

Operating Manual



INSYS Modem 56k small EU

Version 1.02 / 02.04

INSYS
MICROELECTRONICS

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0 Scope Of Delivery

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

- INSYS Modem 56k small EU
- 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 device for shipping damage; please refer to your supplier if damage exists.

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

1 General

The Modem INSYS 56k small EU is a modem for the analogue telephone network (PSTN). It has a very compact design, is only 23 mm wide and is suitable for rail mounting. Installing the modem on the rail in the control cabinet, as well as the connection and the initial operation of the modem are very simple.

It offers various capabilities, such as

- establishing a data connection
- auto answer
- data flow control
- error correction
- data compression

2 Technical Data

2.1 General

2.1.1 Features

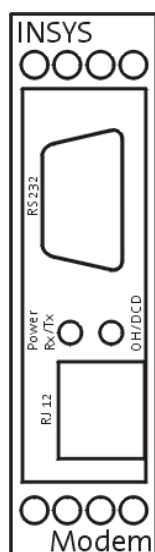
- mounting on DIN rail
- power supply 12..24 V DC, 5% ripple
- level on V.24 interface according to V.28
- protected V.24/V.28 interface with 9-pin SUB-D jack (screwed)
- telephone interface: RJ12 jack
- extended AT instruction set
- auto answer
- setting of 2 user profiles possible
- hardware/software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

2.1.2 Mechanical Features

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

Note: The modem INSYS 56K small EU may not be used in wet environments.

2.2 Interfaces and Display Elements



Front view

2.2.1 Display Elements

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

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

2.2.2 Terminal Layout

The terminals are located on the upper side of the housing



Top view

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

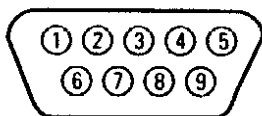
2.2.3 Power Supply

Power supply: 12..24V DC
 Power input: approx. 1.6 W (during connection)
 Current consumption:

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

2.2.4 Serial Interface

Layout of the 9-pin D-SUB jack



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

9-pin D-Sub Pin No.	Description	Function	CCITT V-24	EIA RS232	DIN 66020	E/A DCE to DTE
1	DCD	Data Carrier Detect	109	CF	M5	O
2	RXD	Receive Data	104	BB	D2	O
3	TXD	Transmit Data	103	BA	D1	I
4	DTR	Data Terminal Ready	108	CD	S1	I

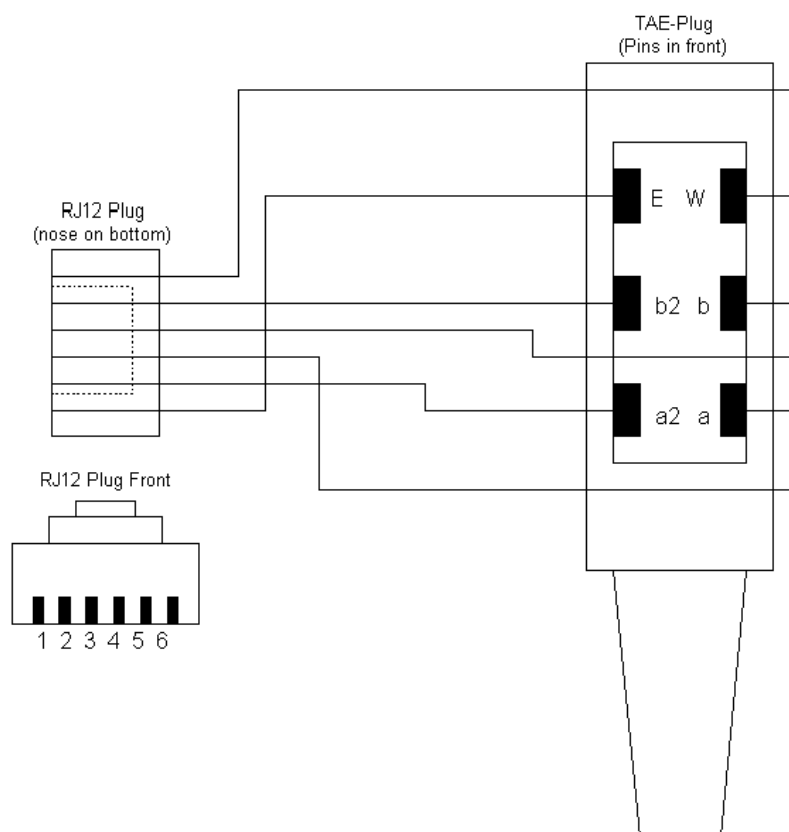
9-pin D-Sub Pin No.	Description	Function	CCITT V-24	EIA RS232	DIN 66020	E/A DCE to DTE
5	GND	Ground	102	AB	E2	
6	DSR	Data set ready	107	CC	M1	O
7	RTS	Request to send	105	CA	S2	I
8	CTS	Clear to send	106	CB	M2	O
9	RI	Ring Indication	125	CE	M3	O

