

Operating Manual



Analog Modem INSYS Pocket 56k 2.x

Version 1.51 / 05.04

INSYS
MICROELECTRONICS

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0 Scope Of Delivery

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

- INSYS Pocket Modem 56k 2.x
- Power supply unit 9..10 V DC
- Phone cord (TAE-N to RJ11)
- RS 232 cable (9-pin plug on 9-pin jack)
- Operating manual

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.

1 General

The INSYS Pocket Modem 56k 2.x is a modem for the analog telephone network (PSTN). 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:

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

2 Technical Data

2.1 Mechanical Features

	Pocket Modem 56K 2.x
Weight	150g / 5.29oz
Dimensions in mm (w x l x h)	71 x 128 x 22
Temperature range	0°C ... 55°C / 32°F ... 131.00°F
Protective class:	Housing IP40/Terminal IP 20
Humidity:	0 - 95 % non-condensing

Note: The Pocket Modem 56K 2.x may not be used in wet environments.

2.2 Interfaces and Display Elements



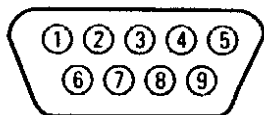
The Pocket Modem 56K 2.x possesses four LED's to indicate the operating state. They have the following meaning:

Meaning	Colour	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

2.3 Serial Interface

2.3.1 Pocket Modem 56K 2.x

Layout of the 9-pin D-SUB jack



9-pin D-SUB jack

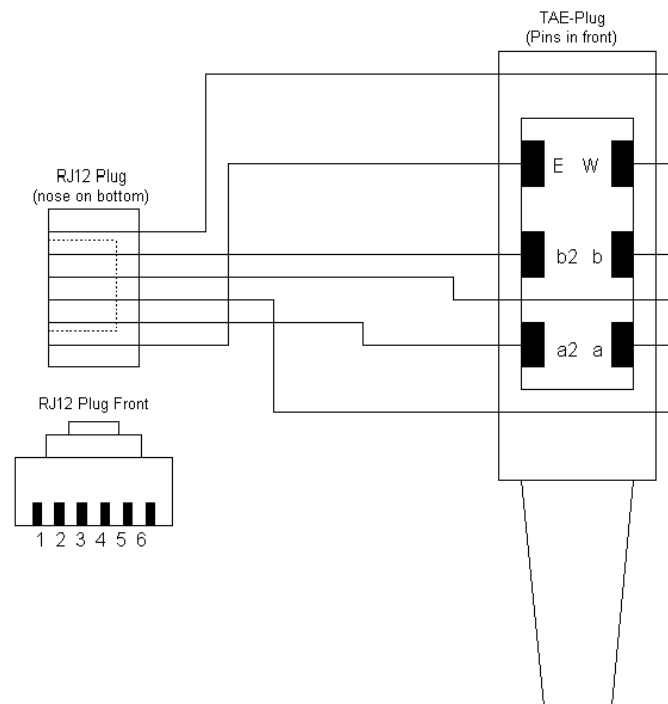
Description of the signals on the 9-pin D-SUB connector on DCE side:

9-pin D-Sub DCE Pin No.	Description	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

Possible interface speeds of the Pocket Modem 56K 2.x:

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

2.4 Telephone Interface



Layout of the RJ11 Connector and the RJ45 Jack

Pin	Description
1	NC
2	E
3	LA1
4	LA
5	LB
6	LB1
7	W
8	NC

Meaning of the Signals:

LA, LB: Incoming phone lines (e.g. exchange connection or PBX)

LA1, LB1: To connect a phone in series. In idle state, LA1 and LB1 are connected with LA and LB via a loop current detector. LA1 and LB1 are detached as soon as the modem uses the line.

2.5 Transmission Standards/ Protocols

	Pocket Modem 56K 2.x
V.21	yes
V.22A/B	yes
V.22bis	yes
V.23	yes
V.23 half-duplex	no
V.32bis	yes
V.34	yes
V.34+	yes
V.44 data compression	yes
V.90	yes
V.92	yes
Bell 212A and 103	yes
V.29	yes
V.27ter	yes
V.21 Channel2	yes
V.17	yes
Fax group 3 send/receive	up to 14,400 bps
Fax class 1 command set	yes
Fax class 2 command set	yes
V.42LAP-M error correction	yes
MNP 2-4 error correction	yes
MNP 10 error correction	yes
V.42bis data compression	yes
V.44 data compression	yes
MNP 5 data compression	yes
Voice functions	yes
Remote control	yes
Automatic callback	yes

2.6 ITU Standards (CCITT)

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

ITU Standards (CCITT)	Meaning
V.21	Transmission with 300 bps duplex
V.23	Send with 75 bps and receive with 1,200 bps and vice versa
V.23 half-duplex	Send and receive with 1,200 bps
V.22	Transmission with 1,200 bps duplex
V.22bis	Transmission with 2,400 bps duplex
V.32	Transmission with 9,600 bps or (fallback) 7,200, 4,800 bps.
V.32bis	Transmission with 14,400 bps or (fallback) 12,000, 9,600, 7,200, 4,800 bps.
V.FC	Transmission with 28,800 bps or (fallback) 26,400, 24,000, 21,600, 19,200, 16,800, 14,400 bps.
V.34	Transmission with 28,800 bps or (fallback) 26,400, 24,000, 21,600, 19,200, 16,800, 14,400 bps.
V.34+	Transmission with 33,600 bps or (fallback) 31,200, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400 bps.
K56flex	Transmission with 56,000 bps or (fallback) 54,000, 52,000, 50,000, 48,000, 46,000, 44,000, 42,000, 40,000, 38,000, 36,000, 34,000, 32,000 bps.
V.42	Error protection method for DCE's with asynchronous-to-synchronous conversion
V42bis	Data compression method
V25bis	Alternate command set for AT command set
V.90	Transmission with 56,000 bps or 54,667, 53,333, 52,000, 50,667, 49,333, 48,000, 46,667, 45,333, 42,667, 41,333, 40,000, 38,667, 37,333, 36,000, 34,667, 33,333, 32,000, 30,667, 29,333, 28,000 bps.

(bis = French: secondly) = extended

3 Installation and Initial Operation

3.1 Installation Steps

On the rear of the modem there are three plug-in connections:

- The jack for the supply voltage.
- The phone jack.
- The 9-pin jack for the connection with the serial interface of your computer.

For the installation, proceed as follows:

1. Connection of the power supply
Plug the supplied power supply connector into the modem and then plug the power supply unit into the outlet. After switching on the modem, the POWER LED should light up.
Important note: Using another power supply unit could damage the modem; the manufacturer will assume no liability for this.
2. Connection with the PC
Connect the 9-pin jack at the modem with the serial interface of your computer.
3. 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.
4. 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.
5. Check if the installation was successful:
Perform a short test using your terminal program (TeraTermPro, ProcommPlus). Enter the command “**AT**” and push the “Enter” key. When the message “**OK**” appears on your monitor, the device has been successfully installed.

6. Connection Test:

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

Dial the following number 0101901929 (**ATD0101901929**) using the command **ATD**.

Attention: For PBXs, which require a "0" for connection, please enter the following: **ATX3DT0,0101901929**

The LED Off Hook lights up

The modem dials.

After a little while (1 minute max.) the message CONNECT is displayed.

Freenet now tries to establish contact.

After a maximum of 1 minute the connection is terminated.

7. Driver Installation

When using the modem with the operating system Windows 95/98, a pertinent standard driver must be selected. For this, select the menu item *Start – Settings – Control Panel* and choose the item Modem.

3.2 Optimizing the Modem Connection

In most cases, the set-up of the connection may be left to the automatic functions of the modem.

If you look at the default settings using the AT command **AT+MS?**, you will see, for example: **+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 partner modem.

Meaning of AT%Q and AT%L

The command **AT%Q** queries a value for the quality, and the command **AT%L** queries a value for the receive level of an established connection.

For an existing connection, the modem must be brought into the command mode before that, using the command **+++**.

Quality values between 0 and 10 are regarded good values. For values over 50 the modem will reduce the data rate (with automatic setting) automatically.

4 Functions

4.1 Defaults

The modem identifies three sets of defaults:

- Default factory setting
- User default 0
- User default 1

The user defaults 0 and 1 are used to save configurations, which the user wants to re-use for certain purposes.

A part of the S registry is saved in each default. The affected registries are marked with an *) in the S registry.

