Tixi

Always online. Even offline.
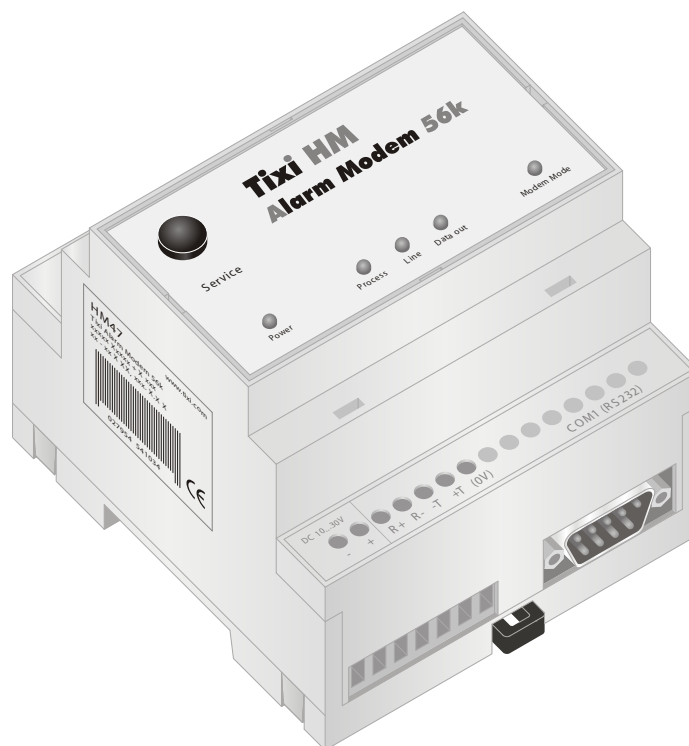
TAM-HM-EN

Tixi Alarm Modem 56k
Tixi Hut Line HM
Manual

HM10 • **HM11** • **HM17**
HM20 • **HM21** • **HM27**
HM3x • **HM41** • **HM47**

Version 1.0.3

Notes

This manual must be read carefully and its contents understood before commissioning and using any devices.

Warranty claims for damage arising from failure to observe the contents this manual are invalid. No liability is accepted for consequential damage arising from the failure to observe the contents of this manual.

Tixi.Com reserves the right to make technical modifications or alterations to this manual at any time without any special notice.

Various registered trademarks, company names and brand names appear in this manual. Even if they are not designated as such, the relevant proprietary rights still apply.

NOTE | During operation messages may be sent that are normally chargeable.

Content

4   Tixi Software

5   Communication with a PLC

6   Appendix

Safety Notes

Target readership electrical specialist personnel

This manual is aimed exclusively at suitably qualified electrical specialist personnel that are familiar with the safety standards required for electrical engineering and automation. The engineering, installation, commissioning, maintenance and testing of devices must only be carried out by qualified electrical technicians. Unless otherwise stated in this manual or other Tixi manuals, any intervention in the hardware and software of our products must only be carried out by our specialists.

Proper use

Tixi Alarm Modems are only designed for use in the application fields described in this manual. Ensure that all the specifications stated in this manual are observed. Unqualified interventions in the hardware or software, and failure to observe the warnings stated in this manual or on the product may lead to serious injury or material damage. No liability is accepted in such cases and any warranty claims become invalid.

Safety instructions

The safety and accident prevention regulations specified for the application concerned must be observed during the engineering, installation, maintenance and testing of devices.

This manual contains special instructions that are important for the safe and proper handling of the device. The warning symbols of the individual instructions have the following meaning:

DANGER:
Means that there is a danger to the life and health of the user if the relevant safety measures are not taken.

ATTENTION:
Is a warning of possible damage to the device, software or other material damage if the relevant safety measures are not taken.

1 Tixi makes Teleservice easy

1.1 Tixi Alarm Modems at a glance

Tixi Alarm Modems are new automatic modems with a large data memory, several functions and integrated Internet technology. They are designed as intelligent communication computers with a 32-bit power CPU and a 2 MB non-volatile Flash memory. This can now be expanded by up to 64 MB, thus providing enough space for your data requirements now and in the future.

Tixi Alarm Modems are fully automatic and can

- send alarm and status messages via SMS, e-mail or Express E-Mail,
- receive switch commands via SMS or e-mail and forward them to a PLC,
- log and send the data of a connected PLC/system,
- visualize modem or PLC data via the integrated web server.

What´s more!

- You can use them as "normal" modems for the remote access of PLCs or systems, and the programming software of the PLC manufacturer can generally be used for this.

State-of-the art communication

The Tixi Alarm Modem can communicate directly with the PLCs of several manufacturers using the relevant PLC protocol. Different bus systems are also supported. User-friendly XML-based software programs enable the required functions to be configured easily. The over twenty year history of modems being controlled by primitive AT commands can now be forgotten at last.

The wide range of functions available on the Tixi Alarm Modems provide solutions for a number of applications such as the monitoring of temperature, pressures, levels, or the activation of motors, fans, pumps slide valves and flaps.
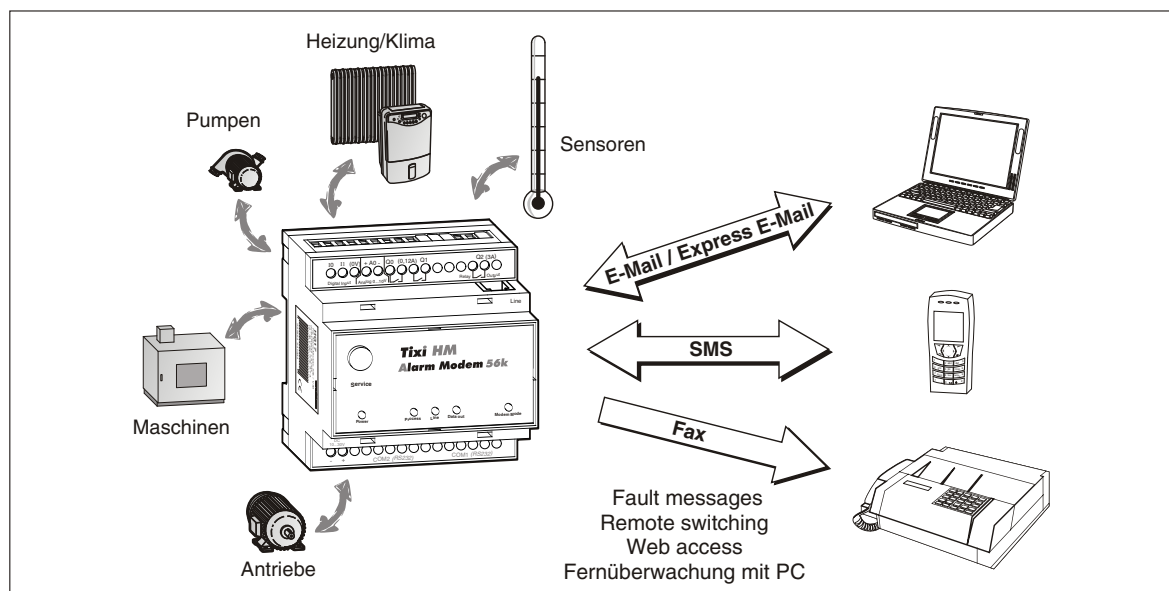
Easy to retrofit

Tixi Alarm Modems can be integrated in existing systems with a minimum of effort. The communication protocols of commonly used PLCs are already implemented and so modifications to the PLC program are normally not required.

1.2   Function overview

1.2.1   Integrated PLC protocols

Tixi Alarm Modems can communicate directly with the PLCs of leading manufacturers using the relevant PLC protocol, and access PLC variables, markers and ports via the PLC programming interface. This can be achieved without having to adapt the PLC program or load a special function block for communication.

Selection of manufacturers with PLCs that are directly supported:

Mitsubishi	**ABB**
Moeller	**Saia Burgess**
Siemens	**VIPA**
Allen Bradley	**Conrad**

A detailed list of supported PLCs is provided in chapter 5.1.

OEM protocols

Two simple options are available for OEMs and customers with special PLCs:

- common access to the Modbus industrial standard or TixiBus protocol.

- implementation by Tixi.Com of the necessary protocol in the Tixi Alarm Modems.

1.2.2   Alarming with acknowledgment

Tixi Alarm Modems are fully automatic and can send status and fault messages to any recipient via SMS, fax, e-mail or Express E-Mail. Messages can be triggered by PLC variables, physical inputs on the Tixi Alarm Modem or via the Tixi Scheduler.

Adress book:	The SMS, fax and e-mail addresses (max. 100) are managed in an address book.
Messages:	The message texts (max. 100) can contain any number of actual values from the PLC and can be of any required length when used with faxes and e-mails.
Alarms:	Up to 100 alarms and actions such as switching commands can be defined.
Alarm cascade and acknowledgments:	Any number of freely definable alarm levels can be set up if message acknowledgment is required. If a message is not acknowledged within a specified time, one or several recipients can be notified. This can be cascaded as required.

1.2.3   Remote switching via SMS and e-mail

A short command via SMS, e-mail or Express E-Mail can switch the optional outputs of the Tixi Alarm Modem and those of a connected PLC. PLC variables can also be set in this way.
The execution of the command can also be acknowledged. 100 SMS switch commands with up to 10 parameters each can be defined as required. PLC variables can be queried simply and quickly by SMS command without the need for a PC.
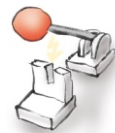
1.2.4   Data logging for the PLC

Tixi Alarm Modems log any PLC data (variables, ports) and system data with time and date stamp in the non-volatile Flash memory (2 MB - 66 MB). Scan cycle and logged data volume can be configured as required. The logged data can be sent by e-mail, Express E-Mail or fax cyclically or event-triggered as an XML text message,

as a compressed binary file or as a data record in another format such as Excel-compatible CSV format. Several log files with a freely definable size can be stored at the same time. The memory is designed as a ring buffer.

1.2.5 Teleservice via PC

A Tixi Alarm Modem can be used to handle the remote maintenance of several controllers via a telephone line or via the Internet. This is usually possible with the programming software in use. The variables and I/O ports of the PLC can also be read or written remotely online with the Tixi Alarm Editor (TILA). The entire configuration of the Tixi Alarm Modem can be carried out by remote dial-in and the logged data can be read "manually".

Secure Login
Optimum security is ensured since unauthorized dial-in attempts are prevented by means of a login procedure with user name and password. All dial-ins and dial-in attempts are recorded.

1.2.6 Web server in the Tixi Alarm Modem

The web server inside the Tixi Alarm Modem allows system states, PLC data and log data to be visualized and modified with the mouse from any computer in the world using a standard browser. The appropriate HTML pages just have to be stored in the modem.
The modem is accessed via the telephone network, fixed IP addresses are not required.