Interface speeds of the modem INSYS 56K small EU:

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

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

2.2.5 Telephone Interface



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

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

2.3 Transmission Standards / Protocols

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

2.4 Approvals

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

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

Approvals:

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

2.5 Firmware

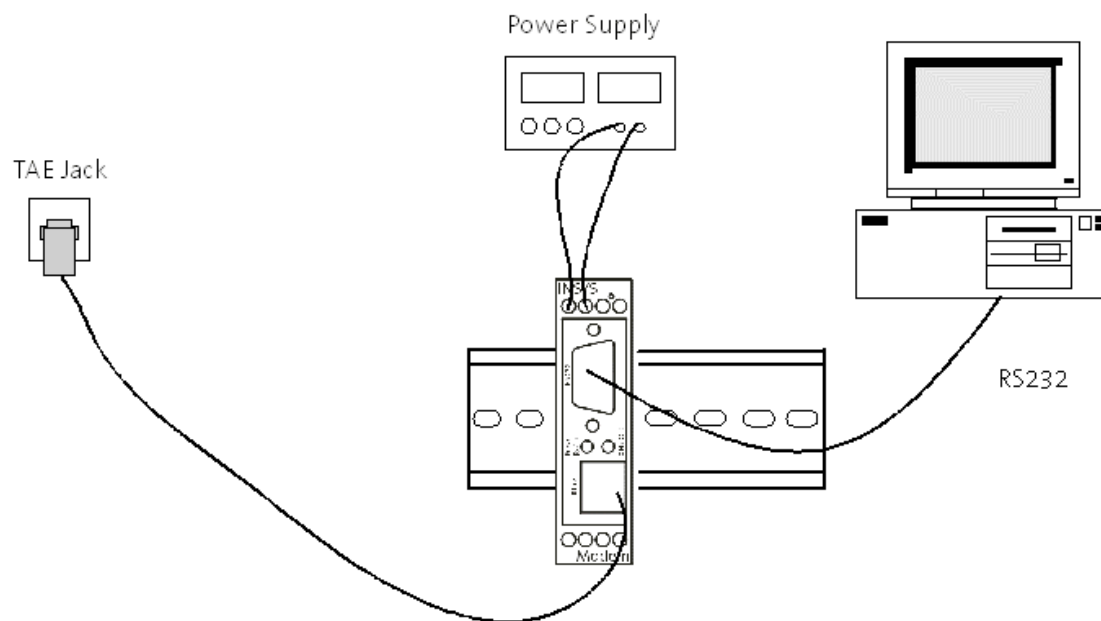
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Version: 1.00

Checksum: 1291

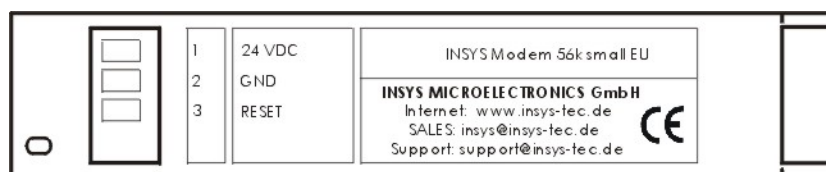
3 Installation and Initial Operation

3.1 Connection Overview



3.2 Installation Steps

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



Top view

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

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

- c) Switch on the power supply

After successful installation, the power LED will be green.

