SIEMENS

SIMATIC Expert Communication
Wireless Data Communication via SMS
(with S7-200 and TC35iT)

Micro Automation Set 5 **V1.5** (Version 04/2004)

Preamble

Micro Automation Sets are fully functional and tested automation configurations based on A&D standard products for simple, fast and inexpensive automation tasks for small-scale automation. Each of these Micro Automation Sets covers a frequently used subtask of a typical customer automation task in the low-end range.

The sets help the customer answer the following questions for these subtasks: "Which products do I need?" and "How do the products work together?"

However, depending on the requirements of the system, a variety of other components (e.g., other CPUs, power supplies, etc.) can be used to implement the functionality on which this set is based. See respective SIEMENS A&D catalogs for these components.

Warranty/Disclaimer of Liability

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Wireless data communication per SMS *(witht S7-200 and TC35)*

1   Required components

Products

Component	Type	MLFB / Order number	No.	Manufacturer
S7-200 CPU	CPU 222 AC	6ES7212-1BB22-0XB0 *	1	SIEMENS A&D
GSM terminal	TC35 GSM kit	6AG1011-1AC00-1AA0	1	

Accessories

Component	Type	MLFB / Order number	No.	Manufacturer
Adapter	Gender Changer for RS232 of the PC/PCI cable, 2x9 pin; assignment: male/female	COM 990	1	Reichelt Elektronik http://www.reichelt.de Elektronikring 1 26452 Sande Germany Tel.: 04422/955-333 Fax: 04422/955-111 E-mail: info@reichelt.de
Connection cable	PC/PPI cable	6ES7901-3CB30-0XA0	1	SIEMENS A&D

Configuration software/tools

Component	Type	MLFB / Order number	No.	Manufacturer
STEP 7Micro/WIN 32	V3.2 SP4	6ES7810-2BC02-0YX0	1	SIEMENS A&D
Terminal program for serial interface (only for a check)	HyperTerminal	contained in Windows	1	
Connection cable (a cable described in accessories section can also be used)	PC/PPI cable	6ES7901-3CB30-0XA0	1	
	USB/PPI cable	6ES7901-3DB30-0XA0		
Serial cable for connection of TC35 and PC (only for a check via HyperTerminal)	Part of the GSM-Kit		1	

Note 1

A field PG or a PC with free serial interface is required for running configuration software and tools!

Note 2

In order to perform a function text, you additionally need a phone with SMS capability.

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* available in different outputs/models

Note 3

Furthermore, you also need a SIM card for the TC35. You obtain it with your mobile communications provider.

In Germany for example:

- **Vodafone**   (http://www.vodafone.de)
- **T-Mobil**   (http://www.t-mobile.de)
- **O$_2$**   (http://www.o2online.de)
- **e plus**   (http://www.eplus.de)

In the US, for example:

- **Vodafone**   (http://www.vodafone.com/, then to the US)
- **T-Mobil**   (http://www.t-mobile.com/)
- **AT&T wireless**   (http://www.attwireless.com/)
- **Cingular**   (http://www.cingular.com/)
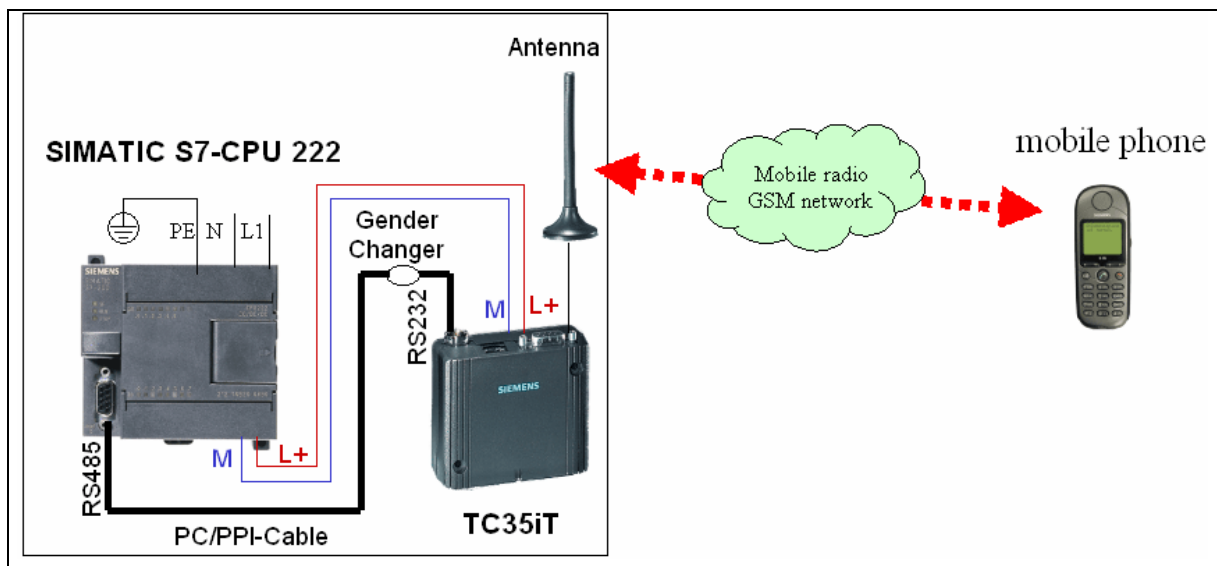
2   Layout Diagram