4.1.1 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. If the modem happens to get completely misadjusted, loading the default factory settings will allow a problem-free recovery of an executable state. The default factory settings of your modem will be shown in your terminal program, if you enter the AT command **AT&F&V**. Here an example:

at&v

ACTIVE PROFILE:

```
B0 E1 L1 M2 Q0 T V1 W0 X3 *A1 *L0 *M6 *P0 *R1 %B0 %C3 %E2 %S0
\A1 \N3 \V0 &A0 &C1 &D2 &G0 &K3 &Q5 &R1 &S0 &X0 &Y0
S00:001 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
S36:183 S38:020 S46:138 S48:007 S95:047
```

SAVED PROFILE 0:

```
B0 E1 L1 M2 Q0 T V1 W0 X3 *A1 *L0 *M6 *P0 *R1 %B0 %C3 %E2
%S0
\A1 \N3 \V0 &A0 &C1 &D2 &G0 &K3 &Q5 &R1 &S0 &X0
S00:001 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 S36:183 S40:104 S41:195
S46:138 S95:047
```

SAVED PROFILE 1:

```

B0 E1 L1 M1 Q0 T V1 W0 X4 *A1 *L0 *M0 *P0 *R1 %B0 %C3 %E2
%S0
\A1 \N3 \V0 &A0 &C1 &D2 &G0 &K3 &Q5 &R1 &S0 &X0
S00:005 S02:043 S06:003 S07:050 S08:002 S09:006 S10:014
S11:000 S12:050 S13:003
S15:000 S17:042 S18:000 S24:000 S36:135 S40:104 S41:195
S46:138 S95:000

```

PHONE NUMBERS:

```

0=                                1=
2=                                3=

```

OK

For technical reasons, the default factory settings for your modem may vary from the shown settings.

4.1.2 Saving the Current Configuration

After the modem configuration has been customized according to the requirements of the user, it is possible to save these settings in user default 0 or 1. For this, the commands **AT&W0** or **AT&W1** are used. These settings will automatically be loaded into the current modem configuration when the modem is reset the next time. The command **AT&Y0** or **AT&Y1**, executed before the hardware reset, will determine if the user default 0 or 1 is loaded.

The software reset commands **ATZ** or **ATZ0** will cause the user default 0 to be loaded; the command **ATZ1** will cause the loading of the user default 1.

4.1.3 Recovery of the Delivery Status

- | | |
|------------------|--|
| AT&F | Recovery of the delivery defaults
If the modem is supposed to be reset to the delivery status, first of all the default factory settings must be loaded into the current modem configuration. This is achieved with the command AT&F . |
| AT&W0 | After that, the current modem configuration is transferred into the user default 0 with the command AT&W0 .
AT&W1 corresponds to user profile 1. |
| AT&Y0 | Finally, a AT&Y0 command causes the user default 0 (now identical to the default factory setting) to be loaded into the current modem configuration with every hardware reset.
AT&Y1 corresponds to user profile 1. |
| ATZ | A software reset is executed. |

4.2 Reset

There are two kinds of reset: hardware reset and software reset:

- A hardware reset is performed when the supply voltage is switched on, or after a warm start/cold start of the PC.
- A software reset is executed with the command **ATZ**.

Both reset possibilities cause a complete modem hardware check (duration approximately three seconds). During this, several check lamps will light up temporarily.

- During a hardware reset (switch on, button reset or PC start for the plug-in card version) a user default is loaded into the current modem configuration. The command **AT&Y**, which was entered previously, will determine if the user default 0 (**AT&Y0**) or the user default 1 (**AT&Y1**) is loaded.
- When a software reset is performed, the user default 0 or 1 is accepted into the modem configuration. **ATZ** and **ATZ0** will cause the loading of the user default 0, **ATZ1** will load user default 1.

4.3 Error Correction and Data Compression

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.

4.3.1 Error Correction

4.3.1.1 V42 Error Correction

The V.42 error correction includes the protocols LAP-M and MNP 4. LAP-M is the preferred error correction.

(Link Access Procedure for Modem)

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.

(See Chapter 5 “AT command set”, command **AT\N**)

4.3.1.2 MNP 2/3/4 Error Correction

The MNP error correction can be operated either in block or in stream mode. In the stream mode, the maximum block size can be set between 64, 129, 192, and 256 byte.

(See Chapter 5 “AT command set”, command **AT\A**)

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

(See Chapter 5 “AT command set”, command **AT\N**)

4.3.2 Data Compression

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

Data compression is only available for error corrected connections.

The usage of data compression will require the remote modem to identify the same data compression mode.

4.3.2.1 V.42bis Data Compression

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.

V.42bis cannot re-pack packed data.

4.3.2.2 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.

4.3.2.3 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 connection, just as V.42bis, and cannot re-compress already compressed data.

4.4 Dial-up Delay

Only valid for devices with BZT (German Federal Telecommunication Engineering Center) approval.

According to the regulations of the Deutsche Telekom, after 12 futile dial-up attempts each further dial-up is locked. In this case, the modem must be temporarily switched off. After a successful dial-up attempt, the counter is automatically reset.

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

4.5 Flash Update

This function enables software updates of the modem without switching an EPROM. You will receive the new software from your service partner, if applicable.

Requirement:

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

The baud rate must be between 9,600 baud and 57,600 baud. Other may 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.

Activation and Process:

The flash load function is started with the command **AT**** .

The modem reports "Download initiated". Now, the ASCII upload of the flash load program HS_LADER.S37 (will be delivered together with the firmware file for the upload) is performed. The transfer process is indicated by dots on the monitor (of the terminal program). After the loading is completed, the message "Download Flash Code" is displayed. Now another ASCII upload is started with the firmware file (xxxxxxx.S37). From this moment on, the transfer may not be interrupted, because otherwise the flash EPROM is deleted, but not re-loaded completely. This upload process is also indicated by dots.

Monitoring of Results:

After the process is completed, the message "Device successfully programmed" is displayed. This finalizes the flash upload.

AT commands for the flash load function:

Command	Description
AT**	Start of the flash load function

Note:

For the terminal program Telix, the delay settings between the character and the lines must be set to "0" for the ASCII protocol. Furthermore, the local echo must be switched off.

4.6 Remote Configuration (Remote Control)

4.6.1 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.

Modem 1 -----Modem 2
(local modem) (remote modem)

4.6.2 Starting Remote Configuration

The remote configuration is started by entering four asterisk (default) with a minimum of 1 second pause in the data flow before and after the asterisks. The initial character for the remote configuration can be changed with S17.

4.6.3 Remote Process Routine

As soon as the remote modem is released for remote configuration **AT*R1**, the prompt for entering the password (default : QWRTERY) appears. If the entered password matches the password saved in the remote modem with the **AT*C** command, the remote modem will send the prompt ">". Now the commands may be sent to the remote modem just as they would be entered at the local modem.

4.6.4 Reduced Command Set during Remote Configuration

Some commands may not be executed during remote configuration and will lead to the response message ERROR (**ATA**, **ATD**, **ATO**, **AT/B**, **AT*C**, **AT&F**).

If the password was not correct, both modems return into data transmission mode.

4.6.5 Terminate the Remote Configuration Process

The commands **AT*E**, **AT*X** or **ATZ** may be used for termination. The commands **AT*E** and **AT*X** will return the modem into online mode. After entering **ATZ**, the remote modem will perform a software reset and interrupt the connection. All entered commands that were not previously saved with **AT&W** will be deleted and the modem will have loaded the user configuration 0.

4.7 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.

4.7.1 Mode of Operation

Activation:

Storing the callback numbers in the phone number registry of the modem that is calling back (at position 1, using the standard AT command **AT&Z1**)

Incoming call:

When the modem answers an incoming call (set **ATS0 <>0** or accept with **ATA**), approximately 2 seconds after the message "CONNECT" appears, the messages "SECURITY CALLBACK" and "REMOTE PASSWORD" are displayed. Now the "Remote Password" must be entered (it is identical with the password for remote access, i.e. it is set with **AT*C** just like for remote access).

Wrong Password:

The modem immediately hangs up and thus prevents unauthorized access to the connected device.

Correct Password:

The modem reports "OK" to the remote terminal, hangs up and dials the phone number saved in **AT&Z1**, after approximately 10 seconds. Altogether, 3 dialing attempts with a pause of 10 seconds between each attempt are performed.

Data connection:

Approximately 2 seconds after the connection has been established, the message "CALLBACK IN PROGRESS" appears and the serial interface is enabled. After that, a normal data connection is established.

Outgoing Data Connections.

Outgoing connections that were initiated from the security callback modem (with **ATD**) are not affected by the security callback.

Deactivation:

The deactivation takes place by deleting the callback phone number, using the command "**AT&Z1=**".

AT Commands for Security Callback:

Command	Description
AT*C	Enter the password into the modem that calls back
AT&Z1=xxx	Enter the callback number into the modem that calls back (xxx stands for the phone number)

4.8 Selective Call Answer

When you activate selective call answer for the Pocket Modem 56K 2.x, the modem will only accept calls from certain callers, which can be configured. The identification of permitted callers takes places via the caller ID. This must, however, be supported by the phone system or the exchange connection, where the modem is connected to.

The following AT commands must be configured:

Command	Description
AT&A	<u>Selective Call Answer On or Off</u> AT&A1 Switches the selective call answer on AT&A0 Switches the selective call answer off The AT&A setting is saved in AT&W .

