

# Operating Manual



## INSYS Modem 56k



File E239995

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## 1 Scope Of Delivery

Please check that the box contains all of the following parts before installation and operation:

- 1 INSYS Modem 144 or INSYS Modem 336 or INSYS Modem 56K
- 1 TAE cable
- 1 RS 232 cable (9 pin plug to 9 pin jack)
- 1 operating manual

If any part is missing, please contact your supplier. Please also inspect the modem for transport damage and in the event of damage, consult your supplier.

Please keep packaging for future dispatch or storage.

## 2 General

The INSYS Modem 336/56k is a modem for the analogue telephone network (PSTN).

INSYS Modem 336/56K provides plenty of advantages for professional users. The mounting on DIN rail in your cabinet is very simple, as well as installation and operation.

The features will be explained in the following sections

- Establishment of a data connection
- Auto answer mode
- Security callback
- Data flow control
- Idle connection control (Data transmit control)
- Flash update
- Alarm input and output for SMS messages transmission and for alarm data connections
- Impulse input for dispatching up to 10 SMS messages (only INSYS Modem 144)
- Fax dispatch with alarm release
- Local and remote parameterization
- INSYS Modem 56K usable in over 80 countries of the world
- SMS transmission in the fixed network
- 2 alarm inputs, 2 control outputs
- switch control outputs by DTMF

## 3 Initial Operation

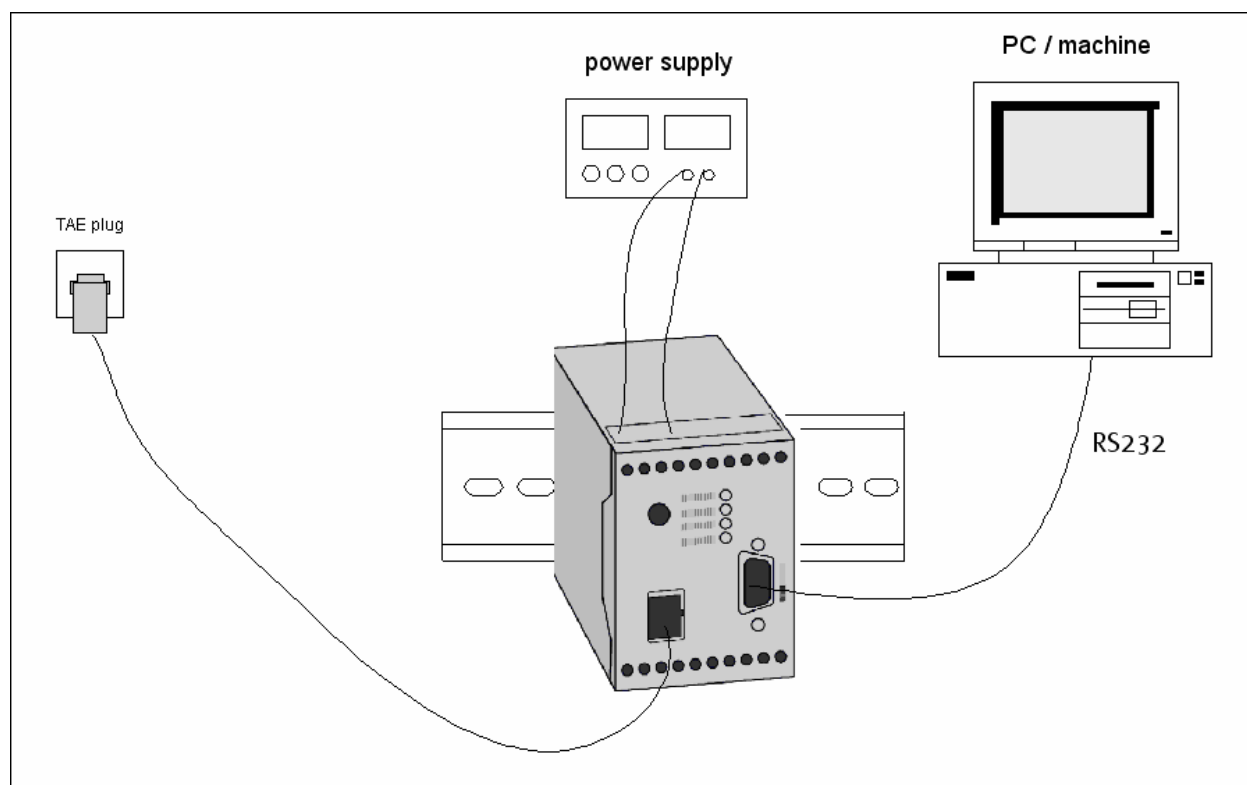
### 3.1 IMPORTANT SAFETY INSTRUCTIONS !

When using your telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock and injury to persons, including the following:

1. Do not use this product near water, for example, near a bath tub, wash bowl, kitchen sink or laundry tub, in a wet basement or near a swimming pool.
2. Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
3. Do not use the telephone to report a gas leak in the vicinity of the leak.

**SAVE THESE INSTRUCTIONS**

### 3.2 Installation Overview



### 3.3 Installation Steps

1. *Mounting on DIN rail:*  
simply clip on

2. Power supply:

- a) Connect earth cable to GND
- b) Connect power supply cable to 10..60 VDC

Note: Maximum ratings at pins 2 and 3 must not be exceeded

- c) *Connect to power supply*

The power LED lights up on successful installation.

3. Telephone network:

- a) Plug the TAE cable into the middle of the RJ-45 socket on the front of the housing  
*or alternatively*  
install via screw terminal on the bottom according to description (b2, b1, a1, a2, NC).
- c) connect cable to the TAE plug

Disconnect the INSYS Modem 144/336/56K from the phone line immediately in case of any fault or functional irregularities – e.g. when the OFF-Hook-LED switches on immediately - and contact your service partner. In order to preserve your guarantee please do not open or interfere with the modem.

4. Connecting PC/terminal:

Plug the enclosed RS 232 interface cable into housing front and connect with PC/terminal.

5. Checking successful installation:

Execute a short test from your terminal program (e.g. HSComm terminal window, HyperTerminal, TeraTermPro, ProcommPlus). Enter the command "**AT**" and press the "**ENTER**" button. If "**OK**" appears on your screen the INSYS Modem 144/336/56K has been successfully installed.

