56-k Modem „small“/
56-k Modem USB„small“

700-751-HSM21 / 700-751-HSM31

Operating Manual

Version: 2.0 / 03.07

Manual Order number : 900-751-HSM21/en

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Note:

We have checked the content of this manual for conformity with the hardware and software described. Nevertheless, because deviations cannot be ruled out, we cannot accept any liability for complete conformity. The information in this manual is regularly updated. When using purchased products, please heed the latest version of the manual, which can be viewed in the Internet at **www.helmholz.de**, from where it can also be downloaded.

Our customers are important to us. We are always glad to receive suggestions for improvement and ideas.

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1 Scope of Delivery

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

- HELMHOLZ Modem 56k small or
  HELMHOLZ Modem 56k USB small
- 2 phone cords (TAE N at RJ12 and RJ12 at RJ12)
- PC connection cable
  9/9-pin (RS232 cable) or USB connection cable
- User Guide
- CD-ROM (optional)

Please contact your supplier if the content is not complete. Please also check the modem for shipping damage. Please also refer to your supplier if anything is damaged.
Please keep the packaging material for possible future shipping or storage.

2 Function Overview

The HELMHOLZ Modem 56k small is a modem for the analogue telephone network. It has a very compact design and very robust plastic housing. The modem supports the following functions, which are described in detail in Chapter 5:

- Usage in 87 countries
- Establishing a data connection
- Auto answer
- Data flow control
- Error correction
- Data compression
- Idle connection control
- Firmware Update
- Remote configuration
- Security callback

3 Notes Regarding the Use of the Manual

- This manual uses the symbol for especially important notes. Further notes will be marked accordingly.
- All factory settings are marked “default”.
  Example (Chap. 5.7.3): Enter old password (default: QWERTY)
- In Chapters 4 to 6 the description consists of two columns. Individual functions are described on the left side. The according **AT** commands and the modem responses can be found in the right column.

Function description	**AT** command
Example (Chap. 5.2.7):	
After the hardware reset, load the user profile 1	**ATZ1**

- All **AT** commands start with the letters **AT** and end with a “Return” (Carriage Return - CR). **AT** commands can be entered in capital or small letters. The command is evaluated as soon as the modem received a response.
- In the following, the used syntax is explained:

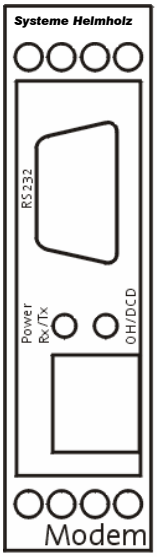
① **ATDT**	**AT** command (font: Courier, bold)
② <**Expression**>	Input of a parameter (font: Courier, bold)
③ <**Expression**>	Input of an optional parameter (Font: Courier, bold)
④ *Expression*	Response from the modem (font: italic)

Examples:

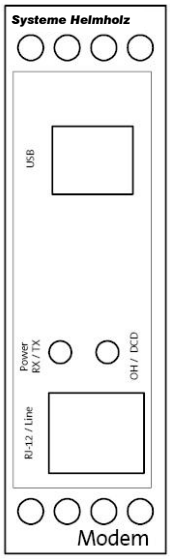
① **ATDT<n>**	Dialing of the phone number **<n>**
ATDT1234	Dialing of the phone number **1234**
②+③ **AT+MS=<Modulation>, [Automode]**	Selection of the modulation type
AT+MS=V92	Selection of the modulation type V.92
AT+MS=V92,1	Selection of the modulation typeV.92 with automatic adjustment
④ *Connect*	The connection to the remote terminal is established
>	Input prompt during the remote configuration.

4 Initial Operation

4.1 Front panel



HELMHOLZ Modem 56k small



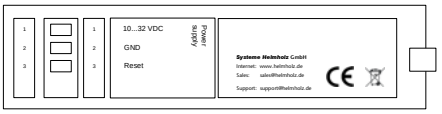
HELMHOLZ Modem 56k USB small

The HELMHOLZ Modem 56k small INT has two LEDs to indicate the operating state:

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 ⚠ **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.

4.2 Top



	Terminal	Meaning
1	10..32V DC	Power supply 10V - 32V DC
2	GND	Ground
3	Reset	Reset input
4	N/A	

4.3 User Profiles

The modem offers a choice of profiles:

- Default factory setting:
  The default factory settings enable you to achieve a fixed defined basic state of the modem. Starting with this “basis”, you can customize the modem according to your requirements.
- User profiles 0 and 1:
  You can save configurations in the user profile, which may be reused for certain purposes.
  A part of the S registry is saved in each profile. In the description, the affected registries are marked with an “*” in the S registry.

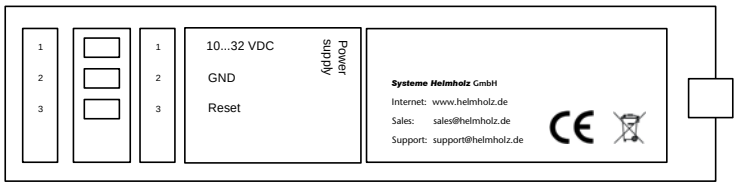
4.4 Installation

Please observe our safety instructions.

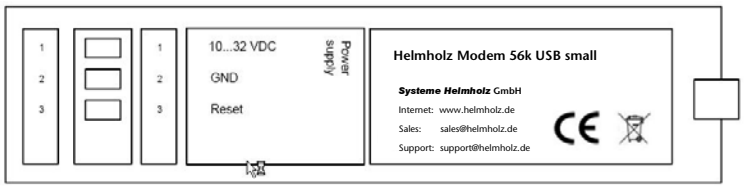
1. **Mounting on DIN rail**
2. **Connecting the power supply**

   a) Connecting the ground connection

   b) Connecting the power supply 10…32V DC



HELMHOLZ Modem 56k small



HELMHOLZ Modem 56k USB small

Note: The minimum value is 10V DC.
The maximum value is 32V DC.

3. **Switch on power supply**

   Power LED lights up green

4. **Connection with a PC**

   Connect the 9-pin jack at the modem with the serial interface or a USB interface of your computer.

5. **Installation of a driver**

   For HELMHOLZ Modem 56k small:
   The installation of a driver is not required when using a terminal program or the HSComm. If you use another application, a driver may be necessary. Please find our current drivers at http://www.helmholz.de/ or install the standard modem 336 under Windows.

   For HELMHOLZ Modem 56k USB small:
   If the HELMHOLZ USB drivers are not installed on your system yet, you must perform the installation described in Chapter 4.5 **.**

6. **Communication with the Modem**

   Now, start your communication program on the PC and set it to the used COM interface. The modem will automatically adjust to the baud rate of your PC.

7. **Communication Control via a Terminal Program**

   Perform a short test using your terminal program.

(TeraTermPro, ProcommPlus).

Open the terminal program and enter the command.

AT *Enter*

LED RXTX lights up for a short time

When the message appears on your monitor, the device has been successfully installed.

OK

8. Check the communication using the configuration program HSComm

Open installed HSComm The configuration program will automatically search for the connected modem

9. Connection to the telephone network

Connect the modem with the phone outlet, using the supplied phone cord.

10. Connection Test

Perform a manual connection, either to another modem or, in this example, to Freenet.

Dial the following number **0101901929**

ATDT 0101901929

ATX3DT 0,0101901929

For PBXs that require a code number to establish a connection - usually "0"- a different command must be used.

The modem will establish a connection

LED OH lights up

Connect…

4.5 Installation of a USB Driver

(Only for HELMHOLZ Modem 56k USB small)

The installation of the HELMHOLZ modem 56k USB small is performed in three steps. During the first two installation steps, a virtual COM port is installed, through which a modem can be addressed via a terminal program or the configuration software HSComm.

During the third step, a modem driver can be installed, which can address the HELMHOLZ Modem 56 k USB small at the just installed COM port.

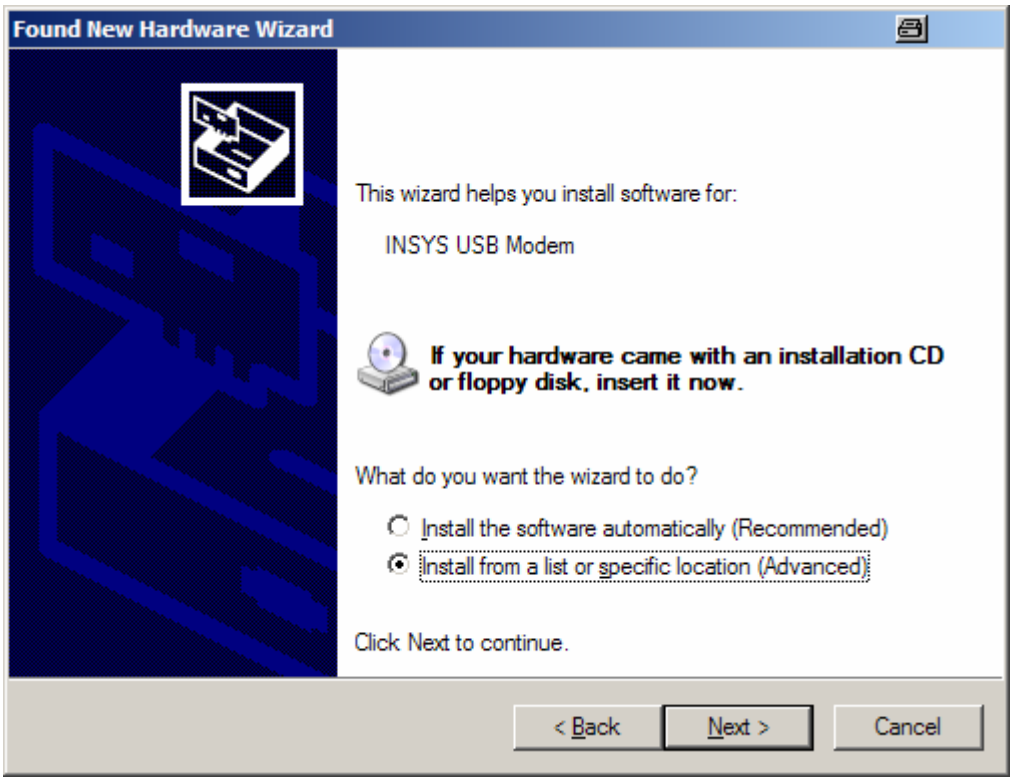
The following describes the installation of the driver using the operating system Windows XP. The installation of the driver using Windows 2000 is slightly different, but in general very similar.

Note: The installation of the driver files creates a virtual serial interface (COM port) on the computer. The PC will treat this interface like a "real" serial interface. All commands and functions in this manual which relate to serial interfaces can also be used for the version HELMHOLZ Modem 56k USB small.

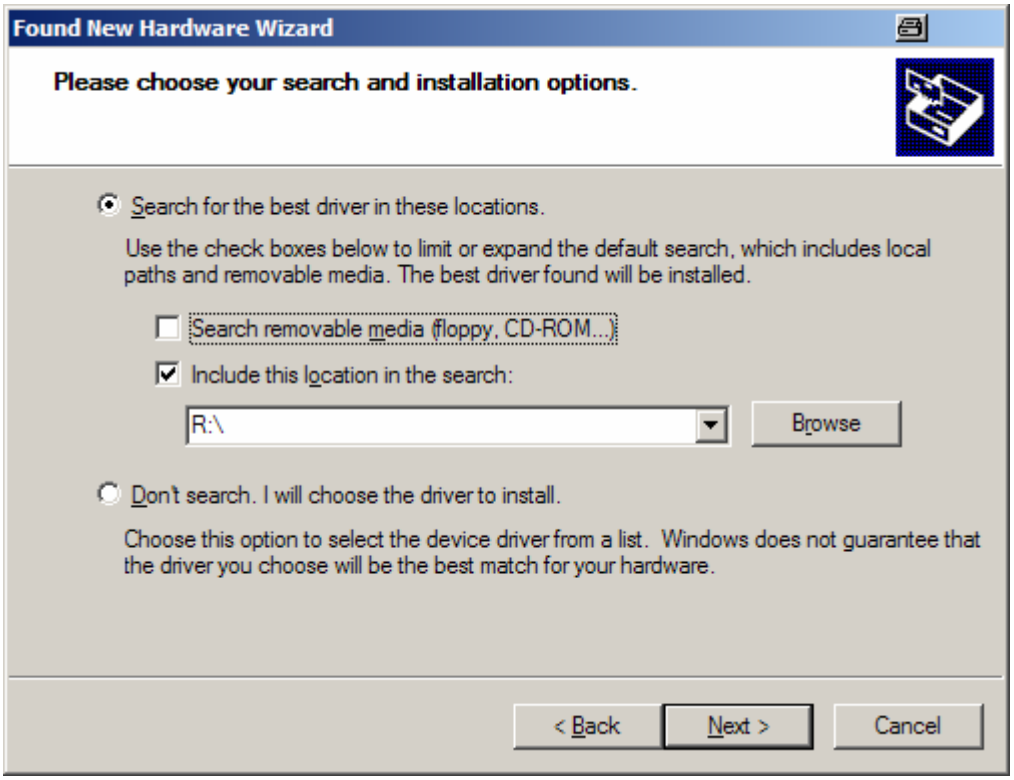
4.5.1 COM port installation

When connecting the modem, the following dialog is displayed:

Click on "Next"...



Select the item "Software from a list..." and click on "Next"...

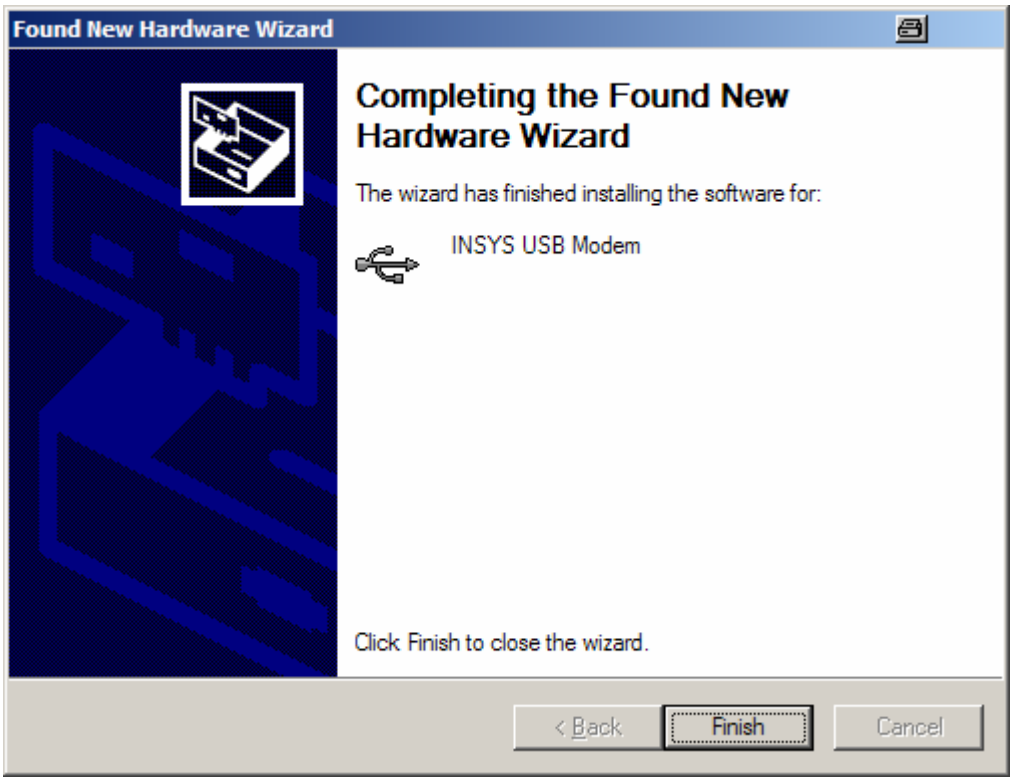


Click the button "Browse" and enter the path to the location of the driver information.

E.g.: <CD Drive>\Driver\small_USB

The system will now search for the driver information.