Command	Description
AT*NO= (number)	<p><u>Enter the permitted phone numbers for the selective call answer</u></p> <p>With AT*NO , all in all 8 phone numbers, for which modem access is permitted, may be defined. 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).</p> <p>The list of phone numbers may also contain wildcards (*). This allows the activation of entire blocks of phone numbers.</p> <p>Example: AT*N0=094158692** will activate all phone numbers that start with 094158692 and have 2 more digits (e.g. extension).</p> <p>After they were entered, the phone numbers are immediately saved in the power fail-safe memory of the modem.</p> <p>Important: The phone number may not contain separators such as brackets or space characters.</p>
AT*N99=	<p><u>Delete the list of permitted phone numbers for the selective call answer</u></p> <p>The command AT*N99= deletes the entire list of phone numbers for the selective call answer.</p>
AT*N?	<p><u>Output of the list of permitted phone numbers</u></p> <p>AT*N? activates the output of the entire saved list of permitted phone numbers for the selective call answer.</p>
AT%N	<p><u>Output of the last rejected phone number</u></p> <p>For active selective call answer (AT&A1) , the last phone number, whose call was rejected, will be displayed with AT%N . This phone number is not saved in the power fail-safe memory of the modem, i.e. after a restart of the modem the number will be empty.</p>

4.9 Password for Connection Set-up

If the password query is activated with **AT*P1** , the password query takes place after the message CONNECT. After the password has been entered correctly, the actual connection will be established 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 **AT*C** .

4.10 Manual Message Dispatch

Brief Description:

The modem can not only transmit a message that was manually triggered by **AT%A** to another analog modem, but can also send it as an SMS to a mobile phone or to the fixed network. Currently, D1, D2, Vodafone, and E-Plus are supported.

Furthermore, a dispatch to a fax device is also possible.

Routine SMS Dispatch to a Mobile Phone:

For this, the text is entered by **AT*V**. The maximum message length is 160 characters.

The message is triggered with the command **AT%A**.

To send the text to a mobile phone, the following settings must be entered according to the mobile phone network:

D1 Network:

AT*M1

AT&Z0=01712521002

AT&Z2=Phone number of the mobile phone in the format 49171xxxxx

D2 Network:

AT*M4

AT&Z0=01722278000

AT&Z2=Phone number of the mobile phone in the format 0172xxxxx

E Network:

AT*M1

AT&Z0=01771167

AT&Z2=Phone number of the mobile phone in the format 49171xxxxx

Notes:

The service number of the mobile phone provider is entered with **AT&Z0**. The numbers specified here assume that no exchange must be accessed.

If a PBX is used, the according sequence must be integrated into this number for accessing the exchange.

AT&Z2 Defines the number of the mobile phone, where the SMS is sent to. The various network providers support various formats to transmit the phone number.

AT*Mn Defines the protocol that is used to send the message to the network provider.

AT*M0 Sets a normal analog modem as remote terminal.

AT*M1 Sets the D1 or the E Network as remote terminal.

AT*M4 Sets the D2 Network as remote terminal.

Routine Fax Dispatch:

If you want to send the message as a fax, enter the text with **AT*V** as usual. The maximum message length is 160 characters.

The command **AT*M5** will set the protocol for the fax device. The number saved in **AT&Z0** must now connect to a fax device.

In addition to dispatching SMS it is also possible to send the message to a fax device. For this, in **AT&Z3** the number of the fax device to which the message is supposed to be sent, must be entered.

Message Dispatch Routine Via Fixed Network Access (e.g. Deutsche Telekom):

Several dispatch possibilities are available:

- To a fixed network phone as voice message
- To a fixed network phone as text message (only for phones with SMS capability)
- To a fax device
- To an e-mail account as an e-mail
- To all mobile phone networks as an SMS

Enter the text as usual, using the command **AT*V**. The maximum length is 160 characters. For e-mail dispatch, the text must start with the e-mail address. The e-mail address is separated from the message itself by a space character. The character @ is replaced by an asterisk "*" (e.g. user*gmxd.de alarm in building 2).

The command **AT*M6** will set the protocol "SMS in the fixed network". In **AT&Z0**, the number of the provider must be entered (e.g. Deutsche Telekom **AT&Z0 01930100**)

The phone number of the recipient of the message (either fixed or mobile phone network) is entered in **AT&Z2**. If you choose fax dispatch, you must enter "99" in front of the according fax number.

If you enter "8000" instead of the number of the recipient, the SMS center of the Deutsche Telekom will assume the delivery as e-mail.

Termination of the Connection:

Every time the modem tries to send the message, it replies with a state:

"OK" Message was successfully sent

"ERROR" Error during the message transmission

When the command **AT%A** was used for activation, 3 attempts (default) to send the message are performed altogether. The bits 0...3 of the S registry S13 may be used to change those values (valid values 1...12, default 3).

In contrast to establishing a connection to another computer, after sending the SMS or the fax message the connection is terminated, i.e., the modem hangs up.

AT commands for manual message dispatch:

Command	Description
AT%A	Manual sending of the message with response regarding the success or failure of the dispatch
AT*Mn	Defines the protocol that is used to send the message to the network provider
AT*M0	The remote terminal is a normal fixed network phone
AT*M1	The remote terminal is the D1 or E Network
AT*M4	The remote terminal is the D2 Network
AT*M5	Sets a fax as remote terminal
AT*M6	Sets "SMS in the fixed network" as protocol
AT*V	Defines the text of the manual message
AT*V?	Queries the message text
AT&Z0=xxx	Saves the service number of the SMS provider (xxx stands for number)
AT&Z2=xxx	Defines the number to which the SMS is sent (xxx stands for number)
AT&Z3=xxx	Defines the number of the fax device, to which the collective message is sent

4.11 Serial Data Transmission

4.11.1 Automatic Baud Rate Detection

The modem identified the baud rate of the connected PC from the AT command that is placed before each command. One also speaks of the DTE or interface speed, meaning the speed between the modem and the computer. The modem can communicate with a PC via the following baud rates (according to the type): 300, 600, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, 57,600, and 115,200 bps.

The adjustment to the transmission speed on the phone line is also performed automatically, unless the settings say otherwise. (See Chapter 5 "AT Command Set") During the establishing of a connection both modems attempt to achieve the **joint** fastest speed on the phone line.

Possible Speeds on the Phone Line

- For data transmission (compression methods will increase this fourfold!):
300 to 56,600 bps
- For fax transmission: 2,300, 2,400, 4,800, 7,200, 9,600, and 14,400 bps.
For fax transmissions, the baud rate to the PC is always 19,200 bps.

4.11.2 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, using the command **AT\N1**.

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

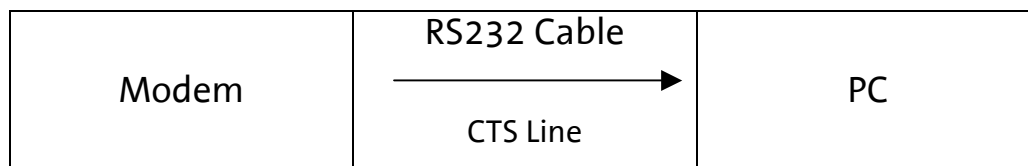
4.11.3 Bit Direct Mode

In the bit direct mode, eleven bits are transmitted. They consist of eight data bits, a parity bit each, and start and stop bits. The bit direct mode is switched on with the command **AT\N1**. 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.

4.11.4 Hardware Data Flow Control with RTS/CTS

Hardware Data Flow Control with the Modem (CTS).

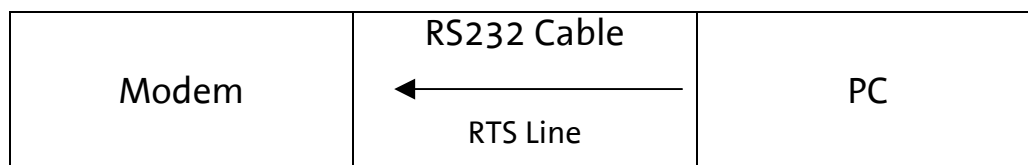


When the input buffer of the modem exceeds a certain XOFF fill state, the modem will set the CTS line to OFF. This will indicate to the modem not to send any more data.

Note: The CTS line is only then operated by the modem, when the commands **AT&K** or **.AT&R** are executed accordingly.

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.

Hardware Data Flow Control with the PC (RTS)



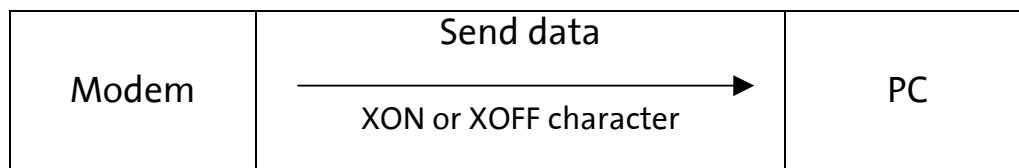
The PC sets the RTS line to OFF to request the modem to interrupt the data transmission.

Note: It will depend on the according PC software, if the RTS/CTS lines are operated from the PC.

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

It depends on the modem settings via the commands **AT&K** or **AT&R**, whether the RTS/CTS lines are operated by the modem.

