

56-k Modem „small“

Operating Manual

Version: 1.02 / 02.04



Order number: 700-751-HSM21

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0 Scope of Delivery

Before you begin with the installation and the initial operation, please check if all accessories are included in the box.

- HELMHOLZ Modem 56k small INT
- Phone cord (TAE-N to RJ11)
- RS 232 cable (9-pin plug on 9-pin jack)
- User Guide

In case the content is not complete, please refer to your supplier. Please also check the device for shipping damage; please refer to your supplier if damage exists.

Please keep the packaging material for possible future dispatch or storage.

1 General

The Modem HELMHOLZ 56k small INT is a modem for the analogue telephone network (PSTN).

It has a very compact design, is only 23 mm wide and is suitable for rail mounting. Installing the modem on the rail in the control cabinet, as well as the connection and the initial operation of the modem are very simple. The modem is available in two separate firmware versions: "Standard Countries" and "Extended Country Group" (see Chapter 7).

It offers various capabilities, such as

- usable in 87 countries
- establishing a data connection
- auto answer
- data flow control
- error correction
- data compression
- alarm functions
- SMS dispatch
- fax dispatch
- selective call acceptance
- security callback
- data transmit control
- flash update
- remote configuration

2 Technical Data

2.1 General

2.1.1 Features

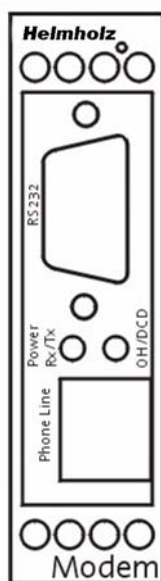
- mounting on DIN rail
- power supply 12..24 V DC, 5% ripple
- level on V.24 interface according to V.28
- protected V.24/V.28 interface with 9-pin SUB-D jack (screw connectors)
- telephone interface: RJ12 jack
- extended AT instruction set
- auto answer
- setting of 2 user profiles possible
- hardware/software handshake
- 4 phone number memories with 32 characters each
- speed can be set automatically and fixed
- online retention
- DTMF signalling
- recognition of busy signal

2.1.2 Mechanical Features

Weight	100 g
Dimensions (maximum)	w x d x h = 23 x 110 x 75
Temperature range	0°C..55°C
Protective class	Housing IP 40/ Terminal IP 20
Humidity	0 - 95% non- condensing

Note: The modem HELMHOLZ 56K small INT may not be used in wet environments.

2.2 Interfaces and Display Elements



Front view

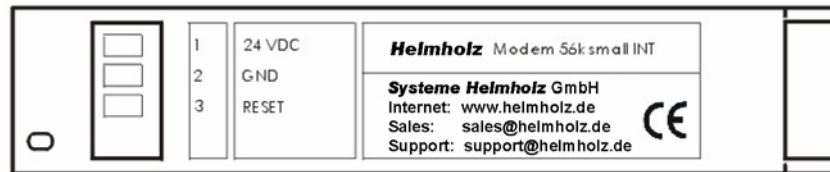
2.2.1 Display Elements

The left LED (Power Rx/Tx) displays the condition of the operating voltage and a data transmission. The right LED (OH/DCD) displays the status OH (off hook) and DCD (data carrier detect). The exact meaning of the display elements is described in the following table.

State	Left LED	Right LED
LED off	No operating voltage applied	The modem is not “off hook” (it has not yet “lifted the receiver”)
LED is green	Operating voltage applied	The modem is hooked to the phone line (it has “lifted the receiver”); a connections has not yet been established.
LED is or blinks orange	Data is transmitted	The connection to the remote terminal is established, the carrier was detected Attention: If the DCD line at the modem is permanently switched on, it cannot be distinguished, whether a connection to the remote terminal is active or not.
LED is red		The modem is not “off hook” (it has not “lifted the receiver” yet) and the DCD line at the modem is permanently switched on.

2.2.2 Terminal Layout

The terminals are located on the upper side of the housing



Top view

1	12..24V DC	Power supply 12V / 24V DC
2	GND	Ground
3	RESET	Reset input

2.2.3 Power Supply

Power supply: 12..24V DC

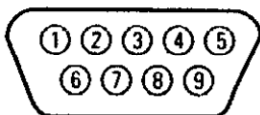
Power input: approx. 1.6 W (during connection)

Current consumption:

Input voltage	Current (closed/circuit)	Current (connection)	Maximum start-up current
12V DC	100 mA	130 mA	300 mA
24V DC	50 mA	65 mA	200 mA

2.2.4 Serial Interface

Layout of the 9-pin D-SUB jack



Description of the signals on the 9-pin D-SUB connector

9-pin D-Sub 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

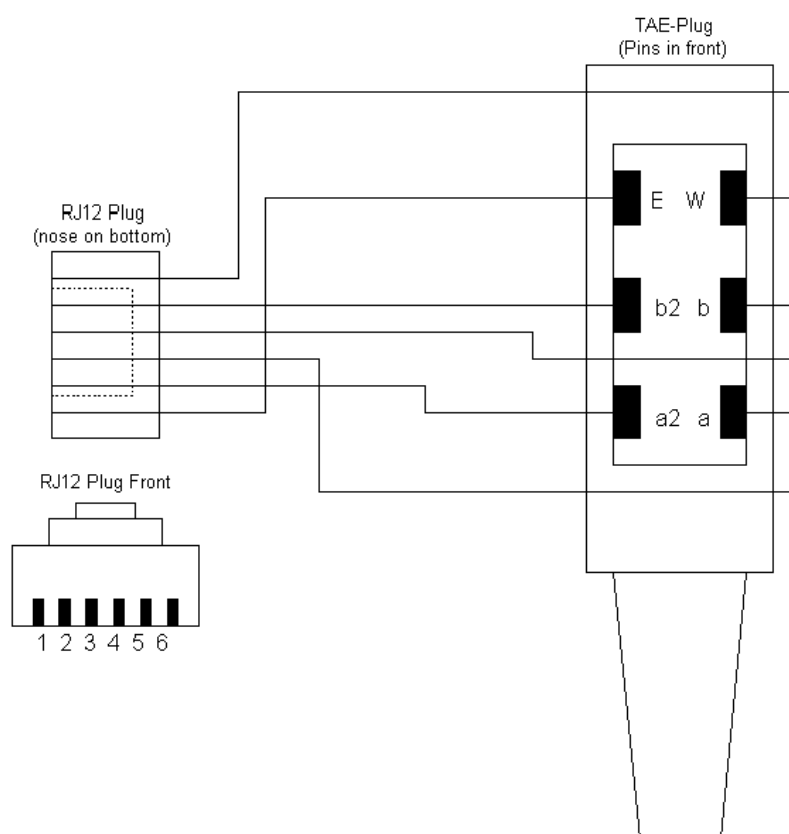
9-pin D-Sub Pin No.	Description	Function	CCITT V-24	EIA RS232	DIN 66020	E/A DCE to DTE
4	DTR	Data Terminal Ready	108	CD	S1	I
5	GND	Ground	102	AB	E2	
6	DSR	Data set ready	107	CC	M1	O
7	RTS	Request to send	105	CA	S2	I
8	CTS	Clear to send	106	CB	M2	O
9	RI	Ring Indication	125	CE	M3	O

Interface speeds of the modem HELMHOLZ 56K small INT:

The automatic baud rate detection supports the baud rates 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600 and 115200 bps.

The baud rate indicates the transmitted bits per second (bps).

2.2.5 Telephone Interface



Layout of the RJ11 connector (TAE cable) and the RJ12 jack (housing front)

RJ11 pin Connector	Description	RJ12 pin Jack
		1
1	LA1, a2	2
2	LA, a	3
3	LB, b	4
4	LB1, b2	5
		6

2.3 Transmission Standards / Protocols

- V.92, V.90, V.34+, V.34, V.32bis, V.32, V.22, V.22bis, V.21, V.23, BELL standard 103, 212
- Fax Class 1, Fax Class 2
- data compression according to MNP5, V.42bis LAPM, V.44, MNP 10, 10EC
- error correction according to MNP2-4 and V.42

2.4 Approvals

The modem HELMHOLZ 56K small INT bears the CE symbol of conformity. This symbol is a declaration, that on account of its design and implementation, this modem is in compliance with the currently valid versions of the following EC directives:

- 89/336/EEC (EMC directive)
- 73/23/EEC (low voltage directive)
- 91/263/EEC (telecommunications devices directive)

Approvals:

- R&TTE
- CTR 21 (Europe)
- CE

2.5 Firmware

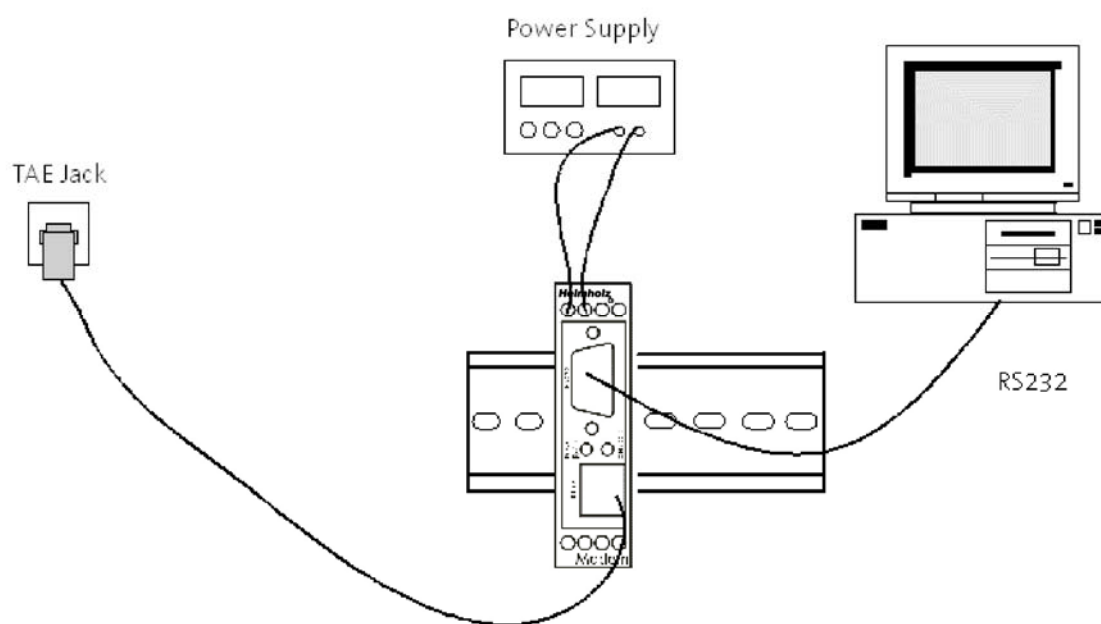
Date: January 2004

Version: 1.00

Checksum: Standard countries 4F4B
 Extended Country Group 7E7D
 (see Chap. 7)

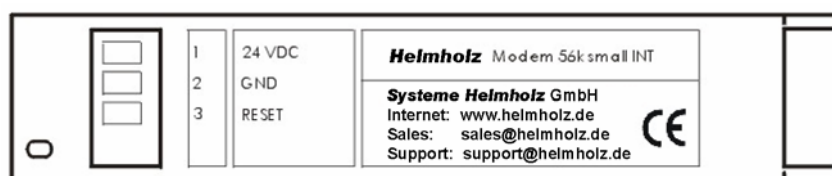
3 Installation and Initial Operation

3.1 Connection Overview



3.2 Installation Steps

1. *Mounting on DIN rail:*
Simple snap-on
2. *Connection of Power Supply:*



Top view

- a) Connect the ground wire to GND
- b) Connect the power supply to 12..24V DC

Attention: The value for Pin 1 stated on the cover top is a maximum value.

- c) Switch on the power supply

After successful installation, the power LED will be green.

