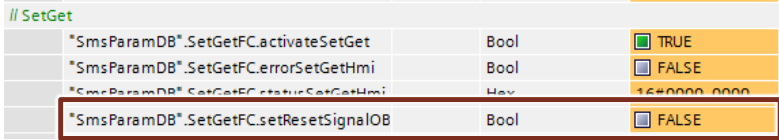
6.4.1 Control of receiving SMS commands and sending an acknowledgment to the recipient

Table 6-5

No.	Action

1.	Open the "StartScreen".
	
	Name
	▼ ☐ CP1242-7_SMS
	  📘 Add new device
	  🖧 Devices & networks
	  ▶ 🖳 S7-1200_CP1242-7 [CPU 1217C DC/DC/DC]
	  ▼ 🖳 SMS Application [KTP1000 Basic color PN]
	    🎛 Device configuration
	    🔍 Online & diagnostics
	    📍 Runtime settings
	    ▼ 📁 Screens
	      📘 Add new screen
	      ☐ Broadcast
	      ☐ Escalation
	      ☐ SetGet
	      ▶ StartScreen

2.	Start the WinCC Advanced simulation by clicking the "Start simulation" icon. VA Siemens - D:\02_Projects\CP1242-7_SMS\CP1242-7_SMS Project Edit View Insert Online Options Tools Window Help 📄 📄 💾 Save project ⬛ ✂ 📋 📋 ✕ ↶± ↷± 🖳 🔃 🔼 🔛 🔣 ⚡ Go onli Project tree Devices
3.	Enter any commands into the "Orders" list. Order 3 SetM= Value 3 Order 4 ResetM= AI Value 4 **Note:** All commands must end with the "=" symbol. Only these commands will be considered by the system.
4.	Enable the "SetGet" process by clicking "Activate SetGet". Error Status ⚪ 00000000 Activate SetGet Deactivate SetGet
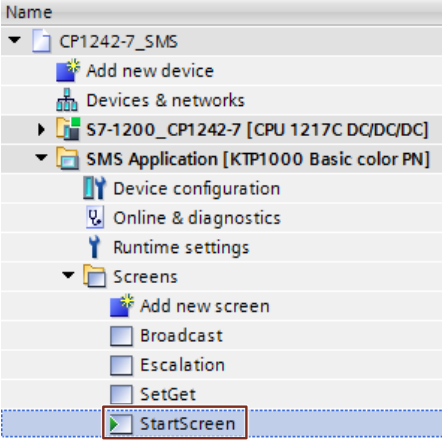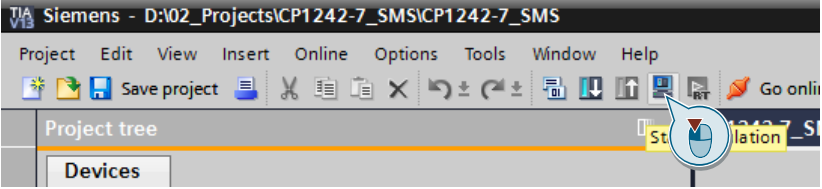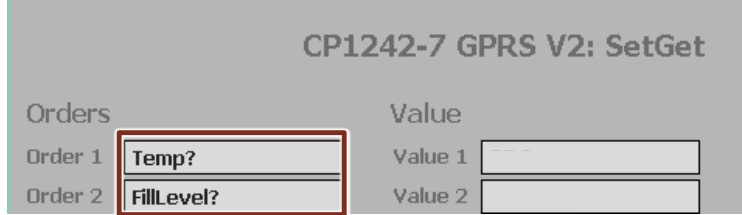
6.4 Control and remote request of values – SetGet