4.11.5 Software Data Flow Control XON and XOFF



When the input buffer of the modem exceeds a certain XOFF 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: It depends on the modem settings via the command **AT&K**, whether the modem will support the XON/XOFF data flow control method.

It will depend on the according PC software, if the PC supports XON/XOFF data flow control.

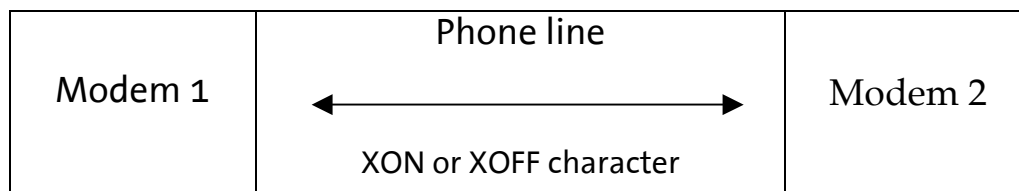
After the modem has operated the input buffer so far that the XON buffer falls below a certain fill state, the modem inserts a XON character into the data stream. This character will cause the PC to send data again.

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 ASCII texts. When programs are transmitted or also for BTX operation or e.g. in the XMODEM transmission protocol, occasionally appearing XON or XOFF characters would disturb the operation.

4.11.6 Data Flow Control between Modems

Software data flow control between two modems for non-error corrected data transmission (without V.42 or MNP4).



New data can be queried by inserting the XON character into the data flow.

The XON/XOFF characters are inserted depending on the fill state of the input modem buffer.

Usually, the XON/XOFF characters received from the other modem, are utilized by the modem and not forwarded to the PC. There is, however, the possibility to utilize XON/XOFF characters from the other modem and to forward them to the PC transparently. (See Chapter 5 “AT Command Set”, command **AT&K**). Errors may occur, if the data contain the characters for XON and/or XOFF by accident. This can only be prevented by using pure text data for transmission.

4.11.7 Software Data Flow Control for V.42, MNP4

Error corrected data transmissions (V.42 or MNP 4) have their own method of data flow control.

4.11.8 Interface Lines, which are Influenced by AT Commands

RS232 line	AT command
DCD	AT&C
DTR	AT&D
RTS/CTS	AT&R, AT&K
DSR	AT&S

5 Command Overview

5.1 AT commands

5.1.1 Syntax of Standard AT Commands

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

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

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

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

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

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

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

5.1.2 Overview AT Commands

Command	Description
AT**	<u>Start of the flash load function</u>
ATA	<u>Answer mode</u> The modem is switched into response mode. This is only effective in Germany, if the connected phone goes off-hook or if a call comes in.
A/	<u>Repeat the last command</u> The last command is repeated.

Command	Description
AT\A	<u>Select the maximum MNP block size</u> Set the maximum block size for an error corrected MNP transmission. AT\A0 64 characters AT\A1 128 characters AT\A2 192 characters AT\A3 256 characters
AT*A	<u>Auto answer on/off</u> AT*A0 Call acceptance is locked independently from S0 AT*A1 Call acceptance according to S0
AT%A	<u>Alarm triggering</u> Triggers a alarm. Success regarding the sending of the message is reported with the response "OK"; no success is reported with the response "Error".
AT&A	<u>Switch selective call acceptance on and off</u> AT&A1 Switches selective call acceptance on AT&A0 Switches selective call acceptance off Enter valid numbers using AT*N The AT&A settings are saved at AT&W .
ATB	<u>CCITT or Bell</u> ATB0 Select CCITT modulation format ATB1 Select Bell modulation format Note: For the i-modul Modem 56K Basic this setting has no effect. Here, the Bell mode is set using the command AT+MS .
AT\B	<u>Send "break" to the other modem</u> For connections that were not error corrected the modem sends a break signal to the other modem. The length of the signal is: the specified parameter times 1/10 of a second. For error corrected connections, the modem sends a break signal according to the active error correction protocol without considering a parameter specification. If no connection is established or if a fax connection is active, an error message is displayed. AT\B1 1/10 second break signal to AT\B9 9/10 second break signal
AT%B	<u>Switch key abort on and off during connection setup</u> AT%B0 Key abort is active. Each character on the Tx line will interrupt the connection setup (default setting). AT%B1 Key abort is deactivated. The connection setup cannot be terminated manually. The connection setup can only be terminated by DTR drop, by internal modem abort (NO DIALTONE , BUSY) or timeout (NO CARRIER) (S registry 36 Bit 6).

Command	Description
AT%C	<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>AT%CO No data compression enabled</p> <p>AT%C1 MNP 5 data compression enabled</p> <p>AT%C2 Enable V.42bis or V.42bis/ data compression V.44</p> <p>AT%C3 Enable MNP 5 and V.42bis/V.44 data compression</p>
AT*C	<p><u>Remote configuration password</u></p> <p>This password protects the remote configuration as well as incoming data connections (see AT*P) and Security Callback.</p> <p>OLD PASSWORD Demands the old password (default factory setting: QWERTY). When a wrong password is entered, the message ERROR will be displayed.</p> <p>NEW PASSWORD Enter the new password with 6 to 12 characters.</p> <p>CONFIRM Repeat the new password. An incorrect input will result in the message ERROR.</p> <p>OK The password is immediately stored in the EEPROM.</p>
AT&C	<p><u>DCD (CT109) behaviour</u></p> <p>Behaviour of the RS232 DCD output of the modem.</p> <p>AT&C0 DCD always on</p> <p>AT&C1 DCD follows the carrier signal of the phone line</p>
ATD	<p><u>Dial</u></p> <p>The modem goes off-hook and dials according to the dialling string transmitted via the ATD command. After dialling, the modem attempts to establish a connection. If the ATD command was performed without a dialling string, the modem goes off-hook and attempts to connect to the other modem (without dialling). The behaviour of the modem depends on the activation of the line current recognition (ATX command).</p> <p>The execution of the ATD command also depends on the last dialling attempt.</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: NO CARRIER</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 AT+FRH had been executed.)</p> <p>The following characters may be transmitted as parameters (brackets, punctuation marks, spaces and semicolons are ignored):</p> <p>0 to 9 The digits from 0 to 9</p> <p>* The asterisk: Only for tone dialling</p> <p># The hash: Only for tone dialling</p> <p>A-D The tone dialling characters A, B, C, D</p> <p>P Pulse dialling mandatory: Pulse or tone dialling is required according to the region.</p> <p>T Tone dialling mandatory: Pulse or tone dialling is required according to the region.</p> <p>W Wait for dialling tone: The modem waits for the dialling tone before it starts dialling. If within the period specified in the S6 registry no dialling tone was detected, the modem hangs up and an error message is displayed.</p> <p>@ Waiting for silence: The modem waits at least five seconds for silence in the</p>

Command	Description
ATD Continuation	<p>line, before it executes the next character from the parameter string. If this five second silence can not be detected and the abort period in the S7 registry has not been exceeded, the modem terminates the connection displaying the following message: NO ANSWER.</p> <p>If busy signal recognition was activated, the modem terminates the connection displaying the message: BUSY.</p> <p>If during the waiting period a response tone from the other modem is received, 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> <p>L Last number redialling.</p> <p>; Return to the input mode after dialling. Is attached to the end of the dialling string. Causes the modem to return to the input mode after reaching the ; (message: OK). This enables the input of AT commands even with the receiver offhook. The additional AT commands can follow in the same input line after the;, or they can be transmitted in further input lines. The ATH command will abort the connection and the receiver is hung up.</p> <p>S=n Dialling the n-th number from the number pool, which was set up with the AT&Z command.</p> <p>! Flash. If the character ! is a part of the dialling string, the modem will hang up within the time determined in S29 and then goes off-hook again.</p> <p>^ Suppresses the sending of a calling tone. Default: Calling tone is sent for fax operation. No calling tone for data operation.</p> <p>() Are ignored – used as an outline.</p> <p>- Are ignored – used as an outline.</p> <p>,, Space characters are ignored – they are only used as an outline.</p> <p>Examples:</p> <p>ATD12345 Dial the phone number 12345 (default: tone dialling method)</p> <p>ATDP12345 Dial the phone number 12345 with the pulse dialling method</p> <p>ATDT12345 Dial the phone number 12345 with the tone dialling method</p> <p>ATD12345; The semicolon (;) causes the modem to return to the input mode after dialling.</p> <p>ATX3D0W12345 For PBXs, which connect to the exchange line using the prefix 0. First, blind dialling is activated with X3, to be able to dial a leading 0 without hearing a dialling tone. After the 0 has been dialled via D0, dialling tone recognition can be switched on again using the parameter W. The modem thereby waits for the dialling tone and continues with the rest of the dial-up (12345) only after hearing the dialling tone. Waiting for the dialling tone may be omitted. In this case, the dialling command is ATX3D012345.</p> <p>For PBXs, which connect to the exchange line using a ground button function. First, blind dialling is activated with X3, to be able to use the ground button function without hearing a dialling tone. After the ground button has been pushed via >, dialling tone recognition can be switched on again using the parameter W. The modem thereby waits for the dialling tone and continues with the rest of the dial-up (12345) only after hearing the dialling tone. Waiting for the dialling tone may be omitted. In this case, the dialling command is ATX3D12345.</p>