3. *Connection to the telephone network*

- a) Plug the supplied TAE cable into the centre of the RJ12 jack on the cover front.
- b) Plug the TAE connector into the telephone outlet

If the HELMHOLZ Modem 56K small INT acts faulty or abnormal, e.g. if the OH/DCD LED is instantly green, please disconnect the connection to the telephone line immediately. For those cases, please refer to your service partner. To keep your warranty claims, please **do not open** the modem.

4. *Connection PC/Terminal*

Plug the enclosed RS232 interface cable into the cover front and connect it with the PC.

5. *Check if the installation was successful:*

Perform a short test using your terminal program (e.g. terminal window of the configuration software HSCommSH or the hyper terminal, TeraTermPro, ProComm Plus). Enter the command "**AT**" and push the "Enter" key. The answer message "**OK**" indicates that the HELMHOLZ Modem 56K small INT has been successfully installed.

6. *Connection Test:*

Perform a manual connection from the terminal program:

- dial the test number 0101901929 (**ATDT01010901929**)
Attention: For PBXs, which require a "0" for connection, please enter the following: **ATX3DT0,0101901929**
- OH/DCD LED is green
- the modem dials
- after a little while (1 minute max.) the message CONNECT is displayed and the OH/DCD LED is orange.

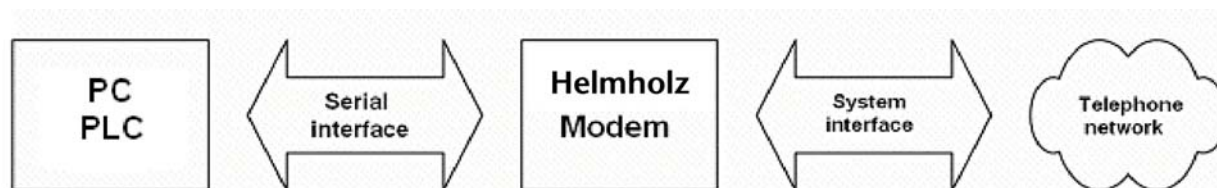
In general this simple connection test is successful – all fine-tuning is described in the following chapter.

4 Configuration

Note: SSW7-TS

If you use the Helmholtz modem together with a Teleservice-Adapter (for example SSW7-TS) for maintaining a Siemens PLC, read the adapters manual for configuring the modem.

The usage of HS-Comm is not necessary.



4.1 Configuration Software HSCommSH

The HELMHOLZ Modem 56K small INT is configured using AT commands. A terminal program enters them as a series of characters. For easy set-up all functions of the HELMHOLZ modem can be entered without knowledge of the AT commands and their parameters. For this, the configuration software HSCommSH is used. A graphical user interface with integrated help function is used to enter the requested settings. In addition, a terminal window to enter commands directly is available.

The configuration program HSCommSH is installed on a PC with a Microsoft operating system, at least Windows 95 or higher.

4.1.1 HSCommSH Operation

The program HSCommSH checks the connected device at the start or via the menu *Device* → *Check Device*. The program window displays the device name and the firmware version in the upper right corner. Only those settings, which are implemented in the identified device, can be selected in the user interface.

The buttons in the right column can be used to select the current settings, to re-initialize (reset) the device or to set the default options.

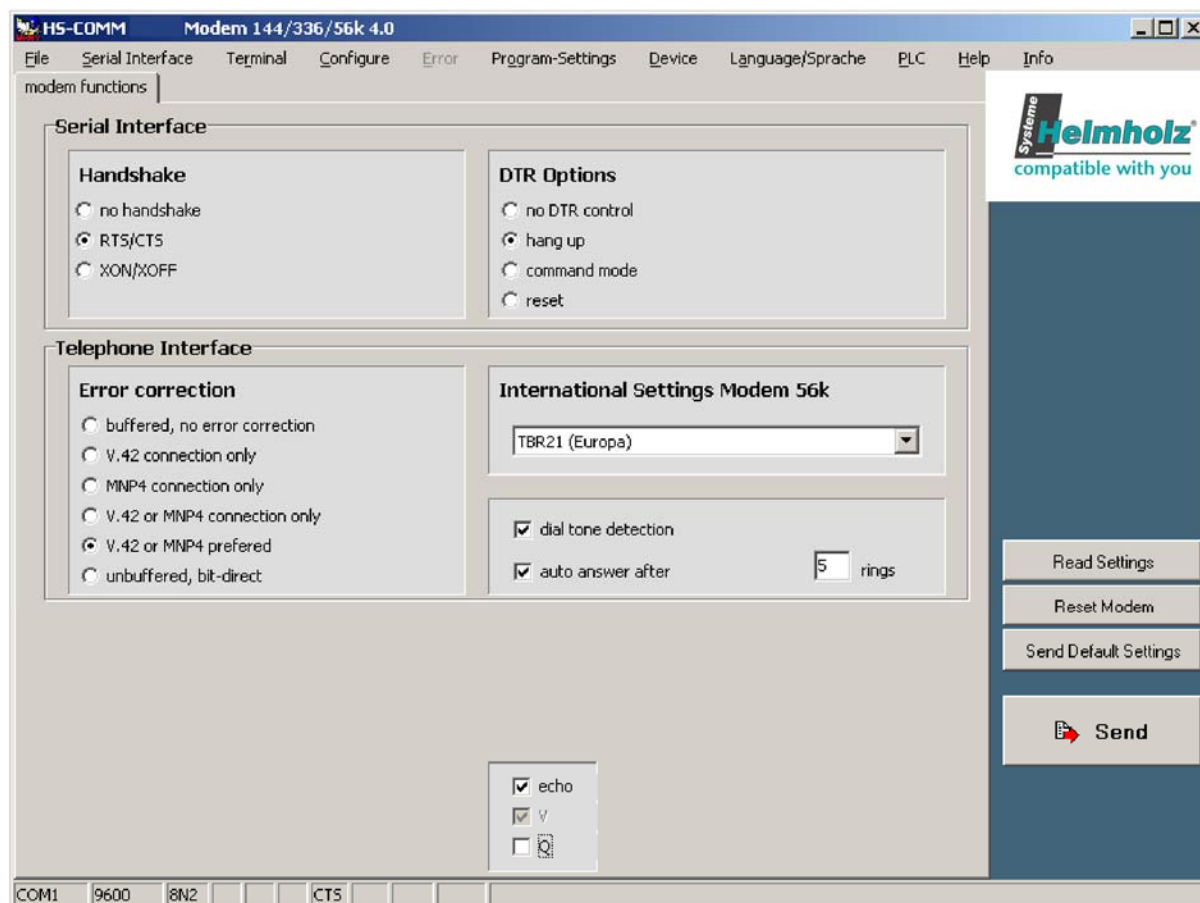
The selected configuration of the parameters is only sent to the HELMHOLZ modem after the button SEND has been pushed.

File menu: Configurations can be saved as files and re-loaded at a later date.

When an error occurs while transmitting a configuration to the HELMHOLZ modem, these are displayed in the *Error* menu.

The available modem settings for the operation with a PLC of leading manufacturers are described in chapter 6.

Hitting the key **F1** will automatically display a help window regarding the currently selected topic.



4.1.2 AT Commands for Default Settings

Command	Description
AT&F	Loading the default factory settings
AT&V	Display settings
AT&W	Saving the settings as user defaults
ATZ	Software reset and loading the user defaults

In Chapter 5 you will find a complete description of the AT commands and their parameters.

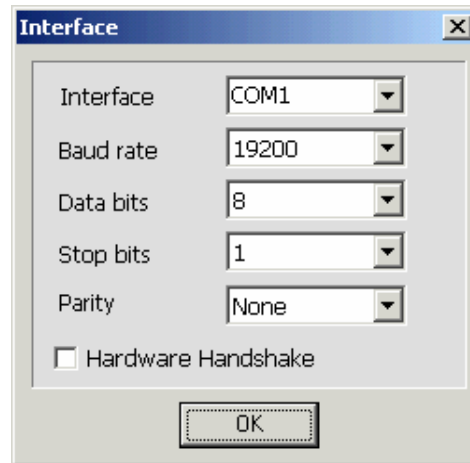
4.2 Serial Interface

The serial interface setting of PC/PLC and HELMHOLZ Modems must be identical:

- baud rate (Data transmission speed)
- format (Start bit, data bits, parity, stop bits)
- data flow control (Hardware/software handshake)

4.2.1 PC Settings

Serial interface settings of the PC (*Interface* menu) – the current settings are displayed in the message bar of the main window.



These settings must also be performed at the device that is connected to the HELMHOLZ modem.

4.2.2 HELMHOLZ Modem Settings

Handshake setting at the HELMHOLZ modem (*Configure* menu → *Modem*):

Auto bauding: With the first AT command, the HELMHOLZ modem recognizes the baud rate and the format of the incoming data and configures itself accordingly. When the HELMHOLZ modem doesn't receive AT commands but user data right away, the last saved settings are kept.

If more data is sent from the PC or the controller than what the HELMHOLZ Modem 56k small INT can transmit, the handshake will regulate the flow.

DTR Behaviour

The signal *Data Terminal Ready (DTR)* on the serial interfaces indicates that the connected device (PLC, PC) is switched on, connected and ready for operation. The HELMHOLZ Modem 56k small INT may abort the connection, when the device is switched off or the cable is removed.

Echo

With the setting *Echo* the HELMHOLZ modem sends each command back via the serial interface. During terminal operation, this makes it obvious which commands are entered.

4.2.3 Data Transmit Control

Data transmit control is a function integrated into the firmware to monitor the data transmission during online operation. This function prevents the modem to stay online for an unlimited time although no data is transmitted any more.

Immediately after the modem goes off-hook the timer starts running. Each byte that is transported via the serial interface will reset the timer completely, which will then restart. After the set time has been reached, a modem reset is performed. The reset will therefore only be performed if no more data is transmitted or received and when the set time has completely expired.

The timer will start running directly after the the modem goes off-hook. We therefore recommend not to enter times below 30 seconds. Remote data transmission will not reset the timer. The data transmit control of the remote modem must be switched off to avoid the connection being terminated after the set time has expired.

The data transmit control may not configured via the HSCommSH, but only via AT commands.

4.3 Telephone Interface

4.3.1 Error Correction

Error correction according to the V.42 or MNP (1-4) standard puts the modem into the position to autonomously recognize and correct data transmission errors that occurred due to line disturbances. If the error correction is not used, there is a risk of unrecognised transmission errors leading to connection abort. The error correction can be selected in HSCommSH (Menu *Configure* → *Modem* → *Error correction*). The settings *only V.42 connection*, *only MNP4 connection* and *only V.42 or MNP4 connection* will abort the connection set-up, if the remote terminal does not support this error correction.

For connections with high response time requests, the setting *buffered, without error correction* may be selected to avoid delay due to block formation.

For error corrected connections data compression is additionally available.

In the mode *unbuffered, bit direct* all bits are transmitted without temporary storage, data compression and error correction. In this mode, the modem has no influence on the transmission format; the abort sequence (+++) is evaluated by the modem, only if the word length is not more than 11 bits.

4.3.2 International Settings

The HELMHOLZ Modem 56k small INT can be used in 96 countries. There are two firmware versions available to cover “standard countries” or “extended group of countries”. Please find an overview of the country codes and the firmware in Chapter 7.

4.3.3 Dial-tone Recognition

Using dial-tone recognition, a dialling attempt without a present dial tone is answered by NO DIAL TONE.

Without dial-tone recognition the modem dials without waiting for a dial tone at a PBX. An ineffective dialling attempt is answered by NO CARRIER

If a busy line is called, the message BUSY appears in both cases.

