INSPIRING INNOVATIONS

INTERFACE

User Manual

UM EN PSI-DATA/BASIC-MODEM/RS232

Order No.: 2888699

Industrial Analog Modem

INTERFACE

User Manual
Industrial Analog Modem

08/2006

Designation: UM EN PSI-DATA/BASIC-MODEM/RS232

Revision: 01

Order No.: 2888699

This user manual is valid for:

Designation	Order No.
PSI-DATA/BASIC-MODEM/RS232	2313067

Please Observe the Following Notes

In order to ensure the safe use of the product described, we recommend that you read this manual carefully. 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.
– qualified application programmers and software engineers, who are familiar with the safety concepts of automation technology and applicable standards.

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The *note* symbol informs you of conditions that must strictly be observed to achieve error-free operation. It also gives you tips and advice on the efficient use of hardware and on software optimization to save you extra work.

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

1.1 Short Description

The DIN rail-mountable PSI-DATA/BASIC-MODEM/RS232 V.24 (RS-232) modem is specifically designed to meet industrial requirements for remote monitoring. It provides access to machines and systems anywhere in the world via dial-up line connections according to the V.34 standard. A wide range of security functions, such as connection establishment with password protection and callback function, protect the system against unauthorized access.

To ensure error-free operation even in harsh EMC conditions, the device has high-quality 3-way isolation and integrated surge protection. The modem also features an integrated automatic "Sleep" function to increase battery life and a wide supply voltage range of 10 V to 30 V, making it suitable for universal use.

Modem startup is very easy using plug and 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.

Features

- For universal use
- Password-protected access/callback function
- Wide supply voltage range of 10 V to 30 V DC
- Power-saving sleep mode
- High-quality three-way isolation (VCC // V.24 (RS-232) // PTSN)
- Slim design width of 22.5 mm
- Easy startup using plug and play and user-friendly configuration software
- 3964R-compatible

1.2 Application

The PSI-DATA/BASIC-MODEM/RS232 modem is suitable for universal and international use as an analog dial-up modem.

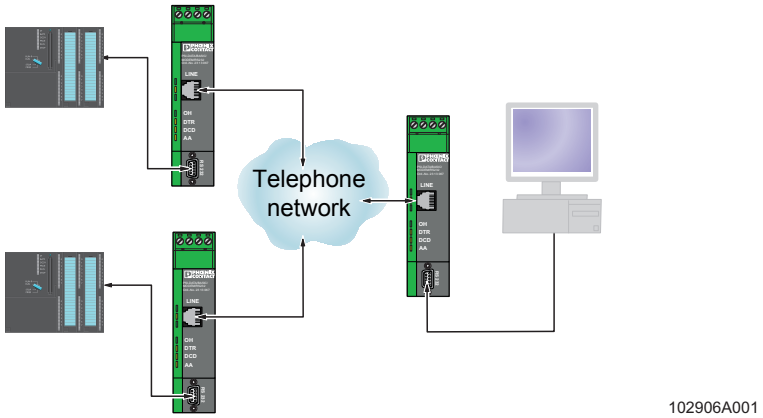


Figure 1-1 Dial-up operation

The following modem applications can be implemented:

– Remote monitoring of systems and machines
– Remote control
– Remote system diagnostics
– Production data acquisition

This device is approved for operation in the following public telephone networks:

– Austria
– Belgium
– Canada
– Denmark
– Finland
– France
– Germany
– Great Britain
– Greece
– Ireland
– Italy
– Luxembourg
– Norway
– Portugal
– Spain
– Sweden
– Switzerland
– The Netherlands
– USA

Approvals for other countries are available on request.

1.3 Ordering Data

Modem

Description	Type	Order No.	Pcs./Pck.
Industrial analog modem for mounting on EN DIN rails Scope of supply: Modem, CD with configuration software, manual, and RJ12/RJ12 cable	PSI-DATA/BASIC-MODEM/RS232	2313067	1

Accessories

Description		Type	Order No.	Pcs./Pck.
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
DIN rail connector, to supply power to the modem via the DIN rail bus		ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	2707437	50
V.24 (RS-232) cable, 2 m, to connect the modem to a 9-pos. device interface	9-pos. D-SUB/ 9-pos. D-SUB (female/female)	PSM-KA9SUB9/BB/2METER	2799474	1
V.24 (RS-232) cable, 0.5 m, to connect the modem to a 9-pos. device interface	9-pos. D-SUB/ 9-pos. D-SUB (female/female)	PSM-KA9SUB9/BB/0,5METER	2708520	1

1.4 Technical Data

Power Supply	
Supply voltage	10 V DC ... 30 V DC via COMBICON plug-in screw terminal
Frequency	DC
Current consumption	
Nominal operation	< 100 mA (at 24 V)
Sleep mode (can be configured via software)	< 40 mA (at 24 V)
Display	Green LED (VCC), steady light during operation

V.24 (RS-232) Interface	
Connection	9-pos. D-SUB pin strip
Device type	Data Communication Equipment (DCE)
Data format/encoding	Serial asynchronous UART/NRZ, 7/8 data, 1/2 stop, 1 parity, 10/11 bits character length
Data flow control/protocols	Software handshake Xon/Xoff, hardware handshake RTS/CTS or 3964R
Serial transmission speed	Automatic transmission speed detection for 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
Data indicator	Green LED (TD), data to modem (dynamic) Yellow LED (RD), data from modem (dynamic)
Control signal indicator	Yellow DTR LED, Data Terminal Ready Yellow DCD LED, Data Carrier Detect

PSTN Port (a/b Line)	
Connection	6-pos. RJ12
Shield	Via metal foot on EN DIN rail
Operating modes	Dial-up modem, 2-wire half/full duplex
Dialing procedure	Multiple frequency/pulse dialing, configuration via software
Transmission speed	Automatic adjustment according to V.8
DCE/DCE	300 baud ... 56 kbaud
Fax	2400 baud ... 14.4 kbaud
Compatibility	ITU V.42bis, V.42, V.92, V.90, V.34 extended, ITU V.32bis, V.32, V.21, V.22bis, V.22, V.23, ITU V.17
Command set compatibility	AT standard command set and extended V.250 basic command set
Error correction	V.42 (LAPM or MNP 2 to 4)
Data compression	V.42bis (throughput 4:1), MNP 5 (throughput 2:1)
Data indicator	Green LED (OH), off the hook Yellow LED (AA), automatic answer, flashes during selective call acceptance
Acoustic signal	Integrated piezo
Startup diagnostics	Selftest, visualization via LEDs (controller, RAM, EEPROM, DSP)
Telecommunications approvals	TBR21, TIA-968-A, CS-03 for Europe, USA, and Canada

Telephone Number Memory	
Telephone number memory	4 telephone numbers with a maximum of 36 digits

Tests/Approvals	
UL	In preparation
Telecommunications	TBR21, TIA-968-A, CS-03 for Europe, USA, and Canada

General Data	
Ambient temperature range (operation)	0°C ... +55°C
Housing	ME 22,5 with T-BUS and ground contact
Material	ABS-V0, green
Dimensions (H x W x D)	99 mm x 22.5 mm x 114.5 mm
Weight	165 g
Functional earth ground	To EN DIN rail in the housing
Vibration resistance	5g according to DIN EN 60068-2-6, 1.5 h each in x, y, and z direction
Shock test according to IEC 60068-2-27	
Operation	15g, 11 ms, half-sine shock pulse
Storage	30g, 11 ms, half-sine shock pulse
Free fall according to IEC 60068-2-32	1 m
Degree of protection	IP20
3-way electrical isolation	Supply // PSTN // V.24 (RS-232)
Test voltage	1.5 kV AC, 50 Hz, 1 min. between all ground levels according to EN 61010-1/VDE 0411-1 and EN 60950

Conformance With EMC Directive 89/336/EEC

Noise Immunity Test According to EN 61000-6-2[1]

Electrostatic discharge (ESD)	EN 61000-4-2	Criterion B[2]	8 kV air discharge 6 kV contact discharge
Electromagnetic HF field	EN 61000-4-3	Criterion A[3]	
Amplitude modulation			10 V/m
Pulse modulation			10 V/m
Fast transients (burst)	EN 61000-4-4		
Signal		Criterion B[2]	2 kV/5 kHz 1 kV/5 kHz
Supply		Criterion A[3]	2 kV/5 kHz
Surge current load	EN 61000-4-5	Criterion B[2]	
Signal			1 kV
Supply			2 kV
Conducted interference	EN 61000-4-6	Criterion A[3]	10 V

Noise Emission Test According to EN 61000-6-4

Noise emission of housing	EN 55022		Limiting curve B

1 EN 61000 corresponds to IEC 61000

2 Criterion B: Temporary adverse effects on the operating behavior, which the device corrects automatically.

3 Criterion A: Normal operating behavior within the specified limits.

2 Quick Startup of a Dial-Up Line Connection

Quick startup refers only to a standard dial-up connection.

2.1 Hardware Installation

2.1.1 Default Configuration

The modem is preconfigured to dial-up line operation with automatic data rate detection and automatic call acceptance by default upon delivery.

2.1.2 Mounting

Only mount devices when the power supply is disconnected.

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

The DIN rail must be connected to PE to ensure safe operation.