6. Connection test:

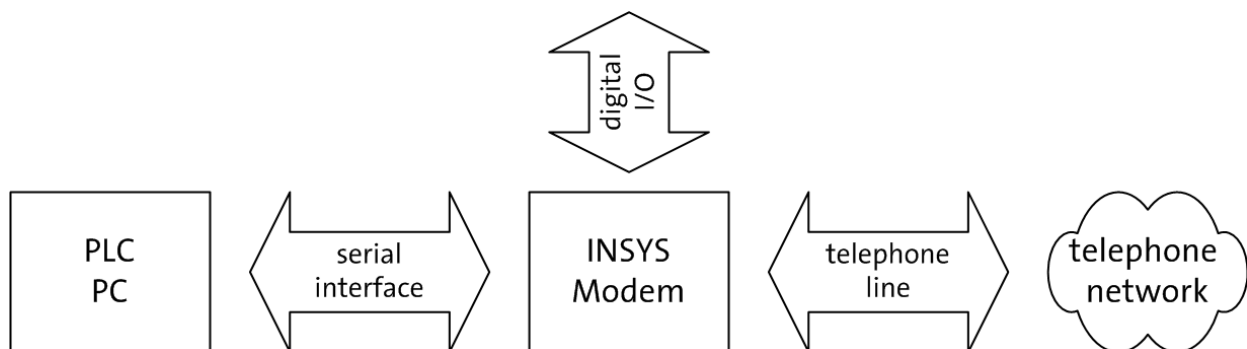
Start a connection from your terminal program:

- Dial the following number 0101901929 (**ATDT0101901929**)  
Attention: For PABXs which require a „0“ for connection set-up, please enter the following **ATX3DT0,0101901929**
- OFF-Hook-LED lights up
- Modem dials
- After some time (not more than 1 minute) the **CONNECT** message appears and the DCD LED switches on

1		1	GND
2		2	X1
3		3	10..60 VDC
4		4	GND
5		5	GND
6		6	RESET
7		7	GND
8		8	INPUT 1
9		9	INPUT 2
10		10	GND



## 4 Configuration



### 4.1 Configuration Software HSComm

INSYS Modem is configured by AT commands from a terminal program or PLC. All basic functions of INSYS Modem can be controlled by the configuration software HSComm without any knowledge about single commands and parameters. The description of settings within HSComm is followed by a list of corresponding AT commands. A terminal window within HSComm allows direct command input when required.

A complete description of all AT commands and registers is available in a separate document.

HSComm is running under Microsoft Windows from version 95.

#### 4.1.1 HSComm Operation

HSComm tests the type of the connected device at startup or by menu *Device* → *Test device* and displays name and firmware revision in the upper right corner of the program window. By default settings are available only when the corresponding firmware revision has been recognized by the test.

The buttons in the right column of the window allow to read out the current settings, to reset the modem or to set it back to factory settings.

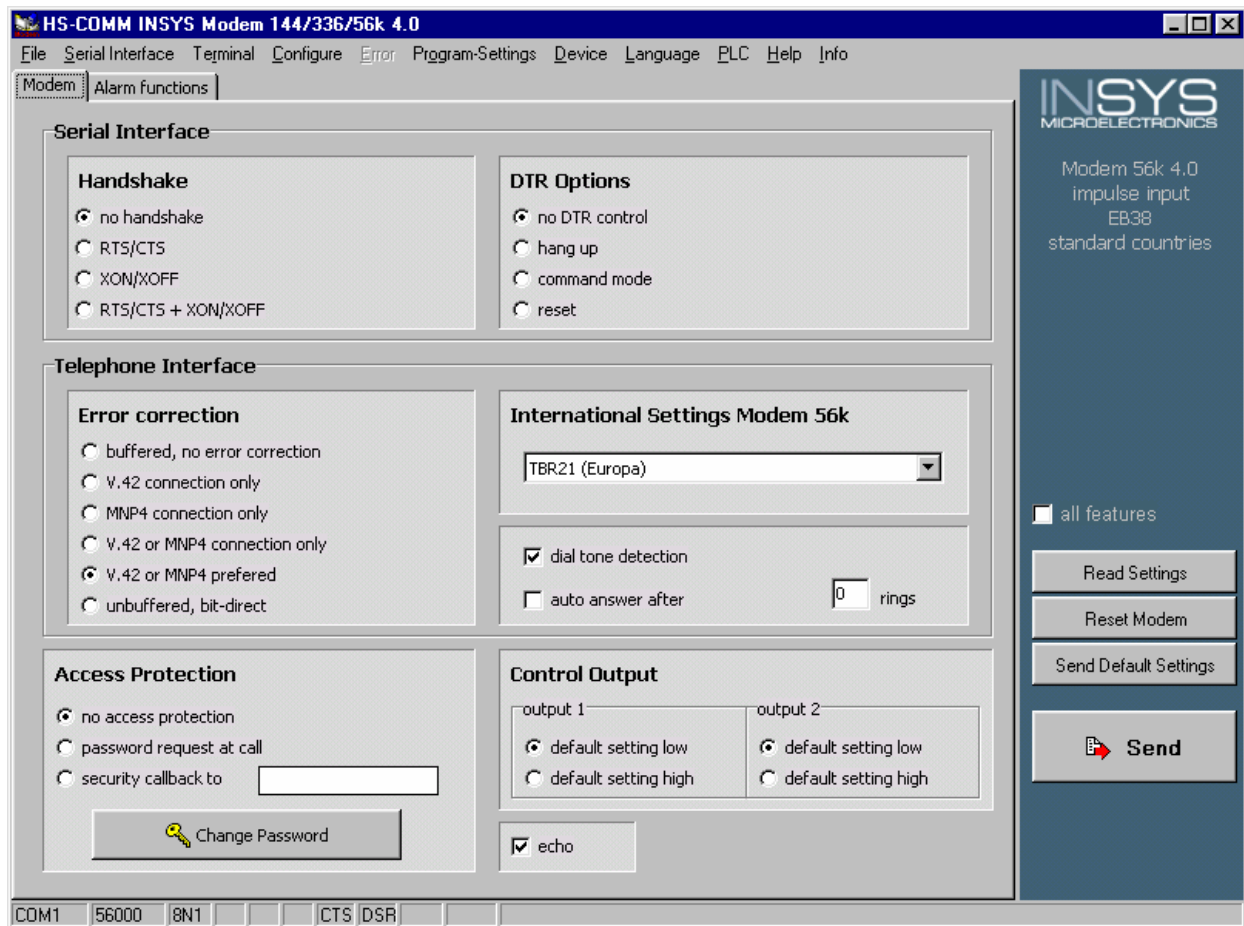
All parameter settings are transmitted to the modem after pushing the SEND button.

Configurations can be saved and restored by the commands of the *File* menu.

Error messages of the modem are displayed in the *Error* menu.

For operation in connection with PLCs refer to chapter 7.

The key **F1** provides a help window for the currently selected option at any time.



### 4.1.2 AT Commands For Settings

Command	Description
AT&F	load factory settings
AT&V	display settings
AT&W	save user settings
ATZ	software reset

A comprehensive description of all AT commands and parameters is available in the addendum „command overview“.