4.3.4 Auto Answer

The modem autonomously answers the call, after a the given number of rings

4.3.5 AT Commands for the Phone Interface

Command	Description
ATA	answer mode
ATB	select modulation format for 300 baud
AT\B	break signal
AT%C	enable data compression
AT+DS	activate/deactivate V.42bis data compression
AT+DS44	activate/deactivate V.44 data compression
AT\N	select error correction
ATW	error correction messages
AT+MR	show modulation type
AT+MS	select modulation type
AT%E	automatic Retrain
AT+GCI	set country code
ATD	dial
ATH	disconnect connection
ATP	switching on pulse dialling
ATT	switching on tone dialling
AT%Q	display of telephone connection quality
ATS0	auto answer
AT+VCID	caller ID
AT+VRID	last received Caller ID
AT\V	format of connect rate messages
ATX	extended result messages, dialling tone recognition
AT%L	display level of the received signal
AT&Z	save phone numbers

In Chapter 5 you will find a complete description of the AT commands and their parameters.

Access control

4.4.1 Password Protection

The password that was set up protects the modem from unauthorized access:

- at an incoming data connection
- at remote control
- at security callback

4.4.2 Security Callback

For incoming calls only the password is requested and the connection is terminated. If the password was correct, the HELMHOLZ modem will establish a data connection to the specified number.

If the modem answers an incoming call, approximately 2 seconds after the message "CONNECT" appears, the calling station displays the messages "SECURITY CALLBACK" and "REMOTE PASSWORD:".

- when the password was incorrect, the modem will immediately hang up and thus prevent unauthorized access to the connected device.
- when the password was correct, the modem reports "OK" to the remote terminal, hangs up and after approximately 10 seconds dials the stored phone number. Altogether, 3 dialing attempts with a 10 second pause between the attempts will be carried out.
- approx. 2 seconds after the connection has been established, the message "CALLBACK IN PROGRESS" is displayed at the remote terminal and the serial interface is unblocked. Now, a normal data connection is established.

Security callback does not influence outgoing data connections.

4.4.3 AT Commands for Access -Control

Command	Description
AT*P	password request after a connection is established
AT*C	remote password configuration
AT*R	enable remote control
AT&Z1=	store phone number for security callback
AT&A	selective call acceptance by caller ID
AT*N	permissible numbers for selective call acceptance
AT%N	last rejected phone number

Please find a complete overview of AT commands and their parameters in Chapter 5.

4.5 Alarm Function

When receiving the command AT%A, the HELMHOLZ Modem 56k small INT triggers an alarm.

In case of an alarm, a message may be sent or a data connection may be established.

4.5.1 Alarm Message

An alarm message consists of an alarm text with a maximum of 160 characters.

The alarm text is stored in the modem using the command AT*V.

Alarm messages may be sent either as SMS, fax, e-mail or "SMS in the fixed network".

After the alarm message has been sent successfully, the established connection is terminated.

If the connection could not be established, 3 dialing attempts with a 10 second pause between the attempts are started. If it is still not possible to establish a connection, the alarm call is terminated. A new call is only initiated after the modem receives the command AT%A.

4.5.1.1 Alarm Message via SMS

SMS messages originating from the analog telephone network are sent using special access numbers from the GSM network provider. These *Service Center Numbers* and the communications protocol (PET or UCP) have already been pre-configured for the GSM networks in Germany.

4.5.1.2 Alarm Message as Fax

In addition, the alarm message may be sent to a central fax number for recording purposes.

4.5.1.3 Alarm Message as SMS in the Fixed Network, Fax or E-mail

Alarm messages may be sent either to a fixed network phone, a fax or an e-mail address. The following data only apply for access to the Deutsche Telekom:

Service-Center: **01930100**

SMS to e-mail: Recipient number **8000** (SMS e-mail gateway)

The text message starts with the e-mail address, followed by a space character and the actual text. In the e-mail address the character @ is replaced by the asterisk *.

SMS to fax: Recipient number **99** (SMS fax gateway)

4.5.2 Data Connection after Alarm Triggering

After the alarm has been triggered, a data connection can be established to the modem to send an alarm message. After the alarm has been transmitted, the connection can be terminated or can remain established.

Connecting to the exchange line is not required for the target phone number, but only for the service number of the provider.

4.5.3 AT Commands for Alarm Functions

Command	Description
AT%A	alarm triggering
AT*M	protocol for alarm messages
AT*V	alarm messages
AT&Z	store phone numbers (mobile phone, service center, fax, etc.)
ATS13	number of dialing attempts (registry S13)

In Chapter 5 you will find a complete overview of the AT commands and their parameters.

4.6 Command Mode

When switched on, the HELMHOLZ modem is in command mode and ready to receive AT commands from the serial interface. When a data connection to a remote modem is established, the modem can be switched back to command mode any time by entering the following escape sequence:

- Pause of at least 1 second
- 3 plus characters (+++) without return
- Pause of at least 1 second

The data connection remains established.

4.6.1 AT Commands for Command Mode

Command	Description
ATO	switch to online data mode
<Pause> +++ <Pause>	switch to command mode

In Chapter 5 you will find a complete overview of the AT commands and their parameters.

4.7 Remote Configuration

To switch into the remote configuration mode, a data connection must be established between the modems. A particular connection type is not mandatory, but we urgently recommend to use error corrected connections to eliminate transmission errors. It is not necessary for the local modem to use any type of remote configuration. The only requirement is an established data connection.

The remote configuration is started using the following escape sequence (e.g. in the terminal window):

- Pause of at least 1 second

4 asterisk characters (****) without return

Pause of at least 1 second

If the modem to be configured has hardware handshake switched on, all handshake lines must be active at the beginning of the remote configuration. Otherwise, hardware handshake should be switched off at the modem to be configured.

Some commands can not be executed with remote configuration and result in the response ERROR: ATA, ATD, ATO, AT\B, AT*C,, AT*C1, AT&F, AT*V.

Attention: As the data transmit control is only reset by characters at the serial interface, the remote modem will terminate the connection after the set time. That is why the data transmit control must be switched off for the remote configuration (when data transmit control was switched on before, for remote configuration the commands ATS11=0 or ATS15=0 must be entered first).

Remote configuration can only be performed using AT commands (e.g. from the HSCommSH terminal window), but not via the menu *Configure*.

4.7.1 AT Commands for Remote Configuration

Command	Description
AT*C	store the remote configuration password (default factory setting QWERTY)
AT*R1	enable remote modem for remote configuration
AT*E / AT*X	end remote configuration
ATS15	data transmit control
<Pause> **** <Pause>	start remote configuration at the local modem

In Chapter 5 you will find a complete overview of the AT commands and their parameters.

4.8 Load Function of the Flash EPROM

The HELMHOLZ Modem 56k small INT has a flash EPROM, which enables a firmware update without intervening with the hardware. You can get the new firmware from your service partner, if necessary. It contains the file flash loader (HS_LADER.S37) and the actual firmware (file with the extension .S37).

To load the new firmware, you will need a PC and a terminal program, which can perform text uploads (ASCII data transmission protocol). Terminal programs, which were tested and are recommended: ProcommPlus and TeraTerm. The following settings are required for the terminal program:

- hardware handshake
- any interpretation of characters (e.g. TAB, CR, BS, ...) prevented by the ASCII upload protocol
- baud rate between 9,600 baud and 57,600 baud

The loading process takes approximately 2 to 3 minutes at 57,600 baud; for lower baud rates this process might take longer.

4.8.1 Flash Upload Procedure

1. The flash load function is started with the command **AT****. The modem answers **"Download initiated"**.
2. ASCII upload of the flash load program HS_LADER.S37. With some terminal programs the transmission progress is indicated by dots on the screen. After the loading process is finished, the message **"Download Flashcode"** appears.
3. ASCII upload of the firmware codes (file xxxxxxxx.S37). The progress of this upload process is also indicated by dots.
Caution: From this moment on, the transmission must not be interrupted, because otherwise the flash EPROM will be deleted, but not reloaded completely.
4. After the process is finished, the message **"Device successfully programmed"** appears. This completes the flash upload.

4.8.2 AT Command for the Flash Load Function

Commandl	Description
AT**	Start of the flash load function

In Chapter 5 you will find a complete overview of the AT commands and their parameters.

Note:

In the settings for the ASCII protocol of the terminal program TELIX the delay time between the characters and the lines must be set to "0". Furthermore, the local echo must be switched off.

4.8.3 AT Commands for the Serial Interface

Command	Description
AT+IPR	Auto bauding; determine baud rate
AT&K	Data flow control between the PC and the modem
ATE	Command echo
AT&S	DSR behaviour
AT&C	DCD (CT109) behaviour
AT&D	DTR (CT108/2) behaviour

In Chapter 5 you will find a complete description of the AT commands and their parameters.

5 Command Overview

5.1 AT commands

5.1.1 Syntax of Standard AT Commands

The modem guideline V.25 ter is applicable with regard to the time sequence of interface commands. The AT standard is a line-oriented command language. Each command consists of three elements: Prefix, body and end character.

The prefix always consists of the letters “**AT**”; the only exception is the command “**A/**”.

The body consists of a name and pertinent values, if applicable. If a pertinent value is optional, this is indicated by square brackets ([...]).

The end character is <CR> (CARRIAGE RETURN or ENTER).

Commands can be grouped to one command line. Space characters between the individual main parts are ignored. The commands can be categorized as follows:

- basic instruction set
- extended instruction set (Main part starts with “+” or “^”)

The commands are acknowledged with “**OK**” or “**ERROR**”. Any further incoming character will interrupt a command that is being edited. Therefore, the next command must wait for acknowledgement to avoid the deletion of the current command.

5.1.2 Overview AT Commands

Command	Description
AT**	<u>Start of the flash load function</u>
ATA	<u>Answer mode</u> The modem is switched into response mode. This is only effective in Germany, if the connected phone goes off-hook or if a call comes in.
A/	<u>Repeat the last command</u> The last command is repeated.
AT\A	<u>Select the maximum MNP block size</u> Set the maximum block size for an error corrected MNP transmission. AT\A0 64 characters AT\A1 128 characters AT\A2 192 characters AT\A3 256 characters
AT*A	<u>Auto answer on/off</u> AT*A0 Call acceptance is locked independently from S0 AT*A1 Call acceptance according to S0

Command	Description
AT%A	<u>Alarm triggering</u> Triggers a alarm. Success regarding the sending of the message is reported with the response " OK "; no success is reported with the response " Error ".
AT&A	<u>Switch selective call acceptance on and off</u> AT&A1 Switches selective call acceptance on AT&A0 Switches selective call acceptance off Enter valid numbers using AT*N The AT&A settings are saved at AT&W .
ATB	<u>CCITT or Bell</u> ATB0 Select CCITT modulation format ATB1 Select Bell modulation format Note: For the i-modul Modem 56K Basic this setting has no effect. Here, the Bell mode is set using the command AT+MS .
AT\B	<u>Send "break" to the other modem</u> For connections that were not error corrected the modem sends a break signal to the other modem. The length of the signal is: the specified parameter times 1/10 of a second. For error corrected connections, the modem sends a break signal according to the active error correction protocol without considering a parameter specification. If no connection is established or if a fax connection is active, an error message is displayed. AT\B1 1/10 second break signal to AT\B9 9/10 second break signal
AT%B	<u>Switch key abort on and off during connection setup</u> AT%B0 Key abort is active. Each character on the Tx line will interrupt the connection setup (default setting). AT%B1 Key abort is deactivated. The connection setup cannot be terminated manually. The connection setup can only be terminated by DTR drop, by internal modem abort (NO DIALTONE , BUSY) or timeout (NO CARRIER) (S registry 36 Bit 6).
AT%C	<u>Enable data compression</u> Enable/disable a data compression type The modem can only perform data compression for error corrected connections. AT%C0 No data compression enabled AT%C1 MNP 5 data compression enabled AT%C2 Enable V.42bis or V.42bis/ data compression V.44 AT%C3 Enable MNP 5 and V.42bis/V.44 data compression
AT*C	<u>Remote configuration password</u> This password protects the remote configuration as well as incoming data connections (see AT*P) and Security Callback. OLD PASSWORD Demands the old password (default factory setting: QWERTY). When a wrong password is entered, the message ERROR will be displayed.

