

# DIN-Rail Modem 56k 4.1

700-751-HSM11

## Operating Manual

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Subject to technical changes as well as correction.

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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
- Phone cord (TAE-N to RJ11)
- PC connection cable 9/9-pin (RS232 cable)
- User Guide
- CD-ROM

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

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

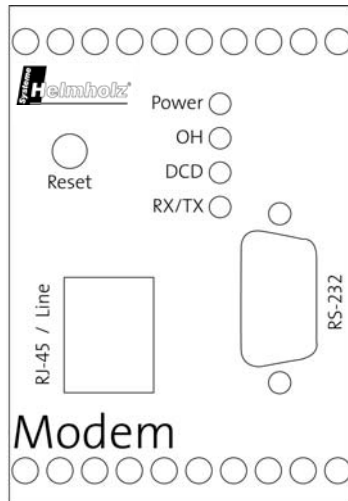
## 2 General

The HELMHOLZ Modem 56k 4.0 is a modem for the analog telephone network. It has a very compact design and a very robust aluminum housing. The modem supports the following functions, which are described in detail in the following:

- Establishing a data connection
- Automatic call
- Alarm inputs and outputs for SMS dispatch and to establish an alarm data connection
- Pulse input to send up to 10 SMS messages
- Fax dispatch at alarm release
- Local or remote configuration
- Usage in 87 countries
- Auto answer
- Data flow control
- Data compression
- Error correction
- Idle connection control
- Flash update
- Security callback

### 3 Description

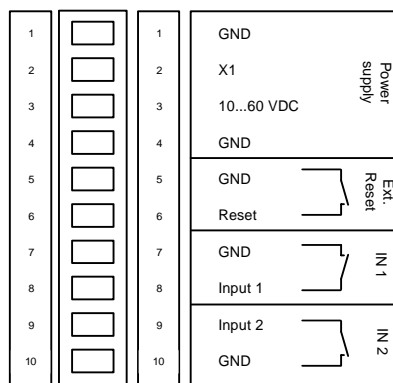
#### 3.1 Front panel



The HELMHOLZ Modem 56k 4.0 has four LED's to indicate the operating state.

Name	Color	Off	On
Power	Green	No supply voltage	Supply voltage available
OH (Off Hook)	Yellow	Modem is offline	Modem is hooked to the phone line (online)
DCD (Data Carrier Detect)	Yellow	No connection is established	Connection is established (Carrier detected)
RX/TX (receive/transmit)	Green	No data exchange	Date is exchanged via the modem

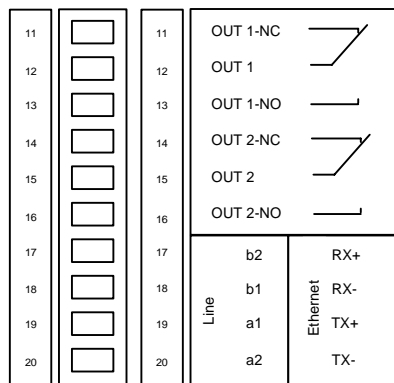
#### 3.2 Top



	Terminal	Meaning
1	GND	Ground
2	X1	Reserved
3	10..60VDC	Power supply 10V to 60V DC
4	GND	Ground
5	GND	Ground
6	Reset	Reset input
7	GND	Ground
8	Input 1	Alarm input 1
9	Input 2	Alarm input 2
10	GND	Ground



### 3.3 Bottom



	Terminal	Meaning
11	OUT1NC	Output 1 normally closed
12	OUT1COM	Output 1
13	OUT1NO	Output 1 normally open
14	OUT2NC	Output 2 normally closed
15	OUT2COM	Output 2
16	OUT2NO	Output 2 normally open
17	b2	Looped-through telephone connection
18	b1	Phone line to network provider
19	a1	Phone line to network provider
20	a2	Looped-through telephone connection

a1 and b1 are the incoming phone lines (e.g. outside line or private branch exchange).  
a2 and b2 are used to connect a phone in series. In idle state, they are connected to a1 and b1 via a loop current connector. a2 and b2 are detached as soon as the modem uses the line.

### 3.4 User Profiles

The modem offers a choice of profiles.

Default factory setting:

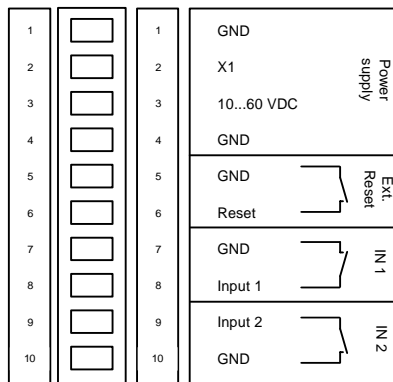
- The default factory settings enable you to achieve a fixed defined basic state of the modem. Starting with this “basis”, you can customize the modem according to your requirements.
- User profiles 0 and 1:  
You can save configurations in the user profile, which may be re-used for certain purposes.  
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 Installation

### 1. Mounting on DIN rail

### 2. Connecting the power supply:

- a) Connecting the ground connection
- b) Connecting the power supply 10..60V DC



**Note:** The specified value 10V DC is the minimum value  
The specified value 60V DC is the maximum value

### 3. Switch on power supply

*Power LED on*

### 4. Connection with the PC

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

### 5. Driver Installation

If you use a terminal program or the HSComm program, the installation of a driver is not necessary. 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.

### 6. Modem communication

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).

Perform a short test using your terminal program (TeraTermPro, ProcommPlus).

Check if the installation was successful

**AT**

Enter the command and push the **"Enter"** key.

*LED RX/TX on*

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 with the telephone network**

Plug the supplied phone cord into the jack on the rear of the modem. The plug of the cable must lock in.

The other end of the phone cord is plugged into the telephone outlet. When modems are connected to older phone outlets, an adapter or a multiple TAE/N outlet may be necessary.

#### **10. Check the connection between two modems**

Enter the command and push the **"Enter"** key

**ATDT 0101901929**

The modem will be connect.

*LED OH lights*

*Connect...*

## 5 Standard Functions

### 5.1 Configuration

#### 5.1.1 Change Configuration

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 an overview.

**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
*Y0,0 *Y1,0 %B0 %C3 %E2 %S0
```

```
\A1 \D0 \N3 \V0 &A0 &C1 &D2 &G0 &K3 &Q5 &R1 &S0
&X0 &Y0
```

```
S00:005 S01:000 S02:043 S03:013 S04:010 S05:008
S06:003 S07:050 S08:002 S09:006
```

```
S10:014 S11:085 S12:050 S13:003 S15:000 S17:042
S18:000 S24:000 S25:005 S26:001
```

```
S36:135 S38:020 S46:138 S48:007 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 X3 *A1 *L0 *M0 *P0 *R1 *Y0,0 *Y1,0 %B0
%C3 %E2 %S0
\A1 \D0 \N3 \V1 &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 *Y0,0 *Y1,0 %B0
%C3 %E2 %S0

\A1 \D0 \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:**

Storage location for the phone numbers:

**PHONE NUMBERS:**

```

0= <Z0>          1= <Z1>
2= <Z2>          3= <Z3>

```

```

AT&Z0=<Phonenumber>
AT&Z1=<Phonenumber>
AT&Z2=<Phonenumber>
AT&Z3=<Phonenumber>

```

### 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

The modem will automatically detect the baud rate of the connected PC.

The adjustment to the transmission speed on the phone line is performed automatically, unless the settings say otherwise. While a connection is established, 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.

**+++**

You will 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 PC operating speed. It is, however, possible to deactivate this data buffering and switch to bit direct mode.

When working with buffers, handshake must be used, because otherwise an overflow could occur which might lead to data transmission errors.

### 5.2.3 Bit Direct Mode

**Note:** Only for special, non-standard data formats

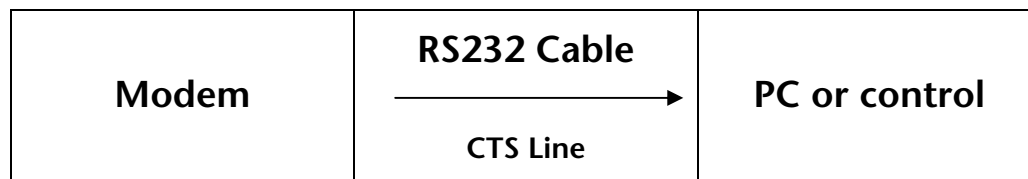
In bit direct mode, the modem has no influence on the transmission format. The data is transmitted without buffering.

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).

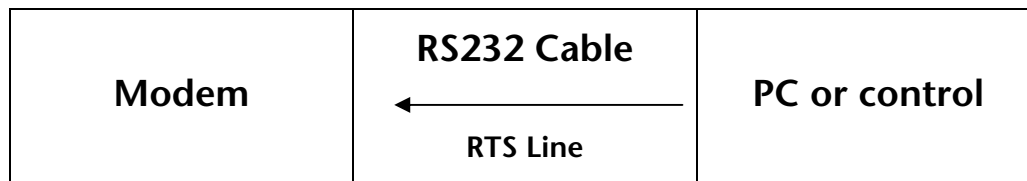


When the input buffer of the modem exceeds a certain fill state, the modem will set the CTS line to OFF. This will indicate to the modem not to send any more data.

**AT&K3 AT&R1**

**Note:** 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 on and reports to the PC that it is ready to receive data again.

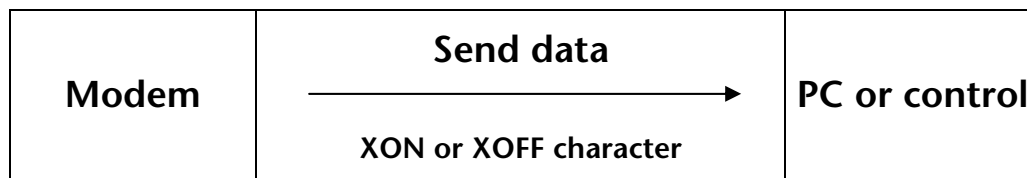
### 5.2.5 Hardware Data Flow Control with the PC (RTS)



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

**Note:** It will depend on the according PC software, if the RTS/CTS lines are operated from the PC. **AT&K** **AT&R**  
The PC sets the RTS line to ON to request data from the modem.

### 5.2.6 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 PC. This character will cause the PC to send no more data.

**Note:** If the PC supports XON/XOFF data flow control will depend on the according PC software. **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 PC to send data again. Analogously, the PC can control the data stream from the modem to the PC.  
The XON/XOFF method is only available when the transmitted data do not contain the characters XON or XOFF, which usually means only in actual ASCII texts (7 bit). When binary data (programs, etc.) are transmitted, also for BTX operation or in the XMODEM transmission protocol, for example, occasionally appearing XON or XOFF characters would disturb the operation.



### 5.2.7 Reset

There are three reset options:

A reset is performed after the power supply has been interrupted for a short time.

After the key RESET on the front panel of the modem is pressed

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**

### 5.2.8 Dial-up Delay

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 MNP error correction can be operated either in block or in stream mode. The maximum block size can be set to either

64 byte	<b>AT\A0</b>
128 byte	<b>AT\A1</b>
192 byte	<b>AT\A2</b>
and 256 byte.	<b>AT\A3</b>

The MNP error correction can either be set automatically or activated via AT commands. **AT\Nn**

## 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%Cn**

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.

MNP 5 cannot re-pack packed data.

**AT%C1**

**AT%C3**

### 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 place via the caller ID transmission (CLIR). 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 matches a phone number that was entered in the list will the modem accept the call according to the settings.

**AT\*Nn=<Nummer>**

e.g.: Store phone number 1234 at storage location 6

**AT\*N6=123**

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\*Nn=094158692\*\***

Our example will activate all phone numbers that start with 094158692 and have 2 more digits (e.g. an extension).

**AT\*N6=094158692\*\***

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

**AT\*Nn=**

**AT\*N5=**

**AT\*Nn=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 Switch Output

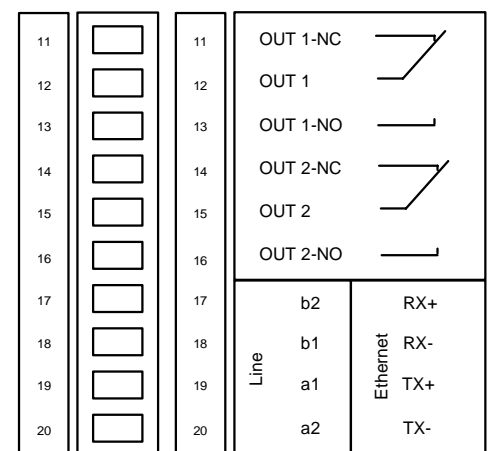
The HELMHOLZ Modem 56k 4.0 has two switch outputs OUT1 and OUT2 at the bottom of the cover, which are designed as potential-free relay switches. They can be controlled individually via software commands. OUT1 is automatically closed during the processing of a pulse alarm.

**AT\*Yx,y**

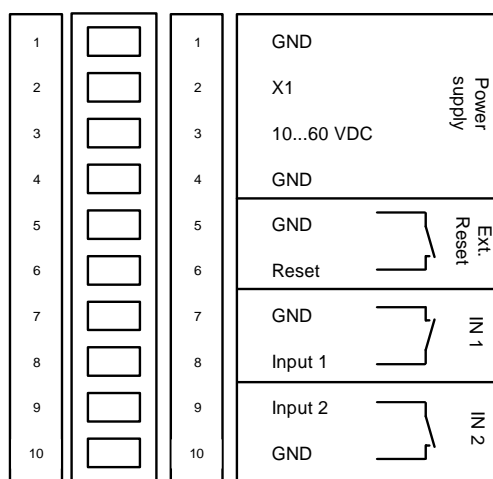
	open	close
Out 1	<b>AT*Y0,0</b>	<b>AT*Y0,1</b>
Out 2	<b>AT*Y1,0</b>	<b>AT*Y1,1</b>

The switch outputs can be remote-controlled:

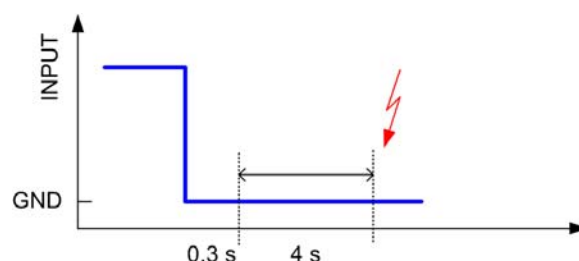
- Via a data connection (see Chap. 5.9)
- Via DTMF tones (see Chap. 5.10)



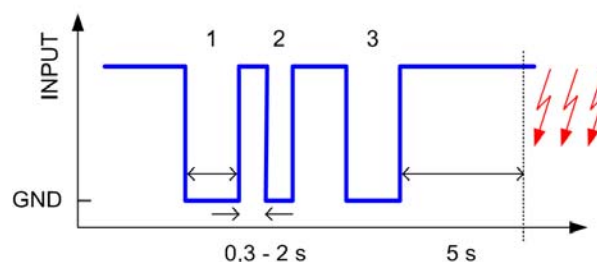
## 5.7 Alarm input



The HELMHOLZ Modem has two digital inputs, which are activated by connecting them to ground (at least 4 seconds). When an alarm occurs, the HELMHOLZ modem can send a message either via a data connection, a fax or an SMS. The simple activation of INPUT2 acts as 2 pulses at INPUT1.



