

GSM 4.1

Operating Manual

Version: 2.05 / 02.04



Order number: 700-751-GSM02

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0 Scope of Delivery

Please check the scope of delivery before initial operation:

- Helmholz GSM 4.1
- 9-pin serial cable for connection between PC and Helmholz GSM 4.1 (RS232 cable)
- CD with configuration software HSCommSH and manual

If the content is not complete, please refer to your supplier.

Optional accessories:

- GSM antenna (wall mounted antenna or magnetic foot antenna)

Please check the device for shipping damage. Please refer to your supplier if damage exists.

Please keep the packaging material for dispatch or storage.

1 General

The Helmholz GSM 4.1 is a terminal device according to ETSI GSM Phase 2/2+ for the transmission of data, voice, fax group 3 and SMS messages in 900 MHz and 1.800 MHz networks.

Design and interfaces

- robust DIN rail housing

- wide voltage range
- 5 Status LEDs (Power, Status, Connect, Rx/Tx, Signal)
- serial interface via RS232 jack
- screw terminals for supply, alarm inputs, switch output
- connection for phone handset
- control by AT commands:
 - locally (terminal)
 - remote (extended command set only)
 - by SMS (extended command set only)
- integrated real time clock (RTC)
- periodic alive SMS for operation monitoring
- power up SMS after each power up (not reset)
- flash update locally and remotely
- event memory (history function) with 200 entries

Connection:

- dualband GSM networks: Class 4 (2W @ 900MHz) , Class 1 (1W @ 1.800MHz)
- automatic login into the network after power failures
- periodical logout and login
- extended data formats of the serial interface (10/11 bit)

Alarm input:

- 2 digital alarm inputs for monitoring
- dispatch of alarm messages by SMS, fax, e-mail and via data connection or establishing a voice connection
- dispatch of the alarm message to up to 10 further recipients out of a pool of 20 numbers
- pulse input:
 - distinction of 10 pulse sequences per input
 - dispatch of an assigned message to an assigned number by SMS
 - dispatch of a message to additional numbers out of the number pool.

Switch output:

- 2 control relay outputs SPDT (single pole double throw)
- control by
 - alarm input, RING, GSM network failure
 - AT command locally and remotely

- SMS command
- DTMF tone

Security and access protection

- password protection for
 - incoming data connections
 - security callback
 - commands by SMS
 - output control by DTMF
 - remote configuration
- selective call answer (CLIP)
- PIN of the SIM card stored for automatic login

2 Technical Data

2.1 General

2.1.1 Features

- mounting on DIN rail DIN EN 500 22
- data, voice, fax, and SMS services (ETSI GSM phase 2/2+)
- power supply 10..60 V DC, 50..80 V DC 5% ripple
- level on V.24 interface according to V.28
- V.24/V.28 interface with 9-pin SUB-D jack (screwed)
- mini SIM card reader with integrated slot (3 V SIM card)
- FME antenna connection

2.1.2 Data Services

Serial interface

- interface terminal adapter (TA) – terminal equipment (TE)
- compatible to RS232 (v.24/V.28)
- baud rates: 300, 600, 1.200, 2.400, 4.800, 9.600, 14.400, 19.200, 28.800, 38.400, 57.600, 115.200 bps – standard: 19.200 bps
- no automatic baud rate detection (command **AT**BAUD**)

Data connection:

Non-transparent asynchronous:

- V.22bis (2.400 bps)
- V.32/V.33/V.34 (4.800/9.600/14.400 bps)
- V.110 (2.400/4.800/9.600/14.400 bps)

The support of particular data services in the GSM network depends on the GSM provider.

Fax transparent:

- Group 3: Class 1 and Class 2

Voice connection:

- HR/FR, EFR

2.1.3 Mechanical Features

Weight	270 g
Dimensions (maximum)	w x d x h = 55 x 110 x 75
Temperature range	0°C ..55°C
Protective class	housing IP 40/ screw termination IP 20
Humidity	0 - 95% non-condensing

Note: The Helmholtz GSM 4.1 must not be used in wet environments.

2.2 System Requirements

The Helmholtz GSM 4.1 is designed for the system environment of mobile networks with 900 MHz and 1.800 MHz corresponding to ETSI GSM phase 2/2+. The access to a GSM network requires a SIM card of the network provider (see chap. 7).

2.3 Interfaces and Display Elements

Front view

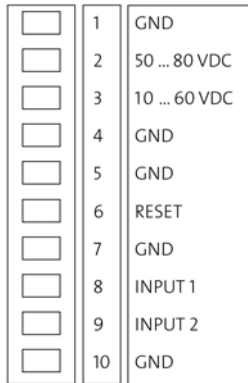
2.3.1 Display Elements

Name	Color	On	Off	Blinking	Flashing
Power	green	Supply OK	No supply		
Status	yellow	GSM engine logged into network*	GSM engine not logged into network*	Data connection alternate blinking with LED Connect: Factory settings loaded	periodic alive SMS, Power Up SMS, and SMS polling
Connect	yellow	Data connection established	No data connection established	alternate blinking with LED Status: Factory settings loaded	
Rx/Tx	green	Data exchange over RS232	No data exchange		
Signal	green	Best GSM signal (field strength)	GSM signal (field strength) too low*	Blinking interval depending on GSM signal (field strength)*: ON 25 .. 31 60 ms 23 .. 24 140 ms 21 .. 22 260 ms 19 .. 20 380 ms 17 .. 18 500 ms 15 .. 16 1000 ms 13 .. 14 OFF 0 .. 12, 99 For explanation of the values see chap. 3.3.1 Blinking in intervals of 1 second during flash process	

*) periodical query of the login state and the GSM field strength has to be active (command **AT**GSMREQ**)

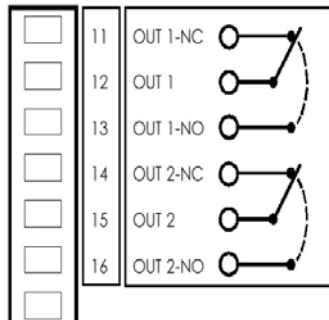
2.3.2 Terminal Layout

Top



	Terminal	
1	GND	Ground
2	50..80VDC	Supply 50V - 80V DC
3	10..60VDC	Supply 10V -60V DC
4	GND	Ground
5	GND	Ground
6	Reset	Reset
7	GND	Ground
8	Input 1	Alarm input 1
9	Input 2	Alarm input 2
10	GND	Ground

Bottom



	Terminal	
11	OUT1NC	Output 1 – normally closed
12	OUT1COM	Output 1
13	OUT1NO	Output 1 – normally open
14	OUT2NC	Output 2 – normally closed
15	OUT2COM	Output 2
16	OUT2NO	Output 2 – normally open

2.3.3 Digital Inputs and Outputs

Alarm input

The alarm inputs are designed as pull-up and are on HIGH in inactive, open state. The alarm inputs are activated by connecting to ground.

LOW active 0 .. 1 V

HIGH inactive 4 .. 12 V

The input current from LOW to internal +5V is typically 0.5 mA.

Switch output

The switch outputs are galvanic insulated relays SPDT (single pole double throw).

Maximum switch voltage: 30 V (DC) / 42V (AC)

Maximum current load: 1 A (DC) / 0,5 A (AC)

2.3.4 Power Supply

Voltage: 10..60 V DC or 50..80 V DC (5% ripple)

	Standby (logged in)	Connect	Unit
Power consumption approx.	1,1	2,1	W
Current consumption at 10VDC	110	200	mA
Current consumption at 24VDC	45	85	mA
Current consumption at 36VDC	32	60	mA

These values have been measured at for a signal field strength of 16 (**AT**SIGNAL?**). The current consumption and the power consumption may increase for poor network conditions.

These are time average values for the estimation of the current consumption. The power supply unit should be able to supply up to 10 W for small periods (577 µs) to ensure proper operation.

2.3.5 Serial Interface RS232 (V.24)

Description of the signals on the 9-pin D-SUB connector on DCE side (Helmholz GSM):

9-pin D-Sub DCE Pin No.	Description	Function	CCITT V-24	EIA RS232	DIN 66020	E/A DCE to DTE
1	DCD	Data Carrier Detect	109	CF	M5	O
2	RXD	Receive Data	104	BB	D2	O
3	TXD	Transmit Data	103	BA	D1	I
4	DTR	Data Terminal Ready	108	CD	S1	I
5	GND	Ground	102	AB	E2	
6	DSR	Data set ready	107	CC	M1	O
7	RTS	Request to send	105	CA	S2	I
8	CTS	Clear to send	106	CB	M2	O
9	RI	Ring Indication	125	CE	M3	O

2.3.6 SIM Card

The Helmholtz GSM 4.1 requires a SIM card from a GSM provider . The SIM card is the identification towards the network provider.

The slot for the SIM card is on the front of the Helmholtz GSM 4.1. Push the sunk yellow button above the card slot to unlock and pull out the insert. The visible contacts of the SIM card must face the top, when inserting the SIM card into the holder. Push the card holder back into the card reader (contacts of the SIM card to the left), until the card holder is flush with the housing (see figure in chap. 3.2.3).

Notes: **Only 3V cards may be used.**

Change the SIM card only when the device is switched off.

The GSM provider has to enable the desired services for the SIM card. A card can be enabled for voice and data services at the same time. The following cards and contracts are normally available:

Function	Prepaid card	Contract for voice transmission	Contract for data transmission
Outgoing data connection	✓	✓	✓
Incoming data connection	-	-	✓
SMS	✓	✓	✓
Voice connection	✓	✓	-

Note: **Different phone numbers are generally assigned to the different services (voice, data connections with 2.400, 4.800 and 9.600 bps). The GSM network does not connect a data call to a phone number for voice connections e.g.**

2.3.7 Audio Interface

The Helmholtz GSM 4.1 has a 4-pin western jack at the front for a phone handset.

Pin layout of the western jack

Pin	Usage
1	Microphone (-)
2	Speaker (-)
3	Speaker (+)
4	Microphone (+)

Reference type: Handset Siemens Gigaset

2.3.8 Antenna Interface

The antenna connector at the front of the Helmholtz GSM 4.1 is of type FME (male).

All commercial GSM antennas with a female FME connector can be used. Ensure that the frequency band corresponds with the one of the provider when using single band antennas (900 MHz or 1800 MHz).

2.3.9 Reset Button

The Helmholtz GSM 4.1 re-initializes after a reset. This takes approximately 30 seconds and is indicated by the flashing LED **Status** (see initial operation, chap. 3.2).

All data and voice connections are interrupted.

Reset

The device is reset to initial state by pressing the reset button shortly.

Factory settings

The device is reset to the factory settings for the extended AT commands by pressing the reset button for more than 25 seconds. This corresponds to the command **AT**DEFAULT**. The reset button can be released as soon as the LED's **Connect** and **Status** blink alternately. The device executes a restart. If the pin of the SIM card has been saved, it is kept.