1.2.7 Web portal with database and machine logbook

An SQL database can be used to manage a large number PLC systems and Tixi Alarm Modems. The data logged can be stored, analyzed and visualized here.
Access to data is only allowed to authorized users. The system can be adapted easily to user requirements and is also open to the devices of other suppliers.
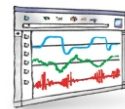
1.2.8 Pump alarm application example

The following example shows how you can use the wide range of functions of the Tixi Alarm Modem to handle complex tasks automatically:

Pump alarm
- Send an e-mail, a fax and an SMS to three different destinations
  if input 312 on the PLC closes.
- Wait ten minutes for a confirmation via SMS.
  Service technicians can query status values by SMS (or dial-in and PC).
- Wait for a switch command for reserve pump 2.
- If the SMS confirmation does not come in 10 minutes,
  start a new alarm message cascade to other recipients.
- If the switch command for switching on the reserve pump has been received,
  switch on the PLC or Tixi output 17 (or a relay) and check at input 210
  whether the reserve pump is running.
- Send a status SMS and a status e-mail after five minutes
  to indicate whether pump 2 is running or not.
- If not, send SMS, fax and e-mail to the fire brigade and other recipients.
  Send an alarm message to an internal SQL database.
- Send the logged data of the last 72 hours as an Excel file (e.g. CSV)
  to two e-mail recipients or to an internel SQL database.

1.3 Model and equipment versions

1.3.1 Interfaces and inputs/outputs

The HM series

The basic functions of HM series Tixi Alarm Modems are identical. Only the type and number of interfaces and inputs/outputs vary according to the model used.

Interfaces	Models with RS232				Models with RS485/422	
	HM10 HM20	**HM11 HM21**	**HM17 HM27**	**HM3x**	**HM41**	**HM47**
COM1	RS232	RS232	RS232	RS232	RS232	RS232
COM2	—	RS232	RS232	RS232	RS485/422	RS485/422
Digital inputs	—	—	2	0 – 12*	—	2
Analog inputs	—	—	1	1	—	1
Digital outputs	—	—	2	0 – 4*	—	2
Relay outputs	—	—	1	—	—	1

*Different I/O configurations available on request as OEM version

The HM 10/HM20, HM 11/ HM 21 and HM17/HM27 only differ in the rating of the power supply and are otherwise identical.

1.3.2 Tixi I/O modules

Tixi I/O modules are available as accessories for HM series devices, enabling you to add up to 128 additional inputs and outputs to the basic unit.The basic unit can be expanded via the Tixi I/O bus with up to 7 I/O modules providing up to 128 inputs/outputs. The Tixi I/O bus can also be used for customized I/O modules.

I/O modules	Description
XP84D	8 digital inputs, 4 digital outputs
XP88D	8 digital inputs, 8 digital outputs
XP84DR	8 digital inputs, 4 relay outpus
XP88AD	8 digital inputs, 8 analog inputs

1.3.3 Memory modules

The Tixi Alarm Modems are provided with a 2 MB non-volatile Flash memory that can store data even when the power supply is not present. An additional memory module can expand this memory to up to 66 MB.

Memory Module	Description
XC016	Tixi Flash memory module: 16 MB
XC032	Tixi Flash memory module: 32 MB
XC064	Tixi Flash memory module: 64 MB

1.3.4 Housing versions

The Tixi Alarm Modem is available in various versions with different housings and features.

■ **Tixi Hut Line: GSM, 56 K modem, ISDN und Ethernet**
Tixi Hut Line modems are especially suitable for mounting on a DIN rail and offer outstandingly easy expansion possibilities for I/O and memory modules.
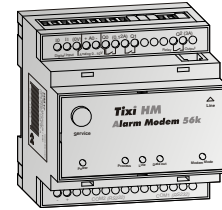
■ **Tixi Alu Line: GSM, 56K modem, ISDN und Ethernet**
The Tixi Alarm Modems are also available in a rugged aluminium housing (Alu Line) in several I/O versions, such as 24/0, 5/3, 16/8 and 32/16 digital inputs and outputs. 16 MB, 32 MB and 64 MB memory expansions are also possible.
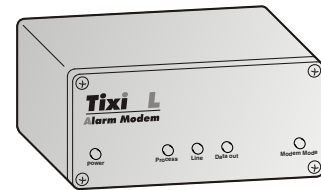
■ **Tixi Office Line**
The Office Line is another version of the Tixi Alarm Modem. The housing is provided with a socket for the power supply. A suitable power supply unit is also provided. This device does not have any inputs and outputs and is not suitable for I/O expansion. The memory expansions of the Alu Line (16 MB, 32 MB, 64 MB) can be used.

1.3.5 Tixi Message Modem AT und Tixi Super Modem AT

In addition to the Tixi Alarm Modems, the modems of the Message Modem AT and Tixi Super Modem AT series offer an inexpensive way of expanding your system. These Tixi modems offer unique and elementary AT commands for sending and receiving SMS messages, e-mails and Express E-Mails as well as for sending faxes. Land-line SMS is also supported. Unlike the Alarm Modems, these message modems require a PC or PLC for managing the addresses and message texts, compiling the messages, integrating actual values, and addressing other alarm destinations in the event of a fault.

Further details on product series/types can be obtained from the website at www.Tixi.Com in the Products area.

1.4　Sending SMS in a land-line network

The land-line SMS network makes it possible to also send an alarm message as an SMS message from an analog modem to mobile and land-line numbers. It is only necessary to select SMS providers that offer special service centres for this feature.

1.4.1　Sending SMS to the mobile network

Land-line SMS messages can be sent via the Tixi Alarm Modem to a mobile device (such as mobile phone or GSM modem) using the SMS service centre of the mobile network supplier. The use of this SMS service is activated by dialling the appropriate phone number of the SMS service centre. The phone numbers of different SMS service centres are already stored in the Tixi Alarm Modem. You simply assign the required supplier to the address entry of the recipient.

The following phone numbers of SMS service centres are used in Germany:

- **D1**　　　　　　　　0171-2521002
- **D2**　　　　　　　　0172-2278025
- **Eplus**　　　　　　　0177-1167

Austria

- **Mobilcom Austria**　43900664914

The selection list can be expanded at any time. Refer to the TILA and TICO manuals for further information.

NOTES	The above list of suppliers is not complete and some phone numbers may be subject to change. Binding information can be obtained by the mobile network supplier concerned.

Your selection of SMS service centre should take into account the costs involved (such as for roaming) in addition to the range of supported mobile networks.

1.4.2　Sending SMS to the land-line network

The option of sending SMS messages to the land-line network has up to now only been available from Deutsche Telekom and the SMS provider Anny Way.

The phone numbers for these SMSCs are as follows:

- **Deutsche Telekom**　　0193010
- **Anny Way**　　　　　　01901504

These two numbers are already stored in the Tixi Alarm Modem. You just have to select the provider required.

The following requirements must be fulfilled in order to send an SMS to a land-line network:

- The call number identification (CLIP) function for incoming calls must be activated. (Telekom service feature CLIP activated.)
- For Deutsche Telekom lines: The land-line connection of the Tixi Alarm Modem must be registered daily at the SMS service centre as SMS-compatible.
- The terminal device must be SMS compatible.
- The telephone supplier must offer the "Land-line SMS" feature.

When entering an address, remember to define the correct address format for the message recipient. The address is made up of the area code followed directly by the phone number. The area code must be entered with a leading zero.

The sender and the recipient must use the same SMSC (such as Deutsche Telekom or Anny Way) so that the SMS can be received as a text message. Otherwise it will be converted to a voice mail. Messages can be sent via the land-line network using both SMSCs.

As land-line SMS is a relatively new service of the Deutsche Telekom, it may be subject to modifications and additions. The latest information on the subject can be found at http://www.sms-im-festnetz.de.

If you are using a different telephone supplier than Deutsche Telekom AG, you should ask your supplier which land-line SMS features are supported on your line. The full range of SMS features provided by the Tixi Alarm modem is currently only supported by lines switched by Deutsche Telekom AG in the local network.

2 Installation

2.1 Terminals
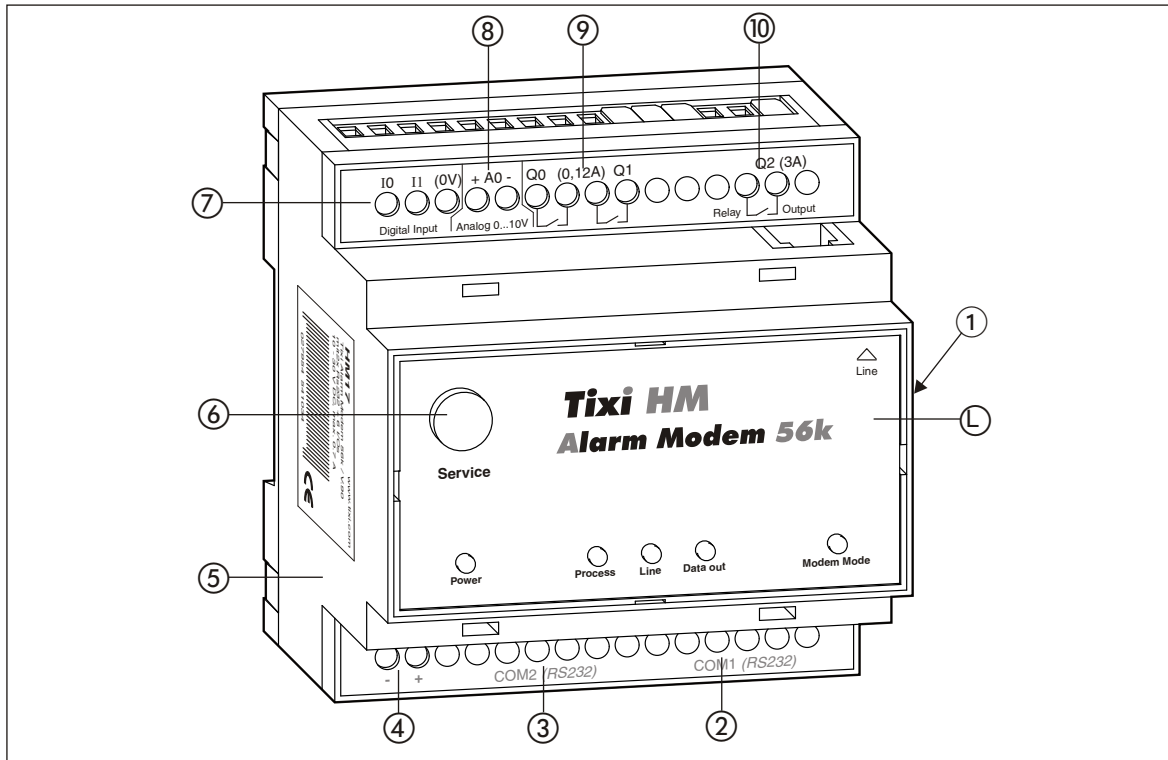
Designations on the HM models		
Ⓛ	Line	Socket for the telephone cable
①	Tixi I/O-Bus	Socket for I/O expansion modules (on side of housing)
②	COM1 (RS232)	9-pole D-SUB socket
③	COM2 (RS232)	9-pole D-SUB plug (not on HM10, HM20, HM41, HM47)
④	10...30 V DC	Power supply (2 terminals)
⑤		Power supply (socket) via external power supply unit (this opening and socket is only available on special models.)
⑥	Service	Pushbutton, freely programmable in the configuration software.

| I/O terminals on HM17, HM27, HM47, HM3x		
⑦	I0, I1	Digital inputs
⑧	Analog 0...10 V	Analog input, 0–10 V, 12-bit resolution
⑨	Q0, Q1	Isolated outputs
⑩	Q2 Relay Output	Relay output, 230 V AC, 3 A

RS 485/422 with HM41, HM47		
③	COM2 (RS485/RS422)	5 screw terminals, configurable via DIP switch

NOTE | **HM30 – HM34**
The I/O terminal assignment for the HM3x devices is shown in the Appendix in section 6.6.2 . The number of digital I/Os is different to that of the standard model.