If the pulse input (INPUT1) is activated, the HELMHOLZ modem can distinguish between 10 pulse sequences. Each of these 10 alarm events is allocated an alarm message and a recipient.



The length of a pulse or the pause respectively can have a duration between 0.3 and 2 seconds.

The entire pulse processing takes place after a pause of 5 seconds.

For control purposes, simple and pulse alarms may be triggered via **AT** commands.

The status of the alarm inputs can be queried by **AT** commands or via DTMF tones (see Chap. 5.10).

The status can also be queried by AT commands.

**AT\*I<n>**

Response for inactive alarm input 1

Response for active alarm input 0

## 5.8 Send Messages

HS-COMM Modem 144/336/56k 4.0

Datei Schnittstelle Terminal Parametrieren Fehler Programmeinstellungen Device Sprache/Language SP5 Hilfe Info

Modem-Funktionen Alarmfunktionen

Aktion bei Alarm:

Alarmierung: Impulseingang aktiv

Verbindungsart: SMS an D1 Netz

Service Center Nummer: 01712521002

☐ FAX-Sammelmeldung

Zeichen für Amtsholung:

Anwahlversuche:

Sammelmeldung (max 120 Zeichen) noch 115 Zeichen übrig

Alarm

Meldung	zugehörige Telefonnummer
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

COM1 9600 8N1

**Note:** The sending time of an SMS from the HELMHOLZ Modem 56k 4.0 to a recipient depends on the pertinent provider of the service number. Depending on the degree of utilization and the time of the day an SMS may be on the way for an extended period.

### 5.8.1 Transmission Configuration

The modem cannot 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 are available.

The maximum text length is 160 characters.

Protocol settings – see table -

**AT\*M<n>**

Transmission	Protocol	Data format	AT command	Example
Data Connection			<b>AT*M0</b>	
SMS to Mobile	PET	8N1	<b>AT*M1</b>	D1 or E Network
SMS to Mobile	UCP	7E1	<b>AT*M2</b>	
SMS to Mobile	PET	7E1	<b>AT*M3</b>	

SMS to Mobile	UCP	8N1	<b>AT*M4</b>	D2 network
Fax			<b>AT*M5</b>	
SMS to Mobile or Fixed Network			<b>AT*M6</b>	

Enter the service number of the network provider to send SMS,  
or the phone number for fax and data connections

**AT&Z0=<Phonenumber>**

Definition of the variable alarm texts and phone numbers  
to send SMS at input 1 or 2. After the command has been  
activated, the modem will query the alarm text.

**AT\*V1=<text>**

**AT\*V2=<text>**

The modem will reply with

*new text:*

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

**<Phonenumber,Text>**

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 all required settings for network  
providers in German-speaking countries in the attachment.

## 5.8.2 Triggering

Manual triggering of the alarm message 1 or 2 via the **AT**  
command or by connecting the inputs (PIN18, 20) with ground.

**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*

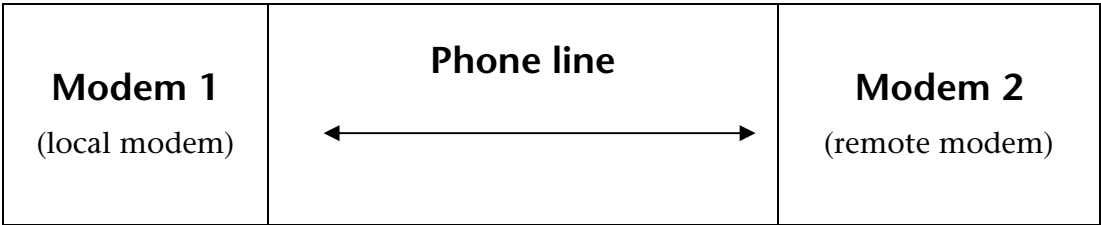
After the message was sent, the connection is terminated.

5.8.3 Fax Logging

All alarm messages can also be sent to a fax number for logging reasons. **AT&Z3=<Phonenumber>**

5.9 Remote Configuration (Remote Control)

5.9.1 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, to use 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.

5.9.2 Remote Modem Preparation

- |                                        |                            |
|----------------------------------------|----------------------------|
| Auto answer                            | <b>ATS0=2</b>              |
| Deactivate security callback           | <b>AT&amp;Z1=</b>          |
| Release modem for remote configuration | <b>AT*R1</b>               |
| Save entry                             | <b>AT&amp;W0 AT&amp;W1</b> |

5.9.3 Change Default Password at Remote Modem

- |                       |                                        |
|-----------------------|----------------------------------------|
| Change password       | <b>AT*C</b><br><br><i>OLD PASSWORD</i> |
| Enter old password    | <b>QWERTY</b>                          |
| Enter new password    | <i>NEW PASSWORD</i>                    |
| Re-enter new password | <i>Confirm</i>                         |



### 5.9.4 Local Modem Operation

Dial the modem

**ATD**  
**<Phonenumber>**

*The modem will establish a successful connection*

*Connect...*

Switch to the mode "Remote Configuration"

**\*\*\*\***

*Prompt for entering the password*

*Remote Access*  
*Remote Password:*

Enter password (default)

**QWERTY**

*If the entry was successful, the remote modem will send the input prompt*

**>**

### 5.9.5 Reduced Command Set

Some commands may not be executed during remote configuration and will lead to the following response

<b>ATA</b>	<b>ATD</b>
<b>ATO</b>	<b>AT/B</b>
<b>AT*C</b>	<b>AT&amp;F</b>

### 5.9.6 Terminate the Remote Configuration Process

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

**ATZ0**      **ATZ1**

*The modem loads the user configuration 0 or*

## 5.10 Remote Switching and Remote Query via DTMF

In phone networks, DTMF is used to dial a remote terminal. To enable switching centers to distinguish between voice and DTMF digits, these digits are created from two unique frequencies, which cannot be created by people in this form. These tones are created with the keys of fixed network and mobile phones.

With the help of DTMF (Dual Tone Multiple Frequency), the status of inputs and outputs can be queried.

### 5.10.1 Preparation

Activate DTMF mode	<b>AT\D1</b>
--------------------	--------------

Deactivate DTMF mode	<b>AT\D0</b>
----------------------	--------------

Save settings (optional)	<b>AT&amp;W</b> <b>AT&amp;W1</b>
--------------------------	-------------------------------------

After the activation the modem is set into receive mode for incoming calls.

At the start of the DTMF mode connection, the PIN number is prompted. The default setting is "0000".	<b>AT*C1=&lt;PIN&gt;</b>
------------------------------------------------------------------------------------------------------	--------------------------

The PIN consists of 4 digits and may be changed any way. The change is immediately stored in the permanent storage.

### 5.10.2 Operation

After the message "OK" (short low tone – short pause – short high tone), the modem expects the input of the PIN.

If the modem recognizes the dial tone of a modem that wants to establish a connection, it will immediately switch to data mode.

After the PIN was entered, the caller will receive a response or a confirmation of his/her action:

"OK"                    short low tone – short pause – short high tone  
                              (command executed)  
"ERROR"                long low tone (invalid command)

The following commands can be performed via the phone keys:

Key	Meaning
0*	<u>Terminate connection</u>
1*x	<u>Control switch output 1:</u> x:                    1                    Set switch output 1 0                    Reset switch output 1 Return: "OK"
2*x	<u>Control switch output 2:</u> x:                    1                    Set switch output 2 0                    Reset switch output 2 Return: "OK"
3*	<u>Query of the two alarm inputs:</u> Both alarm inputs are output in succession. After the "OK", for each alarm input state a tone will occur. If the alarm input is set to "HIGH", a high long tone is output, and for the LOW state a low long tone. HIGH                                    high long tone LOW                                      low long tone

**Note:** If nothing is entered for more than 25 seconds, the modem will automatically disconnect.

## 5.11 Access Control

### 5.11.1 Password

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

The default setting is **QWERTY**

### 5.11.2 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**

### 5.11.3 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.

#### 5.11.3.1 Preparation

The activation takes place by saving the call back number in the phone number registry of the modem that is calling back. **AT&Z1=<Phonenumber>**

The deactivation takes place by deleting the call back phone number. **AT&Z1=**

#### 5.11.3.2 Operation

Establishing a connection to the modem. **ATD <Phonenumber>**

The connection to the modem is established. The modem responds to an incoming call, so after 2 seconds the message *Connect*  
*SECURITY CALLBACK*  
*REMOTE PASSWORD:*

You must now enter the "Remote Password", which is identical with the password for the remote configuration. **QWERTY**

After the password has been entered correctly, the modem hangs up and after about 10 seconds dials the stored phone number. *OK*

Altogether, 3 dialing attempts with a pause of 10 seconds between each attempt are performed. *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***

## **5.12 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.

### **5.12.1 Activation**

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

**ATS15=<n>**

### **5.12.2 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 set 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.

## **5.13 Priority circuit for modems with a downcircuit phone**

The modem 56k 4.1 allows you to give a downcircuit phone priority so that the modem functions do not restrict the availability of the phone connection for its user.

Command	Function 1	Function 2	Function 3
	(Ch. 5.10.1)	(Ch. 5.10.2)	(Ch. 5.10.3)
<b>AT-STE=0</b>	==	==	==(default)
<b>AT-STE=1</b>	√	==	==
<b>AT-STE=2</b>	==	√	==
<b>AT-STE=3</b>	√	√	==
<b>AT-STE=4</b>	==	==	√
<b>AT-STE=5</b>	√	==	√
<b>AT-STE=6</b>	==	√	√
<b>AT-STE=7</b>	√	√	√

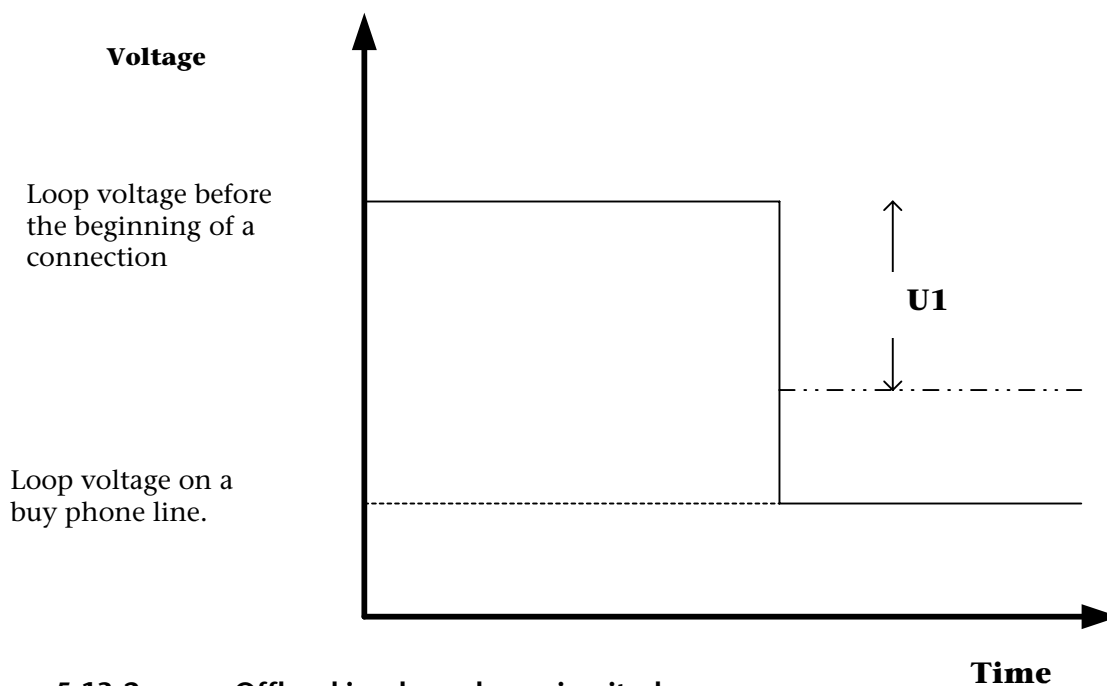
### 5.13.1 Detection of a busy phone line

On a dial-in attempt the modem detects the busy phone line.  
The modem signals

**LINE IN USE**

Using **AT** commands, the change in loop voltage can be set to  
detect the function – detection of a busy line (**U1**).

**AT-TTE=U1, U2, U3**



### 5.13.2 Offhooking by a downcircuit phone

If a downcircuit phone is taken off the hook while a modem connection is up, the modem will end the connection immediately.

The phone is connected to the line and receives a dial tone.