Figure 2-1   Layout diagram of the Micro Automation Set 5

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Wireless data communication per SMS *(witht S7-200 and TC35)*
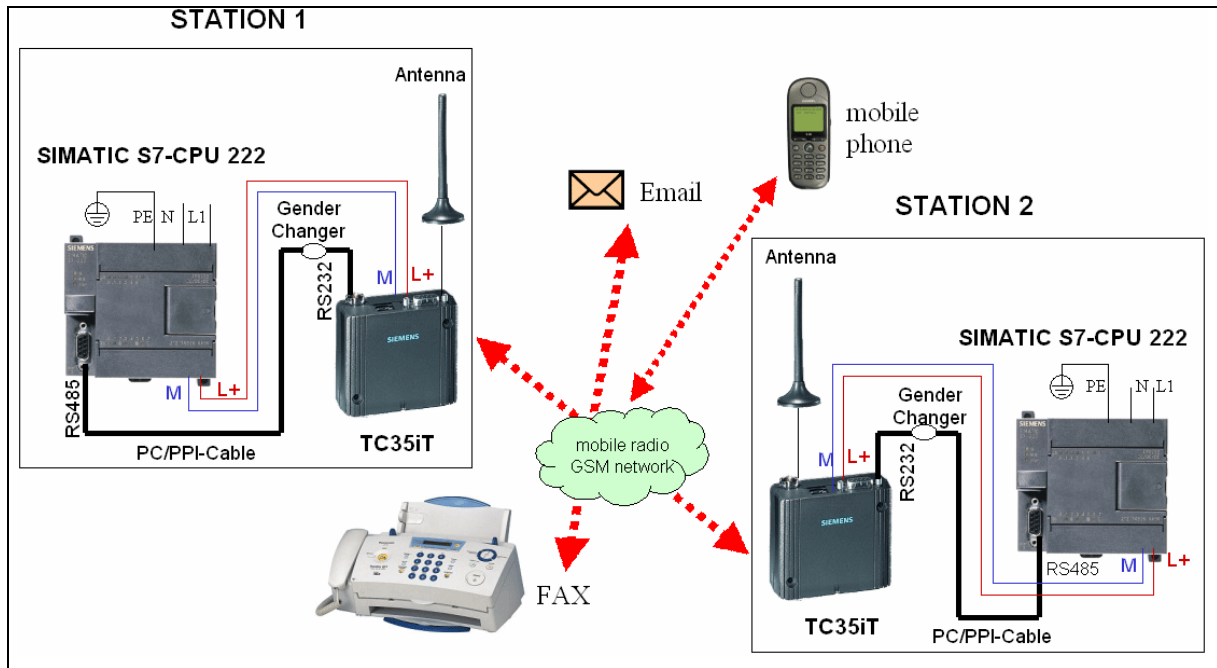

Figure 2 -2   Possible expansion of Set5 (described in the Micro Automation Example 5)

Note

Figure 1-2 " Possible expansion of the Micro Automation Set 5" follows Micro Application Example 5 (Remote control and monitoring per SMS via GSM radio communication)
This is a complete solution on the basis of S7-200 and TC35 with detailed documentation.

3   Method of Function

Using a PC/PPI cable, the TC35iT GSM terminal is connected with its RS 232 interface to the RS 485 interface of the S7-CPU 222. Via this connection, a serial data exchange occurs between both devices.

The S7-222 CPU uses for its interface free port mode. It enables sending AT commands and pure text code via the interface.

Based on the described function principle, this set shows, as an example, how text messages are sent.

Note

For sending e-mails and faxes the SMS function is used. The services must be provided by the provider.

The prerequisite for data exchange and remote configuration functionality is a SIM card with separate telephone number for data calls.