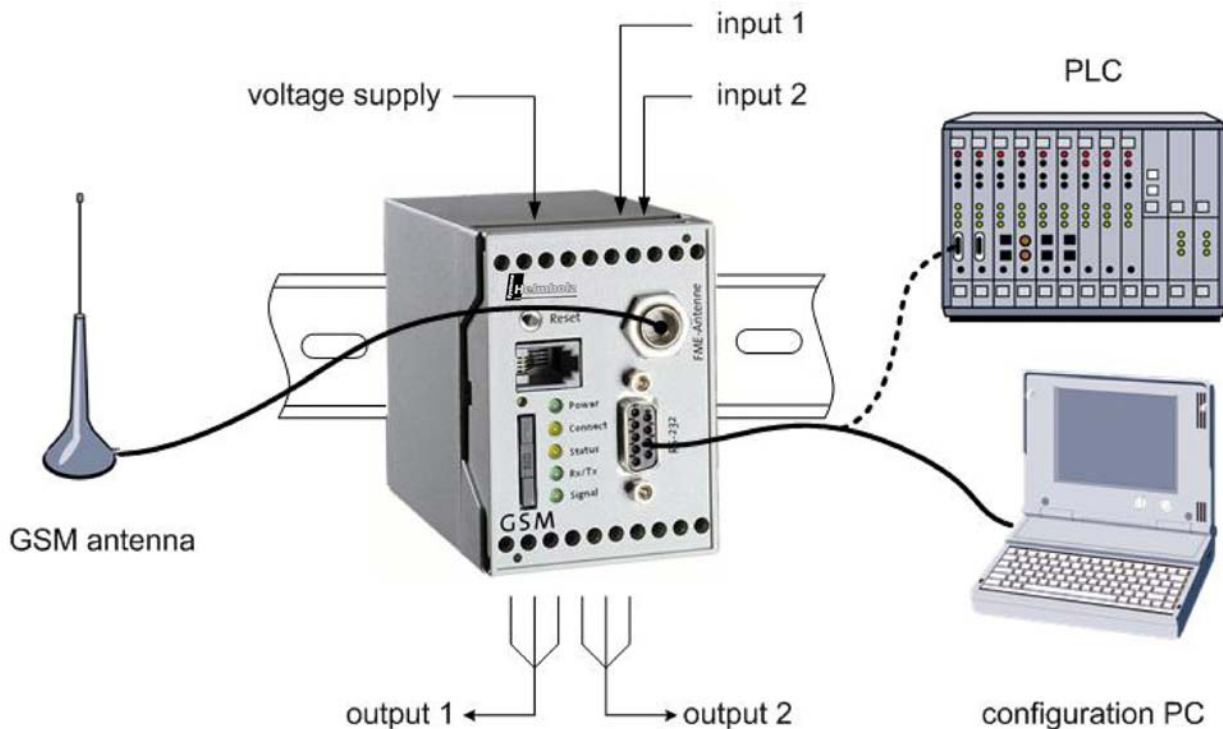
2.4 Approvals / CE

The Helmholtz GSM 4.1 bears the CE symbol of conformity. This symbol declares, that the Helmholtz GSM 4.1 is designed in compliance with the currently valid versions of the following EC directives:

Directives:	89/336/EEC	(EMC directive)
	73/23/EEC	(low voltage directive)
	91/263/EEC	(telecommunications devices directive)
Standards:	ETS 300 342 1	
	EN 60950	
	EN 55022	(class B)
	EN 55024	
	EN 300 607-1	
	EN 301 419-1	
	EN 3015011 V7.01	
	TBR 19, TBR 20	
Approvals:	CE	

3 Initial Operation

3.1 Installation Overview



The serial interfaces (RS 232) of the Helmholz GSM and the configuration PC are connected for the initial operation and configuration. For the data communication during operation, the application (e.g. an SPS) is connected to the serial interface of the Helmholz GSM (dashed line), instead of the PC. The configuration of the digital inputs and outputs is described in chap. 4.3

3.2 Initial Operation

The initial operation may take place comfortably by the configuration software HSComm (see chap. 4) under Windows as well as directly by entering the AT commands by a terminal program (e.g. ProComPlus, HyperTerminal, terminal window of HSComm).

Carry out the following steps 1 to 4, 5a to 9a (HSComm) or 5b to 9b (terminal), and 10 to 13:

1. Have SIM card (see chap. 7) and PIN number ready, but do not insert them.
2. Connect HELMHOLZ GSM and PC with serial cable. Connect GSM antenna.
3. Connect power supply to terminals 10..60 VDC or 50..80 VDC and negative pole to GND and switch on. See chap. 2.3.4 for the requirements – Attention: the given values are maximum values.
4. Initialization starts:

- LED **Connect** is on for approx. 4 seconds
- 8 seconds later the LED **Status** starts to flash for approximately 20 seconds
- LED **Status** turn off afterwards, because no SIM card is inserted and no PIN is entered.
- The LED **Signal** is on or blinks depending on the strength of the GSM network.

Continue either with the steps 5a to 9a with the configuration software HSComm or with the steps 5b to 9b with a terminal program. Subsequently insert the SIM card and execute a restart according to steps 10 to 13.

3.2.1 First Configuration by HSComm

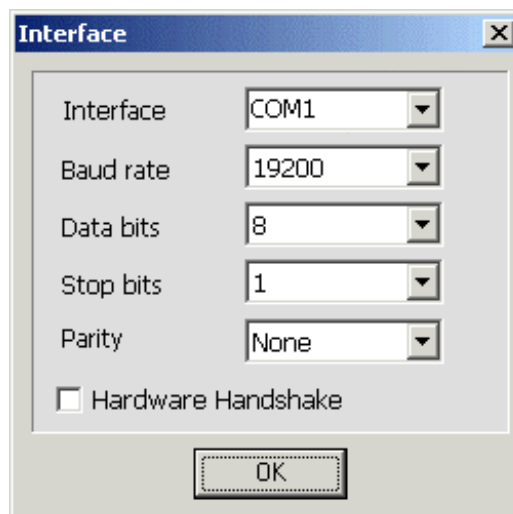
Attention: The AT command sets of the current Helmholz GSM 4.x and the prior version Helmholz GSM 2.0 are not identical:

- ➔ Use HSComm GSM version 4.0.0.0 or higher for Helmholz GSM 4.1
- ➔ Use HSComm GSM version 2.0.6.1 for Helmholz GSM 2.0

Alternative: For direct configuration by AT commands from a terminal program see the steps 5b to 9b in chap. 3.2.2.

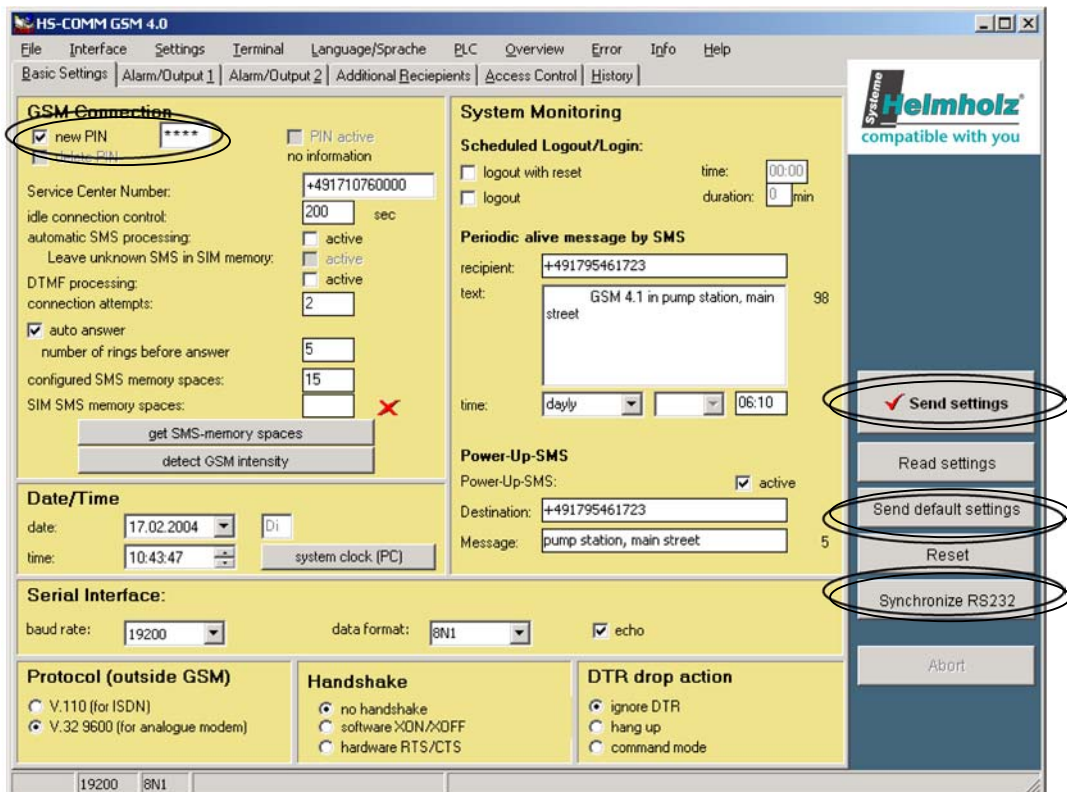
5a. Start HSComm under Windows:

6a. Select the following standard setting for the serial interface of the configurations in the menu *Interface*:

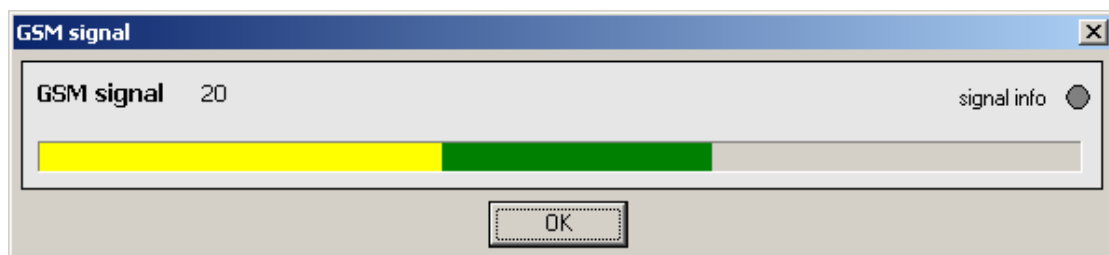


7a. If the Helmholz GSM is in an undefined state, reset it to the factory settings first (button *Send default settings*). If the Helmholz GSM does not respond to the transmission of commands, select the button *Synchronize RS232* to adapt baud rate and data format automatically.

8a. Enter the PIN number (will be stored in the Helmholz GSM): Select the tab *Basic Settings*, select *new PIN* and enter the PIN belonging to the SIM card. The PIN is stored in the Helmholz GSM and used for logging into the GSM network at every restart. Transfer settings by activating the button *Send settings*.