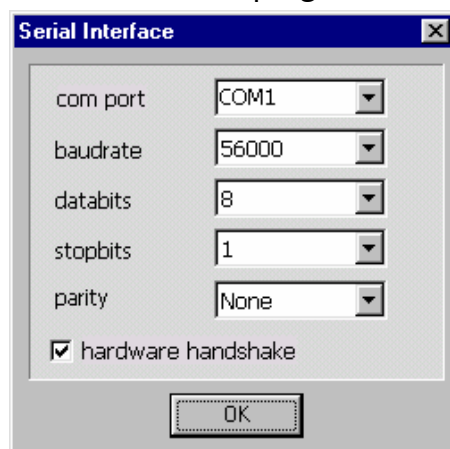
## 4.2 Serial Interface

Both devices on the serial line (PLC or PC on one side and INSYS Modem on the other) have to agree on the following settings for the serial line:

- baud rate (data transmission speed):
- format (start, data, parity and stop bits)
- flow control ( hardware/software handshake)

### 4.2.1 PC Settings

Within HSComm the serial line setting are configured by the menu *interface*. The actual settings are displayed in the status line of the program window.



**Note:** Serial setting has to be configured in any device (PC or PLC) connected to the INSYS Modem.

### 4.2.2 INSYS Modem Settings

Serial line settings of the INSYS Modem are accessed by the menu *Configure → Modem*.

Autobauding: the INSYS Modem recognizes baud rate and format of incoming data at the first AT command. The last settings persist unchanged if the modem receives data (e.g. when answering a call).

Handshake is controlling data flow in case one of the devices is not ready to receive more data temporarily. Hardware handshake is realized by separate control lines within the serial interface.

#### DTR handling

The signal *Data Terminal Ready (DTR)* of the serial line indicates that the device (PLC, PC) is switched on, connected and ready. INSYS Modem can react if the device is switched off or a cable is disconnected.

#### Echo

When *Echo* is set INSYS Modem transmits each command back on the serial line to the sender. This is necessary to see the command input in terminal mode.

### 4.2.3 Idle Connection Control

Idle connection control (formerly data transmit control) is a firmware function to monitor data transmission on the serial line in online mode. It avoids long time connection without data transmission.

A counter starts as soon as the connection is established. Each byte which is transmitted over the serial line resets the counter. The modem is reset when the predefined time is reached without any data transmission or reception on the serial line. As the counter starts at off hook idle time should not be set to less than 30 seconds to allow full connection establishment.

Data transmission on the remote line does not reset the counter. Idle connection control of the remote modem must be switched off for remote control therefore.

Idle connection control is configured by AT command only.

#### 4.2.4 AT Commands For The Serial Line

Command	Description
AT*S	data transmission speed on serial line
AT+IPR	autobauding, baud rate (INSYS Modem 56k only)
AT*U	serial line protocol
AT&K	flow control between PC and modem
ATE	command echo
AT&S	DSR handling
AT&C	DCD (CT109) handling
AT&D	DTR (CT108/2) handling
ATS11=	Idle connection control (INSYS Modem 144/336 only)
ATS15=	Idle connection control (INSYS Modem 56k only)

A comprehensive description of all AT commands and parameters is available in the addendum „command overview“.

### 4.3 Telephone Interface

#### 4.3.1 Error Correction

Error correction according to V.42 or MNP (1-4) standards enables the modem to recognize and correct transmission errors by line disturbances. Transmission may be interrupted without error correction. The type of error correction can be selected by the HSComm menu *Configure → Modem → Error correction*. With the settings *V.42 connection only*, *MNP4 connection only* and *V.42 or MNP4 connection only* connection is refused if the other modem does not support this error correction.

For connections with the requirement of short answer times the setting *buffered, no error correction* avoids any delays by block transmission.

Error corrected connections allow additional data compression.

In *unbuffered, bit-direct* mode up all bits are transmitted without buffering, error correction or compression. The modem does not influence the transmission format in any way. Only the escape sequence (+++) is interpreted by the modem as long as the data format is up to 11 bits.

### 4.3.2 International Settings

INSYS Modem 56k can be adjusted to the line requirements of 87 countries worldwide by a configuration command. The country codes for the firmware versions “standard countries” and “further countries” are listed in chapter 8. Some countries do not require a separate adaptation but are using the standards “TBR21 (Europe)” or “ITU/Taiwan”.

TBR21 is the accurate setting for the countries of the European Union, Switzerland, Liechtenstein, Norway and Iceland. Select the explicit country code only when INSYS Modem is connected to an older private branch exchange (PBX).

INSYS Modem 144 and 336 are configured for operation in western Europe (TBR21) only.

### 4.3.3 Dial Tone Detection

When dial tone detection is active, a dial attempt without the presence of a dial tone being detected is aborted with the message NO DIALTONE. Without dial tone detection dialing is attempted and reports NO CARRIER if not successful. Dialing without dial tone detection is often required behind a private branch exchange (PBX).

Attempts to call a busy line is answered by the message BUSY in both cases.

### 4.3.4 Auto Answer Mode

The modem is answering incoming calls after the specified number of RING indications autonomously.

### 4.3.5 AT Commands For The Telephone Line

Command	Description
ATA	answer mode
AT*A	auto answer mode lock
ATB	modulation for 300 Baud
AT\B	send break signal
AT%B	power up and down of the key abort at dial-up
AT%C	Enable data compression
AT\N	select error correction
ATW	error correction messages
AT\A	MNP block size
AT*L	auto speed limit
AT+MR	modulation type display (INSYS Modem 56k only)
AT+MS	modulation type selection
AT%E	retrain
AT+GCI	country code selection (INSYS Modem 56k only)
ATD	dial
ATH	hang up

Command	Description
ATP	Select pulse dialing
ATT	Select tone dialing
AT%Q	Display phone connection quality
ATSO	auto answer
AT+VCID	set caller ID (INSYS Modem 56k only)
AT+VRID	last received caller ID (INSYS Modem 56k only)
AT\V	connect messages
ATX	Extended result reporting, dial tone detection
AT%L	Display level of received signal
AT&Z	Store phone numbers

A comprehensive description of all AT commands and parameters is available in the addendum „command overview“.

## 4.4 Access Protection

### 4.4.1 Password Protection

With password set the modem is protected from unauthorized access

- for incoming data connections
- for remote control
- for security callback

### 4.4.2 Security Callback

When the modem answers an incoming call the message “CONNECT” is followed by the messages “SECURITY CALLBACK” and “REMOTE PASSWORD:”.

- If the password is wrong the modem immediately disconnects and stops an unauthorized access.
- If the password is correct the modem reports "OK" to the calling terminal, disconnects and dials the phone number specified after 10 seconds. Up to 3 call attempts are executed with 10 seconds breaks in between.
- 2 seconds after the connection the message “CALLBACK IN PROGRESS” is sent by the calling modem and the serial line is released for a standard data connection.

Outgoing calls are not influenced by the security callback functionality.