Command	Description
AT*C Continuation	NEW PASSWORD Enter the new password with 6 to 12 characters. CONFIRM Repeat the new password. An incorrect input will result in the message ERROR . OK The password is immediately stored in the EEPROM.
AT&C	<u>DCD (CT109) behaviour</u> Behaviour of the RS232 DCD output of the modem. AT&C0 DCD always on AT&C1 DCD follows the carrier signal of the phone line
ATD	<u>Dial</u> The modem goes off-hook and dials according to the dialling string transmitted via the ATD command. After dialling, the modem attempts to establish a connection. If the ATD command was performed without a dialling string, the modem goes off-hook and attempts to connect to the other modem (without dialling). The behaviour of the modem depends on the activation of the line current recognition (ATX command). The execution of the ATD command also depends on the last dialling attempt. In the mode FCLASS=0 the modem acts like a data modem. It attempts to connect to another data modem. This attempt is repeated until the waiting period that was specified in the S7 registry has expired. If this period is exceeded, the modem hangs up and the following error message appears: NO CARRIER In the mode FCLASS=1 or =2 the modem acts as a fax modem. It attempts to connect to another fax or fax modem. (The modem goes into receive status HDLC V.21 channel 2, as if the command AT+FRH had been executed.) The following characters may be transmitted as parameters (brackets, punctuation marks, spaces and semicolons are ignored): 0 to 9 The digits from 0 to 9 * The asterisk: Only for tone dialling # The hash: Only for tone dialling A-D The tone dialling characters A, B, C, D P Pulse dialling mandatory: Pulse or tone dialling is required according to the region. T Tone dialling mandatory: Pulse or tone dialling is required according to the region. W Wait for dialling tone: The modem waits for the dialling tone before it starts dialling. If within the period specified in the S6 registry no dialling tone was detected, the modem hangs up and an error message is displayed. @ Waiting for silence: The modem waits at least five seconds for silence in the line, before it executes the next character from the parameter string. If this five second silence can not be detected and the abort period in the S7 registry has not been exceeded, the modem terminates the connection displaying the following message: NO ANSWER . If busy signal recognition was activated, the modem terminates the connection displaying the message: BUSY . If during the waiting period a response tone from the other modem is received, a connection is established. , Dial tone delay: The modem performs a dial tone delay before it executes the next character of the parameter string. The delay length is defined in

Command	Description
ATD Continuation	<p>the S8 registry.</p> <p>L Last number redialling.</p> <p>; Return to the input mode after dialling. Is attached to the end of the dialling string. Causes the modem to return to the input mode after reaching the ; (message: OK). This enables the input of AT commands even with the receiver offhook. The additional AT commands can follow in the same input line after the ;, or they can be transmitted in further input lines. The ATH command will abort the connection and the receiver is hung up.</p> <p>S=n Dialling the n-th number from the number pool, which was set up with the AT&Z command.</p> <p>! Flash. If the character ! is a part of the dialling string, the modem will hang up within the time determined in S29 and then goes off-hook again.</p> <p>^ Suppresses the sending of a calling tone. Default: Calling tone is sent for fax operation. No calling tone for data operation.</p> <p>() Are ignored – used as an outline.</p> <p>- Are ignored – used as an outline.</p> <p>, , Space characters are ignored – they are only used as an outline.</p> <p>Examples:</p> <p>ATD12345 Dial the phone number 12345 (default: tone dialling method)</p> <p>ATDP12345 Dial the phone number 12345 with the pulse dialling method</p> <p>ATDT12345 Dial the phone number 12345 with the tone dialling method</p> <p>ATD12345; The semicolon (;) causes the modem to return to the input mode after dialling.</p> <p>ATX3D0W12345 For PBXs, which connect to the exchange line using the prefix 0. First, blind dialling is activated with X3, to be able to dial a leading 0 without hearing a dialling tone. After the 0 has been dialled via D0, dialling tone recognition can be switched on again using the parameter W. The modem thereby waits for the dialling tone and continues with the rest of the dial-up (12345) only after hearing the dialling tone. Waiting for the dialling tone may be omitted. In this case, the dialling command is ATX3D012345.</p> <p>For PBXs, which connect to the exchange line using a ground button function. First, blind dialling is activated with X3, to be able to use the ground button function without hearing a dialling tone. After the ground button has been pushed via >, dialling tone recognition can be switched on again using the parameter W. The modem thereby waits for the dialling tone and continues with the rest of the dial-up (12345) only after hearing the dialling tone. Waiting for the dialling tone may be omitted. In this case, the dialling command is ATX3D12345.</p>
AT+DS	<u>Activate/deactivate V.42bis data compression</u> AT+DS=0 Deactivates V.42bis data compression AT+DS=3 Activates V.42bis data compression (default)
AT+DS44	<u>Activate/deactivate V.44 data compression</u> AT+DS44=0 Deactivates V.44 data compression AT+DS44=3 Activates V.44 data compression (default)
AT&D	<u>DTR (CT108/2) behaviour</u>

Command	Description
	<p>Monitoring on/off transitions of the RS232 DTR line of the PC.</p> <p>AT&D0 DTR is ignored. Allows the operation with PCs, which do not run DTR.</p> <p>AT&D1 A DTR on/off transition causes the modem to react as if it had received an abort sequence +++. The modem switches to the input mode without hanging up.</p> <p>AT&D2 A DTR on/off transition causes the modem to hang up. Going off-hook automatically is not possible.</p> <p>AT&D3 A DTR on/off transition causes the modem to perform a reset as if an ATZ command had been executed. A preceded AT&Y command decides if either the default 1 or 2 is loaded.</p>
ATE	<p><u>Command entry Echo</u></p> <p>This command toggles the responses, which the modem creates as reactions from PC commands (echo).</p> <p>ATE0 Switch off Echo</p> <p>ATE1 Switch on Echo</p>
AT%E	<p><u>Automatic Retrain</u></p> <p>When transmission problems occur, the modem executes a retrain procedure. After three unsuccessful retrain attempts, the modem will hang up.</p> <p>AT%E0 Retrain not allowed</p> <p>AT%E1 Retrain allowed</p> <p>AT%E2 Fall back, fall forward allowed</p> <p>AT%E3 Fast fall back, fall forward. Is not supported by all modem types.</p>
AT*E	<p><u>End remote configuration</u></p> <p>The command AT*E ends a remote configuration.</p>
AT&F	<p><u>Loading default factory settings</u></p> <p>The modem loads the default factory settings from the internal non-volatile memory. This will take the modem into a defined basic state. AT&F will also store a part of the S registry.</p> <p>(Modems may show two default factory settings (AT&F0, AT&F1).)</p>
AT+GCI	<p><u>Set country code</u></p> <p>The command AT+GCI enables the adaption of the modem to different countries. The default setting for the modem is AT+GCI=FD for Europe (CTR21). Currently, the modem is only approved for this country profile (worldwide approval pending).</p> <p>Please find a detailed list of the supported countries in Chapter 7.</p> <p>Note: Please note that changing the country code resets ALL modem settings to default values (such as AT&F&W) . We therefore recommend to always select the country profile first before entering any other settings.</p>
ATH	<p><u>Disconnect connection</u></p> <p>The modem hangs up.</p>
AT*H	<p><u>Declaration of the connection protocol speed (MNP 10)</u></p> <p>AT*H determines, which speed is used to exchange the declarations during the MNP10 connection set-up before the modems enter the</p>

Command	Description
	<p>MNP 10 mode.</p> <p>AT*H0 Connection set-up takes place with the highest possible speed</p> <p>AT*H1 Connection set-up takes place with 1,200 bps</p> <p>AT*H2 Connection set-up takes place with 4800 bps</p>
ATI	<p><u>Identification</u></p> <p>The modem sends an identification to the PC, according to the following parameter:</p> <p>ATI0 Product code</p> <p>ATI1 Previously calculated EPROM checksum</p> <p>ATI2 Calculation of the EPROM checksum and comparison with the previously calculated checksum stored in the EPROM. Output of OK for correct comparison.</p> <p>ATI3 Number of firmware version in the EPROM</p> <p>ATI4 Modem version number</p> <p>ATI5 Country code parameter (Europe = 253)</p> <p>ATI6 Version number and revision of "data pump"</p>
ATI Continuation	
AT+IPR	<p><u>Determine baud rate</u></p> <p>The command AT+IPR toggles the automatic baud rate detection.</p> <p>AT+IPR=0 Activates the automatic baud rate detection (default)</p> <p>AT+IPR=n Sets the modem to the fixed baud rate n. Supported baud rates: 300, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, 57,600 and 115,200.</p> <p>The setting AT+IPR is not saved with AT&W, which means that in order to activate auto bauding, the command AT+IPR must be sent to the modem every time it is switched on.</p>
AT&K	<p><u>Select data flow control between the PC and the modem</u></p> <p>Fax operation default is RTS/CTS.</p> <p>T-Online requires AT&K0.</p> <p>AT&K0 No data flow control</p> <p>AT&K3 Select data flow control RTS/CTS</p> <p>AT&K4 Select data flow control XON/XOFF</p> <p>AT&K5 Select transparent data flow control XON/XOFF</p> <p>AT&K6 Select RTS/CTS and XON/XOFF data flow control</p>
AT\K	<p><u>Break control</u></p> <p>The modem reacts to a break (receive path off for a certain amount of time), which it receives from another modem or from the PC, or from the command AT\B according to the parameters.</p> <p>1st Situation In case of a break from the PC during the data connection to another modem:</p> <p>AT\K0 Modem enters the command mode and sends no break to the other modem</p> <p>AT\K1 Modem deletes the data buffer and sends a break to the other modem</p> <p>AT\K2 See AT\K1</p> <p>AT\K3 Modem immediately sends break to the other modem; data buffers</p>

Command	Description
AT\K Continuation	are not deleted
	AT\K4 See AT\K0
	AT\K5 Modem inserts break into the data transmitted to the other modem
	2nd Situation During a data connection, the modem was put into command mode by an escape sequence +++ . In this condition, the command AT\B will send break to the other modem. In this situation, the parameter n will cause the following:
	AT\K0 Modem deletes the data buffer and sends a break to the other modem
	AT\K1 See AT\K0
	AT\K2 Modem sends break to the other modem without delay
	AT\K3 See AT\K2
	AT\K4 Modem inserts a break into the data transmitted to the other modem
	AT\K5 See AT\K4 – Return from the online command mode into the data mode via the ATO command.
	3rd Situation In the case a break is received from another modem during a connection that has not been error corrected, the parameters cause the following:
	AT\K0 Modem deletes the data buffer and sends a break to the PC
	AT\K1 See AT\K0
	AT\K2 Modem sends a break to the PC without delay
	AT\K3 See AT\K2
	AT\K4 Modem sends a break to the PC, which is embedded into the data that was received from the other modem
	AT\K5 See AT\K4 (default)
AT-K	<u>Extended MNP functions (MNP 10)</u> This command determines if a V.42LAP-M connection can be switched to a MNP 10 connection AT-K0 Disables switching from V.42 LAP-M to MNP 10 AT-K1 Enables switching from V.42 LAP-M to MNP 10
ATL	<u>Speaker volume</u> This command regulated the speaker volume (see ATM) ATL1 Speaker low volume ATL2 Speaker medium volume ATL3 Speaker high volume Note: The speaker output is optional and is not supported in the standard version.
AT*L	<u>Defining the automatic speed limit</u> The automatic speed limit serves the purpose to automatically obtain the least possible error rate for connections that are not error corrected. The speed limit is therefore always switched on by default. (AT*L0). If the limit is switched off (AT*L1), the modem always establishes the phone-side connection using the fastest possible speed (or the speed defined by AT+MS) , not considering the data rate of the serial interface. This means that e.g. the