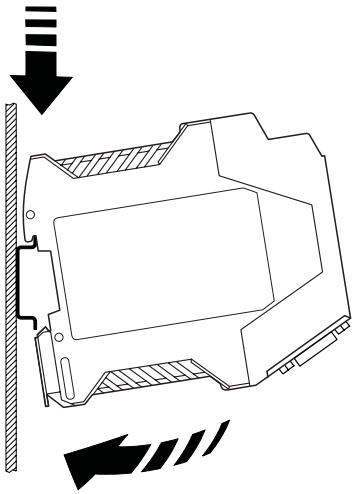


Figure 2-1 Mounting

Electrical connection

Only qualified personnel may connect the power, 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 V.24 (RS-232) Interface

The modem and the computer or another device are connected via the PSM-KA-9SUB9/BB/... V.24 (RS-232) cable (see Section 1.3, "Ordering Data"). The cable is an interface cable with 1:1 connected contacts.

The modem may 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.

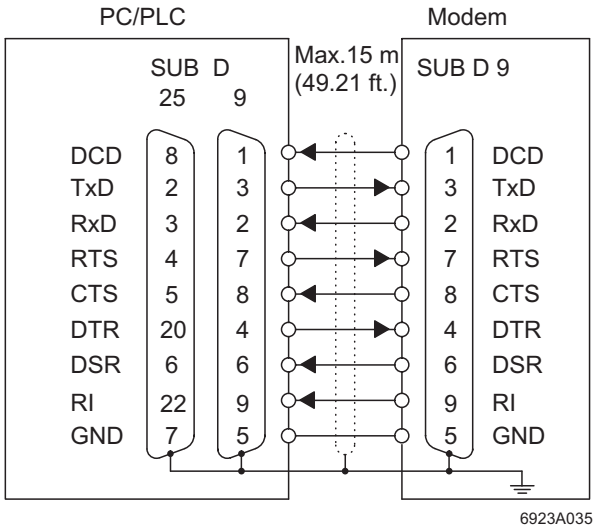


Figure 2-2 V.24 (RS-232) interface

2.1.4 Connecting the Telecommunications Cable

RJ12/RJ11 connector

Connect the telecommunications cable to an RJ12/RJ11 connector on the front of the device. Signals "a" and "b" are assigned to the middle pins, 3 and 4.

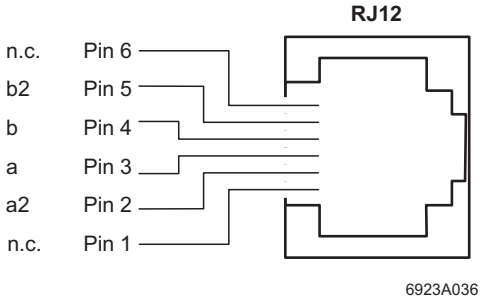


Figure 2-3 Connection using an RJ12/RJ11 connector

2.1.5 Supply Voltage

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

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

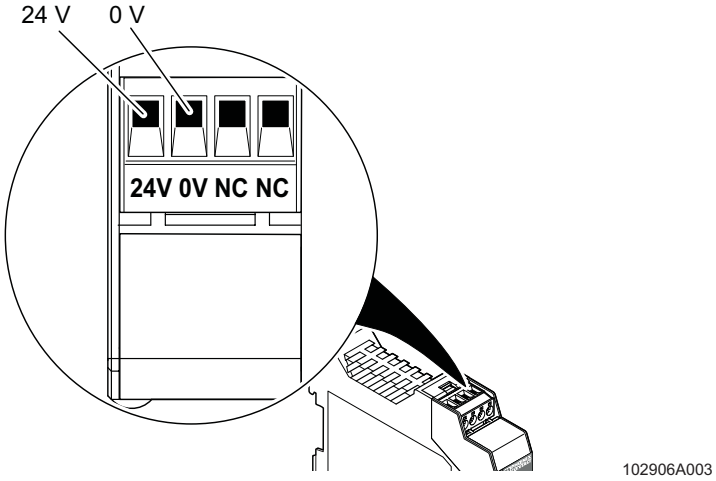


Figure 2-4 Connecting the supply voltage

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 V.24 (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 and play function:

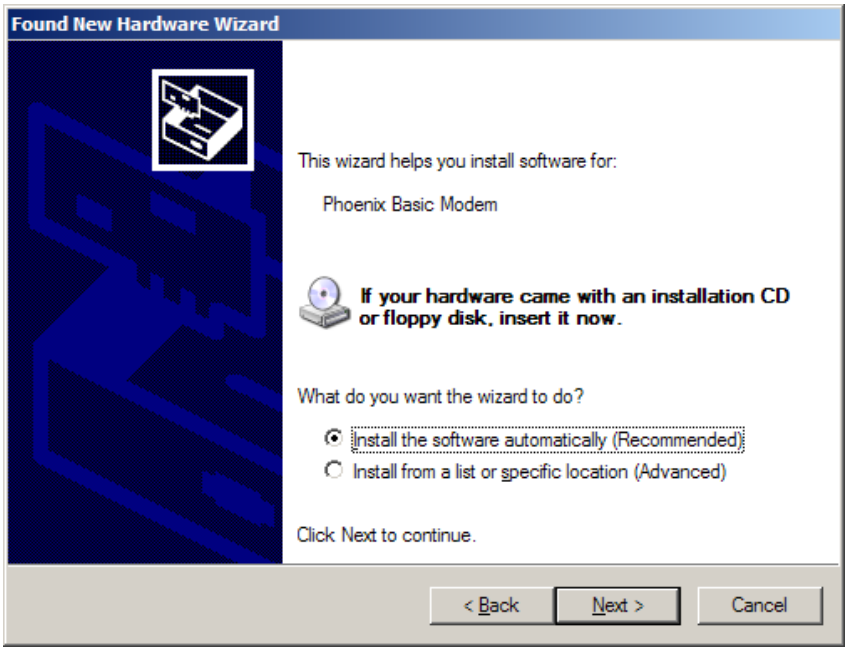
Windows 95, Windows 98, Windows 2000, Windows NT, Windows ME or Windows XP.

The installation procedure for the driver varies depending on the operating system. In the following, driver installation under Windows XP is described as an example. During installation, please always follow the on-screen instructions.

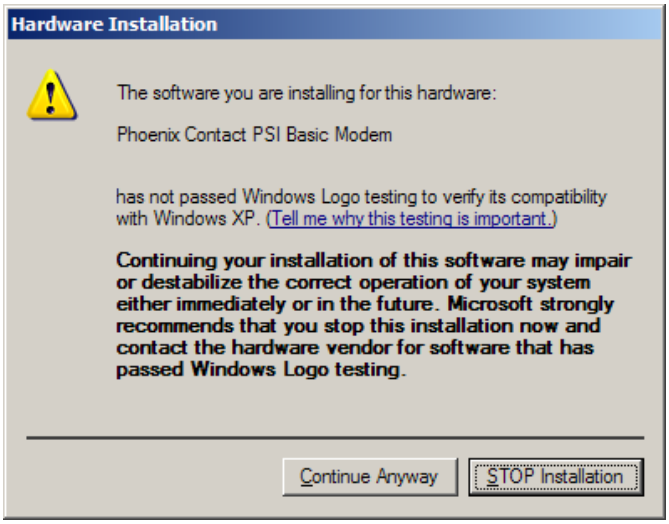
2.2.2 Driver Installation

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

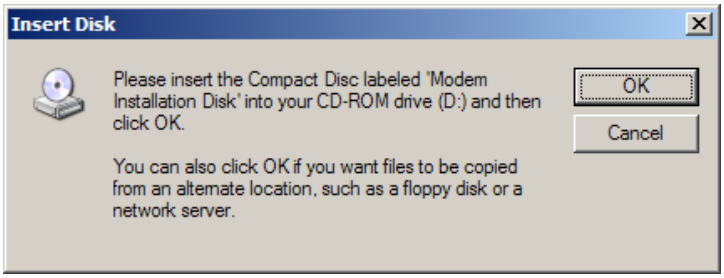
- Select "No, not this time" and click "Next".



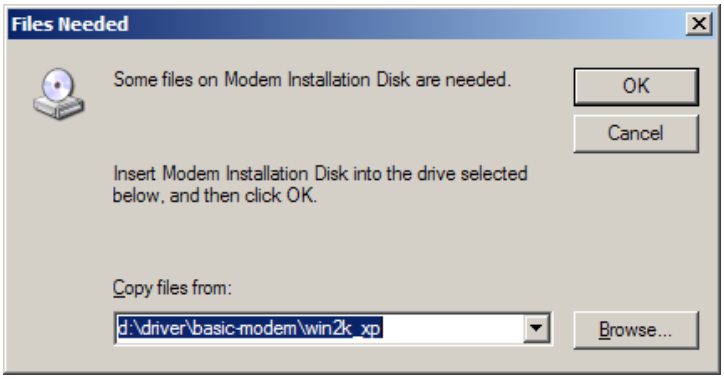
- Insert the "PSI-MODEM-CONF" CD provided in the drive.
- Select "Install the software automatically (Recommended)" and click "Next".



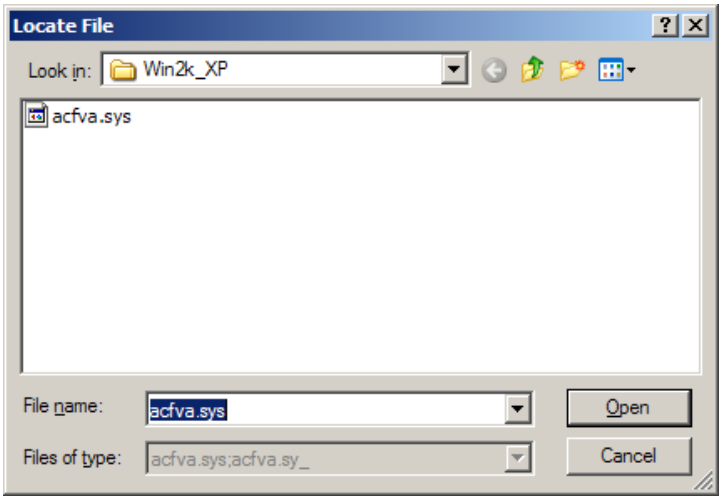
- Click on "Continue Anyway". Contrary to the message displayed, this will in no way affect the operation of the software or your computer.