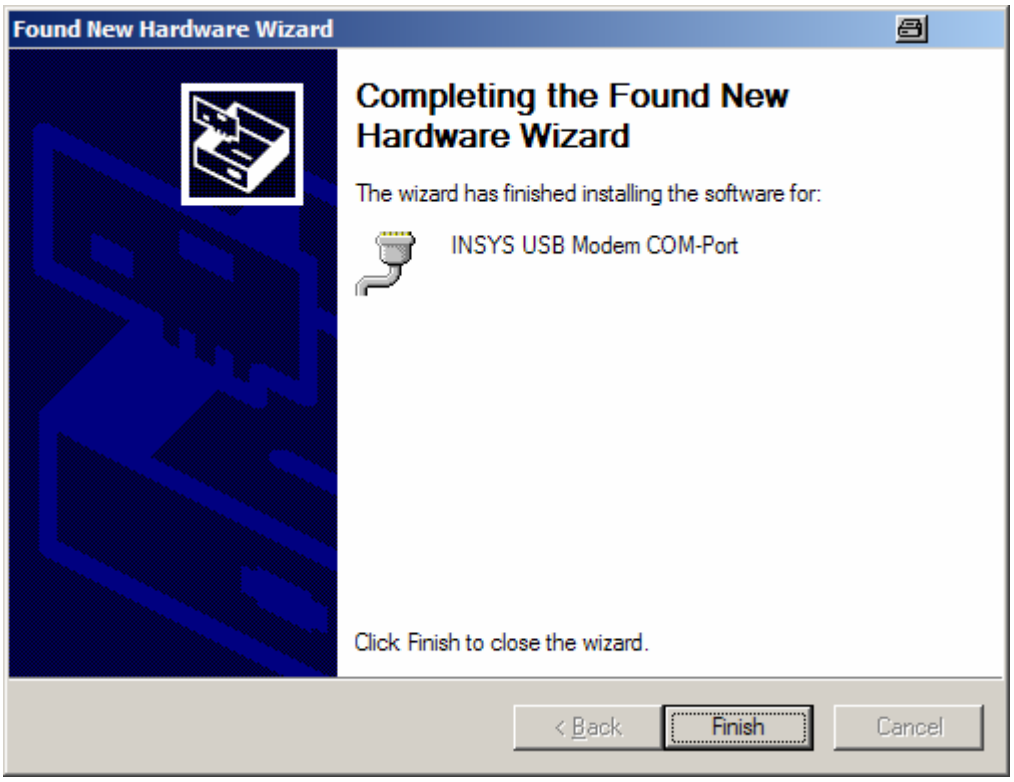
Confirm any warning message from Windows XP by clicking the button "Continue installation".



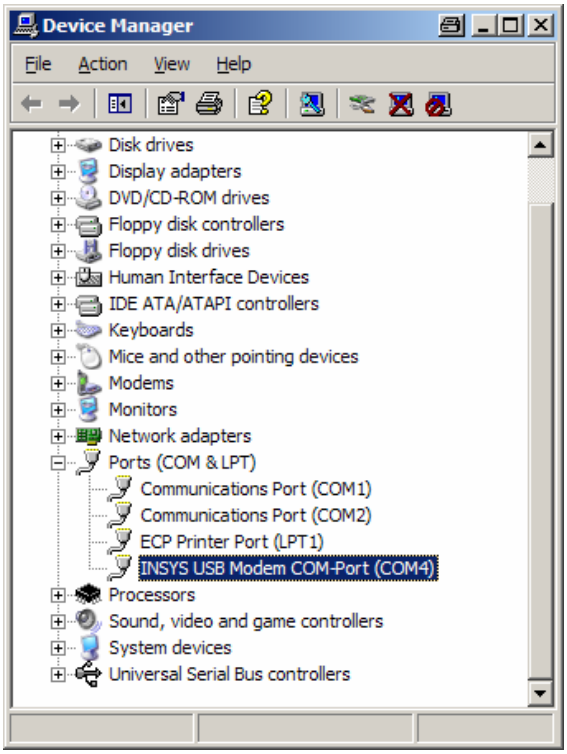
Click on "Finish" to complete the first part of the installation.

Note:

Immediately after the first driver has been installed, this installation route must be performed the same way a second time to install the second part of the driver.



After the second installation has been completed, the system has a new COM port available. You can check the installation by opening the device manager in the start menu at Control Panel ->System -> Hardware -> Device Manager



In this example, the modem was installed at COM port 4. The modem can now only be addressed via this COM port, using the configuration software HSComm, for example.

For many applications, the installation up to this point is sufficient.

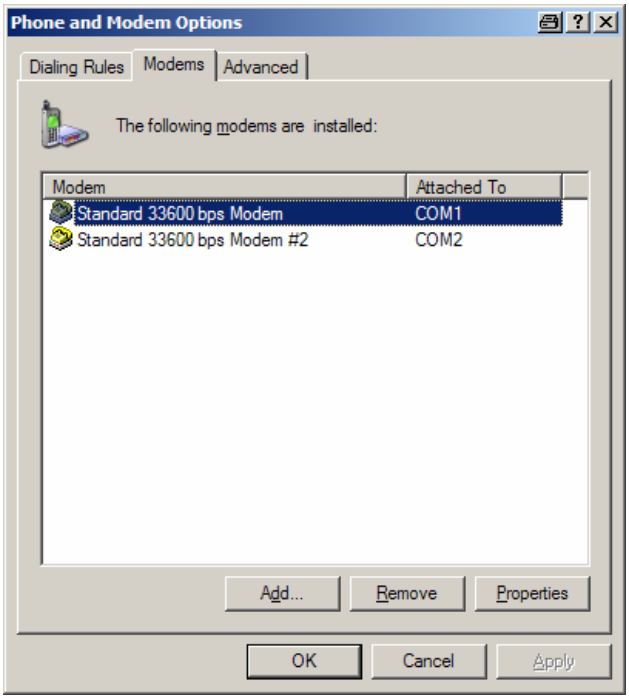
If the modem is supposed to appear as a modem in the control panel as well (e.g. to setup a RDT - remote data transmission - connection), you must install an additional modem driver to ensure the functioning of the installed COM port. The following Chapter will show the details.

4.5.2 Modem Driver Installation

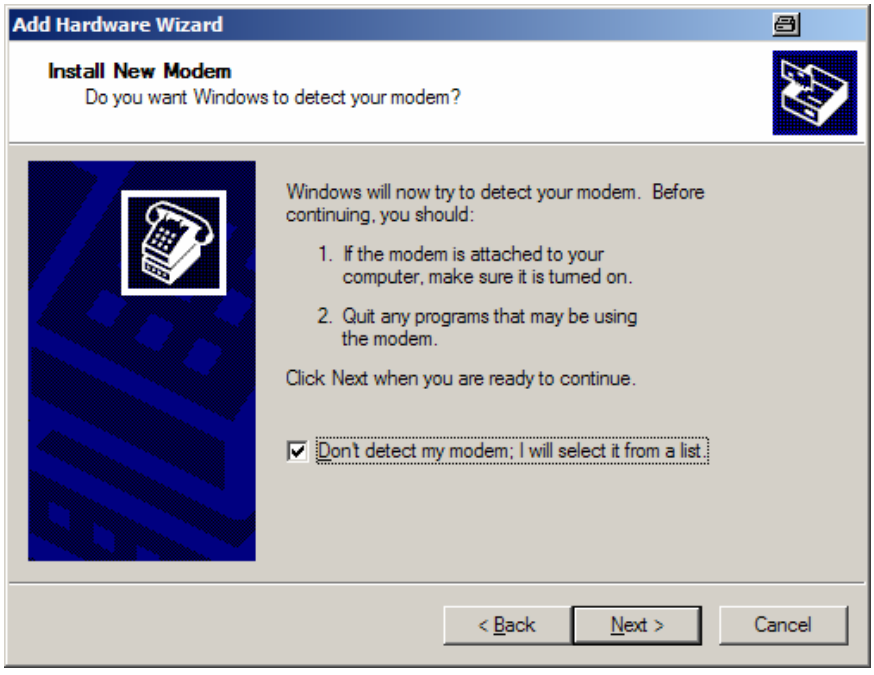
The following describes the installation of a driver for an HELMHOLZ Modem. Open the modem management in the control panel.

Start menu:

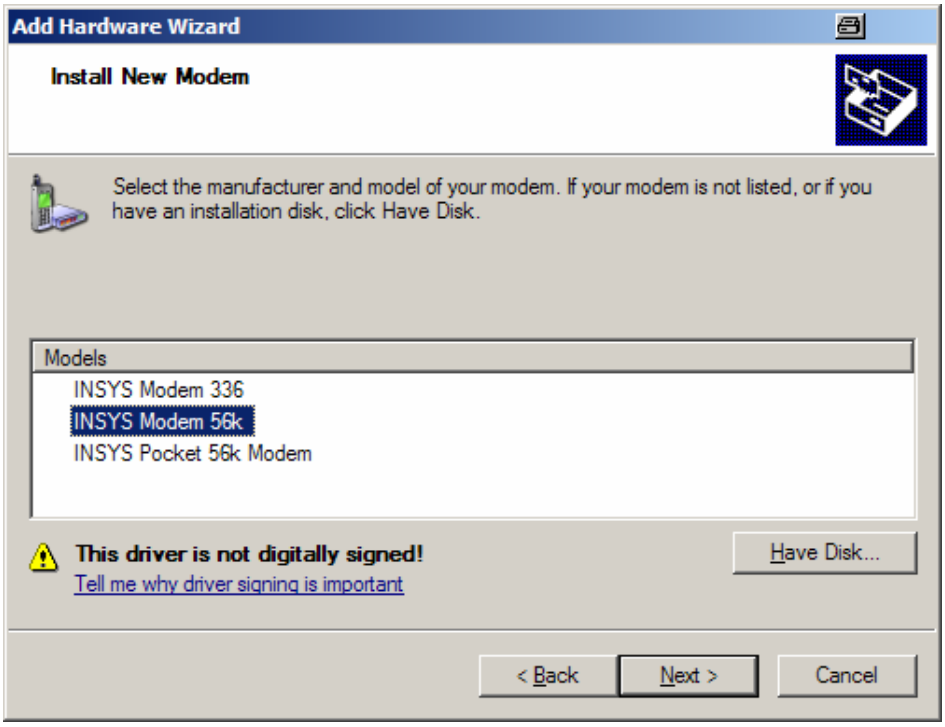
Control Panel ->Network and Internet Connections -> Phone and Modem Options



Start the installation using the button "Add".

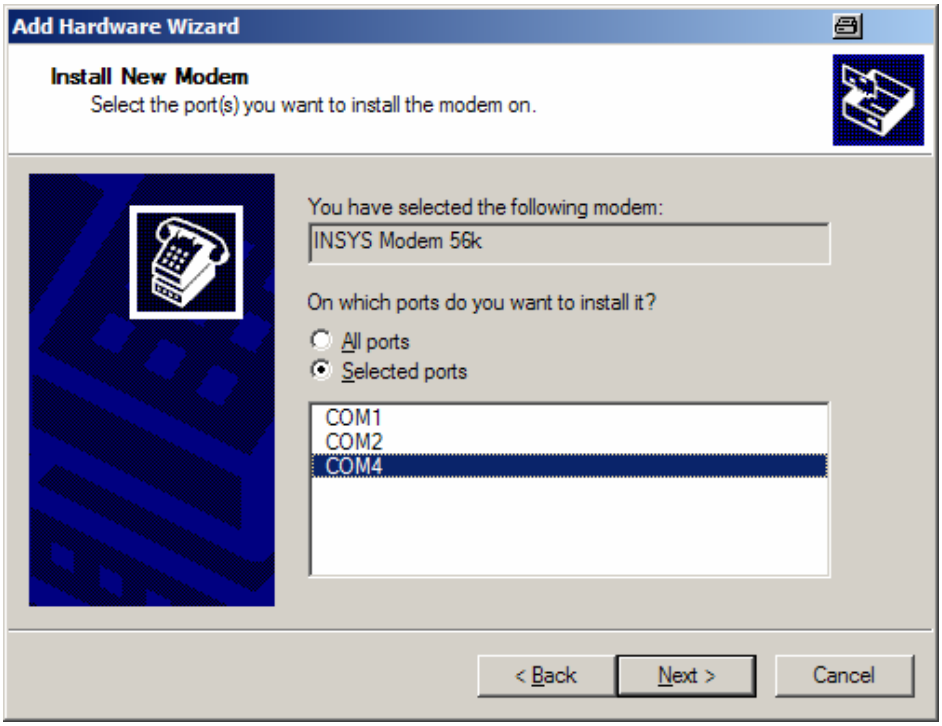


After activating the check box "Select Modem", click on the button "Next".



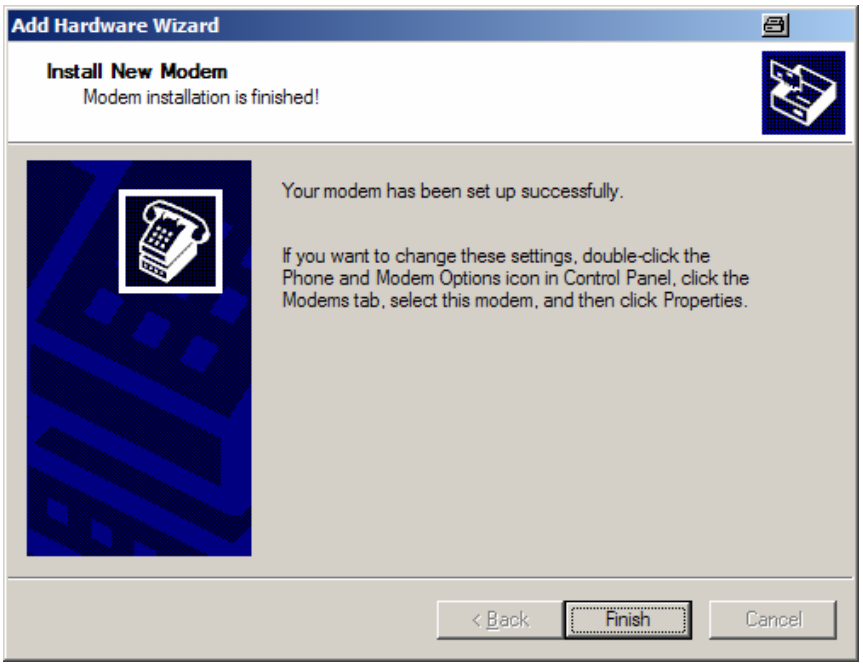
You can now either install a standard modem 56k or a special HELMHOLZ modem driver. If necessary, you may need to enter the storage location manually using the button "Disk Drive" to select the storage location.

E.g. at: <CD Drive>\DIN_Rail\Driver\Modem



Now enter the COM port for the modem connection. Use the virtual COM port that was installed in the previous chapter. In our example, this is COM 4.

Click on "Next" to complete the installation.



The installation is completed.

5 Functions

5.1 Configuration

5.1.1 Configuration Change

Loading the factory settings into the active profile will enable you to easily recover an executable state.	**AT&F**	
Loading the user profile 0	**ATZ0**	**ATZ**
Loading the user profile 1 Prior to the loading of the user profile, a reset is performed.	**ATZ1**	
The settings of all profiles can be displayed in a chart.	**AT&V**	

Example:

The active profile will show all settings currently used by the modem.

```
ACTIVE PROFILE:

B3 E1 L1 M1 Q0 T V1 W0 X4 *A1 *L0 *M0 *P0 *R1 %B0 %C3 %E2 %S0

\A1 \N3 \V0 &A0 &C1 &D2 &G0 &K3 &Q5 &R1 &S0 &X0 &Y0

S00:005 S02:043 S06:003 S07:050 S08:002 S09:006 S10:014 S11:085
S12:050 S13:003

S15:000 S17:042 S18:000 S24:000 S36:135 S40:104 S41:195 S46:138
S95:000
```

Our example currently shows the settings from user profile 0.

User profile 0:

```
STORED PROFILE 0:

B3 E1 L1 M1 Q0 T V1 W0 X4 *A1 *L0 *M0 *P0 *R1 %B0 %C3 %E2 %S0

\A1 \N3 \V0 &A0 &C1 &D2 &G0 &K3 &Q5 &R1 &S0 &X0

S00:005 S02:043 S06:003 S07:050 S08:002 S09:006 S10:014 S11:085
S12:050 S13:003

S15:000 S17:042 S18:000 S24:000 S36:135 S40:104 S41:195 S46:138
S95:000
```

User profile 1:

```
STORED PROFILE 1:

B3 E1 L1 M1 Q0 T V1 W0 X4 *A1 *L0 *M0 *P0 *R1 %B0 %C3 %E2 %S0

\A1 \N3 \V0 &A0 &C1 &D2 &G0 &K3 &Q5 &R1 &S0 &X0

S00:005 S02:043 S06:003 S07:050 S08:002 S09:006 S10:014 S11:085
S12:050 S13:003

S15:000 S17:042 S18:000 S24:000 S36:135 S40:104 S41:195 S46:138
S95:000
```

Note: The user profiles 0 and 1 can be modified without affecting the active profile.

Storage location for the phone numbers:

```
TELEFONNUMMERN:
```

0= <Z0> 1= <Z1>

2= <Z2> 3= <Z3>

5.1.2 Save Configuration

If the modem configuration was adjusted to certain user requirements, these settings can be saved in the user profiles 0

AT&W0 AT&W

or 1.

AT&W1

Configuration changes will be lost after a RESET or restart if they were not saved before.

