User Manual

PSI-DATA/FAX-MODEM/RS232 UM E

Order No.: 2699354

Industrial Modem
PSI-DATA/FAX-MODEM/RS232

PHŒNIX CONTACT
INSPIRING INNOVATIONS

INTERFACE

User Manual

PSI-DATA/FAX-MODEM/RS232 Industrial Modem

Designation: PSI-DATA/FAX-MODEM/RS232 UM E

Revision: 03

Order No.:   2699354

This user manual is valid for:

Designation	Order No.
PSI-DATA/FAX-MODEM/RS232	2708203

Please observe the following notes

In order to ensure the safe use of the product described, you have to read and understand this manual. The following notes provide information on how to use this manual.

User group of this manual

The use of products described in this manual is oriented exclusively to qualified electricians or persons instructed by them, who are familiar with applicable standards and other regulations regarding electrical engineering and, in particular, the relevant safety concepts.

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Explanation of symbols used and signal words

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER
This indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
This indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
This indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

The following types of messages provide information about possible property damage and general information concerning proper operation and ease-of-use.

NOTE
This symbol and the accompanying text alerts the reader to a situation which may cause damage or malfunction to the device, either hardware or software, or surrounding property.

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www.download.phoenixcontact.com/general/7000_en_00.pdf.

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Published by

PHOENIX CONTACT GmbH & Co. KG
Flachsmarktstraße 8
32825 Blomberg
Germany
Phone   +49 - (0) 52 35 - 3-00
Fax   +49 - (0) 52 35 - 3-4 12 00

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tecdoc@phoenixcontact.com.

Table of Contents

1 PSI-DATA/FAX-MODEM/RS232 Industrial Modem

1.1 Description

The PSI-DATA/FAX-MODEM/RS232 DIN-rail mountable RS-232 modem is specifically designed to meet industrial demands for remote monitoring. It provides global access to machines and systems via permanent and dial-up line connections according to the V.34 standard. A wide range of security functions, such as adjustable selective acceptance of calls, connection establishment with password protection, and call back function, protect the system against unauthorized access. One particularly useful feature for remote system monitoring is the configurable warning or alarm input. If this input is activated, the modem calls a user-defined number and sends a stored text message by fax or SMS. To ensure error-free operation even in harsh EMC conditions, the device has high-quality 3-way isolation and integrated surge voltage protection. The modem also features an integrated automatic "Sleep" function to increase battery life and an extremely wide supply voltage range of 10 V to 60 V, making it suitable for universal use. Modem startup is very easy using plug & play and user-friendly configuration software. The modem is approved for use in public telephone networks in Europe, the USA, and Canada. Additional approvals can be provided on request.

6923A001

Figure 1-1   PSI-DATA/FAX-MODEM/RS232

1.1.1   Features

– Can be used globally
– Password-protected access/call back function/selective acceptance of calls
– Configurable input and output
– Alarm sent directly by SMS or fax via the integrated switch input (or via AT commands)
– Sends, receives, and evaluates SMS messages
– Wide supply voltage range of 10 V to 60 V DC or 14 V to 40 V AC
– Current-saving "Sleep" mode
– High-quality 3-way isolation
  (VCC//RS-232//PTSN)
– Integrated surge voltage protection
– Easy startup using P & P (plug & play) and user-friendly configuration software
– 3964R-compatible

> If you have any technical problems, which you cannot resolve with the aid of this documentation, please contact us during the usual office hours at:
>
> Phone: +49 - 52 35 - 31 98 90
> Fax: +49 - 52 35 - 33 09 99
> E-mail: interface-service@phoenixcontact.com

1.2 Application

The PSI-DATA/FAX-MODEM/RS232 modem can be used universally and internationally in the following operating modes:

– Dial-up modem
– Fax modem
– Permanent line modem
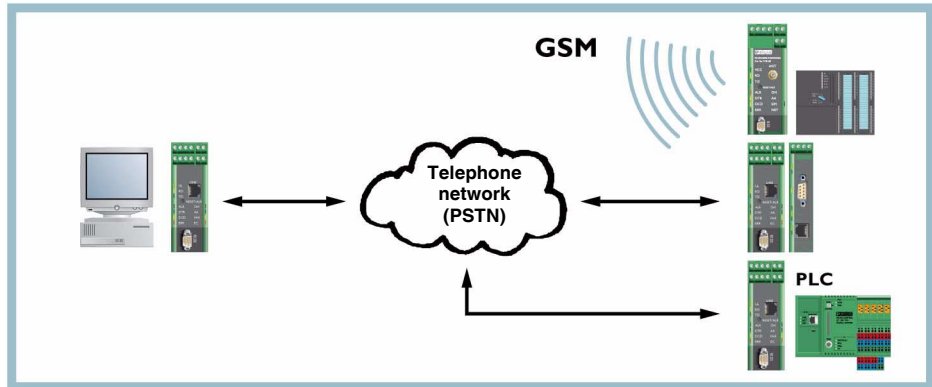
Figure 1-2   Dial-up operation
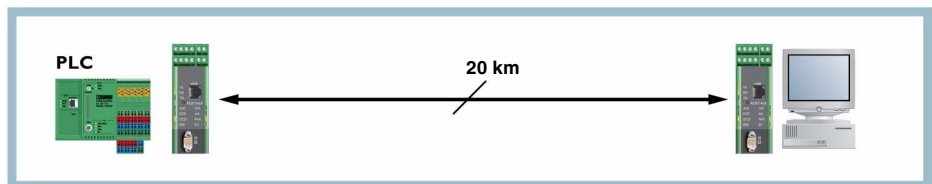
Figure 1-3   Permanent line operation
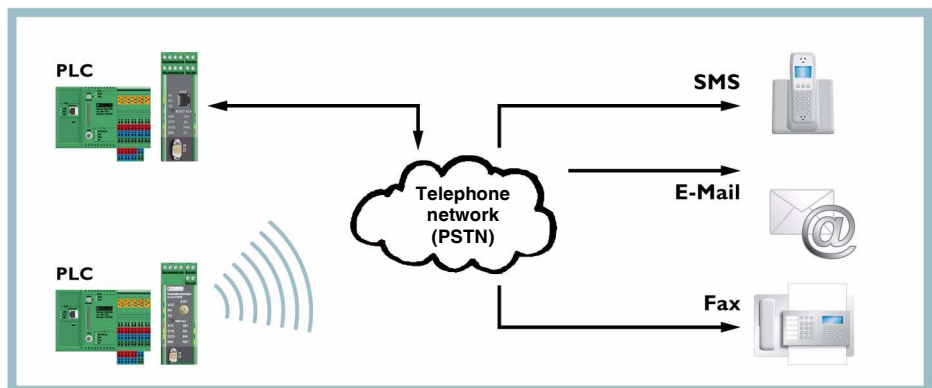
Figure 1-4   Alarm generation

The following modem applications can be covered with that:
–   Remote monitoring of systems and machines
–   Remote control
–   Remote system diagnostics
–   Production data acquisition
–   Automatic alarm generation

This device has been approved for use in public telephone networks in the following countries:
–   Austria
–   Belgium
–   Canada
–   Denmark
–   Finland
–   France
–   Germany
–   Great Britain
–   Greece
–   Italy
–   Ireland
–   Luxembourg
–   The Netherlands
–   Norway
–   Portugal
–   Spain
–   Sweden
–   Switzerland
–   USA

Approvals for other countries are available on request.

1.3   Ordering data

V.34 modem:

Description	Type	Order No.	Pcs./Pkt.
Industrial analog modem, DIN rail-mountable, dial-up and permanent line operation in Europe, USA, Canada, V.24 (RS-232) interface, 3-way isolation, alarm I/O, 24 V AC/DC supply voltage Scope of supply: Modem, CD with configuration software and user manual, and RJ12 cable	PSI-DATA/FAX-MODEM/RS232	2708203	1

General accessories

Description		Type	Order No.	Pcs./Pkt.
DIN rail bus connector (3 required)		ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	1
System power supply unit Primary-switched Input voltage range Nominal output voltage Nominal output current	45 Hz ... 65 Hz 85 V AC ... 264 V AC 24 V DC ±1% 1.5 A	MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1
Surge protection for analog telecommunications interfaces, DIN rail-mountable		MT-2FM-RJ12	2838937	1
PSI-MODEM-SPLITTER, switching module to access two control systems via one modem		PSI-MODEM-SPLITTER	2708766	1

Cables/conductors

Description	Type	Order No.	Pcs./Pkt.
Connecting cable, 9-pos. D-SUB to USB, with 9-pos. D-SUB to 25-pos. D-SUB adapter	CM-KBL-RS232/USB	2881078	1
Short V.24 (RS-232) flat-ribbon connecting cable between modem and PSI-MODEM-SPLITTER	PSI-CA-MODEM-SPLITTER	2311425	1
V.24 (RS-232) cable, 0.5 m, 9-pos. D-SUB female connector to 9-pos. D-SUB female connector	PSM-KA9SUB9/BB/0,5METER	2708520	1
V.24 (RS-232) cable, 2 m, 9-pos. D-SUB female connector to 9-pos. D-SUB female connector	PSM-KA9SUB9/BB/2METER	2799474	1

Adapters

Description	Type	Order No.	Pcs./Pkt.
PSM-AD-D9-NULLMODEM, RS-232 (V.24) null modem connector, 9-pos. D-SUB female connector to 9-pos. D-SUB male connector	PSM-AD-D9-NULLMODEM	2708753	1
Adapter cable for connecting the IB IL RS232 and IB IL RS232-PRO Inline communication terminals	PSM-KAD-IL RS232/9SUB/B/0,8M	2319200	1
MPI adapter for coupling to the programming interface of a SIMATIC® S7-300/400 controller	PSI-MPI/RS232-PC	2313148	1

1.4   Technical data

Power supply	
Supply voltage 1	10 V DC ... 60 V DC, 16 V AC ... 40 V AC Via COMBICON plug-in screw terminal block
Frequency	DC or 50 Hz ... 60 Hz
Supply voltage 2, alternative or redundant	24 V DC ±5% Via backplane bus contact and system power supply

Current consumption
    Nominal operation
    Sleep mode (can be configured via software)
	
	< 100 mA at 24 V
	< 40 mA at 24 V

LED indicator	VCC (green LED):
	    – Steady light: Operation
	    – Flashing: Sleep mode

V.24 (RS-232) interface	
Connection	9-pos. D-SUB pin strip
Device type	Data Communication Equipment (DCE)
Data format	Serial asynchronous UART/NRZ
Encoding	7/8 data, 1/2 stop, 1 parity, 10/11-bit character length
Serial transmission speed	Automatic data rate detection (default) or fixed setting at 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps (adjustable via software)
Data flow control	Software handshake: Xon/Xoff Hardware handshake: RTS/CTS No handshake or 3964R
LED indicator/data indicator	TD (green LED), data to modem (dynamic) RD (yellow LED), data from modem (dynamic)
LED indicator/control signal indicator	DTR (yellow LED), Data Terminal Ready DCD (yellow LED), Data Carrier Detect

PSTN port (a/b line)	
Connection	RJ12, 6-pos., or COMBICON plug-in screw terminal block
Shield	DC coupled to DIN rail
Operating modes	Dial-up modem, 2-wire half/full duplex Fax modem, 2-wire half duplex Permanent line, 2-wire full duplex
Dialing procedure	Multiple frequency/pulse dialing, configuration via software

Transmission speed
    DCE/DCE
    Fax
	Automatic adjustment according to V.8
	        300 baud to 33.6 kbaud
	        2400 baud to 14.4 kbaud

Compatibility	ITU V.42bis, V.42, V.34 extended, ITU V.32bis, V.32, V.21, V.22bis, V.22, V.23, Bell 212A and 103, ITU V.17, Group 3 T.4, T.30, and EIA TR-29
Fax compatibility	EIA TR-29 Class 2, CCITT V.17, Group 3, V.29, V27ter
Command set compatibility	AT standard command set and extended, V.250 basic command set
Error correction	V.42 (LAP-M or MNP 2 to 4)
Data compression	V.42bis (throughput 4:1), MNP 5 (throughput 2:1)

PSTN port (a/b line)(Continued)

LED indicator/data indicator	Green LED (OH), off the hook
	Yellow LED (AA), automatic answer, flashes during selective call acceptance
	Yellow LED (FAX), fax mode active
	Yellow LED (EC), error correction in V.42 mode, flashes when data compression is active
Acoustic signaling	Integrated piezo
Startup diagnostics	Power on selftest, visualization via LEDs (controller, SRAM, EEPROM, DSP)
Adaptive line test	Dial tone test, pulse dial ring test via additional function in configuration software
Telecommunications approvals	TBR21, TBR15, TIA/EIA/IS-968 for Europe, USA, and Canada
Hardware settings	4-pos. DIP switch for dial-up and permanent line operation (under removable cover)

Switching input and output

Switching input	U_N 24 V DC/5 mA, 9 V DC ... 48 V DC input voltage range, floating, activates one or more of the following:
	– Message to the local V.24 (RS-232) interface
	– SMS (only in dial-up operation)
	– Fax (only in dial-up operation)
	– Output control at the remote station (via SMS)
Switching output	60 V DC/1 A or 42 V AC/1 A miniature switching relay, N/O contact, activated by:
	– Input control at the remote station
	– SMS (only in dial-up operation)
	– Local AT command
	– AT command at the remote station
Signaling	ALR (red LED)
	– Flashing: SMS/FAX error message to be sent
	– Steady light: Alarm has been triggered
	ERR (red LED)
	– Steady light: Alarm cannot be triggered
	Reset (acknowledgment) by:
	– SMS (remote)
	– AT command (local + remote)
	– Button (local)

Text and telephone number memory

Text memory	
SMS	160 characters
Fax	480 characters, 30 KB
Telephone number memory	20 telephone numbers with a maximum of 36 digits

General data

CE conformance	EMC directive 89/336/EEC
Approvals	ℜus Ex: ℜus
Ambient operating temperature range	0°C … 55°C

Housing
  Material
  Dimensions (H x W x D)
	ME 35 with 5-pos. bus contact and ground contact
	ABS-V0, green
	99 x 35 x 114.5 mm

Weight of device	165 g
Functional earth ground	Housing contact with DIN rail
Vibration resistance	According to DIN EN 60068-2-6 5g, 1.5 h each in x, y, and z direction

Shock test
  Operation
  Storage
	According to DIN EN 60068-2-27
	15g, 11 ms, half-sine shock pulse
	30g, 11 ms, half-sine shock pulse

Free fall	According to IEC 60068-2-32 from a height of 1 m (without packaging)
Degree of protection	IP20
3-way electrical isolation	Power supply // PSTN // V.24 (RS-232)
Test voltage	1.5 kV AC, 50 Hz, 1 min. between all ground levels according to EN 50178 and EN 61131-2

Electromagnetic compatibility

Noise immunity according to EN 61000-6-2[*]

Electrostatic discharge (ESD)	EN 61000-4-2	Criterion B[†] 8 kV air discharge 6 kV contact discharge

Electromagnetic HF field
  Amplitude modulation
  Pulse modulation
	EN 61000-4-3	Criterion A[‡]
		10 V/m
		10 V/m

Fast transients (burst)
  Signal
 	
  Power supply
	EN 61000-4-4	
		Criterion A[3]
		1 kV/5 kHz
		Criterion A[3]
		2 kV/5 kHz

Surge current load (surge)
  Signal
  Power supply
	EN 61000-4-5	Criterion B[2]
		1 kV
		2 kV

Conducted interference	EN 61000-4-6	Criterion A[3] 10 V
Noise emission	EN 55022	Limiting curve B

[*]   EN 61000 corresponds to IEC 1000

[†]   Criterion B: Temporary adverse effects on the operating characteristics which the device corrects automatically.

[‡]   Criterion A: Normal operating behavior within the specified limits.

2 Quick Installation of a Dial-up Connection

> **i**
>
> The quick startup guide only refers to a standard dial-up connection.
> For the configuration of permanent line operation, please refer to Section 5.1, "Permanent Line".

2.1 Hardware Installation

2.1.1 Default Configuration

The modem is preconfigured to dial-up line operation with automatic data rate detection by default upon delivery, i.e., all DIP switches are set to "OFF".

2.1.2 Mounting

> **NOTE:**
> Only mount and remove modules when the power supply is disconnected.

• Mount the modem on a 35 mm (1.378 in.) EN DIN rail (see Figure 2-1).