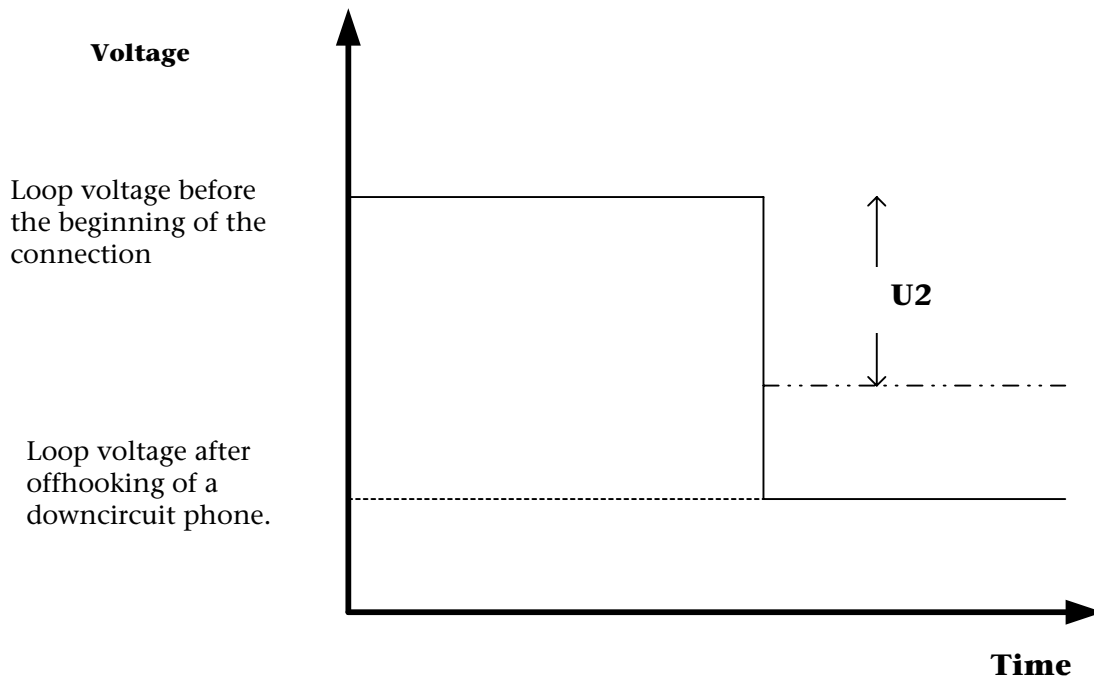
The S86 register is set to the value 25.

**ATS86=25**

When the phone connection has ended, the modem does not reconnect.

Using **AT** commands, the change in loop voltage can be set to detect the function – offhooking by a downcircuit phone (**U2**).

**AT-TTE=U1, U2, U3**



**Note:** Detection starts immediately after the earphone is picked off the hook. Simple analog phone systems often connect the modem directly to the exchange line via a contact when connecting to the exchange, which causes a sudden change or reversal of the loop voltage. This may cause mistaken detection on some analog phone systems. Detection of offhooking is therefore not recommended with analog phone systems.

### 5.13.3 Disconnection by the interlocutor

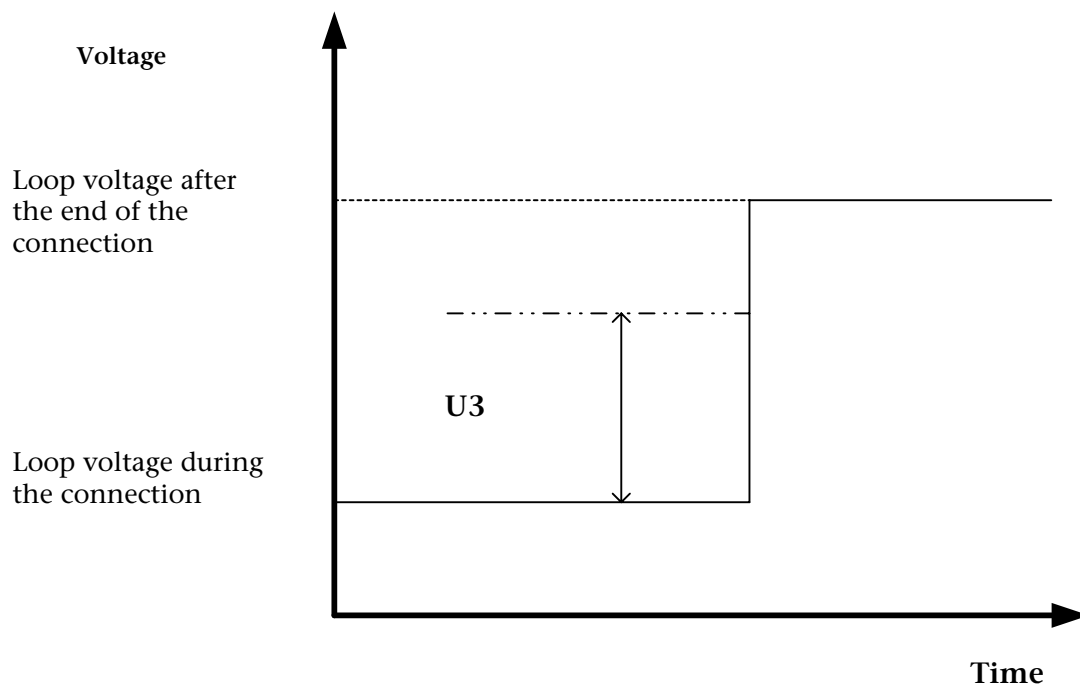
On disconnection by the interlocutor, the modem hangs up immediately.

The S86 register is set to the value 25.

**ATS86=25**

Using **AT** commands, the change in loop voltage can be set to detect the function – disconnection by the interlocutor (**U3**).

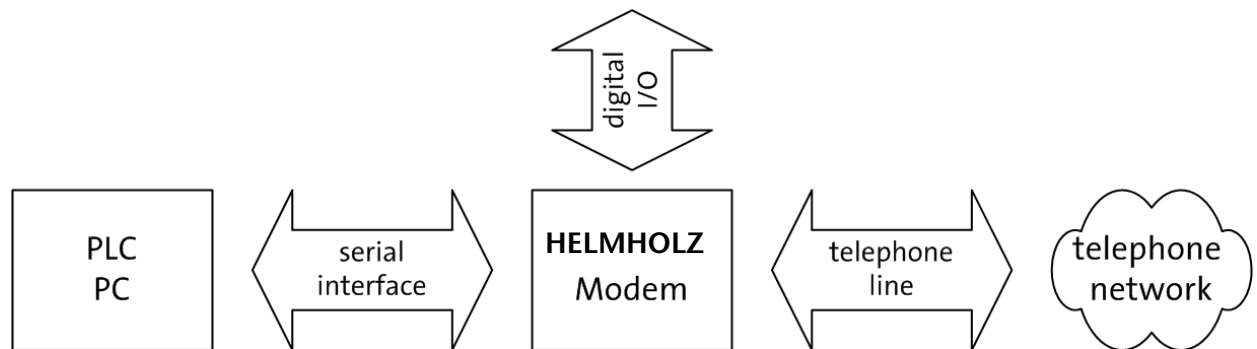
**AT-TTE=U1, U2, U3**



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

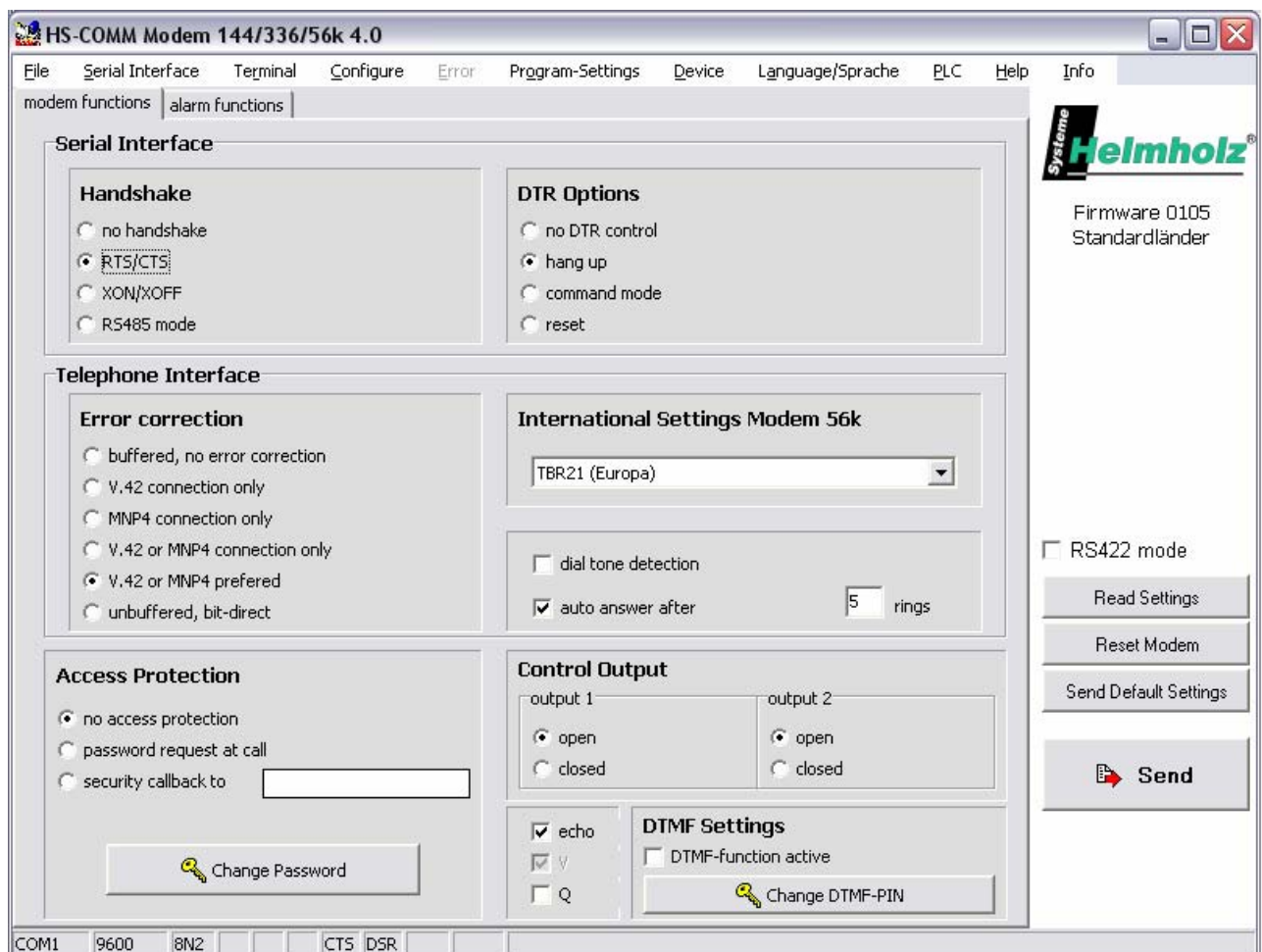


## 6 Software HSComm



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* → *Verify Device*, HSComm verifies the connected device and displays the device name and the firmware in the right top of the program window. 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 send the default options.

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

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

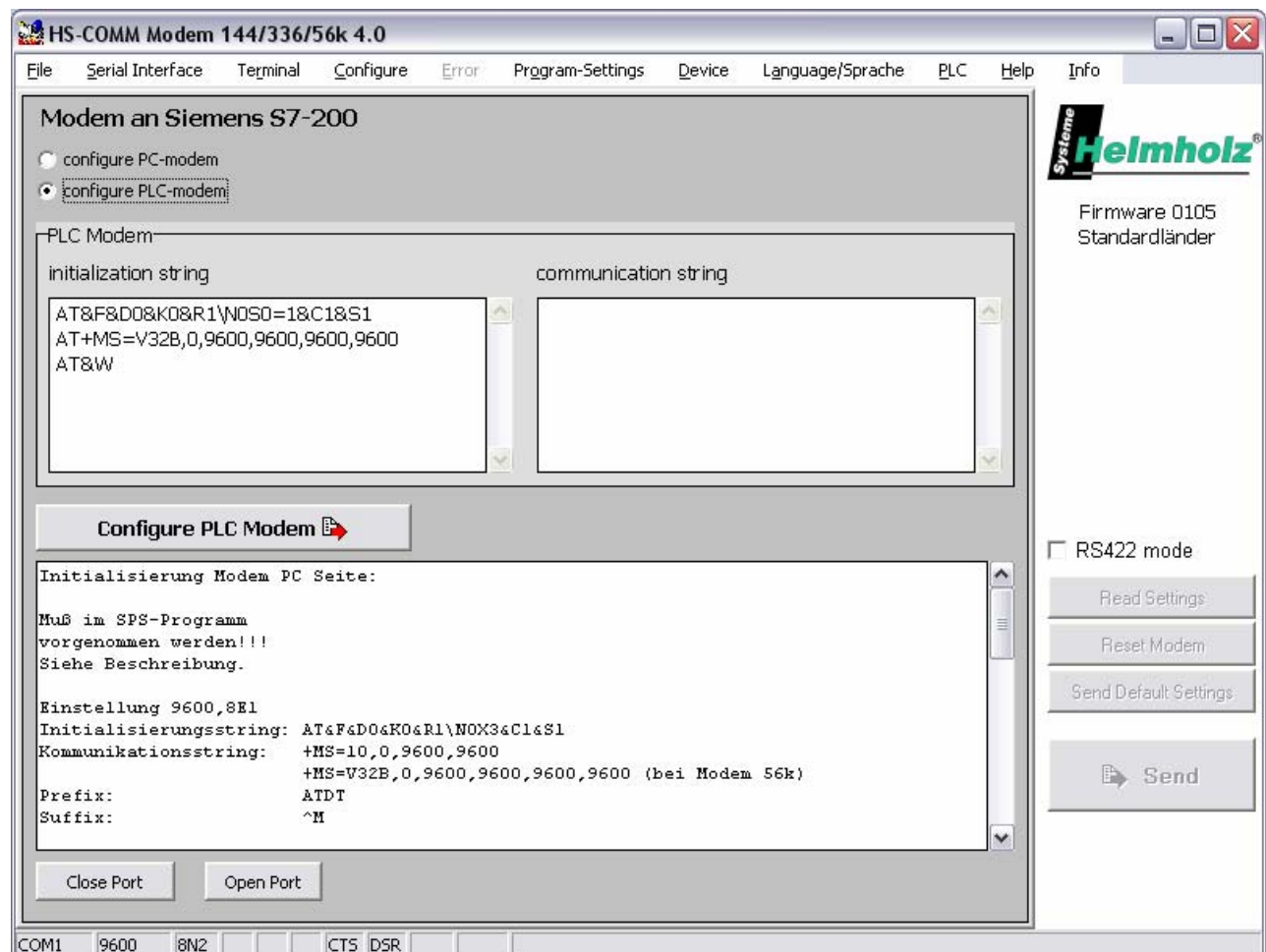
When errors occur while transmitting a configuration to the HELMHOLZ modem, these are displayed in the *Error* menu.