Command	Description
AT+DS	<u>Activate/deactivate V.42bis data compression</u> AT+DS=0 Deactivates V.42bis data compression AT+DS=3 Activates V.42bis data compression (default)
AT+DS44	<u>Activate/deactivate V.44 data compression</u> AT+DS44=0 Deactivates V.44 data compression AT+DS44=3 Activates V.44 data compression (default)
AT&D	<u>DTR (CT108/2) behaviour</u> Monitoring on/off transitions of the RS232 DTR line of the PC. AT&D0 DTR is ignored. Allows the operation with PCs, which do not run DTR. AT&D1 A DTR on/off transition causes the modem to react as if it had received an abort sequence +++ . The modem switches to the input mode without hanging up. AT&D2 A DTR on/off transition causes the modem to hang up. Going off-hook automatically is not possible. AT&D3 A DTR on/off transition causes the modem to perform a reset as if an ATZ command had been executed. A preceded AT&Y command decides if either the default 1 or 2 is loaded.
ATE	<u>Command entry Echo</u> This command toggles the responses, which the modem creates as reactions from PC commands (echo). ATE0 Switch off Echo ATE1 Switch on Echo
AT%E	<u>Automatic Retrain</u> When transmission problems occur, the modem executes a retrain procedure. After three unsuccessful retrain attempts, the modem will hang up. AT%E0 Retrain not allowed AT%E1 Retrain allowed AT%E2 Fall back, fall forward allowed AT%E3 Fast fall back, fall forward. Is not supported by all modem types.
AT*E	<u>End remote configuration</u> The command AT*E ends a remote configuration.
AT&F	<u>Loading default factory settings</u> The modem loads the default factory settings from the internal non-volatile memory. This will take the modem into a defined basic state. AT&F will also store a part of the S registry. (Modems may show two default factory settings (AT&F0 , AT&F1).)
AT+GCI	<u>Set country code</u> The command AT+GCI enables the adaption of the modem to different countries. The default setting for the modem is AT+GCI=FD for Europe (CTR21). Currently, the modem is only approved for this country profile (worldwide approval pending). Please find a detailed list of the supported countries in Chapter 7. Note: Please note that changing the country code resets ALL modem settings to default values (such as AT&F&W). We therefore recommend to always select the country profile first before entering any other settings.

Command	Description
ATH	<u>Disconnect connection</u> The modem hangs up.
AT*H	<u>Declaration of the connection protocol speed (MNP 10)</u> AT*H determines, which speed is used to exchange the declarations during the MNP10 connection set-up before the modems enter the MNP 10 mode. AT*H0 Connection set-up takes place with the highest possible speed AT*H1 Connection set-up takes place with 1,200 bps AT*H2 Connection set-up takes place with 4800 bps
ATI	<u>Identification</u> The modem sends an identification to the PC, according to the following parameter: ATI0 Product code ATI1 Previously calculated EPROM checksum ATI2 Calculation of the EPROM checksum and comparison with the previously calculated checksum stored in the EPROM. Output of OK for correct comparison. ATI3 Number of firmware version in the EPROM ATI4 Modem version number ATI5 Country code parameter (Europe = 253) ATI6 Version number and revision of "data pump"
AT+IPR	<u>Determine baud rate</u> The command AT+IPR toggles the automatic baud rate detection. AT+IPR=0 Activates the automatic baud rate detection (default) AT+IPR=n Sets the modem to the fixed baud rate n. Supported baud rates: 300, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, 57,600 and 115,200. The setting AT+IPR is not saved with AT&W , which means that in order to activate auto bauding, the command AT+IPR must be sent to the modem every time it is switched on.
AT&K	<u>Select data flow control between the PC and the modem</u> Fax operation default is RTS/CTS. T-Online requires AT&K0 . AT&K0 No data flow control AT&K3 Select data flow control RTS/CTS AT&K4 Select data flow control XON/XOFF AT&K5 Select transparent data flow control XON/XOFF AT&K6 Select RTS/CTS and XON/XOFF data flow control
AT\K	<u>Break control</u> The modem reacts to a break (receive path off for a certain amount of time), which it receives from another modem or from the PC, or from the command AT\B according to the parameters. 1st Situation In case of a break from the PC during the data connection to another modem: AT\K0 Modem enters the command mode and sends no break to the other modem AT\K1 Modem deletes the data buffer and sends a break to the other modem AT\K2 See AT\K1 AT\K3 Modem immediately sends break to the other modem; data buffers are not deleted AT\K4 See AT\K0

Command	Description
AT\K Continuation	<p>AT\K5 Modem inserts break into the data transmitted to the other modem</p> <p>2nd Situation During a data connection, the modem was put into command mode by an escape sequence +++. In this condition, the command AT\B will send break to the other modem. In this situation, the parameter n will cause the following:</p> <p>AT\K0 Modem deletes the data buffer and sends a break to the other modem</p> <p>AT\K1 See AT\K0</p> <p>AT\K2 Modem sends break to the other modem without delay</p> <p>AT\K3 See AT\K2</p> <p>AT\K4 Modem inserts a break into the data transmitted to the other modem</p> <p>AT\K5 See AT\K4 – Return from the online command mode into the data mode via the ATO command.</p> <p>3rd Situation In the case a break is received from another modem during a connection that has not been error corrected, the parameters cause the following:</p> <p>AT\K0 Modem deletes the data buffer and sends a break to the PC</p> <p>AT\K1 See AT\K0</p> <p>AT\K2 Modem sends a break to the PC without delay</p> <p>AT\K3 See AT\K2</p> <p>AT\K4 Modem sends a break to the PC, which is embedded into the data that was received from the other modem</p> <p>AT\K5 See AT\K4 (default)</p>
AT-K	<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>AT-K0 Disables switching from V.42 LAP-M to MNP 10</p> <p>AT-K1 Enables switching from V.42 LAP-M to MNP 10</p>
ATL	<p><u>Speaker volume</u></p> <p>This command regulated the speaker volume (see ATM)</p> <p>ATL1 Speaker low volume</p> <p>ATL2 Speaker medium volume</p> <p>ATL3 Speaker high volume</p> <p>Note: The speaker output is optional and is not supported in the standard version.</p>
AT*L	<p><u>Defining the automatic speed limit</u></p> <p>The automatic speed limit serves the purpose to automatically obtain the least possible error rate for connections that are not error corrected.</p> <p>The speed limit is therefore always switched on by default. (AT*L0).</p> <p>If the limit is switched off (AT*L1), the modem always establishes the phone-side connection using the fastest possible speed (or the speed defined by AT+MS), not considering the data rate of the serial interface. This means that e.g. the INSYS Modem 336 will always attempt to establish a connection with 33,600 baud, even if the serial interface is set to only 9,600 baud. Due to the fast speed, higher bit rate errors will occur without error correction, which is usually annoying.</p> <p>The automatic speed limit (AT*L0) limits the speed on the phone side to the speed of the serial interface.</p> <p>It should only be switched off if the speed of the serial interface is changed during the connection.</p>

Command	Description
AT%L	<u>Display level of the received signal</u> The value that is reported from the modem equals the already amplified level within the modem, not the phone line level. Large AT%L responses imply a low signal level; small values imply a high signal level (009 = -9db, 043 = -43db)
ATM	<u>Speaker control</u> This command regulates when the speaker is active (see command ATL). ATM0 Speaker always OFF ATM1 Speaker ON during dialling and connection set-up ATM2 Speaker always ON ATM3 Speaker on during connection set-up
AT+MR	<u>Show modulation type</u> The command " AT+MR " enables the display of the modulation type after the message CONNECT AT+MR=0 switches the display function off (default). AT+MR=1 switches the display function on. The displayed value applies to the sent data AT+MR=2 switches the display function on. The displayed value applies to the received data If the display function is switched on the modem will display the modulation type and the line speed after the message CONNECT . After the message CONNECT the line " MCR: " appears, followed by the modulation type (see AT+MS command) and the line " +MRR: ", followed by the line speed. The AT+MR command is useful for a connection check.
AT+MS	<u>Select modulation type</u> AT+MS determines the modulation type. The command enables or disables automatic modulation recognition and defines the highest and lowest possible connection speed. The command format is AT+MS=Modulation, [Automode], [Send: Minbaud, Maxbaud]; [Reception: Minbaud, Maxbaud] , AT+MS? displays the current setting. AT+MS=? Displays a list of possible parameters Parameter modulation: The modulation parameter determines the preferred (automode = 1) or the mandatory (automode = 0) modulation type. The following values are available: 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