2.2 Meaning of the LEDs
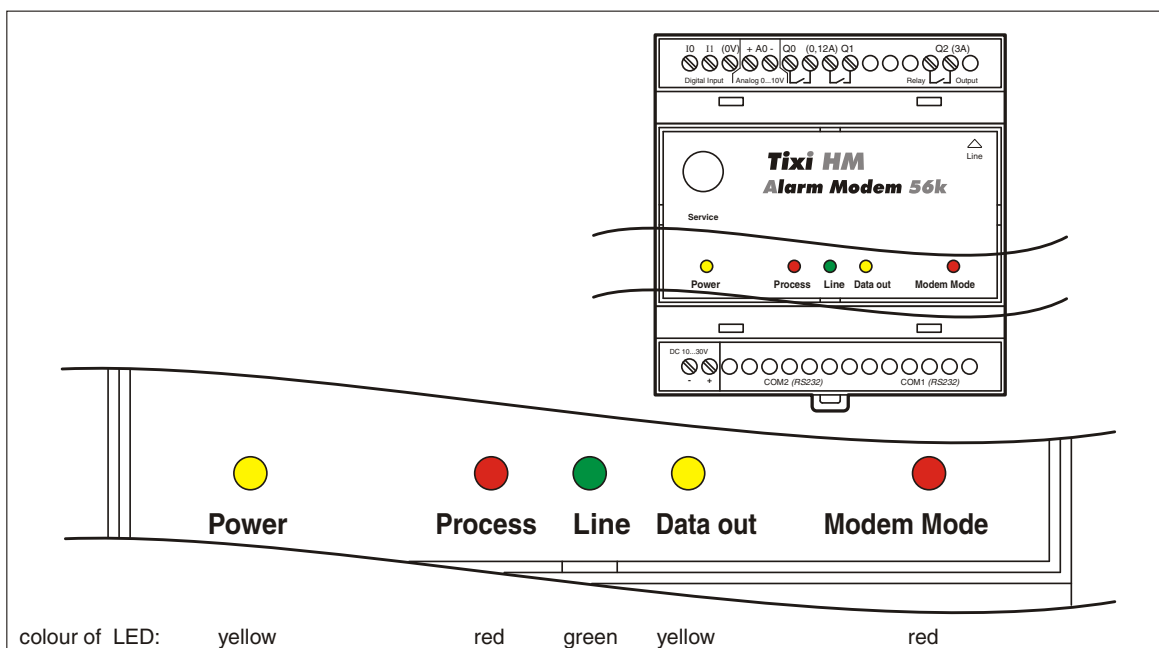
LED	Status	Function
Power	🟡	Device operational
	⚪	No power supply
Process	🔴	Operations in progress, e.g. message generation, changes to variables and switch operations.
	⚪	Normal operation, but no operation executed.
Line	🟢	Telephone connection present.
	⚪	No connection.
	🟢 Flash	Outgoing call: Establishing connection (up to CONNECT)
	🟢 Flash	Incoming call: Establishing connection.
Data Out	🟡	Message for sending in the device.
	⚪	No message in post output.
Modem Mode	⚪	**TiXML Mode** Standard mode for the Tixi Alarm Modem.
	🔴	Modem Mode Device can be used locally as a standard modem via COM1.

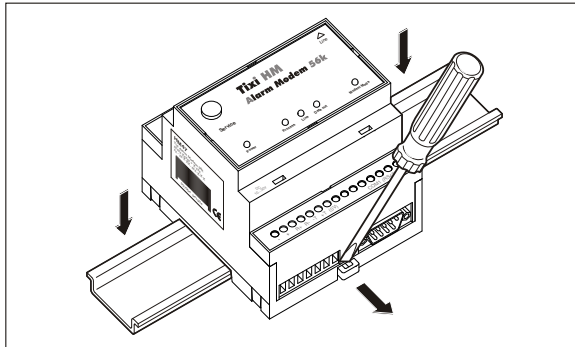| NOTE	**Modem Mode LED red** 🔴

Operations in progress but messages cannot be sent until Modem mode is terminated (see sect. 3.3.5).

2.3 Mounting

Mount the modem by pushing or snap fitting it onto a DIN rail (top-hat rail 35 mm).

Pull out the black tab on the device using a screwdriver and snap fit the device to the DIN rail. You can remove the device from the rail in the same way. Ensure that the retaining mechanism of the modem snaps cleanly and securely into the DIN rail.
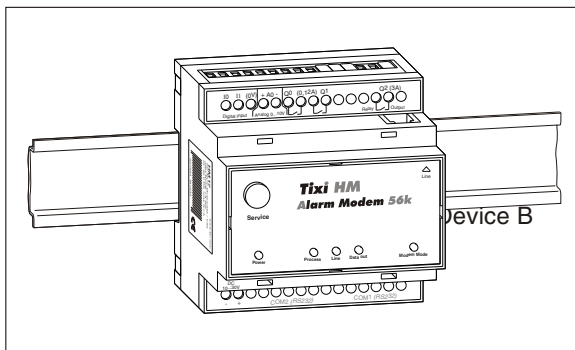

Modem mounted on the DIN rail

ATTENTION: Ambient conditions!

▶ *The device must only be used in rooms that are dry and clean. Protect the device from humidity, water splashes or heat.*

▶ *The device must not be used in environments containing flammable gases, fumes or dust.*

▶ *Do not subject the device to severe vibration.*

2.4 Connection to the telephone network

The connection to the telephone network is established via the socket marked "Line" (see section 2.1).

```
1 - b2
2 - W
3 - a
6 5 4 3 2 1    4 - b
5 - E
6 - a2
```
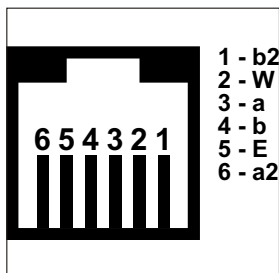
Analog socket RJ11 for the telephone cable

The telephone number of the connection must be known so that your Tixi Alarm Modem can be reached.

To check the telephone number of the phone socket (A) to which the Tixi Alarm Modem is to be connected, first of all connect a simple telephone (A) to this socket. Now dial the number of the connection (A) from any other telephone (B), e.g. a mobile phone. If telephone (A) rings, the number used is correct. Otherwise you can determine the number of connection A by dialing the number of telephone (B) with telephone (A). If connection (A) supports call number identification (CLIR), telephone (B) will ring and display the number of (A).

You can connect the Tixi Alarm Modem if the calls in both directions are successful.

Your Tixi Alarm Modem can now be called, receive messages and trigger defined actions by means if the call number of the caller.

CLIP calling number identification presentation

To initiate actions in the Tixi Alarm Modem, incoming call numbers from your telephone connection must be identifiable. This is carried out using the CLIP function, which you can request from your telephone supplier and have activated.

NOTE	**Connection to a PBX system**
	If you connect the Tixi Alarm Modem to a PBX system, be sure to take into account the exchange codes and the CLIP capabilities of the PBX in the configuration of the device.

2.5 Interfaces

The COM1 and COM2 serial interfaces are used to connect a PC, a PLC or other devices.

NOTE **Interfaces are model-dependent.**
The type and number of interfaces available depend on the type of modem in use (see also section1.3.1 and 6.6).

2.5.1 COM1 – RS232 (socket)

The RS232 interface COM1 (9-pole D-Sub socket) is provided on all Tixi models (see also overview on page 10). It is primarily used as a programming interface for connecting a PC. A standard 1:1 serial cable can be used for this (not supplied).

RI 9
CTS 8
COM1
RTS 7
DSR 6

5 GND
4 DTR
3 TXD
2 RXD
1 DCD
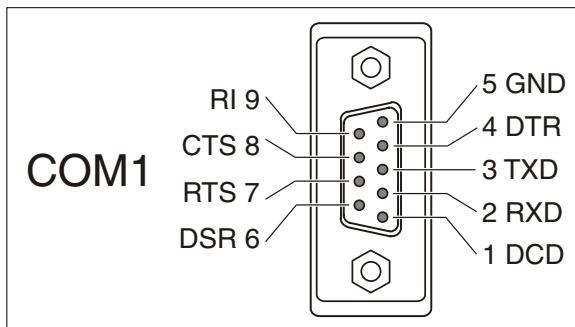
The COM1 port has the same assignment as a standard modem with an RS232 socket.

2.5.2 Blue Adapter = zero modem gender changer

The COM1 interface can also be used for connecting a PLC. In this case the Blue Adapter zero modem gender changer is required (see Accessories, section 6.3) for adapting the plug-socket connection.

2.5.3 COM2 – RS232 (plug)

The 9-pole RS232 interface COM2 (plug) can be used for connecting a PLC directly and has the same assignment as the standard RS232 interface of a PC.

DSR 6
RTS 7
COM2
CTS 8
RI 9

1 DCD
2 RXD
3 TXD
4 DTR
5 GND
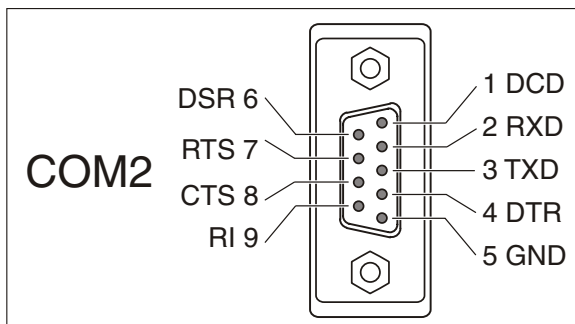
*The assignment of the COM2 (plug) is the same as that of a COM port on the PC.*

NOTE **Connecting a PLC**
As most PLCs require the use of a special serial programming cable, the programming cable of the PLC manufacturer concerned should be used in all cases.

2.5.4   RS485 / RS422

The HM41 and HM47 devices are provided with an RS485/422 interface for connection two-wire and four-wire bus systems to the Tixi Alarm Modem. The interface is provided as a 5-pole screw terminal strip on the device. This interface is not isolated.
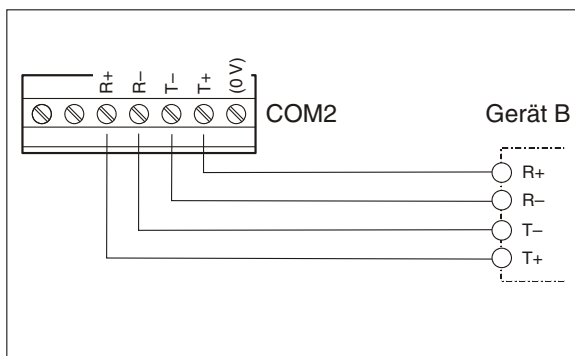
COM2
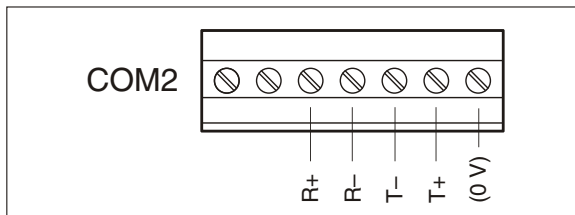
*Assignment of the RS485/422
(viewed from the top)*

NOTE	**Twisted pair cables for RS485/422**

Twisted pair cables are recommended. In RS422 operation and with 4-wire RS485 operation 2 twisted pair cables should be used.