Command	Description
	<p>HELMHOLZ Modem 336 will always attempt to establish a connection with 33,600 baud, even if the serial interface is set to only 9,600 baud. Due to the fast speed, higher bit rate errors will occur without error correction, which is usually annoying.</p> <p>The automatic speed limit (AT*L0) limits the speed on the phone side to the speed of the serial interface.</p> <p>It should only be switched off if the speed of the serial interface is changed during the connection.</p>
AT%L	<p><u>Display level of the received signal</u></p> <p>The value that is reported from the modem equals the already amplified level within the modem, not the phone line level.</p> <p>Large AT%L responses imply a low signal level; small values imply a high signal level (009 = -9db, 043 = -43db)</p>
ATM	<p><u>Speaker control</u></p> <p>This command regulates when the speaker is active (see command ATL) .</p> <p>ATM0 Speaker always OFF</p> <p>ATM1 Speaker ON during dialling and connection set-up</p> <p>ATM2 Speaker always ON</p> <p>ATM3 Speaker on during connection set-up</p>
AT+MR	<p><u>Show modulation type</u></p> <p>The command "AT+MR" enables the display of the modulation type after the message CONNECT</p> <p>AT+MR=0 switches the display function off (default).</p> <p>AT+MR=1 switches the display function on. The displayed value applies to the sent data</p> <p>AT+MR=2 switches the display function on. The displayed value applies to the received data</p> <p>If the display function is switched on the modem will display the modulation type and the line speed after the message CONNECT. After the message CONNECT the line "MCR: " appears, followed by the modulation type (see AT+MS command) and the line "+MRR: ", followed by the line speed.</p> <p>The AT+MR command is useful for a connection check.</p>
AT+MS	<p><u>Select modulation type</u></p> <p>AT+MS determines the modulation type. The command enables or disables automatic modulation recognition and defines the highest and lowest possible connection speed. The command format is AT+MS=Modulation, [Automode], [Send: Minbaud, Maxbaud]; [Reception: Minbaud, Maxbaud],</p> <p>AT+MS? displays the current setting.</p> <p>AT+MS=? Displays a list of possible parameters</p> <p>Parameter modulation:</p> <p>The modulation parameter determines the preferred (automode = 1) or the mandatory (automode = 0) modulation type.</p> <p>The following values are available:</p> <p>V21 V.21 300</p>

Command	Description
AT+MS Continuation	V22 V.22 1200
	V22B V.22bis 2400 or 1200
	V23C V.23 1200
	V32 V.32 9600 or 4800
	V32B V.32bis 14400, 12000, 9600, 7200 or 4800
	V34 V.34 33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800 or 2400
	V90 V.90 56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 48000, 46667, 45333, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000
	V92 V.92 56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 48000, 46667, 45333, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000
	B103 Bell 103 300
	B212 Bell 212 1200/75
	Parameter Automode: The optional parameter automode determines whether the modem automatically adjusts to the desired modulation type. The following values may be used: 0 Automatic modulation adjustment switched off 1 Automatic modulation adjustment switched on
	Parameter Reception Minbaud The optional parameter minbaud determines the lowest possible baud rate for modem reception.
	Parameter Reception Maxbaud The optional parameter maxbaud determines the highest possible baud rate for modem reception.
	Parameter Send Minbaud The optional parameter minbaud determines the lowest possible baud rate for modem sending.
	Parameter Send Maxbaud The optional parameter maxbaud determines the highest possible baud rate for modem sending.
AT*M	<u>Alarm message protocol</u> Defines the protocol for sending the alarm message. AT*M0 Remote terminal is a normal modem in a fixed network AT*M1 Remote terminal is a mobile phone with network access via PET/IXO/TAP protocol and data format 8N1 (e.g. D1 network or E network in Germany) AT*M2 Remote terminal is a mobile phone with network access via EMI/UCP protocol and data format 7E1 AT*M3 Remote terminal is a mobile phone with network access PET/IXO/TAP protocol and dataformat 7E1 AT*M4 Remote terminal is a mobile phone with network access via

Command	Description
	<p>EMI/UCP protocol and dataformat 8N1 (e.g. D2 network in Germany)</p> <p>AT*M5 Remote terminal is a fax device</p> <p>AT*M6 Fixed network SMS: The SMS gateway (e.g. Deutsche Telekom number 01930100) is not bound to a certain mobile phone network, but sends SMS to any mobile or fixed network phone.</p> <p>Note: For the remote terminals AT*M1 to AT*M4 only recipients in the network of one GSM provider may be addressed)</p> <p>Please ask your network provider about the current requirements for sending SMS to mobile phones.</p> <p>Additional commands: AT*V, AT*Vn Definition of messages/phone numbers</p> <p>AT*Z0 Definition of the SMS service center</p>
AT*N	<p><u>Valid numbers for selective call acceptance</u></p> <p>Definition of 8 phone numbers, for which modem access is allowed. The modem reports RING or accepts the call according to the S0 settings (irrespective of this, the line RI is activated with each call) only if the transmitted phone number matches a number specified in the list. The selective call acceptance is switched on and off by AT&A.</p> <p>AT*Nn=Telnr</p> <p>n Describes the storage position – range 0..7.</p> <p>Telnr Permitted phone number consists of numbers and “*” as wildcard for exactly one character. The phone number may not contain field separators such as brackets or space characters. The phone numbers will immediately be stored in the modem memory.</p>
AT*N Continuation	<p>AT*N99= Deletes all existing entries in the list.</p> <p>AT*N? Output of all stored entries.</p> <p>Example: AT*N0=01234567** enables all calls from the number pool 01234567-00 to 01234567-99</p>
AT&N	<p><u>Output of the last rejected phone number</u></p> <p>With active call acceptance (AT&A1), this command will show the last phone number whose call was rejected. This phone number will not be stored in the fail-safe modem memory.</p>
AT\N	<p><u>Select error correction</u></p> <p>This command determines which type of error correction should preferably be used for subsequent connections.</p> <p>AT\N0 Switching off error correction (normal buffered mode)</p> <p>AT\N1 Bit direct mode (only for special data formats)</p> <p>AT\N2 Selects V.42LAP-M or MNP 4 error correction. If no error corrected connection can be established, the modem will hang up.</p> <p>AT\N3 Selects V.42LAP-M or MNP 4 error correction. If such a connection cannot be established, the modem will attempt to establish a</p>

Command	Description
	<p>connection that is not error corrected.</p> <p>AT\N4 Exclusively selects a V.42 LAP-M connection.</p> <p>AT\N5 Exclusively selects a MNP 4 connection.</p>
ATO	<p><u>Return to online data mode</u></p> <p>ATO0 Return to online data mode</p> <p>If the modem is in online command mode, it will return to online data mode. If the modem is in offline command mode, it will report ERROR.</p> <p>ATO1 Before the modem switches to online data mode, a retrain procedure is provoked.</p>
AT*P	<p><u>Password for data connection</u></p> <p>AT*P0 Switches the password request off after connection setup.</p> <p>AT*P1 Switches the password request on after connection setup.</p> <p>If the password request is switched on, the modem will request the password after CONNECT has been established. After the password has been entered correctly, the actual CONNECT takes place and data may be transmitted. If the password is incorrect, the modem will hang up. The password is the same as for remote control and is set using AT*C.</p>
ATP	<p><u>Switch on pulse dialing</u></p> <p>Starting with this command, each dial-up is performed with the pulse dialling method, until an ATT or ATDT command switches it back to tone dialling.</p>
ATQ	<p><u>Quiet control</u></p> <p>This command toggles sending messages from the modem to the PC.</p> <p>ATQ0 Send messages to PC</p> <p>ATQ1 Don't send messages to PC</p>
AT%Q	<p><u>Display of telephone connection quality</u></p> <p>A modem message with a value between 000 and 007 indicates good phone connection quality. The smaller the value, the better the quality.</p> <p>High values indicate bad quality. These values are constantly updated during a connection. If the value increases heavily during a connection, i.e. the quality is decreasing, Autoretrain is performed, provided that a previous AT%E command allows this.</p>
AT&R	<p><u>CTS behaviour</u></p> <p>This command determines how the modem treats the CTS (CT105/CT106) data flow control lines.</p> <p>(See also command AT&K).</p> <p>AT&R0 CTS behaviour complies with V.25bis. CTS is deactivated during the connection setup after recognition of the response or ringing tones and will only be activated after the connection is set up.</p> <p>AT&R1 CTS only switches to off when this is required by the data flow control.</p>
AT*R	<p><u>Switch remote control on or off</u></p> <p>AT*R0 Switches remote control off</p> <p>AT*R1 Switches remote control on</p>

Command	Description
ATS	<u>Read/write of the S registry</u> Some S registries may only be modified within certain limits. The modem still reports OK although the value has not changed as specified. Certain registries are read-only. We recommend checking the results after each write attempt using the ATSn? command. ATSn=x Sets the S registry n to the value x. ATSn? Shows the value of the S registry n
AT&S	<u>DSR behaviour</u> This command determines how the modem treats its DSR (CT107) output. AT&S0 DSR always on AT&S1 DSR on after a response tone has been detected; DSR off when no carrier is detected any more.
AT*S_n	<u>Selection of the transmission speed of the serial interface</u> With this command the speed can be pre-selected. The automatic detection will not be switched off by using this command. As soon as an AT command is detected, the serial interface will switch to the detected speed and protocol. If no AT command is sent, the selected speed will be used until a hardware reset occurs. If the selected speed is supposed to be kept, it must be saved using AT&W . Attention: The registry S23 will not be changed with this command! It will only change by automatic speed limit. AT*S0 Keep the current speed. AT*S1 300 bps AT*S2 600 bps AT*S3 1,200 bps AT*S4 2,400 bps AT*S5 4,800 bps AT*S6 9,600 bps AT*S7 19,200 bps AT*S8 38,400 bps AT*S9 57,600 bps AT*S10 115,200 bps
AT*S Continuation	
ATT	<u>Switching on tone dialling</u> Starting with this command, each dial/up is performed with the tone dialling method, until an ATP or ATDP command switches it back to pulse dialling.
ATV	<u>Format of modem messages</u> This command determines, if the modem transmits messages to the PC in short or long format. ATV0 Messages to PC only in short format, i.e. only the error number ATV1 Messages to PC in long format, i.e. the error text
AT\V	<u>Format of connect rate messages</u> This command enables the display of the connect message in one (\V1) line or in three lines (\V0).
AT&V	<u>Display configurations</u>

Command	Description
	<p>With this command, the active configuration of the modem, the saved user defaults and the saved phone numbers 0 to 3 are displayed.</p> <p>AT&V0 Displays the current and saved settings of the module.</p> <p>AT&V1 Displays the diagnostic data of the last connection (connection partner, reason for disconnect). (Explanation see annex)</p>
AT*V	<p><u>Definition of the alarm text</u></p> <p>For simple alarm: Definition of the alarm text (maximum of 160 characters)</p> <p>When entering AT*V, the modem will answer with NEW TEXT: and will await the alarm text entry (complete with <CR>)</p> <p>This command is not available in remote mode.</p> <p>Additional commands:</p> <p>AT*V Definition of the messages/phone numbers</p> <p>AT*Z0 Definition of the SMS service center</p>
AT*V?	<p><u>Joint alarm text query</u></p> <p>The joint parts of the alarm message and the target phone number are queried using AT*V?.</p>
AT+VCID	<p><u>Set caller ID</u></p> <p>With this function, the phone number of the caller can be displayed during an incoming call.</p> <p>(only for phone connections or phone units which support caller ID. If you want to use caller ID, please ask your network provider, if your connection supports caller ID)</p> <p>AT+VCID=0 switches the caller ID function off (default).</p> <p>AT+VCID=1 switches the caller ID function on and displays the ID preformatted for incoming calls.</p> <p>AT+VCID=2 switches the caller ID function on and displays the ID unformatted for incoming calls.</p>
AT+VRID	<p><u>Set last received caller ID</u></p> <p>The command AT+VRID displays the caller ID of the last caller.</p> <p>AT+VRID=0 displays the ID preformatted.</p> <p>AT+VRID=1 displays the ID unformatted.</p>
ATW	<p><u>Error correction messages</u></p> <p>This command determines which data transmission rate information is provided for a CONNECT message.</p> <p>ATW0 The modem reports the baud rate between modem and PC.</p> <p>ATW1 During the connection set-up, the modem reports the phone line speed, the error correction protocol and the PC baud rate.</p> <p>ATW2 The modem reports the phone line speed.</p>
AT&W	<p><u>Save configuration</u></p> <p>The command saves the current modem configuration including the S registry in one of the two user-defined defaults.</p> <p>AT&W0 Save in user default 0</p> <p>AT&W1 Save in user default 1</p>