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

## 7 Operation with Programmable Logic Controllers (PLC)

The HELMHOLZ Modem 56k 4.0 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 Helmholtz GmbH (mailto: info@helmholz.de).



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

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

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

## 8 Update

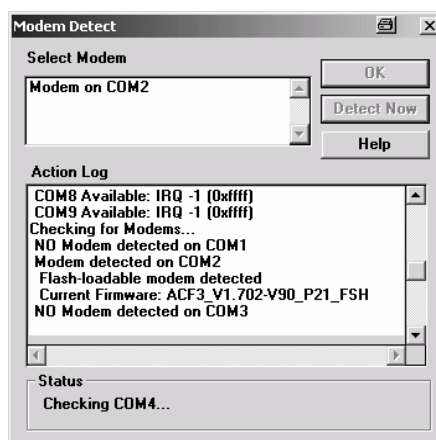
### 8.1 Flashcom.exe

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

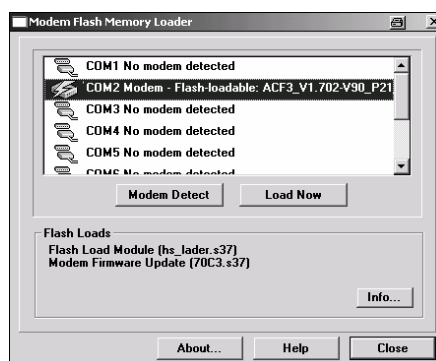
Query of the used firmware

**ATI4**

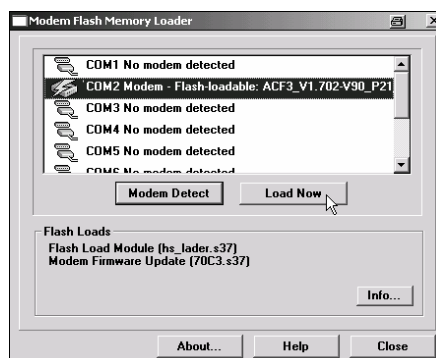
Unpack the file into any directory and start Flashcom.exe.



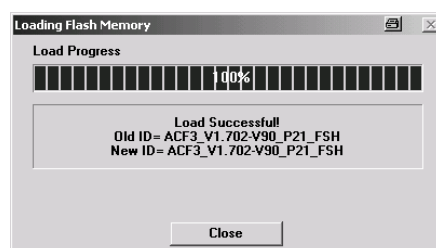
The program will automatically search for the connected modem.



Select the according HELMHOLZ Modem and start the update.



Close the window when the update is completed.



## 8.2 Terminal Program

### 8.2.1 Requirement

You will need a PC and a terminal program for the firmware update. 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, etc.) 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...*

**Transmit the file  
using the terminal  
program.**

The update is performed in two steps.

- ASCII upload of the file HS\_LADER.S37 *Download Flashcode*
- ASCII upload of the firmware (xxxxxxx.S37) *Device successfully programmed*

Completion of the loading procedure.

The process is finished.

#### 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 Configuration Notes

All HELMHOLZ communication devices are controlled internally via AT commands. To enter AT commands directly – instead of configuring the HSComm software – 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>.

## 10 AT commands

If the modem receives an **AT** command after being switched on, it will automatically perform an according adjustment to this baud rate, the number of data and stop bits and the parity. 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 as soon as the modem received the return.

#### Syntax:

<b>&lt;expression&gt;</b>	Input of a parameter
<b>&lt;Pause&gt;</b>	Means a waiting period of one second
<b>[expression]</b>	Optional input of a parameter

The factory settings are marked with "(default)".

Example **ATL<n>** with 'n' having the values 0 to 3, for example **ATL2** (medium volume). For commands which expect a parameter, but are specified without one, the modem automatically assumes the parameter 0. This means that for example the command **ATZ** equals the command **ATZ0**.

The standard end character is “return” (oDh) or “<CR>”. “Return” may not be entered after “\*\*\*\*” or “+++”.

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

## 10.1 AT Commands

Command	Description
<b>AT**</b>	<u>Start of the flash load function</u>
<b>ATA</b>	<u>Answer mode</u> The modem is switched into response mode. This is only effective in Germany, if the connected phone goes off-hook or if a call comes in.
<b>A/</b>	<u>Repeat the last command</u> The last command is repeated.
<b>AT\A&lt;n&gt;</b>	<u>Select maximum MNP block size</u> Define maximum block size for error corrected MNP transmissions. <b>AT\A0</b> 64 characters <b>AT\A1</b> 128 characters (default) <b>AT\A2</b> 192 characters <b>AT\A3</b> 256 characters
<b>AT*A&lt;n&gt;</b>	<u>Automatic call acceptance on/off</u> <b>AT*A0</b> Call acceptance is blocked, irrespective of S0 <b>AT*A1</b> Call acceptance according to S0 (default)
<b>AT%A</b>	<u>Simple alarm release</u> Releases a simple alarm. Corresponds to an activation of the alarm input. The response occurs after the signal has been sent with “OK” or “ERROR”. <b>Note:</b> see also <b>AT*V</b>
<b>AT%A&lt;n&gt;</b>	<u>Triggers a pulse alarm</u> Triggers a pulse alarm. Corresponds to an activation of the alarm input with <b>n</b> pulses from 0.3 .. 2 seconds. n=1..10. The response occurs after the signal has been sent with “OK” or “ERROR”. <b>Note:</b> see also <b>AT*V&lt;n&gt;</b>
<b>AT&amp;A&lt;n&gt;</b>	<u>Selective Call Answer On or Off</u> <b>AT&amp;A1</b> Switches the selective call answer on <b>AT&amp;A0</b> Switches the selective call answer off (default) Input of permitted numbers with <b>AT*N</b> The <b>AT&amp;A</b> setting is saved in <b>AT&amp;W</b> .
<b>ATB&lt;n&gt;</b>	<u>CCITT or Bell for connections with 300 bit/s</u> <b>ATB0</b> Select CCITT modulation format (default) <b>ATB1</b> Select Bell modulation format

Command	Description
<b>AT\B&lt;n&gt;</b>	<p><u>Send "break" to the other modem</u></p> <p>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.</p> <p>For error corrected connections, the modem sends a break signal according to the active error correction protocol without considering a parameter specification.</p> <p>If no connection is established or if a fax connection is active, an error message is displayed.</p> <p><b>AT\B1</b>            1/10 second break signal to</p> <p><b>AT\B9</b>            9/10 second break signal</p>
<b>AT%B&lt;n&gt;</b>	<p><u>Switch key abort on and off during connection</u></p> <p><b>AT%B0</b>            Key abort is active. Each character on the Tx line will result in an interruption of the connection setup. (default)</p> <p><b>AT%B1</b>            Key abort is deactivated. The connection setup cannot be interrupted manually.</p> <p>A connection setup can only be interrupted via DTR drop, Cancel (<b>NO DIALTONE, BUSY</b>) or Timeout (<b>NO CARRIER</b>). (S-Registry 36 Bit 6)</p>
<b>AT%C&lt;n&gt;</b>	<p><u>Enable data compression</u></p> <p>Enable/disable a data compression type</p> <p>The modem can only perform data compression for error corrected connections.</p> <p><b>AT%C0</b>            No data compression enabled</p> <p><b>AT%C1</b>            MNP 5 data compression enabled</p> <p><b>AT%C2</b>            Enable V.42bis data compression</p> <p><b>AT%C3</b>            Enable MNP 5 and V.42bis data compression (default)</p>
<b>AT*C</b>	<p><u>Remote configuration password</u></p> <p>This password secures the remote configuration as well as incoming data connections (see <b>AT*P</b>) and security callback.</p> <p><b>OLD PASSWORD</b>    requires the old password (default setting: QWERTY). Wrong input leads to <b>ERROR</b>.</p> <p><b>NEW PASSWORD</b>    Enter the new password with 6 to 12 characters.</p> <p><b>CONFIRM</b>            repeat the new password. Wrong input leads to <b>ERROR</b>.</p> <p><b>OK</b>                    The password is immediately stored in the EEPROM.</p>



Command	Description
<b>AT+C1</b>	<p><u>DTMF PIN</u></p> <p>The PIN consisting of 4 characters secures the access to DTMF switching commands.</p> <p><b>OLD DTMF-PIN</b>      requires the old PIN (default setting: 0000). Wrong input leads to <b>ERROR</b>.</p> <p><b>NEW DTMF PIN</b>      Enter the new PIN (all characters are allowed – use only DTMF characters: “0..9”, “A..D”).</p> <p><b>CONFIRM</b>              repeat the new PIN Wrong input leads to <b>ERROR</b>.</p> <p><b>OK</b>                      The PIN is immediately stored in the EEPROM.</p>
<b>AT&amp;C&lt;n&gt;</b>	<p><u>DCD (CT109) behavior</u></p> <p>Behavior of the RS232 DCD output of the modem.</p> <p><b>AT&amp;C0</b>                  DCD always on</p> <p><b>AT&amp;C1</b>                  DCD follows the carrier signal of the phone line (default)</p>

Command	Description
<b>ATD&lt;n&gt;</b>	<p><u>Dial</u></p> <p>The modem goes off-hook and dials according to the dialing string transmitted via the <b>ATD</b> command. After it dialed, the modem attempts to establish a connection. If the <b>ATD</b> 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 <b>ATX</b> command).</p> <p>The execution of the <b>ATD</b> command also depends on when the last dialing attempt was performed.</p> <p>In the mode FCLASS=0 the modem acts like a data modem. It attempts to connect to another data modem. This attempt is repeated until the waiting period that was specified in the S7 registry has expired.</p> <p>If this period is exceeded, the modem hangs up and the following error message appears: <b>NO CARRIER</b> is displayed.</p> <p>In the modus 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 <b>AT+FRH</b> had been executed.)</p> <p>The following characters may be transmitted as parameters (brackets, punctuation marks, spaces and semicolons are ignored):</p> <p><b>0 to 9</b>      The digits from 0 to 9</p> <p><b>*</b>            The asterisk: Only for tone dialing</p> <p><b>#</b>            The hash: Only for tone dialing</p> <p><b>A-D</b>        The inband signaling characters A, B, C, D</p> <p><b>P</b>            Pulse dialing mandatory: Pulse or tone dialing is required according to the region.</p> <p><b>T</b>            Tone dialing mandatory: Pulse or tone dialing is required according to the region.</p> <p><b>W</b>            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.</p> <p><b>@</b>            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 cannot be detected and the abort period in the S7 registry has not been exceeded, the modem terminates the connection displaying the message: <b>NO ANSWER</b>.</p> <p>If busy signal recognition was activated, the modem terminates the connection displaying the message: <b>BUSY</b>.</p> <p>If a response tone from the other modem is received during the waiting period, a connection is established.</p> <p>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.</p>

Command	Description
<b>ATD&lt;n&gt;</b> <i>CONTINUATION</i>	<p><b>L</b> Last number re-dialing.</p> <p><b>;</b> Return to the input mode after dialing. Is attached to the end of the dialing string. Causes the modem to return to the input mode after reaching the character “;” (message: <b>OK</b>). This enables the input of <b>AT</b> commands even with a receiver off-hook. The additional <b>AT</b> commands can follow in the same input line after the “;” or they can be transmitted to further input lines. The <b>ATH</b> command will abort the connection and the receiver is hung up.</p> <p><b>S=n</b> Dialing the n-th number from the number pool, which was set up with the <b>AT&amp;Z</b> command.</p> <p><b>!</b> Flash. If the character ! is a part of the dialing string, the modem will hang up within the time determined in S29 and then goes off-hook again.</p> <p><b>^</b> Suppresses the sending of a ringing tone.</p> <p><b>ATD12345;</b> The semicolon (;) causes the return to the input mode after dialing.</p> <p>Factory setting: Ringing tone is sent for fax operation. No ringing tone for data operation.</p> <p>( ) Are ignored: They are just used as an outline.</p> <p>- Are ignored: They are just used as an outline.</p> <p>, , Space characters are ignored: They are just used as an outline.</p> <p>Examples:</p> <p><b>ATD12345</b> Dial the phone number 12345</p> <p><b>ATDP12345</b> Dial the phone number 12345 with the pulse dialing method</p> <p><b>ATDT12345</b> Dial the phone number 12345 with the tone dialing method</p> <p><b>ATX3D0W12345</b></p> <p>For PBXs, which connect to the exchange line using the prefix 0 (or 9): First, blind dialing is activated with <b>:X3</b> (see “<b>ATX3</b>” command), to be able to dial a leading 0 without hearing a dialing tone. After the 0 has been dialed via <b>:D0</b> , dialing tone recognition can be switched on again using the parameter <b>:W</b> . 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 <b>ATX3D012345</b>.</p>