> **NOTE:**
> The DIN rail must be connected to PE to ensure reliable operation.
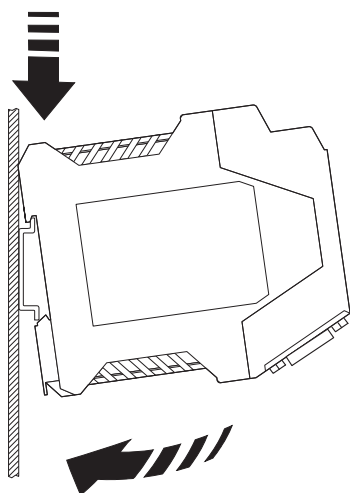
6923A031

Figure 2-1   Mounting

⚠

WARNING: Electrical connection

Only qualified personnel may electrically connect, start up, and operate this device. According to the safety instructions in this text, qualified personnel are persons who are authorized to start up, to ground, and to mark devices, systems, and equipment according to the standards of safety technology. In addition, these persons must be familiar with all warning instructions and maintenance measures in this text.

Disregarding this warning may result in damage to equipment and/or serious personal injury.

2.1.3 RS-232 Interface

The modem and the PC or another device are connected via the RS-232 cable PSM-KA-9SUB 9/BB/2 METER (Order No. 27 99 47 4). The cable is an interface cable with 1:1 connected contacts.

ⓘ

NOTE:

The modem must only be connected to devices which meet the requirements of EN 60950 ("Safety of Information Technology Devices").

• Use this interface cable to connect the modem to a free COM interface on the PC.
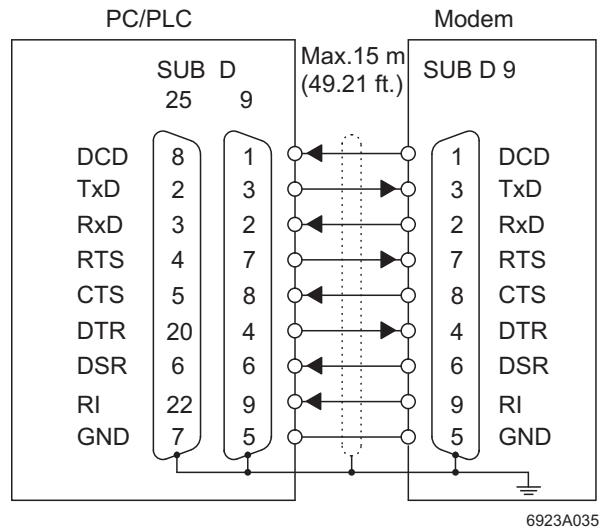
Figure 2-2   RS-232 interface

2.1.4   Connecting the Telecommunications Cable

RJ-12/RJ-11 connectors   Connect the telecommunications cable to an RJ-12/RJ-11 connector on the front of the device. Signals "a" and "b" are assigned to the middle pins, 3 and 4.
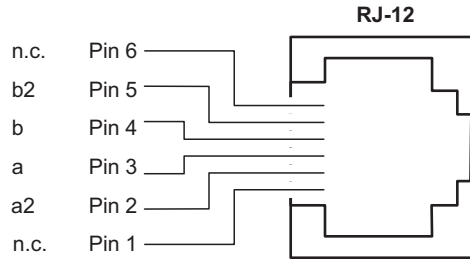
Figure 2-3   Connection using an RJ-12/RJ-11 connector

Screw terminal blocks   Alternatively, the telecommunications cable can be connected via the plug-in screw terminal blocks. You can also connect the cable shield using an ME shield clamp, which can be ordered separately (Order No. 28 53 89 9).
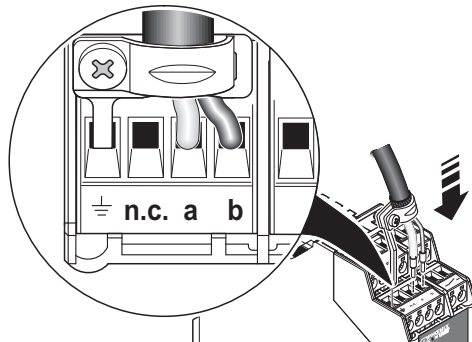
Figure 2-4   Connection using plug-in screw terminal blocks

2.1.5 Supply Voltage

NOTE:
The PSI-DATA/FAX-MODEM/RS232 module is designed exclusively for SELV operation according to IEC 60950/EN 60950/VDE 0805.

Connect the 24 V voltage supply to the "24V" and "0V" connection points on the plug-in screw terminal block.
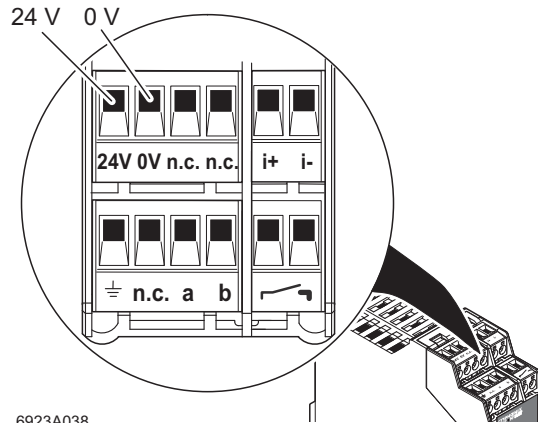
6923A038

Figure 2-5   Connecting the supply voltage

As soon as the "VCC" LED lights up, the modem is ready for dial-up line operation.

2.2 Software Installation

2.2.1 System Requirements

In principle, any device can be connected to the modem via a free RS-232 interface. A terminal program, for example, can be used for configuration. More detailed information can be found in later sections.

A PC with one of the following operating systems is required for the PSI-MODEM-CONF configuration software and the plug & play function:

Windows 95, Windows 98, Windows ME, Windows NT4.0, Windows 2000 or Windows XP.

> **i** Driver installation differs depending on the operating system. The following description uses the example of Windows 2000. During installation, always follow the on-screen instructions.
>
> In the event of any messages indicating that the software does not have a digital signature from Microsoft, please confirm with "Yes". This will not affect the operation of the software or your PC in any way.

2.2.2 Driver Installation

• Connect the modem to the PC as described above and switch on the supply voltage. After the PC is started the modem is automatically detected and the driver can be installed:

• Select "Search for a suitable driver for my device (recommended)" and click on "Next".
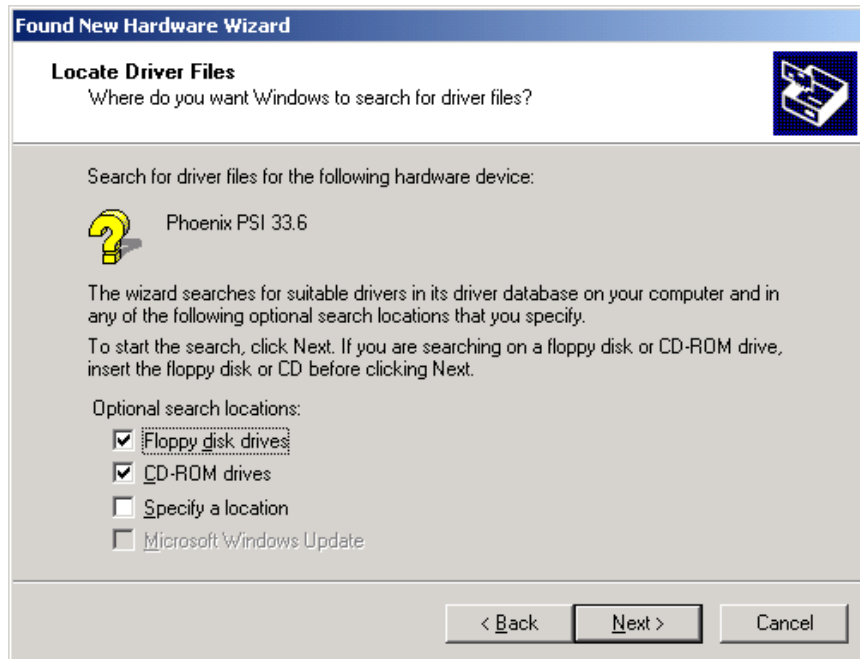
- Insert the CD-ROM provided into the drive and click on "Next".
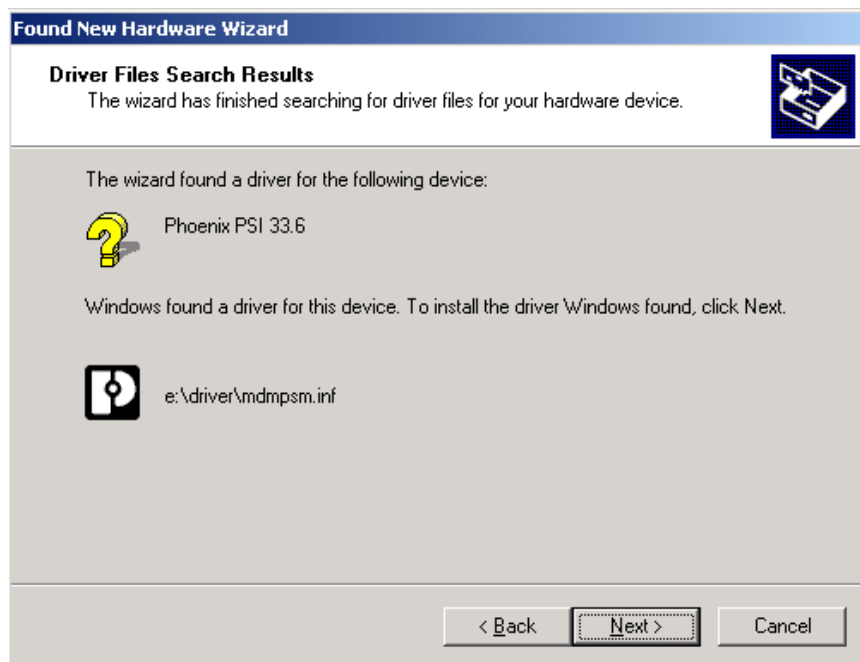
- Click on "Next" to confirm the selection.
- To complete the installation, click on "Finish".

The driver is now installed and the modem is available to application programs, e.g., the data communications network.

3 Hardware Installation

3.1 Structure

Housing Dimensions
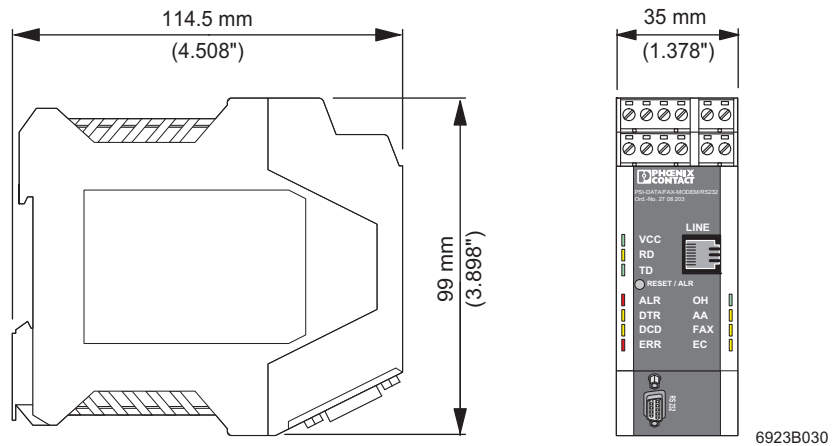
Figure 3-1   Housing dimensions

> ⓘ **NOTE:**
> Only mount and remove modules when the power supply is disconnected.

• Mount the modem on a 35 mm (1.378 in.) EN DIN rail (see Figure 3-2 on page 3-1).

> ⓘ **NOTE:**
> The DIN rail must be connected to PE to ensure reliable operation.
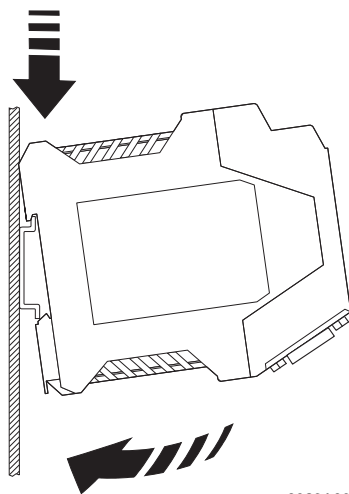
Figure 3-2   Mounting

3.2   Operating Elements
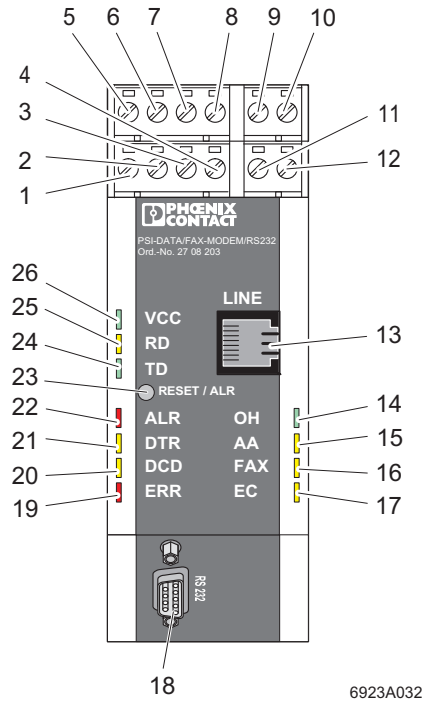
Figure 3-3   Operating elements

3.2.1   Connection Terminals

1   Shield (telecommunications cable)

2   Not used

3   a (telecommunications cable a)

4   b (telecommunications cable b)

5   24 V supply (10 V to 60 V DC, 16 V to 40 V AC)

6   0 V supply (0 V)

7   Not used

8   Not used

9   in+ (9 V to 48 V DC switching input)

10   in– (0 V switching input)

11   out (switching output, form A contact)

12   out (switching output, form A contact)

3.2.2   Connectors

13   Line, RJ-12 (telecommunications cable)

18   RS-232 data interface, 9-pos. D-SUB

3.2.3 LEDs

14	OH	(Green)	Off the hook
15	AA	(Yellow)	Automatic answer (automatic call acceptance), flashes during selective acceptance of calls
16	FAX	(Yellow)	Fax mode
17	EC	(Yellow)	Error correction in V.42 mode, flashes during data compression
19	ERR	(Red)	Alarm message could not be sent
20	DCD	(Yellow)	Data carrier detected, connection established with partner
21	DTR	(Yellow)	Connected device is ready (e.g., PC or PLC)
22	ALR	(Red)	Alarm message was sent successfully, flashes when sending
24	TD	(Green)	Transmit data with reference to the PSTN (telecommunications) connection
25	RD	(Yellow)	Receive data with reference to the PSTN (telecommunications) connection
26	VCC	(Green)	Supply voltage present, flashes in "Sleep" mode

3.2.4 Pushbutton

23	RESET/ALR	Reset alarm message

3.2.5   DIP Switches
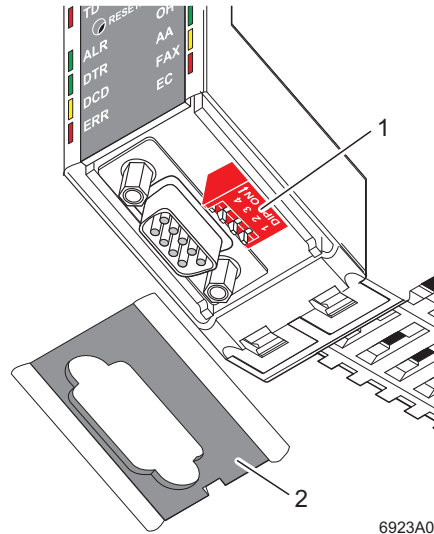
Figure 3-4   DIP switches

The DIP switches (1) are located behind the cap (2) on the RS-232 interface.

• Insert a small screwdriver into the slot on the bottom of the cap and lever it open.

DIP Switch Functions

All DIP switches are set to the "OFF" position by default (dial-up line operation).

Switch 1 is used to switch between dial-up line operation (OFF) and permanent line operation (ON).

> **i** The modem cannot be read or configured in permanent line operation.

Switch 2 must be set to the "OFF" position.

The transmission speed is set to 7200 bps in the "ON" position. This transmission speed is only used for a small number of special applications.

Switch 3 is only used for permanent line operation. In permanent line operation, a modem must be set to "Originate Mode" (ON) and the partner must be set to "Answer Mode" (OFF).

Switch 4 is only used in the event of an emergency. If automatic baud rate detection has been switched off and the device has been configured to a fixed baud rate without echo and without confirmation, it is very difficult to detect this baud rate setting.

- In this case, set switch 4 to "ON" and briefly disconnect the supply voltage. The modem now starts with a fixed defined setting: 19200 bps, 8 data bits, odd parity, 1 stop bit. In normal operation this switch is set to "OFF", i.e., the device starts with the last saved settings.