9a. Check the field strength of the GSM signal using the button *detect GSM intensity*.



The response should be a field strength of at least 12 – otherwise, the antenna location has to be changed. (see also chap. 3.3.1)

3.2.2 First Configuration by Terminal Program

Alternative: For configuration by the configuration software HSComm under Windows see the steps 5a to 9a in chap. 3.2.1.

5b. Start your terminal program or the terminal window of HSComm.

6b. Set the serial interface settings to the standard values: 19.200 baud, 8 data bits, 1 stop bit, no parity

7b. If the Helmholtz GSM is in an undefined state, reset it to the factory settings first.

AT&F&WZ<CR>

ATDEFAULT<CR>**

- 8b. Store the PIN number (in the example below 1234 – to be replaced by your PIN) for the SIM card by the following command and <CR> (Enter or Return key):

ATPIN=1234<CR>**

If the PIN of the SIM card is deactivated, enter **AT**PIN=<CR>** only.

- 9b. Check the field strength of the GSM signal:

ATSIGNAL?<CR>**

The response should be a field strength of at least 12 – otherwise, the antenna location has to be changed. (see also chap. 3.3.1)

3.2.3 Restart

10. Disconnect the power supply.
11. Press the sunk yellow button (see image) above the SIM card slot and take out the card holder. Put the SIM card into the card holder and insert it again. The contacts of the SIM card face to the left when inserting.
12. Connect the power supply.
13. The initialization process starts again (see point 4): If the device has logged in successful, the LED's **Power** and **Status** are on afterwards and the LED **Signal** indicates the strength of the GSM signal.



3.2.4 Connection Test

After this first configuration, you can simply check whether your Helmholz GSM 4.1 is connected with the GSM network:

Dial from the terminal window of the HSComm or your terminal program a phone number (e.g. your mobile phone) with the command **ATD** followed by the number and if it rings, you see that it tries to establish a connection.

Attention: Make sure that your SIM card is enabled for incoming data connection if required (see chap. 2.3.6).

3.3 Troubleshooting

No response on commands

- Helmholz GSM 4.1 and the terminal device (configuration PC or PLC) have to operate the serial interface with the same baud rate and the same data format (Default: 19.200 bps, 8N1).
- the Helmholz GSM 4.1 can be reset to the factory settings by pressing the reset button long (> 25 seconds) (see chap. 2.3.9)

No connection

- sufficient signal quality of the GSM network: see chap. 3.3.1

- Helmholtz GSM logged in: see chap. 3.3.2
- SIM card enabled for data connections: see chap. 2.3.6
- phone number for data (not voice) connection dialed: see chap. 2.3.6
- sufficient power supply for sending: see chap. 2.3.4

Alarm SMS is not dispatched

- SMSC entered correctly: see chap. 4.2.1
- deactivate DTR drop if no device is connected via the serial interface: see chap. 4.2.8 or if a device is used that does not support DTR.
- deactivate handshake if no device is connected via the serial interface: see chap. 4.2.7 or if a device is used that does not support hardware handshake.

3.3.1 Signal Quality

The signal quality at the reception location is queried by the button *detect GSM intensity* at the tab *Basic settings* or by the AT command **AT**SIGNAL?**. The response should be more than 12 (maximum is 31). If required change the antenna location. The response 99 indicates that no field strength can be detected (e.g. due to network failure, defective antenna).

The signal quality is indicated with an update interval of 1 minute (in idle state) by the LED **Signal**:

LED Signal	Response of AT**SIGNAL?	Quality of the radio link
always on	25 .. 31	optimum
60 ms	23 .. 24	very good
140 ms	21 .. 22	
260 ms	19 .. 20	good
380 ms	17 .. 18	
500 ms	15 .. 16	sufficient
1000 ms	13 .. 14	
always off	0 .. 12	not sufficient → improve location
	99	not detectable

3.3.2 Log-In State in GSM Network

Check whether your SIM card and the entered PIN have been accepted by the command **AT+CREG?<CR>** in the terminal window. The status, in the form <+CREG: 0,3> is indicated by the 2nd parameter of the response (in the example: 3, refused).

- | | |
|---|--------------------------------------|
| 0 | not logged in, no GSM network search |
| 1 | logged in at standard provider |
| 2 | not logged in, GSM network search |
| 3 | refused |
| 5 | logged in, roaming |

If you are not logged in, check whether the device expects a PIN by the command **AT+CPIN?<CR>** in the terminal window. The responses mean:

READY no more input required

SIM PIN Enter PIN of the SIM card → store the PIN for automatic login by the Helmholtz GSM 4.1 (see chap. 4.2.1) and execute a reset.

SIM PUK Enter PUK of the SIM card → a wrong PIN has been entered repeatedly and is locked now. The PUK, which you find in the contract documents of your GSM provider is needed to unlock. Remove the SIM card and enter the PUK using the menu of any mobile phone. Absolutely ensure afterwards that the correct PIN is stored in the Helmholtz GSM.

4 Configuration

4.1 Configuration Software HSComm

The software HSComm allows the configuration of the Helmholz GSM 4.1 under Windows without knowledge of the AT commands and their parameters. The settings are sent to or read from the Helmholz GSM only upon instruction (buttons Send settings or Read settings).

The configuration software HSComm is on the CD.

Attention: *The AT command sets of the current Helmholz GSM 4.x and the prior version Helmholz GSM 2.x are not identical:*

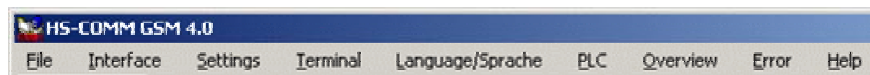
- ➔ *Use HSComm GSM version 4.0.0.0 or higher for Helmholz GSM 4.1*
- ➔ *Use HSComm GSM version 2.0.6.1 for Helmholz GSM 2.x*

4.1.1 Help

The context sensitive is available by the key **F1** or the menu *Help*.

The help also contains the complete command reference for the extended Helmholz AT commands.

4.1.2 Menus

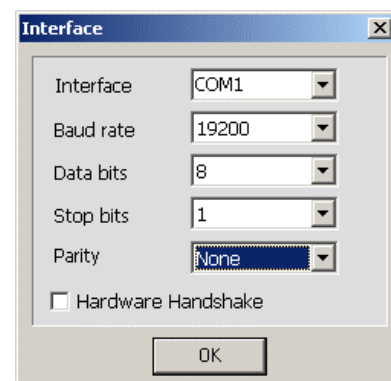


File

The current settings, as displayed in the HSComm user interface, can be saved as a file and read out again.

Interface

Setting of the serial interface by the configuration PC. The baud rate and the format (data bits, stop bit, parity) have to match the settings of the serial interface at the Helmholz GSM (see chap. 4.2.8).

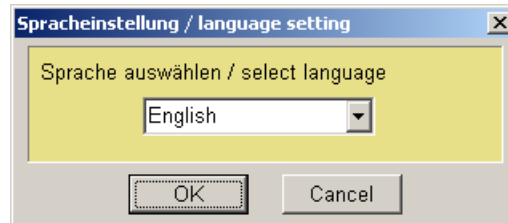


Error

If the configuration was not successful plain text messages are displayed.

Language

Selection of the HSComm user interface language: German or English. The setting does not effect the functionality of the Helmholz GSM 4.1



PLC

Recommended settings and explanations for the use of the Helmholz GSM with the PLCs of leading manufacturers. The Helmholz GSM is typically used as communication device at the PLC. The settings can be adapted to own requirements.

These settings are only transmitted by pressing the button *configure modem at PC side / configure GSM device at PLC side* at this page.

Overview

All current settings of the HSComm are displayed. The output extends over several screen pages and can be saved as text file.

Note: Read out the settings of your device and have this overview ready before contacting the hotline!

4.1.3 Status Bar

The status bar at the lower window border of the HSComm displays the setting and activities of the serial interface. RX and TX light up synchronous when receiving and sending data.

4.1.4 Buttons

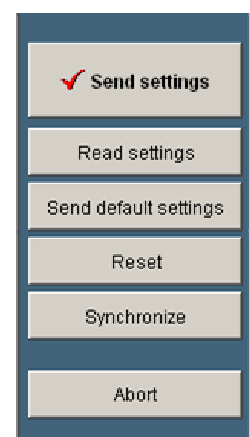
Send settings

The current settings in the HSComm are transferred to the Helmholz GSM 4.1.

The settings in the PLC window are only transferred on hitting the button *configure modem/GSM at PLC side*.

Read settings

The current settings of the Helmholz GSM 4.1 are read out and displayed in the HSComm.



Send default settings

The factory default settings are loaded and a reset is executed. The device logs in into the GSM network again afterwards if the PIN is stored.

Reset

Software reset of the Helmholtz GSM 4.1. The device logs in into the GSM network again if the PIN is stored.

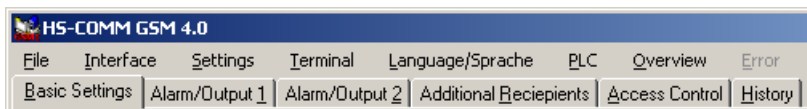
Synchronize

The serial interface of the Helmholtz GSM 4.1 and the connected device have to be configured equally. All possible settings of baud rates and data format at the PC side are tested until both sides match.

Abort

Terminates an ongoing configuration process (*Send settings*, *Read settings*, *Send default settings* – indicated by the progress bar above the buttons).

4.1.5 Tabs



Basic and extended settings are spread across several pages, which can be selected by the tab titles. The settings are transmitted to the Helmholtz GSM 4.1 only after pressing the button *Send settings*.

The functions are described in detail in the following chapters.

4.2 Basic Settings

4.2.1 GSM Connection

PIN

The Helmholtz GSM 4.1 can store the PIN of the SIM card internally and logs into the GSM network automatically when starting up.

To enter, activate *new PIN* and enter the PIN. Instead of the digits, only * are displayed. The default setting is "0000". If the Helmholtz GSM 4.1 has stored a PIN, the option *PIN active* is checked.

A PIN stored in the Helmholtz GSM 4.1 is deleted by *delete PIN*. This also enables the operation of SIM cards without PIN.

PIN active indicates that a PIN is stored. The login state is indicated below:

GSM: registered ready for operation

GSM: rejected

GSM network does not allow access

GSM: not registered

SIM accepted but no access to GSM network

GSM: network search

Radio contact with GSM network too poor → relocate antenna position

PIN missing

Enter PIN number of the SIM card and restart device

PUK required

PIN of the SIM card is locked after repeated false attempts. The PUK, which you find in the contract documents of your GSM provider, is required to unlock. Remove the SIM card and insert it into a mobile phone where you can find a menu for unlocking the SIM card. Absolutely ensure afterwards that the correct PIN is stored in the Helmholtz GSM.