### 4.4.3 AT Commands For Access Protection

Command	Description
AT*P	password request after dial-up
AT*C	remote control password
AT*C1	PIN for DTMF control
AT*R	turn on/off remote control
AT\D	turn on/off DTMF for digital IO
AT&Z1=	store security callback number
AT&A	selective call answer according to caller IDs (INSYS Modem 56k only)
AT*N	allowed numbers for selective call answer (INSYS Modem 56k only)
AT%N	last rejected number (INSYS Modem 56k only)

A comprehensive description of all AT commands and parameters is available in the addendum „command overview“.

## 4.5 Control Output

INSYS Modems 144/336/56k from version 4.0 provide two control outputs OUT1 and OUT2 at the bottom of the housing. These outputs are realized as SPDT (single pole double throw) switches by galvanic insulated relays. The outputs are controlled independently by software commands. OUT1 is closed automatically during impulse alarm processing.

Control outputs can be switched remotely:

- within a remote configuration session (see chap. 4.8)
- by DTMF signals (see chap. 4.9.2)

AT Commands For Control Output

Command	Description
AT*Y	output switching

A comprehensive description of all AT commands and parameters is available in the addendum „command overview“.

## 4.6 Alarm Input

INSYS Modems 144/336/56k from version 4.0 provide two digital inputs which are activated by ground potential. In case of an alarm the modem transmits an alarm notification by data connection, as a fax or an SMS.

If the impulse alarm is activated the modem distinguishes up to 10 pulse sequences. Each of these 10 alarm events correlates to user defined alarm text and receiver.

The status of the alarm inputs can be queried by AT command or by DTMF signals (see chap. 4.9.2)

### 4.6.1 Alarm Trigger

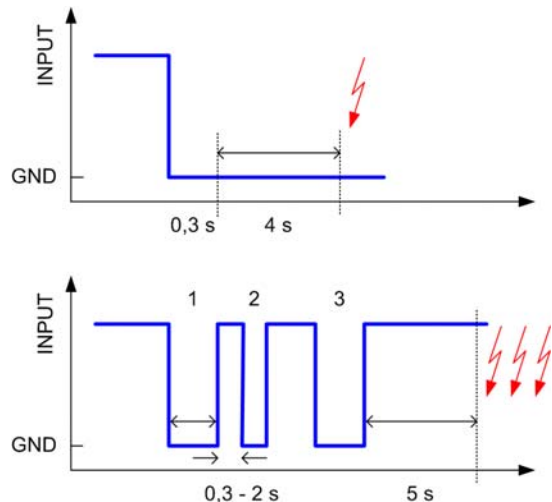
The alarm inputs are on HIGH potential provided by internal pull-up resistors as long as it is open. The alarm is activated by a simple connection to the ground potential.

The alarm input is configured by the HSComm menu *Configure* → *Alarm functions*:

- With *alarm input active* a simple alarm is triggered as soon as INPUT1 is set to ground potential for 4 seconds.
- With *impulse input active* pulses (pulses and pauses with duration of 0,3 to 2 seconds) at INPUT1 are counted and processed after a delay of 5 seconds. If INPUT1 is kept at ground potential for more than 4 seconds a simple alarm only is triggered for compatibility reasons.

Activation of INPUT2 is interpreted like 2 pulses on INPUT1.

Simple and impulse alarms can be triggered by software commands for control purposes.



HS-COMM INSYS Modem 144/336/56k 4.0

File Serial Interface Terminal Configure Error Program-Settings Device Language PLC Help Info

Modem **Alarm functions**

Action At Alarm

alarm input: impulse input active

connection type: SMS to D2 net

characters for dial prefix: 0,

☐ FAX-message

Alarm text (max 159 characters) 126 characters remaining

Testtext

message	corresponding phone number
1 ML1	0172 09544
2	0172
3	0172
4	0172
5	0172
6	0172
7	0172
8	0172
9	0172
10	0172

COM1 56000 8N1 CTS DSR

INSYS MICROELECTRONICS

Modem 56k 4.0  
impulse input  
EB38  
standard countries

☐ all features

Read Settings

Reset Modem

Send Default Settings

**Send**



## 4.6.2 Alarm Actions

SMS transmission from the analog telephone network is routed by special gateway numbers of the network providers. These *Service Center Numbers* and the protocol (PET or UCP) are preconfigured for German GSM networks.

### 4.6.2.1 Simple alarm

Alarm notifications consist of an alarm text of a maximum of 160 characters. The notification is transmitted to a modem over data connection or to mobile phone by SMS.

### 4.6.2.2 Impulse alarm

With impulse alarm active alarm notification are composed from 120 characters common text for all alarms and 80 characters individual alarm text – the first 160 characters are transmitted by SMS. The alarm index is specified by the number of pulses. If more than 10 pulses are applied message 10 is transmitted.

The notifications are transmitted to mobile phones by SMS. All recipients must be located within the network of the same GSM provider.

Attention: alarm number 1 must be configured in any case to activate impulse alarming.

### 4.6.2.3 Collective fax message

In addition all alarm notifications can be sent to a central fax number for logging.

### 4.6.2.4 Connection

If a connection can not be established 3 dial attempts with 10 seconds breaks in between are executed. Alarm notification is aborted if no connection was successful. A new connection is only initiated when the alarm input is opened and closed again.

Data connection to a modem can remain after the transmission of the notification with the selection *data connection, keep connection*. After fax or SMS transmission the connection is closed by the modem in any case.

A dial prefix is necessary for the service center numbers only, not for the single target numbers.

### 4.6.2.5 SMS in the fixed network

SMS gateways in the fixed network are supported by the latest firmware. SMS in the fixed network can be transmitted as well to fixed telephones as to a fax or a e-mail address. The following access data are from Deutsche Telekom:

Service-Center:      **01930100**

SMS to fax:            set prefix **99** ahead of fax device number

SMS to e-mail:        set recipient number to **8000** (SMS-e-mail gateway)  
text message begins with e-mail address, followed by a space and the message. Replace @ in the e-mail address by an asterisk \*.  
(Note: The common text must be empty or start with the e-mail address for pulsed alarm.)

### 4.6.3 AT Commands For Alarm Actions

Command	Description
AT%A	alarm triggering
AT*I	manual request of the alarm input
AT*M	protocol for alarm messages
AT*V	alarm text
AT&Z	store telephone numbers (mobile, service center, fax)
ATS13	number of dialing attempts

A comprehensive description of all AT commands and parameters is available in the addendum „command overview“.

## 4.7 Command Input Mode

At power up INSYS Modem is in the command input mode ready to receive AT commands from the serial line. When a data connection is established the modem can be set back to command input mode by the following escape sequence:

- 1 second break (no input)
- 3 plus characters (+++) without Return
- 1 second break (no input)

Data connection is held in the background.

### AT Commands For Command Input Mode

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

A comprehensive description of all AT commands and parameters is available in the addendum „command overview“.