Command	Description														
<b>AT&amp;D&lt;n&gt;</b>	<p><u>DTR (CT108/2) behavior</u></p> <p>DTR (CT108/2) behavior - Monitoring on/off transitions of the RS232 DTR line of the PC.</p> <p><b>AT&amp;D0</b>      DTR is ignored. Allows the operation with PCs that do not run DTR.</p> <p><b>AT&amp;D1</b>      A DTR on/off transition causes the modem to react as if it had received an abort sequence +++ . The modem switches to the input mode without hanging up.</p> <p><b>AT&amp;D2</b>      A DTR on/off transition causes the modem to hang up. Going off-hook automatically is not possible (default).</p> <p><b>AT&amp;D3</b>      A DTR on/off transition causes the modem to perform a reset as if an <b>ATZ</b> command had been executed. A preceded <b>AT&amp;Y</b> command decides if either the default 1 or 2 is loaded.</p>														
<b>AT\D&lt;n&gt;</b>	<p><u>DTMF mode activation/deactivation</u></p> <p><b>AT\D1</b>      Switch on DTMF mode</p> <p><b>AT\D0</b>      Switch on DTMF mode (default)</p> <p>When the DTMF mode is activated, the modem will be set into DTMF mode for incoming calls. After the signal <b>OK</b>, the modem requires the input of the 4-digit PIN. The PIN input is acoustically acknowledged.</p> <p>The following commands can be performed via the phone keys:</p> <table> <tr> <th>Key</th><th>Meaning</th></tr> <tr> <td><b>0*</b></td><td>Terminate connection</td></tr> <tr> <td><b>1*x</b></td><td>Control switch output 1</td></tr> <tr> <td>    x:</td><td>           1:      Set switch output 1            0:      Reset switch output 1            Return: "OK" </td></tr> <tr> <td><b>2*x</b></td><td>Control switch output 2</td></tr> <tr> <td>    x:</td><td>           1:      Set switch output 2            0:      Reset switch output 2            Return: "OK" </td></tr> <tr> <td><b>3*x</b></td><td> Query of the two alarm inputs:  Both alarm inputs are output as HIGH or LOW in succession.  Return: "OK" – Status input 1 – Status input 2 </td></tr> </table>	Key	Meaning	<b>0*</b>	Terminate connection	<b>1*x</b>	Control switch output 1	x:	1:      Set switch output 1 0:      Reset switch output 1 Return: "OK"	<b>2*x</b>	Control switch output 2	x:	1:      Set switch output 2 0:      Reset switch output 2 Return: "OK"	<b>3*x</b>	Query of the two alarm inputs: Both alarm inputs are output as HIGH or LOW in succession. Return: "OK" – Status input 1 – Status input 2
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<b>3*x</b>	Query of the two alarm inputs: Both alarm inputs are output as HIGH or LOW in succession. Return: "OK" – Status input 1 – Status input 2														

Command	Description
<b>AT\D&lt;n&gt;</b> <i>CONTINUATION</i>	<p><b>Acoustic response</b></p> <p><b>Description</b></p> <p>Short long tone – short pause ok Short high tone</p> <p>Long low tone <b>ERROR</b> invalid command, wrong PIN</p> <p>High long tone <b>LOW</b> Alarm input active <b>HIGH</b> Alarm input inactive</p> <p>If no DTMF tone is entered for more than 25 seconds, the modem will automatically disconnect.</p> <p>If the HELMHOLZ modem recognizes the call tone of a modem that wants to establish a connection, it will immediately switch to data mode.</p>
<b>AT+DS&lt;n&gt;</b>	<p><u>Activate/deactivate V.42bis data compression</u></p> <p><b>AT+DS=0</b> Deactivates V.42bis data compression <b>AT+DS=3</b> Activates V.42bis data compression (default)</p>
<b>AT+DS44=&lt;n&gt;</b>	<p><u>Activate/deactivate V.44 data compression</u></p> <p><b>AT+DS44=0</b> Deactivates V.44 data compression <b>AT+DS44=3</b> Activates V.44 data compression (default)</p>
<b>ATE&lt;n&gt;</b>	<p><u>Command entry Echo</u></p> <p>This command toggles the responses, which the modem creates as reactions from PC commands (Echo).</p> <p><b>ATE0</b> Switch off Echo <b>ATE1</b> Switch on Echo (default)</p>
<b>AT%E&lt;n&gt;</b>	<p><u>Automatic Retrain</u></p> <p>When transmission problems occur, the modem executes a retrain procedure. After three unsuccessful attempts, the modem will hang up.</p> <p><b>AT%E0</b> Retrain not allowed <b>AT%E1</b> Retrain allowed <b>AT%E2</b> Fall back, fall forward allowed (default) <b>AT%E3</b> Fast fall back, fall forward. Is not supported by all modem types.</p>
<b>AT*E</b>	<p><u>Terminate remote configuration</u></p> <p><b>AT*E</b> terminates a remote configuration.</p>
<b>AT&amp;F</b>	<p><u>Loading the default factory settings</u></p> <p>The modem loads the default factory setting from the internal, nonvolatile memory. This puts the modem into a defined basic state. <b>AT&amp;F</b> also resets a part of the S registry.</p>

Command	Description
<b>AT+GCI</b>	<u>Set country code</u> The command <b>AT+GCI</b> allows the customization of the modem for different countries. Factory setting: <b>AT+GCI=FD</b> to Europe (CTR21). Please find a detailed list of the countries that can be set in Chap. 3. <b>Note:</b> Please note that all country settings will result in <b>ALL</b> modem settings being reset to the factory settings (such as <b>AT&amp;F&amp;W</b> ). Therefore, please select a country profile first and adjust the settings afterwards.
<b>ATH</b>	<u>Disconnect connection</u> The modem hangs up.
<b>AT*H&lt;n&gt;</b>	<u>Declaration of the connection protocol speed (MNP 10)</u> <b>AT*H</b> determines the speed that is used to exchange the declarations during the MNP10 connection setup before the modems enter the MNP 10 mode. <b>AT*H0</b> The connection setup takes place with the highest possible speed (default) <b>AT*H1</b> Connection setup takes place with 1,200 bps <b>AT*H2</b> Connection setup takes place with 4,800 bps
<b>ATI&lt;n&gt;</b>	<u>Identification</u> The modem sends an identification to the PC, according to the following parameter: <b>ATI0</b> Product code <b>ATI1</b> Previously calculated EPROM checksum <b>ATI2</b> Calculation of the EPROM checksum and comparison with the previously calculated checksum stored in the EPROM. OK for correct comparison. <b>ATI3</b> Number of firmware version in the EPROM <b>ATI4</b> Modem version number <b>ATI5</b> Country code parameter (Germany = 006/Europe = 253) <b>ATI6</b> Version number and revision of the "data pump"
<b>AT*I</b>	<u>Manual query of the alarm input</u> Response      <Input 1>,<Input 2> The response provides the values "1" for inactive (open) and "0" for active (connected to ground)

Command	Description
<b>AT+IPR=&lt;n&gt;</b>	<p><u>Determine baud rate</u></p> <p>The command <b>AT+IPR</b> switches the automatic baud rate detection on and off.</p> <p><b>AT+IPR=0</b> Activates the automatic baud rate detection (default)</p> <p><b>AT+IPR=&lt;n&gt;</b> 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.</p> <p>The setting <b>AT+IPR</b> is not saved with <b>AT&amp;W</b>, which means that in order to inactivate auto bauding, the command <b>AT+IPR</b> must be sent to the modem every time it is switched on.</p>
<b>AT&amp;K&lt;n&gt;</b>	<p><u>Select data flow control between the PC and the modem (handshake)</u></p> <p>Fax operation default is RTS/CTS.</p> <p><b>AT&amp;K0</b> No data flow control</p> <p><b>AT&amp;K3</b> Select data flow control RTS/CTS (default)</p> <p><b>AT&amp;K4</b> Select data flow control XON/XOFF</p> <p><b>AT&amp;K5</b> Select transparent data flow control XON/XOFF</p> <p><b>AT&amp;K6</b> Select RTS/CTS and XON/XOFF data flow control</p> <p><b>AT&amp;K8</b> 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 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 <b>AT&amp;R</b>.</p>
<b>AT-K&lt;n&gt;</b>	<p><u>Extended MNP functions (MNP 10)</u></p> <p>This command determines if a V.42LAP-M connection can be switched to a MNP 10 connection</p> <p><b>AT-K0</b> Disables switching from V.42 LAP-M to MNP 10 (default)</p> <p><b>AT-K1</b> Enables switching from V.42 LAP-M to MNP 10</p>

Command	Description
<b>AT\K&lt;n&gt;</b>	<p><u>Break control</u></p> <p>The modem reacts to a break (receive path off for a certain amount of time), which it receives from another modem or from the PC, or from the command <b>AT\B</b> according to the parameters.</p> <p><b>1. Situation</b> In case of a break from the PC during the data connection to another modem:</p> <p><b>AT\K0</b> Modem enters the command mode and sends no break to the other modem</p> <p><b>AT\K1</b> Modem deletes the data buffer and sends a break to the other modem</p> <p><b>AT\K2</b> See <b>AT\K1</b></p> <p><b>AT\K3</b> Modem immediately sends break to the other modem; data buffers are not deleted</p> <p><b>AT\K4</b> See <b>AT\K0</b></p> <p><b>AT\K5</b> Modem inserts break into the data transmitted to the other modem</p> <p><b>2. Situation</b> During a data connection, the modem was put into command mode by an escape sequence <b>+++</b>. In this condition, the command <b>AT\B</b> will send a break to the other modem. In this situation, the parameter <b>n</b> will cause the following:</p> <p><b>AT\K0</b> Modem deletes the data buffer and sends a break to the other modem</p> <p><b>AT\K1</b> See <b>AT\K0</b></p> <p><b>AT\K2</b> Modem sends break to the other modem without delay</p> <p><b>AT\K3</b> See <b>AT\K2</b></p> <p><b>AT\K4</b> Modem inserts break into the data transmitted to the other modem</p> <p><b>AT\K5</b> Like <b>AT\K4</b> – Return from the online command mode into the data mode</p> <p>via the <b>ATO</b> command.</p> <p><b>3. Situation</b> In the case a break is received from another modem during a connection that has not been error corrected, the parameters cause the following:</p> <p><b>AT\K0</b> Modem deletes the data buffer and sends a break to the PC</p> <p><b>AT\K1</b> See <b>AT\K0</b></p> <p><b>AT\K2</b> Modem sends a break to the PC without delay</p> <p><b>AT\K3</b> See <b>AT\K2</b></p> <p><b>AT\K4</b> Modem sends a break to the PC, which is embedded into the data that was received from the other modem</p> <p><b>AT\K5</b> Like <b>AT\K4</b></p>



Command	Description
<b>ATL&lt;n&gt;</b>	<p><u>Speaker volume</u></p> <p>This command regulates the speaker volume (see ATM)</p> <p><b>ATL1</b> Speaker volume low (default)</p> <p><b>ATL2</b> Speaker volume medium</p> <p><b>ATL3</b> Speaker volume high</p> <p><b>Note:</b> The speaker output is optional and is not supported in the standard version.</p>
<b>AT*L&lt;n&gt;</b>	<p><u>Determines the automatic speed limitation</u></p> <p>The automatic speed limitation is used to automatically achieve the least possible error rate for connections without error correction.</p> <p>In the factory settings the speed limitation is always switched on (<b>AT*L0</b>).</p> <p>If the limitation is switched off (<b>AT*L1</b>), the modem will always establish the connection on the phone side with the maximum possible speed (or the speed defined with <b>AT+MS</b>), irrespective of the data rate at the serial interface. This means that the HELMHOLZ Modem 56k will, for example, always attempt to establish a 56000-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.</p> <p>The automatic speed limitation (<b>AT*L0</b>) will limit the speed on the phone side to the speed of the serial interface.</p> <p>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.</p>
<b>AT%L</b>	<p><u>Display level of the received signal</u></p> <p>The value that is reported from the modem equals the already amplified level within the modem, not the phone line level.</p> <p>Large <b>AT%L</b> responses imply a low signal level; small values imply a high signal level (009 = -9db, 043 = -43db)</p>
<b>ATM&lt;n&gt;</b>	<p><u>Speaker control</u></p> <p>This command regulates when the speaker is active (see command <b>ATL</b>).</p> <p><b>ATM0</b> Speaker always OFF</p> <p><b>ATM1</b> Speaker ON during dialing and connection setup (default)</p> <p><b>ATM2</b> Speaker always ON</p> <p><b>ATM3</b> Speaker on during connection setup</p>

Command	Description
<b>AT+MR=&lt;n&gt;</b>	<p><u>Show modulation type</u></p> <p>The command “<b>AT+MR</b>” enables the display of the modulation type after the message <b>CONNECT</b></p> <p><b>AT+MR=0</b> switches the display function off (default).</p> <p><b>AT+MR=1</b> switches the display function on. The displayed value applies to the sent data</p> <p><b>AT+MR=2</b> switches the display function on. The displayed value applies to the received data</p> <p>If the display function is switched on the modem will display the modulation type and the line speed after the message <b>CONNECT</b>. After the message <b>CONNECT</b>, the line „<b>+MCR:</b>” appears, followed by the modulation type (see command <b>AT+MS</b>) and the line “<b>MRR:</b>”, followed by the line speed.</p> <p>The <b>AT+MR</b> command is useful for a connection check.</p>
<b>AT+MS=&lt;n&gt;</b> <i>CONTINUATION</i>	<p><b>Parameter Automode:</b></p> <p>The optional parameter automode determines whether the modem automatically adjusts to the desired modulation type. The following values may be used:</p> <p>0 Automatic modulation adjustment switched off</p> <p>1 Automatic modulation adjustment switched on</p> <p><b>Parameter Reception Minbaud:</b></p> <p>The optional parameter minbaud determines the lowest possible baud rate for modem reception.</p> <p><b>Parameter Reception Maxbaud</b></p> <p>The optional parameter maxbaud determines the highest possible baud rate for modem reception.</p> <p><b>Parameter <math>\mu</math>-Law, A-Law</b></p> <p>ISND coding selection</p> <p><b>Parameter reserved</b></p> <p>= always 0</p> <p><b>Parameter Sendspeed Maxbaud</b></p> <p>The optional parameter maxbaud determines the highest possible baud rate for modem sending.</p> <p><b>Example:</b></p> <p>AT+MS=12,1,300,56000,0,0,33600 (automatically adjusted to the remote terminal; the minimum speed is 300 bps. The maximum reception speed is 56,000 bps, the maximum send speed is 33,600 bps).</p>

Command	Description
<b>AT+MS=&lt;n&gt;</b>	<u>Select modulation type</u> <b>AT+MS</b> determines the modulation type. The command enables or disables automatic modulation recognition and defines the highest and lowest possible connection speed. The command format is <b>AT+MS=Modulation, [Automode], [Send: Minbaud, Maxbaud]; [Reception: Minbaud, Maxbaud],</b> <b>AT+MS?</b> Displays the current setting <b>AT+MS=?</b> <b>Displays</b> a list of possible parameters Default factory setting: depending on the device: V.90 or V92