5.2 Serial Data Transmission

5.2.1 Automatic Baud Rate Detection

For each received **AT** command, the modem automatically performs an adjustment to the set baud rate, the number of data and stop bits, and the parity.

The adjustment to the transmission speed on the phone line is performed automatically, unless the settings say otherwise. During the establishing of a connection both modems attempt to achieve the joint fastest speed on the phone line.

For an existing connection, the modem must first switch to command mode.

+++

Use the following command to receive the transmission settings:

AT+MS?

E.g.: *+MS: V92,1,300,48000,300,56000*

This means that a connection between 300 and 56000 bps was established, preferably according to V.92, depending on the line quality and the abilities of the remote terminal.

Query the quality of an existing connection

AT%Q

Query the level of an existing connection

AT%L

Display the connection statistics after the connection is terminated

AT&V1

5.2.2 Data Buffer for Serial Data Transmission

The modem has a fast send and receive cache (so-called buffer) to adjust the modem to the operating speed of the application. It is, however, possible to deactivate this data buffering and switch to bit direct mode.

When working with buffers, handshake is recommended to avoid transmission errors.

5.2.3 Bit direct mode

Only for special, non-standard data formats.

In bit direct mode, the modem has no influence on the transmission format. Data is transmitted without buffering.

Data compression or error correction will not work in bit direct mode. Only the abort sequence - default +++ - is utilized by the modem.

AT\N1

5.2.4 Hardware Data Flow Control with RTS/CTS

Hardware Data Flow Control with the Modem (CTS):

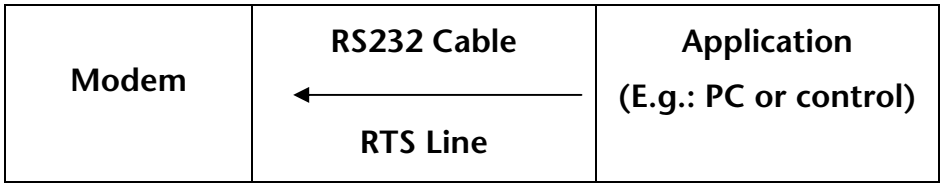
Modem	RS232 Cable → CTS Line	Application (E.g.: PC or control)

When the input buffer of the modem exceeds a certain fill state, the modem will set the CTS line to OFF. This indicates to the application not to send any data.

AT&K3 AT&R1

After the modem has operated the input buffer so far that the XON buffer falls below a certain fill state, it switches the CTS line back ON and reports to the application that it is ready to receive data again.

Hardware data flow control with the application (RTS):

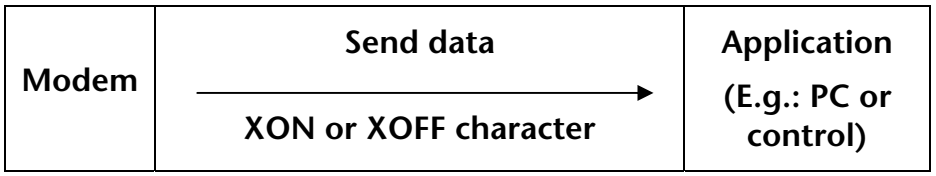


The application sets the RTS line to OFF to request from the modem to interrupt the data transmission.

It will depend on the according application software if the RTS/CTS lines can be operated. **AT&K** **AT&R**

The application sets the RTS line to ON to request data from the modem.

5.2.5 Software data flow control XON and XOFF



When the input buffer of the modem exceeds a certain fill state, the modem will insert an XOFF character into the data stream to the application. This character will cause the application to send no more data.

It will depend on the according application software if the RTS/CTS data flow control is supported. **AT&K4**

After the modem has processed the input buffer so far, it will insert a XON character into the data stream. This character will cause the application to send data to the modem again. Analogously, the applicaiton can control the data stream from the modem to the application.

The XON/XOFF method is only available when the transmitted data do not contain the characters XON or XOFF, which usually appear only in actual ASCII texts (7 bit). When binary data (programs, ...) are transmitted, also for BTX operation or in the XMODEM transmission protocol, for example, occasionally appearing XON or XOFF characters would disturb the operation.

5.2.6 Reset

There are three reset options:

- After the power supply has been interrupted for a short time.
- After the terminal RESET is connected to the terminal GND
- With the help of the terminal program

After the hardware reset, load the user profile 0 **ATZ0** **ATZ**

After the hardware reset, load the user profile 1 **ATZ1**

5.2.7 Dial-up delay

The standard TBR21 applies to all public phone networks in EU countries (Belgium, Denmark, German, Finland, France, Greece, Great Britain, Ireland, Italy, Luxembourg, Netherlands, Austria, Portugal, Sweden, Spain), as well as in Switzerland, Liechtenstein, Norway and Iceland.

According to the TBR 21 regulations, after 12 futile dial-up attempts each further dial-up is locked within 2 hours. In this case, the modem must be temporarily switched off.

The counter is automatically reset after each successfully established connection.

After the connection has been established, a dial delay of 5 seconds is observed.

5.3 Error correction

The modem masters the V.42 error correction protocol including the Microcom Networking Protocol Levels 2/3/4 (MNP2, MNP3, MNP4) and the data throughput optimization MNP10.

5.3.1 V42 Error Correction

The V.42 error correction includes the protocols LAPM (Link Access Procedure for Modem) and MNP 4. LAPM is the preferred error correction.

MNP 4 is supported for compatibility reasons with other MNP modems. Both methods determine frames to transfer net data and use CRC (Cyclic Redundancy Check) check sums for error tests.

In V.42, the possibility exists to have the modem identify if the partner is a V.42 modem, a MNP modem, or a modem without error correction. The modem can then autonomously adjust to the partner.

5.3.2 MNP 2/3/4 error correction

The maximum block size can be set to either

64 byte	**AT\A0**
128 byte	**AT\A1**
192 byte	**AT\A2**
and 256 byte.	**AT\A3**

The MNP error correction can either be set automatically or activated via **AT** commands. **AT\N<n>**

5.4 Data compression

The modem will identify the type of data compression used by the other modem, or it is fixed on a certain type or no data compression. **AT%C<n>**

Data compression is only available for error corrected connections.

To be able to use data compression, both sides (sender and recipient) must be able to recognize the same data compression mode.

5.4.1 V.42bis Data Compression

Switch on V.42bis data compression **AT%C3**

Switch off V.42bis data compression **AT%C0**

V.42bis data compression may only be performed for a V.42 connection (LAP-M or MNP 4). First of all, V.42bis generates a so-called dictionary for the data compression, which contains frequently used character sequences. After that, only short references to these character sequences and not the complete character sequences are transmitted to the other modem. **AT%C2** **AT%C3**

V.42bis cannot re-pack packed data.

5.4.2 MNP 5 Data Compression

The modem masters the Microcom Networking Protocol Level 5. MNP 5 data compression can only be performed for an error corrected MNP 4 connection. MNP 5 replaces frequently used characters by shorter characters, so-called tokens. **AT%C1** **AT%C3**

MNP 5 cannot re-pack packed data.

5.4.3 V.44 Data Compression

The V44 data compression offers better compression of typical internet content than V.42bis. V.44 also requires an error corrected connected, just as V.42bis, and cannot re-compress already compressed data.

Switch off V.44 data compression **AT+DS44=0**

Switch on V.44 data compression **AT+DS44=3**

5.5 Selective Call Answer

If the selective call acceptance is activated, the modem will only accept calls from certain callers. The identification of permitted callers takes places via the caller ID transmission (CLIP). This must, however, be supported by the phone system or the exchange connection, where the modem is connected to.

Activate the selective call acceptance	**AT&A1**
Deactivate the selective call acceptance	**AT&A0**
Display a complete list of saved phone numbers for the selective call answer.	**AT*N?**
Delete the complete phone list for the selective call acceptance.	**AT*N99=**
The list of phone numbers has 8 storage locations altogether (N0 to N7). Only if the transmitted phone number **<nr>** matches a phone number that was entered in the list will the modem accept the call according to the settings.	**AT*N<n>=<nr>**
E.g.: Store phone number 1234 at storage location 6.	**AT*N6=1234**
The memory **N<n>** accepts all phone numbers ending in **<nl>**.	**AT*N<n>=<nl>**
Our first example activates all phone numbers ending in 941586920. The following phone numbers are activated: 0941586920, 00490941586920 und +49941586920	**AT*N7=941586920**
Our second example activates all phone numbers ending in 0941586920. **Only** the phone number 0941586920 is activated.	**AT*N7=0941586920**

The list of phone numbers may also contain wildcards "'*". This allows the activation of entire blocks of phone numbers. The wild card character ("*") replaces exactly 1 character of the phone number.

AT*N<n>=94158692**

Our example will activate all phone numbers that start with 94158692** and have 2 more digits (e.g.: an extension).

AT*N6=94158692**

The phone number may not contain separators such as brackets or space characters.

The phone numbers can be deleted individually in two different ways.

- Delete the entered phone number
  E.g.: Delete the number stored at the storage location 5

AT*N<n>=
AT*N5=

- Overwrite the storage location with a new phone number.
  E.g.: Storage location 5 with phone number 456.

AT*N<n>=456

AT*N5=456

Display the last phone number whose call was rejected. This phone number is not saved in the power fail-safe memory of the modem, i.e. after a restart of the modem the display will be empty.

AT%N

5.6 Send Messages

Note: The sending time of an SMS from the sender to a recipient depends on the pertinent provider of the service number. Depending on the degree of utilization and the time of day, an SMS may be on the way for an extended period.

5.6.1 Transmission Configuration

The modem can not only send the alarm message to another analogue modem, but also to a mobile phone as an SMS. Currently GSM900 and GSM1800, and SMS to fixed networks, fax and e-mail.

The maximum text length is 160 characters.

Protocol settings – see table - **AT*M<n>**

Transmission	Protocol	Data format	Example	
Data Connection				**AT*M0**
SMS to Mobile	PET	8N1	D1 or E Network	**AT*M1**
SMS to Mobile	UCP	7E1		**AT*M2**
SMS to Mobile	PET	7E1		**AT*M3**
SMS to Mobile	UCP	8N1	D2 network	**AT*M4**
Fax				**AT*M5**
SMS to Mobile or Fixed Network				**AT*M6**

Enter the service number of the network provider to send SMS, or the phone number for fax and data connections **AT&Z0=<phone number>**

Definition of the collective message

Definition of the variable alarm texts and phone numbers to send SMS (alarm text 1 or 2). After this command is activated, the modem will query the alarm text. **AT*V1** **AT*V2**

The modem will reply with

new text:

and expects the input of the phone number and the alarm text in the form

<phone number, text>

For the transmission, the variable part (maximum of 80 characters) will be attached to the common part (maximum of 160 characters) of the collective message. Of the maximum of 240 characters, the first 160 characters are sent as SMS.

Some network providers support SMS forwarding to a fax machine or an e-mail address.

All necessary information is available from the customer service of the provider.

Please find an overview of the required settings for network providers in German-speaking countries in the attachment.

5.6.2 Triggering

Manual triggering of the collective message

AT%A

Manual triggering of the alarm messages 1 or 2 via the **AT** command.

AT%A<n>

For the transmission, all in all, 3 attempts (factory default) are made. These values (1...12) can be changed with the S registry S13

ATS13=n

When the alarm is triggered via SMS, the modem will return a status

- Message was successfully sent — *OK*
- Error during the message transmission — *ERROR*

After the message was sent, the connection is terminated.

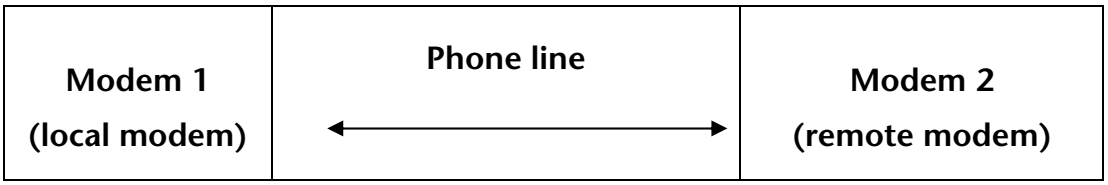
5.6.3 Fax logging

All alarm messages can also be sent to a fax number for logging reasons.

AT&Z3=<phone number>

5.7 Remote Configuration (Remote Control)

5.7.1 Mode of Operation



To switch into the remote configuration mode, a data connection must be established between the modems. A certain connection type is not mandatory, we recommend, however, using only error corrected connections for remote configuration, to avoid transfer errors for the commands.

The local modem is not required to master any remote configuration type.

5.7.2 Remote modem preparation

Auto answer	**ATS0=2**
Deactivate security callback	**AT&Z1=**
Release modem for remote configuration	**AT*R1**
Save entry	**AT&W0 AT&W1**

5.7.3 Remote modem password change

Change password	**AT*C**
	OLD PASSWORD
Enter old password (default: **QWERTY**)	**QWERTY**
Enter new password	*NEW PASSWORD*
Re-enter new password	*Confirm*

5.7.4 Start of the remote configuration at the local modem

Dial the modem	**ATD <phone number>**
The modem will establish a successful connection	*Connect…*
Switch to remote configuration mode	********
Prompt for entering the password	*Remote Access* *Remote Passwort:*
Enter password (default: **QWERTY**)	**QWERTY**
If the entry was successful, the remote modem will send the input prompt	>

5.7.5 Reduced command set

Some commands may not be executed during remote configuration and	**ATA** **ATD** **ATO** **AT/B** **AT&F**
will result in the following response:	*ERROR*

5.7.6 Terminate remote configuration

Before you complete the remote configuration, save all settings in profile 0 or 1.	**AT&W0** **AT&W1**
Several commands may be used for termination.	
Return to online mode without software reset	**AT*E** **AT*X**
Software reset with interruption of all connections The modem loads the user configuration 0 or 1.	**ATZ0** **ATZ1**

5.8 Access Control

5.8.1 Password

To protect from unauthorized access via the phone line, the modem may be protected by a password. This password is used to establish a data connection, as well as for security callback and remote configuration

AT*C

The default setting is **QWERTY.**

5.8.2 Data Connection

An incoming connection is only released after the caller has entered the password.

Activate password protection **AT*P1**

Deactivate password protection **AT*P0**

5.8.3 Security callback

The feature Security Callback will cause the remote modem to hang up and call back a preset number.
This function will only be performed after a password has been entered and is therefore a safe protection against unauthorized access.

5.8.3.1 Preparation

As a preparation, security callback is activated by saving the call back number in the phone number registry of the modem that is calling back.

AT&Z1=<phone number>

The deactivation takes place by deleting the call back phone number.

AT&Z1=

5.8.3.2 Operation

Establishing a connection to the modem.	**ATD <Renumber>**
The connection to the modem is established. The modem responds to an incoming call.	*Connect* *SECURITY CALLBACK* *REMOTE PASSWORD:*
You must now enter the “Remote Password”, which is identical to the password for the remote configuration. (default: **QWERTY**)	**QWERTY**
After the password has been entered correctly, the modem hangs up and after about 10 seconds dials the stored phone number. Altogether, 3 dialing attempts with a pause of 10 seconds between each attempt are performed.	*OK* *No Carrier*
If the entered password was incorrect, the connection is terminated and thus prevents unauthorized access to the connected device.	*No Carrier*
After that, a normal data connection is established.	*Callback in Progress*

5.9 Data Transmit Controller (Idle Connection Control)

The Data Transmit Control (DTC) is a function integrated in the firmware which monitors the data transmission in online mode. This function prevents the modem to stay online for an unlimited amount of time, although no data is being transmitted anymore.

5.9.1 Activation

The activation takes place in the S15 registry. Any time period between 1 and 255 seconds may be set.

ATS15=<n>

5.9.2 Mode of Operation for the "Timer"

The timer will run immediately after the modem goes off-hook. After the set time has been reached, a RESET is performed. The timer is reset by each byte that is sent via the serial interface.

Note: **The timer will run immediately after the modem goes off-hook. We therefore strongly recommend to not setting any times below 30 seconds.**

In remote mode, idle connection control at the modem must be deactivated to prevent the connection from being interrupted after the timer has run out.

The remote data transmission will not reset the timer.