## 4.8 Remote Configuration

To change into remote configuration mode a data connection must exist between the modems. A specific protocol is not necessary, however it is recommended to use an error corrected connection to avoid transmission errors of critical commands.

The local modem does not require any remote configuration functionality.

Remote configuration is initiated by the following escape sequence (e.g. in the terminal window):

- 1 second break (no input)
- 4 asterisk characters (\*\*\*\*) without Return
- 1 second break (no input)

If hardware handshake is active in the remote modem the handshake signals have to be active for the start of remote configuration. Otherwise hardware handshake should be switched off.

Some commands are not available in remote configuration mode and are answered by ERROR: ATA, ATD, ATO, AT\B, AT\*C, AT\*C1, AT&F, AT\*V.

Attention: Idle connection control of the remote modem must be switched off because the counter is only reset by characters on the serial line, which is not in use during remote configuration. Idle connection control can be switched off at the beginning of the remote configuration session.

Remote configuration is executed only by AT commands, e.g. from the HSComm terminal window, but not by HSComm *Configure* menu.

### AT Commands For Remote Configuration

Command	Description
AT*C	store remote configuration password (presettings are QWERTY)
<break> **** <break>	initiate remote configuration
AT*R1	release modem for remote configuration
AT*E / AT*X	terminate remote configuration
ATS11 / ATS15	idle connection control

A comprehensive description of all AT commands and parameters is available in the addendum „command overview“.

## 4.9 Voice Mode and DTMF Transmission

The voice mode of the modem allows

- to digitize telephone audio data and to transmit them over the serial line
- to play back digitized audio data to the telephone line
- to transmit and receive control signals as DTMF

### 4.9.1 DTMF Sounds

Keyboards of fixed network and mobile telephones produce DTMF sounds for the characters (0..9, A..D, \*, #) as a combination of two frequencies which do not occur in the human voice.

DTMF sounds are used for dialing in the telephone network. They may be used as well to transmit control signals during a voice connection – e.g. for answering machines or telebanking.

### 4.9.2 Remote Switching and Status Query

The latest firmware updates for INSYS Modem 144/336/56k 4.0 from January 2003 allow to set the control outputs and to query the status of the alarm inputs by DTMF signals. The INSYS Modem is ready to receive DTMF signals in incoming calls when the DTMF mode has been activated. The connect is indicated by the OK signal and must be answered by a 4 digit PIN. The PIN is acoustically acknowledged.

The following commands are available for remote DTMF control by telephone keyboard:

Key	Description
0*	Close connection
1*x	Control output 1: <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="margin-right: 20px;">x:</div> <div style="text-align: center;">1</div> <div>set control output 1 to 1</div> </div> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="margin-right: 20px;"></div> <div style="text-align: center;">0</div> <div>reset control output 1</div> </div> Return: „OK“
2*x	Control output 2: <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="margin-right: 20px;">x:</div> <div style="text-align: center;">1</div> <div>set control output 2 to 1</div> </div> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="margin-right: 20px;"></div> <div style="text-align: center;">0</div> <div>reset control output 2</div> </div> Return: „OK“
3*	Status query of both alarm inputs: Status of both inputs is indicated in the form of HIGH (not active) or LOW (active). Return: „OK“ – Status Input 1 – Status Input 2

The connection is closed by the INSYS Modem after a idle time of 25 seconds without further DTMF signals.

The INSYS Modem switches to data mode if it receives the call signal for a data connection from a modem.

Acoustic Signals	Description	
short deep sound – short break – short high sound	OK	ready, command executed, PIN ok
long deep sound	ERROR	invalid command, wrong PIN
	LOW	alarm input active
long high sound	HIGH	alarm input not active

### 4.9.3 AT Commands for Voice and DTMF Mode

The AT command sets of INSYS Modem 144/336 and INSYS Modem 56k have a similar content but partly different naming. The comprehensive description of AT commands for voice functions are available as separate documents from INSYS MICROELECTRONICS.

Command	Description
AT\D1	activate DTMF mode
AT\D0	deactivate DTMF mode
AT*C1	PIN for DTMF commands (factory setting „0000“)

## 4.10 Firmware Update

INSYS Modem contains a flash EPROM which allows a firmware update without hardware manipulations. The latest firmware can be requested from your service partner. It consists of the flash loader (file HS\_LADER.s37) and the firmware code (file with extension .S37).

The update is executed by a terminal program, which can perform an ASCII upload (ASCII text transmission protocol), running on a PC. Tested and recommended terminal programs are TeraTermPro, ProcommPlus and HyperTerminal (included in Windows). The following settings in the terminal program are mandatory:

- hardware handshake
- no interpretation of characters like tab stop, line feed, carriage return, backspace
- baud rate between 9.600 baud and 57.600 baud

The upload procedure takes 2 to 3 minutes at 57.600 baud, , longer with lower baud rates.

### 4.10.1 Upload Procedure

1. Upload is initiated by the AT command **AT\*\*** - the modem replies „**Download initiated**“.
2. ASCII upload of the flash loader HS\_LADER.S37. The transmission process is displayed by dots in some terminal programs. Upon termination the message „**Download Flashcode**“ is displayed.
3. ASCII upload of the firmware code (file xxxxxxxx.S37). The transmission process is displayed by dots in some terminal programs.  
Attention: Transmission must not be intercepted under no circumstances. Otherwise the flash EPROM is erased but incompletely written.
4. Successful termination is indicated by the message „**Device successfully programmed**“.

### 4.10.2 AT-Commands For Firmware Update

Command	Description
AT**	start flash update

A comprehensive description of all AT commands and parameters is available in the addendum „command overview“.

**Remark: Mandatory ASCII protocol setting in the Telix terminal program: delay between characters and lines must be 0, local echo must be off.**

## 5 Technical Data

All data at nominal input, full load and 25°C ambient temperature. Stresses listed under „Maximun Ring“ (one at time) may be applied to devices without resulting in permanent damage. The operation of the equipment for extended periods may affect device reliability. Limiting value tolerance are subject to usual fluctuation margins.