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

Command	Description
<b>AT*M&lt;n&gt;</b>	<p><u>Remote terminal selection</u></p> <p>Defines the protocol that is used to send the alarm string to the network provider.</p> <p><b>AT*M0</b>      The remote terminal is a normal fixed network modem (default)</p> <p><b>AT*M1</b>      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)</p> <p><b>AT*M2</b>      The remote terminal is a mobile phone with network access via EMI/UCP protocol and data format 7E1</p> <p><b>AT*M3</b>      The remote terminal is a mobile phone with network access via PET/IXO/TAP protocol and data format 7E1</p> <p><b>AT*M4</b>      The remote terminal is a mobile phone with network access via EMI/UCP and data format 8N1 (e.g. D2 network in Germany)</p> <p><b>AT*M5</b>      The remote terminal is a fax machine</p> <p><b>AT*M6</b>      Fixed network SMS: The SMS gateway (e.g. Deutsche Telekom via phone number <b>01930100</b>) is not tied to a certain mobile phone network, but send SMS to any mobile or fixed network phone.</p> <p>Note:          For the remote terminals <b>AT*M1</b> to <b>AT*M4</b>, only recipients in the network of <i>one</i> GSM provider may be addressed.</p> <p>Your network provider will inform you about the current requirements to send SMS to mobile phones.</p> <p>Relevant commands: <b>AT*V</b>, <b>AT*Vn</b>    Definition of messages/phone numbers</p> <p style="text-align: center;"><b>AT*Z0</b>          Definition of the SMS service center</p>
<b>AT*N&lt;n&gt;=&lt;nr&gt;</b>	<p><u>Permitted numbers for selective call acceptance</u></p> <p>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 in S0 (the line RI is activated with each call, irrespective of that fact). The selective call acceptance is switched on and off with <b>AT&amp;A</b>.</p> <p><b>AT*N&lt;n&gt;=&lt;nr&gt;</b></p> <p><b>&lt;n&gt;</b>            describes the storage location – range of values: 0..7 .</p> <p><b>&lt;nr&gt;</b>           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.</p> <p><b>AT*N99=</b>      deletes all existing entries in the list</p> <p><b>AT*N?</b>        displays all stored entries</p> <p>Example:      <b>AT*N0=01234567**</b> permits all calls from the block of numbers 01234567-00 to 01234567-99</p>

Command	Description
<b>AT*<i>&lt;N&gt;</i>99=</b>	<u>Delete the list of permitted phone numbers for the selective call answer</u> The command <b>AT*N99=</b> deletes the entire list of phone numbers for the selective call answer.
<b>AT*N?</b>	<u>Output of the list of permitted phone numbers</u> <b>AT*N?</b> activates the output of the entire saved list of permitted phone numbers for the selective call answer.
<b>AT%N</b>	<u>Output of the last rejected phone number</u> For active selective call answer ( <b>AT&amp;A1</b> ) , the last phone number, whose call was rejected, will be displayed. This phone number is not saved in the power fail-safe memory of the modem.
<b>AT\N&lt;n&gt;</b>	<u>Select error correction</u> This command determines which type of error correction should preferably be used for subsequent connections.  <b>AT\N0</b> error correction switched off <b>AT\N1</b> bit direct mode Transparent transmission of any data width via the serial interface without data buffering or error correction. The modem will evaluate the escape sequence (+++) up to 11-bit data width. <b>AT\N2</b> Selects V.42LAP-M or MNP 4 error correction. If no error corrected connection can be established, the modem will hang up. <b>AT\N3</b> 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): <b>AT\N4</b> Exclusively selects a V.42 LAP-M connection. <b>AT\N5</b> Exclusively selects a MNP 4 connection.
<b>ATO&lt;n&gt;</b>	<u>Return to online data mode</u> 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 <b>ERROR</b> .  <b>ATO0</b> Return to online data mode <b>ATO1</b> Before the modem switches to online data mode, a retrain procedure is provoked.
<b>ATP</b>	<u>Switch on pulse dialing method (deactivated for some models)</u> Starting with this command, each dial-up is performed with the pulse dialing method, until an <b>ATT</b> or <b>ATDT</b> command switches it back to tone dialing.
<b>AT*P&lt;n&gt;</b>	<u>Password query</u>  <b>AT*P0</b> switches the password query off after the connection has been established (default):  <b>AT*P1</b> switches the password query on after the connection has been established.  If the password query is activated, the modem will query the password after <b>CONNECT</b> has taken place. After the password has been entered correctly, the actual <b>CONNECT</b> will take place and data may be transmitted. If a wrong password was entered, the modem will hang up. The password is the same as for remote control and is set with <b>AT*C</b> .

Command	Description
<b>ATQ&lt;n&gt;</b>	<p><u>Quiet control</u></p> <p>This command toggles sending messages from the modem to the PC on and off.</p> <p><b>ATQ0</b>            Send messages to PC (default)</p> <p><b>ATQ1</b>            Don't send messages to PC</p>
<b>AT%Q</b>	<p><u>Display telephone call quality</u></p> <p>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.</p> <p>Connections with more than 9600 baud will reach the value "000" for good lines and should not have values of more than "010".</p> <p>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).</p> <p>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 <b>AT%E</b> command, an <i>Autoretrain</i> is performed.</p>
<b>AT&amp;R&lt;n&gt;</b>	<p><u>RTS/ CTS behavior</u></p> <p>This command determines how the modem treats the RTS/CTS (CT105/CT106) data flow control lines.</p> <p>(See also command <b>AT&amp;K</b>).</p> <p><b>AT&amp;R0</b>            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 (<b>AT&amp;K8</b>) CTS is active, if the modem sends data at the serial interface. When data is received at the serial interface, CTS is inactive.</p> <p><b>AT&amp;R1</b>            CTS only switches to <i>off</i> when this is required by the data flow control. During the controlled half duplex operation (<b>AT&amp;K8</b>) CTS is inactive, if the modem sends data at the serial interface. When data is received at the serial interface, CTS is active (default):</p>
<b>AT*R&lt;n&gt;</b>	<p><u>Switches the remote control on and off</u></p> <p><b>AT*R0</b>            switches the remote control off</p> <p><b>AT*R1</b>            switches the remote control on (default)</p>

Command	Description
<b>ATS&lt;n&gt;</b>	<p><u>Read/write of the S registry</u></p> <p>Some S registries may only be modified within certain limits. The modem still reports <b>OK</b> although the value has not changed as specified. Certain registries are read-only. We recommend checking the results after each write attempt using the <b>ATS&lt;n&gt;?</b> command.</p> <p><b>ATS&lt;n&gt;=x</b>      Sets the S registry n to the value x.</p> <p><b>ATS&lt;n&gt;?</b>      Shows the value of the S registry n</p>
<b>AT&amp;S&lt;n&gt;</b>	<p><u>DSR behavior</u></p> <p>This command determines how the modem treats its DSR (CT107) output.</p> <p><b>AT&amp;S0</b>          DSR always on (default)</p> <p><b>AT&amp;S1</b>          DSR <i>on</i> after a response tone has been detected; DSR <i>off</i> when no carrier is detected any more.</p>
<b>AT*S&lt;n&gt;</b>	<p><u>Selects the transmission speed at the serial interface.</u></p> <p>With this command the speed can be preselected. This will, however, not switch off the automatic detection. As soon as an <b>AT</b> is recognized, the serial interface will set itself to the recognized speed and protocol.</p> <p>If no <b>AT</b> 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 <b>AT&amp;W</b>.</p> <p>Attention:      This command will not change the registry S23! It only changes if the automatic speed detection is used.</p> <p><b>AT*S0</b>          maintain the current speed.</p> <p><b>AT*S1</b>          300 bps</p> <p><b>AT*S2</b>          600 bps</p> <p><b>AT*S3</b>          1,200 bps</p> <p><b>AT*S4</b>          2,400 bps</p> <p><b>AT*S5</b>          4,800 bps</p> <p><b>AT*S6</b>          9,600 bps</p> <p><b>AT*S7</b>          19,200 bps</p> <p><b>AT*S8</b>          38,400 bps</p> <p><b>AT*S9</b>          57,600 bps</p> <p><b>AT*S10</b>        115,200 bps</p>
<b>AT%S&lt;n&gt;</b>	<p><u>Ability to switch between DCD and DSR lines</u></p> <p><b>AT%S0</b>          The DSR signal is on the DSR line The DCD signal is on the DCD line (Default factory setting)</p> <p><b>AT%S1</b>          The DSR signal is on the DCD line The DCD signal is on the DSR line (Interchangeability of the lines)</p>



Command	Description																																								
ATT	<u>Switching on tone dialing</u> Starting with this command, each dial up is performed with the tone dialing method, until an <b>ATP</b> or <b>ATDP</b> command switches it back to pulse dialing.																																								
AT-TRV	<u>Phone Line Voltage Measurement (Tip Ring Voltage)</u> Use the command <b>AT-TRV</b> 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.																																								
AT*U<n>	<u>Selects the protocols at the serial interface.</u> With this command the protocol can be preselected. This will, however, not switch off the automatic detection. As soon as an <b>AT</b> is recognized, the serial interface will set itself to the recognized speed and protocol. If no <b>AT</b> 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 <b>AT&amp;W</b> . Attention: This command will not change the registry S23! It only changes if the automatic speed and protocol detection is used. <table><tr><td><b>AT*U0</b></td><td>8 data bits,</td><td>no parity,</td><td>1 stop bit</td></tr><tr><td><b>AT*U1</b></td><td>7 data bits,</td><td>odd parity,</td><td>1 stop bit</td></tr><tr><td><b>AT*U2</b></td><td>7 data bits,</td><td>even parity,</td><td>1 stop bit</td></tr><tr><td><b>AT*U3</b></td><td>7 data bits,</td><td>no parity,</td><td>1 stop bit</td></tr><tr><td><b>AT*U4</b></td><td>7 data bits,</td><td>odd parity,</td><td>2 stop bits</td></tr><tr><td><b>AT*U5</b></td><td>7 data bits,</td><td>even parity,</td><td>2 stop bits</td></tr><tr><td><b>AT*U6</b></td><td>7 data bits,</td><td>no parity,</td><td>2 stop bits</td></tr><tr><td><b>AT*U7</b></td><td>8 data bits,</td><td>odd parity,</td><td>1 stop bit</td></tr><tr><td><b>AT*U8</b></td><td>8 data bits,</td><td>even parity,</td><td>1 stop bit</td></tr><tr><td><b>AT*U9</b></td><td>8 data bits,</td><td>no parity,</td><td>2 stop bits</td></tr></table>	<b>AT*U0</b>	8 data bits,	no parity,	1 stop bit	<b>AT*U1</b>	7 data bits,	odd parity,	1 stop bit	<b>AT*U2</b>	7 data bits,	even parity,	1 stop bit	<b>AT*U3</b>	7 data bits,	no parity,	1 stop bit	<b>AT*U4</b>	7 data bits,	odd parity,	2 stop bits	<b>AT*U5</b>	7 data bits,	even parity,	2 stop bits	<b>AT*U6</b>	7 data bits,	no parity,	2 stop bits	<b>AT*U7</b>	8 data bits,	odd parity,	1 stop bit	<b>AT*U8</b>	8 data bits,	even parity,	1 stop bit	<b>AT*U9</b>	8 data bits,	no parity,	2 stop bits
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<b>AT*U9</b>	8 data bits,	no parity,	2 stop bits																																						
ATV<n>	<u>Format of modem messages</u> This command determines if the modem transmits messages to the PC in short or long format. <table><tr><td><b>ATV0</b></td><td>Messages to PC in short format, i.e. only the error number (default)</td></tr><tr><td><b>ATV1</b></td><td>Messages to PC in long form, i.e. the error text</td></tr></table>	<b>ATV0</b>	Messages to PC in short format, i.e. only the error number (default)	<b>ATV1</b>	Messages to PC in long form, i.e. the error text																																				
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<b>ATV1</b>	Messages to PC in long form, i.e. the error text																																								
AT\V<n>	<u>Format of connect rate messages</u> This command enables the display of the connect message in one (\V1) line or in three lines (\V0) *.																																								

Command	Description
<b>AT*V</b>	<u>Definition of the common alarm texts (collective message)</u> 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 <b>AT*V</b> the modem responds with <b>NEW TEXT:</b> and expects the input of the alarm text (completed with <CR>)  This command is not available in the remote operation mode.  Relevant commands: <b>AT*V</b> , <b>AT*V&lt;n&gt;</b> Definition of messages/phone numbers <b>AT*Z0</b> Definition of the SMS service center
<b>AT*V?</b>	<u>Query of the common alarm texts (collective message)</u> The common part of the alarm message is queried with the command <b>AT*V?</b> .
<b>AT*V&lt;n&gt;</b>	<u>Definition of the variable alarm texts and phone numbers</u>  Definition of the 10 variable alarm texts and phone numbers for the SMS dispatch for an input of n=1..10 pulses. The common part of the alarm message ( <b>Collective message</b> ) is defined with <b>AT*V</b> . After this command is activated, the modem will query the alarm text.  To the input <b>AT*V1</b> to <b>AT*V10</b> the modem responds with <b>NEW TEXT:</b> and expects an input in the form <b>phone number,message&lt;CR&gt;</b>  <b>Phone number</b> Enter without characters for accessing the exchange (only required for service number)  <b>Message</b> 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.  This command is not available in the remote operation mode.  Relevant commands: <b>AT*V</b> , <b>AT*V&lt;n&gt;</b> Definition of messages/phone numbers <b>AT*Z0</b> Definition of the SMS service center
<b>AT*V&lt;n&gt;?</b>	<u>Query of the variable alarm texts and phone numbers</u> The variable part of the alarm message and the target phone number are queried with <b>AT*V&lt;n&gt;?</b>