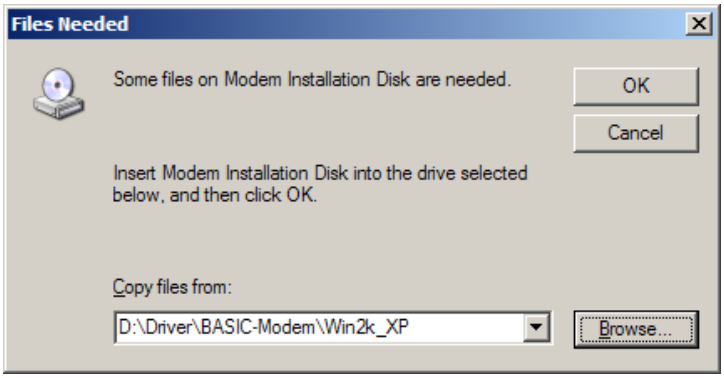
- Insert the "PSI-MODEM-CONF" CD in the corresponding drive and confirm with "OK".



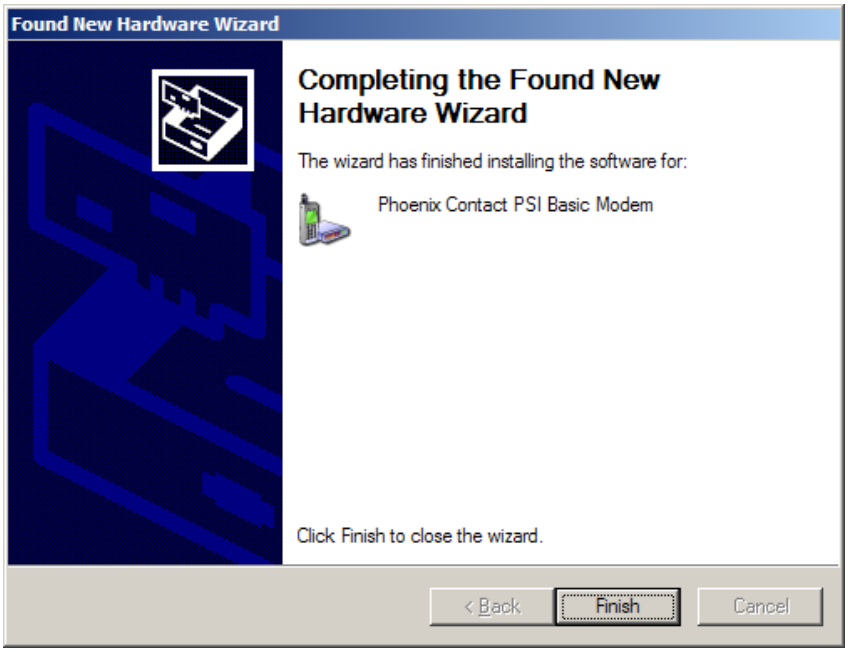
- Select "Browse".



- Click on "acfva.sys" and confirm your selection with "Open".



- Confirm with "OK".



- Click "Finish" to complete the installation.

The driver has now been installed and the modem is available to application programs, e.g., the dial-up network.

3 Hardware Installation

3.1 Structure

Dimensions

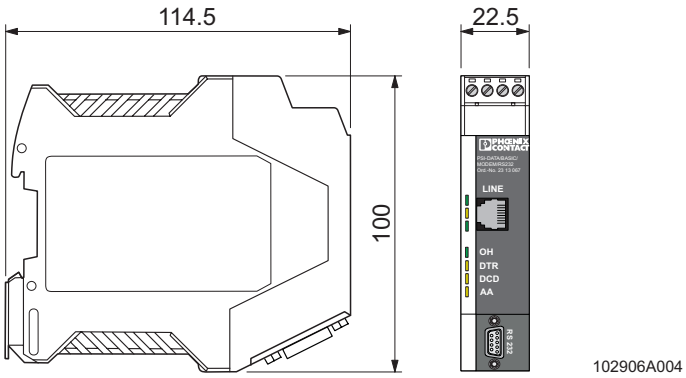


Figure 3-1 Dimensions (in mm)

Only mount devices when the power supply is disconnected.

- Mount the modem on a 35 mm EN DIN rail (see Figure 3-2).

The DIN rail must be connected to PE to ensure safe operation.

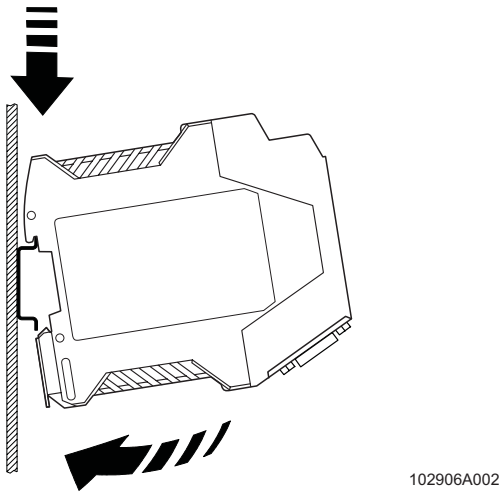


Figure 3-2 Mounting

3.2 Operating Elements

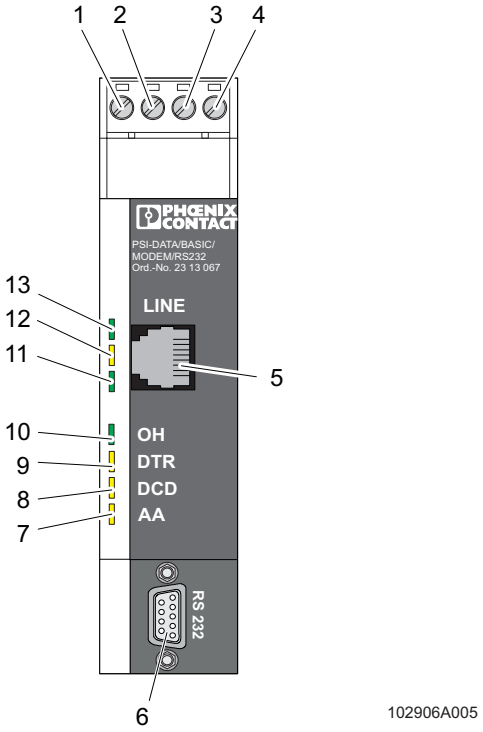


Figure 3-3 Operating elements

3.2.1 Connection Terminal Blocks

1 24 V supply (10 V DC ... 30 V DC)

2 0 V supply (0 V)

3 Not used

4 Not used

3.2.2 Connectors

5 Line, RJ12 (telecommunications connection)

6 V.24 (RS-232) data interface, 9-pos. D-SUB

3.2.3 LEDs

7	AA	(Yellow)	Automatic answer (automatic call acceptance), flashes during selective call acceptance
8	DCD	(Yellow)	Data carrier detected, connection established with partner
9	DTR	(Yellow)	Connected device is ready (e.g., PC or PLC)
10	OH	(Green)	Off the hook
11	TD	(Green)	Transmit data with reference to the PSTN (telecommunications) connection
12	RD	(Yellow)	Receive data with reference to the PSTN (telecommunications) connection
13	VCC	(Green)	Supply voltage is present

3.3 Electrical Connections

Electrical connection

Only qualified personnel may connect the power, 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