### 5.1 General

#### 5.1.1 Key Features

- Mounting on DIN rail DIN EN 500 22
- Data, fax and SMS<sup>1</sup> services
- Power supply 10..60 V DC, 5% ripple
- Voltage level on the V.24 interface corresponding to V.28
- Protected V.24/V.28 interface with 9-pin SUB-D jack (screw-locked)
- Telephone interface via telephone socket (RJ 45) or screw terminal
- Reset by button or via screw terminal
- Watchdog
- Enhanced AT command set
- Auto answer mode
- 2 user profiles
- Hard-/software handshake
- 4 programmable telephone numbers (32 digits)
- Speed automatically adjustable or set
- Online retrain
- MFV dialing
- Flash function
- Alarm function
- Busy recognition
- Remote Control with password
- Callback security function with password
- Idle connection control (data transmit control)

#### 5.1.2 Mechanical Features

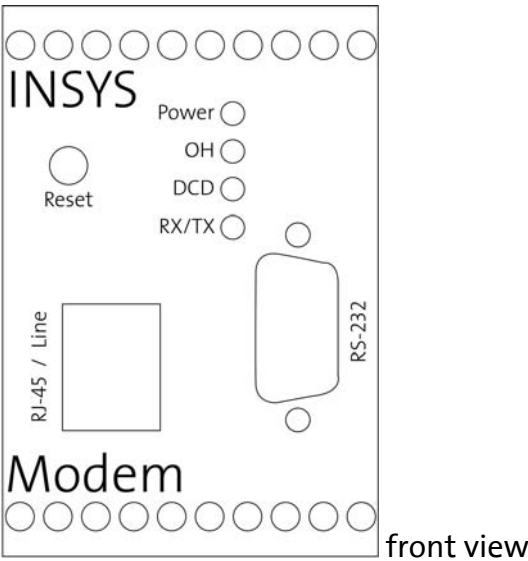
Weight	250 g
Dimensions (max.)	w x d x h = 55 x 110 x 75
Temperature range	0°C ..55°C
Protection class	Housing IP 40/ Terminal IP 20
Humidity	0 - 95% not condensing

**Note:**        **The INSYS Modem 56K must not be used in wet environments.**  
                 **Avoid using a telephone (other than a cordless type) during an electrical**  
                 **storm. There may be a remote risk of electric shock from lightning.**

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<sup>1</sup> support by network provider required

5.2 Interfaces And Display Elements



5.2.1 Display Elements

The INSYS Modem 56K 4.0 provides four LEDs for status indication.

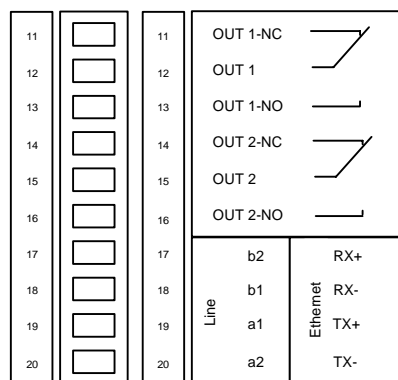
Name	Color	Off state	On state
Power	green	no power supply	power supply connected
OH (off hook)	yellow	Modem is offline	Modem is connected to phone line (online)
DCD (Data Carrier Detect)	yellow	no connection established	connection established (carrier detected)
RX/TX (Receive / Transmit)	green	no data exchange	data is exchanged via the modem

5.2.2 Terminal Layout

Top side terminal

	Terminal	
1	GND	Ground
2	X1	Power supply 50V - 80V DC (optional)
3	10..60VDC	Power supply 10V - 60V DC
4	GND	Ground
5	GND	Ground
6	Reset	Reset input
7	GND	Ground
8	Input 1	Alarm input 1
9	Input 2	Alarm input 2
10	GND	Ground



**Bottom side terminal:**

	Terminal	
11	OUT1NC	Output 1 – normally closed
12	OUT1	Output 1
13	OUT1NO	Output 1 – normally open
14	OUT2NC	Output 2 – normally closed
15	OUT2	Output 2
16	OUT2NO	Output 2 – normally open
17	b2	Through phone line
18	b1	Phone line
19	a1	Phone line
20	a2	Through phone line

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

**note:** a2 and b2 are for the connection of a following telephone equipment. This telephone equipment should be certified accordant UL 60950-1 part 6. Using only cable Typ AWG26.

**5.2.3 Power Supply**

Power supply: 10...60 V DC

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

Current consumption:

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

**Note:** The Power Supply must always be secured with a UL LISTED Fuse Typ T5A H 250V.

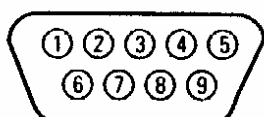
### 5.2.4 Reset

Modem reset can be triggered by an external unit over the screw terminal **Reset**. A low potential has to be applied for a minimum of 3 seconds.

Modem reset can also be triggered by the reset key on the front panel. The key has to be pushed for a minimum of 3 seconds.

### 5.2.5 Serial Interface

Layout of the 9 pin D-Sub jack



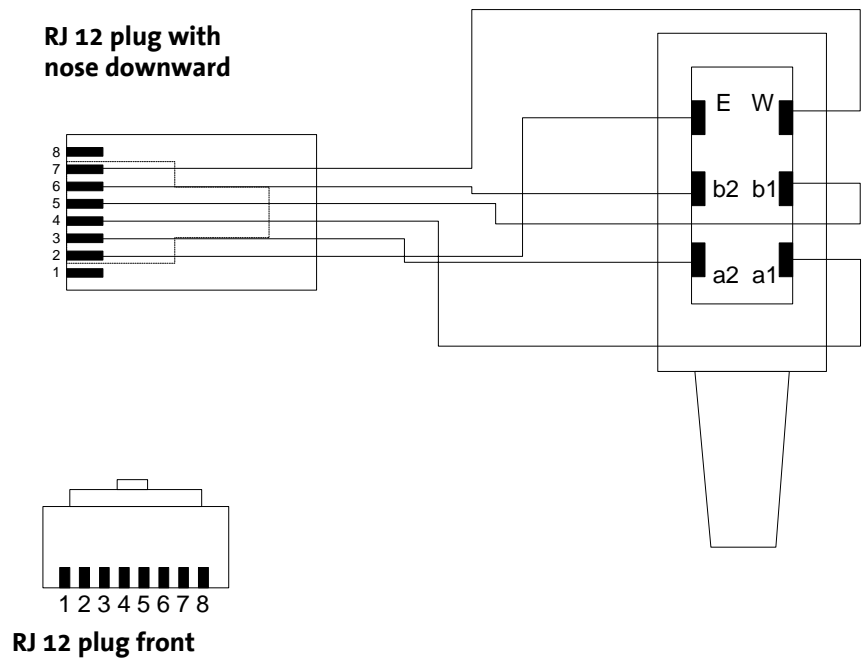
Description of the signals at the 9 pin D-SUB jack of the DCE:

9 pin D-SUB DCE pin no.	Description	Function	CCITT V-24	EIA RS232	DIN 66020	E/A DCE to DTE
1	DCD	Data Carrier Detect	109	CF	M5	O
2	RXD	Receive Data	104	BB	D2	O
3	TXD	Transmit Data	103	BA	D1	I
4	DTR	Data Terminal Ready	108	CD	S1	I
5	GND	Ground	102	AB	E2	
6	DSR	Data Set Ready	107	CC	M1	O
7	RTS	Request To Send	105	CA	S2	I
8	CTS	Clear To Send	106	CB	M2	O
9	RI	Ring Indication	125	CE	M3	O

### 5.2.6 Interface speed

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

5.2.7 Phone Interface



RJ 12 and RJ 45

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

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

**note:** a2 and b2 are for the connection of a following telephone equipment. This telephone equipment should be certified accordant UL 60950-1 part 6. Using only cable Typ AWG26.