Table 3-1   DIP switch assignment

Mode	DIP Switch	
DIAL-UP	OFF	1
LEASED LINE	ON	
DEVICE SETTINGS	OFF	2
7200 BPS	ON	
ANSWER (ANS)	OFF	3
ORIGINATE (ORG)	ON	
DEVICE SETTINGS	OFF	4
19200 BPS; 8 DATA; ODD; 1 STOP	ON	

3.3   Electrical Connections

⚠ **WARNING: Electrical connection**

Only qualified personnel may electrically connect, start up, and operate this device. According to the safety instructions in this text, qualified personnel are persons who are authorized to start up, to ground, and to mark devices, systems, and equipment according to the standards of safety technology. In addition, these persons must be familiar with all warning instructions and maintenance measures in this text.

Disregarding this warning may result in damage to equipment and/or serious personal injury.

3.3.1 Block Diagram
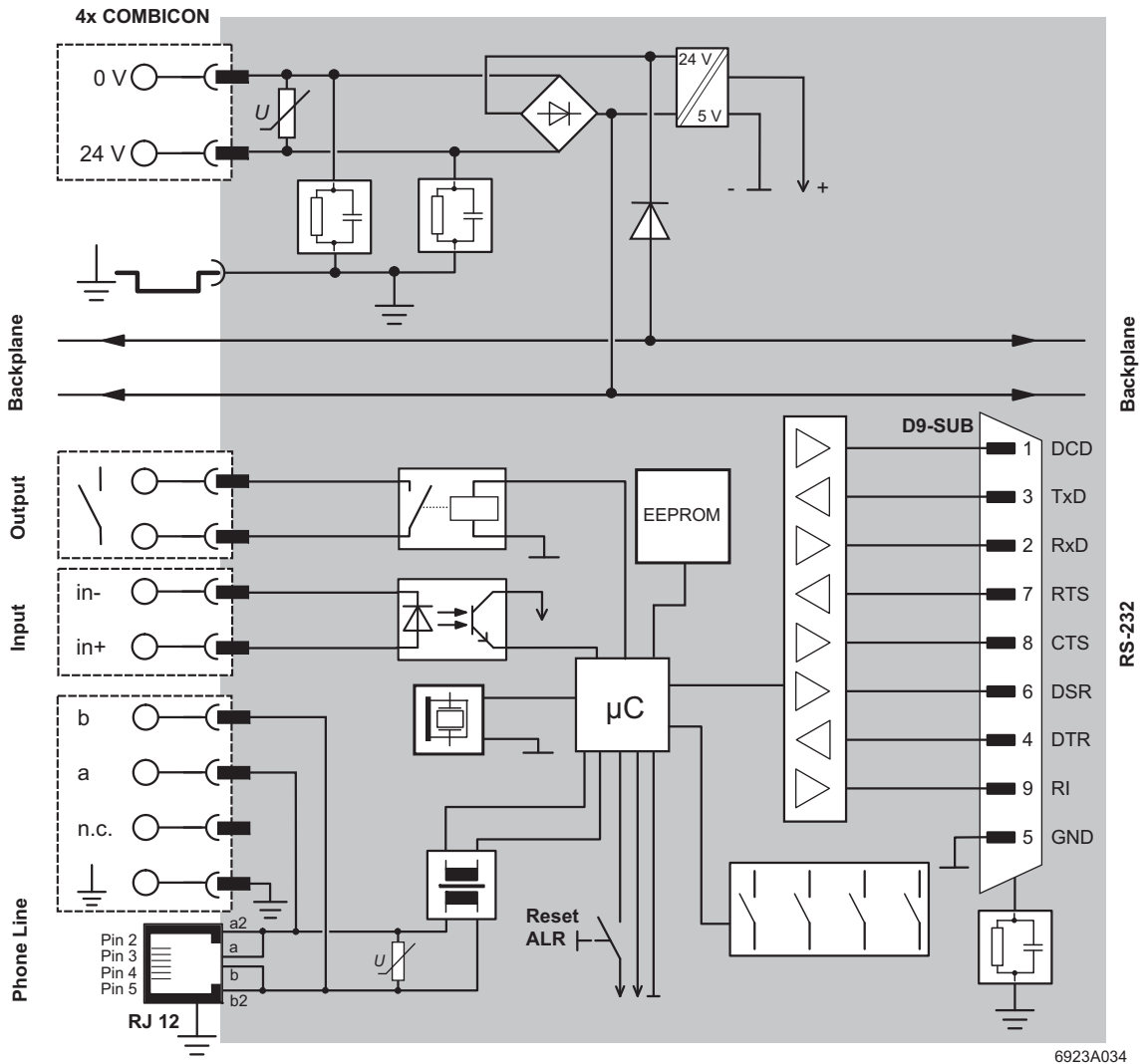
Figure 3-5 Block diagram

3.3.2 RS-232 Interface

The modem and the PC or another device are connected via the RS-232 cable PSM-KA-9SUB 9/BB/2 METER (Order No. 27 99 47 4). The cable is an interface cable with 1:1 connected contacts.

• Use this interface cable to connect the modem to a free COM interface on the PC.

In rare cases, when connecting a PLC or control system, DCE (**D**ata **C**ommunication **E**quipment) may be used instead of DTE (**D**ata **T**erminal **E**quipment), which is typical for a PC. If so, the following cables must be crossed (null modem cable):

– TxD and RxD
– RTS and CTS
– DSR and DTR

If you do not know which type of interface is connected, you can determine the connect configuration by testing (crossing cables).

Minimum configuration   The minimum configuration only requires one connection for TxD, RxD, and GND (software handshake).

This does not apply to the 3964R protocol for Phoenix Contact controller boards. Only TxD, RxD, and GND are connected here, but no handshake protocol is selected.

> **NOTE:**
> The modem must only be connected to devices which meet the requirements of EN 60950 ("Safety of Information Technology Devices").
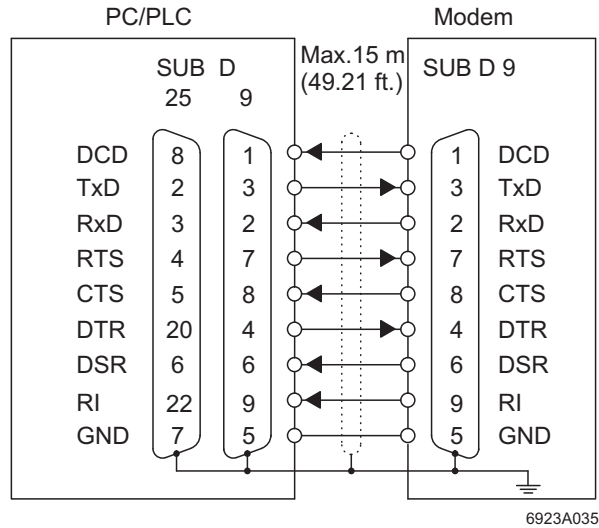
Figure 3-6   RS-232 interface

Table 3-2   Meaning of the terminal designations

Designation	Meaning
DCD (Data Carrier Detect)	Data carrier detected, connection established
TxD (Transmit Data)	Transmit data (refers to PC, PLC, etc.)
RxD (Receive Data)	Receive data (refers to PC, PLC, etc.)
RTS (Request To Send)	Request to send
CTS (Clear To Send)	Clear to send
DTR (Data Terminal Ready)	Ready (PC, PLC, etc.)
DSR (Data Set Ready)	Ready (modem)
RI (Ring Indicator)	Incoming call
GND (Signal Ground)	Signal ground

3.3.3 Telecommunications Cable

RJ-12/RJ-11 connectors
Connect the telecommunications cable to an RJ-12/RJ-11 connector on the front of the device. Signals "a" and "b" are assigned to the middle pins, 3 and 4.

The signals for the optional connection of a telephone are fed back to terminals 2 and 5.

6923A036

Figure 3-7   Connection using an RJ-12/RJ-11 connector

Screw terminal blocks
Alternatively, the telecommunications cable can be connected via the plug-in screw terminal blocks. You can also connect the cable shield using an ME shield clamp, which can be ordered separately (Order No. 2853899).
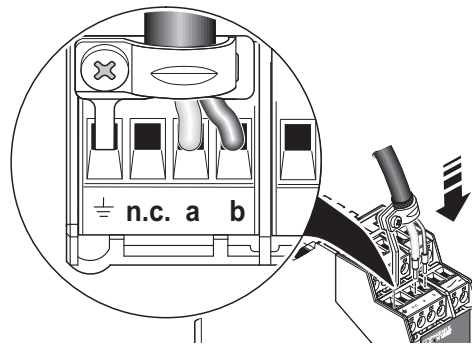
6923A037

Figure 3-8   Connection using plug-in screw terminal blocks

3.3.4   Supply Voltage

The supply voltage must be within the range of 10 V to 60 V DC or 16 V to 40 V AC (50 - 60 Hz).

Connect the 24 V voltage supply to the "24V" and "0V" connection points on the plug-in screw terminal block.

6923A038

Figure 3-9   Connections

As soon as the "VCC" LED lights up, the modem is ready.

3.3.5   Switching Input

Table 3-3   Switching input on the plug-in screw terminal block

Connection	Meaning
i+ (floating)	9 V to 48 V DC
i–	0 V

3.3.6   Switching Output

The switching output is a floating form A contact and is designed for 60 V DC / 1 A or 42 V AC / 1 A. The contact is connected to the plug-in screw terminal block marked with the form A contact symbol (see Figure 3-9).

4 Software Installation

4.1 System Requirements

In principle, any device can be connected to the modem via a free RS-232 interface. A terminal program, for example, can be used for configuration. More detailed information can be found in later sections.

A PC with one of the following operating systems is required for the plug & play function:

Windows 95, Windows 98, Windows ME, Windows NT4.0, Windows 2000 or Windows XP.

i	Driver installation differs depending on the operating system. The following description uses the example of Windows 2000. During installation, always follow the on-screen instructions.
	In the event of any messages indicating that the software does not have a digital signature from Microsoft, please confirm with "Yes". This will not affect the operation of the software or your PC in any way.

4.2 Driver Installation

• Connect the modem to the PC as described above and switch on the supply voltage. After the PC is started the modem is automatically detected and the driver can be installed:

• Select "Search for a suitable driver for my device (recommended)" and click on "Next".

Found New Hardware Wizard

Locate Driver Files
Where do you want Windows to search for driver files?

Search for driver files for the following hardware device:

Phoenix PSI 33.6

The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.

To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.

Optional search locations:
☑ Floppy disk drives
☑ CD-ROM drives
☐ Specify a location
☐ Microsoft Windows Update

< Back   Next >   Cancel

• Insert the CD-ROM provided into the drive and click on "Next".

Found New Hardware Wizard

Driver Files Search Results
The wizard has finished searching for driver files for your hardware device.

The wizard found a driver for the following device:

Phoenix PSI 33.6

Windows found a driver for this device. To install the driver Windows found, click Next.

e:\driver\mdmpsm.inf

< Back   Next >   Cancel

• Click on "Next" to confirm the selection.
• To complete the installation, click on "Finish".

The driver is now installed and the modem is available to application programs, e.g., the data communications network.

4.3 Configuration Software

The PSI-MODEM-CONF software is used to configure the
PSI-DATA/FAX-MODEM/RS232. Your modem has more functions than can be mapped in
the configuration software. To use these functions, enter additional AT commands in the
"Additional Settings" field (see page 4-15). The AT commands and their meanings are
described in Section "Command Descriptions" on page 6-2.

4.3.1 Installation

- Insert the CD-ROM labeled "PSI-MODEM-CONF" into the CD-ROM drive on your PC.
- Use the Windows Explorer to start the "Setup_Vx.x.xxx(EN).exe" file located in the
  "...:\PSI-CONF" directory.

Starting installation
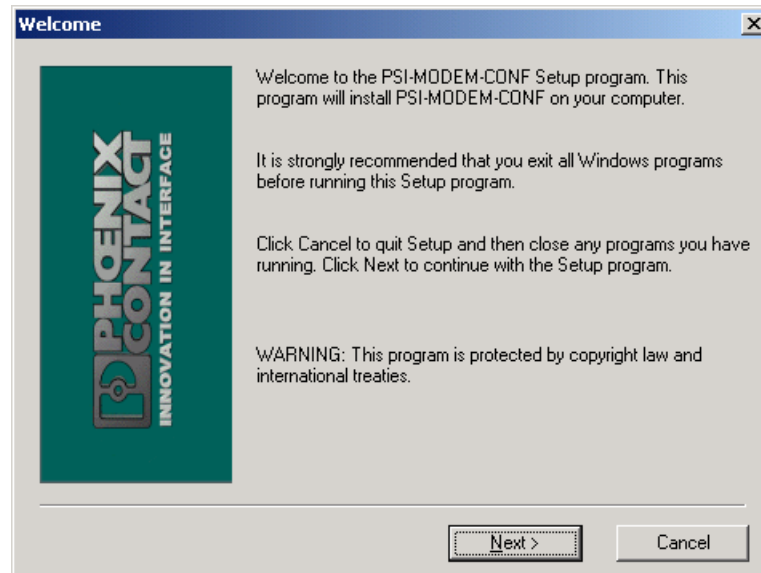
- Close all other applications and click on "Next".

Accepting the terms of the license agreement
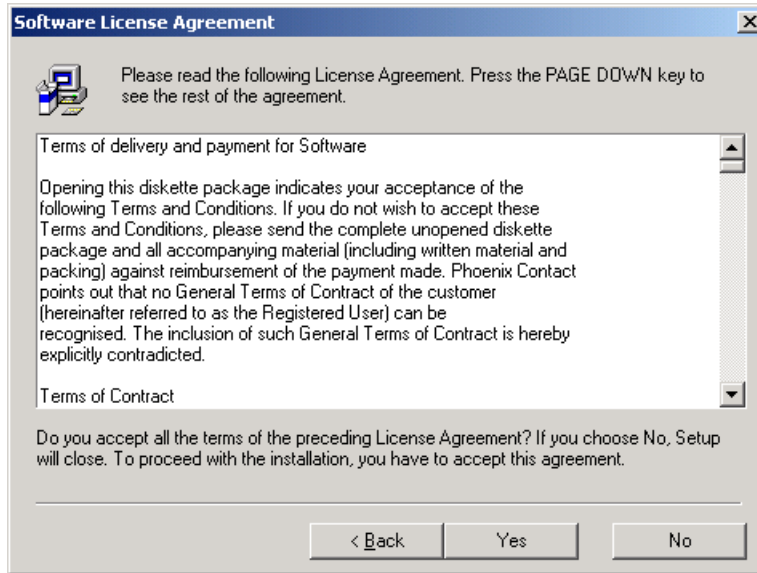
- Read the terms of the software license agreement thoroughly and click on "Yes" to accept them.

You may now select a specific installation folder.

The default setting is "C:\Program Files\PSI-MODEM-CONF".

Selecting an installation folder
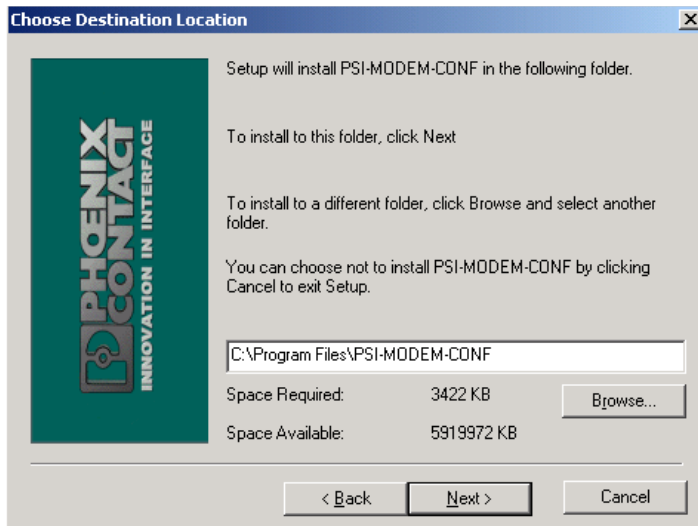
- If necessary, select a different folder and click on "Next".

Start copying
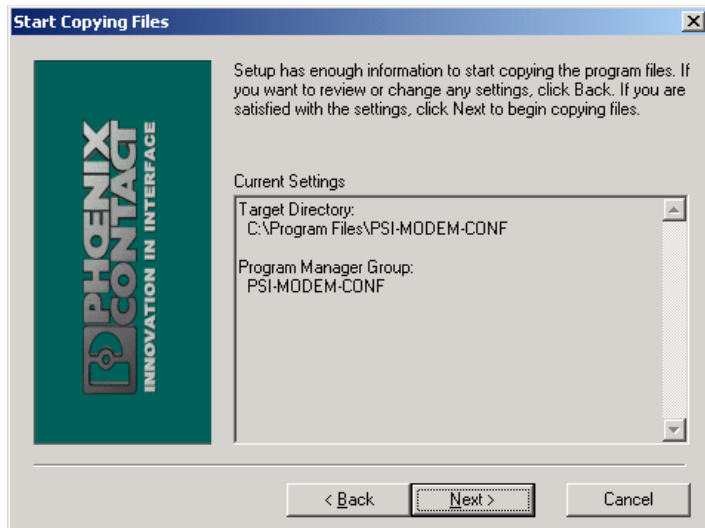
- Click on "Next" to start copying the files. This may take a few seconds depending on the system.