Service Center Number

The number of the SMS service center (SMSC) of the own GSM provider is required for sending alarm messages by SMS. Enter the number in international format (e.g. Germany: +49).

The SMSC for your SIM card is found by in the contract documents of your GSM provider. Usual SMSCs are listed in Chap. 7.

The screenshot displays the 'HS-COMM GSM 4.0' software window. The 'Basic Settings' tab is active, showing the 'GSM Connection' section. In this section, the 'new PIN' checkbox is checked, and the 'PIN' field contains '****'. A red circle highlights the 'PIN' field. Below this, the 'Service Center Number' is set to '+49171070000'. Other settings include 'idle connection control' (200 sec), 'automatic SMS processing' (active), 'DTMF processing' (active), 'connection attempts' (2), 'auto answer' (checked, 5 rings), 'configured SMS memory spaces' (15), and 'SIM SMS memory spaces' (empty). The 'Date/Time' section shows the date as 17.02.2004 and time as 10:43:47. The 'Serial Interface' section shows a baud rate of 19200 and data format of 8N1. The 'Protocol (outside GSM)' section has 'V.32 9600 (for analogue modem)' selected. The 'Handshake' section has 'no handshake' selected. The 'DTR drop action' section has 'ignore DTR' selected. The 'System Monitoring' section shows 'Scheduled Logout/Login' (logout with reset and logout both unchecked), 'Periodic alive message by SMS' (recipient: +491795461723, text: GSM 4.1 in pump station, main street, time: daily, 06:10), and 'Power-Up-SMS' (active, destination: +491795461723, message: pump station, main street). On the right side, there is a vertical toolbar with buttons: 'Send settings', 'Read settings', 'Send default settings', 'Reset', 'Synchronize RS232', and 'Abort'. The Helmholtz logo is visible in the top right corner.

Idle connection control

Hanging connections, over which no data is exchanged anymore, can be terminated automatically by the Helmholz GSM after a waiting period.

Waiting period is entered in seconds, after which the data connection is terminated automatically. Each character which is sent over the serial interface (both directions) re-triggers the timer.

0	deactivated
1..255	activated

Automatic SMS processing

Incoming SMS messages are read out once per minute. Each SMS is checked for usability (configurations, query alarm input, setting switch output) and possible validity (format, password, selective call acceptance). A response SMS is sent after processing, if requested and the SMS is deleted from the storage location.

If the SMS is not usable, it will be deleted from the SMS buffer immediately.

SMS reception by the user application is only possible with restriction. The GSM engine is operated in the mode **AT+CMGF=1** (SMS text mode).

If the dialog box *'leave remote SMS in SIM buffer'* is activated (operating mode **AT**SMSRX=2**), the SMS unknown to the controller are left in the SMS buffer and may be used for the application.

Any activity at the serial interface (AT commands) restarts the query interval without executing the query. No query is made during an active data connection.

During the query of the SMS, the LED **Status** is flashing. Commands entered at the serial interface are ignored. The query duration depends on the baud rate and the size of the SMS storage to be queried.

Incoming SMS messages are protected by the remote configuration password if set (see chap. 4.6).

Caution:

Keep the following in mind when using the option "leave unknown SMS in SIM card memory":

1. The SMSs that are not processed by Helmholz GSM 4.1, remain in the memory of the SIM card until they are queried and deleted over the serial line. No more SMSs are accepted while the SIM card memory is full.
2. The Helmholz GSM 4.1 processed and deletes the following SMSs:
 - a) all SMSs with a valid configuration password (see chap. 5.3) if this is set, regardless whether the subsequent command is valid or not.
 - b) all SMSs with a valid syntax if the configuration password is not set. That are:
 - SMSs starting with **AT****

- SMSs which consist of the text "QUIT"
- SMSs which consist of an alarm message configured in the device (acknowledgement of alarms)

Possible solution:

The application should know the configuration password. In that case the application can leave SMSs with this password at the Helmholtz GSM 4.1 and process and delete all other SMSs.

Additionally, the polling cycle of the application should be longer than the controller's polling cycle (e.g. multiplier 2-3), as the controller triggers its polling cycle with every query from application (= activity on RS232 interface). If not considering this, the controller can not query the SMS buffers any more.

SMS memory size

The number of SMS stored on the SIM card is read out by the button '*get SMS-memory spaces*'.

The Helmholtz GSM 4.1 queries the SMS memory in intervals of one minute. The baud rate and the number of SMS storage locations to be configured determine the duration of the query.

Examples:	Baud rate	19200
	Configured SMS storage locations	15
	Query duration	5 seconds

The number of SMS storage locations which should be considered by the controller during its query routine must be specified in the dialog box '*configured SMS memory spaces*'. A problem may occur if there are more incoming SMS than SMS storage locations are queried. In this case, SMS are stored in the storage location which is not considered by the query and can therefore not be processed by the controller.

DTMF processing

The Helmholtz GSM 4.1 is ready to detect and process incoming DTMF tones during a voice connection. (The number for voice connection has to be dialed.)

The following extended responses are displayed instead of **RING** when activated DTMF processing activated:

+CRING: VOICE	for voice/DTMF connections
+CRING: REL ASYNC	for data connections

The DTMF functions are optionally protected by the DTMF PIN (see chap. 4.6).

Connection retries

The number of attempts to connect if the remote terminal does not answer. This setting is effective for:

- Dispatch of messages (alarm or periodic alive SMS)

- Connection for alarm messages via a data connection
- Connection for security callback

Possible values are 1 .. 12, default is 3.

There are not retries for an acknowledgement SMS after a configuration by SMS.

Auto answer

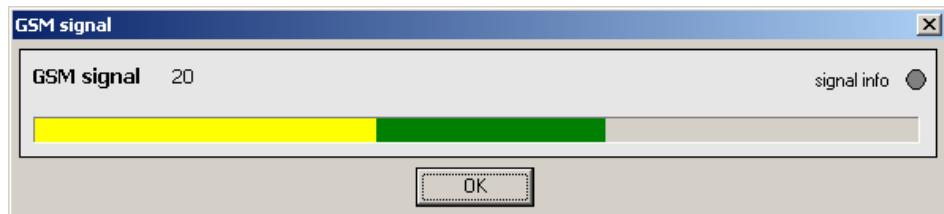
A data call is accepted by the Helmholtz GSM 4.1 after this number of ring indications.
(Incoming voice calls are automatically accepted with enabled DTMF processing.)

0 off

2..255 on

Detect GSM intensity

The currently field strength of the GSM signal is read out and displayed graphically. Values below 12 are poor



– the antenna location should be improved. The value 99 stands for not ascertainable field strength, e.g. for network loss or damaged antenna. When the location of the antenna is changed, it usually takes 5 to 10 seconds until the field strength of the Helmholtz GSM 4.1 is displayed correctly.

4.2.2 System Monitoring

Scheduled Logout/Login

The Helmholtz GSM 4.1 logs out for a short period and logs in again daily to allow maintenance functions of the GSM provider. Enter the logout time and the duration (1 to 98 minutes).

Subsequently, the Helmholtz GSM logs in into the GSM network again, if the PIN of the SIM card is stored.

Scheduled Logout/Login with Reset

For scheduled logout/login with reset, a device reset can be performed during the scheduled logout.

Subsequently, the Helmholtz GSM logs in into the GSM network again, if the PIN of the SIM card is stored.

Periodic alive message by SMS

The Helmholtz GSM can send a periodic alive message as SMS message daily, weekly or monthly. The LED **Status** is flashing during the dispatch.

Power up SMS

If this function is active, a SMS is sent with each power up (not reset).

4.2.3 Date/Time

Setting date and time of the real time clock of the Helmholtz GSM 4.1 manually or according to the system time of the configuration PC.

4.2.4 Echo

With echo, all commands which are transmitted to the Helmholtz GSM 4.1 via the serial interface are returned at the serial interface to allow local monitoring of the AT commands in terminal operation.

4.2.5 Connection

For a data connection with a device outside the GSM network (analog modem or ISDN TA) the right protocol has to be selected. This setting is for data connections with a GSM device.

4.2.6 Handshake

The handshake controls the data flow at the serial interface if the data rate is too high. Software handshake controls the data flow by control characters (XON/XOFF) via the data lines, hardware handshake uses separate control lines RTS/CTS.

Without handshake, overflowing data is ignored.

Attention: Handshake must be deactivated, if the Helmholz GSM 4.1 is operated *standalone* – i.e. without connection via the serial interface – or if it is operated with a device which does not support hardware handshake.

4.2.7 DTR

The control line DTR of the serial interface indicates whether a device (configuration PC, PLC) is connected to the Helmholz GSM and active. The setting controls the behavior when the DTR signal is missing, e.g. when the terminal device (PC, PLC) is disconnected.

Attention: Reaction on DTR has to be inactive, if the Helmholz GSM 4.1 is operated *standalone* – i.e. without connection via the serial interface – or if it is operated with a device which does not support DTR.

4.2.8 Serial Interface

Settings of the serial interface of the Helmholz GSM 4.1. The baud rate and the format (data bits, stop bit, parity) have to match with the settings of the serial interface at the connected device.

AT commands	
AT&D	function type of the control line DTR
AT**ALIVE	periodic alive SMS
AT**BAUD	baud rate of the serial interface
AT**DATE	date
AT**DAY	weekday
AT**DIAL	dial-up attempts for periodic alive or alarm messages
AT**DTC	Idle connection control (Data Transmit Controller)

AT commands	
AT**DTMF	enable DTMF processing
AT**FORMAT	data format of the serial interface
AT**GSMREQ	periodical query of the field strength and the login state in the GSM network
AT**LOGOUT	timer-controlled logout / login again or device reset respectively
AT**PIN	PIN of the SIM card
AT**POWER	dispatch of SMS during power up
AT**SCN	SMS service center number
AT**SIGNAL	GSM signal field strength
AT**SMSBUF	specification of existing SMS storage locations of the SIM card
AT**SMSRX	automatic SMS reception processing
AT**TIME	time
AT\Q	data flow control of the serial interface
ATE	set command echo
ATS0	automatic call acceptance

4.3 Alarm

The Helmholtz GSM 4.1 has two independent digital inputs for alarm detection. Alarms are triggered by connecting an alarm input to ground. The alarm input is on HIGH potential by a pull-up resistor in open state.

In case of an alarm, an alarm message can be dispatched or the switch output (see chap. 5.3 can be activated.

4.3.1 Alarm Trigger

Single alarms are triggered by connecting the input to ground.

The Helmholtz GSM 4.1 can distinguish pulse sequences from 1 to 10 pulses as pulse counter and assign these to 10 different alarms. The pulses and pauses can have a length from 0,3 to 2 seconds.

4.3.2 Alarm Transmission Medium

SMS: Dispatch of an SMS to the entered phone number. For pulse input, the message text and the recipient number are used according to the number of pulses.