Command	Description
ATX	<p><u>Extended result messages, dialling tone recognition</u></p> <p>The command determines which group of messages the modem sends to the PC. This is important for PBXs, as often a leading 0 or 9 must be dialled before a dialling tone is heard on the line. Blind dialling (dialling without detecting the dialling tone) is activated or deactivated according to the parameter. The detection of the dialling tone, however, can always be enforced using the parameter W in the ATD dialling string (see command ATD). In the mode AT+FCLASS=1,2, the modem always sends the message CONNECT to the PC without specifying the transmission speed.</p> <p>ATX0 No detection of the dialling tone, i.e. an unsuccessful dialling attempt leads to the message NO CARRIER. No detection of the busy signal, i.e. when calling a busy line the message NO CARRIER is displayed. The message is displayed without specifying the speed.</p> <p>ATX1 As ATX0, but the CONNECT message contains the speed specification.</p> <p>ATX2 Dialling tone detection is active, i.e. a dialling attempt without the presence of a dialling tone will lead to the message NO DIALTONE. No detection of the busy signal, i.e. when calling a busy line the message NO CARRIER is displayed.</p> <p>ATX3 No detection of the dialling tone, i.e. an unsuccessful dialling attempt leads to the message NO CARRIER. Busy signal detection active, i.e. when calling a busy line the message BUSY is displayed.</p> <p>ATX4 Dialling tone detection is active, i.e. a dialling attempt without the presence of a dialling tone will lead to the message NO DIALTONE. Busy signal detection is active, i.e. when calling a busy line the message BUSY is displayed.</p>
ATY	<p><u>Long space disconnect</u></p> <p>The command determines how the modem acts when it receives a long space disconnect (BREAK) or in which form the modem creates a long space disconnect.</p> <p>ATY0 No long space disconnect behaviour</p> <p>ATY1 Long-term interruption behaviour active. For connections without error correction the modem sends a long space disconnect of 4 seconds before hanging up. The modem reacts to the reception of a long space disconnect (break longer than 1.6 seconds) by hanging up.</p>
AT&Y	<p><u>Selection of user configuration for hardware reset</u></p> <p>AT&Y0 For a hardware reset following the AT&Y0-command, the user default 0 (created using the AT&W0 command) is loaded into the current modem configuration.</p> <p>AT&Y1 For a hardware reset following the AT&Y1-command, the user default 1 (created using the AT&W1 command) is loaded into the current modem configuration.</p>
ATZ	<p><u>Software reset/load default</u></p> <p>The command causes the modem to perform a software reset. The modem will load the default saved by the user (according to the parameter). If no parameter is specified, the user default 0 is loaded.</p> <p>ATZ0 Software reset; afterwards the user default 0 is loaded.</p> <p>ATZ1 Software reset; afterwards the user default 1 is loaded.</p>
AT&Z	<u>Save phone numbers</u>

Command	Description
	<p>The command saves four entries (0-3) permanently in the EEPROM. Each entry may consist of up to 35 characters. The entries may be overwritten and must comply with the dialling string as described in the ATD command.</p> <p>AT&Zn=x</p> <p>n is the number of the list entry (from 0 to 3).</p> <p>x is the dialling string with the phone number.</p> <p>Settings for alarm functions and security callback:</p> <p>AT&Z0=xxx number of the modem or fax device for simple alarm notification service center number of the GSM provider for SMS access</p> <p>AT&Z1=xxx target number for security callback</p> <p>AT&Z2=xxx mobile phone number for simple alarm notification by SMS</p> <p>AT&Z3=xxx number of the fax device for collective alarm notification</p>
<p><Pause> ****</p> <p><Pause></p>	Start of the remote configuration at the local modem
<p><Pause>+++</p> <p><Pause></p>	Start of the online command mode

5.1.3 Responses for Normal Data Communication

During normal data communication (no command level) the modem detects several operating states and events. These are reported to the connected application (e.g. PC or data communication device). This can be performed either in detailed (RESPONSE) or short format (Code). The following table shows and explains the possible responses.

Response	Code	Type	Meaning
OK	0	Final	Command executed, no error
CONNECT	1	Progress message	Connection established if parameter setting X=0
CONNECT [<text>]		Progress message	Connection established if parameter setting X=0 <text>: e.g. 'connect 9600'. The data transmission rate is then 9.600 bit/s.
RING	2	Non-synchronized	Ring tone recognized
NO CARRIER	3	Final	Connection not established or disconnected
ERROR	4	Final	Invalid command or command line too long
NO DIAL TONE	5	Final	No dial tone, connection set-up not successful, wrong operating mode
BUSY	6	Final	Remote terminal busy
NO ANSWER	7	Final	Timeout for connection set-up

5.1.4 Overview AT Responses

Message number	Message text in long form	ATXn				
Short form		n=0	n=1	n=2	n=3	n=4
+F4	+FCERROR	X	X	X	X	X
0	OK	X	X	X	X	X
1	CONNECT	X	X	X	X	X
2	RING	X	X	X	X	X
3	NO CARRIER	X	X	X	X	X
4	ERROR	X	X	X	X	X
5	CONNECT 1200	1	X	X	X	X
6	NO DIAL TONE	3	3	X	3	X
7	BUSY	3	3	3	X	X
8	NO ANSWER	1	X	X	X	X
9	CONNECT 600	1	X	X	X	X
10	CONNECT 2400	1	X	X	X	X
11	CONNECT 4800	1	X	X	X	X
12	CONNECT 9600	1	X	X	X	X

Message number Short form	Message text in long form	ATXn				
		n=0	n=1	n=2	n=3	n=4
13	CONNECT 7200	1	X	X	X	X
14	CONNECT 12000	1	X	X	X	X
15	CONNECT 14400	1	X	X	X	X
16	CONNECT 19200	1	X	X	X	X
17	CONNECT 38400	1	X	X	X	X
18	CONNECT 57600	1	X	X	X	X
19	CONNECT 115200	1	X	X	X	X
20	CONNECT 230400	X	X	X	X	X
21	CONNECT V.23 HDX	X	X	X	X	X
22	CONNECT 75TX/1200RX	1	X	X	X	X
23	CONNECT 1200TX/75RX	1	X	X	X	X
24	DELAYED	4	4	4	4	X
32	BLACKLISTED	4	4	4	4	X
33	FAX	X	X	X	X	X
34	*FC:	X	X	X	X	X
35	DATA	X	X	X	X	X
40	CARRIER 300	X	X	X	X	X
42	CARRIER 600	X	X	X	X	X
44	CARRIER 1200/75	X	X	X	X	X
45	CARRIER 75/1200	X	X	X	X	X
46	CARRIER 1200	X	X	X	X	X
47	CARRIER 2400	X	X	X	X	X
48	CARRIER 4800	X	X	X	X	X
49	CARRIER 7200	X	X	X	X	X
50	CARRIER 9600	X	X	X	X	X
51	CARRIER 12000	X	X	X	X	X
52	CARRIER 14400	X	X	X	X	X
53	CARRIER 16800	X	X	X	X	X
54	CARRIER 19200	X	X	X	X	X
55	CARRIER 21600	X	X	X	X	X
56	CARRIER 24000	X	X	X	X	X
57	CARRIER 26400	X	X	X	X	X
58	CARRIER 28800	X	X	X	X	X
59	CONNECT 16800	1	X	X	X	X
61	CONNECT 21600	1	X	X	X	X

Message number Short form	Message text in long form	ATXn				
		n=0	n=1	n=2	n=3	n=4
62	CONNECT 24000	1	X	X	X	X
63	CONNECT 26400	1	X	X	X	X
64	CONNECT 28800	1	X	X	X	X
66	COMPRESSION: CLASS 5	X	X	X	X	X
67	COMPRESSION: V.42 bis	X	X	X	X	X
68	COMPRESSION: V44					
69	COMPRESSION: NONE	X	X	X	X	X
70	PROTOCOL: NONE	X	X	X	X	X
77	PROTOCOL: LAP-M	X	X	X	X	X
78	CARRIER 31200	X	X	X	X	X
79	CARRIER 33600	X	X	X	X	X
80	PROTOCOL: ALT	X	X	X	X	X
81	PROTOCOL: ALT-CELLULAR	X	X	X	X	X
82	Download initiated...	X	X	X	X	X
83	LINE IN USE	X	X	X	X	X
84	CONNECT 33600	X	X	X	X	X
91	CONNECT 31200	X	X	X	X	X
130	+ILRR					
134	MODULATION: B103	X	X	X	X	X
135	MODULATION: B212	X	X	X	X	X
136	MODULATION: V21	X	X	X	X	X
137	MODULATION: V22	X	X	X	X	X
138	MODULATION: V22B	X	X	X	X	X
139	MODULATION: V23C	X	X	X	X	X
140	MODULATION: V32	X	X	X	X	X
141	MODULATION: V32BIS	X	X	X	X	X
142	MODULATION: V34	X	X	X	X	X
144	MODULATION: K56	X	X	X	X	X
145	MODULATION: V90	X	X	X	X	X
146	MODULATION: V92	X	X	X	X	X
150	CARRIER 32000	X	X	X	X	X
151	CARRIER 34000	X	X	X	X	X
152	CARRIER 36000	X	X	X	X	X
153	CARRIER 38000	X	X	X	X	X
154	CARRIER 40000	X	X	X	X	X

Message number Short form	Message text in long form	ATXn				
		n=0	n=1	n=2	n=3	n=4
155	CARRIER 42000	X	X	X	X	X
156	CARRIER 44000	X	X	X	X	X
157	CARRIER 46000	X	X	X	X	X
158	CARRIER 48000	X	X	X	X	X
159	CARRIER 50000	X	X	X	X	X
160	CARRIER 52000	X	X	X	X	X
161	CARRIER 54000	X	X	X	X	X
162	CARRIER 56000	X	X	X	X	X
165	CONNECT 32000	X	X	X	X	X
166	CONNECT 34000	X	X	X	X	X
167	CONNECT 36000	X	X	X	X	X
168	CONNECT 38000	X	X	X	X	X
169	CONNECT 40000	X	X	X	X	X
170	CONNECT 42000	X	X	X	X	X
171	CONNECT 44000	X	X	X	X	X
172	CONNECT 46000	X	X	X	X	X
173	CONNECT 48000	X	X	X	X	X
174	CONNECT 50000	X	X	X	X	X
175	CONNECT 52000	X	X	X	X	X
176	CONNECT 54000	X	X	X	X	X
177	CONNECT 56000	X	X	X	X	X
178	CONNECT 230400	X	X	X	X	X
180	CARRIER 28000	X	X	X	X	X
181	CARRIER 29333	X	X	X	X	X
182	CARRIER 30667	X	X	X	X	X
183	CARRIER 33333	X	X	X	X	X
184	CARRIER 34667	X	X	X	X	X
185	CARRIER 37333	X	X	X	X	X
186	CARRIER 38667	X	X	X	X	X
187	CARRIER 41333	X	X	X	X	X
188	CARRIER 42667	X	X	X	X	X
189	CARRIER 45333	X	X	X	X	X
190	CARRIER 46667	X	X	X	X	X
191	CARRIER 49333	X	X	X	X	X
192	CARRIER 50667	X	X	X	X	X

Message number Short form	Message text in long form	ATXn				
		n=0	n=1	n=2	n=3	n=4
193	CARRIER 53333	X	X	X	X	X
194	CARRIER 54667	X	X	X	X	X
195	CARRIER 28000	X	X	X	X	X
196	CARRIER 29333	X	X	X	X	X
197	CARRIER 30667	X	X	X	X	X
198	CARRIER 33333	X	X	X	X	X
199	CARRIER 34667	X	X	X	X	X
200	CARRIER 37333	X	X	X	X	X
201	CARRIER 38667	X	X	X	X	X
202	CARRIER 41333	X	X	X	X	X
203	CARRIER 42667	X	X	X	X	X
204	CARRIER 45333	X	X	X	X	X
205	CARRIER 45667	X	X	X	X	X
206	CARRIER 49333	X	X	X	X	X
207	CARRIER 50667	X	X	X	X	X
208	CARRIER 53333	X	X	X	X	X
209	CARRIER 54667	X	X	X	X	X
210	CONNECT 25333	X	X	X	X	X
211	CONNECT 26667	X	X	X	X	X
212	CARRIER 25333	X	X	X	X	X
213	CARRIER 26667	X	X	X	X	X

Notes regarding the table

An X in the column indicates that a message is either sent in long or short form (depending on the ATV command). In the topmost line, the characters 0 to 4 each indicate the parameters for the commands ATX0 to ATX4.