3. *Connection to the telephone network*

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

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

4. *Connection PC/Terminal*

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

5. *Check if the installation was successful:*

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

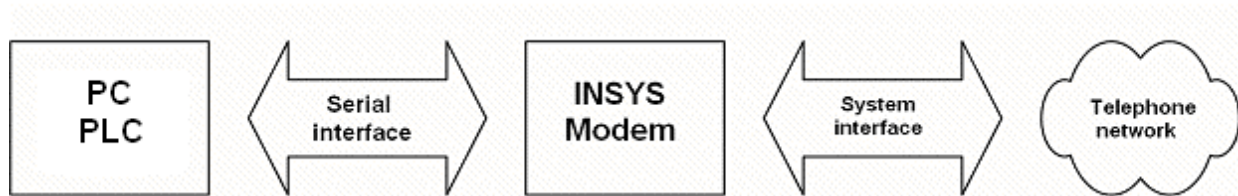
6. *Connection Test:*

Perform a manual connection from the terminal program:

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

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

4 Configuration



4.1 Configuration Software HSComm

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

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

4.1.1 HSComm Operation

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

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

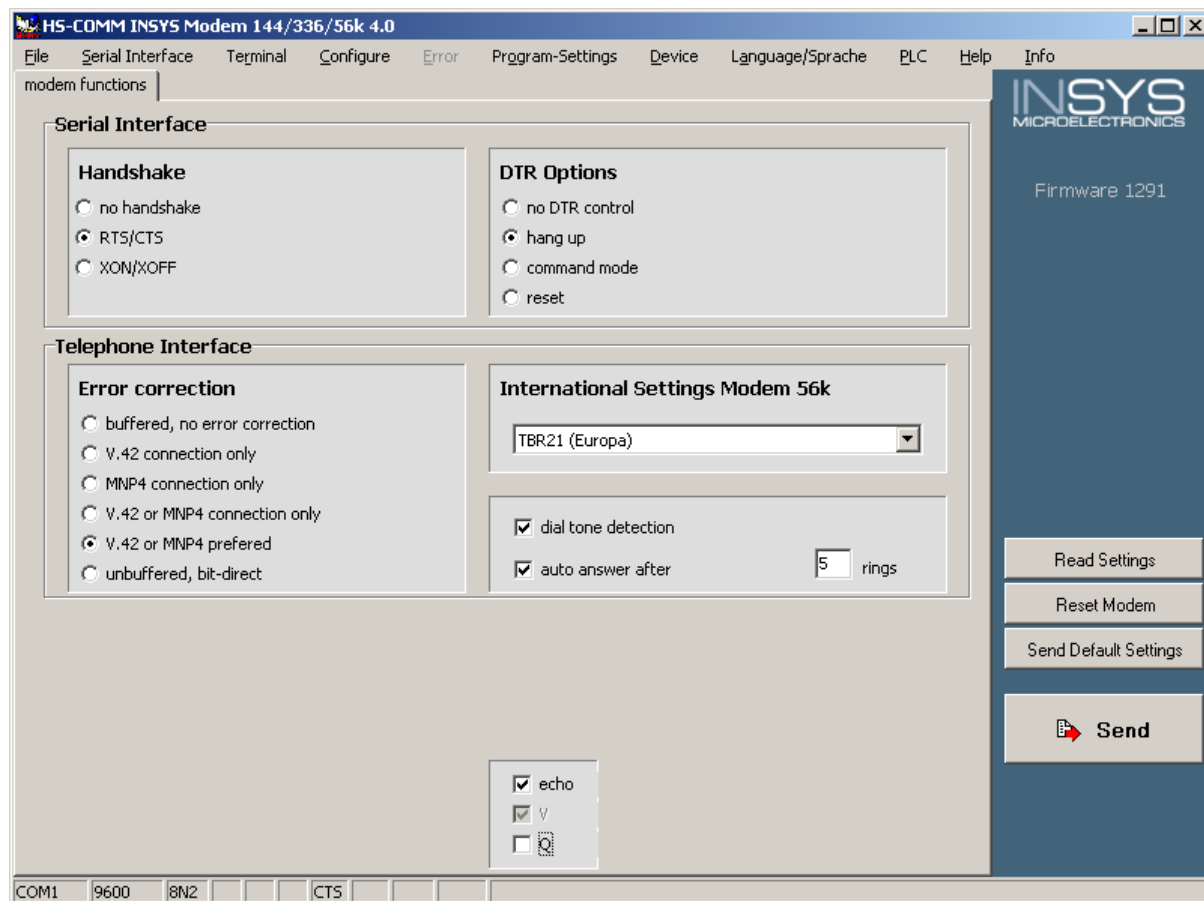
The selected configuration of the parameters is only sent to the INSYS modem after the button SEND has been pushed.