Finishing installation
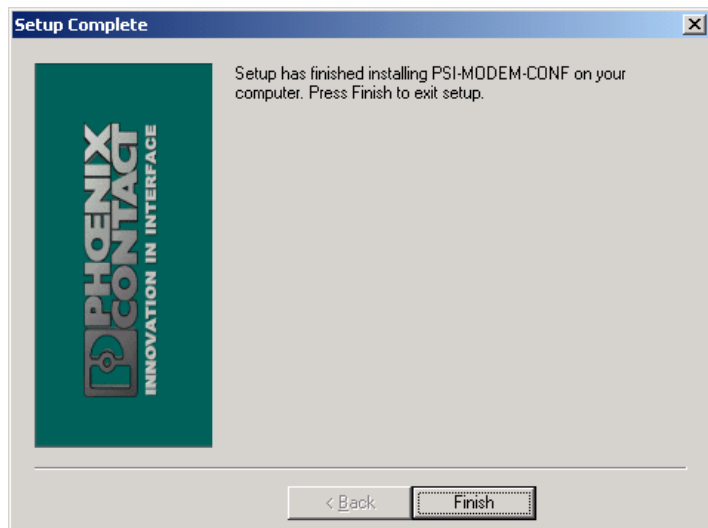
- Exit setup by clicking on "Finish".

4.3.2　Operation

After installation, you will find the following icon on your desktop:

Starting the software　　Double-click on this icon to start the PSI-MODEM-CONF configuration software.
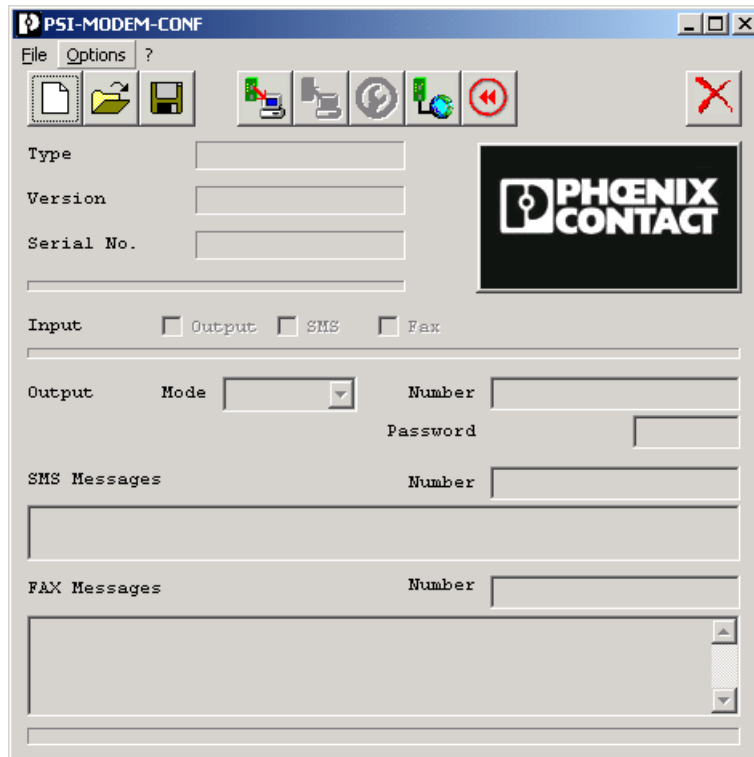
Figure 4-1　　　PSI-MODEM-CONF configuration software

Configuring the interface   First, you must configure the interface.

- Select the "RS-232" function from the "Options" menu.
- Select the interface to which your modem is connected.
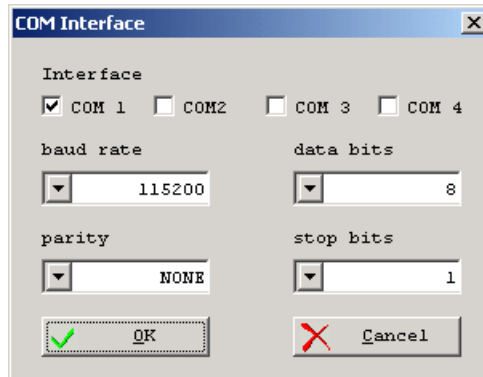
- Adjust the parameters according to your application requirements.
- Save the settings by confirming with "OK".

- Click on the "Write" button to write the settings to the modem.

• Click on the "Read" button ![Read button icon] to read data from the connected modem.
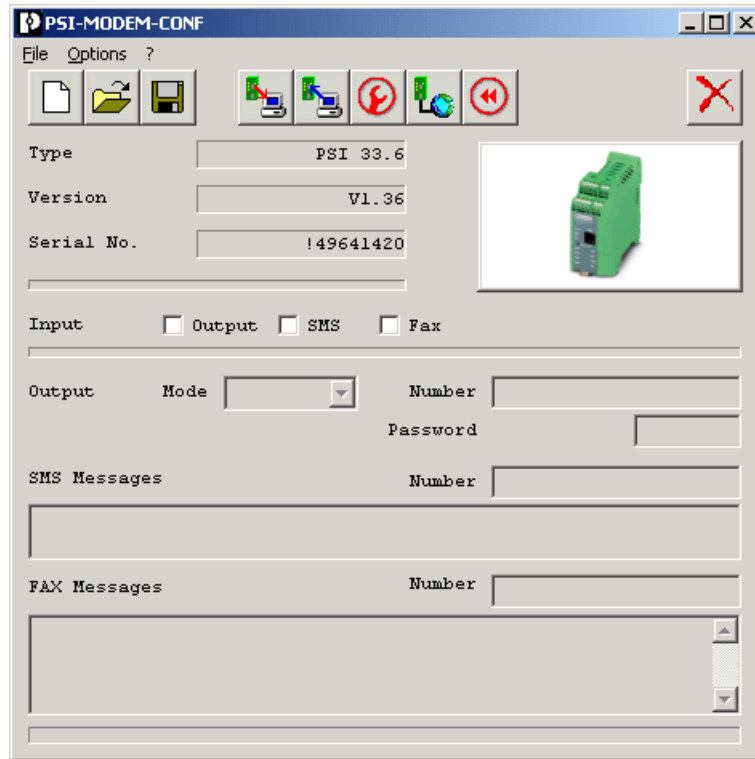
The software displays the type and version of the firmware, and the serial number of the modem.

You now have the option of assigning various functions to the integrated modem switching input.

SMS

For this function the modem requires a service provider that supports SMS in the fixed-line network. The modem is preset to "Deutsche Telekom". A description of how to set up other service providers appears on page 4-15.
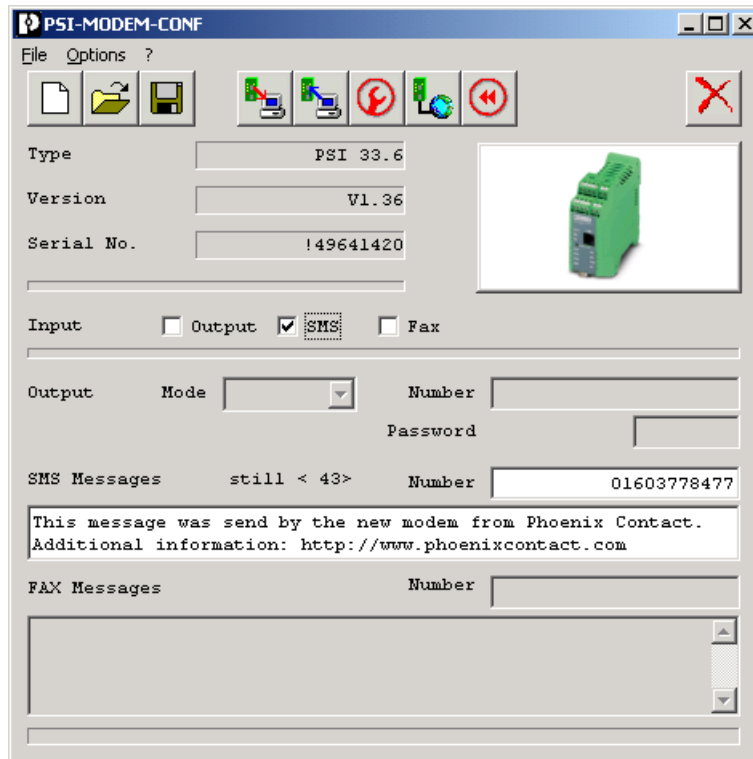
- Select the **"SMS"** checkbox to activate the SMS function.
- Enter the telephone number of the SMS receiver in the white "**Number**" field.
- Write your message in the "**SMS Messages**" field. The text must not exceed 160 characters.

- Click on the "Write" button to write the settings to the modem.
- To send the SMS message, activate the modem switching input (see Section "Switching Input" on page 3-10).

Fax
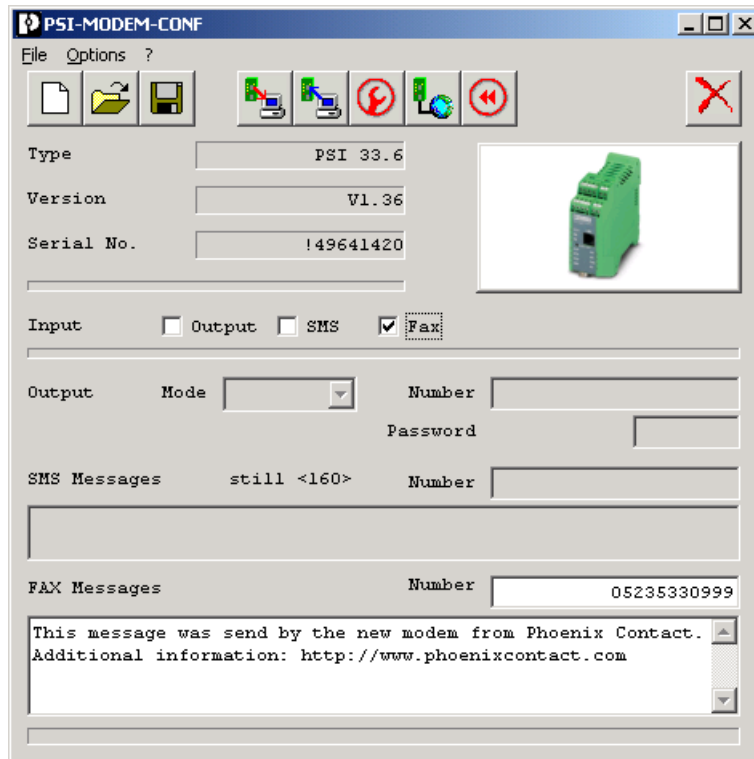
- To activate the fax function select the **"Fax"** checkbox.
- Enter the telephone number of the fax receiver in the white "**Number**" field.
- Write your message in the "**Fax Message**" field. The text must not exceed 253 characters.

- Click on the "Write" button to write the settings to the modem.
- To send the fax message, activate the modem switching input (see Section "Switching Input" on page 3-10).

 You can send fax and SMS messages simultaneously.

Switching Output

<table>
<tr><td>i</td><td>For this function, the partner modem must be a "PSI-DATA/FAX-MODEM/RS232" modem.</td></tr>
</table>

- To activate the switching output function select the "**Output**" checkbox.
- Enter the telephone number of the partner in the white "**Number**" field.
  If you wish to use the devices in permanent line operation, you can enter any telephone number.
- Enter the password for the partner in the "**Password**" field, as the partner switching output is password-protected.

- Specify the modem mode:

– In "**Set**" mode the modem responds to a positive edge on the local input by calling the partner and setting the partner output. This output can be reset by an AT command (local or remote), an SMS, the integrated pushbutton or by briefly disconnecting the supply voltage.

– In "**Follow**" mode the modem responds to a positive edge on the local input by calling the partner and setting the partner output. This output can be reset by a falling edge on the same input and by calling the partner again.

- Click on the "Write" button to write the settings to the modem.

Line Test

The "Line Test" function can be used to check that the telecommunications cable is connected correctly.

- Click on the "Line Test" button to start the line test.
  The result of the line test is displayed on-screen.
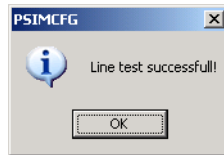
 The telecommunications cable is connected correctly.

 Please check the telecommunications cable (see Section "Telecommunications Cable" on page 3-9).

File Functions

Creates a new project file with the default settings.

Opens a saved project file.

Saves the current settings.

Profile Settings

Click on the "Settings" button .

This opens the "Profile settings" window.
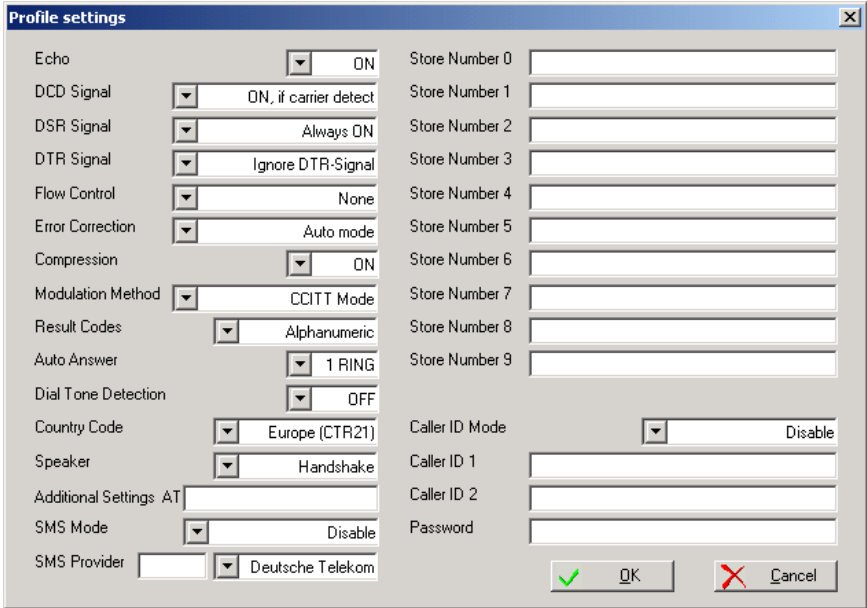
Figure 4-2   "Profile settings" window

Echo	If the echo is on, all characters sent by the PC in command mode are sent back by the modem. The characters can thus be displayed on-screen on the PC.
DCD Signal	When the partner carrier detect signal is detected, the RS-232 interface activates the DCD signal (**D**ata **C**arrier **D**etect). Alternatively, this signal can also be permanently switched on.
DSR Signal	The DSR signal (**D**ata **S**et **R**eady) of the RS-232 interface can be permanently switched on or switched off in command mode.

DTR Signal

Your modem can process the DTR signal (**D**ata **T**erminal **R**eady) as follows:

– The modem returns to command mode if there is no DTR signal at the RS-232 interface.
– The modem hangs up and returns to command mode if there is no DTR signal at the RS-232 interface.
– The modem hangs up, is reset, and returns to command mode if there is no DTR signal at the RS-232 interface.
– The modem ignores the DTR signal. This may be necessary when using a PLC, as the RS-232 interface of a PLC is often unable to provide a DTR signal.

Flow Control

The data flow control of the RS-232 interface can be set for various operating modes:

– For the "Hardware" setting, the CTS and RTS signals are used for a bidirectional data flow control.
– For the "Software" setting, the data flow control is bidirectional using XON and XOFF characters.
– In "XON/XOFF Unidirect" mode, the **XON** character is sent to the PC (DTE) to start data transmission and the **XOFF** character is sent to stop data transmission. The PSI-DATA/FAX-MODEM/RS232 ignores **XON** and **XOFF** characters sent by the PC.
– Data flow control can also be switched off completely. This may be necessary when protocols such as 3964R are transmitted, which control the flow independently.

Compression	Data compression on the telecommunications cable results in increased data throughput.
Modulation Method	You can specify the transmission method of your modem (default: CCITT).
	Table 6-1 on page 6-22 shows how the various settings work.
Result Codes	Your modem is configured so that it outputs alphanumeric responses on-screen. The "Numeric" option can be used if your software package or PLC only supports numeric confirmations. The relevant settings can be found in Table 6-2 on page 6-23.
Auto Answer	Auto Answer (automatic call acceptance) enables you to specify the number of rings after which your modem can automatically respond to incoming calls. Automatic call acceptance is switched off by default upon delivery. Active automatic call acceptance is indicated by the yellow "AA" (Automatic Answer) LED.