No.	Action
5.	Use your mobile device to send an SMS with one of the entered commands, for example, "SetM=".
6.	The command will be recognized by the system and confirmed with the "OK" string. **CP1242-7 GPRS V2: SetGet** Orders / Value Order 1 — Temp? — Value 1 — 25 C Order 2 — FillLevel? — Value 2 — 45% Order 3 — **SetM=** — Value 3 Order 4 — ResetM= — Value 4
7.	The "SmsParamDB".SetGetFC.setResetSignalOB1 signal is set. *// SetGet* "SmsParamDB".SetGetFC.activateSetGet — Bool — TRUE "SmsParamDB".SetGetFC.errorSetGetHmi — Bool — FALSE "SmsParamDB".SetGetFC.statusSetGetHmi — Hex — 16#0000_0000 "SmsParamDB".SetGetFC.setResetSignalOB — Bool — TRUE
8.	Use your mobile device to send an SMS with one of the entered commands, for example, "ResetM=".
9.	The command will be recognized by the system and confirmed with the "OK" string. **CP1242-7 GPRS V2: SetGet** Orders / Value Order 1 — Temp? — Value 1 — 25 C Order 2 — FillLevel? — Value 2 — 45% Order 3 — SetM= — Value 3 Order 4 — **ResetM=** — Value 4
10.	The "SmsParamDB".SetGetFC.setResetSignalOB1 signal is reset. *// SetGet* "SmsParamDB".SetGetFC.activateSetGet — Bool — TRUE "SmsParamDB".SetGetFC.errorSetGetHmi — Bool — FALSE "SmsParamDB".SetGetFC.statusSetGetHmi — Hex — 16#0000_0000 "SmsParamDB".SetGetFC.setResetSignalOB — Bool — FALSE
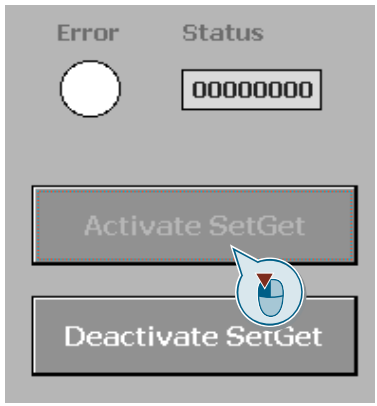
6.4.2 Receiving a remote request of a value and sending the requested value to the recipient

Table 6-6

No.	Action

1.	Open the "StartScreen".
	
	Name
	▼ ☐ CP1242-7_SMS
	   📷 Add new device
	   🔧 Devices & networks
	   ▶ 🖥 S7-1200_CP1242-7 [CPU 1217C DC/DC/DC]
	   ▼ 🖥 SMS Application [KTP1000 Basic color PN]
	      📱 Device configuration
	      🔍 Online & diagnostics
	      🔧 Runtime settings
	      ▼ 📁 Screens
	         📷 Add new screen
	         ☐ Broadcast
	         ☐ Escalation
	         ☐ SetGet
	         ▶ StartScreen

2.	Start the WinCC Advanced simulation by clicking the "Start simulation" icon.
3.	Enter any requests into the "Orders" list. CP1242-7 GPRS V2: SetGet Orders Value Order 1 Temp? Value 1 - - - Order 2 FillLevel? Value 2 **Note:** All requests must end with the "?" symbol. Only these requests will be considered by the system.
4.	Enter the current values matching each request into the "Values" list. CP1242-7 GPRS V2: SetGet Orders Value Order 1 Temp? Value 1 25 C Order 2 FillLevel? Value 2 45%

6.4 Control and remote request of values – SetGet

No.	Action	
5.	Enable the "SetGet" process by clicking "Activate SetGet".	Error Status 00000000 Activate SetGet Deactivate SetGet
6.	Send your mobile device an SMS with one of the entered requests, for example, "Temp?".	
7.	The request will be recognized by the system and the current temperature "**Temp: 25 C**" will be sent to your mobile device.	

7 Appendix

7.1 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:
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. Please send queries to Technical Support via Web form:
www.siemens.com/industry/supportrequest

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

Service offer

Our range of services includes the following:

- 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 web page:
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

7.2 Links and literature

Table 7-1

	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Download page of the entry https://support.industry.siemens.com/cs/ww/en/view/58638283
\3\	SIMATIC NET S7-1200 – TeleControl CP 1242-7 GPRS V2 – Operating Instructions https://support.industry.siemens.com/cs/ww/en/view/109476700
\4\	How do you program the TC_CONFIG instruction to change the parameters of a CP 1242-7 configured in STEP 7? https://support.industry.siemens.com/cs/ww/en/view/67396336

7.3 Change documentation

Table 7-2

Version	Date	Modifications
V1.0	07/2016	First version
V1.1	09/2016	TC_CONFIG was added
V1.2	04/2018	Migration to TIA Portal V15 Bugfixing
V1.3	09/2019	Migration to TIA Portal V15.1