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

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

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

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



4.1.2 AT Commands for Default Settings

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

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

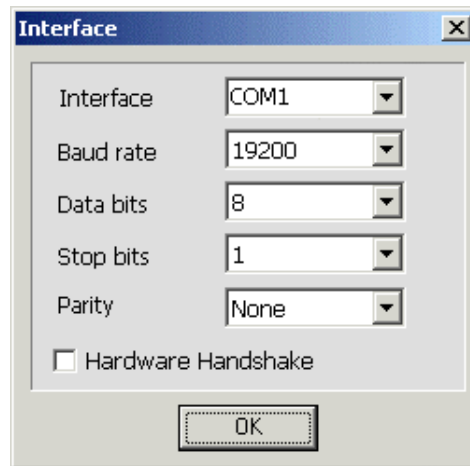
4.2 Serial Interface

The serial interface settings of PC/PLC and INSYS Modem must be identical:

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

4.2.1 PC Settings

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



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

4.2.2 INSYS Modem Settings

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

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

If more data is available than what can be received by the INSYS modem, the handshake will regulate the data flow.

DTR Behaviour

The signal *Data Terminal Ready (DTR)* on the serial interfaces indicates that the connected device (PLC, PC) is switched on, connected and ready for operation. The INSYS modem may react to the device being switched off or the cable being removed.

Echo

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

4.2.3 AT Commands for the Serial Interface

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

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

4.3 Telephone Interface

4.3.1 Error Correction

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

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

For error corrected connections data compression is additionally available.

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

4.3.2 International Settings

The INSYS Modem 56K small EU is configured for operation in Western Europe (TBR21) and cannot be modified.

TBR21 is the current setting for the EU countries (Belgium, Denmark, Germany, Finland, France, Greece, Great Britain, Ireland, Italy, Luxembourg, Netherlands, Austria, Portugal, Sweden, Spain) as well as Switzerland, Liechtenstein, Norway and Iceland.

4.3.3 Dial-tone Recognition

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

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

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

4.3.4 Auto Answer

The modem autonomously answers the call after the given number of rings.

4.3.5 AT Commands for the Phone Interface

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

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

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**> (=0X0D) by default.

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
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.
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 .
ATVB	<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. ATVB1 1/10 second break signal to ATVB9 9/10 second break signal

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%C0 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</p> <p>AT%C3 Enable MNP 5 and V.42bis/V.44 data compression</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 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 re-dialling.</p>