HS-COMM GSM 4.0

File Interface Settings Terminal Language/Sprache PLC Overview Error Info Help

Basic Settings Alarm/Output 1 Alarm/Output 2 Additional Recipients Access Control History

Alarm input 1

alarm trigger: pulsed alarm input (1 to 10)

alarm transmission by: SMS

10 individual alarm notifications by SMS

Control output1

activated by:

- ☒ by command (AT, SMS, DTMF)
- ☐ alarm at alarm input
- ☐ incoming call (RING)
- ☐ GSM network loss

collective message remaining characters: 47

Alarm notification from GSM 4.1 form location: Pump Station 23A main Street Oberhausen:

collective and individual message must not exceed 140 characters in total

No. individual message		recipient number
1	Main entrance open too long	113 +491701112222
2	Detention Reservoir 1 filled 90 %	107 +4916051415141
3	Detention Reservoir 2 filled 90%	108 +4917525252525
4	Detention Reservoir 1 filled 100 %	106 +4917259159512
5	Detention Reservoir 2 filled 100%	107 +4901605978451
6	Overflow Switch activated	115 +4917156456458
7	Main Pump out of function - replacement pump startet	88 +4917045829712
8	All Pumps out of function	115 +4998854695127
9	undefined state of PLC, reset initiated	102 +4917591478261
10	PLC restarted	127 +1728794612352

19200 8N1

Systeme Helmholz
compatible with you

Send settings

Read settings

Send default settings

Reset

Synchronize RS232

Abort

If the GSM provider supports these features, an SMS can also be sent to a fax device or an e-mail address.

For fax dispatch, enter the fax prefix of your GSM provider before the actual fax number (examples see Chap. 7).

For the e-mail dispatch, send the SMS to the mail gateway of your GSM provider (examples see chap. 7) and start the SMS text with the e-mail address of the recipient, followed by one space character and the message.

Many network providers transmit SMS messages to fixed network numbers as voice messages.

Data connection short: A data connection will be established and the message will be transmitted as plain text. After this, the connection will be terminated.

Data connection long: A data connection will be established and the message will be transmitted as plain text. The connection remains until the alarm input is deactivated. The connection can also be terminated by idle connection control (Chapter 4.2.1), if the remote terminal hangs up, by DTR drop or +++ATH.

Voice: A voice connection is established and is maintained as long as the alarm input is active. The connection for a handset is on the front (chap. 2.3.7)

4.3.3 Individual Message

Alarm message – for pulse alarms 10 different texts according to the number of pulses.

The internal GSM character set does not match the usual ASCII character set of PCs in all positions. Therefore, the following restrictions must be observed for SMS texts.

- Permitted text characters in SMS messages are only letters (without umlauts), digits, punctuation marks, brackets, underscore, % & *.
- 8-bit characters (e.g. umlauts) and the characters \$ @ { } [] ^ ° ` ´ are not supported.
- For e-mail addresses, the character @ must be replaced by the character *; KPN in The Netherlands requires replacement by!.
- When the underscore is entered in the terminal instead of the data entry mask of the HSComm software, it must be replaced by the character 11h. The character 00h may not be used in any case.

4.3.4 Collective Message

All alarm messages start with this text, the message text according to the number of pulses will be added. Collective message and individual messages may both have a length of up to 140 characters – but only the first 140 characters of the composed message will be transmitted.

4.3.5 Recipient Number

Phone number of the recipient.

Data connection: GSM, ISDN or modem number

SMS: Mobile phone or fixed network number*, fax prefix*+fax number, mail gateway* (*support of the GSM provider required, see chap. 7)

Voice: Mobile phone or fixed network number

10 further recipients from the number pool (see chap. 4.4) can be assigned to each alarm.

If further recipients are activated, the symbol  is displayed besides the phone number.

AT commands	
AT**INPUT	configuration of the alarm inputs
AT**MSG	alarm message texts
AT**DST	main target number for alarm messages
AT**SMS	manual SMS dispatch of the stored alarm messages

4.4 Additional Alarm Recipients

Each alarm, which is sent by SMS or short data connection, can be transmitted to 10 further recipients out of the number pool (see chap. 0). The number pool consists of 20 recipient numbers.

The additional recipients (in lines) are combined with the available alarm messages (in columns).

additional recipients for alarm notification		Connection to alarm input 2									
	number	alarm number									
		1	2	3	4	5	6	7	8	9	10
recipient 1:	+491701112222	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
recipient 2:	+4916051415141	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
recipient 3:	+4917525252525	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
recipient 4:	+4901759159512	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
recipient 5:	+4901605978451	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
recipient 6:	+4917156456458	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
recipient 7:	+4917045829712	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
recipient 8:	+4998854695127	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
recipient 9:	+4917591478261	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
recipient 10:	+4998844552211	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
recipient 11:	+4917548721987	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
recipient 12:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
recipient 13:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
recipient 14:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
recipient 15:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
recipient 16:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
recipient 17:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
recipient 18:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
recipient 19:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
recipient 20:		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

up to 10 connects for each alarm

delete all connections

Send settings

Read settings

Send default settings

Reset

Synchronize RS232

Abort

A maximum of 10 additional recipients can be assigned to each alarm message.

The button *delete all connections* deletes all entered combinations.

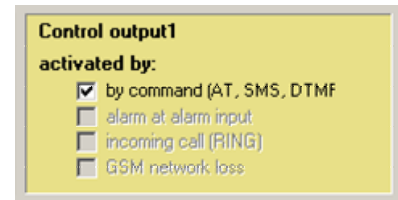
AT commands	
AT**COMBINE	combination of the alarm text with a target number from the number pool
AT**POOL	phone number pool for alarm messages

4.5 Switch Output

The Helmholtz GSM 4.1 provides two relay switches, which can be switched by command or by the device status. The settings for the two switch outputs are independent of each other.

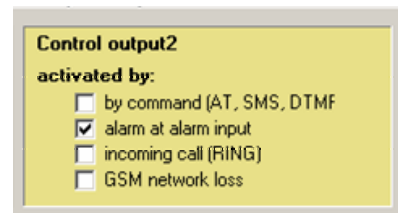
4.5.1 Activated by Command

If activated by AT command, SMS or DTMF is selected the other options (4.5.2) can not be selected anymore. The operation of the switch output is described in chap. 4.3. The processing of SMS messages and DTMF tones has to be enabled under *Basic Settings* (see chap. 4.2.1).



4.5.2 Activated by State

Following options can be selected only when activation by AT command, SMS or DTMF is not enabled (4.5.1). The switch outputs are switched to normally closed and updated when the next event occurs accordingly. The switch output becomes active (normally open) as soon as one of the following states occurs:



Alarm at alarm input

The switch output will be activated during the processing of alarm functions (alarm input 1 → switch output 1, alarm input 2 → switch output 2). With this, a signal can be sent to an external device that the alarm input is busy.

Incoming call (RING)

An incoming RING signal switches the switch output active. With this, an external signal (lamp, horn) can be switched.

GSM network loss

When the GSM network fails, the output is switched. Updated like LED **Status** after 60 seconds of inactivity of the serial interface.

Requirement: **AT**GSMREQ=1**

AT commands	
AT**OUTPUT	configuration of the switch outputs
AT**OUT	manual switching of the outputs

4.6 Access Control

4.6.1 Selective Call Answer

If this option is selected, only connections are accepted from the entered phone numbers. The caller has to activate the calling line identification presentation (CLIP). The selective call acceptance is also valid for data and voice connections as well as incoming SMS commands (see chap. 5.4.1).

Incoming calls of numbers which are not allowed are rejected immediately. They can neither be accepted manually (**ATA**). The caller receives the signal BUSY.

Selective call acceptance is active after a device reset only. The GSM engine works with the setting **AT+CLIP=1**. In addition, the phone numbers of incoming calls are displayed:

RING

+CLIP: "+49941560061",145,,,,,0

The allowed number has to be entered in exactly the same format as it is displayed (without "). The transmitted format of the number may depend on the provider – e.g. the leading "+49" may be replaced by "0049". It is absolutely recommended to verify the number by a test call.

It is possible to allow whole blocks of numbers: The wildcard character „*“ replaces one single digit.

HS-COMM GSM 4.0

File Interface Settings Terminal Language/Sprache PLC Overview Error Info Help

Basic Settings Alarm/Output 1 Alarm/Output 2 Additional Recipients **Access Control** History

Selective Call Answer

☒ only calls from the following numbers are accepted

number 1: +4917011122222

number 2: +4994156987456

number 3: +4981269451542

number 4: +4917525252525

number 5:

number 6:

number 7:

number 8:

number 9:

number 10:

number 11:

number 12:

number 13:

number 14:

number 15:

* is wildcard for exactly one digit

delete list

Password for

data connection, security callback

set password ☐ Password active

remote configuration, control by SMS

set password ☐ Password active

output control by DTMF

set PIN ☐ password active

Callback number +4994155884421

connection protected by password

Send settings

Read settings

Send default settings

Reset

Synchronize RS232

Abort

19200 8N1

4.6.2 Passwords, DTMF PIN

Besides the PIN for the SIM card (see chap. 4.2.1), which controls the access to the GSM network, the Helmholtz GSM 4.1 manages three other passwords/PIN's to control the access:

data connection, security callback

This password protects

- incoming data connections
- security callback (see chap.4.6.3)

The password consists of a maximum of 16 characters.

If an incoming connection is accepted and established, after 2 seconds the caller is asked to enter the password:

SECURITY CALLBACK: (only when callback is active)

REMOTE PASSWORD:

If no valid password is entered within 60 seconds, the connection will be terminated. A valid password is acknowledged by **OK**.

If no security callback number is set (see Chap. 4.6.3), the connection is released for data transmission after 2 seconds.

If a security callback number has been set, the existing data connection will be terminated and a new connection to the security callback number will be established after 30 seconds. If this connection is established, the message **CALLBACK IN PROGRESS** is transmitted after 2 seconds and after 2 more seconds the interface is released for data transmission. If the remote terminal is busy, the dial-up will be repeated according to the setting *connection attempts*.

The LED **Status** is flashing during the security callback process.

Remote configuration, control by SMS

This password protects

- remote configuration via data connection
- the acceptance of SMS messages to switch and query the inputs/outputs (see Chap. 5.2.5)
- the acceptance of SMS messages with extended **AT**** commands

The password consists of a maximum of 16 characters.

The remote configuration mode is initiated by the escape sequence (default *******) during a data connection (see chap. 5.1.1).

Switching via DTMF

The DTMF PIN controls the access to switch and query the inputs/outputs by DTMF tones during a voice connection. The DTMF PIN consists of 4 digits.

4.6.3 Security Callback

If a number is entered, the data password is queried for all incoming calls and the connection is terminated then. If the password has been entered correctly, the Helmholtz GSM 4.1 establishes a data connection to the entered number subsequently.

The security callback number is independent of the number of the caller, which triggers the security callback.

Outgoing calls from the Helmholtz GSM 4.1 are not affected.