5.10 Priority Circuit for Modems with Phones Connected in Series

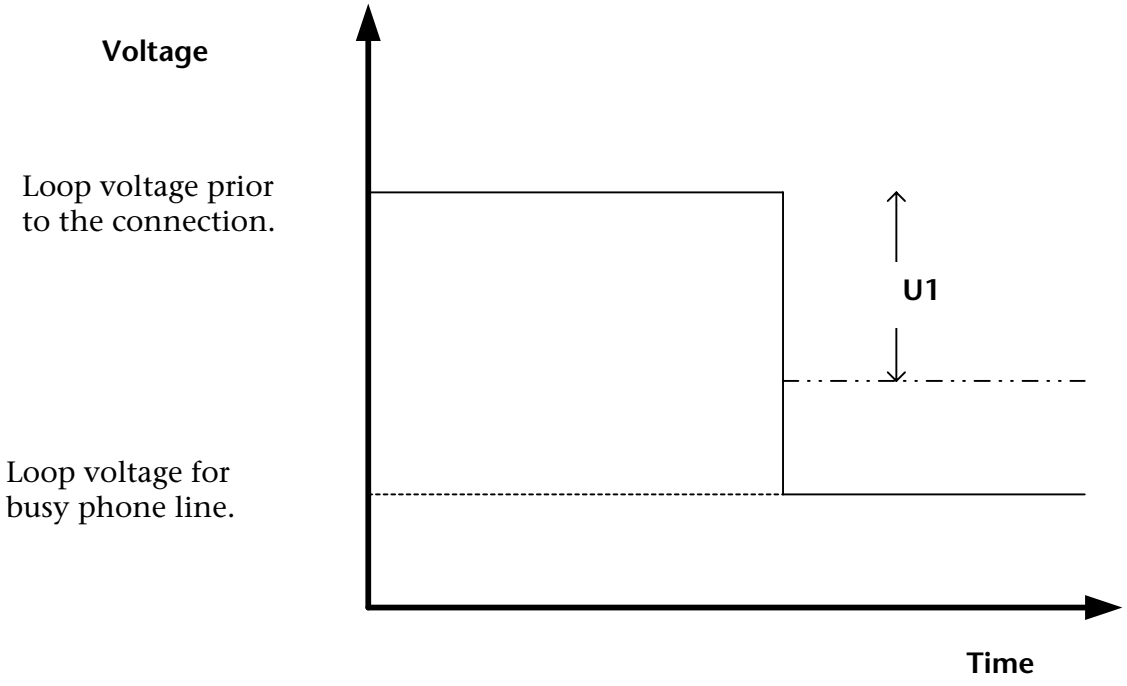
The HELMHOLZ Modem 56k small gives a phone connected in series priority, to make sure it interferes as little as possible with the usage of the phone connection.

Command	Function 1 (Chap. 5.10.1)	Function 2 (Chap. 5.10.2)	Function 3 (Chap. 5.10.3)	
AT-STE=0	==	==	==	(default)
AT-STE=1	√	==	==	
AT-STE=2	==	√	==	
AT-STE=3	√	√	==	
AT-STE=4	==	==	√	
AT-STE=5	√	==	√	
AT-STE=6	==	√	√	
AT-STE=7	√	√	√	

5.10.1 Detecting a busy phone line

During a dial-up attempt, the model detects the busy phone line. The modem reports ***LINE IN USE***

Changing the loop voltage to detect the function – Detection of a busy line (**U1**) – can be set with the help of **AT** commands. **AT-TTE=U1, U2, U3**



5.10.2 Going off-hook on account of a telephone connected in series

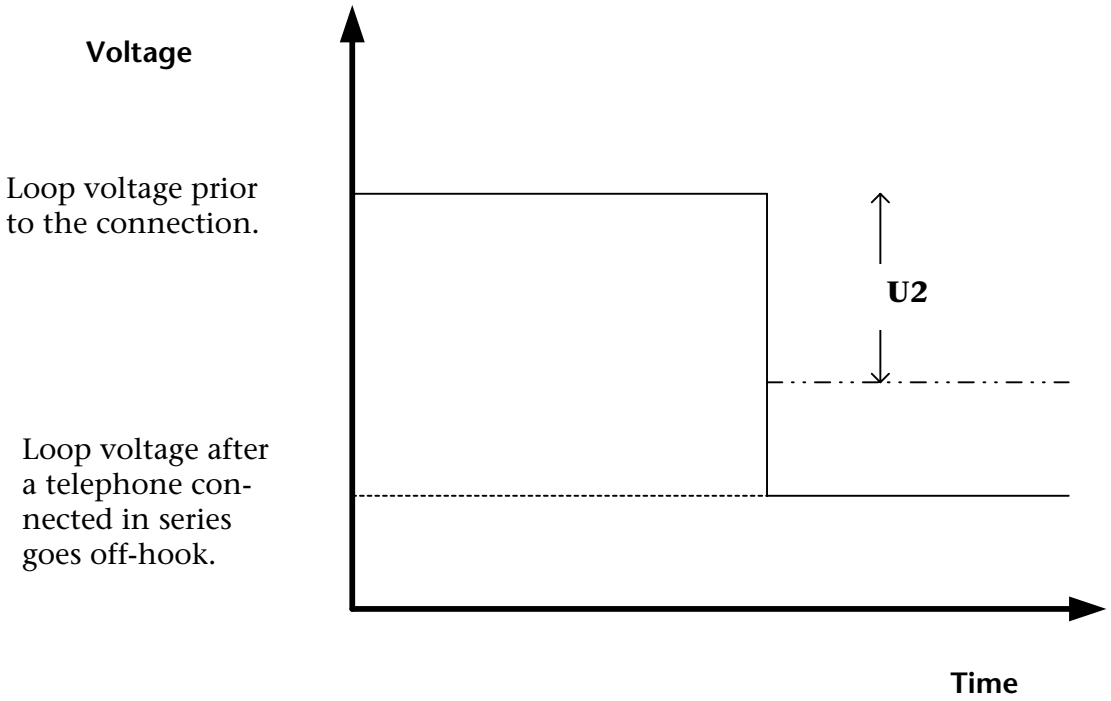
If a telephone connected in series goes off-hook during an existing modem connection, the modem will immediately terminate the connection.

The telephone is connected to the line and receives a dialing tone.

In the registry S86, the value is set to 25. **ATS86=25**

When the phone connection is terminated, the modem will not establish a new connection.

Changing the loop voltage to detect the function – Off-hook on account of a telephone connected in series (**U2**) – can be set with the help of **AT** commands. **AT-TTE=U1, U2, U3**



Note: **The detection starts immediately after the handset is picked up. To access the exchange, simple analogue phone systems often connect the modem per contact directly with the exchange, which results in a strong change or polarity reversal of the loop voltage. For some analogue phone systems, this may result in an erroneous detection. Off-hook detection is therefore not recommended in connection with analogue phone systems.**

5.10.3 Remote Terminal Connection Abort

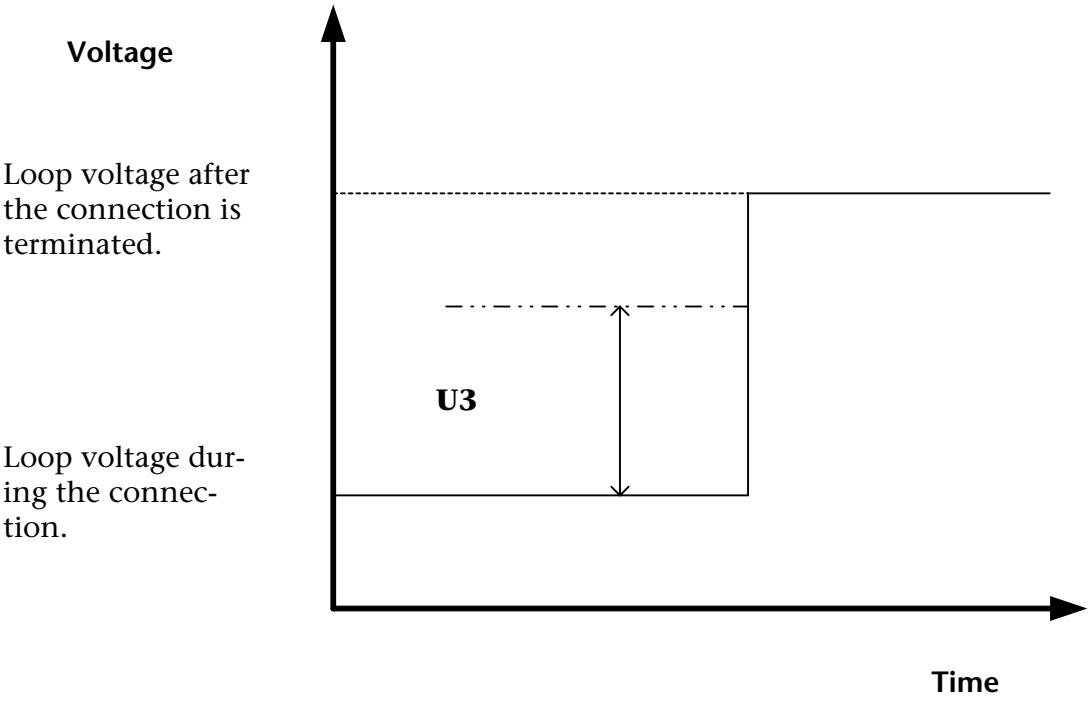
When the remote terminal aborts a connection, the modem will immediately hang up.

In the registry S86, the value is set to 25.

ATS86=25

Changing the loop voltage to detect the function – Remote Terminal Connection Abort (**U3**) – can be set with the help of **AT** commands.

AT-TTE=U1, U2, U3

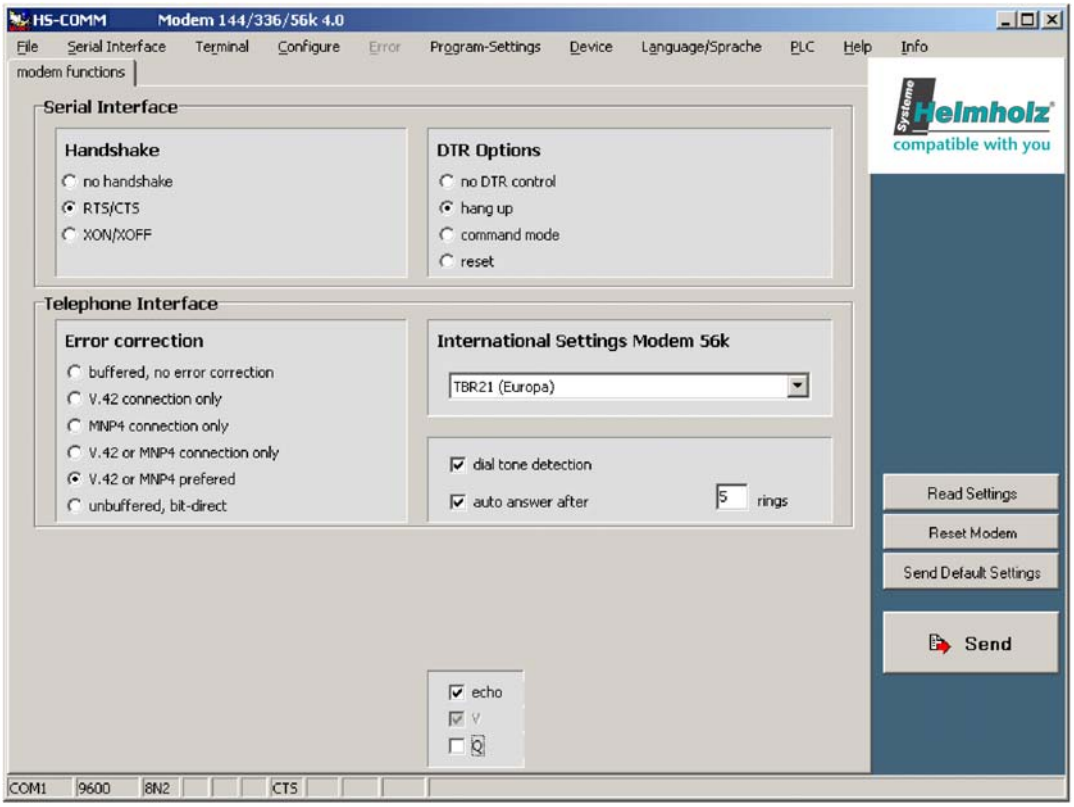


Note: **This detection is based on the change of the loop voltage (AT-TTE=U1, U2, U3). It will not work for all connections. ISDN phone systems in particular often suppress the hang-up noise.**

6 Configuration Software HSComm

The configuration of the HELMHOLZ modem takes place via **AT** commands which are entered by a terminal program or a control program in the form of character sequences. For a simple set-up, all basic functions of the HELMHOLZ modem can be entered without knowing the individual commands and their parameters, using the configuration software.

The software can be installed on all common Microsoft Windows operating systems. A terminal window to enter commands directly is available.



At the start or via the menu *Device* → *Device*, HSComm verifies the connected device and displays the device name and the firmware in the right top program window. By default, only those settings can be selected which are implemented in the identified device.

The buttons in the right column can be used to select the current settings, to restart (reset) the device or to set the default options. The selected configuration of the parameters is only sent to the HELMHOLZ modem after you click the button SEND.

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

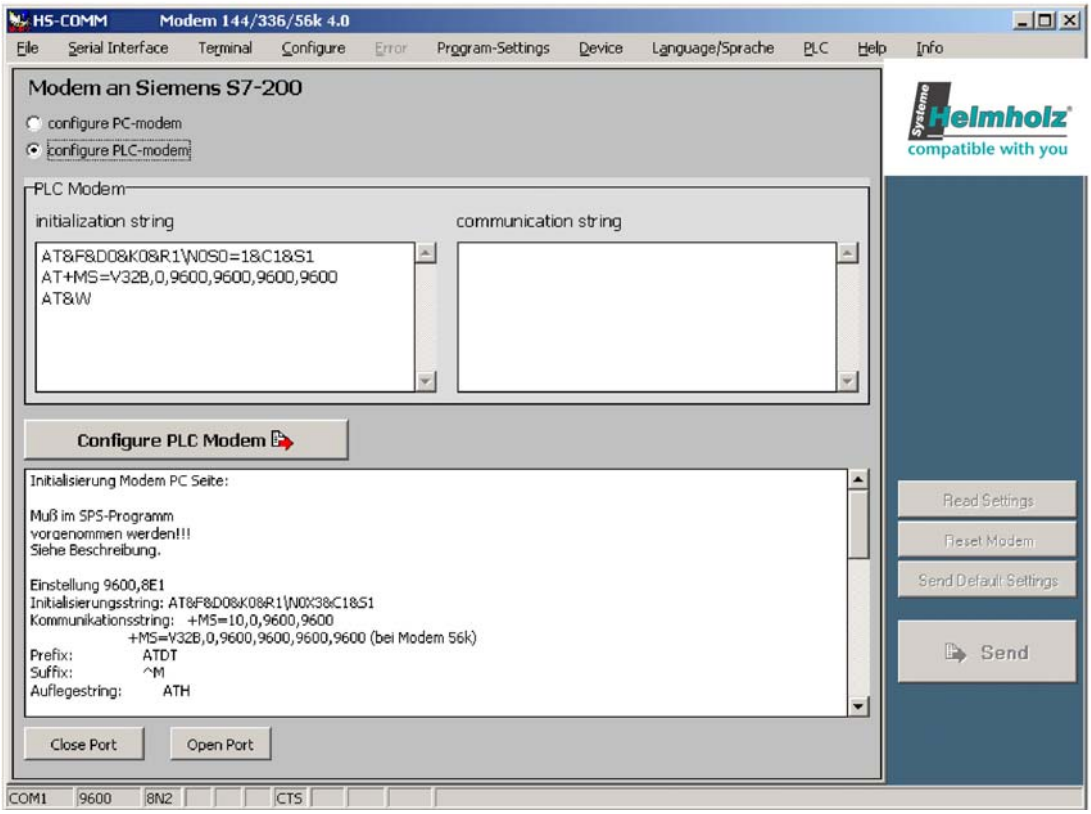
When an error occurs while transmitting a configuration to the HELMHOLZ modem, these are displayed in the *Error* menu.

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

7 Operation with a PLC

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

The documentation (Application Notes) of the settings required for the respective PLC can be queried at Systeme Helmholz GmbH (E-mail: **info@helmholz.de**).



HSComm offers a range of recommended settings for the modems connected at the PLC or the PC at the control center.

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

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

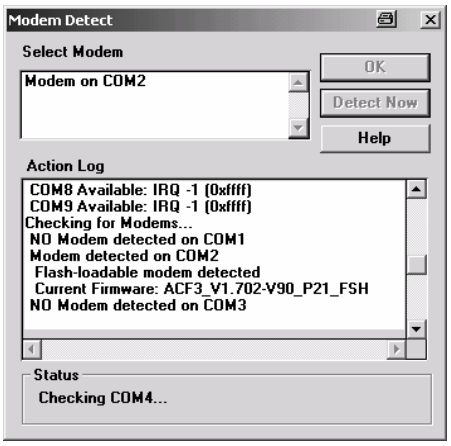
8 Firmware Update

8.1 Flashcom.exe

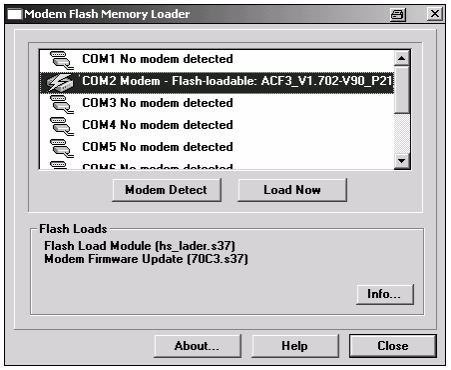
This function enables firmware updates of the modem without switching the EEPROM. The new version is available from your service partner.