4　　Configuration/Test Code

4.1　　Configuration

Function

The goal of the configuration/test code is to show the easiest way of sending a text message from the S7-200 CPU. (The respective program code enables sending **a text message in a simple way!**)

Warning

The data which are sent by the modem to the S7-222 CPU will not be evaluated. For clarity reasons, a sequence chart for the required AT commands has not been automated.

For an actual use of the configuration an error evaluation and automated sequence chart are recommended!

The S7-200 CPU communicates with the TC35iT modem via AT commands. To use this function, the free port mode of the internal interface is used.

The AT commands necessary for sending a text message are stored in the data block as a character string. The expected control character is located at the end of the string (comparable, for example, with a Return key on a computer).
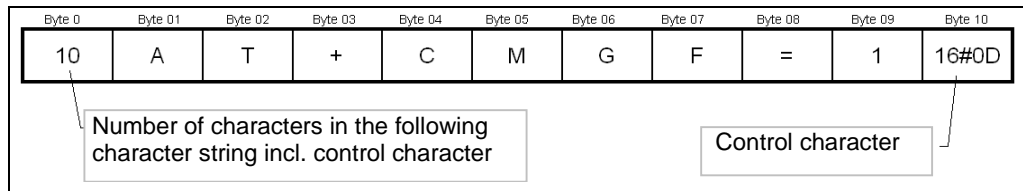

Byte 0	Byte 01	Byte 02	Byte 03	Byte 04	Byte 05	Byte 06	Byte 07	Byte 08	Byte 09	Byte 10
10	A	T	+	C	M	G	F	=	1	16#0D

Number of characters in the following character string incl. control character

Control character

Fig. 5-1　　Structure example of a character string

AT commands used:

Description	AT command	Control character	Storage in DB
PIN transfer	AT+CPIN=XXXX	16#0D (PC Enter)	VB500
Transferring the number to the short message center	AT+CSCA=+XXXXXXXXXXXX	16#0D (PC Enter)	VB520
Switching the TC35iT modem into the SMS text mode	AT+CMGF=1	16#0D (PC Enter)	VB600
Sending of an SMS	AT+CMGS=XXXXXXXXXX	16#0D (PC Enter)	VB700
	SMS in text format	16#1A (PC Cntr-Z)	VB800

Adjustment of the Configuration/Test Code

Parameters for PC/PPI cable

The following switch positions must be set for the described data cable.

Switch	1	2	3	4	5	6	7	8
ON/OFF	0	1	0	0	0	1	0	0

Changing parameters in the code (data block)

You can make changes at the places marked in red, as shown in the example below.

Please note that if the length of a string has been changed, the correct length has to be updated at the beginning of the string.

```
//Data Block: AT-Commands

//PIN transfer (HERE you must enter your PIN)
VB500   15        //number of characters for XMT (=number of characters send-string + control character byte)
VB501   'AT+CPIN="****"'  //AT Command PIN transfer
VB515   16#0D     //=Enter key (control character)


//maybe telephone number of short message central (HERE you must enter the telephone number
//of your providers short message central)
VB520   22        //number of characters for XMT (=number of characters send-string + control character byte)
VB521   'AT+CSCA=+491222270333'  //AT-Command number of short message central transfer (number here vodafone germany)
VB542   16#0D     //Enter key (control character)

//text mode (MODEM switched to text mode ==> necessary to transfer SMS text as plain text)
VB600   10        //number of characters for XMT (=number of characters send-string + control character byte)
VB601   'AT+CMGF=1'   //AT-Command text mode
VB610   16#0D     //=Enter keykey (control character)

//SMS send, ALWAYS use both (following) parts!
//SMS init (HERE you must enter the mobile phone number, wich should receiving SMS)
VB700   20        //number of characters for XMT (=number of characters send-string + control character byte)
VB701   'AT+CMGS=01721234567'  //AT Command init SMS-text transfer and transfer of mobile phone number
VB720   16#0D     //Enter key (control character)
//SMS-Text to transfer (HERE enter your SMS text)
VB800   51        //number of characters for XMT (=number of characters send-string + control character byte)
VB801   'Hier steht der SMS Text der verschickt werden soll'  //Text transfer
VB851   16#1A     //here no "Enter", "STRG-Z" is expected =HEXCODE 16#1A (control character)
```

Max. text length 160 characters

Please pay attention to the length of the character string

Info

Provider and function numbers for Germany as an example

(For other countries, please contact the service provider)