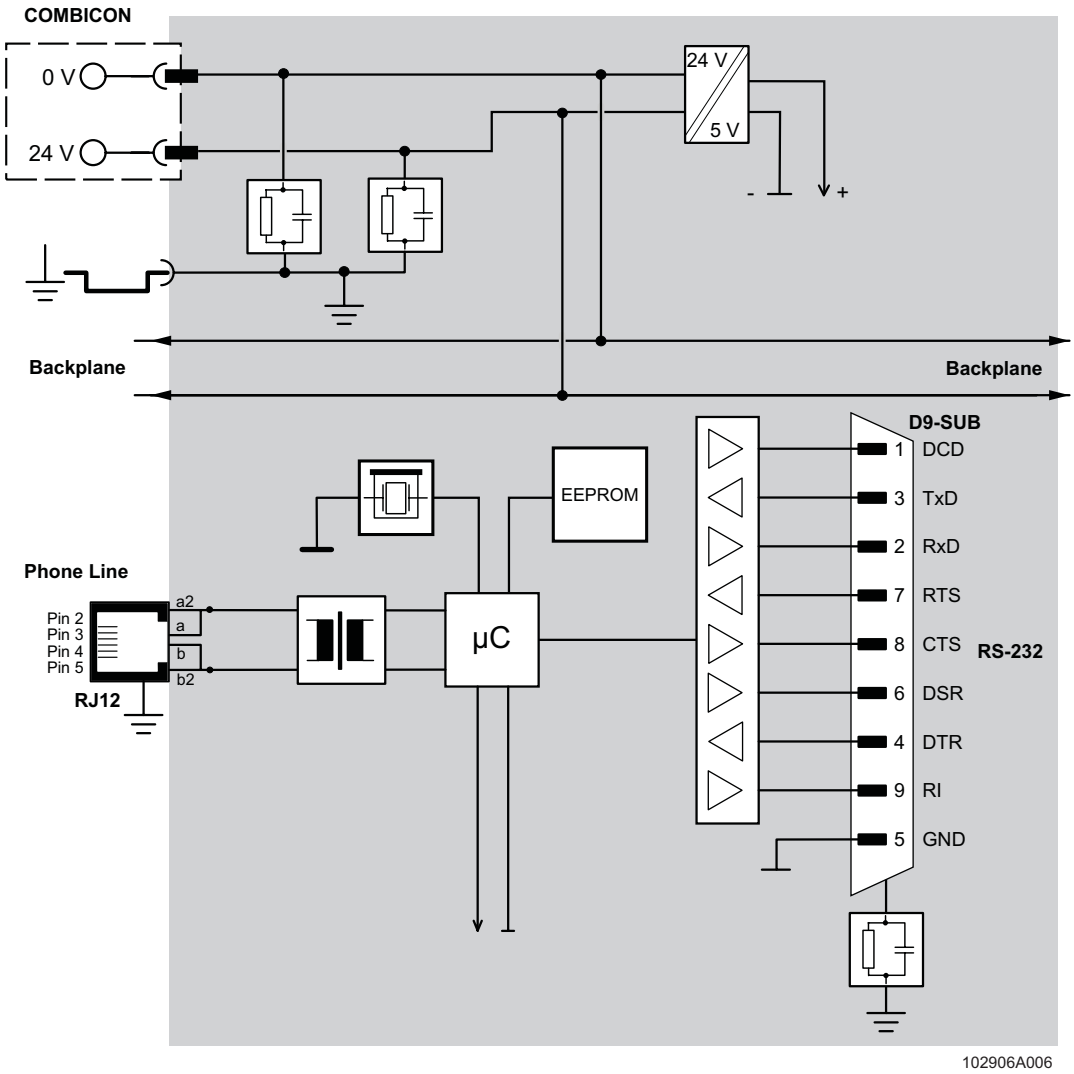


Figure 3-4 Block diagram

3.3.2 V.24 (RS-232) Interface

The modem and the computer or another device are connected via the PSM-KA-9SUB9/BB/... V.24 (RS-232) cable (see Section 1.3, "Ordering Data"). The cable is an interface cable with 1:1 connected contacts.

- Use the 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 correct 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.

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

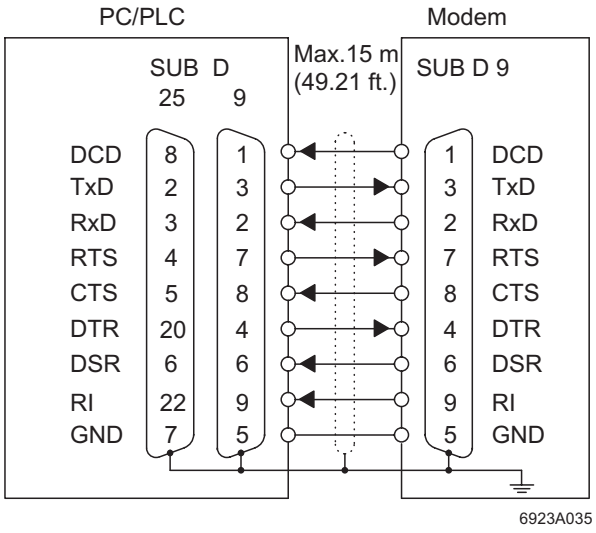


Figure 3-5 V.24 (RS-232) interface

Table 3-1 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

RJ12/RJ11 connector

Connect the telecommunications cable to an RJ12/RJ11 connector on the front of the device. Signals "a" and "b" are assigned to the middle pins, 3 and 4.

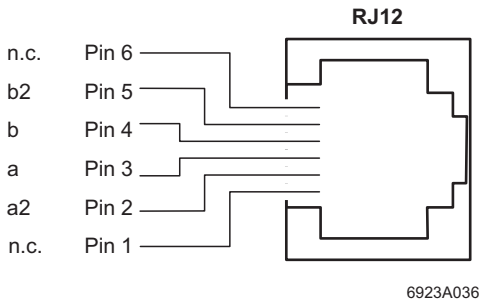


Figure 3-6 Connection using an RJ12/RJ11 connector

3.3.4 Supply Voltage

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

The supply voltage must be between 10 V and 30 V DC.

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

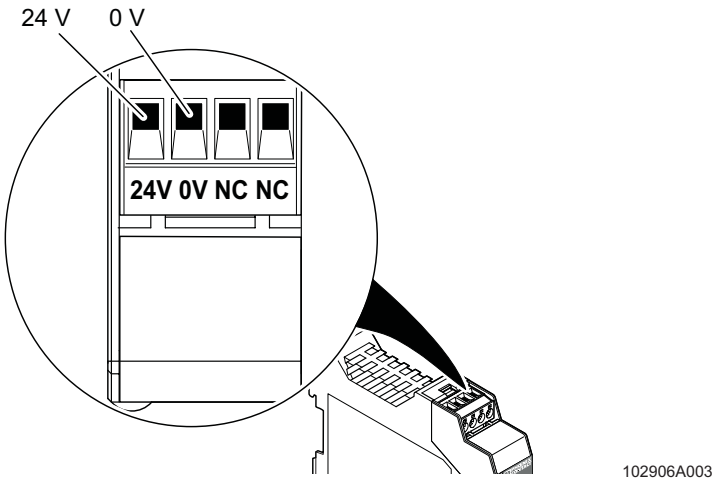


Figure 3-7 Connections

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

4 Software Installation

4.1 System Requirements

In principle, any device can be connected to the modem via a free V.24 (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 and play function:

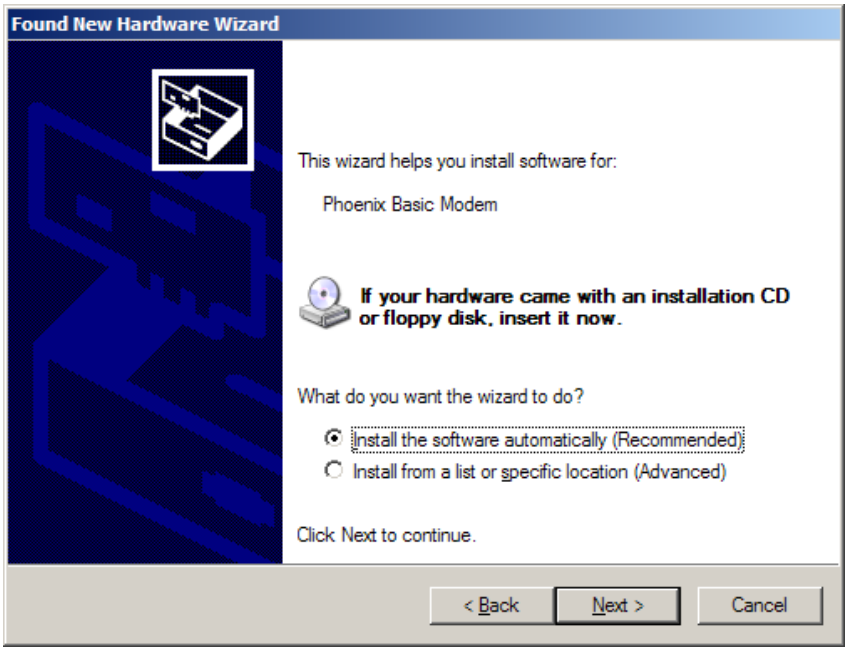
Windows 95, Windows 98, Windows 2000, Windows NT, Windows ME or Windows XP.

The installation procedure for the driver varies depending on the operating system. In the following, driver installation under Windows XP is described as an example. During installation, please always follow the on-screen instructions.

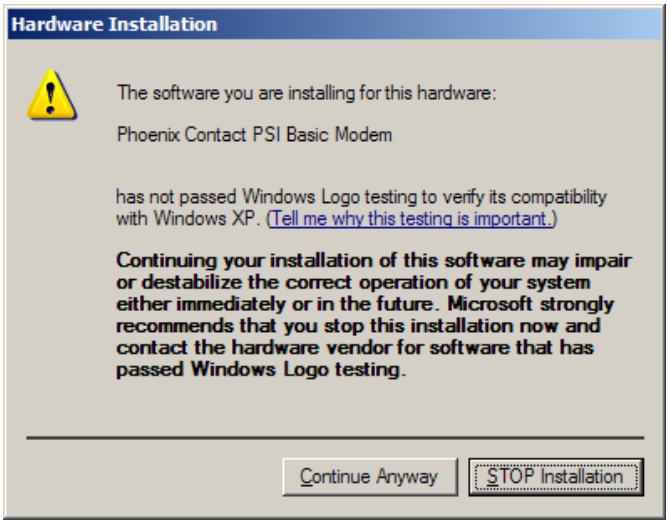
4.2 Driver Installation

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

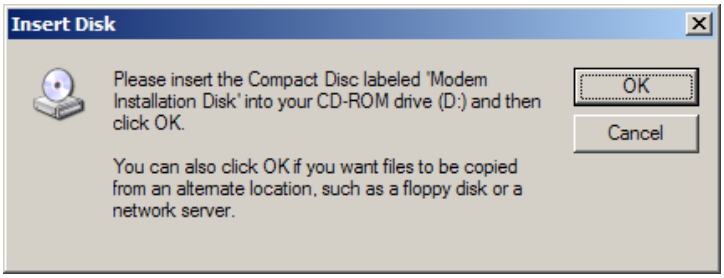
- Select "No, not this time" and click "Next".