Query of the used firmware **`ATI4`**

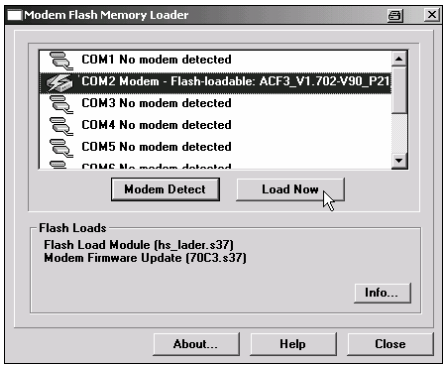
Unpack the file into any directory on the PC and start Flash-com.exe.



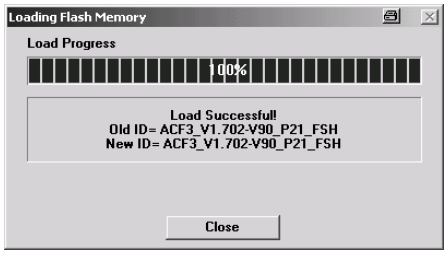
The program will automatically search for the connected modem.



Select the according HELMHOLZ Modem and start the update.



Close the window when the update is completed.



8.2 Terminal Program

8.2.1 Requirements

For the firmware update, you will need a PC and a terminal program. The terminal program must be able to perform an ASCII upload (ASCII data transmission protocol). Setting the hardware flow control is mandatory. For safety reasons, any interpretation of characters (e.g.: TAB, CR, BS...) by the ASCII upload protocol must be prevented.

The baud rate must be between 9,600 baud and 57,600 baud. Other baud rates may lead to errors. The loading procedure takes about 2 to 3 minutes for 57,600 baud; for lower baud rates accordingly longer.

8.2.2 Activation and Process

Start of the flash update	**AT****
The modem sends a response	*Download initiated…*
	Transfer file with the help of the terminal program.
The update is performed in two steps:	*Download Flashcode*

- ASCII upload of the file HS_LADER.S37
- ASCII upload of the firmware (xxxxxxxx.S37)

Device successfully programmed

The process is finished as soon as the loading procedure is completed.

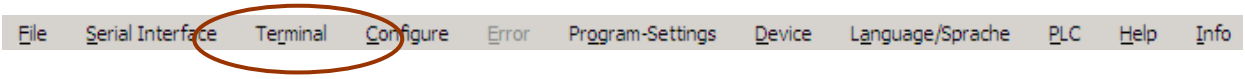
Monitoring of Results:

The transfer process is indicated by dots on the monitor (of the terminal program).

Note: **For the terminal program Telix, the delay settings between the character and the lines must be set to "0" for the ASCII protocol.**

9 AT Command Set

All HELMHOLZ communication devices are controlled internally via **AT** commands. A terminal program is integrated in the HSComm. The **AT** commands can be directly entered at the menu item "Terminal".



Alternatively, we recommend the terminal program TeraTerm by T. T. Teranishi. The free software can be downloaded at http://www.vector.co.jp/authors/VA002416/teraterm.html.

Each **AT** command starts with the letters **AT** and ends with a "Carriage Return" (CR). Capital and small letters will both be accepted, but the leading characters must be either '**AT**' or '**at**'. The command line is evaluated after the modem receives a return command. In the description, a parameter with the letter "**n**" means that it can have various values.

For example, **ATL<n>**, where '**n**' can have the value 0 or 3, e.g. **ATL2** (medium volume). For commands which expect a parameter but don't have a parameter, the modem will automatically assume the parameter 0. For example, the commands **ATZ** and **ATZ** will have the same effect.

The factory settings are marked "(default)".

The standard end character is "return" (0Dh) or "<CR>". "Return" may not be entered after "****" or "+++".

The commands are acknowledged with "OK" or "ERROR". A command that is being edited will be interrupted by any further incoming character. Therefore, the next command must wait for acknowledgement to avoid the deletion of the current command.

Note: The installation of the driver files creates a virtual serial interface (COM port) on the computer. The PC will treat this interface like a "real" serial interface. All commands and functions in this manual which relate to serial interfaces can also be used for the version HELMHOLZ Modem 56k USB small.

9.1 Overview AT Commands

Command	Description
AT**	Start of the flash load function
ATA	Answer mode 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/	Repeat the last command The last command is repeated.
AT\A<n>	Select maximum MNP block size Define maximum block size for error corrected MNP transmissions. **AT\A0** 64 byte **AT\A1** 128 byte (default) **AT\A2** 192 byte **AT\A3** 256 byte
AT*A<n>	Automatic call acceptance on/off **AT*A0** Call acceptance is blocked, irrespective of S0 **AT*A1** Call acceptance according to S0 (default) **Note: see also S-Registry 36, bit 7**
AT&A<n>	Selective Call Answer On or Off To evaluate selective call answer, the phone number must be transmitted (CLIP). The following countries support the “CLIP” function: Australia, Belgium, China, Denmark, Germany, Finland, Great Britain, Hong Kong, India, Ireland, Iceland, Italy, Canada, Korea, New Zealand, The Netherlands, Norway, Austria, Sweden, Singapore, Spain, Taiwan, USA. **AT&A1** Switches the selective call answer ON **AT&A0** Switches the selective call answer OFF (default) **The AT&A setting is saved in AT&W.**
AT%A<n>	Send alarm text manually Manual triggering of the message. After the message is sent, the device responds with **OK** (success) or **ERROR** (failure). **Note: see also AT*V<n>**

Command	Description
AT\B<n>	Send “break” to the other modem 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 **AT\B2** 2/10 second break signal **AT\B3** 3/10 second break signal **AT\B4** 4/10 second break signal **AT\B5** 5/10 second break signal **AT\B6** 6/10 second break signal **AT\B7** 7/10 second break signal **AT\B8** 8/10 second break signal **AT\B9** 9/10 second break signal
AT%B<n>	Switch key abort on and off during connection **AT%B0** Key abort is active. Each character on the Tx line will result in an interruption of the connection setup. (default) **AT%B1** Key abort is deactivated. The connection setup cannot be interrupted manually. A connection setup can only be interrupted via DTR drop, internal canceling of the modem (**NO DIALTONE, BUSY**) or Timeout (**NO CARRIER**). (S-Registry 36 Bit 6)
AT%C<n>	Enable data compression 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 and V.44 data compression **AT%C3** Enable MNP 5 and V.42bis data compression (default)

Command	Description
AT*C	Remote configuration password This password secures the remote configuration as well as incoming data connections (see **AT*P**) and security callback. **OLD PASSWORD** Requires the old password (default: **QWERTY**). Wrong input leads to **ERROR**. **NEW PASSWORD** Enter the new password with 6 to 12 characters. **CONFIRM** Repeat the new password. Wrong input leads to **ERROR**. **OK** The password is immediately stored in the EEPROM.
AT&C<n>	DCD (CT109) behavior Behavior of the RS232 DCD output of the modem. **AT&C0** DCD is always ON **AT&C1** DCD follows the carrier signal of the phone line (default)
AT+CMGF=<n>	Set the SMS dispatch format with AT+CMGS **AT+CMGF=0** Sets the PDU mode for the SMS dispatch via **AT+CMGS** (default). **AT+CMGF=1** Sets the text mode for the SMS dispatch via **AT+CMGS** (default).
AT+CMGS	SMS dispatch directly via AT command Depending on the setting of **AT+CMFG**, the command **AT+CMGS** will have a different syntax. Setting **AT+CMGF=1** (text mode): **AT+CMGS="phone number"** The modem returns the "**>**" character and awaits the SMS text (up to 160 characters), ending with an EOF character (0x1A or STRG-Z). Notes: Depending on the provider, the phone number must be entered in the format "0941xxxx" or "49941xxxx" (see **AT*M** and/or A**T&Z2**). - After the sending procedure was successful, the modem will return "**+CMGS: 000**" Setting **AT+CMGF=0** (PDU mode): **AT+CMGS=<PDU string length>** The modem returns the character "**>**" and awaits the PDU string, ended with an EOF character (0x1A or STGR-Z). Notes: - Depending on the provider, the phone number must be entered in the format "0941xxxx" or "49941xxxx" (see **AT*M** and/or A**T&Z2**). - "Numbering Plan" is ignored. - The service center is defined by **AT&Z0**, the SCA field in the PDU string is ignored. - Message header, confirmation SMS and validity period are not supported. - Data coding scheme: Only the "default alphabet" is supported. - After the sending procedure was successful, the modem will return "**+CMGS: <MR>**" where **<MR>** is the message reference defined in the PDU string.

Command	Description
AT+CPIN?	Dummy command for GSM compatibility **AT+CPIN?** responds with **"+CPIN: READY**" This command only serves for the purpose of compatibility with applications for GSM devices.
AT+CREG?	Dummy command for GSM compatibility **AT+CREG?** responds with **"+CREG: 0,1"**. This command only serves for the purpose of compatibility with applications for GSM devices.
AT+CSQ	Dummy command for GSM compatibility **AT+CSQ** responds with **"+CSQ: 20,99"**. This command only serves for the purpose of compatibility with applications for GSM devices.
AT+CPMS?	Dummy command for GSM compatibility **AT+CPMS?** responds with **"+CPMS: "MT",8,40,"MT",8,40,"MT",8,40**". This command only serves for the purpose of compatibility with applications for GSM devices.

Command	Description
ATD<n>	Dial The modem goes off-hook and dials according to the transmitted dialing string. After the dialing procedure, the modem attempts to establish a connection. If the **ATD** command was performed without a dialing string, the modem goes off-hook and attempts to connect to the other modem (without dialing). The behavior of the modem depends on the activation of the line current recognition (see **ATX** command). The execution of the **ATD** command also depends on when the last dialing attempt was performed. In the mode **AT+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 dialing **#** The hash: Only for tone dialing **A-D** The inband signaling characters A, B, C, D **P** Pulse dialing mandatory: Pulse or tone dialing is required according to the region. **T** Tone dialing mandatory: Pulse or tone dialing is required according to the region. **W** Wait for dialing tone: The modem waits for the dialing tone before it starts to dial. If no dialing tone was detected within the period specified in the S6 registry, 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 message: **NO ANSWER**. If busy signal recognition was activated, the modem terminates the connection displaying the message: **BUSY**. If a response tone from the other modem is received during the waiting period, a connection is established.

Command	Description	
ATD<n> *CONTINUATION*	,	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 the S8 registry.
	L	Last number re-dialing.
	;	Return to the input mode after dialing. It is added to the end of the dialing string and causes the moden to return to the entry mode when it reaches ";" (with: message **OK**). This enables the input of **AT** commands even with a receiver off-hook. The additional **AT** commands can follow in the same input line after the ";" or they can be transmitted to further input lines. The **ATH** command will abort the connection and the receiver is hung up.
	S=n	Dialing the n-th number from the number pool, which was set up with the **AT&Z<n>** command.
	!	If the character "!" is a part of the dialing string, the modem will hang up within the time frame determined in S29 and then goes off-hook again.
	^	Suppresses the sending of a ringing tone.
	ATD12345;	The semicolon (**;**) causes the return to the input mode after dialing.
	Default:	Ringing tone is sent for fax operation. No ringing tone for data operation.
	( )	Are ignored: They are just used as an outline.
	-	Are ignored: They are just used as an outline.
	, ,	Space characters are ignored: They are just used as an outline.
	Examples:	
	ATD12345	Dial the phone number 12345
	ATDP12345	Dial the phone number 12345 with the pulse dialing method
	ATDT12345	Dial the phone number 12345 with the tone dialing method
	ATX3D0W12345	For PBXs, which connect to the exchange line using the prefix 0 (or 9): First, blind dialing is activated by: **X3** (see the command **„ATX3"**) to be able to dial a leading 0 without hearing a dialing tone. After 0 has been dialed via: **D0** dialing tone recognition can be switched on again using the parameter: **W**. The modem thus waits for the dialing tone and continues with the rest of the dial-up (via: 12345) only after hearing the dialing tone. Waiting for the dialing tone may be omitted. In this case, the dialing command is **ATX3D012345**.

Command	Description
AT&D<n>	DTR (CT108/2) behavior DTR (CT108/2) behavior - Monitoring on/off transitions of the RS232 DTR line of the PC. **AT&D0** DTR is ignored. Allows the operation with PCs which do not run DTR. **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. **AT&D2** A DTR on/off transition causes the modem to hang up. Going off-hook automatically is not possible. (default) **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 0 or 1 is loaded.
AT+DS=<n>	Activate/deactivate V.42bis data compression **AT+DS=0** Deactivates V.42bis data compression **AT+DS=3** Activates V.42bis data compression (default)
AT+DS44=<n>	Activate/deactivate V.44 data compression **AT+DS44=0** Deactivates V.44 data compression **AT+DS44=3** Activates V.44 data compression (default)
ATE<n>	Command entry Echo This command toggles the responses, which the modem creates as reactions from application commands (Echo), ON or OFF. **ATE0** Switch off Echo **ATE1** Switch on Echo (default)
AT%E<n>	Automatic Retrain When transmission problems occur, the modem executes a retrain procedure. After three unsuccessful retrain attempts, the modem will hang up. **AT%E0** Retrain not allowed **AT%E1** Retrain allowed **AT%E2** Fall back, fall forward allowed (default) **AT%E3** Fast fall back, fall forward. Is not supported by all modem types.
AT*E	Terminate remote configuration The command **AT*E** terminates a remote configuration.
AT&F	Loading the default factory settings The modem loads the default factory setting from the internal, nonvolatile memory. This puts the modem into a defined basic state. **AT&F** also overwrites a part of the S registry. The HELMHOLZ Modem 56k small has two factory defaults (**AT&F0, AT&F1**).

Command	Description
AT+GCI=<N>	Set country code The command **AT+GCI** allows the customization of the modem for different countries. As default, the modem is set to Europe (CTR21) with **AT+GCI=FD.** Currently, the modem is only authorized for this country profile. Please find a detailed list of the countries that can be set in Chap. 15 "Country Codes". **Note: Please note that all country settings will result in ALL modem settings being reset to the default settings (such as AT&F&W). Therefore, please select a country profile first and adjust the settings afterwards.**
ATH	Disconnect connection The modem terminates the connection.
AT*H<n>	Declaration of the connection protocol speed (MNP 10) **AT*H** determines the speed that is used to exchange the declarations during the MNP10 connection setup before the modems enter the MNP 10 mode. **AT*H0** Connection setup takes place with the highest possible speed. (default) **AT*H1** Connection setup takes place with 1,200 bps **AT*H2** Connection setup takes place with 4800 bps
ATI<n>	Identification The modem sends an identification to the PC, according to the following parameter: **ATI0** Product code **ATI1** Previously calculated EEPROM checksum **ATI2** Calculation of the EEPROM checksum and comparison with the previously calculated checksum stored in the EEPROM. OK for correct comparison. **ATI3** Number of firmware version in the EEPROM **ATI4** Modem version number **ATI5** Country code parameter (Germany = 006/Europe = 253) **ATI6** Version number and revision of “data pump”
AT+IPR=<n>	Determine baud rate The command **AT+IPR** switches the automatic baud rate detection on and off. **AT+IPR=0** Activates the automatic baud rate detection (default) **AT+IPR=<n>** Sets the modem to the fixed baud rate n. The following baud rates are supported: 300, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, 57,600 and 115,200. The setting **AT+IPR** is not saved with **AT&W** , which means that in order to inactivate auto bauding, the command **AT+IPR** must be sent to the modem every time it is switched on.