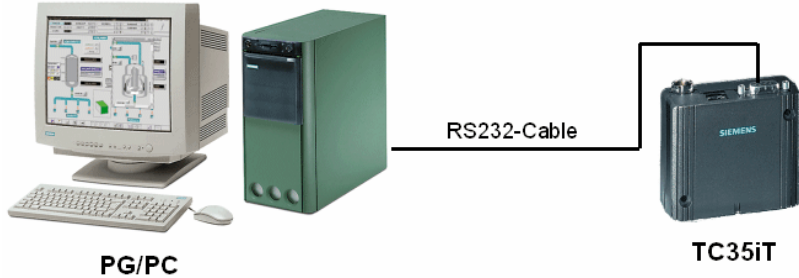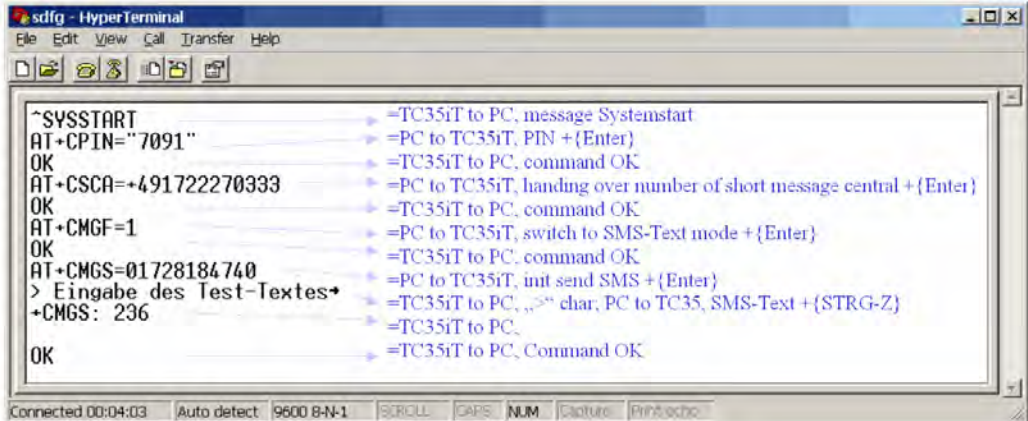| Network operator	SMS center (provider number)	Function number SMS to e-mail	Function number SMS to fax
O$_2$	+49-176-0000443	6245 (+at begin of message e-mail address!)	329+FAX-No.
E	-49-177-0600000	7676245 (+at begin of message e-mail address!)	1551+FAX-No.
D1	+49-171-0760000	8000 (+at begin of message e-mail address!)	99+FAX-No. German 98+FAX-No. English
D2	+49-172-227033	3400 (+at begin of message e-mail address!)	88+FAX-No. (with advertisement) 99+FAX-No. (without advertisement)

4.2   Configuration test

The possible check can be made via Windows HyperTeminal. (This program is a part of each Windows operating system.)

Tip	Before using the test code, connect the TC35iT modem to your PC and enter the AT commands by hand. Thus, you will get a good impression of how the communication between the CPU and the TC35iT modem works. Connect the modem **via the serial cable (which is attached to the GSM kit)** with the PC.

Step	Activity
1	Connect the TC35 modem to the serial interface of your PC/PC. **PG/PC** RS232-Cable **TC35iT**
2	Start the HyperTerminal (START→Programs→Accessories→ Communication) and create a new connection making the following settings: Name: *any* Connection: *used COM Port* Bits per second: *9600* Data bits: parity: *no* Stop bits: *1* Flow control: *hardware*
3	Now you can enter AT commands via the keyboard and Enter key in the window of HyperTerminal

4.3 Operation of the Configuration/Test Code

The following functions have to be activated one by one

Initiation	Function	Note	Check option
E0.0	PIN transfer	Once, after voltage recovery	AT+CPIN? Or if the PIN is correct and the modem logged on to the network, the LED flashes green every 3s
E0.1	Transmitting the number to the short message center	Once, for initialization after voltage recovery (after PIN)	AT+CSCA?
E0.2	Switching the TC35iT modem into the SMS text mode	Once, for initialization after voltage recovery (after PIN)	AT+CMGF?
E0.3	Initialization of SMS sending procedure and transmission of recipient number	Starting the sending procedure	not possible
E0.4	Transmitting the SMS test to the TC35iT modem	Text transmission and start of the sending procedure	not possible

4.4 Configuration/Test Code

- To call the corresponding project file, click "testcode_set_5_.mwp", if you are running Micro/Win 32 V3.2 SP4.

- The test code as well as the specified test parameters/configurations enable sending of an SMS.