RS422 connection

COM2   Gerät B

*The **receive cables** are connected to
R+ (communication partner T+) and
R- (communication partner T-)
and the **transmit cables** to
T+ (communication partner R+) and
T- (communication partner R-)
as shown in the diagram.*

Access to the DIP switches

A DIP switch is provided for selecting the operating mode at the RS485/422 interface. This is located on the right of the COM2 connection terminal and is accessible after the cover is removed.
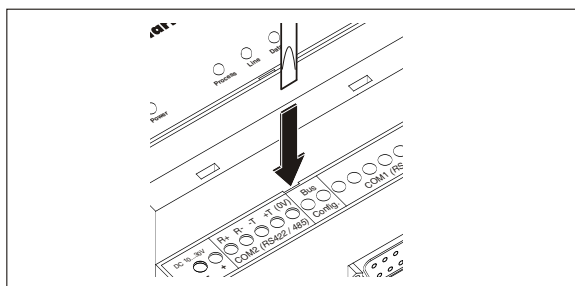
Insert a screwdriver (approx. 3 mm blade width) into the slot and turn the screwdriver a little.
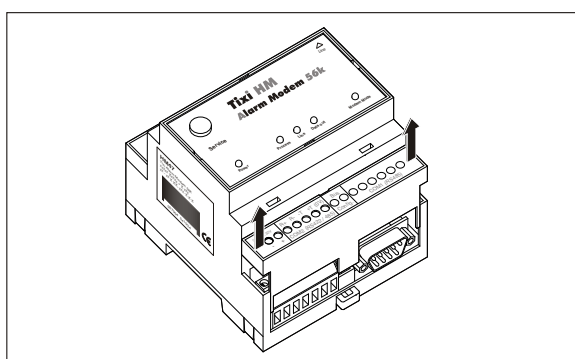
The terminal cover will snap out of the housing with an audible click and can be removed.
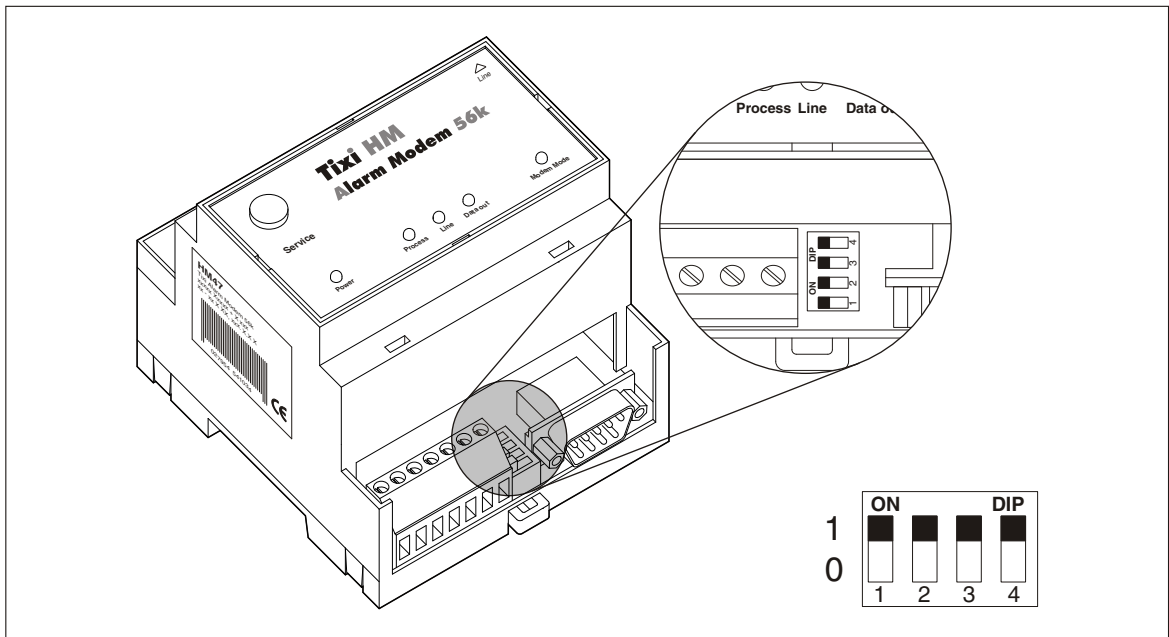
Setting the operating mode on the DIP switch

Operating mode	switch 1	switch 2	switch 3	switch 4	DIP
Two-wire RS485 with termination	1	1	1	1	1111
Two-wire RS485 without termination	0	0	1	1	0011
Four-wire RS485 without termination	0	0	0	0	0000
Four-wire RS485 with termination of receive cable	1	1	0	0	1100
RS422	0	0	0	0	0000

NOTE | **RS485 Termination**
RS485 stipulates that the cables should be terminated at both ends of the transmission section. The termination prevents signal reflections in the cables and in times of no data transmission enforces a defined idle state on the bus. This termination can be implemented using, for example, specific resistors at the screw terminal. This can also be implemented via the DIP switches on the Tixi Alarm Modem.

**RS485 2-wire connection (2-wire bus system, half-duplex)**

In this operating mode, transmit cables and receive cables are interconnected. If the Tixi Alarm Modem is installed at the beginning (first station) or end (last station) of the bus system, the bus system must be terminated by setting the DIP switches accordingly.
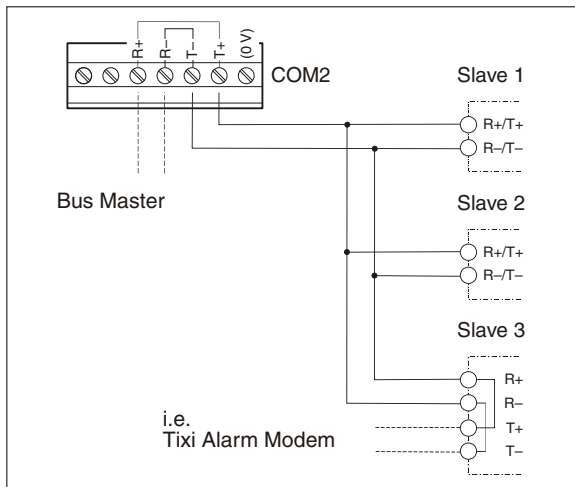
The twisted pair cable must be connected with T+ to T+ or R+ and T- to T- or R- as shown in the diagram.

RS485 4-wire connection (4-wire bus system, full-duplex)

The terminals of the 2 twisted-pair cables are wired in the same way as for the RS422 connection. Both twisted-pair cables must be terminated if the Tixi Alarm Modem is installed at the start or end of the bus cables. The termination of the receive cables is activated via the DIP switches. The transmit cables must be terminated externally (see figure).
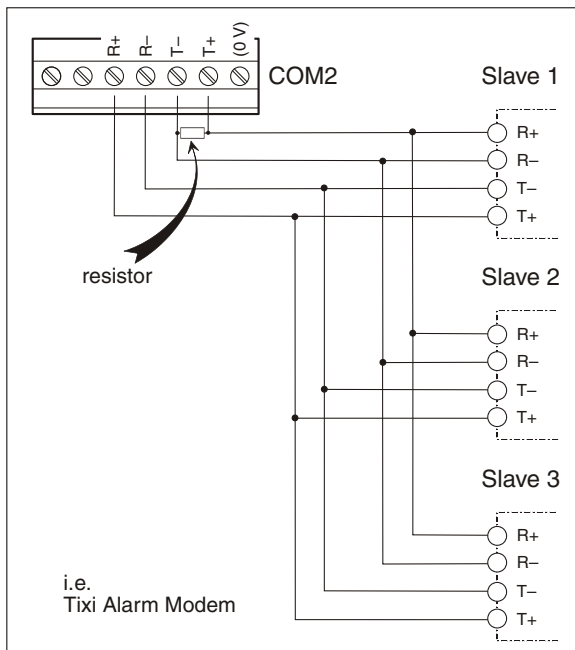
The two twisted double core cables must be connected as shown in the diagram.
To terminate the transmit cables connect a 120 Ω / 0.5 W resistor to the screw terminals T+ and T-.

⚠ **ATTENTION: Termination on the bus!**
Always ensure that the end devices are terminated correctly.
Incorrect or missing termination may give rise to communication faults.
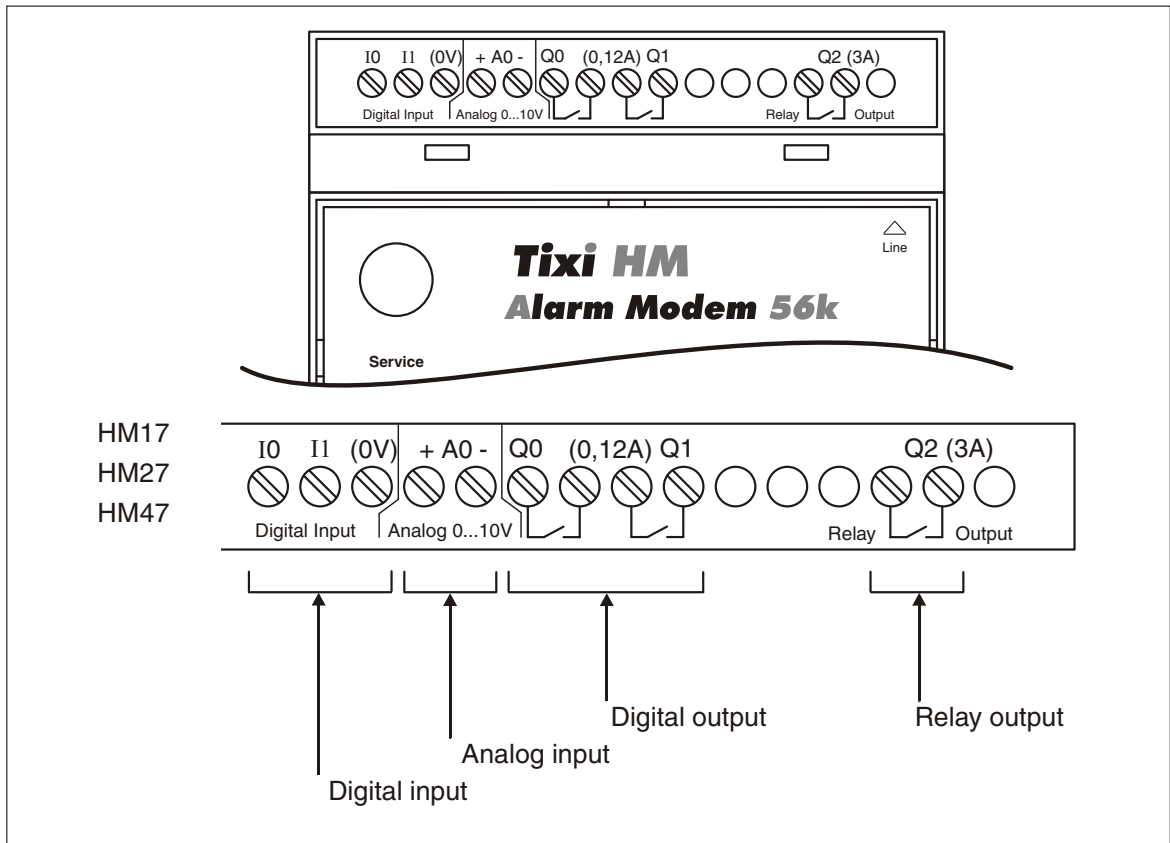

2.6 Digital and analog Inputs/Outputs

Both digital and analog signals can be evaluated and processed via the inputs.
The outputs and relays are used for switching operations.