## 5.2.8 Digital Inputs and Outputs

### 5.2.8.1 Alarm input:

LOW 0 .. 1 V

HIGH 4 .. 12 V

current from LOW to internal +5 V voltage: typ. 0.5 mA

### 5.2.8.2 Control output:

SPDT (single pole double throw) switches by galvanic insulated relays

maximum voltage: 30 V (DC) / 30 V (AC)

maximum current: 1 A (DC) / 0.5 A (AC)

## 5.3 Transmission Standards/Protocols

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

ITU Standards (CCITT)	Meaning
V.21	Transmission with 300 bps full duplex
V.22	Transmission with 1,200 bps full duplex
V.22bis	Transmission with 2,400 bps full duplex
V.23	Send with 75 bps and receive with 1,200 bps and vice versa (full duplex).
V.23 half-duplex	Send or receive with 1,200 bps (half duplex)
V25bis	Alternate command set for AT command set
V.32	Transmission with 9,600 bps or (fallback) 7,200, 4,800 bps.
V.32bis	Transmission with 14,400 bps or (fallback) 12,000, 9,600, 7,200, 4,800 bps.
V.FC	Transmission with 28,800 bps or (fallback) 26,400, 24,000, 21,600, 19,200, 16,800, 14,400 bps.
V.34	Transmission with 28,800 bps or (fallback) 26,400, 24,000, 21,600, 19,200, 16,800, 14,400 bps.
V.34+	Transmission with 33,600 bps or (fallback) 31,200, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400 bps.
V.42	Error protection method for DCE's with asynchronous-to-synchronous conversion
V42bis	Data compression method
V.90	Receive with 56,000 bps or (fall back) 54,667, 53,333, 52,000, 50,667, 49,333, 48,000, 46,667, 45,333, 42,667, 41,333, 40,000, 38,667, 37,333, 36,000, 34,667, 33,333, 32,000, 30,667, 29,333, 28,000 bps.  Send with 33,600 bps or (fall back) 31,200, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400 bps.
V.92	Receive with 56,000 bps or (fall back) 54,667, 53,333, 52,000, 50,667, 49,333, 48,000, 46,667, 45,333, 42,667, 41,333, 40,000, 38,667, 37,333, 36,000, 34,667, 33,333, 32,000, 30,667, 29,333, 28,000 bps.  Send with 48,000 bps or (fall back) 46,667, 45,333, 42,667, 41,333, 40,000, 38,667, 37,333, 36,000, 34,667, 33,333, 32,000, 30,667, 29,333, 28,000 bps.

## 5.4 Firmware

Date	Checksum		Description
	Standard Countries	Extended Countries	
Mai 2004	F205	9F6E	supported countries in the firmware versions for standard countries and extended country group see chap. 8

## 5.5 Approvals

The INSYS Modem 144/336/56K bears the CE symbol of conformity. This symbol declares that the INSYS Modem 144/336/56K corresponds to the currently valid versions of the following EC Directives:

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

Approvals:

- R&TTE
- CTR 21 (Europe)
- CE
- Approval number CE 0682X

## 6 Command Overview

### 6.1 AT Command AND S-Register Overview

A comprehensive description of all AT commands and parameters is available in the addendum „command overview“ from

INSYS Microelectronics GmbH , Waffnergasse 8, 93057 Regensburg, Germany  
Tel +49 941 560061, Fax +49 941 563471, Email: insys@insys-tec.de

### 6.2 Syntax Of The Standard AT Commands

Modem guideline V.25 ter is applicable as regards the time sequence of interface commands. The AT standard is a line-oriented command language. Each command is made up of three elements: the prefix, the body and the termination character.

The prefix always consists of the letters **AT**, except the **A/** command.

The body consists of a name and, if applicable, of associated values. In case an associated value is optional, it is marked by square brackets ([...])

The default termination character is **<CR>** (= 0x0D).

Commands may be combined in the same command line. Spaces between the individual bodies are ignored. The commands can be classified as:

- basic command set
- extended command set (beginning with “+” or “^”)

Commands are acknowledged with “OK” or “ERROR”. A command currently being processed is interrupted by each subsequent incoming character. Consequently, the next command must wait until acknowledgment has been received as otherwise the current command will be canceled.

## 6.3 Messages Returned For Normal Data Communication

Response	Code	Type	Meaning
OK	0	final	Command executed, no errors
CONNECT	1	intermediate	Connection set up, if parameter setting X=0
CONNECT [<text>]		intermediate	Connection set up, if parameter setting X>0 <text>: e.g.: 'cnx 9600'. Data transfer rate is 9600 Bit/sec. then.
RING	2	unsolicited	Ring detected
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, dialing impossible, wrong mode
BUSY	6	final	Remote terminal busy
NO ANSWER	7	final	Connection completion time-out

## 6.4 S Register

The modem uses status registers to control operation.

S-registers can be read and written with the **ATS** command.

Certain S-registers can only be read, while others can only be set within a limited range of values.

If a value limit is exceeded, the modem will respond **OK**, even though the value is not accepted. Therefore, it is recommended to check the contents of a register, after changes have been made by use of the **ATS<n>?** command.

### Short Overview S Register

Register	Function	Units	Range	Default
S0*	Rings to auto answer	rings	0-5	5
S1	Ring counter	rings	0-255	0
S2*	Escape character	ASCII	0-255	43
S3	Return character	ASCII	0-127	13
S4	Line feed character	ASCII	0-127	10
S5	Backspace character	ASCII	0-255	8
S6*	Waiting time for dial tone	s	4-7	4
S7*	Waiting time for carrier signal	s	0-100	60
S8*	Dialing pause	s	1-7	2
S9*	Reaction time on carrier signal	0.1 s	1-255	6
S10*	Time between lost carrier signal and hang-up	0.1 s	20-254	20
S12*	ESC prompt delay	0.02 s	0-255	50

Register	Function	Units	Range	Default
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 initial character		0-127	42
S21*	Settings for V24			116
S22*	Settings			75h (117)
S24*	Time until changing to sleep mode	s	0-255	0
S25	Time for DTR signal	0.01 s	0-255	5
S26	Time between RTS/CTS	0.01 s	0-255	1
S27*	General settings	-		137
S29	Time for modifiers „flash“	10 ms	17	17
S30	Time until hang-up for inactivity	10 s	0-255	0
S31*	General settings	-		C2h (194)
S36*	Resetting the error protocols	-		135
S38	Time 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*	Settings for V42 negotiation phase	-		7
S86	Error result code	-		read only
S91*	Send level	-	0-15	9
S95*	Result code	-		0