> ℹ️ This LED flashes in the event of an incoming call, regardless of automatic call acceptance.

Dial Tone Detection	When dial tone detection is switched on the modem waits for the dial tone before dialing. Dial tone detection should be switched off in an private branch exchange.
Country Code	Select the country where you wish to use your PSI-DATA/FAX-MODEM/RS232. If your country is not listed, select Europe (CTR21) or the USA.

Speaker　　　　　　　　　The internal speaker can be switched off, always on or only switched on when establishing a connection.

Additional Settings　　　Your modem has more functions than can be mapped in the configuration software. To use these functions, enter additional AT commands in the "Additional Settings" field.
The AT commands and their meanings are described in Section "Command Descriptions" on page 6-2.

Example: Entering **L3** increases the speaker volume.

i	Additional settings can be saved in the project file via the "Save" button. However, the are not read from the modem by the configuration software.

SMS Mode　　　　　　　When SMS mode is disabled, you can only send SMS messages. In addition, your service provider must support "SMS in the fixed-line network" (see Section "SMS in the Fixed-Line Network" on page 5-10).

When SMS mode is enabled, SMS messages received are output to the RS-232 interface. To receive SMS messages, this feature must be supported and enabled by your SMS provider. In addition, check that the caller ID (CLIP) is transmitted as far as the modem (usually a problem for many older private branch exchanges).

Enabling SMS receipt using Deutsche Telekom as an example:
• 　　Send an SMS with the text "ANMELD" to telephone number 8888.
• 　　You can log off by sending the text "ABMELD" to telephone number 8888.

In control mode the PSI-DATA/FAX-MODEM/RS232 can be controlled via SMS messages. For example, you can activate the output, reset the alarm or send the status of the modem simply by sending an SMS message. In this mode, the SMS message is not forwarded to the termination equipment, but is evaluated by the modem itself. The SMS message sent to the modem must be structured as follows:

#<Password>:<Command>

The password is the password stored in the modem (maximum of seven characters). Please note that not all characters can be sent in the SMS message. Choose a password according to the SMS character set. If the password is, e.g., 12345, the message should appear as follows:

#12345:<Command>

The following control commands are available:

RESET　　　　　　　　　Resets the alarm and the switching output (e.g., **AT*AR**).

SET:OUTPUT　　　　　　Activates the switching output ("Output").

CLR:OUTPUT　　　　　　Deactivates the switching output ("Output").

SEND:STATUS　　　　　Sends a status SMS message to the caller.

"Text"　　　　　　　　　Outputs all the characters within the inverted commas to the RS-232 interface.

Examples　　　　　　**#12345:SET:OUTPUT**　　Activates the output.

#12345:SEND:STATUS　Sends an SMS message (status report) to the sender.

#12345:"RST PLC"　　Sends the text **RST PLC** to the terminal equipment (RS-232 interface).

#12345:RESET　　　　Resets the alarm function and the switching output.

SMS Provider

The number for the SMS provider must be stored in the modem memory. It is set to Deutsche Telekom by default.

• Select your provider from the list. If your provider is not listed, select "No Provider" and enter the telephone number of your provider in the "Additional Settings" field as follows:

&Z20=<Number>

Example for Deutsche Telekom: **&Z20=01930100**

ℹ	The number saved manually (&Z20) cannot be read by the configuration software. Therefore save the profile on the PC and reuse it for the next initialization.

If your modem is used in a private branch exchange, you can prefix the number for your service provider with the number for dialing an outside line.

Example: **0,**

(The comma represents a short pause.)

The field in front of the service provider name can also be used to enter a call-by-call number. This is required, e.g., if your service provider does not support SMS in the fixed-line network. In most telephone networks you then have the option of selecting a different service provider.

Example for Deutsche Telekom: **01033**

Store Numbers

You can store ten telephone numbers in Store Numbers 0 through 9, which can be used as a speed dial memory. The use of stored telephone numbers with the **DS=n** command is described on page 6-4.

Store Number 0 has additional special functions. This telephone number is used for password-protected call back. For a description of the call back function, please refer to Section "Password Protection" on page 5-4. In addition, this number can also be used for automatic dialing.

Example: **%P1** in the "Additional Settings" field

If the DTR signal is now activated at the RS-232 interface, the modem automatically dials the number in Store Number 0.

If the modem is configured to "Ignore DTR Signal", the modem dials the phone number in Store Number 0 as soon as it is powered up.

Caller ID Mode

Caller ID or CLIP (**C**alling **L**ine **I**dentification **P**resentation) is the transmission of the caller's telephone number. If this function is enabled at your analog connection, the PSI-DATA/FAX-MODEM/RS232 can detect, output, and evaluate the caller ID.

When the caller ID output function is activated in the PSI-DATA/FAX-MODEM/RS232, the caller ID, e.g., for Deutsche Telekom is transmitted after the first ring, i.e., the modem does not accept the call until after the second ring. The caller ID is then detected by the PSI-DATA/FAX-MODEM/RS232 and output to the RS-232 interface as follows:

<CRLF>RING<CRLF>

CLIP:0401234…<CRLF>

<CRLF>RING<CRLF>

A telephone number is only then output if a valid caller ID has been detected. It is only output once for each call.

Selective Call Acceptance

If "Selective Answer" is selected, the PSI-DATA/FAX-MODEM/RS232 automatically checks whether, e.g., the service PC is calling the modem and establishes a connection. Up to two telephone numbers can be stored in the device, which the modem compares and automatically establishes a connection if they match. The fields Caller ID 1 and Caller ID 2 are reserved for this function.

If these numbers are stored in these fields and "Selective Answer" is enabled, the PSI-DATA/FAX-MODEM/RS232 checks each call to see whether one of the saved numbers has been called. If so, the modem accepts the call and establishes a connection, regardless of the settings for automatic call acceptance. Your control system therefore does not have to evaluate the caller ID and the modem makes sure that the service numbers (Caller ID 1 and Caller ID 2) reach your system, even without a call back function.

The telephone number evaluation function has a filter function, which also enables partial evaluation of the telephone number. The evaluation starts with the last digit and is carried out for each stored digit. If, for example, from the telephone number 0123456789 only the digits 56789 have been stored, all telephone numbers that end with these digits are classed as valid. The number of preceding digits is of no importance. The advantage of this is that various formats (e.g., +49 40 xxxxx and 040 xxxxx) can be evaluated.

The "AA" LED flashes to indicate that this mode is active. The call is only accepted if the stored numbers match. The caller ID is also output.

Password

Enter your password here.

- Click on the "Write" button to write the settings to the modem once they have all been entered.

5 Special Functions

5.1 Permanent Line

The PSI-DATA/FAX-MODEM/RS232 modem supports 2-wire permanent line operation.

– DIP switches for master/slave selection

– Up to 33600 bps/115200 bps (bidirectional, full duplex)

– Automatic connection/continuous line monitoring

– TBR15 approval

– Transmission via its own telephone cable (2-wire) over a distance of up to 20 km (12.43 mi.)

The device is approved for 2-wire permanent lines according to TBR15, i.e., you can rent a permanent line for a service provider (e.g., Deutsche Telekom) or use your own private 2-wire line to then establish a point-to-point connection via this line.

Setting Permanent Line Operation

The settings for permanent line operation, e.g., data save and choice of transmission speed must first be set and saved with the **AT&W** command, as the modem cannot be parameterized in permanent line operation via the RS-232 interface.

DIP Switches

DIP switch 3 should be set first to specify which modem should operate in "Originate Mode" (ORG) and which modem should operate in "Answer Mode" (ANS). One of the modems should be set to ORG mode and the partner modem should be set to ANS mode.

• Set DIP switch 3 to the desired mode:

DIP 3 = OFF   ANS mode

DIP 3 = ON   ORG mode

Permanent line operation is configured via DIP switch 1.

• Set DIP switch 1 to the "ON" position.

As soon as the power is switched on, the PSI-DATA/FAX-MODEM/RS232 starts automatic permanent line operation and establishes a connection with the partner.

5.2 Alarm Inputs and Alarms

The PSI-DATA/FAX-MODEM/RS232 modem has one electrically isolated input and one electrically isolated output. Alarm functions can be assigned to the input, i.e., SMS and/or fax messages can be automatically sent by activating the input and/or the output of a partner can be activated.

The control system is configured using AT commands (see Section "AT Commands" on page 6-1).

Configuring the Input

– Command: **AT*A1<CR>**

Configure the modem via the following menu items:

CONFIG INPUT 1
SMS (Y/N) Y
FAX (Y/N) Y
OUT (Y/N) Y

If you activate the SMS function with **Y**, you are prompted to enter the destination number and the text (160 characters maximum) for the SMS message. End the text entry with **^Z** (Ctrl+Z).

Example for an SMS **NUMBER <;>TEXT…<^Z>: 0160123456789;Alarm at input 1 pump failure^Z**

If you do not wish to send an SMS or fax message during configuration, enter **N**. You then do not have the option of entering the SMS or fax message.
Press "ESC" to cancel an entry. This may take a moment, as all messages have to be reformatted and then saved.

The number must end with **;**. In the fax text, **<CR>** is the code for a line break, the ASC text is exited via Ctrl+Z. The maximum line length of 60 characters must not be exceeded.

Example for a fax **NUMBER <;>TEXT…<^Z>: 040999888777;<CR>**
JohnDoe<CR>
615N10thStreet<CR>
RichmondVA12345-0123<CR>
<CR>
ALARM MESSAGE
<CR>
Heating failure - pump faulty <^Z>

The number and the password for the partner must be entered for the OUT configuration. The option can be set to "0" or "1":

Option 0 **Set**

The partner output is set by activating the local input

Option 1 **Follow**

The partner output follows the local input. A new call must be made each time the input changes. Sleep/Power Down mode is disabled in this mode.

Example for OUT   **NUMBER <;>PASSWORD<;>OPTION<^Z>: 040999888777;QWERT;0^Z**

– **AT*A1?** command

The **AT*A1?** command can be used to view the specified configuration again.

Examples   **AT*A1?<CR>**
CONFIG INPUT 1
SMS (Y/N) Y
FAX (Y/N) Y
OUT (Y/N) Y

– **SMS** (SMS function)**:**

NUMBER <CR>TEXT…<^Z>: 0160123456789<CRLF>Alarm at input 1 pump failure

– **FAX** (fax function)**:**

NUMBER <CR>TEXT…<^Z>: 040999888777;<CRLF>
JohnDoe<CRLF>
615N10thStreet<CRLF>
RichmondVA12345-0123<CRLF>
<CRLF>
ALARM MESSAGE
<CRLF>
Heating failure - pump faulty <CRLF>

– **OUT** (set partner output)**:**

NUMBER <CR>PASSWORD:01291212<CRLF>
QWERT<CRLF>
OPTION:0<CRLF>

When **AT*A1?<CR>** messages are requested, **<CR>** is replaced with **<CRLF>** in the text. This improves the message display in a terminal program.

Alarm at the Input:

In the event of an alarm at input 1, the alarm message "INPUT 1 ACTIVE" is first sent to the local RS-232 interface. The configured messages are then sent with the following priority:

1. Set output
2. SMS message
3. Fax message

The "ALR" LED starts flashing and does not enter the ON state until all the alarm jobs have been processed. The PSI-DATA/FAX-MODEM/RS232 modem attempts to send each message (SMS or fax) up to four times.

If this is not possible, an alarm error is generated and the "ERR" LED lights up. The "ALR" LED remains lit until the alarm is reset with the **AT*AR<CR>** command, by pressing the button on the modem or by an SMS.

> **NOTE: The modem cannot be addressed at the RS-232 interface while alarm messages are being sent.**
>
> CTS (Clear To Send) is not active during this time. In the event of an **AT** from the control system there is no confirmation.

5.3 Password Protection

5.3.1 Selecting a Password

ℹ️ The password can contain up to seven characters from the ASCII character set (1 to 127), excluding question marks. The password is not case sensitive.

If no password is stored, the modem continues to request the stored telephone details. The password and telephone number can be stored using the ***P=x** and **&Zn=x** commands (see below).

Example

AT&F	Load default setting
AT*P=ASDFG1	Enter the password "ASDFG1"
AT&Z0=012345	Enter the call back number
AT%S1	Activate password protection with call back
ATS0=1	Activate automatic call back

– ***P=x** command

Stores a password in the permanent memory

The ***P=x** command stores the password x (maximum of seven characters from the ASCII character set, excluding question marks) in the permanent memory on the modem. No password is stored on the modem by default. If no password is stored and the **%S1** or **%S2** command is activated, the modem skips the password request stage.

– ***P?** command

Displays the stored password

The ***P?** command displays the stored password.

Your modem has a built-in safety function, which can be activated when your modem is in auto answer mode (see page 6-17).

5.3.2 Disabling Password Protection

The **%S0** command disables password-protected call back (see Section "Password-Protected Call Back" on page 5-5). By default upon delivery, password protection is disabled.

5.3.3   Password-Protected Call Back

The **%S1** command enables password-protected call back. If you wish to activate this function, switch your modem to auto answer mode (automatic call acceptance; **ATS0** > 0). Your modem now accepts calls and executes the usual handshake. The caller is then requested to enter a password. If the password is invalid or the time allocated for password entry has been exceeded, the caller has two more attempts to enter the correct password.

When the correct password is entered, the modem aborts the existing connection to dial the number that is stored in the memory under **&Z0**. The modem has three attempts to establish a connection with the call back number.

5.3.4   Dial In With Password Protection

The **%S2** command enables password validation when an incoming called is accepted. In this case, the caller must enter a password after the incoming call has been accepted. If the password is invalid or the time allocated for password entry has been exceeded, the caller has two more attempts to enter the correct password. When the correct password is entered, the modem continues to operate as usual, otherwise the connection is aborted.

> **i** Automatic call acceptance must be activated for all password-protected functions (see Section "Description of the S Registers" on page 6-17).

5.4 Caller ID and Selective Call Acceptance

5.4.1 Caller ID Output

Caller ID or CLIP (**C**alling **L**ine **I**dentification **P**resentation) is the transmission of the caller's telephone number. If this function is enabled at your analog connection, the PSI-DATA/FAX-MODEM/RS232 can detect, output, and evaluate the caller ID.

The **AT%G1** command activates the caller ID output function in the PSI-DATA/FAX-MODEM/RS232. The caller ID, e.g., for Deutsche Telekom is transmitted after the first ring, i.e., the modem does not accept the call until after the second ring. The caller ID is detected by the PSI-DATA/FAX-MODEM/RS232 and output to the RS-232 interface as follows:

<CRLF>RING<CRLF>

CLIP:0401234…<CRLF>

<CRLF>RING<CRLF>

A telephone number is only then output if a valid caller ID has been detected. It is only output once for each call. The call is accepted according to S register S0.

5.4.2 Selective Call Acceptance

The PSI-DATA/FAX-MODEM/RS232 can automatically check whether it has been called from a specific telecommunications cable and establishes a connection. Up to two telephone numbers can be stored in the device, which the modem compares and automatically establishes a connection if they match. Store numbers 18 and 19 are reserved for this purpose (**&Z18**, **&Z19**).

Example

AT&Z18=040 123456789

AT&Z19=0170 123 45 69

If these numbers are stored in these fields and "Selective Answer" is enabled (**AT%G3**), the PSI-DATA/FAX-MODEM/RS232 checks each call to see whether one of the saved numbers has been called. If so, the modem accepts the call and establishes a connection, regardless of the settings for S register S0. Your control system therefore does not have to evaluate the caller ID and the modem makes sure that only the service numbers (&Z18 and &Z19) reach your system, even without a call back function.

The telephone number evaluation function has a filter function, which also enables partial evaluation of the telephone number. The evaluation starts with the last digit and is carried out for each stored digit. If, for example, from the telephone number 0123456789 only the digits 56789 have been stored, all telephone numbers that end with these digits are considered as valid. The number of preceding digits is of no importance. The advantage of this is that various formats (e.g., +49 40 xxxxx and 040 xxxxx) can be evaluated.

The flashing "AA" LED indicates that this mode is active. The call is only accepted if the stored numbers match. The caller ID is also output.

5.5   DTMF

DTMF (**D**ual **T**one **M**ultiplexed **F**requency) tones are created by superimposing two tones from different frequency ranges. The tone lasts 100 ms and is followed by a 100 ms pause.

5.5.1   DTMF Alarm

Once the PSI-DATA/FAX-MODEM/RS232 has dialed a phone (an optional CLIP decoder is useful for identifying the modem), the termination equipment (PC or PLC) can generate a DTMF message.