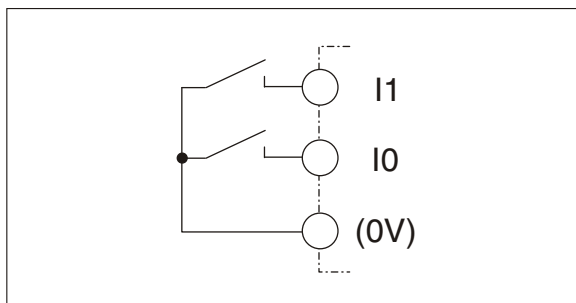| NOTE	**HM10, HM20, HM11, HM21 und HM41 have no inputs or outputs.**
	The design and number of inputs/outputs depends on the type of modem in use (see also section 1.3.1 and 6.6).

Terminal assignment

Digital Input

The digital inputs I0 and I1 can be isolated via switches or relay contacts.

Connection of the digital inputs
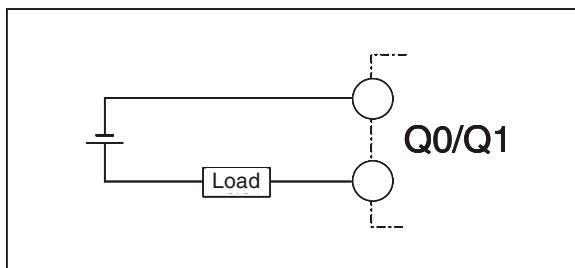
Analog input

Analog input A0 can be connected to a voltage between 0 and 10 V DC. The typical input current at 10 V is approx. 100 μA.
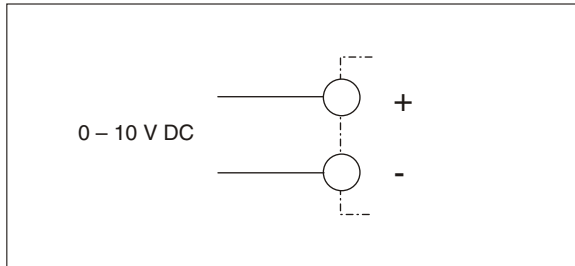
Connection of the analog input

Digital output

The digital outputs Q0 and Q1 are isolated and can be connected to a maximum DC or AC voltage of 125 V. The load capacity of each output is 0.12 A.
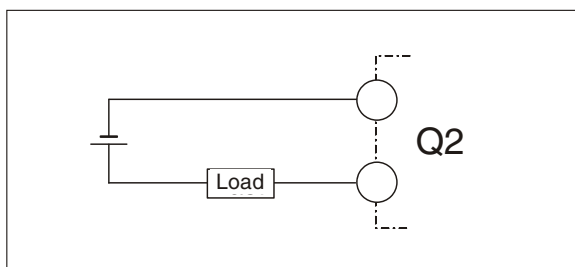
Connection of the digital outputs

ATTENTION: I_{max} = 0.12 A; U_{max} = 125 V AC/DC!
Ensure that the maximum output load capacity of the digital outputs is not exceeded in any way, otherwise this may destroy the outputs.

Relay output

Resistive or inductive loads can be connected directly to relay output Q2. The load capacity of the relay output is 3 A at 230 V AC or 0.3 A at 110 V DC.

Connection of the relay outputs

ATTENTION: I_{max} = 3 A at 230 V AC
                    = 0,3 A at 110 V DC
The maximum output load capacity of the relay output must not be exceeded in any way, otherwise this may damage the modem.

NOTE | **Hazardous voltage**
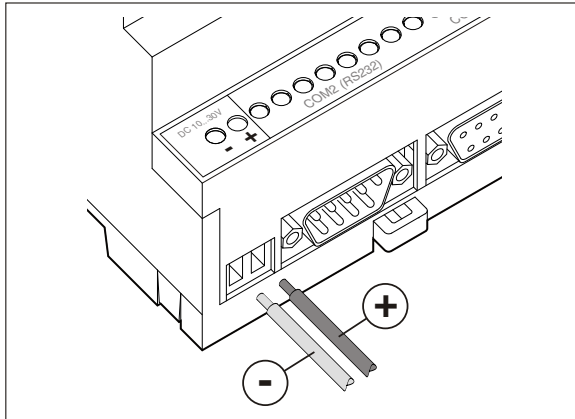Ensure that cables carrying hazardous voltage are laid separately from control and data cables.

2.7 Power supply

After all other installation steps are completed, switch on the power supply to the Tixi Alarm Modem.

⚠ **ATTENTION: U = 10–30 V!**
Ensure the correct polarity of the power supply terminals.

Ensure that the screws are seated correctly.

| NOTE	**DC and AC cables**
	In order to avoid the interference from power supply units or other interference sources, DC cables should not be installed in the direct vicinity of AC cables.

⚡ **DANGER: Observe during installation!**

▶ *Only use cables with a sufficient cable cross section for the connection.*

▶ *The device should only be wired in a de-energized state.*

▶ *Regularly check the live cables to which the devices are connected for insulation faults or breaks. If a cabling fault is found, the devices and cabling must be de-energized immediately and the cabling replaced.*

▶ *When using the devices the electrical and physical specifications stated must be strictly observed.*

---

3 Commissioning

3.1 Power up

Once all installation steps have been completed in accordance with chapter 1, you can commission the Tixi Alarm Modem.

3.1.1 LEDs on the Tixi Alarm Modem

| colour of LED: | yellow | | red | green | yellow | | red |
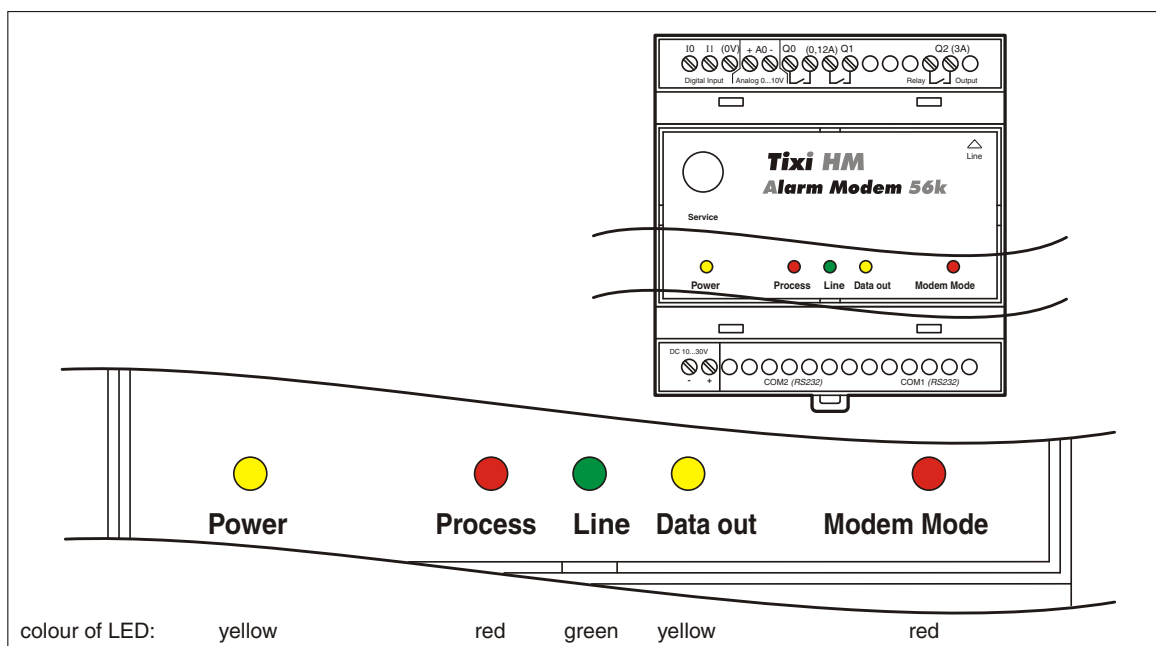
3.1.2 LEDs during the self-test

Power	Process	Line	Data Out	Modem Mode	
⬤			⬤		Start of self-test
⬤	⬤	⬤	⬤	⬤	Test of all LEDs
⬤			⬤ flashes		Memory test
⬤					TAM is operational.
					Duration of self-test approx. 12 s

Self-test after power up

The Tixi Alarm Modem carries out an extensive self-test after the power supply is switched on. All the LEDs will switch on for test purposes and all three types of memory are checked. The memory test is also carried out automatically with every power up.

Memory test

This tests the internal memory with RAM, program memory (Flash ROM) and the file system in the user memory (Flash). On basic models (2 MB for the user memory) this test lasts approx. 12 seconds. If memory expansions have been fitted, the time can be considerably longer depending on the size of memory in use (see operating manual for Tixi Flash Memory Module Hut Line).

Tixi Alarm Modem is operational

The device is then operational once the self-test is completed. The Power-LED is lit. If the Tixi Alarm Modem was correctly configured with a project and connected to the telephon line before power on, it will "start work".

NOTE	**Project required.**

If the Tixi Alarm Modem is being commissioned for the first time or after a complete delete operation (Factory reset, section 6.2.2), it must be loaded with a project first of all (Initial configuration, sect. 3.2.1).

3.2 Configuration and projects

3.2.1 Initial configuration

You can regard a Tixi Alarm Modem (TAM) in the same way as you would consider a PC with an operating system and many communication programs. After the initial power up, the task memory is empty and the TAM "doesn't know" what it is meant to do. It has to be configured first of all and assigned a task. The task definition for the TAM with all the relevant data is called a project and is saved in a TiXML project file. These points are explained in the following paragraphs.

3.2.2 Loading projects in the TAM

You can create projects with a number of different user programs available, such as S-TILA, TILA or TICO (see chapter 4, Software). The required parameters can be entered easily on the PC and then saved on the hard disk of the PC as a TiXML project file. The project must then be loaded onto the Tixi Alarm Modem via a serial interface.

The device is now functional as a stand-alone device (i.e. without a PC) and can be used, for example, to monitor PLCs.

3.2.3 Loading projects remotely on the TAM

Once a functional configuration has been loaded on the TAM, this can also be modified or transferred by remote dial-in. The project file can also be loaded onto the device via an e-mail or Express E-Mail. Every reconfiguration (remotely or locally) can be protected from unauthorized access by means of a password and user name. Refer to section 4.4, Secure Login, for further information.