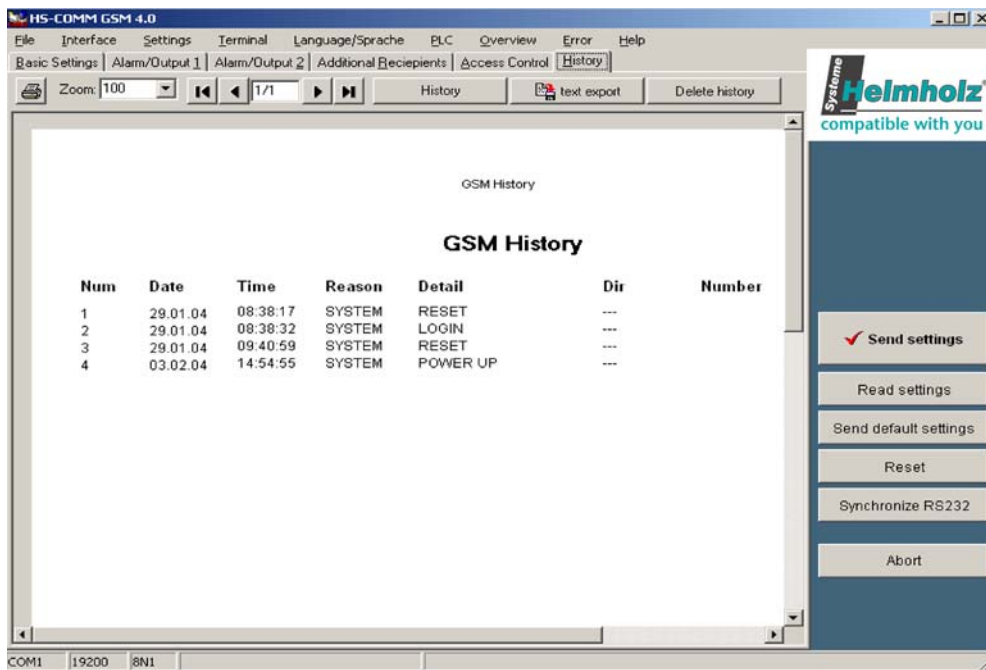
AT commands	
AT**PASS	password
AT**CLIP	selective Call Answer
AT**DIAL	connection attempts
AT**CALLBACK	target number security callback

4.7 4.7 History

The ring buffer always contains the last 200 entries. The buffer will be deleted when resetting to factory settings. The entries are displayed on 1 to 4 pages in chronological order.

ASCII export

The displayed data can be stored as text file. Have this data ready if you request technical support.



History

The current values from the internal history list are read out and displayed.

The Helmholtz GSM records the following events continuously in a ring buffer.

Cause	Detail	Meaning
SYSTEM	RTC ERROR	internal real time clock defective (time stamp empty)
	RTC RESET	internal real time clock has been reset since the gold cap was discharged (power reserve used up) time stamp: 00:00:00 01.01.03
	GSM ERROR	instruction from controller to GSM engine could not be processed correctly (e.g. AT command, dial-up, SMS dispatch...)
	SIGNAL ERROR	field strength not ascertainable (AT**SIGNAL?: 99)
	LOGOUT	GSM engine logged out (update interval like STATUS LED)
	LOGIN	GSM engine logged in (update interval like STATUS LED)
	REMOTE PARAM	remote configuration starts (** detected)
	ALIVE	alive SMS process starts
	POWER UP	Power Up executed
	RESET	Software/ Hardware reset

Cause	Detail	Meaning
SECURITY	DPW ERROR	data password has been entered wrong or timeout
	PPW ERROR	configuration password has been entered wrong or timeout
	TPW ERROR	DTMF PIN has been entered wrong or timeout
	CLIP ERROR	call with invalid (rejected) phone number (selective call answer)
	SECURITY CALL-BACK	security callback process starts
ALARM	Start	alarm at alarm input detected
	End	Alarm at alarm input processed
	Quit	Acknowledgement of an alarm message
VOICE	Start	outgoing voice connections incoming voice connections for activated DTMF processing number for outgoing calls number for incoming calls for activated selective call acceptance
	End	voice connection terminated
DATA	Start	data connection outgoing or incoming; incoming number given when selective call acceptance activated
	End	data connection terminated
SMS	Power up	Power Up SMS dispatched
	PARAM	SMS for configuration has been received*
	QUITT	SMS with the text QUITT has been received*
	QUITT	SMS for acknowledging a configuration SMS has been sent*
DTMF	PARAM	DTMF command has been detected

*) automatic SMS processing has to be activated.

The following columns of the history list are displayed additionally:

Dir

Direction of the recorded event: IN stands for incoming, OUT for outgoing calls and SMS messages.

Number

The involved phone numbers, alarm inputs and number of pulses are recorded when applicable.

Time/Date

Time stamp of the internal clock

AT commands	
AT**HISTORY	read out history list

5 Functional Description

5.1 Operating Modes

The Helmholtz GSM 4.1 provides the following three operating modes – the separate configuration mode of earlier versions has been dropped with the integration of the extended Helmholtz **-AT**** commands.

5.1.1 Command Mode

Offline

The offline command mode is the state after switching on or resetting the Helmholtz GSM 4.1. The Helmholtz GSM 4.1 can be accessed by AT commands in the AT command mode.

Online

The Helmholtz GSM 4.1 can be switched to online command mode during a data connection by the escape sequence <1 second pause>+++<1 second pause> via the serial interface. AT commands can be entered 2 seconds after the response OK. The data connection remains established, but may be terminated by the command **ATH**. The Helmholtz GSM 4.1 switches back to connection mode by **ATO**.

Remote configuration

The Helmholtz GSM 4.1 can be switched to remote configuration mode during a data connection by the escape sequence <1 second pause>***<1 second pause> via the data connection from the remote terminal. The data connection persist while extended HELMHOLTZ **AT**** commands are processed. The Helmholtz GSM 4.1 switches back to connection mode by **AT**EXIT**.

If configured, the remote configuration password is requested before switching to the remote configuration mode.

SMS configuration

If the Helmholtz GSM 4.1 is in command mode (offline), it can also receive extended Helmholtz **AT**** commands via SMS. Syntax see chap. 5.4.1

5.1.2 Connection mode (online)

In connection mode the asynchronous byte stream between the serial interface of the Helmholtz GSM and the remote terminal is exchanged transparently. The Helmholtz GSM 4.1 can change to command mode by the local escape sequence +++ as well as to remote configuration mode by the remote escape sequence *** during a data connection.

Connection

ATD015265241	Dial number to which a connection is to be set up (always with dialing code). The phone number must be closed with a semicolon only for voice connections. The cursor is displayed, as long as the other phone rings.
CONNECT 9600/RLP	The call has been accepted. The data is exchanged over the GSM network.
+++	Changing from data mode to online AT command mode. The connection still remains, but no characters are transmitted to the other modem anymore.
ATH	Hang up (terminate connection)
ATO	Return to data mode.
NO CARRIER	The other party has terminated the connection.

Termination

Connections can be terminated as follows:

- manually by the **ATH** command in online command mode
- if the remote terminal hangs up
- by the idle connection control (Data Transmit Controller)
- by activating an alarm input
- by DTR drop

5.1.3 Alarm State

As soon as an alarm input of the Helmholtz GSM 4.1 has been activated, data and voice connections are terminated. Incoming commands are ignored during the processing of the alarm actions. If an input is activated while processing an alarm at the other input, the second alarm state is saved and executed subsequently.

If a connection cannot be established, a re-dial is attempted after 1 minute until the defined maximum number of dial-up attempts is reached.

The LED **Status** is flashing during the (attempted) connection set-up.

AT commands	
***	remote configuration mode
+++	switch to online command mode
ATD	dial
ATH	close a connection
AT**EXIT	leave the remote configuration mode
ATO	leave the online command mode
AT**PASSC	password for remote configuration
AT**ESC	escape character for remote command mode

5.2 Alarm Functionality

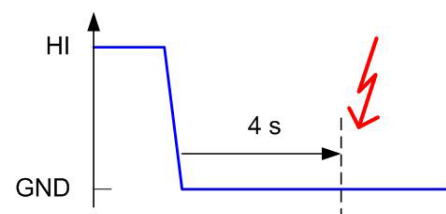
The Helmholz GSM 4.1 has 2 independent alarm inputs, which are pulled to HIGH by pull-up resistors in open (inactive) state. The alarm inputs are activated by connecting to ground.

5.2.1 Alarm Trigger

Each alarm input can be configured as single alarm input or as pulse input (see chap. 4.3.1).

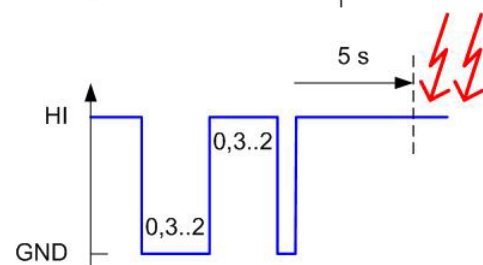
Single alarm input

A single alarm is triggered by changing the alarm input from HIGH to LOW/GND. The alarm is accepted after 0,3 seconds. Even in case it is configured as pulse input, a single alarm is triggered as soon as the input is connected to ground for at least 4 seconds - irrespective of the prior history.



Pulse input

Sequences of up to 10 pulses can be detected as different alarms at the pulse input. Pulses and pauses may last from 0,3 to 2 seconds.



The pulse input can be used particularly to transmit several alarm states from small PLCs like SIEMENS Logo!™, Crouzet Millenium™, Comat BoxX™ or Moeller Easy™. A demonstration program for creating such pulse sequences with the PLC “Siemens Logo” is available on request (e-mail to info@helmholz.de).

5.2.2 Alarm Actions

When detecting an alarm state, the following actions can be configured (see chap. 4.3.1):

Alarm action	Single alarm	Pulse alarm
Set-up of a long data connection (remains established after transmitting the message as long as the alarm is active)	✓	-
Set-up of a short data connection (will be terminated immediately after transmitting the message)	✓	✓
Dispatch of an alarm message as SMS	✓	✓
Set-up of a voice connection	✓	-
Switching the corresponding switch output	✓	✓

Requirements for sending an SMS are:

- valid number of the SMS service center SMSC (see chap. 4.2.1)
- valid recipient number
- text of the alarm message is defined
- existing connection with GSM network
- DTR behavior and handshake deactivated if no device is connected via the serial interface.

An existing data connection is terminated before an alarm message is dispatched via SMS or data connection, or before a voice connection is established.

If no connection can be established, as much dial-up attempts will be made as configured under *basic settings* (chap. 4.2.1) in intervals of approx. 60 seconds.

The LED **Status** is flashing during the alarm processing.