An operator can acknowledge the message with a DTMF tone. The modifier **L** in the dialing string (**ATD1234….L;**) enables the DTMF alarm function. After dialing, the modem switches to command mode and can now output DTMF tones with the dialing command (**ATDT00000000;**). In command mode, the device can detect DTMF tones and forward them to the RS-232 interface.

DTMF: x<CRLF>

This message is output to the RS-232 interface, where **x** is the DTMF tone (0 to 9,*,#).

As an alternative to **ATDxxxL;** the special dialing string **ATDxxxK;** can be used. When the **ATDxxxK;** command is issued, the modem waits for five seconds of silence after dialing (i.e., no dial tone means the partner has accepted the call).

> **NOTE:** The S7 timer is no longer valid in command mode.
> The connection can only be can be aborted by the **ATH** or **ATZ** command.

5.5.2   DTMF Control

The modem is called by a telephone or calls a telephone. The partner uses DTMF tones and sends control characters to the modem. The modem decodes these and outputs the characters to the serial interface.

In order that the modem can be called, this function must be enabled with the **ATR1** command. Once the modem has accepted the call, it waits for five seconds for the DTMF start character (**#**). If the character is detected, the modem switches to command mode and sends a signal tone to the partner.

If no start character is detected, the modem starts with the standard modem handshake. In command mode, the detected DTMF tones are output to the interface. The start character is not forwarded to the interface.

> **NOTE:** The S7 timer is no longer valid in command mode.
> The connection can only be can be aborted by the **ATH** or **ATZ** command.

5.6   ASCII to Fax Conversion

The PSI-DATA/FAX-MODEM/RS232 supports ASCII to fax conversion. The modem can automatically generate a fax from a simple ASCII string and send it. The converted fax is limited to 30 kbytes, i.e., each line is limited to 60 characters. First, the unique ID should be set once (**AT+FLID="123"**). It is stored in a non-volatile memory and can be reset at any time.

Send an ASCII fax:

AT*AF<CR>
NUMBER<;>TEXT…^Z:

Following the **AT*AF** command, you are prompted to enter the number and text. The number must end with **;**. In the text, **<CR>** is the code for a line break, the ASCII text is exited via Ctrl+Z. The maximum line length of 60 characters must not be exceeded, after which a **<CR>** is automatically inserted. A maximum of 253 characters in total is permitted.

After exiting the entry (Ctrl+Z) the data is converted into a fax and the specified number is dialed. The conversion may take a moment (approximately 30 seconds to 1 minute). The fax is then sent. The fax is acknowledged by the hang-up message (Class2) and OK (successful) or ERROR (unsuccessful). If unsuccessful, the command must be repeated.

The following character set is used (characters that do not appear in this character set are replaced by a space):

Table 5-1   Fax characters

Fax Characters	ASCII Characters
20_{hex} to $2F_{hex}$	!,",#,$,%,&,',(,),*,+,,,-,.,/
30_{hex} to $3F_{hex}$	0,1,2,3,4,5,6,7,8,9,:,;,<,=,>,?
40_{hex} to $104F_{hex}$	@,A,B,C,D,E,F,G,H,I,J,K,L,M,N,O
50_{hex} to $5F_{hex}$	P,Q,R,S,T,U,V,W,X,Y,Z,Ä,Ö,Ü,ß,_
60_{hex} to $6F_{hex}$	´,a,b,c,d,e,f,g,h,i,j,k,l,m,n,o
70_{hex} to $7F_{hex}$	p,q,r,s,t,u,v,w,x,y,z,ä,ö,ü,~

Table 5-2   DOS Umlauts

DOS Umlaut	ASCII Character
84_{hex}	ä
94_{hex}	ö
81_{hex}	ü
$8E_{hex}$	Ä
99_{hex}	Ö
$9A_{hex}$	Ü
$E1_{hex}$	ß

Table 5-3   Windows Umlauts

Windows Umlaut	ASCII Character
E4$_{hex}$	ä
F6$_{hex}$	ö
FC$_{hex}$	ü
C4$_{hex}$	Ä
D6$_{hex}$	Ö
DC$_{hex}$	Ü
DF$_{hex}$	ß

Please note, DOS umlauts and Windows umlauts are only valid in 8-bit data format.

5.7 SMS in the Fixed-Line Network

You can send and receive SMS messages in the Deutsche Telekom fixed-line network with the PSI-DATA/FAX-MODEM/RS232. SMS messages can only be received if this feature has been enabled by Deutsche Telekom and an SMS message is sent first to log in.

5.7.1 Sending SMS Messages

AT*AS<CR>
NUMBER<;>TEXT…^Z:

Following the **AT*AS** command, you are prompted to enter the number and text. The number must end with **;**. Exit the message with Ctrl+Z. The message must not exceed 160 characters.

After exiting the entry (Ctrl+Z), the data is converted and the SMS is automatically sent. The message is acknowledged by OK (successful) or ERROR (unsuccessful). If unsuccessful, the command must be repeated.

The number for the SMS provider must be stored in store number 20 (**AT&Z20**). It is set to Deutsche Telekom (01930100) by default.

5.7.2 Receiving SMS Messages

When SMS mode is enabled, SMS messages received are output to the RS-232 interface. To receive SMS messages, this feature must be supported and enabled by your SMS provider. In addition, check that the caller ID (CLIP) is transmitted as far as the modem (usually a problem for many older private branch exchanges).

The number for the SMS provider must be stored in store number 20 (**AT&Z20**). It is set to Deutsche Telekom (01930100) by default.

Enabling SMS receipt using Deutsche Telekom as an example:
- Send an SMS with the text "ANMELD" to telephone number 8888.
- You can log off by sending the text "ABMELD" to telephone number 8888.

SMS messages are preceded by the caller ID (CLIP) of the service provider. The caller ID is not transmitted until after the first ring, so that the modem does not respond to the call until the second ring.

The following command activates the receive SMS function:

AT\S1<CR>

The actual message is transmitted after the first ring (RING) and is structured as follows:

Example
RING
RECEIVE SMS
FROM: 0160123456789
DATE/TIME: 05.03.02 / 16:55:00
MESSAGE: RESET PLC 1234 confirmation to 016012345

The last SMS message is stored and can be viewed again via the **AT*AS?** command:

AT*AS?

**RECEIVE SMS
FROM: 0160123456789
DATE/TIME: 05.03.02 / 16:55:00
MESSAGE: RESET PLC 1234 confirmation to 016012345
OK**

5.7.3 Control via SMS Messages

The PSI-DATA/FAX-MODEM/RS232 can be controlled via SMS messages. For example, you can activate the output, reset the alarm or send the status of the modem simply by sending an SMS message.

This mode is activated using the **AT\S2** command. In this mode, the SMS message is not forwarded to the termination equipment, but is evaluated by the modem itself. The SMS message sent to the modem must be structured as follows:

#<Password>:<Command>

The password (**AT*P=**) is the password stored in the modem (maximum of seven characters). Please note that not all characters can be sent in the SMS message. Choose a password according to the SMS character set. If the password is set, e.g., to **AT*P=12345** the message should appear as follows:

#12345:<Command>

The following control commands are available:

RESET	Resets the alarm and the switching output (e.g., **AT*AR**).
SET:OUTPUT	Activates the switching output ("Output").
CLR:OUTPUT	Deactivates the switching output ("Output").
SEND:STATUS	Sends a status SMS message to the caller.
"Text"	Outputs all the characters within the inverted commas to the RS-232 interface.

Examples

#12345:SET:OUTPUT	Activates the output.
#12345:SEND:STATUS	Sends an SMS message (status report) to the sender.
#12345:"RST PLC"	Sends the text **RST PLC** to the terminal equipment (RS-232 interface).
#12345:RESET	Resets the alarm function and the switching output.

5.8   Setting a Partner Output

5.8.1   Transmitting Local Inputs to the Partner Output

The PSI-DATA/FAX-MODEM/RS232 modem has one electrically isolated input and one electrically isolated output. Alarm functions can be assigned to the input, i.e., the partner output, for example, can be activated by activating the input.

The input configuration can be found in Section "Alarm Inputs and Alarms" on page 5-2.

5.8.2   Switching the Partner Output via AT Commands

The PSI-DATA/FAX-MODEM/RS232 can be used to transmit its input to a partner output.

Setting/deleting the partner output:

AT*AO<CR>

NUMBER<;>PASSWORD<;>COMMAND^Z:

Following the **AT*AO** command, you are prompted to enter the number, the password, and the control command for the partner output. The number must end with **;**. The password length is limited to seven characters.

The following control commands are available:

RESET	Resets the alarm and the switching output (e.g., **AT*AR**).
SET:OUTPUT	Activates the switching output ("Output").
CLR:OUTPUT	Deactivates the switching output ("Output").
"Text"	Outputs all the characters within the inverted commas to the RS-232 interface.

After exiting the entry (Ctrl+Z) an attempt is made to contact the partner and transmit the control command. The message is acknowledged by OK (successful) or ERROR (unsuccessful). If unsuccessful, the command must be repeated.

6   AT Commands

Your modem stores its operating characteristics in a non-volatile memory (EEPROM). These characteristics can be overwritten using commands and can thus modify the method of operation of the device. The modem executes commands as long as it is in command mode. Your modem is automatically in command mode until you dial a number and establish a connection. You can enter commands for your modem using appropriate communication software (e.g., HyperTerminal). The device supports data transmission speeds of 300, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, and 115,200 bps.

> **i**   Make sure that the baud rate setting for your COM port in your communication software corresponds to one of these speeds.

Modes

The modem can be operated in two modes:

– **Command mode:** The modem can be configured and controlled via AT commands. As soon as a connection is established, the modem automatically switches to data mode.
– **Data mode:** In this mode, the modem transmits data to the partner.

Command Structure

All commands transmitted to the modem must start with **AT** and must be confirmed by pressing ENTER. The commands can be entered in either upper or lower case, but not a mixture of the two. Spaces may be inserted between the commands so that the command lines are easier to read.

> **i**   **AT** deletes the last command line executed by your modem (if present) and prepares your modem for the new command line. In addition, **AT** informs your modem of the transmission speed, parity, and character length.
>
> For commands that must be specified by a parameter, a missing parameter corresponds to parameter 0, e.g., **ATM** = **ATM0**.

Correcting a Typing Error

If you make a mistake when entering a command, you can correct it using the backspace key. Pressing the backspace key deletes the last character entered. The **AT** at the start of the command line is not deleted.

Repeating the Previous Command

You can instruct your modem to repeat the last command by entering **A/** in command mode. **AT** is not entered for this command and it does not have to be confirmed by pressing ENTER, i.e., the command is repeated as soon as **A/** is entered.

6.1 Command Descriptions

AT

Attention String

AT is the prefix of a command line and must be entered at the start of each command line (except for the **A/** command or the **+++** Escape string). The Attention characters transmit the transmission speed, character format, and parity of your PC or terminal to your modem.

> **i** If you attempt to execute a command line that does not start with **AT**, an error message is generated (except when repeating a command with **A/** or using the **+++** Escape string).

A

Manual Answering

Use the **A** command to manually answer a call. The **A** command can also be used to convert voice communication into data communication: Once you have completed the spoken part of the call, the caller enters the **ATD** command and ENTER to enable data transmission. The partner responds with the **ATA** command and ENTER. Your modem does not execute any commands that appear after the **A** in the command line. You must therefore enter all settings **before** the **A** command.

A/

Repeat the Previous Command

The **A/** command instructs the modem to repeat the last command line (i.e., the last command that it stored in its memory). You can use the **A/** command to redial a number if the line was busy on the first attempt or it could not connect.

> **i** The **A/** command does not have to be preceded by **AT** or confirmed by pressing ENTER. You can use the **A/** command to repeat the last command line as many times as you wish until the command is deleted from the modem memory by either resetting the modem or entering a new command line.

B

Set Transmission Method

The **B** command can be used to operate your modem in Bell and/or CCITT mode depending on the DTE baud rate and on whether your modem is generating or answering a call. Table 6-1 on page 6-22 shows how this command works.

D   **Dialing**

The **D** command instructs your modem to dial a number. Enter the number that wish to dial after the **D** command. You can modify the **D** command with the following additional commands:

P   **Pulse Dialing**

The **P** modifier generates the call using pulse dialing (German standard). Enter the modifier after the command, followed by the desired telephone number.

T   **Tone Dialing**

The **T** modifier instructs the modem to use tone dialing. Enter the modifier after the command, followed by the desired telephone number.

W   **Wait for a Dial Tone**

The **W** modified instructs the modem to wait for a second dial tone. Use this command in private branch exchanges to wait for a dial tone after calling an outside line.

Example: **ATDP0W555-1111**
This command dials 0 for an outside line, waits for a second dial tone and then dials the number 555-1111.

,   **Pause**

This modifier inserts a 2-second pause before dialing. If, for example, your modem is located in a private branch exchange (e.g., in offices), where a number (usually 0) must be dialed for an outside line, insert a comma between the 0 and the actual telephone number you wish to dial. Your modem dials 0, waits for two seconds and then dials the telephone number. If a longer pause is required, you can either insert another comma in the command line or change the value of the S8 register (see page 6-18).

@   **Wait for Five Seconds of Silence**

This modifier instructs the modem to wait until no tone has been detected on the line for five seconds before dialing the specified number.

!   **Dial an Outside Line/Divert Calls**

Use this modifier to divert a call. Enter the telephone number that is to be dialed first, then the **!** modifier followed by the telephone number to which the call is to be diverted. Once the modem has established a connection with the first telephone number, it waits for two seconds and then diverts the call.

>   **Dial an Outside Line via a Ground Button**

;   **Return to Command Mode**

If your modem is to call another modem and then return to command mode without disconnecting, enter the **;** modifier as the last character in your dial command line.

L;   **DTMF Alarm Mode, Without Waiting for Silence**

See Section "DTMF Alarm" on page 5-7.

K;   **DTMF Alarm Mode, With Waiting for Silence**

See Section "DTMF Alarm" on page 5-7.

DS=n   **Dial One of the Stored Telephone Numbers**

The **DS=n** command instructs the mode to dial one of 20 telephone numbers, where **n** is a value from 0 through 20. Use the **&Z** command to store telephone numbers (see page 6-8).

Example: **ATDS=1**
The modem dials the telephone number in store number 1.

E   **Echo**

Your modem is set by default to display commands on the PC screen in command mode (echo). This feature is only necessary if your PC is configured for full duplex mode.

> Most systems operate in full duplex mode. In this case, you can enable the echo function with the **E1** command.
>
> If you are working in half duplex mode, you must disable the echo function with the **E0** command.

+++   **Escape String**

The escape string can be used to switch your modem from data mode to command mode without losing the connection with the partner. When you enter the escape string, your modem outputs an OK message to inform your that it is in command mode.

Enter **ATO** to return to data mode and confirm by pressing ENTER. Enter **ATH** to hang up and confirm by pressing ENTER.

H   **Hook (Hang Up)**

H0   The modem hangs up.

I   **Identification**

I0   Display the ID number for your modem.

I1   Display the ROM checksum for your modem.

I2   Execute a memory test and output an OK message if the test was successful.

I3   Display the V.42bis ID number for your modem.

I4   Display the internal ID for your modem.

I8   Display the serial number for your modem.

L   **Volume Control**

L0   Low volume

L1   Low volume

L2   Medium volume

L3   High volume

M   **Speaker**

M0   Speaker off

M1   Speaker on during the connection phase

M2   Speaker always on

O   **Data Mode/Fall Forward/Fall Backward**

    O0   Return to data mode if you switched to command mode using the escape string.

    O1   Adjustment after returning to data mode.

    O2   Adjustment by increasing the speed (Fall Forward) in increments of 1200 bps after returning to data mode.

    O3   Adjustment by decreasing the speed (Fall Backward) in increments of 1200 bps after returning to data mode.

This function is useful if errors emerge, e.g., due to modifying the telephone line attributes. The Fall Forward/Fall Backward options enable the user to set the required transmission speed.

P   **Pulse Dialing**

This command sets pulse dialing by default for your modem (see **D** command).

Q   **Modem Messages**

    Q0   Information from the modem about its status and display confirmations on your PC screen.

    Q1   Disable confirmations. This may be necessary, e.g., if a PLC is connected to your modem and responses would interfere.

    Q2   Display confirmations only when the modem has established a connection.

R   **DTMF Remote Configuration**

    R0   DTMF remote configuration off

    R1   DTMF remote configuration on

Sr?   **Read the Modem Register**

Your modem has 29 registers (0 through 28), which are used to set the operating parameters. **Sr?** can be used to read the values set in the registers.

Sr=n   **Set Register Values**

Sr=n can be used to modify the register values for your modem (see Section "S Registers" on page 6-16).