Command	Description
AT&K<n>	Select data flow control between the PC and the modem (handshake) Fax operation default is RTS/CTS. **AT&K0** No data flow control **AT&K3** Select data flow control RTS/CTS (default) **AT&K4** Select data flow control XON/XOFF **AT&K5** Select transparent data flow control XON/XOFF **AT&K6** Select RTS/CTS and XON/XOFF data flow control **AT&K8** Activates the controlled half duplex operation on the serial interface for RS485. In this mode, the CTS signal is deactivated (high), while the HELMHOLZ Modem 56k small sends data at the serial interface. Thus, the CTS signal can be used as driver release signal for a RS485 driver. The polarity can be set with **AT&R**.
AT-K<n>	Extended MNP functions (MNP 10) 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 (default) **AT-K1** Ermöglicht V.42 LAP-M zu MNP 10 Umschaltung

Command	Description	
AT\K	Break control 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.	
	1. Situation	In case of a break from the PC during the data connection to another modem:
	AT\K0	Modem enters the command mode and sends no break to the other modem
	AT\K1	Modem deletes the data buffer and sends a break to the other modem
	AT\K2	See **AT\K1**
	AT\K3	Modem immediately sends break to the other modem; data buffers are not deleted.
	AT\K4	See **AT\K0**
	AT\K5	Modem inserts a break into the data transmitted to the other modem.
	2. Situation	During a data connection, the modem was set to command mode by an escape sequence +++**.** In this condition, the command **AT\B** will send a 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 a 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	Like **AT\K4** – Return from the online command mode into the data mode via the command **ATO**.
	3. 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	Like **AT\K4**

Command	Description
ATL<n>	Speaker volume This command regulates the speaker volume (see **ATM**) **ATL1** Speaker volume low (default) **ATL2** Speaker with medium volume **ATL3** Speaker with high volume **Note: The speaker output is optional and is not supported in the standard version.**
AT%L	Display level of the received signal The value that is reported from the modem equals the already amplified level within the modem, not the phone line level. Large **AT%L** responses imply a low signal level; small values imply a high signal level (009 = -9db, 043 = -43db)
AT*L<n>	Determines the automatic speed limitation The automatic speed limitation is used to automatically achieve the least possible error rate for connections without error correction. In the factory settings, the speed limitation is always switched on (**AT*L0**). If the limitation is switched off (**AT*L1**), the modem will always establish the connection on the phone side with the maximum possible speed (or the speed defined with **AT+MS**), irrespective of the data rate at the serial interface. This means that the HELMHOLZ Modem 56k small will, for example, always attempt to establish a 33600 baud connection, even if the serial interface is only set to 9600 baud. Without error correction the high speed will obviously lead to higher bit error rates, which is usually disruptive. The automatic speed limitation (**AT*L0**) will limit the speed on the phone side to the speed of the serial interface. It should only be switched off if very low baud rates are employed or if the speed of the serial interface is changed during the connection.
ATM<n>	Speaker control This command regulates when the speaker is active. (see command **ATL**). **ATM0** Speaker always OFF **ATM1** Speaker ON during dialing and connection setup (default) **ATM2** Speaker always ON **ATM3** Speaker on during connection setup

Command	Description
AT+MR=<n>	Show modulation type The command "**AT+MR**" enables the display of the modulation type after the message **CONNECT.** **AT+MR=0** Switches the display function OFF (default). **AT+MR=1** Switches the display function ON. The displayed value applies to the sent data. **AT+MR=2** Switches the display function ON. The displayed value applies to the received data. 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 command **AT+MS**) and the line "+**MRR:**", followed by the line speed. The **AT+MR** command is useful for a connection check.
AT+MS=<Modulation>, [Automode], [Send Minbaud, Send Maxbaud], [Receive Minbaud, Receive Maxbaud]	Select modulation type **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 has the format **AT+MS=<Modulation>, [Automode], [Send Minbaud, Send Maxbaud], [Receive Minbaud, Receive Maxbaud]** **AT+MS?** Shows the current setting **AT+MS=?** Displays a list of possible parameters Default factory setting: HELMHOLZ Modem 56k small V92

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>AT+MS=<Modulation>, [Automode], [Send Minbaud, Send Maxbaud], [Receive Minbaud, Receive Maxbaud]
CONTINUATION</td><td>
Parameter modulation:
The modulation parameter determines the preferred (automode = 1) or the mandatory (automode = 0) modulation type.
The following values are available:
<table>
<tr><td>V21</td><td>V.21</td><td>300</td></tr>
<tr><td>V22</td><td>V.22</td><td>1200</td></tr>
<tr><td>V22B</td><td>V.22bis</td><td>2400 or 1200</td></tr>
<tr><td>V23C</td><td>V.23</td><td>1200</td></tr>
<tr><td>V32</td><td>V.32</td><td>9600 or 4800</td></tr>
<tr><td>V32B</td><td>V.32bis</td><td>14400, 12000, 9600, 7200 or 4800</td></tr>
<tr><td>V34</td><td>V.34</td><td>33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800 or 2400</td></tr>
<tr><td>V90</td><td>V.90</td><td>56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 48000, 46667, 45333, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000</td></tr>
<tr><td>V92</td><td>V.92</td><td>56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 48000, 46667, 45333, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000</td></tr>
<tr><td>B103</td><td>Bell 103</td><td>300</td></tr>
<tr><td>B212</td><td>Bell 212</td><td>1200/75</td></tr>
</table>
Parameter Automode:
The optional parameter automode determines whether the modem automatically adjusts to the desired modulation type. The following values may be used:
<table>
<tr><td>0</td><td>Automatic modulation adjustment switched off</td></tr>
<tr><td>1</td><td>Automatic modulation adjustment switched on (default)</td></tr>
</table>
Parameter Reception Minbaud:
The optional parameter minbaud determines the lowest possible baud rate for modem reception. (default: 300)

Parameter Reception Maxbaud:
The optional parameter maxbaud determines the highest possible baud rate for modem reception. (default: 56000)

Parameter Send Minbaud:
The optional parameter minbaud determines the lowest possible baud rate for modem sending. (default: 300)

Parameter Send Maxbaud:
The optional parameter maxbaud determines the highest possible baud rate for modem sending. (default: 48000)
</td></tr>
</table>

Command	Description
AT*M<n>	Remote terminal selection Defines the protocol that is used to send the alarm string to the network provider. **AT*M0** The remote terminal is a normal fixed network modem (default) **AT*M1** The remote terminal is a mobile phone with network access via PET/IXO/TAP protocol and data format 8N1 (e.g. D1 and E networks in Germany) **AT*M2** The remote terminal is a mobile phone with network access via EMI/UCP protocol and data format 7E1 **AT*M3** The remote terminal is a mobile phone with network access via PET/IXO/TAP protocol and data format 7E1 **AT*M4** The remote terminal is a mobile phone with network access via EMI/UCP and data format 8N1 (e.g. D2 network in Germany) **AT*M5** The remote terminal is a fax machine **AT*M6** Fixed network SMS: The SMS gateway (e.g. Deutsche Telekom via phone number **01930100**) is not tied to a certain mobile phone network, but send SMS to any mobile or fixed network phone. **Note:** **For the remote terminals AT*M1 to AT*M4, only recipients in the network of one GSM provider may be addressed.** Your network provider will inform you about the current requirements to send SMS to mobile phones. Relevant commands: **AT*V, AT*V<n>** Definition of messages/phone numbers **AT*Z0** Definition of the SMS service center
AT\N<n>	Select error correction This command determines which type of error correction should preferably be used for subsequent connections. **AT\N0** Switching off error correction (normal buffered mode) **AT\N1** Bit direct mode (only for special data formats) **AT\N2** Selects V.42LAP-M or MNP 4 error correction. If no error corrected connection can be established, the modem will hang up. **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 connection that is not error corrected. (default) **AT\N4** Exclusively selects a V.42 LAP-M connection. **AT\N5** Dials exclusively MNP 4 connections.

Command	Description
AT*N<n>=<nr>	Permitted numbers for selective call acceptance Definition of 8 authorized phone numbers, for which modem access is permitted. Only if the transmitted phone number matches a phone number that was entered in the list will the modem report RING for an incoming call or will accept the call according to the settings of **ATS0** (the line RI is activated with each call, irrespective of that fact). **The selective call acceptance is switched on and off with AT&A.** **AT*Nn=<nr>** **<n>** Describes the storage location – range of values: 0..7 . **<no>** Permitted phone number consists of numbers and the wild card "*" for exactly one character. The phone number may not contain separators such as brackets or space characters. After they were entered, the phone numbers are immediately saved in the power fail-safe memory of the modem. **AT*N<n>=<nl>** The memory **N<n>** allows all phone numbers ending in **<nl>**. **AT*N99=** Deletes all existing entries in the list. **AT*N?** Displays all stored entries. Example: **AT*N5=1234** allows all calls ending with **1234**. E.g.: 0175/999**1234**, 0941/888**1234** or +4940/777**1234** **AT*N1=01234567**** permits all calls from the block of numbers 01234567-00 to 01234567-99
AT*N99=	Delete the list of permitted phone numbers for the selective call answer The command **AT*N99=** deletes the entire list of phone numbers for the selective call answer.
AT*N?	Output of the list of permitted phone numbers **AT*N?** activates the output of the entire saved list of permitted phone numbers for the selective call answer.
AT%N	Output of the last rejected phone number For active selective call answer (**AT&A1**) , the last phone number, whose call was rejected, will be displayed. **Note: This phone number is not saved in the power fail-safe memory of the modem.**
ATO<n>	Return to online data mode 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**. **ATO0** Return to online data mode. **ATO1** Before the modem switches to online data mode, a retrain procedure is provoked.

Command	Description
ATP	Switch on pulse dialing method (deactivated for some models) Starting with this command, each dial-up is performed with the pulse dialing method, until an **ATT** or **ATDT** command switches it back to tone dialing.
AT*P<n>	Password query **AT*P0** Switches the password query off after the connection has been established (default). **AT*P1** Switches the password query on after the connection has been established. If the password query is activated, the modem will query the password after **CONNECT** has taken place. After the password has been entered correctly, the actual **CONNECT** will take place and data may be transmitted. If a wrong password was entered, the modem will hang up. **Note: This is set using AT*C. The passwords for the connection setup and the remote control are the same.**
ATQ<n>	Quiet control This command toggles sending messages from the modem to the application ON and OFF. **ATQ0** Send messages to application (default). **ATQ1** Don't send messages to application.
AT%Q	Display telephone call quality Displays the quality of the data connection (deviation from the eye diagram). Low values indicate a good line quality. The line quality value must be evaluated differently depending on the negotiated data rate. Connections with more than 9600 baud will reach the value "000" for good lines and should not have values of more than "010". For connections with 33600 baud good lines will have values between 010…030. Depending on the settings and the modulation type a fall back or retrain is triggered if the line quality is too bad to enable a new negotiation of the connection (if necessary with a slower speed). High values indicate bad quality. These values are constantly updated during a connection. If the value increases significantly during a connection, the quality will deteriorate. After a previous **AT%E** command, an Autoretrain is performed.

Command	Description
AT\Q<n>	Quiet Call Quiet Call will switch of the phone connected in series at the first ring. In connection with the selective call answer (**AT&N<n>**), calls from a previously defined phone number can take place without a ring of the phone connected in series. If the phone number is not detected by the modem, the phone is switched on again after the first ring. **AT\Q0** Switches Quiet Call off (default) **AT\Q1** Activates Quiet Call. The phone connected in series is disconnected, as soon as an entire ring signal cycle is detected on the line. **AT\Q2** Activates Quiet Call. The phone connected in series is disconnected, as soon as a ring signal flank is detected on the line. The selection between the settings **AT\Q1** or **AT\Q2** depends on the circumstances at the phone connection. For **AT\Q2** in connection with pulse dialing, phones that are connected in parallel will sometimes result in an erroneous detection of a ring signal flank. When using pulse dialing at the phones connected in series, **AT\Q1** must be used.
AT&R<n>	RTS/ CTS behavior This command determines how the modem treats the RTS/CTS (CT105/CT106) data flow control lines. (See also command **AT&K<n>**). **AT&R0** CTS behavior 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. During the controlled half duplex operation (**AT&K8**) CTS is active, if the modem sends data at the serial interface. When data is received at the serial interface, CTS is inactive. **AT&R1** CTS only switches to OFF when this is required by the data flow control. During the controlled half duplex operation (**AT&K8**) CTS is inactive, if the modem sends data at the serial interface. When data is received at the serial interface, CTS is active. (default)
AT*R<n>	Switches the remote control on and off **AT*R0** Switches the remote control OFF. **AT*R1** Switches the remote control ON (default).
ATS<n>	Read/write of the S registry Depending on the country settings, the S registries may only be changed within certain limits. The modem still reports **OK** although the value has not changed as specified. We recommend checking the results after each write attempt, using the **ATS<n>?** command. **ATS<n>=<x>** Sets the S registry n to the value x. **ATS<n>?** Shows the value of the S registry **n.**

Command	Description
AT%S<n>	Ability to switch between DCD and DSR lines **AT%S0** The DSR signal is on the DSR line The DCD signal is on the DCD line (default) **AT%S1** The DSR signal is on the DCD line The DCD signal is on the DSR line (Interchangeability of the lines)
AT&S<n>	DSR behavior This command determines how the modem treats its DSR (CT107) output. **AT&S0** DSR always ON (default). **AT&S1** DSR ON after a response tone has been detected. DSR OFF when no carrier is detected any more.
AT*S<n>	Selects the transmission speed at the serial interface. The settings can be selected with this command. This will, however, not switch off the automatic detection. As soon as an **AT** is recognized, the serial interface will set itself to the recognized speed and protocol. If no **AT** is sent, the selected speed is maintained until a hardware reset is performed. If the selected speed should be maintained longer, it must be stored with **AT&W.** **This command will not change the registry S23! It only changes if the automatic speed detection is used.** **AT*S0** Maintaining 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

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>AT-STE=<n></td><td>
<u>Priority Circuit for Modems with Phones Connected in Series</u>
The HELMHOLZ Modem 56k small gives a phone connected in series priority, to make sure it interferes as little as possible with the usage of the phone connection. (see Chapter 5.10)

Monitoring Functions:
1) Detecting a busy phone line
During a dial-up attempt, the model detects the busy phone line (LINE IN USE).

2) Going off-hook on account of a telephone connected in series
If a telephone connected in series goes off-hook during an existing modem connection, the modem will immediately terminate the connection.
The telephone is connected to the line and receives a dialing tone.

3) Remote terminal connection abort
When the remote terminal aborts a connection, the modem will immediately terminate the connection.

<table>
<tr><th>Command</th><th>Function 1</th><th>Function 2</th><th>Function 3</th><th></th></tr>
<tr><td>AT-STE=0</td><td>--</td><td>--</td><td>--</td><td>(default)</td></tr>
<tr><td>AT-STE=1</td><td>√</td><td>--</td><td>--</td><td></td></tr>
<tr><td>AT-STE=2</td><td>--</td><td>√</td><td>--</td><td></td></tr>
<tr><td>AT-STE=3</td><td>√</td><td>√</td><td>--</td><td></td></tr>
<tr><td>AT-STE=4</td><td>--</td><td>--</td><td>√</td><td></td></tr>
<tr><td>AT-STE=5</td><td>√</td><td>--</td><td>√</td><td></td></tr>
<tr><td>AT-STE=6</td><td>--</td><td>√</td><td>√</td><td></td></tr>
<tr><td>AT-STE=7</td><td>√</td><td>√</td><td>√</td><td></td></tr>
</table>
</td></tr>
<tr><td>ATT</td><td>
<u>Switching on inband signaling</u>
Starting with this command, each dial up is performed with the tone dialing method, until an ATP or ATDP command switches it back to pulse dialing.
</td></tr>
<tr><td>AT-TRV</td><td>
<u>Phone Line Voltage Measurement (Tip Ring Voltage)</u>
Use the command AT-TRV to measure the phone line voltage (Tip Ring Voltage). The result is yielded in volt. For an existing connection the voltage range will be 5V – 12V. Otherwise the voltage is higher than 20V. If the voltages are lower than 2V, no phone line is connected.
</td></tr>
</table>

Command	Description
AT-TTE=U1, U2, U3	Parameter Configuration for Priority Circuit The command **AT-TTE=U1, U2, U3** will set the change of the loop voltage. The settings are required to detect **AT-STE=<n>**. (see Chap. 5.10) **U1** **Line busy** Default factory setting: u1=1000 (10V) **U2** **Going off-hook on account of a telephone connected in series** Default factory setting: u2=100 (1V) **U3** **Remote terminal connection abort** Default factory setting: u3=500 (5V) **Note:** These settings cannot be stored with AT&W in the power fail-safe memory.
AT*U<n>	Select the data format at the serial interface The data format can be preselected with this command. This will, however, not switch off the automatic detection. As soon as an **AT** is recognized, the serial interface will set itself to the recognized speed and protocol. If no **AT** is sent, the selected protocol is maintained until a hardware reset is performed. If the selected protocol should be maintained longer, it must be stored with **AT&W.** **Attention: This command will not change the registry S23! It only changes if the automatic speed and protocol detection is used.** **AT*U0** 8 data bits, no parity, 1 stop bit **AT*U1** 7 data bits, odd parity, 1 stop bit **AT*U2** 7 data bits, even parity, 1 stop bit **AT*U3** 7 data bits, no parity, 1 stop bit **AT*U4** 7 data bits, odd parity, 2 stop bits **AT*U5** 7 data bits, even parity, 2 stop bits **AT*U6** 7 data bits, no parity, 2 stop bits **AT*U7** 8 data bits, odd parity, 1 stop bit **AT*U8** 8 data bits, even parity, 1 stop bit **AT*U9** 8 data bits, no parity, 2 stop bits
ATV<n>	Format of modem messages This command determines if the modem transmits messages to the application in short or long format. **ATV0** Messages in short format, i.e. only the error number **ATV1** Messages in long format, i.e. the error text (default)