5.2.3 Main Recipient of an Alarm Message

The following devices can be recipients of an alarm message:

- mobile phone as SMS recipient in the GSM network or for voice connection
- fax device (via SMS)
- E-mail recipient in the internet (via SMS)
- fixed network phone as SMS recipient (voice output by network provider) or for voice connection
- analog Modem, ISDN TA or GSM device for data connections

The SMS transmission to a fax device or an e-mail address requires the support by the network provider (see Chap. 7). The voice output of SMS messages in the fixed network has to be supported by the network provider as well.

5.2.4 Additional Recipients of an Alarm Message

Each alarm message, which is dispatched by SMS or short data connection, can be sent additionally to 10 further recipients out of a pool of 20 numbers.

The alarm messages to these additional recipients are all transmitted in the same way (via SMS or short data connection) as to the main recipient.

5.2.5 Querying the Alarm Inputs

The state of the alarm inputs can be queried via AT commands, SMS or DTMF:

AT command

Entering the command **AT**IN?** <CR> via a terminal program or the terminal window of HSComm. The responses mean:

OPEN not activated, open

CLOSE activated, connected to ground

SMS query (see chap.5.4.1)

The automatic processing of SMS messages has to be enabled (see chap. 4.2.1)

DTMF query (see chap.5.5)

The processing of DTMF tones has to be enabled (see chap. 4.2.1)

AT commands	
AT**MSG	alarm message texts
AT**DST	main target number for alarm messages
AT**DIAL	dial-up attempts for periodic alive or alarm messages
AT**SCN	SMS service center number
AT**COMBINE	combination of the alarm text with a target number out of the number pool
AT**POOL	phone number pool for alarm messages
AT**IN	query the alarm inputs
AT**INPUT	configuration of the alarm inputs

5.3 Switch Outputs

The Helmholtz GSM 4.1 provides two galvanic insulated relay switches (see Chap. 2.3.3), which can be switched by command or by the device status. The two switch outputs can be configured independently (see Chap.4.5).

AT command

Enter the command **AT**OUT[<output>]=<status><CR>** via a terminal program or the terminal window of HSComm with the following parameters:

<output>	1, 2	Switch output OUT1 or OUT2
<status>	0	Switch output to normally close
	1	Switch output to normally open
	PULSE<xx>	Switch output is pulsed <xx> times
<xx>	01 .. 10	Number of pulses (two-digit)

This command can also be entered in remote configuration mode via an existing data connection (see chap.5.1.1).

SMS command (see chap. 5.4.1)

The automatic processing of SMS messages has to be enabled (see chap. 4.2.1)

DTMF query (see chap. 5.5)

The processing of DTMF tones must be enabled (see chap. 4.2.1)

AT commands	
AT**OUT	set/query the switch outputs
AT**OUTPUT	Configuration of the switch outputs

5.4 SMS Functions

If *automatic SMS processing* is activated, incoming SMS messages are checked, as soon as the Helmholtz GSM 4.1 is not busy with data connection, alarm processing and processing of AT commands for 60 seconds. Incoming SMS messages are optionally password protected (see chap. 4.6.2).

5.4.1 Commands via SMS

Most of the extended **AT**** commands as well as commands for switching the outputs and querying the alarm inputs can be transferred via SMS to the Helmholtz GSM 4.1. Responses can be sent back via SMS to a user defined number.

Syntax for extended AT commands via SMS:

[<password> ,] <command> [, CN: <reply>]

- <password> Password for remote configuration and SMS query. If no password is set, the separating comma is dropped also.
- <reply> Optional phone number, to which the response is sent via SMS. The number must be separated from "CN:" by a space.
- <command> Extended **AT**** command with parameters

Examples for switch outputs / alarm inputs:

- <command> **AT**OUT1=OPEN** Switch output 1 to normally open
- AT**OUT2=CLOSE** Switch output 2 to normally open
- AT**OUT2=PULSE09** Output 9 pulses at switch output 2
- AT**IN?** Query state of the alarm inputs

5.4.2 SMS Acknowledgement

An SMS in the format of a command SMS, which contains only the text **QUIT** instead of an **AT**** command, is entered in to the history list, with time stamp and calling number if automatic SMS processing is active.

An alarm message that is received as SMS may be acknowledged by sending it back to the Helmholtz GSM 4.1.

5.4.3 Creating and receiving an SMS

The Helmholtz GSM 4.1 can create as well as receive SMS messages by AT commands. The respective commands and parameters are listed in the separate document "AT Command Set for Helmholtz GSM 4.1".

Attention: If automatic SMS processing is activated, the SMS messages are read out, processed and deleted once a minute by the Helmholtz GSM 4.1 (see Chap. 4.2.1).

AT commands	
AT**SMSRX	automatic SMS reception processing
AT+CMGD	delete SMS message
AT+CMGF	SMS message format
AT+CMGL	list SMS message
AT+CMGR	read SMS message
AT+CMGS	send SMS message
AT+CSCA	number of the SMS service center

AT commands	
AT^SMGL	list SMS messages (without changing the state)
AT^SMGO	SMS overflow
AT^SMGR	read SMS message (without changing the state)

5.5 DTMF Functions

DTMF tones (e.g. from a touch-tone phone) can be used via a voice connection to query alarm inputs and to switch outputs. The Helmholtz GSM 4.1 has to be called using its voice number.

These functions are optionally protected by a PIN (see chap. 4.6.2). If a PIN is set, the PIN (4 digits) has to be entered first after the connection establishment. This is acknowledged with **ERROR** or **OK**.

The following commands (keys) are defined:

0*	Terminate connection
1*1	Switch output 1 to normally open
1*0	Switch output 1 to normally closed
2*1	Switch output 2 to normally open
2*0	Switch output 2 to normally closed
3*	Query the alarm inputs: response state input 1 – pause – state input 2

Each command is acknowledged by **OK** first. The acoustic responses have the following meaning:

	acoustic	corresponding keys
OK	low (short) high (short)	* #
ERROR	low (long)	1
Input inactive (HIGH)	high (medium long)	D
Input activated (LOW)	low (medium long)	1

The processing of DTMF tones has to be enabled (see chap. 4.2.1). Incoming voice calls are automatically accepted if DTMF processing is enabled.

AT commands	
AT**DTMF	enable DTMF processing

5.6 Login / Logout

5.6.1 Automatic Login at Restart

The PIN number has to be stored in the controller to allow the Helmholz GSM to log in automatically after a restart/reset (see chap. 3.2, 4.2.1).

By default, the Helmholz GSM 4.1 logs into the strongest GSM network at every restart or reset. If required, a preferred network can be pre-selected with the command **AT**PROVIDER** (syntax and parameters are listed in the separate document “AT Command Set For Helmholz GSM 4.1”).

SIM card change

Prior to changing a SIM card, the PIN must be changed or deleted before inserting a new card. Otherwise, the Helmholz GSM 4.1 will lock the SIM card after three login attempts.

5.6.2 Timer-Controlled Login / Logout

In order to allow changes in infrastructures and software updates by the network providers, the Helmholz GSM 4.1 can log out daily at a given time. Subsequently, the device executes a reset or logs in again after a user defined pause. For settings see chap. 4.2.1. If an alarm is activated during this pause at an external alarm input or a periodic alive SMS is due, the module will login again immediately. If the logout time has not been expired, the Helmholz GSM 4.1 logs out again afterwards.

The logout procedure will be postponed during active data connections. A voice connection and a communication in AT command mode will be interrupted immediately when logging out.

AT commands	
AT**LOGOUT	time scheduled logout

5.7 Audio Interface / Voice Connections

The Helmholz GSM 4.1 has a standard western jack at the front to connect a phone handset of reference type Handset Siemens Gigaset (see chap. 2.3.7).

The connection is set-up and closed either by AT commands in the terminal program or by an alarm input (*Medium for alarm transport: voice* see chap. 4.3.1).

AT commands	
ATD<nr>;	set-up voice
ATH	terminate connection
ATA	accept call

5.8 Flash Update

The firmware of the Helmholtz GSM 4.1 can be loaded locally or using a data connection. The firmware exists as file with the suffix **MHX**.

The terminal baud rate has to be set to 19.200 bps for the local flash process. The following responses are returned with this fixed baud rate.

Hardware handshake is absolutely necessary. For remote flash (using the data connection) it must be ensured that hardware handshake is activated for both the terminal program and the modem of the remote terminal. To avoid a remote flash crash, the GSM 4.1 baud rate must be set to 19,200 bps. In addition, the terminal program that initiates the flash process must be set to a line delay of at least 100 ms (line end character TX=CR). The duration of the remote flash is approx. 5 minutes.

ATFLASH**

Enter command in terminal window

Start Update with Esc, Reset with @

Flash process starts if the **ESC** key is pressed within 60 seconds. This prompt also appears for every restart (with a timeout of 2 seconds).

Expecting download with 8N1

Prompt for sending

The firmware has to be sent as *.mhx file.

Settings of the terminal program:

Protocol: ASCII
Data format: 8N1
Handshake: Hardware

After the flash process is completed, a full device reset is executed.

If necessary for the adaptation, the settings are reset to factory settings. The PIN of the SIM card is kept).