T   **Tone Frequency Dialing**

Tone frequency dialing is stored by default.

V   **Alpha or Numeric Responses**

Your modem displays responses on-screen.

    V0   Display numeric confirmations. This option can be used if your software package or PLC only supports numeric confirmations.

    V1   Display alpha confirmations (default).

W   **Additional Confirmations**

The **W** command enables or disables the **MNP/V.42**, **CONNECT**, and **CARRIER** additional confirmations and determines whether the modem is specifying the DCE speed (modem speed) or the DTE speed (PC speed).

W0   Disable additional confirmations and display the DTE speed
(e.g., **CONNECT 115200**).

W1   Enable additional confirmations and display the DCE speed.
CARRIER 33600
PROTOCOL: LAP-M
COMPRESSION: V.42BIS
CONNECT 115200/ARQ

W2   Disable additional confirmations and display the DCE speed
(e.g., **CONNECT 33600**).

X   **Confirmation Settings**

The **X** command can be used to control the way in which your modem responds to specific events. There are five different command sets for answering:

X0   Hayes Smart Modem 300-compatible answering/dummy dialing
(private branch exchange)

X1   As X0 plus all CONNECT answering/dummy dialing
(private branch exchange)

X2   As X1 plus detection of dial tone/proceed-to-dial tone (outside line)

X3   As X1 plus detection of engaged tone/dummy dialing
(private branch exchange)

X4   All answering and detection of dial tone and engaged tone

Y   **Break Signal**

Y0   No transmission of break signals and no response to them.

Y1   Response to break signals. The device sends a break signal for four seconds before disconnecting. In addition, it aborts an active connection when it receives a break signal for 1.6 seconds from the partner.

Z   **Reset**

Use the Z command to reset your modem. Your modem then hangs up and loads configuration profile 0 or 1. This command must be the last one in the command line.

Z0   Reset and activate stored configuration profile 0.

Z1   Reset and activate stored configuration profile 1.

&C   **Carrier Detect Signal**

&C0   Continuous activation of the carrier detect signal for your modem.

&C1   Set the RS-232-C carrier detect signal for your modem (DCD) when the modem detects a carrier detect signal from the partner (default).

&D   **Data Terminal (PC) Ready Signal (DTR)**

    &D0   Ignore the status of the DTR signal. The DTR signal is always activated, even when your PC is switched off.

    &D1   Reset to command mode if the modem detects a falling edge on the DTR line.

    &D2   Hang up and reset to command mode if the modem detects a falling edge on the DTR line.

    &D3   Hang up, reset, and switch back to command mode if the modem detects a falling edge on the DTR line.

&E   **Automatic Speed Adjustment (Fall Forward/Fall Backward)**

This feature automatically adjusts the speed if the transmission quality deteriorates while connected.

    &E0   Disable automatic speed adjustment (default).

    &E1   Enable automatic speed adjustment.

&F   **Factory Configuration**

The **&F** command (default) restores the factory settings with V.42bis and enables hardware flow control.

&K   **Set DTE Flow Control**

The **&K** command specifies the type of data control that is set between the modem and the local PC to prevent overruns. Your modem has type types of data flow control. The selected function depends on the requirements of your PC.

    &K0   Disable data flow control.

    &K3   Use CTS/RTS signals for bidirectional data flow control. The CTS signal starts or finishes data transmission from the PC or terminal. The RTS signal control data transmission to the PC.

            If the RTS is disabled, data transmission is finished. If it is enabled, the modem sends data to the PC.

    &K4   Select data flow in both directions (**XON/XOFF**).

    &K5   Select data control in one direction. The modem sends the ASCII characters **XON** to the DTE to start data transmission or the ASCII characters **XOFF** to end data transmission. However, the modem ignores **XON/XOFF** characters that are sent by the DTE.

&O   **Local Switching Output**

    &O0   Reset the local switching output.

    &O1   Set the local switching output.

&S   **DSR Options**

    &S0   Enable the DSR signal (default).

    &S1   Enable the DSR signal during the handshake and in data mode and disable it in test or silent mode.

            The DSR is activated when the carrier detect signal is lost.

&V   **Display Configuration Profiles**

The **&V** command can be used to activate and store the configuration profiles and to view the first three telephone numbers that are stored on your modem. Any commands or registers that appear in the active or stored commands, but are not described in the user manual, can be ignored.

> This command can not be activated when the modem is online.

&W   **Save Active Configuration**

This command saves the active configuration in the permanent memory.

    &W0   Store the active settings as configuration profile 0.

    &W1   Store the active settings as configuration profile 1.

&X   **Synchronous Pulse Generator**

The **&X** commands specifies the device for which the synchronous pulse generator is available.

    &X0   Generation of the synchronous pulse generator by the modem itself.

    &X1   Accept the synchronous pulse generator of the PC or terminal.

    &X2   Derive the synchronous pulse generator from the signal of the partner modem.

&Y   **Select Active Profile**

The **&Y** command specifies which stored profile is loaded when the modem is switched on or reset.

    &Y0   Use configuration profile 0 (default).

    &Y1   Use configuration profile 1.

&Zn=x   **Store a Telephone Number in the Permanent Memory**

The **&Zn=x** command stores a telephone number (x) (36 digits maximum) in the permanent memory of the modem. Your modem can store up to 20 telephone numbers (n = 0 through 20).

%D   **Clear Down Signal**

The **%D** command specifies whether a Clear Down Signal is used when the connection is aborted.

    %D0   Disable the Clear Down function.

    %D1   Enable the Clear Down function (default).

%F	**Full Duplex/Half Duplex**
	The **%F** command switches between half duplex and full duplex mode.

%F0 Full duplex

%F1 Half duplex mode (V.23 only)

%G	**Caller ID**

%G 0 Disable the caller ID function.

%G 1 Enable caller ID output. The caller ID is output to the RS-232 interface in a specific format

%G 3 Enable caller ID evaluation.

Selective call acceptance: Only calls from the stored caller IDs from **&Z18** and **&Z19** are accepted, regardless of register S0.

%P	**Power-On Auto-Connect**
	The **%P** command specifies whether the modem automatically establishes a connection with another modem when it is switched on.

%P0 Configuration of the modem for normal operation (default).

%P1 Enable the auto-connect function. The modem automatically dials telephone number **x** which was stored with the **&Z0=x** command (see page 4-16).

%S	**Call-Back Security**

%S0 Disable call-back security.

%S1 Enable call-back security with password validation.

%S2 Enable password validation.

\F	**Display all Stored Telephone Numbers**
	The command displays all 20 stored telephone numbers.

\L	**Check the Telephone Connection**
	This command executes a line test.

\S	**Receive SMS Messages**

\S0 Do not receive SMS messages.

\S1 Receive SMS messages. The telephone number for the SMS provider must be stored under **&Z20**. SMS messages are output to the RS-232 interface in a specific format.

\S2 Control the modem via SMS Messages (see Section "SMS in the Fixed-Line Network" on page 5-10).

*A **Configuration of the Switching Input**

    *A1 Configuration of input 1

    *A1? Display the configuration of input 1

    *AF ASCII to fax: automatically generate and send faxes

    *AS Automatically send SMS messages

    *AS? View the last received SMS message

    *AO Control the partner output

*F **Reset Modem**

The **AT*F** command returns the modem to its default state.

> **i** All settings will be lost.
> (Telephone numbers/passwords/configurations)

*P=x **Store a Password in the Permanent Memory**

The ***P=x** command stores the password x (maximum of seven characters from the ASCII character set, excluding question marks) in the permanent memory on the modem. No password is stored on the modem by default. If no password is stored and the **%S1** or **%S2** command is activated, the modem skips the password request stage.

*P? **Display Stored Password**

The ***P?** command displays the stored password.

*W **Baud Rate**

    *W0 Automatic baud rate detection is enabled.

    *W= Automatic baud rate detection is disabled, sets a specific baud rate.
            *W=baud,d,p,s

            baud = 300, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200 bps
            d = Number of data bits (7 or 8)
            p = Parity (N = None, E = Even, O = odd, S = Space, M = Mark)
            s = Number of stop bits (1)

            Examples:
            AT*W=2400,7,E,1 = 2400 bps, 7 data bits, even parity, 1 stop bit
            AT*W=57600,8,O,1 = 57600 bps, 8 data bits, odd parity, 1 stop bit

6.2 AT Commands for MNP and LAPM (V.42bis)

%An

Auto Reliable Fallback

The **%A** command specifies which character forces the modem to fall back from a connection in Reliable Mode to a connection in normal mode when the **\C2** command is activated. The fallback character can be specified in ASCII code as any value between 0 and 127.

Default: 0

%C

Data Compression (V.42bis/MNP 5)

%C0 Disable data compression

%C1 Enable data compression (default)

The compression algorithm enabled is determined by the error correction protocol used: If a V.42 connection is present, V.42bis compression is used. If an MNP-2-4 connection is present, MNP-5 compression is used.

\An

Maximum MNP Block Size

(MNP = **M**icrocom **N**etworking **P**rotocol)

The **\A** command specifies the MNP block size during group 4 and group 5 operations and causes your modem to send smaller data blocks.

Use these commands if the quality of the telephone line is poor.

\A0 Maximum block size = 64

\A1 Maximum block size = 128

\A2 Maximum block size = 192

\A3 Maximum block size = 256

\B

Send BREAK

The **\B** commands sends a break character to the modem that is calling so that the connection is aborted. If you have established a standard connection (i.e., not an MNP connection), enter a number after this command to specify how long your modem should send the break character. This number is multiplied by 100 milliseconds.

If you are using a Reliable Connection (MNP), you do not have to enter a number after this command. The pause is always 300 milliseconds for these connections (default: 3).

\C	Set MNP Buffer

The **\C** specifies whether the modem stores received data in the buffer memory while both modems are establishing a Reliable Connection (LAPM [**L**ink **A**ccess **P**rocedure **M**odems] or MNP [**M**icrocom **N**etworking **P**rotocol]). It also specifies whether the modem should respond to the fallback character that was specified with the **%A** command.

\C0   Instruct your mode to not store data in the buffer while a Reliable Connection is being established. The fallback character is disabled.

\C1   Create buffers of up to 200 characters while establishing a Reliable Connection. The fallback character is disabled.

When the buffer memory is full or four seconds have elapsed since the connection was established, the modem establishes a standard connection and sends the data stored in the buffer to your system.

\C2   Do not save data while establishing a connection. Detection of the fallback character is enabled.

If the modem detects the fallback character while establishing a Reliable Connection, it automatically switches back to normal mode.

\E	Echo

Your modem is set by default not to display an echo of the specified data on-screen as long as the modem is in data mode.

\E0   Disable the echo function (default). The echo function is disabled in Reliable Mode.

\E1   Enable the echo function. You can view on-screen all the data that is exchanged between your modem and the partner modem.

\G	DCE Flow Control (XON\XOFF)

The **\G** command enables or disables data flow control during a connection in normal mode. Data control is required if the calling modem transmits data faster than your modem can process it.

\G0   Disable data flow control (default).

\G1   Enable data flow control.

\J	Set Serial Data Transmission Speed

The **\J** command specifies whether the data transmission speed between your modem and your computer should be adapted to the transmission speed between the two modems.

\J0   Disable speed adjustment and use data compression.

This default setting enables the use of a high baud rate between your PC and your modem, regardless of the connection speed between the two modems. For example, you can set your DTE speed to 115,200 bps regardless of the transmission speed between the modems.

\J1   Enable speed adjustment so that the serial data rate is automatically adjusted to the rate between the modems.

\K   **Process Break Character**

The **\K** command specifies one of three options for processing the break character:

– Immediate disconnection with data loss
  The buffer memory is deleted and the break character is transmitted immediately.
– Immediate disconnection
  The break character is transmitted before any data is stored in the buffer.
– Delayed disconnection
  The break character is transmitted once the data in the buffer memory has been sent.

Section "Processing the Break Character" on page 6-25 describes the various ways in which your modem can process break characters.

\N   **V.42/MNP Data Connection**

The **\N** command specifies what type of data connection your modem can establish (MNP or LAPM (V.42bis)).

\N0   Establish a standard data connection (i.e., a connection that does not use MNP or V.42).

\N1   Establish a direct data connection (i.e., a connection that bypasses error correction).

\N2   Establish only V.42 or MNP data connections. If the partner modem does not use V.42 or MNP, your modem aborts the connection and returns to command mode.

\N3   Establish standard, V.42 or MNP data connections depending on whether the calling modem uses MNP or V.42. If the partner modem does not use MNP or V.42, a standard data connection is established. If the partner modem uses MNP or V.42, one of these connections is established.

\N4   Establish only V.42 data connections. If the partner modem does not use V.42, your modem aborts the connection and returns to command mode.

\N5   Establish only MNP data connections. If the partner modem does not use MNP, your modem aborts the connection and returns to command mode.

\N6   Establish standard or MNP data connections depending on whether the calling modem uses MNP. If the partner modem does not use MNP, a standard data connection is established. If the partner modem uses MNP, this connection is established.

> **i** Data flow control (**&K**) should be enabled during **\N0**, **\N2** ,**\N3**, **\N4**, **\N5**, and **\N6** operations.

\T   **Set Switch Off Timer**

The **\T** command instructs your modem to disconnect if no data activities take place within a specified time (n), where n is between 0 and 90 minutes.

The default setting 0 disables the timer.

\X   **Forward XON/XOFF**

When the command for software-controlled data flow control (**\G1**) is activated, the PC and modem execute data control with **XON/XOFF** characters. The **\X** command specifies whether the control characters are sent from your modem to the partner modem.

\X0   Detect the **XON/XOFF** characters without your modem forwarding them to the partner system (default).

\X1   Detect **XON/XOFF** characters and immediately forward them to the partner system.

6.3 V.250 Commands Implemented

A	Manual Answering
D	Dialing
E	Echo
H	Hook (Hang Up)
I	Identification
L	Volume Control
M	Speaker
O	Data Mode/Fall Forward/Fall Backward
P	Pulse Dialing
Q	Modem Messages
T	Tone Frequency Dialing
V	Alpha or Numeric Responses
X	Confirmation Settings
Z	Reset
&C	Carrier Detect Signal
&D	Data Terminal (PC) Ready Signal (DTR)
&F	Factory Configuration
+GMI	Manufacturer ID
+GMM	Modem ID
+GMR	Firmware ID
+GSN	Serial number
+FCLASS	Fax class
S0	Number of Rings Before Automatically Answering (Auto Answer)
S3	Carriage Return
S4	Line Feed
S6	Wait When Dialing Without Dial Tone
S7	Wait for the Carrier Detect Signal for the Selected Modem
S8	Pause Character Duration (,)
S10	Waiting Time for Losing the Carrier Detect Signal

6.4   S Registers

Your modem has 105 registers (S0 through S104). These registers influence the operating characteristics of the modem, send your information via your modem, and enable you to test your modem. The values of certain registers can be modified using specific commands. If you use a command to modify a register value, this command remains active until your switch off or reset your modem. Your modem then reverts back to the operating characteristics stored in its permanent memory.

Reading a Register Value

Use the **Sr?** command to read the current value of a register:

r = Register number (0 through 104)

Your modem displays a three-digit decimal value for the register.

Modifying a Register Value

Use the **Sr=n** command to modify the current value of a register:

r = Register number (0 through 104)
n = New value

Description of the S Registers

S0   **Number of Rings Before Automatically Answering (Auto Answer)**

Register S0 specifies the number of rings after which your modem can automatically respond to incoming calls.

Default: 0 (this value disables automatic answer).

S1   **Count the Received Ring Signals**

Register S1 counts the ring signals when you are called. If the value in this register is greater than or equal to 1 and corresponds to the value in register S0, your modem answers the call.

S2   **Escape Character**

Register S2 specifies the ASCII value of the escape character.

Default: 43

(This value corresponds to the ASCII character "+". This can be changed to any value between 0 and 255. Values greater than 127 disable the escape function and prevent reset to command mode.)

S3   **Carriage Return**

Register S3 defines the ASCII value of the carriage return character. This character is used to terminate a command line and enables your modem to execute this line. In addition, this character appears after the response that your modem sends to you.

Default: 13

(Any ASCII value between 0 and 127 can be used. This may be required if you have a non-standard device.)

S4   **Line Feed**

Register S4 specifies the ASCII value of the line feed character. Your modem sends the character for the line feed after a carriage return character. If you wish to prevent a line feed, set the value in this register to zero. It is not possible, however, to disable a line feed character.

Default: 10

(Any ASCII value between 0 and 127 can be used.)

S5   **Backspace**

Register S5 specifies the ASCII value of the backspace character. This character is generated when the backspace key is pressed and when the cursor is moved to the left.