3.3   Operating modes: Modem mode and TiXML mode

TiXML Modus = Tixi Automatic Mode

Tixi Alarm Modems (TAM) can handle a wide range of tasks automatically. These tasks are written and configured in TiXML, a variant of the XML standard. This operating mode is called TiXML mode.

Modem Mode

3.3.1   TILA activates the correct mode

If you always configure the Tixi Alarm Modem with Tixi's TILA software, you do not have to worry about the two modes, as this tool will automatically activate the correct mode (TiXML mode). You can skip the rest of this section and continue reading at the chapter 4"Tixi Software".

3.3.2   Using TAM without TILA and TICO

Only if you are using the TAM without TILA and TICO, for example:

■ because you wish to use the TAM for other programs than just as a simple modem, or

■ because you wish to work with a terminal program such as Windows Hyperterminal, or

■ because your are programming a PLC that is required to send commands to the TAM,

do you have to take the difference between TiXML mode and Modem mode into account.

3.3.3   TiXML mode

The task definition for TiXML mode is loaded on the TAM by means of a project file (the configuration file). These kinds of projects can be created with different software tools (TILA, TICO, see below). TILA will automatically switch a TAM to the correct mode, i.e. TiXML mode. The user does not have to worry about this.

Modem Mode

After power up a TAM will always be in TiXML mode so that can immediately start with the automatic tasks, e.g. send alarms in the event of faults.

3.3.4   Modem mode (also AT mode)

Normal modems (AT modems) can do nothing "on their own" and are controlled by means of simple communication commands, e.g.:

■ "Dial a telephone number and connect me" and

■ "Terminate the connection and hang up."

Modem Mode

These modems always require a PC or a communication controller that executes the tasks since they have no "intelligence" of their own and do not recognize any Internet protocols.

For greater compatibility, however, Tixi Alarm Modems can also be switched to operating like a normal AT modem. This is called Modem mode, in which the red Mode LED will be lit.

3.3.5 Activating/deactivating Modem mode

In Modem mode, a TAM operates like a normal modem and establishes connections with the conventional AT command: "ATDT 0123456789".

The TAM must, however, be switched beforehand from TiXML mode to Modem mode.

Activating Modem mode

The following TiXML command can be used to switch the device to Modem mode via COM1:

```
[<Switch _="ModemMode"/>]
```

Modem Mode

The device will send back the following acknowledgment:

```
[<Switch/>]
```

Once this command has been sent, the TAM will only recognize AT commands and will respond to these, for example, with OK.

Deactivating Modem mode, activating TiXML mode

If the device is in Modem mode, it can be switched back to TiXML mode using the following AT command:

```
AT+T Mode="TiXMLMode"
```

Modem Mode

Response from TAM:

```
OK
```

Once this command has been sent, the TAM will only recognize TiXML commands and no AT commands.

⚠️ ***ATTENTION:*** 🔴 ***Modem Mode LED on - Tixi Alarm Modem disabled for TAM functions!***
The TAM cannot send or receive messages if the red Modem mode LED is lit. Although the TAM will continue processing the tasks, message jobs cannot be sent until the modem is free again and the Modem mode LED is off.

NOTES | **AT commands**
A manual with a description of AT commands can be downloaded from the "Service" area of www.Tixi.Com.

TiXML mode and Modem mode
AT commands are only understood by Tixi Alarm Modems in Modem mode.
TiXML commands are only understood in TiXML mode.

3.3.6 Sending commands to the TAM

Any terminal program, such as Windows Hyperterminal, can normally be used for entering and transferring TiXML and AT commands.

The following COM port settings are recommended:

115.200 Bit/s and 8N1 (8 data bits, no parity, 1 Stop bit)

4 Tixi Software

Tixi.Com also supplies a range of different software tools for configuring the Tixi Alarm Modem, which are designed to meet the particular requirements of different user groups.

S-TILA: Simple TILA for the end user
TILA: Tixi Alarm Editor for technicians and experienced end users
TICO: TiXML console for developers and experienced technicians
R-CON: Teleservice tool for technicians

4.1 Simple TILA (S-TILA)

S-TILA is a user-friendly software that enables end users without any technical experience to enter the required data, such as a mobile phone number for SMS, a fax number for faxes or an e-mail address for alarm messages. The appearance and functionality of S-TILA can be fully adapted in detail to the requirements of OEM customers.

NOTE	**S-TILA for OEM customers**
	Customized versions of TILA that only allow specific entries can be created for OEM customers.

4.2 Tixi Alarm Editor TILA

TILA is a user-friendly Windows software for configuring TAM functions such as alarms and messages, as well as the reception/sending of messages and the reading of logged data. You use the mouse to configure the recipients, messages, PLC variables or I/O ports for alarm messages. TILA also allows you to dial into a remote TAM from a PC via a modem, landline or mobile phone connection and to configure it remotely: In this way, TILA allows you to access a remote device exactly as if it was a local device, and with the same range of functions.
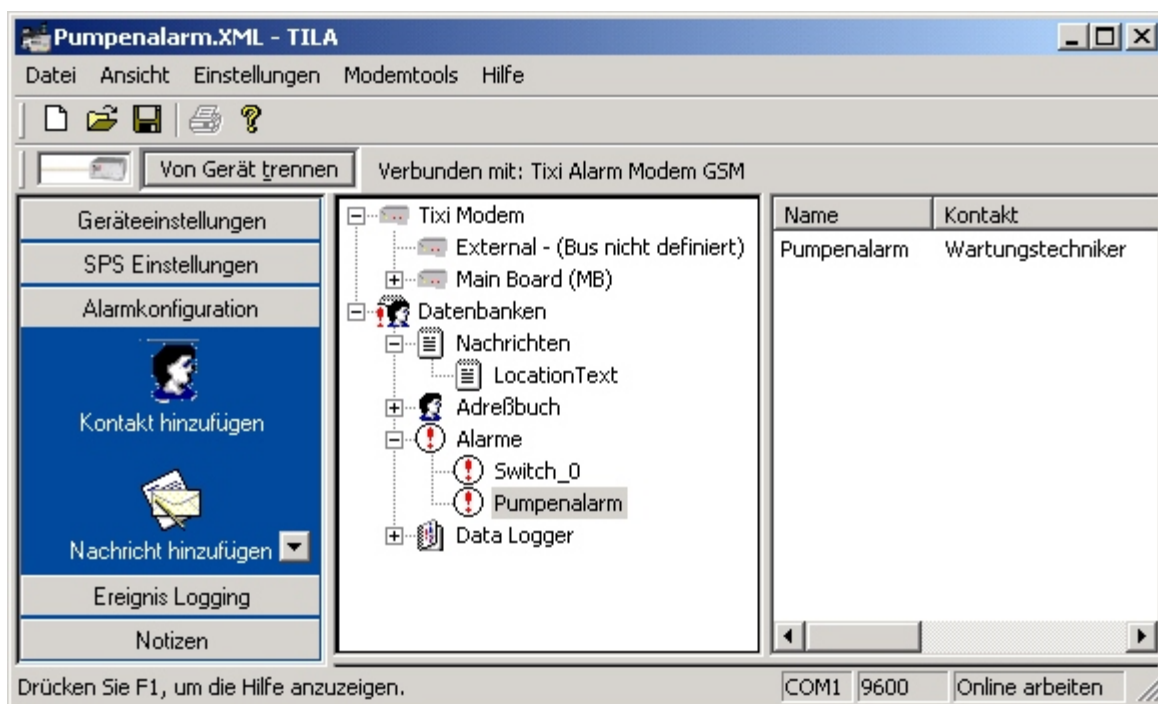
4.3 TiXML console for the developer

The Windows TICO program is designed for creating TiXML projects for complex tasks. Experience in XML programming is useful but is not an absolute necessity. Demo projects with a tutorial are supplied.

Training for a fast entry in TiXML and TICO
A 1–2 day seminar is recommended for a fast entry in TiXML and TICO.

4.4 Secure Login: Protection against unauthorized access

Tixi Alarm Modems can be protected against unauthorized access. To do this, the names and passwords of authorized users are defined in the software tool (TICO, TILA) during the configuration. In this way, only authorized users are able to modify or read the TAM configuration or access the Tixi Alarm Modem locally or remotely.

If the Secure Login data was "forgotten", the device must undergo a factory reset and restored to its original default settings. This is the only way to delete the entire configuration that also contains the project (see 6.2.2). The TAM must then be reconfigured with a project and a Secure Login.

4.5 R-CON RS 232 remote bridge tool

If you are using a PLC programming software to configure and control your PLC, you can also make use of its functions remotely by means of the R-CON remote bridge tool. To do this, the PLC must be connected to a serial interface on the TAM. The R-CON remote bridge tool also has to be installed on your local PC in addition to the PLC programming software.

R-CON is a Windows-based software that establishes a connection to the remote Tixi Alarm Modem and uses its RS232 interface to the PLC as a virtual local COM interface for your PC. This transparent modem connection allows you to access your PLC using your standard software as if it was connected directly to your PC. You can then carry out any required task remotely.

R-CON supports the Secure Login function of the Tixi Alarm Modem, thus enabling R-CON to request the entry of user name and password, which are then automatically transferred to the TAM. The TAM only grants access to the PLC for teleservice and remote configuration if these entries are correct.
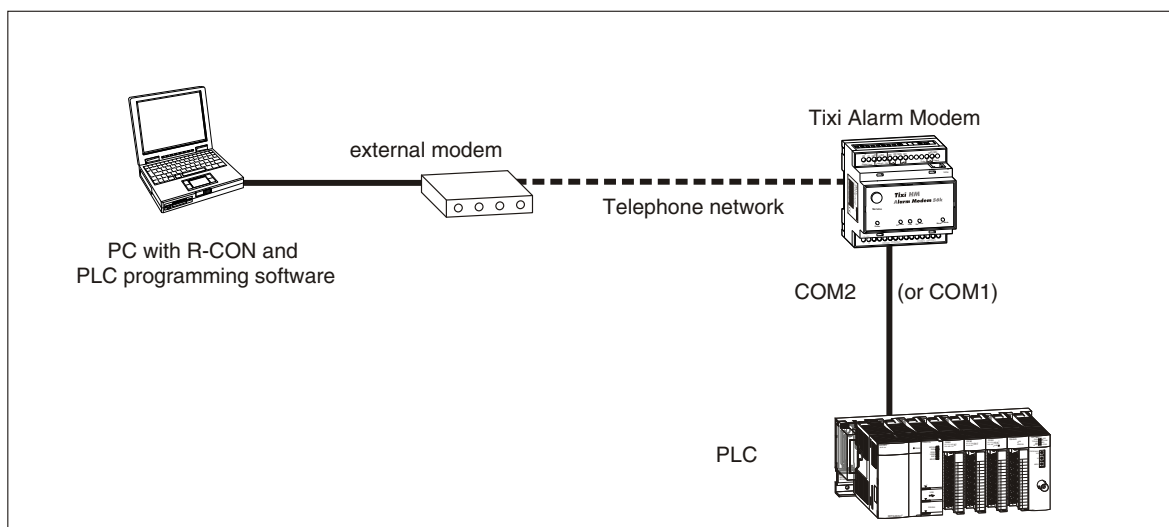
5 Communication with a PLC

Tixi Alarm Modems can communicate with a PLC in three different ways:

- The Tixi Alarm Modem can speak the language of your PLC.
  Technical feature: The required **PLC driver** is integrated in the Tixi Alarm Modem.
- The PLC speaks the language of the Tixi Alarm Modem.
  Technical feature: The **Tixi driver** is loaded in the PLC.
- The Tixi Alarm Modem and the PLC can speak a third joint language.
  Technical feature: Tixi Alarm Modem and PLC use the **same protocol**, e.g. Modbus, TixiBus.