Command	Description
<b>AT&amp;V&lt;n&gt;</b>	<p><u>Display configurations</u></p> <p><b>AT&amp;V0</b> 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</p> <p><b>AT&amp;V1</b> Displays the diagnostic data of the last connection (connection partner, reason for disconnect).</p> <p><b>TERMINATION REASON:</b> Reason for termination. For example manually with the command <b>ATH: "LOCAL REQUEST"</b>.</p> <p><b>LAST TX rate:</b> Last baud rate at the phone line in send direction, prior to the termination.</p> <p><b>HIGHEST TX rate:</b> Highest baud rate that was achieved at the phone line in send direction, prior to the termination.</p> <p><b>LAST RX rate:</b> Last baud rate at the phone line in receive direction, prior to the termination.</p> <p><b>HIGHEST RX rate:</b> Highest baud rate that was achieved at the phone line in receive direction, prior to the termination.</p> <p><b>Note:</b> 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 <b>AT+MS</b>.</p> <p><b>PROTOCOL:</b> Displays the used error correction protocol. "<b>LAPM</b>" equals a V.42 secured connection. For "<b>NONE</b>", the connection was not error corrected (the error corrected can be influenced with the command <b>AT\N</b>).</p> <p><b>COMPRESSION:</b> Displays the used data compression method. The example shows the used compression method V.42bis (the compression method can be set with the command <b>AT%C</b>).</p> <p><b>LINE QUALITY:</b> 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.</p> <p>Connections with more than 9600 baud will reach the value "000" for good lines and should not have values of more than "010".</p> <p>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).</p> <p><b>Rx LEVEL:</b> 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. Too high levels could cause distortions; too low levels will cause the line noise to have a negative impact on the connection quality.</p> <p><b>Local Rtrn Count:</b> Number of retrains (renegotiation of the connection), triggered by the local modem.</p> <p><b>Remote Rtrn Count:</b> Number of retrains (renegotiation of the connection), triggered by the remote modem.</p>

Command	Description
<b>AT+VCID=&lt;n&gt;</b>	<u>Set caller ID</u> With this function, the phone number of the caller can be displayed during an incoming call. (only for phone connections or phone units which support caller ID. If you want to use caller ID, please ask your network provider, if your connection supports caller ID) <b>AT+VCID=0</b> switches the caller ID function off. (default) <b>AT+VCID=1</b> switches the caller ID function on and displays the ID preformatted for incoming calls. <b>AT+VCID=2</b> switches the caller ID function on and displays the ID unformatted for incoming calls.
<b>AT+VRID=&lt;n&gt;</b>	<u>Set last received caller ID</u> The command <b>AT+VRID</b> displays the caller ID of the last caller. <b>AT+VRID=0</b> displays the ID preformatted. <b>AT+VRID=1</b> displays the ID unformatted.
<b>ATW&lt;n&gt;</b>	<u>Error correction messages</u> This command determines which data transmission rate information is provided for a CONNECT message. <b>ATW0</b> The modem reports the baud rate between modem and PC (default). <b>ATW1</b> During the connection setup, the modem reports the phone line speed, the error correction protocol and the PC baud rate. <b>ATW2</b> The modem reports the phone line speed.
<b>AT&amp;W&lt;n&gt;</b>	<u>Save configuration</u> The command saves the current modem configuration including the S registry in one of the two user-defined defaults. <b>AT&amp;W0</b> Save in user default 0 <b>AT&amp;W1</b> Save in user default 1

Command	Description
<b>ATX&lt;n&gt;</b>	<p><u>Extended result messages, dial tone detection</u></p> <p>The command determines which group of messages the modem sends to the PC. This is important for PBXs, as often a leading 0 or 9 must be dialed before a dialing tone is heard on the line. <i>Blind dialing</i> (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 <b>ATD</b> dialing string (see command <b>ATD</b>). In the mode <b>AT+FCLASS=1,2</b>, the modem always sends the message <b>CONNECT</b> to the PC without specifying the transmission speed.</p> <p><b>ATX0</b>      No detection of the dialing tone, i.e. an unsuccessful dialing attempt leads to the message <b>NO CARRIER</b>.  No detection of the busy signal, i.e. when calling a busy line the message <b>NO CARRIER</b> is displayed. The message is displayed without specifying the speed.</p> <p><b>ATX1</b>      As <b>ATX0</b>, but the <b>CONNECT</b> message contains the speed specification.</p> <p><b>ATX2</b>      Dialing tone detection is active, i.e. a dialing attempt without the presence of a dialing tone leads to the message <b>NO DIALTONE</b>.  No detection of the busy signal, i.e. when calling a busy line the message <b>NO CARRIER</b> is displayed.</p> <p><b>ATX3</b>      No detection of the dialing tone, i.e. an unsuccessful dialing attempt leads to the message <b>NO CARRIER</b>.  Busy signal detection active, i.e. when calling a busy line the message <b>BUSY</b> is displayed.</p> <p><b>ATX4</b>      Dialing tone detection is active, i.e. a dialing attempt without the presence of a dialing tone leads to the message <b>NO DIALTONE</b>. (default)  Busy signal detection is active, i.e. when calling a busy line the message <b>BUSY</b> is displayed.</p>
<b>AT*X</b>	<p><u>Terminate remote configuration</u></p> <p>The command <b>AT*X</b> terminates a remote configuration.</p>
<b>AT&amp;Y&lt;n&gt;</b>	<p><u>Selection of user configuration for hardware reset</u></p> <p><b>AT&amp;Y0</b>      For a hardware reset following the <b>AT&amp;Y0</b>-command, the user default 0 (created using the <b>AT&amp;W0</b> command) is loaded into the current modem configuration (default).</p> <p><b>AT&amp;Y1</b>      For a hardware reset following the <b>AT&amp;Y1</b>-command, the user default 1 (created using the <b>AT&amp;W1</b> command) is loaded into the current modem configuration.</p>
<b>AT*Yx,y</b>	<p><u>Switch outputs</u></p> <p><b>x:</b>            Port (OUT1=0, OUT2=1)  If no port is specified (x), OUT1 is used</p> <p><b>y:</b>            Desired condition of the output (relay open =0, relay closed =1)</p> <p>Factory setting:                      <b>AT*Y0,0</b>                      <b>AT*Y1,0</b></p>

Command	Description
<b>ATZ&lt;n&gt;</b>	<p><u>Software reset/load default</u></p> <p>The command causes the modem to perform a software reset. The modem will load the default saved by the user (according to the parameter). If no parameter is specified, the user default 0 is loaded.</p> <p><b>ATZ0</b>                Software reset; afterwards the user default 0 is loaded.</p> <p><b>ATZ1</b>                Software reset; afterwards the user default 1 is loaded.</p> <p><b>Note:</b>                If the command is executed during an existing connection, the modem will terminate this existing connection and then execute the RESET!</p>
<b>AT&amp;Z&lt;n&gt;</b>	<p><u>Save phone numbers</u></p> <p>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.</p> <p><b>AT&amp;Z&lt;n&gt;=xxx</b>        <b>n</b>        is the number of the list entry (from 0 to 3).                                  <b>xxx</b>        is the dialing string with the phone number.</p> <p>Layout of the alarm functions and security callback:</p> <p><b>AT&amp;Z0=xxx</b>        Number of the modem or fax for a simple alarm message                                  Service center number of the GSM provider for SMS access</p> <p><b>AT&amp;Z1=xxx</b>        Enter the password into the modem that calls back</p> <p><b>AT&amp;Z2=xxx</b>        Number of the mobile phone for simple alarm messages</p> <p><b>AT&amp;Z3=xxx</b>        Number of the fax machine for collective alarm messages</p>
<Pause> +++ <Pause>	<p><u>Change from data mode to command mode (online command mode).</u></p> <p>1 second pause before and after the entry, no &lt;CR&gt;. After the response OK, an additional waiting period of 1 second for the re-entering of AT commands must be observed.</p>
<Pause> **** <Pause>	<p><u>Start of the remote configuration at the local modem</u></p> <p>1 second pause before and after the entry, no &lt;CR&gt;. After the response OK, an additional waiting period of 1 second for the re-entering of AT commands must be observed.</p>

## 10.2 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.

## 10.3 AT Messages

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

Message Number Short form	Message text in long form	ATX0	ATX1	ATX2	ATX3	ATX4
+F4	+FCERROR	X	X	X	X	X
0	OK	X	X	X	X	X
1	CONNECT	X	X	X	X	X
2	RING	X	X	X	X	X
3	NO CARRIER	X	X	X	X	X
4	ERROR	X	X	X	X	X
5	CONNECT 1200	1	X	X	X	X
6	NO DIAL TONE	3	3	X	3	X
7	BUSY	3	3	3	X	X
8	NO ANSWER	1	X	X	X	X
9	CONNECT 600	1	X	X	X	X
10	CONNECT 2400	1	X	X	X	X
11	CONNECT 4800	1	X	X	X	X
12	CONNECT 9600	1	X	X	X	X
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

Message Number Short form	Message text in long form	ATX0	ATX1	ATX2	ATX3	ATX4
49	CARRIER 7200	X	X	X	X	X
50	CARRIER 9600	X	X	X	X	X
51	CARRIER 12000	X	X	X	X	X
52	CARRIER 14400	X	X	X	X	X
53	CARRIER 16800	X	X	X	X	X
54	CARRIER 19200	X	X	X	X	X
55	CARRIER 21600	X	X	X	X	X
56	CARRIER 24000	X	X	X	X	X
57	CARRIER 26400	X	X	X	X	X
58	CARRIER 28800	X	X	X	X	X
59	CONNECT 16800	1	X	X	X	X
61	CONNECT 21600	1	X	X	X	X
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



Message Number Short form	Message text in long form	ATX0	ATX1	ATX2	ATX3	ATX4
167	CONNECT 36000	X	X	X	X	X
168	CONNECT 38000	X	X	X	X	X
169	CONNECT 40000	X	X	X	X	X
170	CONNECT 42000	X	X	X	X	X
171	CONNECT 44000	X	X	X	X	X
172	CONNECT 46000	X	X	X	X	X
173	CONNECT 48000	X	X	X	X	X
174	CONNECT 50000	X	X	X	X	X
175	CONNECT 52000	X	X	X	X	X
176	CONNECT 54000	X	X	X	X	X
177	CONNECT 56000	X	X	X	X	X
178	CONNECT 230400	X	X	X	X	X
180	CARRIER 28000	X	X	X	X	X
181	CARRIER 29333	X	X	X	X	X
182	CARRIER 30667	X	X	X	X	X
183	CARRIER 33333	X	X	X	X	X
184	CARRIER 34667	X	X	X	X	X
185	CARRIER 37333	X	X	X	X	X
186	CARRIER 38667	X	X	X	X	X
187	CARRIER 41333	X	X	X	X	X
188	CARRIER 42667	X	X	X	X	X
189	CARRIER 45333	X	X	X	X	X
190	CARRIER 46667	X	X	X	X	X
191	CARRIER 49333	X	X	X	X	X
192	CARRIER 50667	X	X	X	X	X
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**.

A number in a column indicates an error message according to this error number.

## 11 S Registry

S registries may be read and written using the **ATS** command. (See Chapter 5 “AT command set”, command **ATS**) 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 the modifications by reading (**ATSn?**).

### Note:

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

### 11.1 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
S11*	Data Transmit Controller DTC (144/336)	1s	0-255	0**
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*	Data Transmit Controller DTC (56k)	1s	0-255	0**
S17*	Initial character for remote configuration		0-127	42
S21*	Settings for V24			116
S22*	Settings			75h (117)
S24*	Time period until switching into sleep mode	s	0-255	0
S25	Time period for DTR signal	0.01 s	0-255	5
S26	Time period between RTS/CTS	0.01 s	0-255	1
S27*	General settings	-		137

Register	Function	Units	Range	Default
S29	Time period for modifier "flash"	10 ms	17	17
S30	Time period until hang up due to silence	10 s	0-255	0
S31*	General settings	-		C2h (194)
S36*	Reset of error logs	-		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*	Data Compression	-		138
S48*	Setting for V42 declaration phase	-		7
S86	Error event code	-		Read-only
S91*	Transmit Level	-	0-15	9
S95*	Result code	-		0

## 11.2 Description S Registry

### S0\* Rings to Auto Answer:

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 Ring Counter

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

### S2\* Escape Character

Escape character which causes a switch from data mode to online command input mode. Values larger than 127 will lead to the fact that no ESC character will be recognized.

### S3 Carriage Return Character

Carriage Return Character

**S4**    Linefeed Character

Linefeed character

**S5**    Backspace Character

Backspace character

**S6\***    Wait Time for Dial Tone (Before Blind Dialing)

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 no dialing tone is detected, it will check if the dialing tone detection has been activated or if the dial string (Chap. „AT Command Set“, command **ATD**) includes the parameter W. If the dialing tone detection is not active, the modem waits for the dialing tone. The waiting time is specified in S6.

The value of S6 can be between 4 and 7.

**S7\***    Wait for Carrier

Wait for the carrier frequency from the other modem. The maximum time for the modem to wait for a response from the other modem is specified in S7.

The time starts running as soon as the modem has finished dialing. The value of S7 can be between 0 and 180 seconds.

**S8\***    Pause Time for Dial Delay Modifier

Dial pause time, if a comma is included in the dialing string. If a comma is included 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\***    Carrier Detect Response Time

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\***    Carrier Loss Disconnect Time

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\*** Escape Prompt Delay

Minimum pre and post run time and maximum interim time in tenth 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. <b>Note:</b> The limitation to a maximum of 12 attempts is necessary for approval purposes (black listing).
Bit 4-7	Reserved	

**S14\*** General Bitmapped Options Status – General settings

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

**S15\*** DRC Time Settings

The idle connection control is a function integrated in the firmware that 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\*** General Bitmapped Options Status – Settings for V24

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

**S22\*** Bitmapped Options Status

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

**S24\*** Sleep Timer:

The time after which the modem switches to energy saving mode (sleep) during inactivity is determined (in seconds) in S24. The energy saving mode will be quit as soon as characters are sent to the modem, or when a call comes in.

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

**S25** Delay to DTR Off:

Time period, in which a DTR signal is applied to the modem before it hangs up (in hundreds of seconds).