Command	Description
AT+MS Continuation	<p>B103 Bell 103 300 B212 Bell 212 1200/75</p> <p>Parameter Automode: 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 1 Automatic modulation adjustment switched on</p> <p>Parameter Reception Minbaud The optional parameter minbaud determines the lowest possible baud rate for modem reception.</p> <p>Parameter Reception Maxbaud The optional parameter maxbaud determines the highest possible baud rate for modem reception.</p> <p>Parameter Send Minbaud The optional parameter minbaud determines the lowest possible baud rate for modem sending.</p> <p>Parameter Send Maxbaud The optional parameter maxbaud determines the highest possible baud rate for modem sending.</p>
AT*M	<p><u>Alarm message protocol</u> Defines the protocol for sending the alarm message.</p> <p>AT*M0 Remote terminal is a normal modem in a fixed network</p> <p>AT*M1 Remote terminal is a mobile phone with network access via PET/IXO/TAP protocol and data format 8N1 (e.g. D1 network or E network in Germany)</p> <p>AT*M2 Remote terminal is a mobile phone with network access via EMI/UCP protocol and data format 7E1</p> <p>AT*M3 Remote terminal is a mobile phone with network access PET/IXO/TAP protocol and dataformat 7E1</p> <p>AT*M4 Remote terminal is a mobile phone with network access via EMI/UCP protocol and dataformat 8N1 (e.g. D2 network in Germany)</p> <p>AT*M5 Remote terminal is a fax device</p> <p>AT*M6 Fixed network SMS: The SMS gateway (e.g. Deutsche Telekom number 01930100) is not bound to a certain mobile phone network, but sends SMS to any mobile or fixed network phone.</p> <p>Note: For the remote terminals AT*M1 to AT*M4 only recipients in the network of one GSM provider may be addressed)</p> <p>Please ask your network provider about the current requirements for sending SMS to mobile phones.</p> <p>Additional commands: AT*v, AT*vn Definition of messages/phone numbers AT*ZO Definition of the SMS service center</p>

Command	Description
AT*N	<p><u>Valid numbers for selective call acceptance</u></p> <p>Definition of 8 phone numbers, for which modem access is allowed. The modem reports RING or accepts the call according to the S0 settings (irrespective of this, the line RI is activated with each call) only if the transmitted phone number matches a number specified in the list. The selective call acceptance is switched on and off by AT&A.</p> <p>AT*Nn=Telnr</p> <p>n Describes the storage position – range 0..7.</p> <p>Telnr Permitted phone number consists of numbers and “*” as wildcard for exactly one character. The phone number may not contain field separators such as brackets or space characters. The phone numbers will immediately be stored in the modem memory.</p> <p>AT*N99= Deletes all existing entries in the list.</p> <p>AT*N? Output of all stored entries.</p> <p>Example: AT*N0=01234567** enables all calls from the number pool 01234567-00 to 01234567-99</p>
AT&N	<p><u>Output of the last rejected phone number</u></p> <p>With active call acceptance (AT&A1), this command will show the last phone number whose call was rejected. This phone number will not be stored in the fail-safe modem memory.</p>
AT\N	<p><u>Select error correction</u></p> <p>This command determines which type of error correction should preferably be used for subsequent connections.</p> <p>AT\N0 Switching off error correction (normal buffered mode)</p> <p>AT\N1 Bit direct mode (only for special data formats)</p> <p>AT\N2 Selects V.42LAP-M or MNP 4 error correction. If no error corrected connection can be established, the modem will hang up.</p> <p>AT\N3 Selects V.42LAP-M or MNP 4 error correction. If such a connection cannot be established, the modem will attempt to establish a connection that is not error corrected.</p> <p>AT\N4 Exclusively selects a V.42 LAP-M connection.</p> <p>AT\N5 Exclusively selects a MNP 4 connection.</p>
ATO	<p><u>Return to online data mode</u></p> <p>ATO0 Return to online data mode</p> <p>If the modem is in online command mode, it will return to online data mode. If the modem is in offline command mode, it will report ERROR.</p> <p>ATO1 Before the modem switches to online data mode, a retrain procedure is provoked.</p>
AT*P	<p><u>Password for data connection</u></p> <p>AT*P0 Switches the password request off after connection setup.</p> <p>AT*P1 Switches the password request on after connection setup.</p> <p>If the password request is switched on, the modem will request the password after CONNECT has been established. After the password has been entered correctly, the actual CONNECT takes place and data may be transmitted. If the password is incorrect, the modem will hang up. The password is the same as for remote control and is set</p>

Command	Description
	using AT*C .
ATP	<u>Switch on pulse dialing</u> Starting with this command, each dial-up is performed with the pulse dialling method, until an ATT or ATDT command switches it back to tone dialling.
ATQ	<u>Quiet control</u> This command toggles sending messages from the modem to the PC. ATQ0 Send messages to PC ATQ1 Don't send messages to PC
AT%Q	<u>Display of telephone connection quality</u> A modem message with a value between 000 and 007 indicates good phone connection quality. The smaller the value, the better the quality. High values indicate bad quality. These values are constantly updated during a connection. If the value increases heavily during a connection, i.e. the quality is decreasing, Autoretrain is performed, provided that a previous AT%E command allows this.
AT&R	<u>CTS behaviour</u> This command determines how the modem treats the CTS (CT105/CT106) data flow control lines. (See also command AT&K). AT&R0 CTS behaviour complies with V.25bis. CTS is deactivated during the connection setup after recognition of the response or ringing tones and will only be activated after the connection is set up. AT&R1 CTS only switches to off when this is required by the data flow control.
AT*R	<u>Switch remote control on or off</u> AT*R0 Switches remote control off AT*R1 Switches remote control on
ATS	<u>Read/write of the S registry</u> Some S registries may only be modified within certain limits. The modem still reports OK although the value has not changed as specified. Certain registries are read-only. We recommend checking the results after each write attempt using the ATSn? command. ATSn=x Sets the S registry n to the value x. ATSn? Shows the value of the S registry n
AT&S	<u>DSR behaviour</u> This command determines how the modem treats its DSR (CT107) output. AT&S0 DSR always on AT&S1 DSR on after a response tone has been detected; DSR off when no carrier is detected any more.
AT*Sn	<u>Selection of the transmission speed of the serial interface</u> With this command the speed can be pre-selected. The automatic detection will not be switched off by using this command. As soon as an AT command is detected, the serial interface will switch to the detected speed and protocol. If no AT command is sent, the selected speed will be used until a hardware reset occurs. If the selected speed is supposed to be kept, it must be saved using AT&W . Attention: The registry S23 will not be changed with this command! It will only change by automatic speed limit.

Command	Description
AT*S	AT*S0 Keep the current speed.
Continuation	AT*S1 300 bps AT*S2 600 bps AT*S3 1,200 bps AT*S4 2,400 bps AT*S5 4,800 bps AT*S6 9,600 bps AT*S7 19,200 bps AT*S8 38,400 bps AT*S9 57,600 bps AT*S10 115,200 bps
ATT	<u>Switching on tone dialling</u> Starting with this command, each dial/up is performed with the tone dialling method, until an ATP or ATDP command switches it back to pulse dialling.
AT*Un	<u>Select the protocol at the serial interface</u> You can pre select the protocol with this command. But the auto detection will not be turned off. If an AT command is detected, the serial interface triggers automatically the detected speed and detected protocol. If no AT command is sent, the selected protocol rests until a hardware reset. If you wanted to store the used protocol, you have to save it with AT&W . Important: The S-register S23 will not be changed with this command. This will only be changed with the auto speed- and protocol-detection. AT*U0 8 data bits, no parity, 1 stop bit AT*U1 7 data bits, parity ODD, 1 stop bit AT*U2 7 data bits, parity EVEN, 1 stop bit AT*U3 7 data bits, no parity, 1 stop bit AT*U4 7 data bits, parity ODD, 2 stop bits AT*U5 7 data bits, parity EVEN, 2 stop bits AT*U6 7 data bits, no parity, 2 stop bits AT*U7 8 data bits, parity ODD, 1 stop bit AT*U8 8 data bits, parity EVEN, 1 stop bit AT*U9 8 data bits, no parity, 2 stop bit
ATV	<u>Format of modem messages</u> This command determines, if the modem transmits messages to the PC in short or long format. ATV0 Messages to PC only in short format, i.e. only the error number ATV1 Messages to PC in long format, i.e. the error text
ATV	<u>Format of connect rate messages</u> This command enables the display of the connect message in one (V1) line or in three lines (V0).
AT&V	<u>Display configurations</u> With this command, the active configuration of the modem, the saved user defaults and the saved phone numbers 0 to 3 are displayed. AT&V0 Displays the current and saved settings of the module. AT&V1 Displays the diagnostic data of the last connection (connection partner,