Command	Description
AT\V<n>	Format of connect rate messages **AT\V0** This command enables the display of the connect message in three lines. **AT\V1** This command enables the display of the connect message in one line. (default)
AT*V	Definition of the common alarm texts (collective message) for simple alarm: Definition of the alarm text (maximum of 160 characters) for pulse alarm: Definition of the common part of the alarm message (maximum of 160 characters – within HSComm limited to 120 characters) To the input **AT*V** the modem responds with **NEW TEXT:** and expects the input of the alarm text (completed with **<CR>**). This command is not available in the remote operation mode. Relevant commands: **AT*V, AT*V<n>** Definition of messages/phone numbers **AT&Z0** Definition of the SMS service center
AT*V?	Query of the common alarm texts (collective message) The common part of the alarm message is queried with the command **AT*V?**.
AT*V<n>	Definition of the variable alarm texts and phone numbers Definition of the alarm texts and phone numbers for the SMS dispatch. After the input **AT*V1** or **AT*V2** the modem responds with **NEW TEXT:** and expects an input in the format **phone number,message<CR>** **Phone number** Enter without characters for accessing the exchange (only required for service number) **Message** Alarm message (maximum of 80 characters) For the transmission, the variable part (maximum of 80 characters) will be attached to the common part (maximum of 160 characters) of the collective message. Of the maximum of 240 characters, the first 160 characters are sent as SMS. Relevant commands: **AT*V<n>** Definition of messages/phone numbers **AT&Z0** Definition of the SMS service center
AT*V<n>?	Query of the variable alarm texts and phone numbers The variable part of the alarm message and the target phone number are queried with **AT*V1?** or **AT*V2?.**

Command	Description	
AT&V<n>	Show the configurations	
	AT&V0	The active configuration of the modem, the saved user defaults and the saved phone numbers 0 to 3 (the parameter 0 may be omitted) are displayed
	AT&V1	Displays the diagnostic data of the last connection (connection partner, reason for disconnect). **TERMINATION REASON:** Reason for disconnect. E.g.: Connection termination via command (**ATH**: "**LOCAL REQUEST**"). **LAST TX rate:** Last baud rate at the phone line in send direction, prior to the termination. **HIGHEST TX rate:** Highest baud rate that was achieved at the phone line in send direction, prior to the termination. **LAST RX rate:** Last baud rate at the phone line in receive direction, prior to the termination. **HIGHEST RX rate:** Highest baud rate that was achieved at the phone line in receive direction, prior to the termination. **Note: The data rates may vary if a fall forward, fall back or retrain occurred during the connection. To impact the negotiated data rate, use the command AT+MS.** **PROTOCOL:** Displays the used error correction protocol. "**LAPM**" equals a V.42 secured connection. For "**NONE**", the connection was not error corrected (the error corrected can be influenced with the command **AT\N**). **COMPRESSION:** Displays the used data compression method. The example shows the used compression method V.42bis (the compression method can be set with the command **AT%C**). **LINE QUALITY:** Displays the quality of the data connection (deviation from the eye diagram). Low values indicate a good line quality. The line quality value must be evaluated differently depending on the negotiated data rate. Connections with more than 9600 baud will reach the value "000" for good lines and should not have values of more than "010". For connections with 33600 baud good lines will have values between 010…030. Depending on the settings and the modulation type a fall back or retrain is triggered if the line quality is too bad to enable a new negotiation of the connection (if necessary with a slower speed). **Rx LEVEL:** Displays the receive level (which is internally applied at the modem chip) in –dBm. High values indicate a low input level, low values indicate a high input level. The optimum receive levels range from approx. 012 to 028. To high levels could cause distortions; too low levels will cause the line noise to have a negative impact on the connection quality. **Local Rtrn Count:** Number of retrains (renegotiation of the connection), triggered by the local modem. **Remote Rtrn Count:** Number of retrains (renegotiation of the connection), triggered by the remote modem.
	AT&V3	Display of the currently set baud rate (**AT*S<n>**) as well as the currently set data format (**AT*U<n>**).

Command	Description
AT+VCID=<n>	Set CLIP With this function, the phone number of the caller can be displayed during an incoming call. (Only for phone lines or systems that support CLIP. If you want to use the CLIP function, please ask your network provider, if your connection supports this function. The following countries support CLIP: Australia, Belgium, China, Denmark, Germany, Finland, Great Britain, Hong Kong, India, Ireland, Iceland, Italy, Canada, Korea, New Zealand, The Netherlands, Norway, Austria, Sweden, Singapore, Spain, Taiwan, USA). **AT+VCID=0** Switches the CLIP function off (default). **AT+VCID=1** Switches the CLIP function on and displays the ID preformatted for incoming calls. **AT+VCID=2** Switches the CLIP function on and displays the ID unformatted for incoming calls.
AT+VRID=<n>	Set last received CLIP The command **AT+VRID** displays the CLIP of the last caller. **AT+VRID=0** Displays the ID preformatted. **AT+VRID=1** Displays the ID unformatted.
ATW<n>	Error correction messages This command defines which details regarding the data transmission rate need to be specified for a **CONNECT** message. **ATW0** The modem reports the baud rate between modem and PC. (default) **ATW1** During the connection setup, the modem reports the phone line speed, the error correction protocol and the PC baud rate. **ATW2** The modem reports the phone line speed.
AT&W<n>	Save the configuration The command saves the current modem configuration including the S registry in one of the two user-defined defaults. **AT&W0** Save in user default 0 **AT&W1** Save in user default 1

Command	Description
ATX<n>	Extended result messages, dial tone detection 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 dialed before a dialing tone is heard on the line. *Blind dialing* (dialing without detecting the dialing tone) is activated or deactivated according to the parameter. The detection of the dialing tone, however, can always be enforced using the parameter **W** in the **ATD** dialing 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. **ATX0** No detection of the dialing tone, i.e. an unsuccessful dialing 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. **ATX1** As **ATX0**, but the **CONNECT** message contains the speed specification. **ATX2** Dialing tone detection is active, i.e. a dialing attempt without the presence of a dialing tone leads to the message **NO DIALTONE.** No detection of the busy signal, i.e. when calling a busy line the message **NO CARRIER** is displayed. **ATX3** No detection of the dialing tone, i.e. an unsuccessful dialing attempt leads to the message **NO CARRIER.** Busy signal detection active, i.e. when calling a busy line the message **BUSY** is displayed. **ATX4** Dialing tone detection is active, i.e. a dialing attempt without the presence of a dialing tone leads to the message **NO DIALTONE.** (default) Busy signal detection is active, i.e. when calling a busy line the message **BUSY** is displayed.
AT*X	Terminate remote configuration The command **AT*X** terminates a remote configuration (like the command **AT*E**).
AT&Y<n>	Selection of user configuration for hardware reset **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. **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.

Command	Description
ATZ<n>	Software reset 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. **ATZ0** Software reset; afterwards the user default 0 is loaded. **ATZ1** Software reset; afterwards the user default 1 is loaded.
AT&Z<n>	Save phone numbers The command saves four entries permanently in the EEPROM. Each entry may consist of up to 35 characters. The entries may be overwritten and must comply with the dialing string as described in the **ATD** command. **AT&Z<n>=xxx** **n** This is the number of the list entry (from 0 to 3). **xxx** This is the dialing string with the phone number. Layout of the alarm functions and security callback: **AT&Z0=xxx** Number of the modem or fax for a simple alarm message Service center number of the GSM provider for SMS access **AT&Z1=xxx** Enter the callback number for security callback **AT&Z2=xxx** Number of the mobile phone for simple alarm messages **AT&Z3=xxx** Number of the fax machine for collective alarm messages
<Pause> **+++** <Pause>	Change from data mode to command mode (online command mode). 1 second pause before and after the entry, no **<CR>.** After the response **OK**, an additional waiting period of 1 second for the re-entering of **AT** commands must be observed.
<Pause> ******** <Pause>	Start of the remote configuration at the local modem After the 4 escape characters ******** were entered at the local modem (1 second pause before and after the entry, no return - **<CR>** -), the remote configuration at the remote terminal is activated. After the response **OK**, an additional waiting period of 2 seconds for the re-entering of AT commands must be observed.

9.2 Overview Fax and Voice Commands

More detailed information regarding the Fax Class 2 commands and a document regarding voice commands can be obtained from your supplier.

9.3 AT Messages

List of message numbers and messages texts depending on the command **ATX<n>.**

Message Number Short form	Message text in long form	ATX<0>	ATX<1>	ATX<2>	ATX<3>	ATX<4>
+F4	+FCERROR	X	X	X	X	X
0	OK	X	X	X	X	X

Message Number Short form	Message text in long form	ATX<0>	ATX<1>	ATX<2>	ATX<3>	ATX<4>
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 DIALTONE	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
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
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
35	DATA	X	X	X	X	X
40	CARRIER 300	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

Message Number Short form	Message text in long form	ATX<0>	ATX<1>	ATX<2>	ATX<3>	ATX<4>
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
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
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
84	CONNECT 33600	X	X	X	X	X
91	CONNECT 31200	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
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

Message Number Short form	Message text in long form	ATX<0>	ATX<1>	ATX<2>	ATX<3>	ATX<4>
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
193	CARRIER 53333	X	X	X	X	X
194	CARRIER 54667	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.

10 S Registry

S registries may be read and written using the **ATS<n>** command. (See Chapter 9 "**AT** Command Set", command **ATS<n>**) Certain S registries 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>?**).

Note:

*** These registries are stored in the user defaults with AT&W0 or AT&W1.**

10.1 Overview S Registry

Register	Function	Units	Range	Default
S0*	Number of ringing tones until automatically going off-hook	Ringing tones	0-5	5
S1	Ringing tone counter	Ringing tones	0-255	0
S2*	Escape	ASCII	0-255	43
S3	Return	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 to send the message		1-12	3
S14*	General settings			138
S15*	DTC Time Settings	1s	0-255	0*
S17*	Initial character for remote configuration		0-127	42
S21*	Settings for V24			116
S22*	Speaker system 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
S29	Time period for modifier “Flash”	10 ms	17	17

Register	Function	Units	Range	Default
S30	Time period until hang up due to silence	10 s	0-255	0
S31*	General settings	-		C2h (194)
S36*	Reset of error logs	-		135
S38	Time period until forced hang up	s	0-255	20
S39*	Flow control	-		3
S40*	General settings	-		104
S41*	General settings	-		195
S46*	V.42bis Data Compression	-		138
S48*	V42bis Connection setup protocol	-		7
S86	Error event code	-		Read-only
S91*	Transmit Level	-	0-15	9
S95*	Result code	-		0

10.2 Description S Registry

Note: **Registries marked with *) are stored in the user defaults with the command AT&W- Befehl.**

S0* Number of ringing tones until automatically going off-hook

Number of rings until the modem goes off-hook

For S0=0 the modem will not go off-hook when a call comes in. The value of S0 can be between 0 and 5.

S1 Ringing tone counter

Counter for call ringing. S1 is read-only. S1 will be reset to zero, when the modem answers a call.

S2* Escape

Escape character which causes a switch from data mode to online command input mode. Values larger than 127 will result in no ESC character being recognized.

S3 Return

Carriage Return Character (CR).

S4 Linefeed character

Linefeed character

S5 Backspace character

Backspace character

S6* Waiting period dial tone

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

If it does not detect a dialing tone, it will check if dial tone recognition is activated or if the dialing string (Chapter 9 „**AT** Command Set“, command **ATD**) contains the parameter **W**. If the dialing tone detection is not activated, the modem waits for the dialing tone. The waiting time (in seconds) is specified in S6.

The value of the S6 registry can be between 4 and 7 seconds.

S7* Waiting period carrier signal

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 dialing. The value of S7 can be between 0 and 180 seconds.

S8* Dial tone delay

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

S9* Reaction time carrier signal

DCD response time for the 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* Time period between lost carrier signal and hang up

The time which leads to termination 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* Transmission clock of the ESC characters

Minimum pre and post run time and maximum interim time in 1/50 of seconds between two characters. This must be observed, if the modem is supposed to detect an abort sequence (usually +++).

S13* Number of dialing attempts to send the message

Bit	Meaning	
Bit 0 – 3	Number of dialing attempts	Range of values: 1...12 Default value: 3 S13 determines the number of attempts to send the message. **Note: The limitation to a maximum of 12 attempts is necessary for approval purposes (black listing).**
Bit 4 - 7	Reserved	

S14* 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 codes:	0: Message numbers (**ATV0**) 1: Message texts (**ATV1**)
Bit 4	Reserved		
Bit 5	Tone/pulse dialing	Tone/pulse	0: Tone dialing (**ATT**) 1: Pulse dialing (**ATP**)
Bit 6	Reserved		
Bit 7	Originate/answer	Originate/answer	0: Answer mode 1: Originate mode

S15* DTC Time Settings

The idle connection control is a function integrated in the firmware which monitors the data transmission in online mode. This function prevents the modem to stay online for an unlimited amount of time, although no data is being transmitted anymore.

In the registry S15, any time period between 1 and 255 seconds may be entered. If S15 is set to 0, the idle connection control is switched off.

The timer will run immediately after the modem goes off-hook. As soon as the timer has run out, a modem reset is performed (which will forcibly lead to the hanging up of the modem).

S17* Initial character for remote configuration

In S17, the ASCII code of a character which is used to start the remote configuration, is defined. Values >127 switch the remote configuration off completely. The default setting in S17 is “42”, which equals the ASCII character “*”. This means that the remote configuration is started with the Escape character sequence

<Pause> ** <Pause>**.

Note: The number of characters in the Escape sequence is fixed to "4" characters).

S21* Settings for V24

Bit	Meaning	
Bit 0.1	Reserved	
Bit 2	CTS behavior	CT106 (CTS) behaviour: 0: see AT\K0 1: see **AT&R1**
Bit 3-4	DTR behavior	CT108 (DTR) behaviour: 0: see **AT&D0** 1: see **AT&D1** 2: see **AT&D2** 3: see **AT&D3**
Bit 5	DCD behavior	CT109 (DCD) behavior: 0: see **AT&C0** 1: see **AT&C1**
Bit 6	DSR behavior	CT107 (DCD) behavior: 0: see **AT&S0** 1: see **AT&S1**
Bit 7	Long-term interruption	Long space disconnect: 0: see **ATY0** 1: see **ATY1**

S22* Speaker system settings

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 the setting of **AT*L**	

S24* Time period until switching into sleep mode

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: **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". Further AT commands may be entered immediately.**

S25 Time period for DTR signal

Time period, in which a modem waits without a DTR signal before it hangs up (1/100 seconds).

S26 Time period between RTS/CTS

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

S27* 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 Time period for modifier "flash"

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

S30 Time period until hang up due to silence

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

S31* General settings

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

S36* Reset of error logs

Bit	Meaning	
Bit 0..2	Determines what happens if an attempt to establish a V.42 LAP-M connection fails. It 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 3.0.4	SMS type	0: normal fixed network modem **(AT*M0)** 1: D1 and E networks **(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	Call acceptance	1: Call answer not locked (**AT*A1**) 0: Call acceptance locked (**AT*A0**)

S38 Time period until 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* Flow control

Selection of the data flow control between the modem and the application.

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 Transparente XON data flow control **(AT&K5)**

S39=6 RTS/CTS and XON/XOFF data flow control

S40* General settings

Bit	**Meaning**	
Bit 0	Reserved	
Bit 1	Reserved	
Bit 2	Reserved	
Bit 3-5	Break behavior	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 settings

Bit	**Meaning**	
Bit 0.1	Select compression type	Compression Selection 0: No compression (**AT%C0**) 1: MNP5 (**AT%C1**) 2: V42bis (**AT%C2**) 3: MNP5 or V.42bis (**AT%C3**)
Bit 2	Auto retrain	Auto retrain control 0: No auto retrain (**AT%E0**) 1: Auto retrain (**AT%E1**)
Bit 3	Reserved	
Bit 4	MNP block mode reserved for 56k models	Block Mode Control MNP 0: Stream Mode (**AT\L0**) 1: Block mode (**AT\L1**)
Bit 5	Reserved	
Bit 6	Fallback/Fallforward	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.42bis Connection setup protocol

S48=0 Only LAPM connection possible

S48=7 LAPM or MNP 4 connection

S48=128 Connection protocol as laid down in S36

S86 Error event 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 establishing of an error-corrected (V.42) connection

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=25 Termination of the connection by the remote terminal or by a phone connected in series

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 0 dBm

S91=15 Transmit level -15 dBm

Note: The range and the default value depend on the country settings (`AT+GCI`).