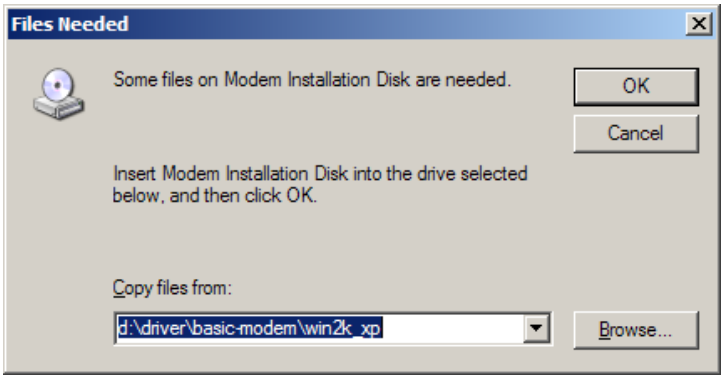
- Insert the "PSI-MODEM-CONF" CD provided in the drive.
- Select "Install the software automatically (Recommended)" and click "Next".



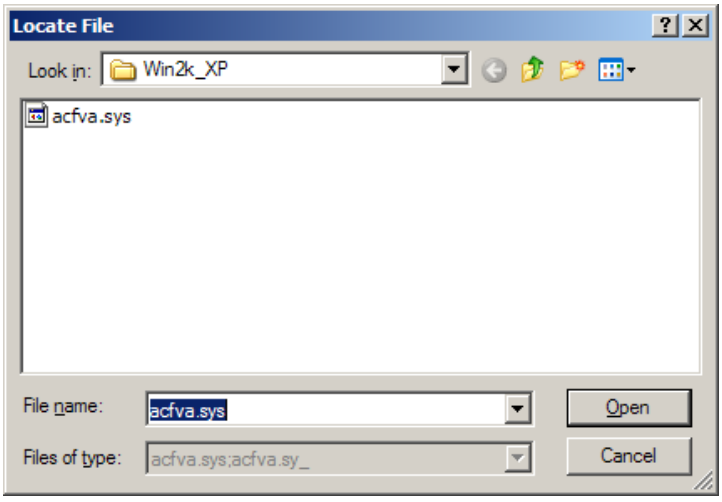
- Click on "Continue Anyway". Contrary to the message displayed, this will in no way affect the operation of the software or your computer.



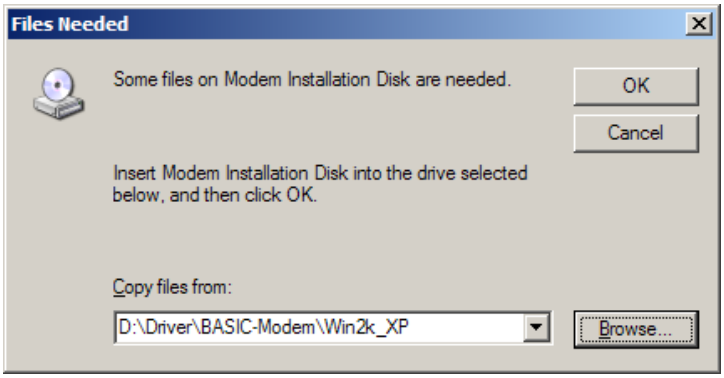
- Insert the "PSI-MODEM-CONF" CD in the corresponding drive and confirm with "OK".



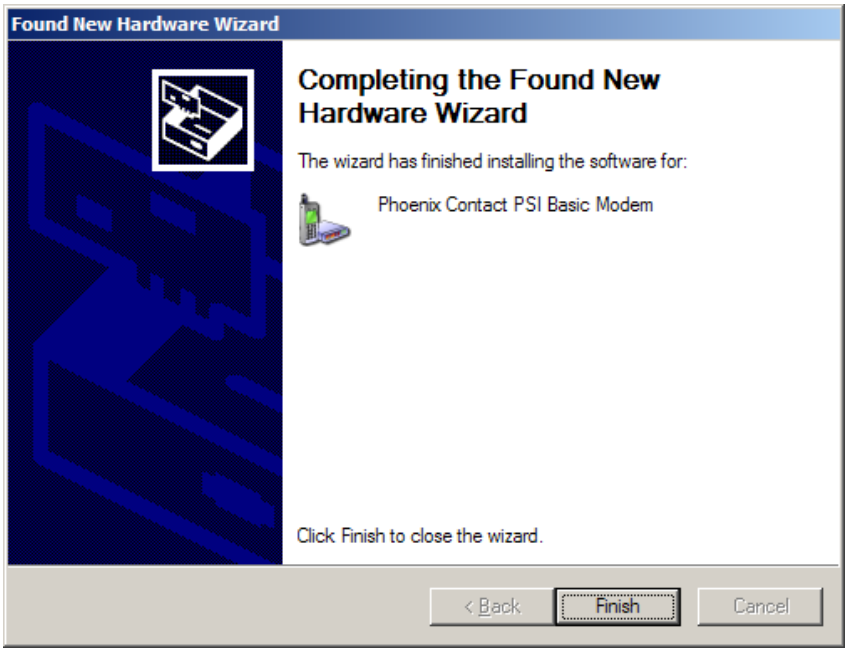
- Select "Browse".



- Click on "acfva.sys" and confirm your selection with "Open".



- Confirm with "OK".



- Click "Finish" to complete the installation.

The driver has now been installed and the modem is available to application programs, e.g., the dial-up network.

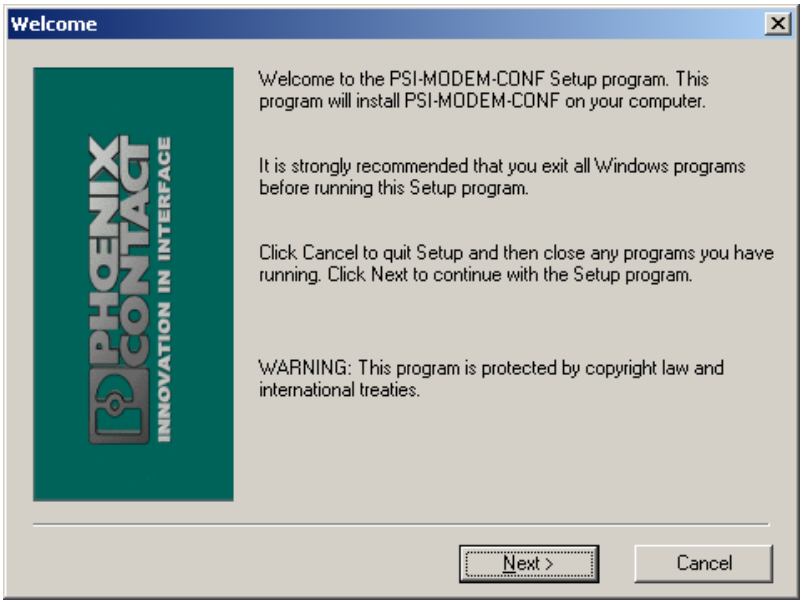
4.3 Configuration Software

The PSI-MODEM-CONF software is used to configure the PSI-DATA/BASIC-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 "Command Descriptions" on page 6-2.

4.3.1 Installation

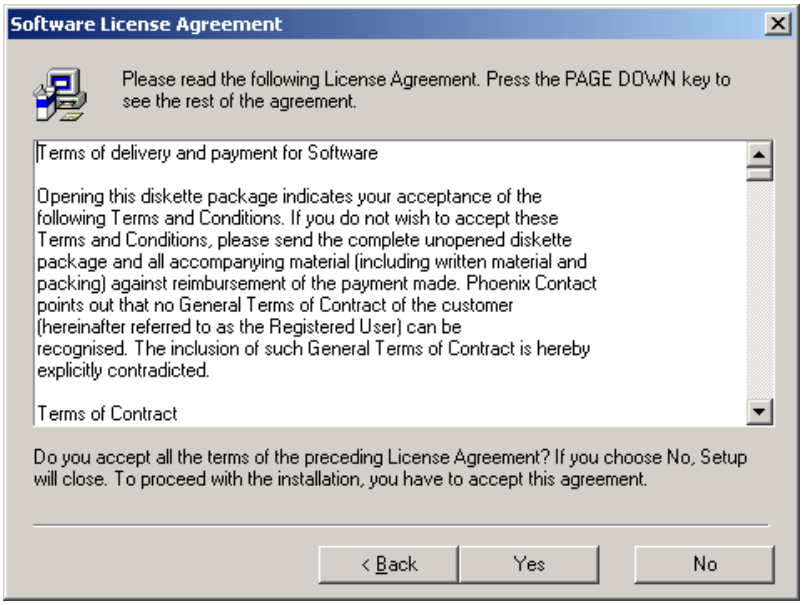
- Insert the CD labeled "PSI-MODEM-CONF" in the CD-ROM drive on your computer.
- Use Windows Explorer to start the "Setup_Vx.x.xxx.exe" file located in the "...:\PSI-CONF" directory.

Starting installation



- Close all other applications and click "Next".

Accepting the terms of the license agreement

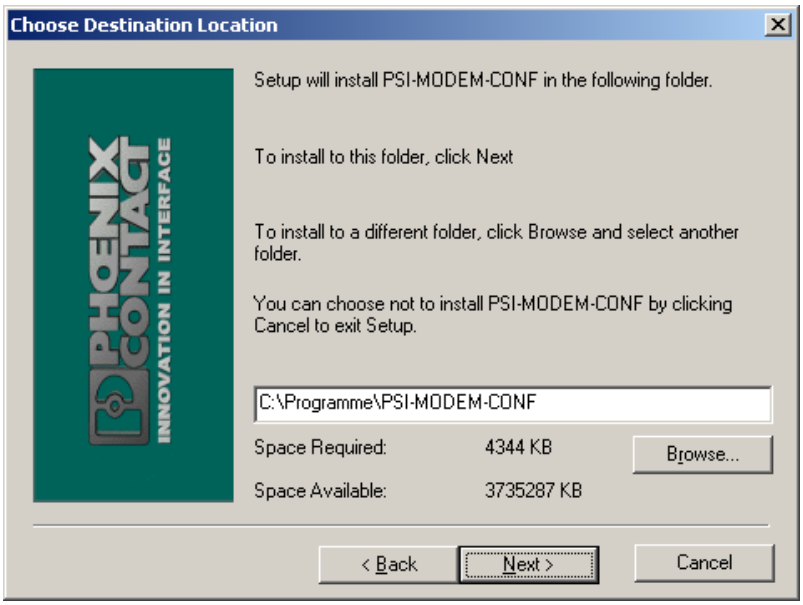


- Read the terms of the software license agreement thoroughly and click "Yes" to accept them.