Command	Description
	reason for disconnect). (Explanation see annex)
AT*V	<u>Definition of the alarm text</u> For simple alarm: Definition of the alarm text (maximum of 160 characters) When entering AT*V , the modem will answer with NEW TEXT: and will await the alarm text entry (complete with <CR>) This command is not available in remote mode. Additional commands: AT*V Definition of the messages/phone numbers AT*Z0 Definition of the SMS service center
AT*V?	<u>Joint alarm text query</u> The joint parts of the alarm message and the target phone number are queried using AT*V? .
AT+VCID	<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) AT+VCID=0 switches the caller ID function off (default). AT+VCID=1 switches the caller ID function on and displays the ID preformatted for incoming calls. AT+VCID=2 switches the caller ID function on and displays the ID unformatted for incoming calls.
AT+VRID	<u>Set last received caller ID</u> The command AT+VRID displays the caller ID of the last caller. AT+VRID=0 displays the ID preformatted. AT+VRID=1 displays the ID unformatted.
ATW	<u>Error correction messages</u> This command determines which data transmission rate information is provided for a CONNECT message. ATW0 The modem reports the baud rate between modem and PC. ATW1 During the connection set-up, the modem reports the phone line speed, the error correction protocol and the PC baud rate. ATW2 The modem reports the phone line speed.
AT&W	<u>Save configuration</u> The command saves the current modem configuration including the S registry in one of the two user-defined defaults. AT&W0 Save in user default 0 AT&W1 Save in user default 1

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

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

5.2 Overview AT Responses

Message number Short form	Message text in long form	ATXn n=0	n=1	n=2	n=3	n=4
+F4	+FCERROR	X	X	X	X	X
0	OK	X	X	X	X	X
1	CONNECT	X	X	X	X	X
2	RING	X	X	X	X	X
3	NO CARRIER	X	X	X	X	X
4	ERROR	X	X	X	X	X
5	CONNECT 1200	1	X	X	X	X
6	NO DIAL TONE	3	3	X	3	X
7	BUSY	3	3	3	X	X
8	NO ANSWER	1	X	X	X	X
9	CONNECT 600	1	X	X	X	X
10	CONNECT 2400	1	X	X	X	X
11	CONNECT 4800	1	X	X	X	X
12	CONNECT 9600	1	X	X	X	X
13	CONNECT 7200	1	X	X	X	X
14	CONNECT 12000	1	X	X	X	X
15	CONNECT 14400	1	X	X	X	X
16	CONNECT 19200	1	X	X	X	X
17	CONNECT 38400	1	X	X	X	X
18	CONNECT 57600	1	X	X	X	X
19	CONNECT 115200	1	X	X	X	X
20	CONNECT 230400	X	X	X	X	X
22	CONNECT 75TX/1200RX	1	X	X	X	X
23	CONNECT 1200TX/75RX	1	X	X	X	X
24	DELAYED	4	4	4	4	X
32	BLACKLISTED	4	4	4	4	X
33	FAX	X	X	X	X	X
35	DATA	X	X	X	X	X
40	CARRIER 300	X	X	X	X	X
44	CARRIER 1200/75	X	X	X	X	X
45	CARRIER 75/1200	X	X	X	X	X
46	CARRIER 1200	X	X	X	X	X
47	CARRIER 2400	X	X	X	X	X
48	CARRIER 4800	X	X	X	X	X
49	CARRIER 7200	X	X	X	X	X
50	CARRIER 9600	X	X	X	X	X
51	CARRIER 12000	X	X	X	X	X
52	CARRIER 14400	X	X	X	X	X

Message number Short form	Message text in long form	ATXn n=0	n=1	n=2	n=3	n=4
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
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

Message number Short form	Message text in long form	ATXn n=0	n=1	n=2	n=3	n=4
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.

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

6 S- Registers

The modem has status registers, which control the operation.

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

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

6.1 Brief Overview S- Registers

Register	INSYS Modem	Function	Units	Range	Default
S0*		Number of ringing tones until automatically accepting a call	Ringing tones	0-5	5
S1		Ringing tone counter	Ringing tones	0-255	0
S2*		Escape character	ASCII	0-255	43
S3		Return character	ASCII	0-127	13
S4		Linefeed character	ASCII	0-127	10
S5		Backspace character	ASCII	0-255	8
S6*		Waiting period dial tone	s	4-7	4
S7*		Waiting period carrier signal	s	0-100	60
S8*		Dial tone delay	s	1-7	2
S9*		Reaction time carrier signal	0.1 s	1-255	6
S10*		Time period between lost carrier signal and hang up	0.1 s	20-254	20
S12*		Transmission clock of the ESC characters	0.02 s	0-255	50
S13*		Number of dialing attempts for alarm		1-12	3
S14*		General settings			138
S15*		Data Transmit Controller DTC	1s	0-255	0**
S17*		Remote introductory character		0-127	42
S21*		Settings for V24			116
S22*		Settings			75h (117)
S24*		Time period until switching into sleep mode	s	0-255	0
S25		Time period for DTR signal	0.01 s	0-255	5
S26		Time period between RTS/CTS	0.01 s	0-255	1
S27*		General settings	-		137
S29		Time period for modifier "flash"	10 ms	17	17

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

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

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

6.2 Total Overview S- Registers

S0* Rings to Auto-Answer - Number of rings until the modem accepts a call

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

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

S2* Escape Character -Escape character which causes a switch from data mode to online command input mode. Values larger than 127 will lead to unrecognised ESC characters.

S3 Carriage Return Character – Carriage Return Character.

S4 Linefeed Character – Linefeed character

S5 Backspace Character – Backspace character

- S6*** Wait Time for Dial Tone (Before Blind Dialling) - Maximum time to wait for the dialling tone
After the modem went off-hook, it waits 7 seconds for the dialling tone (fixed for approval purposes). If it detects a dialling tone during this waiting period it will start dialling.
If it does not detect a dialling tone, it will check if dialling tone recognition is activated or if the dialling string (Chapter "AT Command Set", command ATD) contains the parameter W. When dialling tone recognition is not activated, the modem will wait for the dial tone during the time period (in seconds) specified in S6.
The value of S6 can be between 4 and 7.
- S7*** Wait for Carrier - Wait for the carrier frequency from the other modem. The maximum time for the modem to wait for a response from the other modem is specified in S7. The time starts running as soon as the modem has finished dialling. The value of S7 can be between 0 and 180 seconds.
- S8*** Pause Time for Dial Delay Modifier - Dial pause time, if there is a comma in the dialling string.
If there is a comma in the dialling string, the modem will wait during the dialling procedure, until the time specified in S8 (in seconds) has run out. The value of S8 can be between 1 and 7 seconds.
- S9*** Carrier Detect Response Time - DCD reaction time on carrier frequency from the other modem.
The DCD output of the RS232 interface (CT109) of the modem switches to **on**, when the carrier frequency from the other modem is detected before the time defined in S9 (in tenth of seconds) runs out. S9 must be smaller than S10.
- S10*** Carrier Loss Disconnect Time - The time which leads to disconnection after carrier frequency loss.
In S10, the time is specified in tenth of seconds, which the modem awaits to disconnect, if it can't detect the carrier frequency from the other modem anymore.
- S12*** Escape Prompt Delay – Minimum pre and post run time and maximum interim time in fifteenth of seconds between two characters, which must be observed, if the modem is supposed to detect an escape sequence (usually +++).

S13* Number of dialing attempts for alarm

Bit	Meaning	
Bit 0 – 3	Number of dialing attempts	Range of values: 1...12 Default value: 3 S13 determines how often the sending of an alarm message is attempted. Hinweis: For approval purposes (blacklisting) the attempts are limited to a maximum of 12.
Bit 4 - 7	Reserved	

S14* General Bitmapped Options Status – General settings

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

S15* DTC time setting

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

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

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

S17* Remote control introductory character

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

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

S21* General Bitmapped Options Status – Settings for V24

Bit	Meaning	
Bit 0.1	Reserved	
Bit 2	CTS behaviour	CT106 (CTS) behaviour: 0: see AT&R0 1: see AT&R1
Bit 3-4	DTR behaviour	CT108 (DTR) behaviour: 0: see AT&D0 1: see AT&D1 2: see AT&D2 3: see AT&D3
Bit 5	DCD behaviour	CT109 (DCD) behaviour: 0: see AT&C0 1: see AT&C1
Bit 6	DSR behaviour	CT107 (DSR) behaviour: 0: see AT&S0 1: see AT&S1
Bit 7	Long space disconnect	Long space disconnect: 0: see ATY0 1: see ATY1