S95* Result code

Bit	Meaning
Bit 0	CONNECT message with line speed
Bit 1	CONNECT/ARQ 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 messages enabled (messages 66 - 69)
Bit 6	Reserved
Bit 7	Reserved

11 Sending SMS as Fax or E-mail

Chapter 11 shows an overview of network providers for German-speaking countries (Germany, Austria, Switzerland). All necessary information is available from the customer service center of the provider.

11.1 SMS as Fax

Network provider	Service center	Phone number format	Example	SMS format
T-COM (Germany)	01930100	99+area code+ Phone number	990941586920	This is a test
A1 (Austria)	43900664914	Area code+phone number	0941586920	This is a test
Swisscom (Switzerland)	+41794998123	Area code+phone number	0941586920	*FAX#This is a test

11.2 SMS as e-mail

Network provider	Service center	Phone number	SMS format	E-mail address	Example
T-COM (Germany)	01930100	8000	E-mail address+space+text	abc@defg.de	abc*defg.de This is a test
A1 (Austria)	43900664914	E-mail address	Text		This is a test
Swisscom (Switzerland)	+41794998123	555	E-mail address+space+text	abc@defg.de	abc*defg.de This is a test

12 FAQ

In the following some questions are described, which – from experience – may occur during the installation.

Problem:	Possible cause:	Remedy
The modem does not accept calls.	Automatic call acceptance is deactivated.	Enter the following commands in the terminal program: **ATS0=2** **AT*A1**
The key entries are not displayed in the terminal program.	The display of the key entries (echo) is deactivated.	Activate the echo with **ATE1**.
The modem starts dialing after the dialing command **ATD** has been entered and reports the error "**No Dialtone**".	The phone line is interrupted.	Check the phone line.
The modem starts dialing after the dialing command **ATD** has been entered and reports the error "**No Dialtone**".	The modem is operated at a PBX. The PBX requires that a code number is dialed to establish a connection or that the flash function is activated, before the dialing tone is heard. The modem, however, is awaiting a ring back signal already before the first digit is dialed.	After the leading digit was dialed without a ring back signal, inserting a **W** into the dialing string will re-activate the ring back signal detection. (Example **ATD0W12345**). This problem can be solved by blind dialing (dialing without ring back signal) with the **ATX3** command or by inserting the character > into the dialing string. (See Chapter 9, command **ATX,** command **ATD**)
After the **ATD** dialing command, the modem will not start dialing right away.	The dialing lock of 3o seconds is active.	See Chapter 5.2.8 "Dial-up Delay".

Problem:	Possible cause:	Remedy
It is not possible to establish a phone connection.	The modem dials with the pulse dialing method instead of the required tone dialing method, or vice versa.	You can determine if your phone system dials with pulses or tones: If you hear a rattling on the line during dialing, you are using pulse dialing. The dialing types can be switched with the commands **ATDP** or **ATDT**. See also Chapter 9 "AT Command Set", commands **ATDP,ATDT, ATP, ATT**.
The modem can send data, but can't receive data.	The data flow control settings (RTS/CTS) are wrong.	See Chapters 5.2.4 to 5.2.6 "Data flow control".
The modem does not cooperate with a particular communication program.	The communication program expects a certain data flow control type. The modem has not been set to the required type.	Setting the modem to the required data flow control type will solve the problem. Most of the time, the used communication program allows the creation of an initialization string, in which the necessary settings can be entered. This string is transmitted to the modem during the program start. See also the manual for the used software and the paragraphs regarding "Data Flow Control" in Chapter 5.2.
The modem cannot communicate with another modem, or only with errors.	The other modem uses a transmission protocol, which the local modem cannot understand.	Using the data compression type and error protocol required by the other modem will solve the problem. (See also Chapters 5.3 and 5.4 "Error Correction" and "Data Compression").

13 Safety Instructions

13.1.1 General

- All areas that can be opened are maintenance areas. Unauthorized opening of a maintenance area and inappropriate repairs may endanger the user.

- The HELMHOLZ Modem 56k small may not be used in wet environments. Please also take care not to let liquids seep into the modem as this may lead to short circuits.

- If a power failure occurs the device will not be operational. We recommend providing a separate circuit for the HELMHOLZ Modem 56k small . If other devices experience short circuits, the HELMHOLZ Modem 56k small will thus not be inoperative.

- Using another power supply unit could damage the HELMHOLZ Modem 56k small; in this event, the manufacturer will assume no liability.

- We recommend installing a suitable overvoltage protection.

13.2 Cleaning

- For cleaning purposes, use a slightly damp cloth or an antistatic cloth.

- Do not use solvents.

- In any case, please take care that no moisture seeps into the modem as this could damage the modem.

➢

14 Technical Data

14.1 Mechanical Features

	HELMHOLZ Modem 56k small/USB small
Weight	3.53 oz
Dimensions (maximum)	w x d x h = 23 x 110 x 75
Temperature range	32.00°F..131°F
Protection class	Housing IP 40/ Terminal IP 20
Humidity	0 - 95% non-condensing

14.1.1 Power Supply

All specified technical data was measured with a nominal input voltage, full load, and an ambient temperature of 77.00 °F. The threshold value tolerances are subject to the typical fluctuations. A maximum of one value may be operated in the threshold value range.

To operate the HELMHOLZ modem, a suitable device protection must be used.

Power supply: 10...32 V DC

Power input: approx. 2.5 W (during connection)

Current consumption:

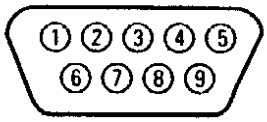
Input voltage	**Current (closed circuit)**	**Current (connection)**	**Maximum startup current**
10 V DC	200 mA	240 mA	300 mA
24 V DC	100 mA	110 mA	150 mA

14.2 PC Interface

14.2.1 Serial interface

(Only for HELMHOLZ Modem 56k small)

Layout of the 9-pin D-SUB jack



Description of the signals on the 9-pin D-SUB connector on DCE side:

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

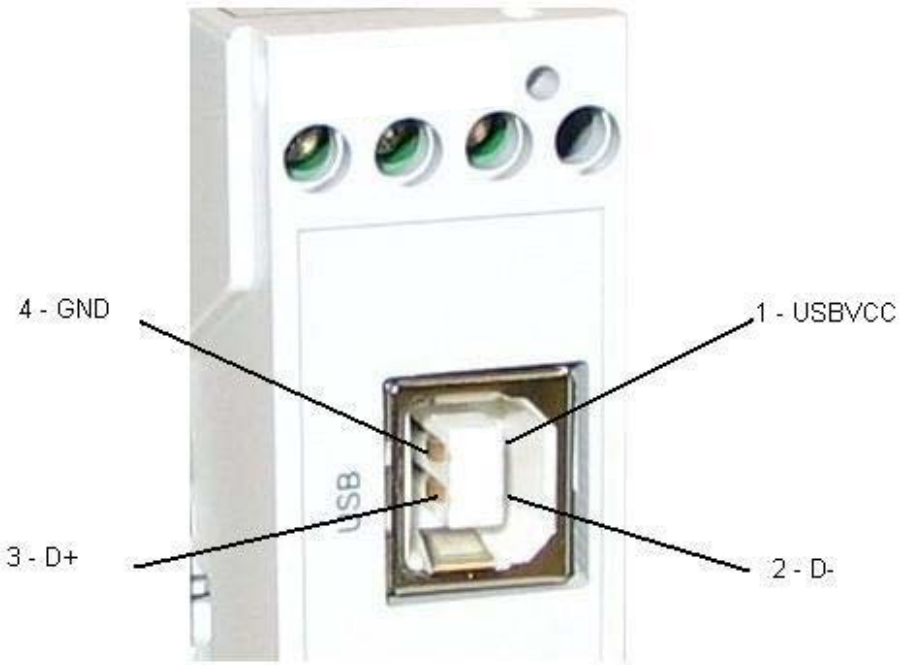
14.2.2 USB Interface

(Only for HELMHOLZ Modem 56k USB small)

Layout of the 4-pin USB jack, type B

Description of the signals:

Pin	Name
1	USBVCC, USB supply voltage
2	D-, data line
3	D-, data line
4	GND, ground



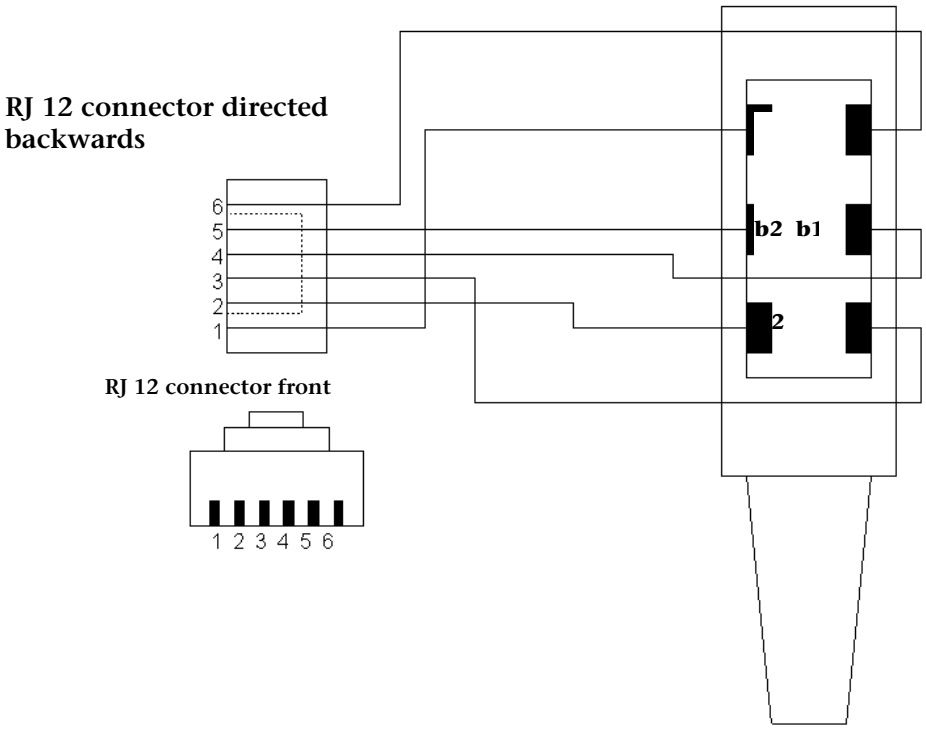
14.3 Possible Interface Speeds

Baud rate in bps		
300	4.800	28.800
600	9.600	38.400
1.200	14.400	57.600
2.400	19.200	115.200

14.4 Supported Transmission Standards

Transmission standard		Transmission standard	
V.17	✓	V.44 Data Compression	✓
V.21	✓	V.90	✓
V.21 Channel2	✓	V.92	✓
V.22A/B	✓	Bell 212A and 103	✓
V.22bis	✓	Remote Maintenance	✓
V.23	✓	Fax group 3 send/receive	**up to 14,400 bps**
V.27ter	✓	Fax class 1 command set	✓
V.29	✓	Fax class 2 command set	✓
V.32bis	✓	MNP 2-4 error correction	✓
V.34	✓	MNP 5 Data Compression	✓
V.34+	✓	MNP 10 error correction	✓
V.42bis Data Compression	✓	Security callback	✓
V.42 LAPM error correction	✓	Voice functions	✓

14.5 Telephone Interface



Layout of the RJ12 Connector and the RJ45 Jack

Pin	Description	Pin	Description
1	NC	4	b1
2	a2	5	b2
3	a1	6	NC

Meaning of the Signals:

a1, b1: Incoming phone lines
(e.g. exchange connection or PBX)

a2, b2: They are used to connect a telephone in series. In idle state, a2 and b2 are connected with a1 and b1 via a loop current connector. a2 and b2 are disconnected as soon as the modem occupies the line.

14.6 ITU Standards (CCITT)

ITU Standards (CCITT)	Meaning
V.21	Transmission with 300 bps (duplex)
V.22	Transmission with 1,200 bps (duplex)
V.22bis*	Transmission with 2,400 bps (duplex)
V.23	Send with 75 bps and receive with 1,200 bps and vice versa.
V.23 half-duplex	Send and receive with 1,200 bps.
V.25bis*	Alternate command set for AT command set
V.32	Transmission with 9,600 bps or (fallback) 7,200, 4,800 bps.
V.32bis*	Transmission with 14,400 bps or (fallback) 12,000, 9,600, 7,200, 4,800 bps.
V.FC	Transmission with 28,800 bps or (fallback) 26,400, 24,000, 21,600, 19,200, 16,800, 14,400 bps.
V.34	Transmission with 28,800 bps or (fallback) 26,400, 24,000, 21,600, 19,200, 16,800, 14,400 bps.
V.34+	Transmission with 33,600 bps or (fallback) 31,200, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400 bps.
K56flex	Transmission with 56,000 bps or (fallback) 54,000, 52,000, 50,000, 48,000, 46,000, 44,000, 42,000, 40,000, 38,000, 36,000, 34,000, 32,000 bps.
V.42	Error protection method for DCE's with asynchronous-to-synchronous conversion
V.42bis*	Data compression method
V.90	Transmission with 56,000 bps or 54,667, 53,333, 52,000, 50,667, 49,333, 48,000, 46,667, 45,333, 42,667, 41,333, 40,000, 38,667, 37,333, 36,000, 34,667, 33,333, 32,000, 30,667, 29,333, 28,000 bps.

*bis = extended (french: secondly)

Bps indicates the transmitted bits per second.
Duplex means that the transmission takes place into both directions.

15 Country Codes

Adjust the modem to local requirements using the command
AT+GCI=<countrycode>

All other settings should be carried out <u>after</u> the country code has been selected, because some factory settings depend on the country.

Country	HELMHOLZ Modem 56k small	
	Standard countries	Extended country groups
TBR21***)**	FD (default)	FD (default)
Egypt		38
Albania		B8
Algeria	FE	
Andorra	FD	FD
Argentina		07
Australia	09	
Algeria	FE	
Bangladesh	FE	
Belgium*	FD/0F	FD
Birma (Myanmar)	FE	
Brazil	16	
Bolivia	FE	
Bosnia Herzegovina	FE	
Brunei	FE	
Bulgaria		1B
Chile		25
China		26
Costa Rica	FE	
Denmark*	FD/31	
Germany	FD/42	
Dominican Republic		33
Ecuador	FE	
El Salvador	FE	
Estonia		F9
Finland*	FD/3C	FD
France*	FD/3D	FD
Greece*	FD/46	FD
Great Britain*	FD/B4	FD
Guatemala	FE	
Honduras	FE	
Hong Kong		50

Country	HELMHOLZ Modem 56k small	
	Standard countries	Extended country groups
India		53
Indonesia		54
Ireland*	FD/57	FD
Iceland*	FD/52	FD
Israel		58
Italy*	FD/59	FD
ITU/Taiwan	FE	
Japan	00	
Yemen	FE	
Jordan	FE	
Cambodia	FE	
Canada	20	
Colombia		27
Republic of Korea		61
Croatia		FA
Kuwait		62
Laos	FE	
Latvia	FD	FD
Lebanon		64
Liechtenstein*	FD	FD
Lithuania	FE	
Luxembourg*	FD/69	
Malaysia		6C
Macedonia	FE	
Mexico	73	
Monaco	FD	FD
Montenegro	FE	
New Zealand		7E
Nicaragua	FE	
Netherlands*	FD/7B	FD
Nigeria		81
Norway*	FD/82	
Oman	FE	
Austria*	FD/0A	FD
Pakistan		84
Panama		85
Paraguay		87
Peru	FE	
Philippines		89
Poland	8A	
Portugal*	FD/8B	FD

Country	HELMHOLZ Modem 56k small	
	Standard countries	Extended country groups
Romania	8E	
Russian Federation		B8
San Marino*	FD	FD
Saudi Arabia	98	
Sweden*	FD/A5	FD
Switzerland	FD/A6*	FD
Senegal		99
Serbia	FE	
Singapore		9C
Slovak Republic	FB	
Slovenia	FC	
Spain*	FD/A0	
Sri Lanka		A1
South Africa		9F
Taiwan	FE	
Thailand		A9
Czech Republic	2E	
Turkey	AE	
Tunisia	FE	
Ukraine	FE	
Hungary	51	
Uruguay		B7
USA	B5	
Venezuela		BB
United Arab Emirates		B3
Belarus	FE	
Cyprus		2D

***) The standard TBR21 applies to all public phone networks in EU countries (Belgium, Denmark, German, Finland, France, Greece, Great Britain, Ireland, Italy, Luxembourg, Netherlands, Austria, Portugal, Sweden, Spain), as well as in Switzerland, Liechtenstein, Norway and Iceland. Only old telecommunications systems require the individual country to be set explicitly.**