If there is a number in a column, this indicates that an error message is displayed according to the error number.

5.2 S Registers

The modem has status registers, which control the operation.

S registers may be read and written using the ATS command. Certain S registers may only be read; into others, only a particular range of values may be entered.

If the range of values is exceeded, the modem will report OK, although the value was not accepted. We therefore recommend to immediately check modifications by reading (ATS n ?).

5.2.1 Brief Overview S Registers

Register	HELMHOLZ Modem	Function	Units	Range	Default
S0*		Number of ringing tones until automatically accepting a call	Ringing tones	0-5	5
S1		Ringing tone counter	Ringing tones	0-255	0
S2*		Escape character	ASCII	0-255	43
S3		Return character	ASCII	0-127	13
S4		Linefeed character	ASCII	0-127	10
S5		Backspace character	ASCII	0-255	8
S6*		Waiting period dial tone	s	4-7	4
S7*		Waiting period carrier signal	s	0-100	60
S8*		Dial tone delay	s	1-7	2
S9*		Reaction time carrier signal	0.1 s	1-255	6
S10*		Time period between lost carrier signal and hang up	0.1 s	20-254	20
S12*		Transmission clock of the ESC characters	0.02 s	0-255	50
S13*		Number of dialing attempts for alarm		1-12	3
S14*		General settings			138
S15*		Data Transmit Controller DTC	1s	0-255	0**
S17*		Remote introductory character		0-127	42
S21*		Settings for V24			116
S22*		Settings			75h (117)
S24*		Time period until switching into sleep mode	s	0-255	0
S25		Time period for DTR signal	0.01 s	0-255	5
S26		Time period between RTS/CTS	0.01 s	0-255	1
S27*		General settings	-		137

Register	HELMHOLZ Modem	Function	Units	Range	Default
S29		Time period for modifier "flash"	10 ms	17	17
S30		Time period until hang up due to silence	10 s	0-255	0
S31*		General settings	-		C2h (194)
S36*		Reset of error logs	-		7
S38		Time period until forced hang up	s	0-255	20
S39*		Flow control	-		3
S40*		General settings	-		104
S41*		General settings	-		195
S46*		Data compression	-		138
S48*		Setting for V42 declaration phase	-		7
S86		Error event code	-		Read-only
S91*		Transmit level	-	0-15	9
S95*		Result code	-		0

* These registries are saved in the EEPROM together with the AT&W command.

** The defaults may not be valid for each country code.

5.2.2 Total Overview S Registers

- S0*** Rings to Auto-Answer - Number of rings until the modem accepts a call
For S0=0 the modem will not accept a call when a call comes in. The value of S0 can be between 0 and 5.
- S1** Ring Counter - Counter for call ringing
S1 is read-only. S1 will be reset to zero, when the modem answers a call.
- S2*** Escape Character -Escape character which causes a switch from data mode to online command input mode. Values larger than 127 will lead to unrecognised ESC characters.
- S3** Carriage Return Character – Carriage Return Character.
- S4** Linefeed Character – Linefeed character
- S5** Backspace Character – Backspace character
- S6*** Wait Time for Dial Tone (Before Blind Dialling) - Maximum time to wait for the dialling tone

After the modem went off-hook, it waits 7 seconds for the dialling tone (fixed for approval purposes). If it detects a dialling tone during this waiting period it will start dialling.

If it does not detect a dialling tone, it will check if dialling tone recognition is activated or if the dialling string (Chapter "AT Command Set", command ATD) contains the parameter W. When dialling tone recognition is not activated, the modem will wait for the dial tone during the time period (in seconds) specified in S6.

The value of S6 can be between 4 and 7.

S7* Wait for Carrier - Wait for the carrier frequency from the other modem. The maximum time for the modem to wait for a response from the other modem is specified in S7. The time starts running as soon as the modem has finished dialling. The value of S7 can be between 0 and 180 seconds.

S8* Pause Time for Dial Delay Modifier - Dial pause time, if there is a comma in the dialling string.

If there is a comma in the dialling string, the modem will wait during the dialling procedure, until the time specified in S8 (in seconds) has run out. The value of S8 can be between 1 and 7 seconds.

S9* Carrier Detect Response Time - DCD reaction time on carrier frequency from the other modem.

The DCD output of the RS232 interface (CT109) of the modem switches to **on**, when the carrier frequency from the other modem is detected before the time defined in S9 (in tenth of seconds) runs out. S9 must be smaller than S10.

S10* Carrier Loss Disconnect Time - The time which leads to disconnection after carrier frequency loss.

In S10, the time is specified in tenth of seconds, which the modem awaits to disconnect, if it can't detect the carrier frequency from the other modem anymore.

S12* Escape Prompt Delay – Minimum pre and post run time and maximum interim time in fifteenth of seconds between two characters, which must be observed, if the modem is supposed to detect an escape sequence (usually +++).

S13* Number of dialing attempts for alarm

Bit	Meaning	
Bit 0 – 3	Number of dialing attempts	Range of values: 1...12 Default value: 3 S13 determines how often the sending of an alarm message is attempted. Hinweis: For approval purposes (blacklisting) the attempts are limited to a maximum of 12.

Bit 4 - 7	Reserved	
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S14* General Bitmapped Options Status – General settings

Bit	Meaning	
Bit 0	Reserved	
Bit 1	Echo on inputs	Command echo 0: Echo off 1: Echo on
Bit 2	Reserved	
Bit 3	Result format	Result code: 0: Message number (ATV0) 1: Message texts (ATV1)
Bit 4	Reserved	
Bit 5	Tone/pulse dialling	Tone/pulse 0: Tone dialling (ATT) 1: Pulse dialling (ATP)
Bit 6	Reserved	
Bit 7	Originate/answer	Originate/answer 0: Answer mode 1: Originate mode

S15* DTC time setting

Idle connection control (DR) is a function integrated into the firmware to monitor the data transmission during online operation. This function prevents the modem to stay online for an unlimited time although no data is transmitted any more.

In the registry S15 any time between 1 and 255 seconds may be set. If S15 is set to 0, data transmit control is switched off.

The timer will start running directly after the the modem goes off-hook. As soon as the set time has expired, a modem reset is performed (which automatically results in the modem hanging up).

S17* Remote control introductory character

In S17, the ASCII code of the character which is used to start remote configuration is defined. Values larger than 127 completely switch off remote configuration. The default for S17 is "42", which equals the ASCII character "*", i.e. the remote configuration is started with the escape sequence <Pause> "****" <Pause>.

(Note: The number of characters in the escape sequence is fixed to "4")

S21* General Bitmapped Options Status – Settings for V24

Bit	Meaning	
Bit 0.1	Reserved	

Bit	Meaning	
Bit 2	CTS behaviour	CT106 (CTS) behaviour: 0: see AT&R0 1: see AT&R1
Bit 3-4	DTR behaviour	CT108 (DTR) behaviour: 0: see AT&D0 1: see AT&D1 2: see AT&D2 3: see AT&D3
Bit 5	DCD behaviour	CT109 (DCD) behaviour: 0: see AT&C0 1: see AT&C1
Bit 6	DSR behaviour	CT107 (DSR) behaviour: 0: see AT&S0 1: see AT&S1
Bit 7	Long space disconnect	Long space disconnect: 0: see ATY0 1: see ATY1

S22* Bitmapped Options Status

Bit	Meaning	
Bit 0.1	Speaker volume	Speaker volume: 0: Off (ATL0) 1: Silent (ATL1) 2: Medium (ATL2) 3: Loud (ATL3)
Bit 2-3	Speaker control	Speaker control: 0: Off (ATM0) 1: On until carrier (ATM1) 2: Always on (ATM2) 3: On at establishing (ATM3)
Bit 4-6	Error message group	Limit result codes: 0: see ATX0 4: see ATX1 5: see ATX2 6: see ATX3 7: see ATX4
Bit 7	Stores AT*L-settings	

S24* Sleep Timer

The time after which the modem switches to energy saving mode (sleep) during inactivity is determined (in seconds) in S24.

The energy saving mode will be quit as soon as characters are sent to the modem, or when a call comes in.

Note: The first "AT" ends the sleep mode, but is not recognized positively. When the modem is in sleep mode, it is necessary to send an "AT" command before sending other commands. This first "AT" command may not be answered with "OK".

S25 Delay to DTR Off

Time period, in which a DTR signal is applied to the modem, before it hangs up.

S26 RTS to CTS Delay

Time period between RTS and CTS activation in 1/100 seconds.

S27* General Bitmapped Options Status - General settings

Bit	Meaning	
Bit 0-3	RS232 mode	Asynchronous Mode Selection: 0: see AT&M0 or AT&Q0 9: see AT&Q5 10: see AT&Q6
Bit 4,5	Reserved	
Bit 6	CCITT or Bell modulation	CCITT/Bell select 0: CCITT modulation 1: Bell modulation
Bit 7		Remote control 0: Remote control off 1: Remote control on

S29 Flash Dial Modifier Time

Sets the time in tenths of seconds, after which the modem hangs up due to a flash in the dialling string.

S30 Disconnect Inactivity Timer

Time period, in which the modem waits without activity before hanging up. Units in seconds (only for FAX Class 1).

S31* General Bitmapped Options Status - General settings

Bit	Meaning	
Bit 0		
Bit 1	Description Connect message	0: 3-line message (\V0) 1: Expanded 1-line message (\V1)
	Error correction Messages	Messages: 0: Only PC baud rate (ATW0) 1: PC and phone baud rate (ATW1) 2: Only phone baud rate (ATW2)
Bit 4-7	Reserved	

S32 XON Character

ASCII code of the character that is recognized by the modem as XON.

S33 XOFF Character

Number of the character that is recognized by the modem as XOFF.

S36* LAPM Failure Control

Bit	Meaning	
Bit 0..2	Determines what happens if an attempt to establish a V.42 LAP-M connection fails. This is connected to the registry S48.	0 Modem hangs up 1 Modem stays online and establishes a direct mode connection. 2 Reserved 3 Modem stays online and establishes a direct mode connection. 4 Modem attempts to establish a MNP connection. In case of failure it hangs up. 5 Modem attempts to establish a MNP connection. In case of failure a direct mode connection is established. 6 Reserved 7 Modem attempts to establish a MNP connection. In case of failure a normal mode connection is established.
Bit 3	SMS type	0: Normal fixed net modem (AT*MO) 1: D1 and E network (AT*M1) 2: D2 network (AT*M4) 5: Fax (AT*M5)
Bit 6	Key abort	0: Key abort activated 1: Key abort deactivated
Bit 7		1: Call acceptance not locked (AT*A1) 0: Call acceptance locked (AT*A0)

S38 Delay Before Forced Hang-up - Maximum time left for the buffers to empty their data, after a command to hang up has been received. Only applies to error corrected connections.