S22* Bitmapped Options Status

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

S24* Sleep Timer

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

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

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

S25 Delay to DTR Off

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

S26 RTS to CTS Delay

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

S27* General Bitmapped Options Status – General settings

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

S29 Flash Dial Modifier Time

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

S30 Disconnect Inactivity Timer

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

S31* General Bitmapped Options Status – General settings

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

S32 XON Character

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

S33 XOFF Character

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

S36* LAPM Failure Control

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

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

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

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

S40* General Bitmapped Options Status – General settings

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

S41* General Bitmapped Options Status – General settings

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

S46* V.42bis Data Compression

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

S48* V.42 Negotiation Control

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

S86 Call Failure Reason Code

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

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

S91* Transmit level

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

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

S95* Result Code Control – Result code

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

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

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

7 Country Codes

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

Country	Standard Countries	Extended Group of Countries
Ireland*	FD / 57*	FD
Israel		58
Italy*	FD / 59*	FD
Japan	00	00
Jordan	FE	FE
Korea Republic		61
Kuwait	62	62
Latvia	FD	FD
Lebanon		64
Liechtenstein*	FD	FD
Lithuania	FE	FE
Luxembourg*	FD / 69*	FD
Macedonia	FE	FE
Malaysia		6C
Malta	B4	
Mexico	73	
Monaco	3D	
Montenegro	FE	FE
Morocco	FE	FE
Netherlands*	FD / 7B*	FD
New Zealand		7E
Nicaragua	FE	FE
Nigeria		81
Norway*	FD / 82*	FD
Oman	FE	FE
Pakistan		84
Panama		85
Paraguay		87
Peru	FE	FE
Philippines		89
Poland	8A	
Portugal*	FD / 8B*	FD
Romania	8E	
Russian Federation		B8
San Marino	59	
Saudi Arabia	98	
Senegal		99
Serbia	FE	FE
Singapore		9C
Slovak Republic	FB	
Slovenia	FC	
South Africa		9F
Spain*	FD / A0*	FD
Sri Lanka		A1
Sweden*	FD / A5*	FD

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

Country code is set by the parameterisation software HSComm or the AT command `AT+GCI=nn`

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

8 Glossary

Analog	Opposite of digital. Analog variables can assume any values.
Answer	When two modems are connected, one modem must work as recipient (answer mode), and the other modem as sender (originate mode).
ARQ	Automatic Retransmission Request – Automatic request of retransmission. Only for connections with error correction protocol.
ASCII	American Standard Code for Information Interchange. This code assigns a numerical value to letters, numbers, and special characters. One character consists of eight bits. This makes only 256 characters possible.
Asynchronous	Data transmission method, where the data bits of a character are transmitted with additional bits (start bit, stop bit, parity bit). By means of these additional bits, the remote terminal may determine when a new character starts, and if the last one was transmitted correctly.
AT command	All commands that a modem understands start with the prefix AT (for Attention).
Auto Answer	The capability of the modem to answer an incoming call automatically after a determined number of ring signals (SO registry).
Baud	Unit of the step speed in steps per second (on the phone line or between modem and computer). On the serial interface, this is the transmission rate in Bit/s. On the phone, usually more bits per step are transmitted.
BBS	Bulletin Board System. A computer software which can receive and send messages and files via a modem or several modems.
bis	French: secondly, or the second revision.
BPS	Unit of the bit rate; bits per second.
BTZ	Abbr. for Bundesamt für Zulassungen in der Telekommunikation (German PTT Licensing Body)
CCITT	Comité Consultatif International Telephonique et Telegraphique; was replaced by the ITU-TSS, the international authoritative body for telecommunications standards and affairs.
CD	Carrier Detect (Data carrier signal was detected).
CEPT	Abbr. for Commission Européenne Postale et Telephonique (European Post and Telecommunications Commission). CEPT is a transmission protocol, e.g. for BTX (Datex-J).
Class 2	Fax transmission standard.
COM Port	Description for the serial interface of a PC.
CRC	Cyclic Redundancy Check – A method to identify transmission errors.
CTS/RTS	Control lines of the serial interface to RS232. With the support of these lines, the hardware handshake is handled.
Data Compression	To scale down information into smaller information units. E.g.: frequently occurring character sequences are replaced by small codes, and only the references to those

	codes is transmitted.
Data Pump	Modem-internal module which is responsible for the transmission (speed).
DCD	Data Carrier Detected - Data carrier signal was detected.
DCE	Data Communications Equipment – Data transmission unit, e.g. a modem or an acoustic coupler.
DEE / DTE	Data terminal unit/data terminal equipment; the DTE speed describes the interface speed between computer and modem.
DCE	Data Communication or Remote Data Transmission – Data transmission with the help of computers.
Demodulation	Converting analog signals back into digital signals.
Digital	Opposite of analog. Digital variables may only have the values 0 and 1.
DSR	Data Set Ready – A signal line of the serial interface. With it, the modem signals that it is ready to receive data at the serial interface.
DTR	Data Terminal Ready – A signal line of the serial interface. With it, the computer signals that it is ready to receive data at the serial interface.
EPROM	Electrically Programmable Read Only Memory – An electrically programmable permanent memory, which can only be deleted by UV light. The firmware of a modem is often housed in an EPROM.
Error Correction	Errors caused by bad line quality are detected by the error correction method (MNP4 or V.42bis) and corrected by the modem without the computer noticing it.
FIFO	First-in-first-out buffer (included in UART 16550) – Is recommended when using high transmission rates and/or for multitasking operating systems.
Firmware	Operating software of the modem.
Handshake	When a data connection is started, the two modems must negotiate (“handshake”) a mutual speed and transmission protocol. This negotiation phase is also called handshake phase.
ITU	International Telecommunications Union – New description for the authoritative body CCITT for standardization.
LAPM	Link Access Procedure for Modems – An error-corrected transmission protocol.
LED	Light Emitting Diode
MNP	Error Correction and Data Compression protocol
Modem	Modulator Demodulator – Converts the digital signals of the computer into analog signals for the phone line. (On the remote side analog into digital)
Offline	No modem connection.
Online	A modem connection is established.
Parity	Parity – A test method to check data for asynchronous transmission.
Redundant	The presence of equal information.
Reset	To bring into a defined basic state.
RTS/ CTS	Control lines of the serial interface for flow control.
RXD	Received Data – Line of the serial interface for received data.
S Registry	Status Registry – This is where the modem stores its operational parameters.

SREJ	Selective Reject – SREJ is an extension of the error correction protocol V.42bis.
ter	French: three or third revision.
Terminal Program	A program that can send and receive data with the help of a modem.
X-Modem	An older, but still very common transmission protocol. Often called the “lowest common denominator” for the selection of transmission protocols. Due to the usage of blocks with only 128 Bytes each, the X-Modem protocol does not offer a very high transmission rate. Furthermore, it doesn’t allow file name transmission.
XON/ XOFF	See Chapter “Serial Data Transmission”.
Z- Modem	Obviously the “standard transmission protocol” when it comes to remote data transmission. Z-Modem offers a high transmission rate and the possibility to also transmit file names and paths. Furthermore, an interrupted transmission may be continued. Z-Modem-G is the improved successor of Z-Modem, but not very commonly used.

9 FAQ's

Herein after, some questions are described, which – from experience – may occur during the installation.

Problem:	The modem doesn't react to an ATZ command.
Possible cause:	<p>The COM interface number or the interrupt number that were entered in the communication software don't match the modem interface number.</p> <p>The modem has not supply voltage or is not switched on.</p> <p>The modem is not correctly plugged into the serial PC interface.</p> <p>(See Chapter 3 "Initial Operation").</p>
Problem:	The modem does not start dialing after the dialing command ATD has been entered, and reports an error.
Possible cause:	<p>The modem is operated at a PBX. The PBX requires that a 0 or a 9 are dialed beforehand, or that the ground button (optional) or the flash function is activated before the ring back signal can be heard. The modem, however, is awaiting a ring back signal already before the first digit is dialed.</p> <p>This problem can be solved by blind dialing (dialing without ring back signal) with the ATX3 command or by inserting the character > into the dialing string. (See Chapter 5 "AT Command Set", command ATX, command ATD)</p> <p>After the leading digit was dialed without a ring back signal, or the ground button function was performed, inserting a W into the dialing string will re-activate the ring back signal detection.</p> <p>(Example ATD0W12345).</p>
Problem:	After the ATD dialing command, the modem will not start dialing right away.
Possible cause:	<p>The dialing lock of 30 seconds is active.</p> <p>(See Chapter 4 "Dial-up Delay")</p>
Problem:	The modem can send data, but can't receive data.
Possible cause:	<p>The settings of the hardware handshake line DTR are not correct. Most of the time the setting AT&D2 is correct.</p> <p>(See also Chapter 4 "Data Flow Control")</p>
Problem:	The modem does not cooperate with a particular communication program.
Possible cause:	<p>The communication program expects a certain data flow control type. The modem has not been set to the required type.</p> <p>The problem can be solved by setting the modem to the required data flow control type. 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.</p> <p>(See also the handbook of the used software and the paragraphs regarding "Data Flow Control" in Chapter 4).</p>
Problem:	The modem cannot communicate with another modem, or only with errors.

Possible cause: The other modem uses a transmission protocol, which the local modem cannot understand.
The problem can be solved by using the data compression type and error protocol required by the other modem. (See also Chapter 4 “Error Correction and Data Compression”)

Problem: It is not possible to establish a phone connection.

Possible cause: The modem dials with the pulse dialing method instead of the required tone dialing method, or vice versa.

You can determine if your phone system dials with pulses or tones: If you hear a rattling on the line during dialing, you are using pulse dialing. The dialing types can be switched with the commands ATDP or ATDT.

(See also Chapter 5 “AT Command Set”, commands **ATDP**, **ATDT**, **ATP**, **ATT**).

Subject to technical changes as well as correction. Version 04/2004