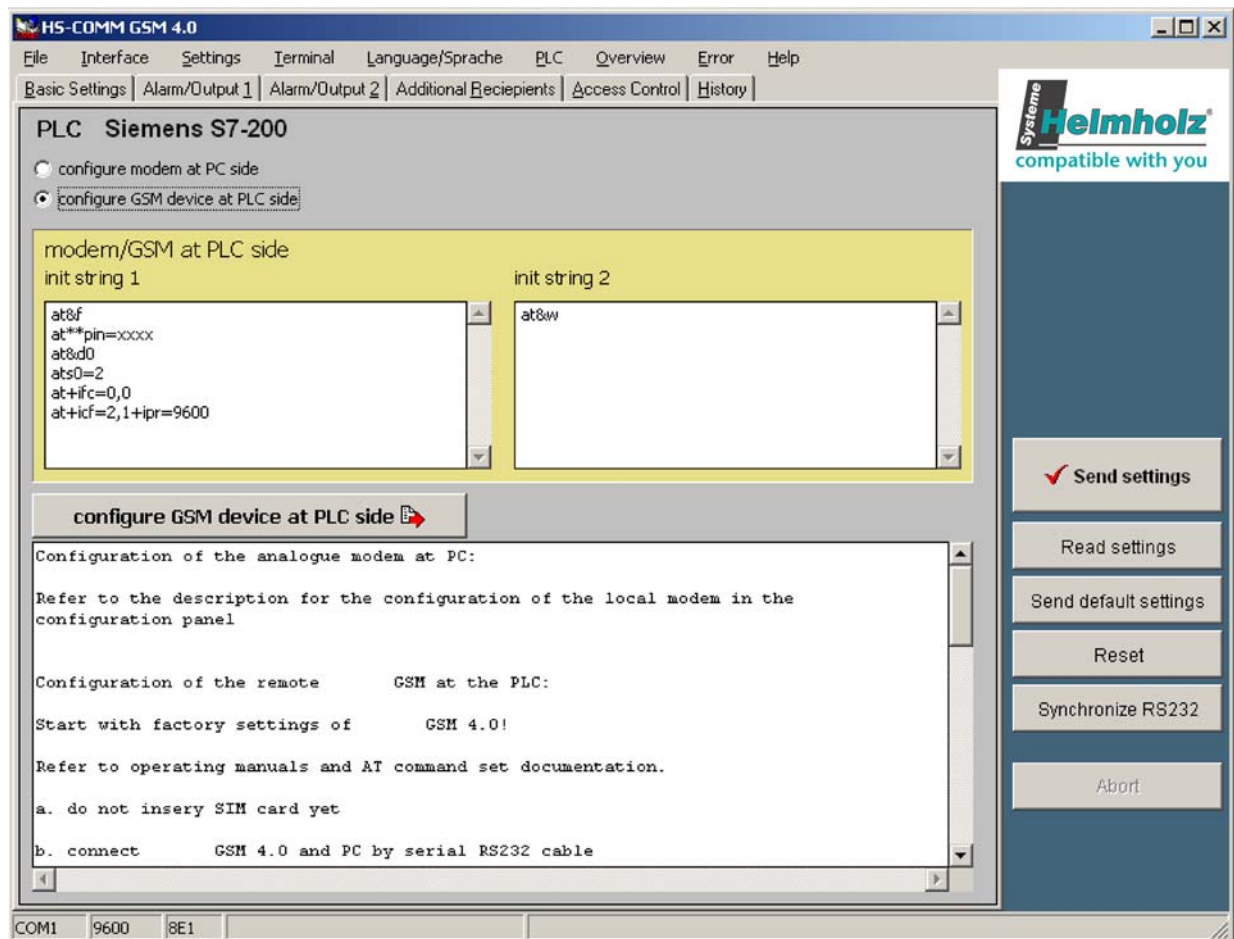
AT commands	
AT**FLASH	firmware update

5.9 Operation with PLC's

The Helmholtz GSM 4.1 has been tested for the most common PLC systems on the market. The documentation of the settings required for the respective PLC can be queried at Helmholtz (mailto: info@helmholz.de).

Currently, documentations for the following PLC systems are available:

- **Siemens S7 using the SSW7-TS (-> no settings necessary!)**
- Bosch SPS CL400
- Mitsubishi MELSEC FX 2N / 232BD
- OMRON SPS C200HX – CPU44
- PILZ SPS PSS3056
- Schiele SPS S400
- Systron S200, S250 and S400



6 AT Command Sets

The Helmholtz GSM 4.1 is configured and controlled using two AT command sets: The *standard AT commands* control the GSM engine to establish data connections using the GSM network. The *extended Helmholtz AT** commands* control the extensions implemented by Helmholtz for the digital inputs/outputs, alarm functions, security functions and timer-controlled functions.

The standard AT commands can be entered locally via the serial interface if the device is either in offline state (no active data connection) or in online command mode (interrupted data connection).

The extended Helmholtz AT** commands can be entered locally as well as remotely (remote configuration) and in most cases also by SMS. The configuration by SMS is restricted to commands with responses of up to 140 characters.

The most important standard AT commands and all extended AT commands are listed in the document “AT Command Set For Helmholtz GSM 4.1” which is on the CD. The complete command reference for the standard AT commands is also available on request.

The modem guideline V.25 ter is applicable with respects to the time sequence of commands. The AT standard is a line-oriented command language. The commands are not context-sensitive. All commands are closed with the carriage return character set with the command **ATS3** (default = <CR> = 0x0D).

Note: Lining up several commands per input line is not possible for the extended Helmholtz AT commands. Further commands can be sent only after the processing of the previous command, i.e. when the response has been output.

For lining up standard AT commands please refer to the detailed command set of the GSM engine.

The IT commands implemented in Helmholtz GSM 2.0 are replaced by the extended Helmholtz **AT**** commands of the form **AT**name**, changing to configuration mode is not necessary anymore. A replacement table for the IT commands can be found in chap. 6.2.

6.1 Short Description HELMHOLZ AT Commands

Command	Short description	Configuration		
		Local	remote	SMS
AT**ALIVE	periodic alive SMS	X	X	S
AT**BAUD	baud rate of the serial interface	X	X	X
AT**CALLBACK	target number security callback	X	X	X
AT**CLIP	selective call acceptance	X	X	S

Command	Short description	Configuration		
		Local	remote	SMS
AT**COMBINE	combination of the alarm text with a target number from the number pool (AT**POOL)	X	X	S
AT**DATE	date	X	X	X
AT**DAY	weekday	X	X	X
AT**DEFAULT	factory settings of the Helmholtz AT** commands	X	X	X
AT**DIAL	dial-up attempts for periodic alive or alarm messages	X	X	X
AT**DST	main target number for alarm messages	X	X	S
AT**DTC	idle connection control (Data Transmit Controller)	X	X	X
AT**DTMF	enable DTMF processing	X	X	X
AT**ESC	escape character for remote command mode	X	X	X
AT**EXIT	exiting the remote command mode		X	
AT**FLASH	firmware update of the controller	X	X	
AT**FORMAT	data format of the serial interface	X	X	X
AT**GSMREQ	periodical query of the field strength and the login state in the GSM network	X	X	X
AT**HISTORY	history function (event memory)	X	X	S
AT**IN	querying the alarm inputs	X	X	X
AT**INPUT	configuration of the alarm inputs	X	X	X
AT**LOGOUT	timer-controlled logout / login again or device reset respectively	X	X	X
AT**MSG	alarm message texts	X	X	S
AT**OUT	set/reset the switch outputs	X	X	X
AT**OUTPUT	configuration of the switch outputs	X	X	X
AT**PASS	Password Protection	X	X	X
AT**PIN	PIN of the SIM card	X	X	X
AT**POOL	phone number pool for alarm messages	X	X	S
AT**POWER	dispatch of SMS during power up	X	X	X

Command	Short description	Configuration		
		Local	remote	SMS
AT**PROFILE	query of the settings of the Helmholtz AT** commands	X	X	
AT**PROVIDER	manual GSM provider selection	X	X	X
AT**RESET	device reset	X	X	X
AT**SCN	SMS service center number	X	X	X
AT**SIGNAL	GSM signal field strength	X	X	X
AT**SMS	manual SMS dispatch of the stored alarm messages	X		X
AT**SMSRX	automatic SMS reception processing	X	X	X
AT**SMSBUF	specification of existing SMS storage locations on the SIM card	X	X	X
AT**TIME	time	X	X	X
AT**VERSION	query of the software version	X	X	X

X = completely implemented

S = only setting implemented

6.2 Comparison IT Commands / Helmholtz AT** Commands

The IT commands implemented in Helmholtz GSM 2.0 are replaced by the extended Helmholtz **AT**** commands of the form **AT**name**, changing to configuration mode is not necessary anymore.

IT command	Helmholtz AT** command	new
ITA	AT**OUTPUT AT**INPUT	configuration of outputs configuration of inputs
ITA*	AT**OUT	switching also possible by local command
ITAS	AT**OUTPUT AT**SMSRX	automatic SMS reception processing has to be enabled with AT**SMSRX
ITB	AT**BAUD	common baud rate for controller and GSM engine
ITD	AT**DST	
ITDC	AT**CALLBACK	

IT command	Helmholz AT** command	new
ITE	not applicable	standard AT command ATE
ITF	AT**FORMAT	common data format for controller and GSM engine
ITI	AT**IN	query also locally
ITM	AT**DATE AT**DAY	New: weekday with AT**DAY
ITN	AT**MSG	
ITO	AT**LOGOUT	additional device reset possible
ITP	AT**PIN	4 to 8 digit PIN possible
ITR	AT**PROFILE	
ITS	AT**SCN	
ITT	AT**TIME	extended (with seconds)
ITU	AT**PROVIDER	
ITV	AT**DIAL	
ITW	AT**PASS	
ITX	AT**EXIT	
ITY	AT**SMS	
ITZ	AT**RESET	

7 Appendix: GSM Provider

In the following you find an overview about the most important mobile providers in Germany, Austria, and Switzerland (state 2002). No responsibility is accepted for the correctness and completeness of this information. The given numbers may only be valid for particular contracts with the network provider.

Please find the current data for your SIM card in your contract documents.

7.1 Service Numbers

Country	Provider	Network	SMS Service Center Number (SCN)	Fax Prefix	Number of the E-Mail Gateway
D	T-Mobile	T-D1	+49 171 076 0000 +49 171 209 2522	99 (German) 98 (English)	8000
D	Vodafone D2	D2 Vodafone	+49 172 227 0000 +49 172 227 0042 +49 172 227 0111 +49 172 227 0010 +49 172 227 0222 +49 172 227 0333	99	3400
D	E-Plus	E-Plus	+49 177 061 0000 +49 177 060 0000 +49 177 062 0000	1551	767 62 45
D	O2	O2	+49 176 0000 443 +49 176 0000 433	329	6245
D	Mobilcom	D1	+49 171 076 0315	1091	1090
D	Mobilcom	D2	+49 172 0227 0880	1091	
D	Mobilcom	E-Plus	+49 177 061 0000	1551	
A	Mobilkom	A1	+43 334 0501 +43 664 0501	-	-
A	max.mobil		+43 676 021	6762	6761
A	One (Connect)		+43 699 000 1999	-	-
CH	Orange	Orange	+41 78 777 7070		
CH	Swisscom	Swiss GSM	+41 79 499 900 0 +41 79 499 812 3		
CH	TDC	Sunrise	+41 76 598 0000		

7.2 SMS transmission to Fax and e-mail

An SMS can also be sent to a fax device or an e-mail address with support of the GSM provider.

Examples:

In order to transmit a message via SMS from the T-D1 network to the fax number 0123/456789 select the following settings:

SMS service center: +491710760000
Phone number: 990123456789 (the leading + is replaced with 00 in international phone numbers)
Message: 140 characters

In order to transmit a message via SMS from the Vodafone network to the e-mail recipient **name@domain.de** select the following settings:

SMS service center: +491722270000
Phone number: **3400**
Message: **name*domain.de** remaining text
E-mail address and remaining text must be separated by a space
The @-sign must be replaced by an asterisk *.

8 Version lists

Firmware

Version:	Description
1.1	Basic version
1.21	<p>New:</p> <ul style="list-style-type: none"> • Power up SMS • AT**SMSBUF • AT**SMSRX=2 <p>Changes:</p> <ul style="list-style-type: none"> • The history currently has 200 entries • non-authorized callers are immediately rejected

Hardware

Version:	Description
Helmholz GSM 4.0	GSM Engine TC35
Helmholz GPRS 4.0	GSM/GPRS Engine MC35
Helmholz GSM 4.1	GSM Engine TC35i
Helmholz GPRS 4.1	GSM/GPRS Engine MC35i