You may now select a specific installation folder.

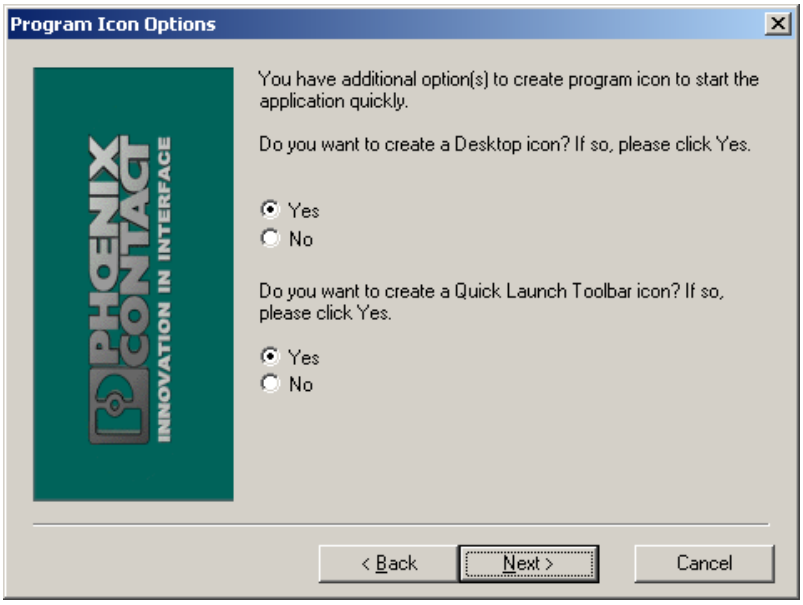
The default setting is "C:\Program Files\PSI-MODEM-CONF".

Selecting an installation folder



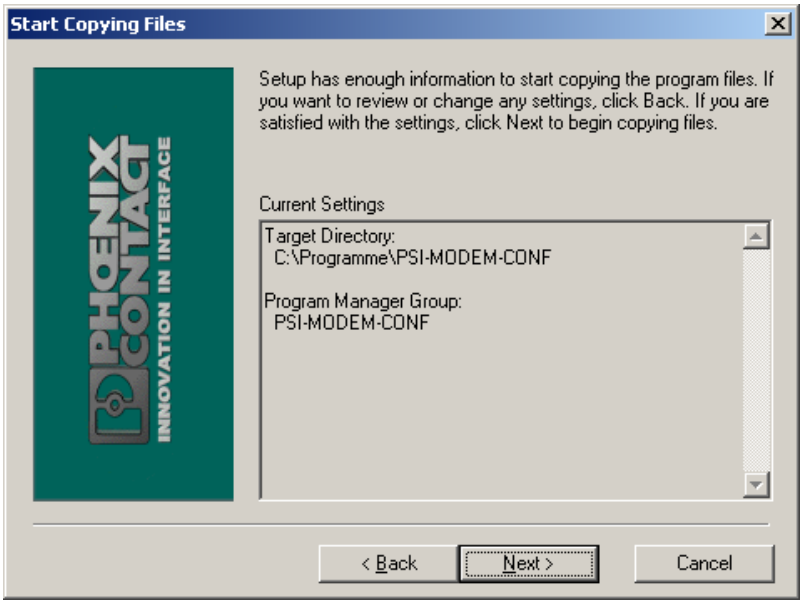
- If necessary, select a different folder and click "Next".

Selecting shortcuts



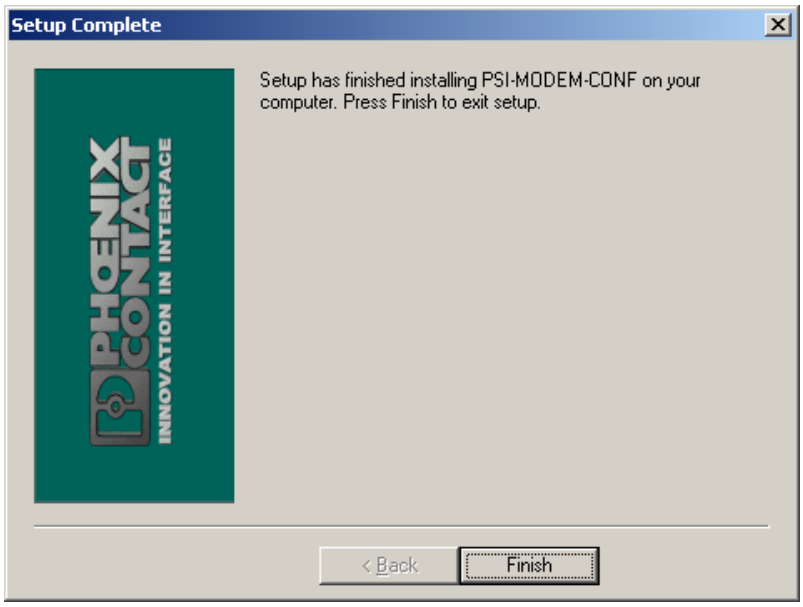
- For full installation, select "Yes" for both options.
- Experienced users can select "No" so that no shortcuts are created on the desktop or in the Start menu.

Start copying



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

Finishing installation



- Exit setup by clicking "Finish".

4.3.2 Operation

After installation the following shortcut will appear on your desktop:

Starting the software

Double-click on this icon to start the PSI-MODEM-CONF configuration software.

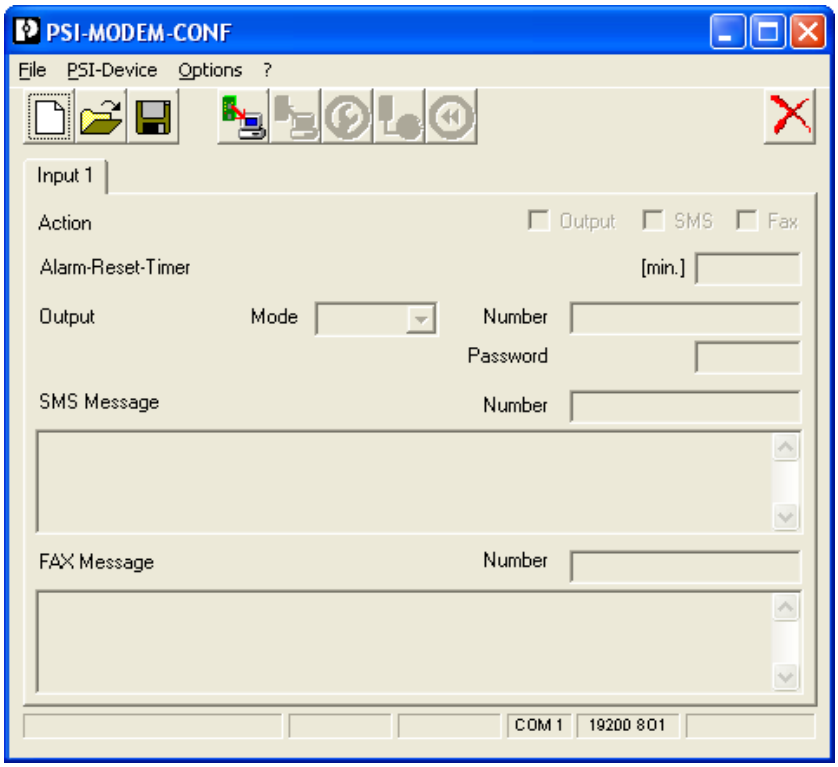


Figure 4-1 PSI-MODEM-CONF configuration software

Select language

You can set the language to English or German in the "Options" menu item.

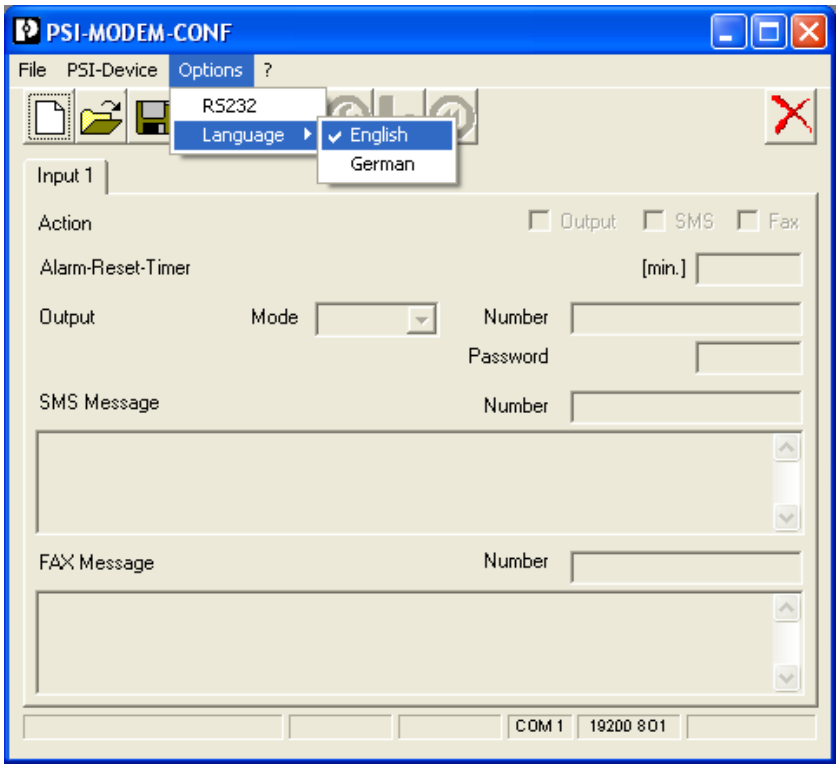
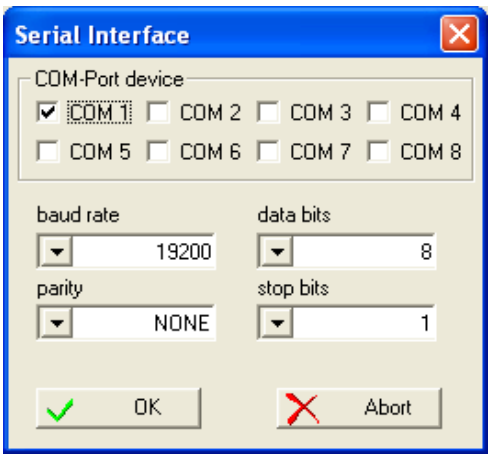