Command	Description
ATD Continuation	<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 off-hook. The additional AT commands can follow in the same input line after the ;, or they can be transmitted in further input lines. The ATH command will abort the connection and the receiver is hung up.</p> <p>S=n Dialling the n-th number from the number pool, which was set up with the AT&Z command.</p> <p>! Flash. If the character ! is a part of the dialling string, the modem will hang up within the time determined in S29 and then goes off-hook again.</p> <p>^ Suppresses the sending of a calling tone. Default: Calling tone is sent for fax operation. No calling tone for data operation.</p> <p>() Are ignored – used as an outline.</p> <p>- Are ignored – used as an outline.</p> <p>, , Space characters are ignored – they are only used as an outline.</p> <p>Examples:</p> <p>ATD12345 Dial the phone number 12345 (default: tone dialling method)</p> <p>ATDP12345 Dial the phone number 12345 with the pulse dialling method</p> <p>ATDT12345 Dial the phone number 12345 with the tone dialling method</p> <p>ATD12345; The semicolon (;) causes the modem to return to the input mode after dialling.</p> <p>ATX3D0W12345 For PBXs, which connect to the exchange line using the prefix 0. First, blind dialling is activated with X3, to be able to dial a leading 0 without hearing a dialling tone. After the 0 has been dialled via D0, dialling tone recognition can be switched on again using the parameter W. The modem thereby waits for the dialling tone and continues with the rest of the dial-up (12345) only after hearing the dialling tone. Waiting for the dialling tone may be omitted. In this case, the dialling command is ATX3D012345.</p> <p>For PBXs, which connect to the exchange line using a ground button function. First, blind dialling is activated with X3, to be able to use the ground button function without hearing a dialling tone. After the ground button has been pushed via >, dialling tone recognition can be switched on again using the parameter W. The modem thereby waits for the dialling tone and continues with the rest of the dial-up (12345) only after hearing the dialling tone. Waiting for the dialling tone may be omitted. In this case, the dialling command is ATX3D12345.</p>
AT&D	<p><u>DTR (CT108/2) behaviour</u> Monitoring on/off transitions of the RS232 DTR line of the PC.</p> <p>AT&D0 DTR is ignored. Allows the operation with PCs, which do not run DTR.</p> <p>AT&D1 A DTR on/off transition causes the modem to react as if it had received an abort sequence +++. The modem switches to the input mode without hanging up.</p> <p>AT&D2 A DTR on/off transition causes the modem to hang up. Going off-hook automatically is not possible.</p> <p>AT&D3 A DTR on/off transition causes the modem to perform a reset as if an ATZ command had been executed. A preceded AT&Y command decides if either the default 1 or 2 is loaded.</p>

Command	Description
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&F	<u>Loading the default factory settings</u> The modem loads the default factory setting from the internal, non-volatile memory. This puts the modem into a defined basic state. AT&F also overwrites a part of the S registry. (The modems may show two default factory settings (AT&F0 , AT&F1).)
AT\G	<u>Data flow control between modems (XON/XOFF)</u> Disables or enables data flow control for connections that were not error corrected. The ASCII characters XON and XOFF regulate the data flow control. The modem interrupts the data transmission after receiving an XOFF character and continues the data transmission after receiving an XON character. Error corrected transmissions use their own type of data flow control. Therefore, a possible default data flow control setting is ignored within error corrected connections. During videotex operation, the XON/XOFF data flow control must be switched off. AT\G0 Switching off the modem/modem data flow control AT\G1 Switching on the modem/modem data flow control with XON/XOFF
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"

Command	Description
AT+IPR	<p><u>Determine baud rate</u></p> <p>The command AT+IPR toggles the automatic baud rate detection.</p> <p>AT+IPR=0 Activates the automatic baud rate detection (default)</p> <p>AT+IPR=n Sets the modem to the fixed baud rate n. Supported baud rates: 300, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, 57,600 and 115,200.</p> <p>The setting AT+IPR is not saved with AT&W, which means that in order to activate auto bauding, the command AT+IPR must be sent to the modem every time it is switched on.</p>
AT&K	<p><u>Select data flow control between the PC and the modem</u></p> <p>Fax operation default is RTS/CTS.</p> <p>T-Online requires AT&K0.</p> <p>AT&K0 No data flow control</p> <p>AT&K3 Select data flow control RTS/CTS</p> <p>AT&K4 Select data flow control XON/XOFF</p> <p>AT&K5 Select transparent data flow control XON/XOFF</p> <p>AT&K6 Select RTS/CTS and XON/XOFF data flow control</p>
AT\K	<p><u>Break control</u></p> <p>The modem reacts to a break (receive path off for a certain amount of time), which it receives from another modem or from the PC, or from the command AT\B according to the parameters.</p> <p>1st Situation In case of a break from the PC during the data connection to another modem:</p> <p>AT\K0 Modem enters the command mode and sends no break to the other modem</p> <p>AT\K1 Modem deletes the data buffer and sends a break to the other modem</p> <p>AT\K2 See AT\K1</p> <p>AT\K3 Modem immediately sends break to the other modem; data buffers are not deleted</p> <p>AT\K4 See AT\K0</p> <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 a 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>