5.1 PLC driver in the Tixi Alarm Modem

Tixi Alarm Modems can communicate with the relevant PLCs using their protocols without having to load a program, driver or function block into the PLC concerned. They then have direct access to all variables, markers and I/O on the PLCs. To do this, you simply have to select the appropriate driver for your PLC from the component system of the Feature Packs. Other PLC drivers are available from Tixi.Com on request and can be developed to customer specifications.

PLC driver for Tixi Alarm Modems

PLC manufacturer	Series	Tixi Feature Pack
Mitsubishi Electric	Alpha XL	FP-MIT-AL
	MELSEC FX1S/FX1N, MELSEC FX2N/FX2NC	FP-MIT-FX
Moeller Electric	EASY 400–800, MFD-Titan	FP-ML-EASY
	PS4 Series	FP-ML-PS4
Siemens	Simatic S7-200	FP-S72
VIPA	100V, 200V, 300V	FP-VIPA
ABB	AC010	FP-ABB-AC10
	AC31	FP-ABB-AC31
Saia Burgess	PCD1, PCD2, PCS	FP-SA-SB
Allen Bradley	PICO	FP-AB-PI
Theben	Pharao2	FP-TH-P2
Fieldbus standards		
Modbus	RTU	FP-MOD-RTU
	ASCII	FP-MOD-ASC

5.2   Tixi driver in the PLC

If your PLC protocol is not yet supported by Tixi and the PLC does not support a common fieldbus standard you can write a Tixi driver for any PLC protocol . This is loaded into the PLC and then starts the required functions and tasks in the Tixi Alarm Modem. There are two options available for communication with a TAM:

- **TiXML commands**
- **TixiBus protocol**

TiXML commands for powerful PLCs

This powerful XML text protocol allows you to create a whole range of functions and the entire configuration of a Tixi Alarm Modem.

Tixi bus protocol for small PLCs with little memory

This very simple protocol is particularly suitable for very small controllers and PLCs with little memory and which only require basic functions for exchanging values between PLC and Tixi Alarm Modem.

5.3   Fieldbus systems

Different international fieldbus systems can also be used as a common standard for communication between a TAM and the PLC. The following bus systems are currently available:

- **Modbus (ASCII and RTU)**
- **M bus**
- **CAN bus**
- **TixiBus**

Other fieldbus protocols are available from Tixi.Com on request and can be developed to customer specifications.

6   Appendix

6.1   Technical data of the HM series

Main functions

Alarm and fault indication unit	Automatic generation and sending of fault messages from message templates and actual values (from PLC or Tixi Alarm Modem).
	Up to 100 events can be defined to trigger actions (depending on time requirements). Address book with up to 100 addresses, max. 100 message texts, max. 100 alarms.
Acknowledgment	Acknowledgment option for an alarm and triggering of an alarm cascade if the acknowledgment is not received in the time specified.
	Acknowledgment possible by SMS, Express E-Mail, e-mail and web server.
Alarm cascade	Several levels of alarm actions and recipients for when alarm messages are not acknowledged in time.
	Alarm actions can be SMS, e-mail, faxes, Express E-Mails, switching operations and log entries. Alarm cascade can run on a database server on the Internet.
PLC protocols	The Tixi Alarm Modem communicates directly with several PLC types of major manufacturers (PLC protocols already integrated).
	The Tixi Alarm Modem can remotely access these PLCs.
Event	Event, such as: Change at input port, set scheduler time, button actuation, fault, incoming call, PLC communication aborted, alarm acknowledgment.
	All actions in the Tixi Alarm Modem are event-triggered.
Fax	Send messages as fax (text).
SMS	Send and receive SMS messages.
e-Mail	Send and pick up e-mails (SMTP / POP3).
Express e-Mail	Send and receive e-mail via direct telephone connections. Secure e-mail transfer without Internet (see section 6.7) with immediate sending to the recipient.
Pager	Messaging service: Currently only Cityruf in Germany supported. Other services (also worldwide) are possible..
Remote switching	Remote switching of outputs or changing of variable values of the connected PLCs and the Tixi Alarm Modem by sending switch commands as SMS, e-mail or Express e-Mail to the Tixi Alarm Modem.
	Password protection optional.
	Switching also by dialing with caller identification (CLIP) without connection establishment, i.e. without telephone charges.
Data logging	PLC variables, inputs/outputs, events, dial-in attempts, system data etc. can be recorded and compressed in different log files.
	Log data can be sent at regular intervals or event-triggered by e-mail, Express E-Mail and fax.
	The format can be set, such as CSV for Excel, binary, XML.
Web Server	The Embedded Web Server can visualize PLC or modem data in any browser via the Internet. Worldwide access to PLC and Tixi Alarm Modem.
	Dynamic IPs. CGI interface for data requests and modifications.
Teleservice	Configuration of the Tixi Alarm Modem and a connected PLC by remote dial-in via modem.
	Configuration changes by e-mail and Express E-Mail.

Scheduler	Calendar and scheduler with time resolution from 1 minute to 1 year for any action (e.g. alarm schedules, data logging schedules, switching tasks). Specific times can be linked via logic operations and conditions.
Sequencer	Execution of switch operations, setting of variables or control of analog outputs according to a detailed sequence with priorities and higher-level schedule periods. The data can be sent by e-mail to the Tixi Alarm Modem. Each action is assigned a specified time and up to 6 variables that can be set.
OEM functions	OEM protocols, calculation functions and routines can be incorporated in the Tixi Alarm Modem.
Logic operations	Logic operations with variables, ports and with the scheduler.
Caller identification	Switching with CLIP feature (Calling Line Identity Presentation), i.e. call number identification.
Security	Local and remote configuration can be protected against unauthorized access by login and password.

System architecture

CPU	32-bit RISC processor
Program memory	2 MB Flash ROM, 1 MB SRAM
Data memory	2 MB Flash Memory onboard, non-volatile
Expansions	16 MB, 32 MB, 64 MB (128 MB, 256 MB) Flash memory modules
System clock	Real-time clock, battery-backed Time synchronization via an Internet time server

Analog modem

Network	Analog telephone connection (a/b Interface), RJ11
Data transmission	300bps – 56kbps ITU-T (V.90, V.34+, V.32bis, V.32, V.22bis, V.22, V.21), Bell 212A, Bell103
Fax transmission	Fax group 3 / Class 1 2400bps – 14,4kbps, ITU-T (V.17, V.29, V.27ter, V.21 ch2)
Error correction/ data compression	V.42 / MNP 2-4, V.42bis / MNP5

Firmware

Operating system	Commercial RTOS (real-time multitasking operating system) with C++ abstraction layer
File system	Commercial DOS compatible Flash file system C++ abstraction layer
External control protocol	TiXML: simple, text-based XML-compatible protocol for modem configuration. External applications can create events / alarms by sending event commands.

The type and number of interfaces and inputs/outputs depends on the model.
Refer to the overview in section 1.3.1 and the models in chapter 6.6.

Serial interfaces

RS232		To ITU-T V.24, V.28, Hardware Handshake
	COM1	D-Sub 9 pole, Socket FIFO 16550, max. 230.400 bps, Signals: DTR, DSR, RTS, CTS, DCD, GND, RI, RxD, TxD Transmission distance 12 m
	COM2	D-Sub 9-pole, plug, otherwise as for COM1
RS485/422		To EIA/TIA-485
	COM2	5 pole screw terminal for T+, T-, R+, R-, 0 V max 1.5 Mb/s, not isolated Termination integrated, activated via DIP switches Transmission distance max.1200 m depending on the transmission rate, bus system and cable type

Inputs/Outputs

Inputs	digital	Can be connected via isolated contacts
	analog	0 – 10 V, 12-bit resolution
Outputs	digital	Isolated, AC/DC 125 V, 130 mA
	Relay	Isolated, 230 V AC 3 A, 110 V DC 0,3 A
Terminals Inputs/outputs		Screw terminal (5.08 mm grid), cross-section max. 2.5 mm²

General data

Power supply		10 – 30 V DC, max. 0.7 A, screw terminal 2.5 mm²
LEDs		Power, Process, Line (connection), Data out, Modem Mode
Operating elements		Buttons, freely configurable
Housing/mounting		DIN rail housing / on 35 mm top-hat rail to EN 50022, vertical, horizontal
Conformity	EMC Safety	C€, EN 50081-1, EN 50082-1, EN 55022, ETS 300342-1 (G) EN 60950
	Telecom	R&TTE TBR19, TBR31
Temperature range	Operation	0 to +50 °C
	Storage	-30 to +70 °C
Permissible air humidity		5 to 95 % relative humidity, non-condensing
Degree of protection		IP20
Degree of pollution		Pollution degree 2
Dimensions		Width: 88 mm x height: 57 mm x depth: 91 mm
Weight	220 g	HM17, HM27, HM3x, HM47: 260 g

6.2 LEDs, Reset, Update, Error Diagnostics

6.2.1 LEDs on restart

The Tixi Alarm System runs through a memory test after the power supply is switched on, after a factory reset or after new firmware is installed.

Power	Process	Line	Data Out	Modem Mode	
○			○		Start of self-test
○	●	●	○	●	Test of all LEDs
○			((○)) **flashes**		Memory test
○					TAM is operational.
					Duration of self-test approx. 12 s

6.2.2 Factory Reset

A factory reset deletes all the data stored in the Tixi Alarm Modem and overwrites them with factory settings.

Procedure:

- Switch off the Tixi Alarm Modem.
- Press the Service button and keep depressed.
- Switch on the Tixi Alarm Modem and wait for the Power LED to flash.
- Release the Service button momentarily and
- Press again until the Power LED visibly flashes at a faster rate.
- Release the Service button.

The configuration is completely deleted and the TAM starts up with the default settings of the manufacturer.

> ⚠️ ***ATTENTION: A factory reset deletes the configuration!***
> *Remember that this operation will delete any configuration contained in the modem.*

LEDs during factory reset

Power	Process	Line	Data Out	Modem Mode		Duration
(yellow) flashes			(yellow)		Service button was pressed during startup.	1–2 s
(yellow) flashes quickly			(yellow)		Renewed pressing of the Service button until the Power LED flashes at a faster rate, and Enable.	1–2 s

Restart and self-test						
	(red)	(green)	(yellow)	(red)	Test of all LEDs.	
(yellow)			(yellow) flashes		Memory test and reformatting of the data memory (total deletion).	25 s
(yellow)					TAM is operational.	
					Total duration	**approx. 30 s**

6.2.3 Firmware update

A new firmware can be loaded onto the Tixi Alarm Modem using an upload tool. In this case the LEDs of the Tixi Alarm Modem will light up as follows:

Power	Process	Line	Data Out	Modem Mode		Duration
(yellow)					TAM is operational.	
(yellow) flashes			(yellow)		Start of update.	2s
			(yellow)		TAM waiting for commands.	
		(green) flashes	(yellow) flashes		After start of update: Transfer of firmware	approx. 250 s
	(red) flashes	(green)			Possibly during the update: Processing of transferred firmware in TAM.	