Figure 4-2 Select language

Configuring the interface

First, you must configure the interface.

- Select the "RS232" function in the "Options" menu.
- Select the interface to which your modem is connected.



- Adjust the parameters according to your application requirements.
- Apply the settings by confirming with "OK".
- Click on the "Write" button to write the settings to the modem.

- Click on the "Read" button to read data from the connected modem.

The software displays the modem type and firmware version.

File Functions

Creates a new project file with the default settings.

Opens a saved project file.

Saves the current settings.

Configuration Profile

Click on the "Settings" button .

This opens the "Basic Modem Configuration" window.

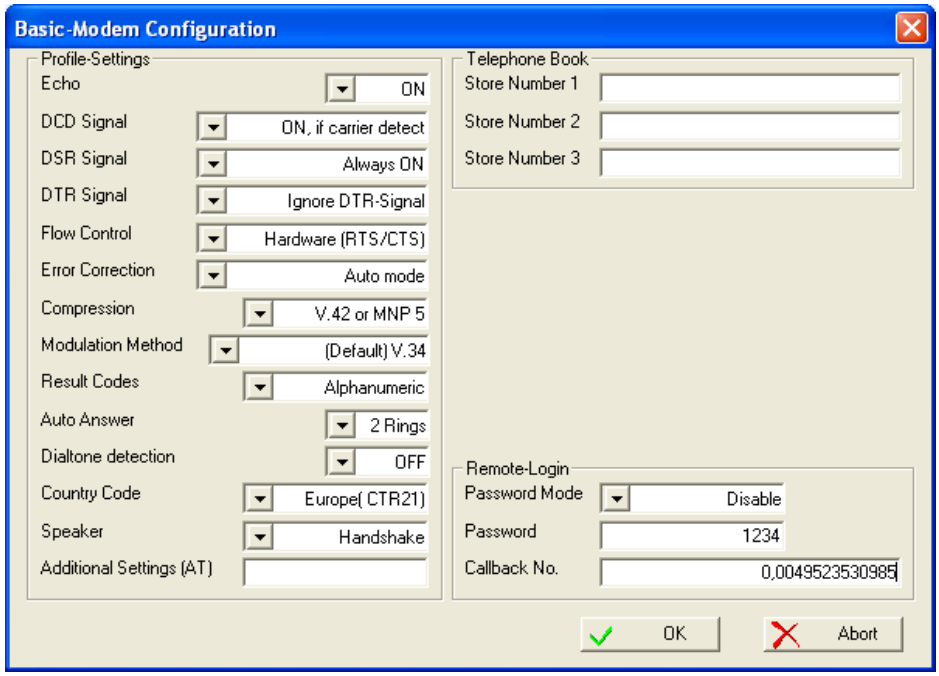


Figure 4-3 "Basic Modem Configuration" window

Echo

If the echo is on, all characters sent by the computer in command mode are sent back by the modem. The characters can thus be displayed on screen on the computer.

DCD Signal

When the partner carrier detect signal is detected, the V.24 (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 V.24 (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 V.24 (RS-232) interface.
– The modem hangs up and returns to command mode if there is no DTR signal at the V.24 (RS-232) interface.
– The modem hangs up, is reset, and returns to command mode if there is no DTR signal at the V.24 (RS-232) interface.
– The modem ignores the DTR signal. This may be necessary when using a PLC, as the V.24 (RS-232) interface of a PLC is often unable to provide a DTR signal.

Flow Control

The data flow control of the V.24 (RS-232) interface can be set for various operating modes:

– For the "Hardware" setting, the CTS and RTS signals are used for 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 computer (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 computer.
– 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.

Error Correction

When error correction is switched on, any transmission errors are corrected automatically by the modem. For this, error correction must be activated on the transmitting and receiving modem. Some protocols, such as 3964R, must not be transmitted with error correction.

Compression

Data compression on the telecommunications cable results in increased data throughput. For this, data compression must be activated on the transmitting and receiving modem. Some protocols, such as 3964R, must not be transmitted with data compression.

Modulation Method

You can specify the transmission method of your modem (default: CCITT).

Table 6-1 on page 6-17 shows how the various settings work.

Result Codes

Your modem is configured so that it outputs alphanumeric responses on the 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 6-18.

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.

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

Dialtone 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 a 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 (AT)

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 "Command Descriptions" on page 6-2.

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

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

Telephone Book

You can store three telephone numbers in Store Numbers 1 through 3, 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.

Remote Login

Password Mode

When password mode is **active**, 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.

When password mode is **active with callback** the caller is 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 **Callback No.** The modem has three attempts to establish a connection with the callback number.

Automatic call acceptance must be activated for all password-protected functions.

Password

Enter your password here.

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.

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

5 Password Protection

This section describes password protection using AT commands. For information about password protection using the PSI-MODEM-CONF configuration software, refer to page 4-16.

5.1 Selecting a Password

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 callback number
AT%S1	Activate password protection with callback
ATS0=1	Enable automatic call acceptance

– ***P=x** command

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?** command

Display stored password

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

Your modem has a built-in security function, which can be activated when your modem is in auto answer mode (see page 6-12).

5.2 Deactivating Password Protection

The **%S0** command deactivates password-protected callback (see "Password-Protected Callback" on page 5-2). By default upon delivery, password protection is deactivated.

5.3 Password-Protected Callback

The **%S1** command activates password-protected callback. 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 callback number.

5.4 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.

Automatic call acceptance must be activated for all password-protected functions (see "S Registers" on page 6-11).

6 AT Commands

Your modem stores its operating characteristics in a non-volatile memory (EEPROM). You can overwrite these characteristics 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.

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 lowercase, but not a mixture of the two. Spaces may be inserted between the commands so that the command lines are easier to read.

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**.

Correct 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.

Repeat the Previous Command

You can instruct your modem to repeat the previous 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 computer or terminal to your modem.

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 previous 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.

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 the CCITT or Bell Transmission Method

The **B** command can be used to operate your modem in Bell and/or CCITT mode. This command is only relevant for transmission speeds from 300 to 1200 bps. For all other speeds, only CCITT modulation is used.

B0 Use CCITT modulation

B1 Use Bell modulation

D **Dial**

The **D** command instructs your modem to dial a number. Enter the number that you 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, which is standard in Germany. 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** modifier 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 6-13).

@ **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 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 **Redial**

The last dialed telephone number is redialed.

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

The **DS=n** command instructs the modem to dial one of four telephone numbers, where **n** is a value between 0 and 3. 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 computer screen in command mode (echo). This feature can only be used if your computer 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 you 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.
- **H1** The line is occupied by the modem (only required for test purposes).

I **Identification**

- **I0** Display the ID number for your modem (e.g., 56000).
- **I1** Display the ROM checksum for your modem (e.g., 255).
- **I2** Output an OK message.
- **I3** Display the fixed ID code.
- **I4** Display the variable ID code.
- **I5** Display the country code (see +GCI).
- **I6** Display the data pump version.
- **I7** Output an OK message.

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** Completely new adjustment with speed modification after returning to data mode.
- **O2** Quick adjustment without speed modification after returning to data mode.
- **O3** Adjustment without speed modification after returning to data mode.
- **O4** Adjustment by decreasing the speed (Fall Backward) after returning to data mode.
- **O5** Adjustment by increasing the speed (Fall Forward) 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 you 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 of confirmations on your screen.
- **Q1** Disable confirmations. This may be necessary, e.g., if a PLC is connected to your modem and responses would interfere.

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 6-11).

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 (computer speed).

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

W1 Enable additional confirmations and display the DCE speed.
E.g.,
+MCR: V34
+MRR: 33600
+ER: LAPM
CONNECT 115200

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

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 V.24 (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 Return to command mode if the modem detects a falling edge on the DTR line.

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

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

The **&Q** command influences the function of the **&D** command.

&F **Factory Configuration**

The **&F** command (default) restores the factory settings with enabled hardware flow control.

&K **Set DTE Flow Control**

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

&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 computer or terminal. The RTS signal controls data transmission to the computer.

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

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

&K5 Select transparent data flow control (**XON/XOFF**).

&Q **Connection Mode**

The &Q command is preset automatically, and should not be modified.
Otherwise, the &Q command can affect the function of the &D command.

&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 deactivated when the carrier detect signal is lost.