Command	Description
AT-K	<u>Extended MNP functions (MNP 10)</u> This command determines if a V.42LAP-M connection can be switched to a MNP 10 connection AT-K0 Disables switching from V.42 LAP-M to MNP 10 AT-K1 Enables switching from V.42 LAP-M to MNP 10
ATL	<u>Speaker volume</u> This command regulated the speaker volume (see ATM) ATL1 Speaker low volume ATL2 Speaker medium volume ATL3 Speaker high volume Note: The speaker output is optional and is not supported in the standard version.
AT%L	<u>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

Command	Description
AT+MS Continuation	<p>V22B V.22bis 2400 or 1200</p> <p>V23C V.23 1200</p> <p>V32 V.32 9600 or 4800</p> <p>V32B V.32bis 14400, 12000, 9600, 7200 or 4800</p> <p>V34 V.34 33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800 or 2400</p> <p>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</p> <p>B103 Bell 103300</p> <p>B212 Bell 2121200/75</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</p> <p>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+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>

Command	Description
ATP	<u>Switching on dial pulsing</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.
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.
ATT	<u>Switching on tone dialling</u> Starting with this command, each dial/up is performed with the tone dialling method, until an ATP or ATDP command switches it back to pulse dialling.
ATV	<u>Format of modem messages</u> This command determines, if the modem transmits messages to the PC in short or long format. ATV0 Messages to PC only in short format, i.e. only the error number ATV1 Messages to PC in long format, i.e. the error text
AT\V	<u>Format of connect rate messages</u> This command enables the display of the connect message in one (\V1) line or in three lines (\V0).
AT&V	<u>Display configurations</u> 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, reason for disconnect). (Explanation see annex)

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

Command	Description
ATY	<p><u>Long space disconnect</u></p> <p>The command determines how the modem acts when it receives a long space disconnect (BREAK) or in which form the modem creates a long space disconnect.</p> <p>ATY0 No long space disconnect behaviour</p> <p>ATY1 Long-term interruption behaviour active. For connections without error correction the modem sends a long space disconnect of 4 seconds before hanging up. The modem reacts to the reception of a long space disconnect (break longer than 1.6 seconds) by hanging up.</p>
AT&Y	<p><u>Selection of user configuration for hardware reset</u></p> <p>AT&Y0 For a hardware reset following the AT&Y0-command, the user default 0 (created using the AT&W0 command) is loaded into the current modem configuration.</p> <p>AT&Y1 For a hardware reset following the AT&Y1-command, the user default 1 (created using the AT&W1 command) is loaded into the current modem configuration.</p>
ATZ	<p><u>Software reset/load default</u></p> <p>The command causes the modem to perform a software reset. The modem will load the default saved by the user (according to the parameter). If no parameter is specified, the user default 0 is loaded.</p> <p>ATZ0 Software reset; afterwards the user default 0 is loaded.</p> <p>ATZ1 Software reset; afterwards the user default 1 is loaded.</p>
AT&Z	<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>
<Pause> **** <Pause>	<u>Start of the remote configuration at the local modem</u>
<Pause>+++ <Pause>	<u>Start of the online command mode</u>