**S26** RTS to CTS Delay

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

**S27\*** General Bitmapped Options Status – General settings

Bit	Meaning	
Bit 0-3	RS232-Mode	Asynchronous Mode Selection: 0: see <b>AT&amp;M0</b> or <b>AT&amp;Q0</b> 9: see <b>AT&amp;Q5</b> 10: see <b>AT&amp;Q6</b>
Bit 4.5	Reserved	
Bit 6	CCITT or Bell Modulation	CCITT/Bell Select 0: CCITT Modulation 1: Bell Modulation
Bit 7		Remote control 0: Remote control off 1: Remote control on

**S29** Flash Dial Modifier Time:

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

**S30** Disconnect Inactivity Timer:

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

**S31\*** General Bitmapped Options Status – General settings

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



**S36\*** LAPM Failure Control

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..4	SMS type	0: normal fixed network modem ( <b>AT*M0</b> ) 1: D1 and E networks ( <b>AT*M1</b> ) 2: D2 network ( <b>AT*M4</b> ) 5: Fax ( <b>AT*M5</b> )
Bit 6	Key abort	0: Key abort activated 1: Key abort deactivated
Bit 7		1: Call answer not locked ( <b>AT*A1</b> ) 0: Call answer locked ( <b>AT*A0</b> )

**S38** Delay Before *Forced* Hang-up

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

**S39\*** PC / Flow Control Modem

Selection of the data flow control between the PC and the modem

S39=0 No data flow control (**AT&K0**)

S39=3 RTS/ CTS data flow control (**AT&K3**)

S39=4 XON/ XOFF data flow control (**AT&K4**)

S39=5 Transparent XON data flow control (**AT&K5**)

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

**S40\*** General Bitmapped Options Status – General settings

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

**S41\*** General Bitmapped Options Status – General settings

Bit	Meaning	
Bit 0.1	Select compression type	Compression Selection 0: No compression ( <b>AT%C0</b> ) 1: MNP5 ( <b>AT%C1</b> ) 2: V42bis ( <b>AT%C2</b> ) 3: MNP5 or V.42bis ( <b>AT%C3</b> )
Bit 2	Auto retrain	Auto retrain control 0: No auto retrain ( <b>AT%E0</b> ) 1: Auto retrain ( <b>AT%E1</b> )
Bit 3	Reserved	
Bit 4	MNP block mode reserved for 56k models	Block Mode Control MNP 0: reserved 1: Block mode ( <b>AT\L1</b> )
Bit 5	Reserved	
Bit 6	Fall back/fall forward	FB/FF control 0: No FB/FF 1: FB/FF ( <b>AT%E2</b> )
Bit 7	Reserved	

**S46\*** V.42bis Data Compression

S46=136 No data compression

S46=138 V.42bis data compression on

**S48\*** V.42 Negotiation Control – 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**    Call Failure Reason Code

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

S86=0	Normal disconnect, no error
S86=4	Carrier lost
S86=5	No error corrected (V.42) connection could be established
S86=6	No extensions could be negotiated
S86=7	Remote terminal only supports synchronous modems
S86=8	No joint framing detected
S86=9	No protocol could be established
S86=10	Invalid answer when negotiating extensions
S86=11	No synchronous marks received from remote terminal
S86=12	Normal disconnection by remote terminal
S86=13	Remote terminal didn't respond any more (ten attempts)
S86=14	Protocol error
S86=15	DTR drop
S86=16	Remote terminal demanded cleardown (GSTN cleardown)
S86=17	Inactivity timer expired
S86=18	Desired speed is not supported
S86=19	Long space disconnect
S86=20	Key abort (character was sent during connection setup)
S86=22	No connection setup possible
S86=23	Cleardown after 3 retrains
S86=26	Remote terminal hung up

**S91\***    Transmit Level

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

S91=0	Transmit level – 1 dBm
S91=15	Transmit level – 16dBm

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

**S95\*** Result Code Control – Result code

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

## 12 Overview for the Sending of SMS as Fax or E-Mail

Chapter 12 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.

### 12.1 SMS as Fax

Network provider	Service center	Phone number format	Example	SMS format
T-COM (Germany)	0193010	99+area code+ Phone number	990941586920	This is a test
A1 (Austria)	43900664914	Area code+phone number	0941586920	This is a test
Swisscomm (Switzerland)	+41794998123	Area code+phone number	0941586920	*FAX#This is a test

**12.2 SMS as E-Mail**

Network provider	Service center	Phone number	SMS format	E-mail address	Example
T-COM (Germany)	0193010	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

## 13 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: <b>ATS0=2</b> <b>AT*A1</b>
The keyboard entries are not displayed in the terminal program.	The display of the keyboard entries (echo) is deactivated.	Activate the echo with <b>ATE1</b> .
The modem starts dialing after the dialing command <b>ATD</b> has been entered and reports the error " <b>No Dialtone</b> ".	The phone line is interrupted.	Check the phone line.
The modem starts dialing after the dialing command <b>ATD</b> has been entered and reports the error " <b>No Dialtone</b> ".	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 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 <b>ATD0W12345</b> ).  This problem can be solved by blind dialing (dialing without ring back signal) with the <b>ATX3</b> command or by inserting the character > into the dialing string. (See Chapter 8 " <b>AT Command Set</b> ", command <b>ATX</b> , command <b>ATD</b> )
After the <b>ATD</b> dialing command, the modem will not start dialing right away.	The dialing lock of 30 seconds is active.	See Chapter 5 "Dial-up Delay".

<b>Problem:</b>	<b>Possible cause:</b>	<b>Remedy</b>
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 <b>ATDP</b> or <b>ATDT</b> .  See also Chapter 5 "AT Command Set", commands <b>ATDP</b> , <b>ATDT</b> , <b>ATP</b> , <b>ATT</b> .
The modem can send data, but can't receive data.	The data flow control settings (RTS/CTS) are wrong.	See Chapter 5 "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 handbook of the used software and the paragraphs regarding "Data Flow Control" in Chapter 5.
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 Chapter 5 "Error Correction and Data Compression"



## 14 Safety Instructions

### 14.1 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 4.0 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. If other devices experience short circuits, the HELMHOLZ Modem will thus not be inoperative.
- Using another power supply unit could damage the modem; in this event, the manufacturer will assume no liability.
- We recommend installing suitable overvoltage protection.

### 14.2 SMS

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.

### 14.3 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.

## 15 Technical Data

### 15.1 Physical Features

Physical Features	
Dimensions w x l x h	2.22 in x 2.22 in x 0.57 in
Weight	1,129 / 0,847 oz.
Pitch dimension of the connector	0.08 in
Diameter of the fastening holes	0.10 in
Plug height over board edge	0.24 in

### 15.2 Power Supply

Power supply: 10..60 V DC

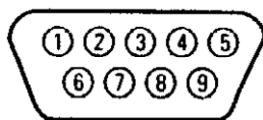
Power consumption: approx. 2,5 W (with connection)

Current consumption:

Supply voltage	Current (idle)	current (connection)	max . power-up current
10 VDC	200 am	240 mA	300 mA
24 VDC	100 mA	110 mA	150 mA

### 15.3 Serial Interface

Layout of the 9 pin D-Sub jack



Description of the signals at the 9 pin D-SUB jack of the DCE:

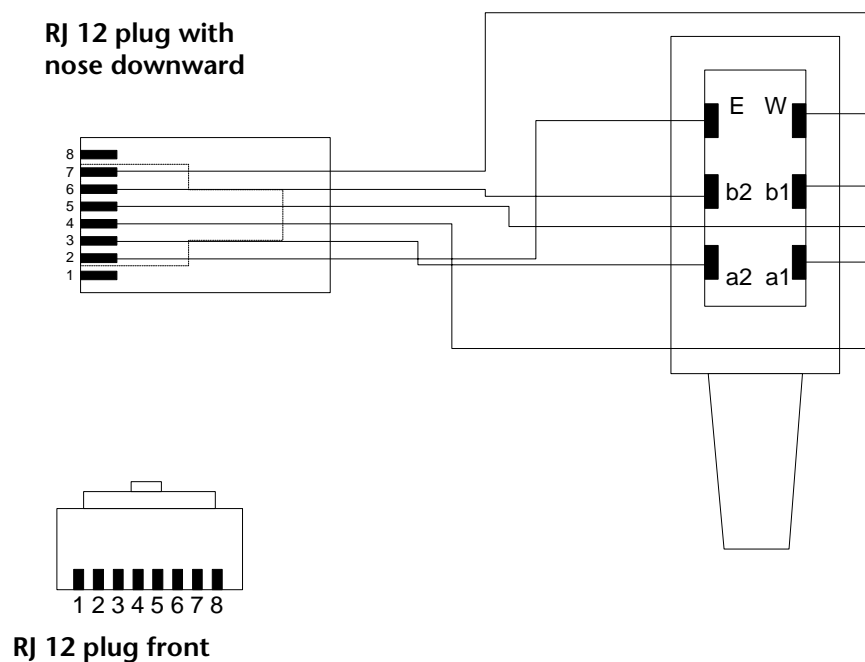
9 pin D-SUB DCE pin no.	Description	Function	CCITT V-24	EIA RS232	DIN 66020	E/A DCE to DTE
1	DCD	Data Carrier Detect	109	CF	M5	O
2	RXD	Receive Data	104	BB	D2	O
3	TXD	Transmit Data	103	BA	D1	I
4	DTR	Data Terminal Ready	108	CD	S1	I
5	GND	Ground	102	AB	E2	
6	DSR	Data Set Ready	107	CC	M1	O
7	RTS	Request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

9	RI	Ring Indication	125	CE	M3	O
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## 15.4 Interface speeds

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

## 15.5 Phone Interface



### RJ 12 and RJ 45

Pin RJ12 plug	Name	Pin RJ45 socket	Name	Pin	Name
1	NC	4	a1	7	NC
2	NC	5	b1	8	NC
3	a2	6	b2		

a1 and b1 are the incoming phone lines (e.g. outside line or private branch exchange).  
a2 and b2 are used to connect a phone in series. In idle state, they are connected to a1 and b1 via a loop current connector. a2 and b2 are detached as soon as the modem uses the line.

## 15.6 Standards

### 15.6.1 ITU Standards (CCITT)

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

ITU Standards (CCITT)	Meaning
V.21	Transmission with 300 bps full duplex
V.22	Transmission with 1,200 bps full duplex
V.22bis	Transmission with 2,400 bps full duplex
V.23	Send with 75 bps and receive with 1,200 bps and vice versa (full duplex).
V.23 half-duplex	Send or receive with 1,200 bps (half duplex)
V25bis	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.
V.42	Error protection method for DCE's with asynchronous-to-synchronous conversion
V42bis	Data compression method
V.90	Receive with 56,000 bps or (fall back) 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. Send with 33,600 bps or (fall back) 31,200, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400 bps.
V.92	Receive with 56,000 bps or (fall back) 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. Send with 48,000 bps or (fall back) 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.

## 15.6.2 Supported Standards

Helmholz Modem 56k 4.1 V.42bis, V.42, V.32bis, V.32, V.23, V.22, V22 bis, V21  
V.34+, V.FLC, V.90

## 15.7 Reset

A reset is possible via the screw terminal marked **Reset**, using an external device. A low potential must be applied at the terminal for at least 3 seconds.

Alternatively, the reset key should be pressed at least 3 seconds to trigger a reset

## 15.8 Digital Inputs And Outputs

### 15.8.1 Alarm Input

LOW 0 .. 1 V

HIGH 4 .. 12 V

Input current from LOW to internal +5V: Type 0.5 mA

### 15.8.2 Switch Output

Potential-free relay switches

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

Maximum current load: 1 A (DC) / 0.5 A (AC)

## 15.9 Approvals

The HELMHOLZ Modem 56k 4.0 bears the CE symbol of conformity. This symbol indicates that on account of its design and implementation, the HELMHOLZ Modem 56k 4.0 is in compliance with the currently valid versions of the following EC directives:

- 89/336/EEC (EMC directive)
- 73/23/EEC (Low voltage directive)
- 91/263/EEC (Telecommunications devices directive)

Approvals:

- R&TTE
- CTR21 (Europe)
- CE
- Approval number CE 0682X

## 16 Country Codes as from 56k 4.1

Adjust the modem to local requirements using the command AT+CGI=<countrycode>. All other settings should be carried out after the country code has been selected, because some factory settings depend on these country settings.

	Firmware for "standard countries"	Firmware for "extended country group"
Europe TBR21	FD (default)	FD (default)
Albania		B8
Algeria	FE	
Andorra	FD	FD
Argentina		07
Australia	09	
Austria*	0A	FD
Bangladesh	FE	
Belarus	FE	
Belgium*	0F	FD
Bolivia	FE	
Bosnia-Herzegovina	FE	
Brazil	16	
Brunei	FE	
Bulgaria		1B
Burma (Myanmar)	FE	
Cambodia	FE	
Canada	20	
Chile		25
China		26
Colombia		27
Costa Rica	FE	
Croatia		FA
Cyprus		2D
Czech Republic	2E	
Denmark*	31	FD
Dominican Republic		33
Ecuador	FE	
Egypt		36
El Salvador	FE	
Estonia		F9
Finland*	3C	FD
France*	3D	FD
Germany*	42	FD
Greece*	46	FD
Guatemala	FE	
Honduras	FE	
Hong Kong		50
Hungary	51	
Iceland*	52	FD
India		53
Indonesia		54
Ireland*	57	FD

Israel		58
Italy*	59	FD
ITU/Taiwan	FE	
Japan	00	
Jordan	FE	
Korea (Republic)		61
Kuwait		62
Laos	FE	
Latvia	FD	FD
Lebanon		64
Liechtenstein*	FD	FD
Lithuania	FE	
Luxembourg*	69	FD
Macedonia	FE	
Malaysia		6C
Mexico	73	
Monaco	FD	FD
Montenegro	FE	
Netherlands*	7B	FD
New Zealand		7E
Nicaragua	FE	
Nigeria		81
Norway*	82	FD
Oman	FE	
Pakistan		84
Panama		85
Paraguay		87
Peru	FE	
Philippines		89
Poland	8A	
Portugal*	8B	FD
Rumania	8E	
Russia		B8
San Marino *	FD	FD
Saudi Arabia	98	
Senegal		99
Serbia	FE	
Singapore		9C
Slovakia	FB	
Slovenia	FC	
South Africa		9F
Spain*	A0	FD
Sri Lanka		A1
Sweden*	A5	FD
Switzerland*	A6	FD
Taiwan	FE	
Thailand		A9
Tunesia	FE	
Turkey	AE	
Ukraine	FE	
United Arab Emirates		B3
United Kingdom*	B4	FD

Uruguay		B7
USA	B5	
Venezuela		BB
Vietnam	FE	
Yemen	FE	

\* The standard TBR21 (FD) setting applies to all public phone networks in these countries.

Only old telecommunications systems require the individual country to be set explicitly (in the standard firmware).

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## **17 Declaration of Conformity (on request)**