S39* PC / Flow Control - Selection of data flow control between PC and modem.

S39=0 No data flow control (AT&K0)
 S39=3 RTS/CTS data flow control (AT&K3)
 S39=4 XON/XOFF data flow control (AT&K4)
 S39=5 Transparent XON data flow control (AT&K5)
 S39=6 RTS/CTS and XON/XOFF data flow control

S40* General Bitmapped Options Status – General settings

Bit	Meaning	
Bit 0	Reserved	
Bit 1	Reserved	
Bit 2	Reserved	

Bit 3-5	Break handling	Break handling 0: see AT\K0 1: see AT\K1 2: see AT\K2 3: see AT\K3 4: see AT\K4 5: see AT\K5
Bit 6-7	MNP block size	MNP Block Size 0: 64 characters (AT\A0) 1: 128 characters (AT\A1) 2: 192 characters (AT\A2) 3: 256 characters (AT\A3)

S41* General Bitmapped Options Status – General settings

Bit	Meaning	
Bit 0 and 1	Select compression type	0: No compression (AT%C0) 1: MNP5 (AT%C1) 2: V.42bis/V.44 (AT%C2) 3: MNP5 or V.42bis/V.44 (AT%C3)
Bit 2	Auto retrain	Auto retrain control 0: No auto retrain (AT%E0) 1: Auto retrain (AT%E1)
Bit 3	Data flow control Modem/modem	Modem to modem flow control 0: Off (AT\G0) 1: On (AT\G1)
Bit 4	MNP block mode Reserved with 56k models	Block Mode Control MNP 0: Stream Modus (AT\L0) 1: Block Modus (AT\L1)
Bit 5	Reserved	
Bit 6	Fall back/fall forward	FB/FF control 0: No FB/FF 1: FB/FF (AT%E2)
Bit 7	Reserved	

S46* V.42bis Data Compression

S46=136 No data compression
S46=138 V.42bis data compression on

S48* V.42 Negotiation Control

S48=0 Only LAPM connection possible
S48=7 LAPM or MNP 4 connection
S48=128 Connection protocol as laid down in S36

S86 Call Failure Reason Code

When a connection fails (**NO CARRIER**) an event code is written into this registry.

S86=0 Normal disconnect, no error
S86=4 Carrier lost
S86=5 No error corrected (V.42) connection could be established
S86=6 No extensions could be negotiated

S86=7	Remote terminal only supports synchronous modems
S86=8	No joint framing detected
S86=9	No protocol could be established
S86=10	Invalid answer when negotiating extensions
S86=11	No synchronous marks received from remote terminal
S86=12	Normal disconnection by remote terminal
S86=13	Remote terminal didn't respond any more (ten attempts)
S86=14	Protocol error
S86=15	DTR drop
S86=16	Remote terminal demanded cleardown (GSTN cleardown)
S86=17	Inactivity timer expired
S86=18	Desired speed is not supported
S86=19	Long space disconnect
S86=20	Key abort (character was sent during connection setup)
S86=22	No connection setup possible
S86=23	Cleardown after 3 retrains
S86=26	Remote terminal hung up

S91* Transmit level

The value for the transmit level of the modem is stored in the S91 registry. The value can be set between 0 and 15. The connection can in some cases be improved by decreasing the transmit level.

S91=0	Transmit level – 1 dBm
S91=9	Default factory setting (HELMHOLZ Modem 144/336)
S91=15	Transmit level – 26 dBm –16 dBm

S95* Result Code Control – Result code

Bit	Meaning
Bit 0	CONNECT message with line speed
Bit 1	CONNECT/ARO message for error corrected connection
Bit 2	CARRIER messages enabled (messages 40 – 47)
Bit 3	PROTOCOL messages enabled (messages 70 – 80)
Bit 4	Reserved
Bit 5	COMPRESSION message enabled (Messages 66 – 69)
Bit 6	Reserved
Bit 7	Reserved

* These registries are stored in the EEPROM with the **AT&W** command.

** The default can differ according to the set country code.

6 Operation with Programmable Logic Controllers (PLC)

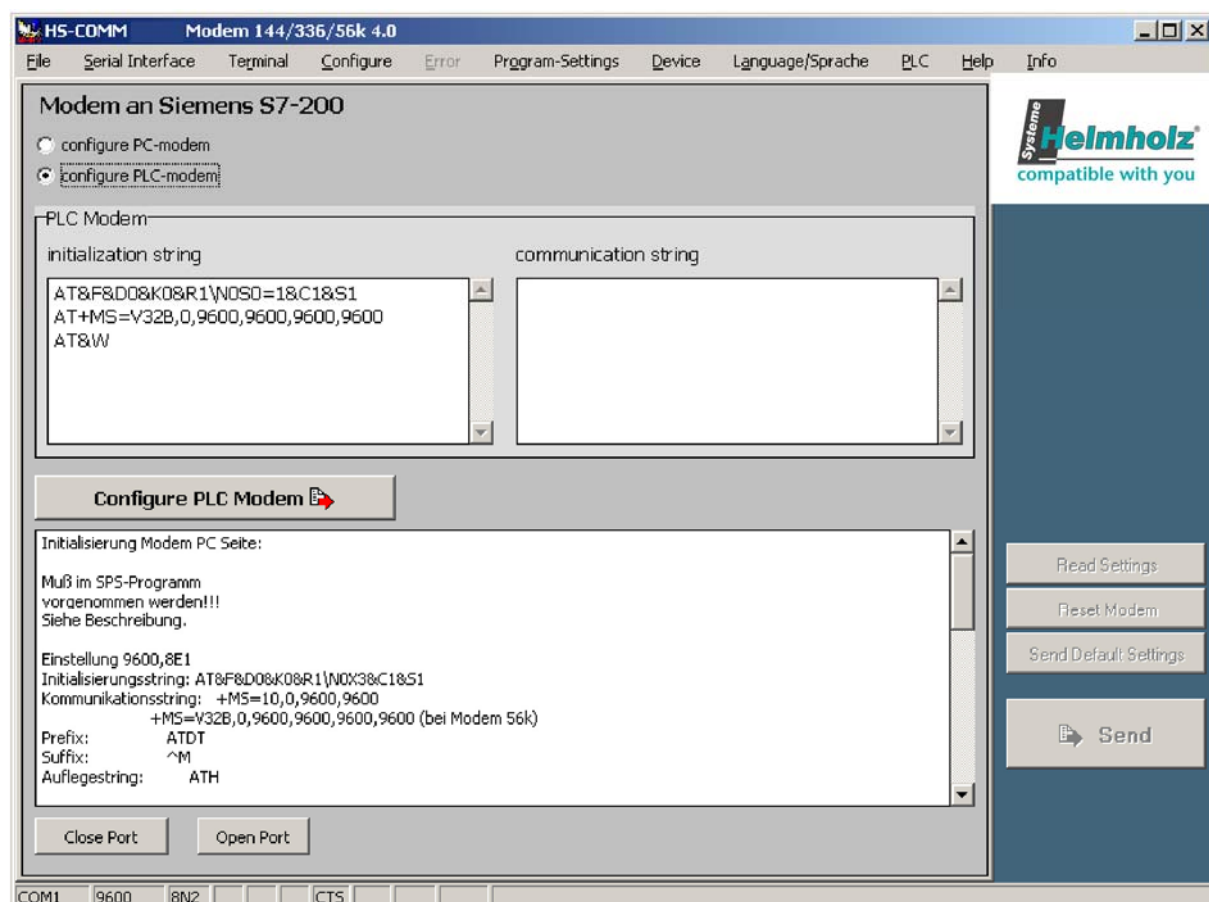
The HELMHOLZ Modem 56K small INT has been tested for the most common PLC systems on the market.

The documentation of the settings required for the respective PLC can be queried at HELMHOLZ (E-mail: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

6.1 Operation with HSCommSH



The configuration software HSCommSH offers a range of recommended settings for the modems connected with PLC and PC at the control centre.

If it is selected in the menu *SPS*, then for both modem locations the necessary settings and a user prompting are displayed as text. The user can adjust the settings.

The commands *Configure SPS modem* and *Configure PC modem* transmit these settings to the connected modem.

7 Country Codes

Country	Standard Countries	Extended Group of Countries
Europe TBR21	FD (Default)	FD (Default)
ITU/Taiwan	FE	FE
Albanien		B8
Algeria	FE	FE
Andorra	A0	
Argentina		07
Australia	09	09
Austria*	FD / 0A*	FD
Belgium*	FD / 0F*	FD
Bolivia	FE	FE
Bosnia-Herzegovina	FE	FE
Brazil	16	
Brunei	FE	FE
Bulgaria		1B
Canada	20	
Chile		25
China	26	26
Columbia		27
Costa Rica	FE	FE
Croatia		FA
Cyprus		2D
Czech Republic	2E	2E
Denmark*	FD / 31*	FD
Dominican Republic		33
Ecuador	FE	FE
Egypt		36
El Salvador	FE	FE
Estonia		F9
Finland*	FD / 3C*	FD
France*	FD / 3D*	FD
Germany*	FD / 42*	FD
Great Britain*	FD / B4*	FD
Greece*	FD / 46*	FD
Guatemala	FE	FE
Honduras	FE	FE
Hong Kong		50
Hungary	51	51
Iceland*	FD / 52*	FD
India	53	53
Indonesia		54

Country	Standard Countries	Extended Group of Countries
Ireland*	FD / 57*	FD
Israel		58
Italy*	FD / 59*	FD
Japan	00	00
Jordan	FE	FE
Korea Republic		61
Kuwait	62	62
Latvia	FD	FD
Lebanon		64
Liechtenstein*	FD	FD
Lithuania	FE	FE
Luxembourg*	FD / 69*	FD
Macedonia	FE	FE
Malaysia		6C
Malta	B4	
Mexico	73	
Monaco	3D	
Montenegro	FE	FE
Morocco	FE	FE
Netherlands*	FD / 7B*	FD
New Zealand		7E
Nicaragua	FE	FE
Nigeria		81
Norway*	FD / 82*	FD
Oman	FE	FE
Pakistan		84
Panama		85
Paraguay		87
Peru	FE	FE
Philippines		89
Poland	8A	
Portugal*	FD / 8B*	FD
Romania	8E	
Russian Federation		B8
San Marino	59	
Saudi Arabia	98	
Senegal		99
Serbia	FE	FE
Singapore		9C
Slovak Republic	FB	
Slovenia	FC	
South Africa		9F
Spain*	FD / A0*	FD

Country	Standard Countries	Extended Group of Countries
Sri Lanka		A1
Sweden*	FD / A5*	FD
Switzerland*	FD / A6*	FD
Taiwan	FE	FE
Thailand	A9	A9
Tunisia	FE	FE
Turkey	AE	AE
Ukraine	FE	FE
United Arabian Emirates		B3
Uruguay		B7
USA	B5	B5
Venezuela		BB
White Russia (Belarus)	FE	FE
Yemen	FE	FE

Country code is set by the parametrisation software HSCommSH or the AT command AT+GCI=nn

- *) The standard **TBR21** (setting "FD") is valid and recommended for all public phone networks in the *EC countries* (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Great Britain, Ireland, Italy, Luxembourg, Netherlands, Portugal, Sweden, Spain) as well as in *Switzerland, Liechtenstein, Norway and Iceland*.
An explicit setting of the single country (marked by *) is only required and useful for old PABXs.