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

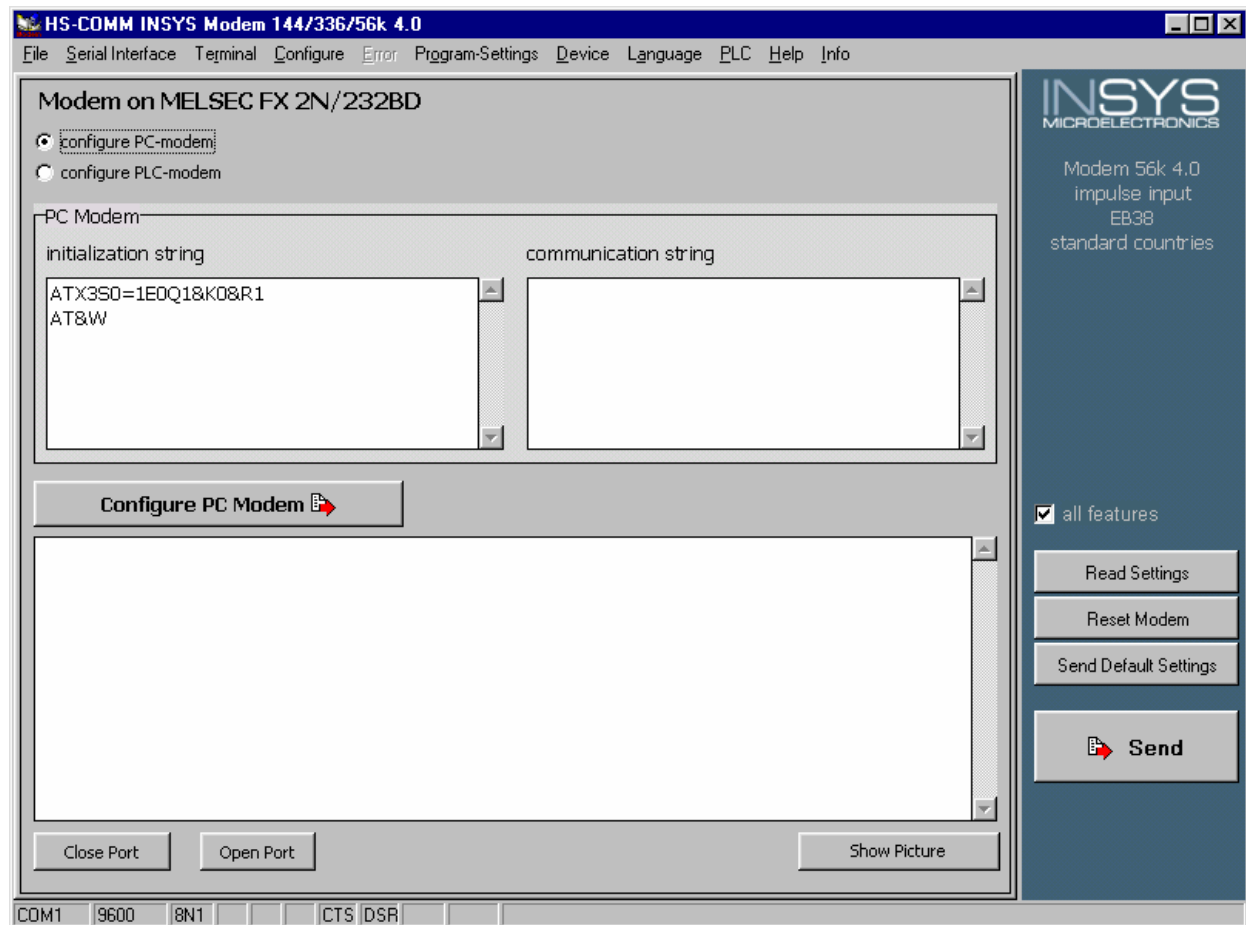


## 7 Operation With PLCs

The INSYS Modem 144/336/56K has been tested for the most common PLC systems on the market.

The documentation of the settings required for the respective PLC (Application Note) can be requested at INSYS (email: [insys@insys-tec.de](mailto:insys@insys-tec.de))

### Installation by HSComm



The configuration software HSComm provides recommended settings for the modems connected to the PLC or to the PC in the central office.

With the menu *PLC* the required settings and installation instruction are displayed in text form. The recommended settings can be adjusted by the user.

The settings are transferred to the attached device by the buttons *Configure PC Modem* and *Configure PLC Modem*.

## 8 Country Codes

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

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

Land	INSYS Modem 56k 4.0	
	Standardländer	erweiterte Ländergruppe
TBR21*)	FD (default)	FD (default)
Ägypten		36
Algerien		FE
Argentinien		07
Australien	09	09
Algerien	FE	
Belgien	0F	0F
Brasilien	16	16
Bolivien	FE	FE
Bosnien-Herzegowina	FE	FE
Brunei	FE	FE
Bulgarien		1B
Chile		25
China	26	26
Costa Rica	FE	FE
Dänemark	31	
Deutschland	42	
Dominikanische Republik		33
Ecuador	FE	FE
El Salvador	FE	FE
Finnland	3C	
Frankreich	3D	
Griechenland	46	
Großbritannien	B4	
Guatemala	FE	FE
Honduras	FE	FE
Hong Kong		50

Land	INSYS Modem 56k 4.0	
	Standardländer	erweiterte Ländergruppe
Indien	53	53
Indonesien		54
Irland	57	
Island	52	
Israel		58
Italien	59	
ITU/Taiwan	FE	FE
Japan	00	00
Jemen	FE	FE
Jordanien	FE	FE
Kanada	20	
Kolumbien		27
Korea Republik		61
Kroatien		FA
Kuwait	62	62
Libanon		64
Liechtenstein	FD	
Lettland	FD	FD
Lichtenstein		FD
Litauen	FE	FE
Malaysia		6C
Marokko	FE	FE
Mexiko	73	
Neuseeland		7E
Nicaragua	FE	FE
Niederlande	7B	
Nigeria		81
Norwegen	82	
Oman	FE	FE
Österreich	0A	
Pakistan		84
Panama		85
Paraguayx		87

Land	INSYS Modem 56k 4.0	
	Standardländer	erweiterte Ländergruppe
Peru	FE	FE
Philippinen		89
Polen	8A	
Portugal	8B	
Rumänien	8E	
Russische Föderation		B8
Saudi-Arabien	98	
Schweden	A5	
Schweiz	A6	
Senegal		99
Singapur		9C
Slowakische Republik	FB	
Slowenien	FC	
Spanien	A0	
Sri Lanka		A1
Südafrika		9F
Taiwan	FE	FE
Thailand	A9	A9
Tschechische Republik	2E	
Türkei	AE	
Tunesien	FE	FE
Ukraine	FE	FE
Ungarn	51	
Uruguay		B7
USA	B5	B5
Venezuela		BB
Vereinigte Arabische Emirate		B3
Weißrussland (Belarus)	FE	
Zypern		2D