5.1.3 Responses for Normal Data Communication

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

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

5.1.4 Overview AT Responses

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

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

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

Message number Short form	Message text in long form	ATXn				
		n=0	n=1	n=2	n=3	n=4
154	CARRIER 40000	X	X	X	X	X
155	CARRIER 42000	X	X	X	X	X
156	CARRIER 44000	X	X	X	X	X
157	CARRIER 46000	X	X	X	X	X
158	CARRIER 48000	X	X	X	X	X
159	CARRIER 50000	X	X	X	X	X
160	CARRIER 52000	X	X	X	X	X
161	CARRIER 54000	X	X	X	X	X
162	CARRIER 56000	X	X	X	X	X
165	CONNECT 32000	X	X	X	X	X
166	CONNECT 34000	X	X	X	X	X
167	CONNECT 36000	X	X	X	X	X
168	CONNECT 38000	X	X	X	X	X
169	CONNECT 40000	X	X	X	X	X
170	CONNECT 42000	X	X	X	X	X
171	CONNECT 44000	X	X	X	X	X
172	CONNECT 46000	X	X	X	X	X
173	CONNECT 48000	X	X	X	X	X
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

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

Notes regarding the table

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

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

5.2 S Registers

The modem has status registers, which control the operation.

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

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

5.2.1 Brief Overview S Registers

Register	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
S14*		General settings			138
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
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

Register	INSYS Modem	Function	Units	Range	Default
S38		Time period until forced hang up	s	0-255	20
S39*		Flow control	-		3
S40*		General settings	-		104
S41*		General settings	-		195
S46*		Data compression	-		138
S48*		Setting for V42 declaration phase	-		7
S86		Error event code	-		Read-only
S91*		Transmit level	-	0-15	9
S95*		Result code	-		0

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

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

5.2.2 Total Overview S Registers

S0* Rings to Auto-Answer - Number of rings until the modem accepts a call
For S0=0 the modem will not accept a call when a call comes in. The value of S0 can be between 0 and 5.

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

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

S3 Carriage Return Character – Carriage Return Character.

S4 Linefeed Character – Linefeed character

S5 Backspace Character – Backspace character

S6* Wait Time for Dial Tone (Before Blind Dialling) - Maximum time to wait for the dialling tone
After the modem went off-hook, it waits 7 seconds for the dialling tone (fixed for approval purposes). If it detects a dialling tone during this waiting period it will start dialling.

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

The value of S6 can be between 4 and 7.

- S7*** Wait for Carrier - Wait for the carrier frequency from the other modem. The maximum time for the modem to wait for a response from the other modem is specified in S7. The time starts running as soon as the modem has finished dialling. The value of S7 can be between 0 and 180 seconds.
- S8*** Pause Time for Dial Delay Modifier - Dial pause time, if there is a comma in the dialling string.
If there is a comma in the dialling string, the modem will wait during the dialling procedure, until the time specified in S8 (in seconds) has run out. The value of S8 can be between 1 and 7 seconds.
- S9*** Carrier Detect Response Time - DCD reaction time on carrier frequency from the other modem.
The DCD output of the RS232 interface (CT109) of the modem switches to **on**, when the carrier frequency from the other modem is detected before the time defined in S9 (in tenth of seconds) runs out. S9 must be smaller than S10.
- S10*** Carrier Loss Disconnect Time - The time which leads to disconnection after carrier frequency loss.
In S10, the time is specified in tenth of seconds, which the modem awaits to disconnect, if it can't detect the carrier frequency from the other modem anymore.
- S12*** Escape Prompt Delay - Minimum pre and post run time and maximum interim time in tenth of seconds, which must be observed, if the modem is supposed to detect a disconnection.
- 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

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

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.

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.