Default: 8

(Other ASCII values between 0 and 32 or the value 127 can be used.)

i	A value between 33 and 126 must not be specified for the backspace character.

S6	**Wait When Dialing Without Dial Tone**

Register S6 informs your modem how long it should wait after being activated before it dials the first digit in a dialing instruction when dial tone detection is disabled, i.e., the **X0**, **X1** or **X3** confirmations are enabled.

Default: 3 seconds

S7	**Wait for the Carrier Detect Signal for the Selected Modem**

Register S7 defines how many seconds your modem should wait for the carrier detect signal from the selected modem before it hangs up.

Default: 45 seconds

(You can set this value to another value between 1 and 100 seconds if your modem does not receive a carrier detect signal within the specified time.)

If your modem detects the carrier detect signal within the specified time, it outputs the message **CONNECT** and switches to data mode. If no carrier detect signal is detected within this time, the modem sends back the message **NO CARRIER**, hangs up, and returns to command mode.

S8	**Pause Character Duration (,)**

Register S8 informs your modem how long the pause for each comma in a dial command line should last in seconds. The pause character **,** is normally used in private branch exchanges or other special telephone networks where it is necessary to wait for an outside line.

Default: 2 seconds

(You can select any value between 0 and 255 seconds.)

$\mathbf{i}$	We recommend that you insert several commas in your command line rather than modify this register.

S9	**Waiting Time for Detecting the Carrier Detect Signal**

Register S9 specifies how long the carrier detect signal for the selected modem must be present so that your modem can detect it. This function ensures that your modem does not incorrectly interpret other signals such as the engaged tone, telephone ringing or voice paging as a carrier detect signal.

This register value is specified in units of one tenth of a second.

Default: 600 milliseconds

(Any value between 1 and 255 can be used. If, for example, you specify the value 13, your modem must receive the carrier detect signal for the selected modem for 1.3 seconds before responding.)

The higher the value, the less likely the modem is to incorrectly identify carrier detect signals.

S10 **Waiting Time for Losing the Carrier Detect Signal**

Register S10 specifies how long your modem should wait after losing the carrier detect signal for the selected modem before it aborts the connection. This function can be used to prevent your modem from aborting the connection if the selected carrier detect signal only briefly disappears from the line.

This register is set in units of one tenth of a second.

Default: 1400 milliseconds

(The entire valid range is between 1 and 200.)

Select a higher value if the connection is poor and the selected carrier detect signal is disturbed by other noises.

Set the value to 255 if your modem should ignore the carrier detect status and establish that the carrier detect signal for the selected modem is continuously present (not possible in certain countries).

i	If the value of this register is less than the value of register S9, your modem interrupts the connection as soon as the carrier detect signal briefly disappears.
	In this case register S10 elapses before the waiting time allocated for detecting the carrier detect signal elapses.

S11 **Dialing Speed (Dial Tone Duration) For Tone Dialing**

Register S11 controls the speed of tone frequency dialing (DTMF).

Default: 85 milliseconds

(This value cannot be modified.)

i	Register S11 has no effect on pulse dialing.

S12 **Waiting Time for Detecting the Escape Character**

Register S12 specifies how long your modem should wait once the Escape string has been entered before identifying the escape character and displaying an OK message.

This value is specified in units of 20 milliseconds (1/50 seconds).

Default: 50 (1 second)

(A smaller value may not leave enough time to type in three Escape characters before the waiting time elapses.)

S13 **Not used**

S14 **Modem Control Register (Bit-Mapped)**

Register S14 can be used to control specific modem features, such as confirmations, echo, and dialing methods.

In addition, you can specify whether your modem should act as a caller or callee.

S15 **Not used**

S16	**RDL Options, Line Enable, Retraining, Reply Codes for the Modem (Bit-Mapped)**
	Register S16 controls the options for requesting a digital remote test (remote digital loopback), the use of enable signals, retraining, and the reply codes that your modem outputs.
S17	**Not used**
S18	**Modem Test Duration**
	Register S18 defines the maximum duration of modem tests.
	Default: 0
	(I.e., this function is disabled.)
S19	**Not used**
S20	**Not used**
S21	**Modem Control Register (Bit-Mapped)**
	Register S21 controls the caller mode (originate) and control signals for data transmission.
S22	**Modem Control Register (Bit-Mapped)**
	Register S22 controls the internal modem speaker.
S23	**Modem Control Register (Bit-Mapped)**
	Register S23 specifies the status of DTE data rate, parity, and monitoring tone.
S24	**Not used**
S25	**Delay Time for Data Terminal Ready Status**
	This register specifies how long your modem needs to detect a change in the DTR signal. The values are between 0 and 255 in units of 0.01 seconds.
	Default: 0.05 seconds
S26	**Delay Interval Between Request To Send (RTS) and Clear To Send (CTS)**
	This register specifies how long your modem should wait when the RTS signal switches from off to on, before a CTS signal is output. The values for this register are between 0 and 2.55 seconds in 10-millisecond intervals.
	Default: 10 milliseconds
S27	**Modem Control Register (Bit-Mapped)**
	This register defines asynchronous/synchronous operations, pulse generators for synchronous pulses, and the DCE rate.
S28	**Modem Control Register (Bit-Mapped)**
	This register controls the activation of automatic dialing, the password-protected call back function, automatic baud rate detection, and the DCE protocol options.

S30   **Inactive Timer**

This register controls the inactive timer (**\T**). The values for this register are between 0 and 255 in 10-minute intervals.

Default: 0 minutes

(I.e., the inactive timer is disabled.)

S31 to S91   **Reserved**

S92   **Transmit Level for Permanent Line Operation**

This register controls the transmit level for permanent line operation. The values for this register are between 6 and 15 in negative dBm intervals.

Default: -13 dBm

S93 to S103   **Reserved**

S104   **Maximum Connection Time**

This register controls the maximum connection time in minutes. Regardless of the data traffic, the modem automatically disconnects when the maximum time has elapsed. The values for this register are between 0 and 255 in 1-minute intervals.

Default: 0

(I.e., the timer function is disabled.)

6.5   Bell/CCITT Mode

The **B** command can be used to set the transmission method (see page 6-2).

Table 6-1   Bell/CCITT mode

AT Command	DTE Baud Rate (bps)	Bell/CCITT Mode
B0	300	V.21
	1200	V.22
	2400	V.22bis/V.22/Bell 212A
	4800, 9600	V.32/V.22bis/V.22/Bell 212A
	19,200	V.32bis/V.32/V.22bis/V.22/Bell 212A
	19,200, 38,400, 57,600, 115,200	V.34/V.FC/V.32bis/V.32/V.22bis/ V.22/Bell 212A
B1	300	Bell 103
	1200	Bell 212A
	2400	V.22bis/V.22/Bell 212A
	4800, 9600	V.32/V.22bis/V.22/Bell 212A
	19,200	V.32bis/V.32/V.22bis/V.22/Bell 212A
	19,200, 38,400, 57,600, 115,200	V.34/V.FC/V.32bis/V.32/V.22bis/ V.22/Bell 212A
B2	Any speed	V.34*/V.FC*/V.32bis/V.32/V.22bis/V.22/Bell 212A
B3	Any speed	V.23 (1200/75 bps)
B4	Any speed	V.21 (300 bps)
B5	Any speed	V.22 (1200 bps)
B6	Any speed	V.22bis (2400 bps)
B7	Any speed	V.32 (4800 bps)
B8	Any speed	V.32 (9600 bps)
B9	Any speed	V.32bis (14,400 bps)
B10	Any speed	V.34/V.FC at 16,800 bps
B11	Any speed	V.34/V.FC at 19,200 bps
B12	Any speed	V.34/V.FC at 21,600 bps
B13	Any speed	V.34/V.FC at 24,000 bps
B14	Any speed	V.34/V.FC at 26,400 bps
B15	Any speed	V.34/V.FC at 28,800 bps

6.6 Modem Confirmations

The **X** command can be used to control the way in which your modem responds to specific events (see page 6-6).

Table 6-2 Modem confirmations

Word	X	Number	Meaning
OK	0,1,2,3,4	0	Modem has executed a command.
CONNECT	0,1,2,3,4	1	Data connection has been established.
RING	0,1,2,3,4	2	Modem has detected a ring.
NO CARRIER	0,1,2,3,4	3	Carrier detect signal for the selected modem was lost or was not detected within the time specified by register S7.
ERROR	0,1,2,3,4	4	Error detected in your command line.
CONNECT 1200	1,2,3,4	5	1200 bps connection established.
NO DIALTONE	2,4	6	No dial tone detected.
BUSY	3,4	7	Engaged tone received.
NO ANSWER	1,2,3,4	8	Partner not answering.
CONNECT 2400	1,2,3,4	10	2400 bps connection established.
CONNECT 4800	1,2,3,4	11	4800 bps connection established.
CONNECT 7200	1,2,3,4	13	7200 bps connection established.
CONNECT 9600	1,2,3,4	12	9600 bps connection established.
CONNECT 12000	1,2,3,4	14	12,000 bps connection established.
CONNECT 14400	1,2,3,4	15	14,400 bps connection established.
CONNECT 16800	1,2,3,4	59	16,800 bps connection established.
CONNECT 19200	1,2,3,4	16	19,200 bps connection established.
CONNECT 21600	1,2,3,4	61	21,600 bps connection established.
CONNECT 24000	1,2,3,4	62	24,000 bps connection established.
CONNECT 26400	1,2,3,4	63	26,400 bps connection established.
CONNECT 28800	1,2,3,4	64	28,800 bps connection established.
CONNECT 31200	1,2,3,4	91	31,200 bps connection established.
CONNECT 33600	1,2,3,4	84	33,600 bps connection established.
CONNECT 38400	1,2,3,4	17	38,400 bps connection established.
CONNECT 57600	1,2,3,4	18	57,600 bps connection established.
CONNECT 115200	1,2,3,4	19	115,200 bps connection established.
CONNECT 1200/75	1,2,3,4	23	1200/75 bps connection established.
CONNECT 75/1200	1,2,3,4	22	75/1200 bps connection established.
CARRIER 300	1,2,3,4	40	Connection with 300 bps carrier.
CARRIER 120075	1,2,3,4	44	Connection with 1200/75 bps carrier.
CARRIER 75/1200	1,2,3,4	45	Connection with 75/1200 bps carrier.
CARRIER 1200	1,2,3,4	46	Connection with 1200 bps carrier.

Table 6-2   Modem confirmations(Continued)

Word	X	Number	Meaning
CARRIER 2400	1,2,3,4	47	Connection with 2400 bps carrier.
CARRIER 4800	1,2,3,4	48	Connection with 4800 bps carrier.
CARRIER 7200	1,2,3,4	49	Connection with 7200 bps carrier.
CARRIER 9600	1,2,3,4	50	Connection with 9600 bps carrier.
CARRIER 12000	1,2,3,4	51	Connection with 12,000 bps carrier.
CARRIER 14400	1,2,3,4	52	Connection with 14,400 bps carrier.
CARRIER 16800	1,2,3,4	53	Connection with 16,800 bps carrier.
CARRIER 19200	1,2,3,4	54	Connection with 19,200 bps carrier.
CARRIER 21600	1,2,3,4	55	Connection with 21,600 bps carrier.
CARRIER 24000	1,2,3,4	56	Connection with 24,000 bps carrier.
CARRIER 26400	1,2,3,4	57	Connection with 26,400 bps carrier.
CARRIER 28800	1,2,3,4	58	Connection with 28,800 bps carrier.
CARRIER 31200	1,2,3,4	78	Connection with 31,200 bps carrier.
CARRIER 33600	1,2,3,4	79	Connection with 33,600 bps carrier.
COMPRESSION: CLASS 5	1,2,3,4	66	–
COMPRESSION: V.42BIS	1,2,3,4	67	–
COMPRESSION: NONE	1,2,3,4	69	–
PROTOCOL: NONE	1,2,3,4	76	–
PROTOCOL: LAP-M	1,2,3,4	77	–
PROTOCOL: ALT	1,2,3,4	80	–

6.7   Processing the Break Character

The **\K** command specifies one of three options for processing the break character (see page 6-13):

Table 6-3   Break character received from the PC with an MNP or standard connection

AT\Kn	Effect
n = 0, 2, 4	Do not send a break character to the partner system.
n = 1	Delete buffer memory and immediately send a break character to the partner modem.
n = 3	Immediately send a break character to the partner modem.
n = 5	Send all data from the buffer memory and then send a break character to the partner modem.
n = 6	Ignore break character.

Table 6-4   Break character received by the PC while the modem is directly connected in data mode

AT\Kn	Effect
n = 0, 2, 4	Immediately send a break character and then set the modem to command mode.
n = 1, 3, 5	Immediately send a break character to the partner modem.
n = 6	Ignore break character.

Table 6-5   Break character received by the PC while the modem is connected via an MNP or standard connection in data mode

AT\Kn	Effect
n = 0, 1	Delete buffer memory and send a break character to the partner modem.
n = 2, 3	Immediately send a break character to the other modem.
n = 4, 5	Send all data from the buffer memory, followed by a break character to the other modem.
n = 6	Ignore break character.

Table 6-6   Break character received by the partner modem while the modem is connected via a standard connection in data mode

AT\Kn	Effect
n = 0, 1	Delete buffer memory and immediately send a break character to the serial output.
n = 2, 3	Immediately send a break character to the serial output.
n = 4, 5	Send all stored data followed by a break character to the serial output.
n = 6	Ignore break character.

7 Configuration Help

7.1 Programming Connection for Phoenix Contact Controllers

If you wish to use the modem in conjunction with Phoenix Contact controllers, you will need a three-wire null modem cable. The pin assignment is as follows:

Modem	Controller
Pin 2	Pin 3
Pin 3	Pin 2
Pin 5	Pin 5

A modem cable (1:1) is required to connect the modem to the PC. The pin assignment is as follows:

Modem	PC
Pin 1	Pin 1
Pin 2	Pin 2
Pin 3	Pin 3
Pin 4	Pin 4
Pin 5	Pin 5
Pin 6	Pin 6
Pin 7	Pin 7
Pin 8	Pin 8
Pin 9	Pin 9

The interface on the PC must be set as follows:
– 9600 bps
– 8 data bits
– Even parity
– 1 stop bit

Configuration of the Modem

The modem must be configured as follows when connecting to Phoenix Contact controllers:

AT Command	Function
AT*F	Default setting
ATS0=1	Automatic call acceptance
AT&D0	Ignore DTR signal
AT&K0	No data flow control
ATW0	Only **CONNECT** message
ATX3	Dummy dialing

AT Command	Function
AT\N0	No error correction
ATE0	Echo off
AT&W0	Store

The interface on the PC must be set as follows:

– 9600 bps
– 8 data bits
– Even parity
– 1 stop bit

7.2 Programming Connection for Siemens S7 300/400

A TS adapter (Siemens Part No. 6ES7 972 - 0CA34-0XA0) is required to connect the PSI-DATA/FAX-MODEM/RS232 to the Siemens MPI interface. The programming connection is established using Siemens TeleService software.

A modem cable (1:1) is required to connect the modem to the TS adapter. The pin assignment is as follows:

Modem	TS Adapter
Pin 1	Pin 1
Pin 2	Pin 2
Pin 3	Pin 3
Pin 4	Pin 4
Pin 5	Pin 5
Pin 6	Pin 6
Pin 7	Pin 7
Pin 8	Pin 8
Pin 9	Pin 9

A modem cable (1:1) is required to connect the modem to the PG/PC. The pin assignment is as follows:

Modem	PG/PC
Pin 1	Pin 1
Pin 2	Pin 2
Pin 3	Pin 3
Pin 4	Pin 4
Pin 5	Pin 5
Pin 6	Pin 6
Pin 7	Pin 7
Pin 8	Pin 8
Pin 9	Pin 9

The interface on the PC must be set as follows:
– 9600 bps (or 38,400 bps)
– 8 data bits
– No parity
– 1 stop bit

The "19,200 bps default modem" can also be used by Windows as a modem driver.

Configuration of the Modem on the PG/PC

The modem must be configured as follows when connected to the PG/PC:

AT Command	Function
AT*F	Default setting
ATX3	Dummy dialing
AT&W0	Store

Configuration of the Modem at the TS Adapter

The initialization string that is already stored in the TS adapter can be initialized without modification. The following entries are preconfigured by Siemens:

AT Command	Function
AT*F	Default setting
E1	Echo on
L1	Low volume
M1	Speaker is on when establishing a connection
Q0	Confirmations on
V1	Word confirmations
&C1	DCD, if carrier detected
S0=1	Automatic call acceptance after one ring

The **+++ATH** command is used to disconnect (default for modem and TS adapter). The default transmission speed is 19,200 bps.