&V **Display Configuration Profiles**

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

This command cannot be activated when the modem is online.

&W **Save Active Configuration**

This command saves the active configuration in the permanent memory.

&W0 Save the active settings as configuration profile 0.

&W1 Save the active settings as configuration profile 1.

&Y **Select Active Profile**

The **&Y** command specifies which saved 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) (31 digits, maximum) in the permanent memory of the modem. Your modem can store up to four telephone numbers (n = 0 through 3).

%S **Callback Security**

%S0 Disable callback security.

%S1 Enable callback security with password validation.

%S2 Enable password validation.

***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.

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

The modem can establish a data connection via LAPM (**L**ink **A**ccess **P**rocedure for **M**odems) (V.42bis) or MNP (**M**icrocom **N**etworking **P**rotocol).

%C **Data Compression (V.42bis/MNP 5)**

%C0 Disable data compression.

%C1 Use MNP-5 compression.

%C2 Use V.42bis compression.

%C3 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.

\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 ms.

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

\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 memory.
– Delayed disconnection
  The break character is transmitted once the data in the buffer memory has been sent.

"Processing the Break Character" on page 6-20 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 and speed buffering).
- **\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.

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

+DR **Confirmation for Data Compression**

The **+DR** command enables extended confirmation for data compression.

- **+DR=1** Enable confirmation.
- **+DR=0** Disable confirmation.
- **+DR?** Request setting.

The confirmations are described in Table 6-2 on page 6-18.

+GCI **Country ID**

The **+GCI** command sets the country ID for the modem. If your country is not listed, use "+GCIB5" (default).

- **+GCI09** Australia
- **+GCI16** Brazil
- **+GCI20** Canada
- **+GCI42** Europe
- **+GCIB5** USA

+GCI? **Request Country ID**

Indicates the set country ID.

+MS

Modulation Method

The **+MS** command sets the modulation method for the modem.
+MS=Modu, Auto, MinSend, MaxSend, MinRec, MaxRec

Modu=	Modulation method (for possible values, see Table 6-1 on page 6-17).
Auto=0	Only use specified modulation type.
Auto=1	Automatic adjustment of the modulation type.
MinSend=	Lowest baud rate for sending data (see Table 6-1).
MaxSend=	Highest baud rate for sending data (see Table 6-1).
MinRec=	Lowest baud rate for receiving data (see Table 6-1).
MaxRec=	Highest baud rate for receiving data (see Table 6-1).

Example:

AT+MS=V34,1,9600,33600,9600,33600

Preferably, V.34 modulation should be used here. If V.34 is not possible, another modulation type is used (automatic adjustment of the modulation type). To send and receive, a minimum of 9600 bps and a maximum of 33600 bps should be used.

6.3 S Registers

Your modem has 211 registers (S0 through S210). These registers influence the operating characteristics of the modem, send you 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 you 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 210)

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 210)
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 call acceptance).

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 return 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

(Any ASCII value between 0 and 32 can be used.)

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: 2 seconds

S7 **Wait for the Carrier Detect Signal from the Dialed Modem**

Register S7 defines how many seconds your modem should wait for the carrier detect signal from the dialed 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.)

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 from the dialed 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 ms

(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 from the dialed 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 from the dialed 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 ms

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

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

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

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 ms

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 ms (1/50 s).

Default: 50 (1 s)

(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 - 20 **Reserved**

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 indicates the status of the monitoring tone.

S24 **Energy-Saving Mode (Sleep Timer)**

This register indicates the time in seconds after which the modem switches to energy-saving mode. As soon as an activity is detected on the telephone line or on the serial interface, the modem exits energy-saving mode.

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 s

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 s in 10 ms intervals.

Default: 10 ms

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.

S29 **Reserved**

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 min

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

S31 to S90 **Reserved**

S91 **Transmit Level for Fax Mode**

This register controls the transmit level for permanent line operation. The values for this register are between 0 and 15 in negative dBm intervals.

Default: -10 dBm

S92 **Transmit Level for Modem Mode**

This register controls the transmit level for permanent line operation. The values for this register are between 0 and 15 in negative dBm intervals.

Default: -10 dBm

S93 to S210 **Reserved**

6.4 Modulation Commands

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

Table 6-1 Modulation commands

AT Command	Modulation	Possible Transmission Speeds in bps
+MS=B103	Bell 103	300
+MS=B212	Bell 212	1200 Rx/75 Tx or 75 Rx/1200 Tx
+MS=V21	V.21	300
+MS=V22	V.22	1200
+MS=V22B	V.22bis	2400 or 1200
+MS=V23	V.23	1200
+MS=V32	V.32	9600 or 4800
+MS=V32B	V.32bis	14400, 12000, 9600, 7200 or 4800
+MS=V34	V.34	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800 or 2400
+MS=V90	V.90	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 2800
+MS=V92	V.92 downstream	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 2800
+MS=V92	V.92 upstream	48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 2800

6.5 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 from the dialed 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
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 600	1,2,3,4	9	600 bps connection established
CONNECT 1200	1,2,3,4	5	1200 bps connection established
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	12000 bps connection established
CONNECT 14400	1,2,3,4	15	14400 bps connection established
CONNECT 16800	1,2,3,4	59	16800 bps connection established
CONNECT 19200	1,2,3,4	16	19200 bps connection established
CONNECT 21600	1,2,3,4	61	21600 bps connection established
CONNECT 24000	1,2,3,4	62	24000 bps connection established
CONNECT 26400	1,2,3,4	63	26400 bps connection established
CONNECT 28800	1,2,3,4	64	28800 bps connection established
CONNECT 31200	1,2,3,4	91	31200 bps connection established
CONNECT 33600	1,2,3,4	84	33600 bps connection established
CONNECT 38400	1,2,3,4	17	38400 bps connection established
CONNECT 57600	1,2,3,4	18	57600 bps connection established
CONNECT 115200	1,2,3,4	19	115200 bps connection established
CONNECT 1200TX/75RX	1,2,3,4	23	1200/75 bps connection established
CONNECT 75TX/1200RX	1,2,3,4	22	75/1200 bps connection established
+MRR: 300	1,2,3,4	40	Connection with 300 bps carrier
+MRR: 1200/75	1,2,3,4	44	Connection with 1200/75 bps carrier
+MRR: 75/1200	1,2,3,4	45	Connection with 75/1200 bps carrier
+MRR: 1200	1,2,3,4	46	Connection with 1200 bps carrier

Table 6-2 Modem confirmations (Continued)

Word	X	Number	Meaning
+MRR: 2400	1,2,3,4	47	Connection with 2400 bps carrier
+MRR: 4800	1,2,3,4	48	Connection with 4800 bps carrier
+MRR: 7200	1,2,3,4	49	Connection with 7200 bps carrier
+MRR: 9600	1,2,3,4	50	Connection with 9600 bps carrier
+MRR: 12000	1,2,3,4	51	Connection with 12000 bps carrier
+MRR: 14400	1,2,3,4	52	Connection with 14400 bps carrier
+MRR: 16800	1,2,3,4	53	Connection with 16800 bps carrier
+MRR: 19200	1,2,3,4	54	Connection with 19200 bps carrier
+MRR: 21600	1,2,3,4	55	Connection with 21600 bps carrier
+MRR: 24000	1,2,3,4	56	Connection with 24000 bps carrier
+MRR: 26400	1,2,3,4	57	Connection with 26400 bps carrier
+MRR: 28800	1,2,3,4	58	Connection with 28800 bps carrier
+MRR: 31200	1,2,3,4	78	Connection with 31200 bps carrier
+MRR: 33600	1,2,3,4	79	Connection with 33600 bps carrier
+DR: ALT	1,2,3,4	66	Data compression: MNP CLASS 5
+DR: V.42B	1,2,3,4	67	Data compression: V.42bis
+DR: NONE	1,2,3,4	69	No data compression
+ER: NONE	1,2,3,4	76	No error correction
+ER: LAPM	1,2,3,4	77	Error correction: V.42 LAPM
+ER: ALT	1,2,3,4	80	Error correction: MNP
LINE IN USE	1,2,3,4	83	Line in use
+MCR: B103	1,2,3,4	134	Connection with Bell 103 modulation
+MCR: B212	1,2,3,4	135	Connection with Bell 212 modulation
+MCR: V21	1,2,3,4	136	Connection with ITU-T V.21 modulation
+MCR: V22	1,2,3,4	137	Connection with ITU-T V.22 modulation
+MCR: V22B	1,2,3,4	138	Connection with ITU-T V.22bis modulation
+MCR: V23	1,2,3,4	139	Connection with ITU-T V.23 modulation
+MCR: V32	1,2,3,4	140	Connection with ITU-T V.32 modulation
+MCR: V32B	1,2,3,4	141	Connection with ITU-T V.32bis modulation
+MCR: V34	1,2,3,4	142	Connection with ITU-T V.34 modulation
+MCR: K56	1,2,3,4	144	Connection with K56flex modulation
+MCR: V90	1,2,3,4	145	Connection with ITU-T V.90 modulation

6.6 Processing the Break Character

The **\K** command specifies one of three options for processing the break character (see page 6-9):

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

AT\Kn	Effect
n = 0, 2, 4	Do not send a break character to the partner system. Set the modem to command mode.
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.

Table 6-4 Break character received by the computer while the modem is connected via an MNP or standard connection in command 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.

Table 6-5 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.

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\N0	No error correction
ATE0	Echo off
AT&W0	Save

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 Order No. 6ES7 972 - 0CA34-0XA0) is required to connect the PSI-DATA/BASIC-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 38400 bps)
– 8 data bits
– No parity
– 1 stop bit

The "19200 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	Save

Configuration of the Modem on 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 19200 bps.