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

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 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
S91=15	Transmit level – 26 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

6 Operation with Programmable Logic Controllers (PLC)

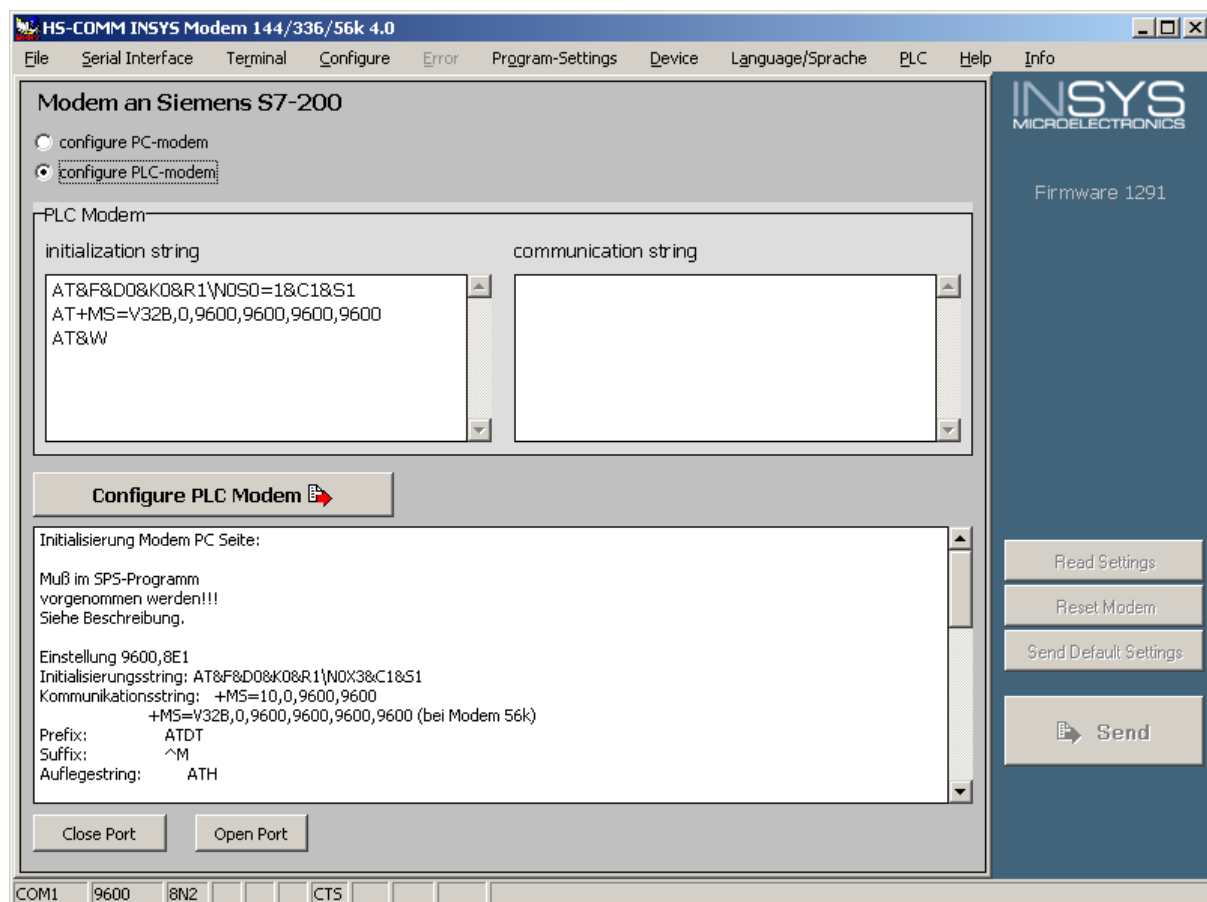
The INSYS Modem 56K small EU has been tested for the most common PLC systems on the market.

The documentation of the settings required for the respective PLC can be queried at INSYS Microelectronics (E-mail: insys@insys-tec.de).

Currently, documentations for the following PLC systems are available:

- Bosch SPS CL400
- Mitsubishi MELSEC FX 2N / 232BD
- OMRON SPS C200HX – CPU44
- PILZ SPS PSS3056
- Schiele SPS S400
- Siemens S7
- Systron S200, S250 and S400

6.1 Operation with HSComm



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

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

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