Restart and self-test						
(yellow)	(red)	(green)	(yellow)	(red)	Test of all LEDs	
(yellow)			(yellow) flashes		Memory test	25 s
(yellow)					TAM is operational.	
					Total duration	**approx. 4 min 40 s**

The duration of a firmware update may vary according to the operating system and the speed of the serial PC interface (the values shown in the table were achieved at 115,200 baud).

6.3   Accessories

The following parts can be obtained via Tixi.Com for equipping your Tixi Alarm Modem. Other accessories are available on request and at www.Tixi.Com.

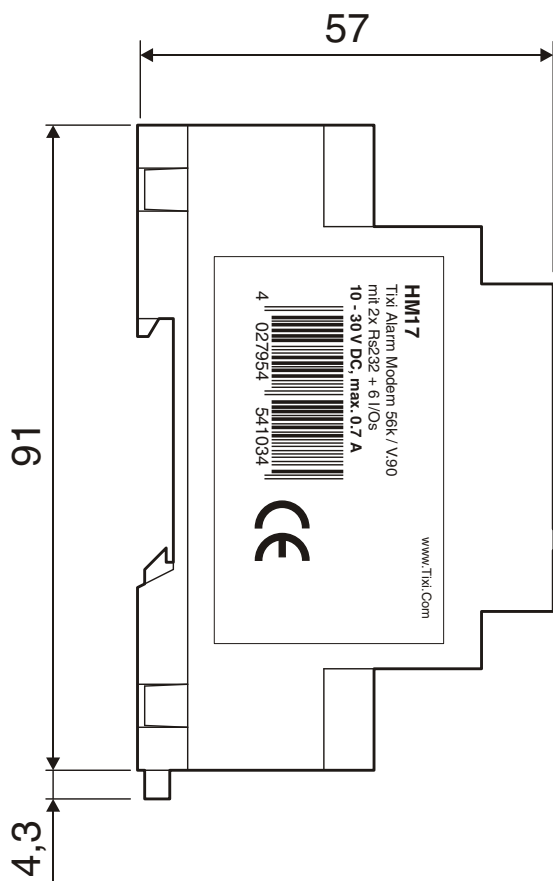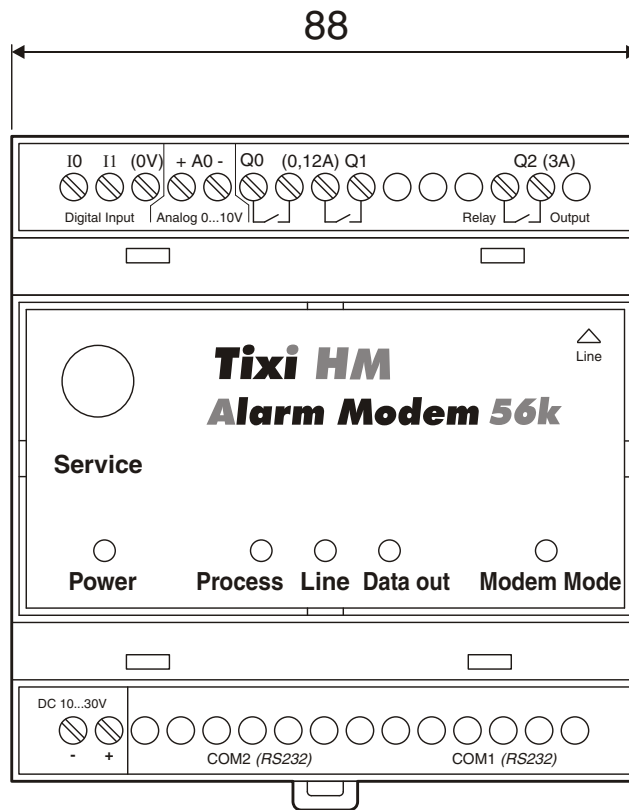| Accessories	Description
ZK-BA	Blue Adapter (zero modem gender changer, RS232, D-Sub-9, plug-plug)
ZK-R9M9F180	9-pole serial interface cable (plug-socket), length=180 cm

6.4   Support and training

Any enquiries concerning the installation and operation of the modem described in this manual should initially be directed to your specialist dealer or supplier, who will also be able to offer training courses for your individual requirements. Any other enquiries should be directed to the Tixi SupportLine on Tel.: ++49 (0)1 90 / 86 10 85, 1.86 €/min. or by using the Support form in the Service area of our home page at www.Tixi.Com. This page provides answers to frequently asked questions as well as up-to-date information.

Training courses and individual adaptions

Several training courses for you to become acquainted with the wide range of options of the Tixi Alarm Modem and the software are available at our company headquarters in Berlin or can be arranged at your premises.

We can tailor projects with TILA, TICO or TiXML on request, according to the requirements of your application.

6.5 Dimensions

88

I0 I1 (0V) + A0 - Q0 (0,12A) Q1   Q2 (3A)

Digital Input | Analog 0...10V   Relay   Output

Tixi HM
Alarm Modem 56k

△
Line

Service

Power   Process   Line   Data out   Modem Mode

DC 10...30V

-   +   COM2 *(RS232)*   COM1 *(RS232)*

57

91

4,3

HM17
Tixi Alarm Modem 56k / V90
mit 2x Rs232 + 6 I/Os
10 - 30 V DC, max. 0.7 A

4 027954 541034

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CE

6.6 Terminals

6.6.1 HM2x: Tixi Alarm Modems with RS232 and up to 6 I/Os

HM10, HM20
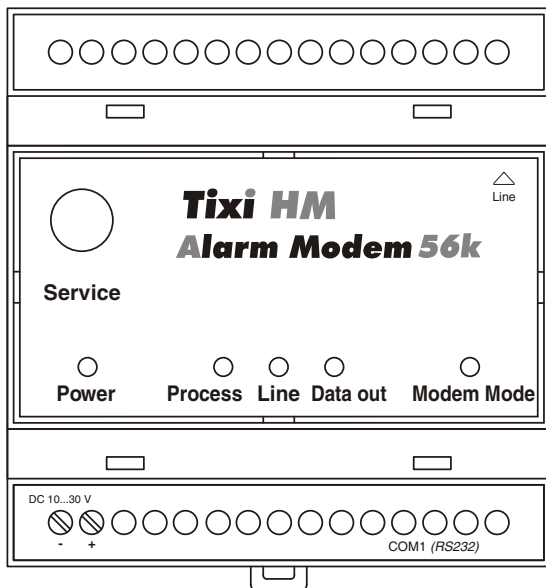
RS232-F (COM1)
no I/Os

HM11, HM21
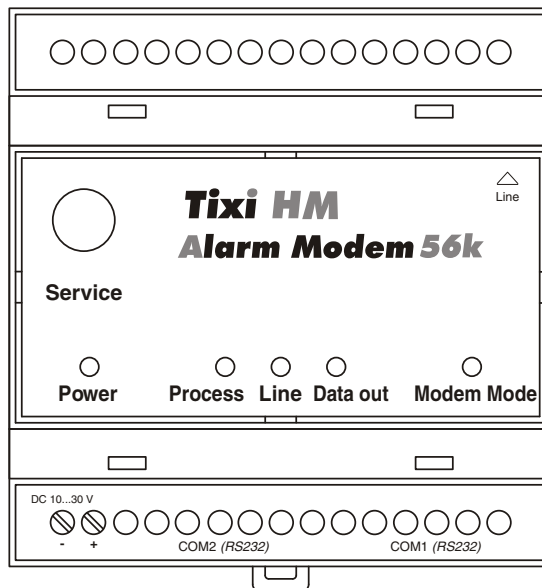
RS232-M (COM2)   +   RS232-F (COM1)
no I/Os

HM17, HM27
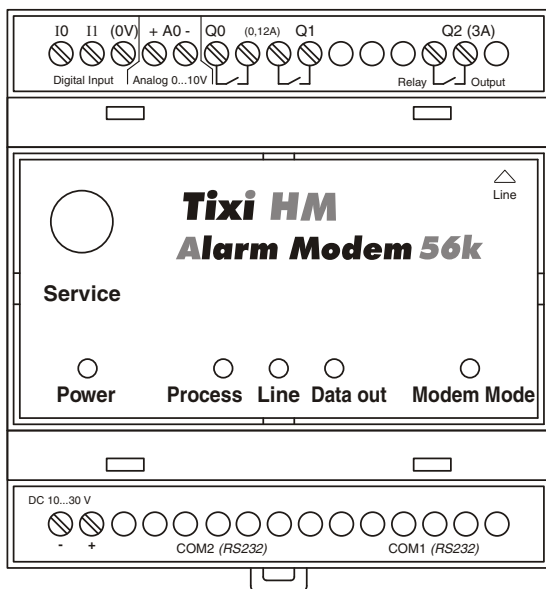
RS232-M (COM2)   +   RS232-F (COM1)

I/Os	DI	DO	AI	RO
	2	2	1	1

Identically constructedness

The HM10/HM20, HM11/ HM 21 and HM17/HM27 only differ in the rating of the power supply and are otherwise identical.

Meaning of abbreviations:

RS232-F = socket (female)
RS232-M = plug (male)
AI = Analog input
DI = Digital input
DO = Digital output
RO = Relay output

6.6.2   HM3x: Tixi Alarm Modems with RS232 and up to 13 I/Os

HM30

RS232-M (COM2)   +   RS232-F (COM1)

I/Os	DI	DO	AI
	12	0	1

HM31

RS232-M (COM2)   +   RS232-F (COM1)

I/Os	DI	DO	AI
	10	1	1

HM32

RS232-M (COM2)   +   RS232-F (COM1)

I/Os	DI	DO	AI
	8	2	1

HM34

RS232-M (COM2)   +   RS232-F (COM1)
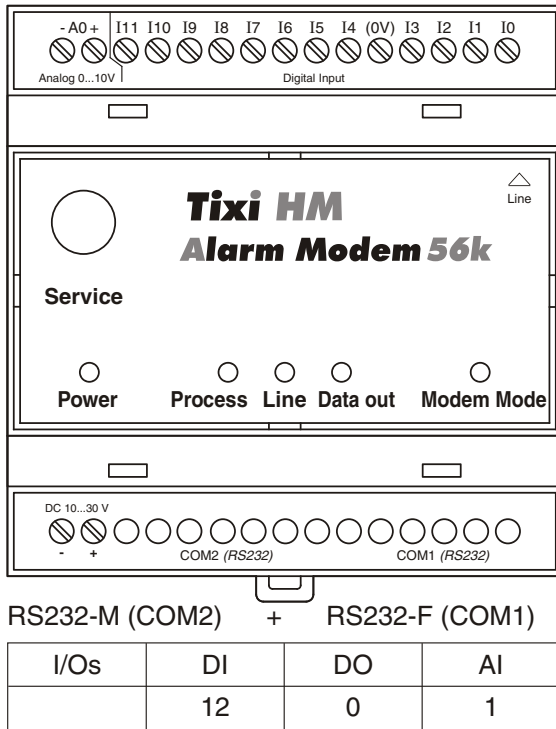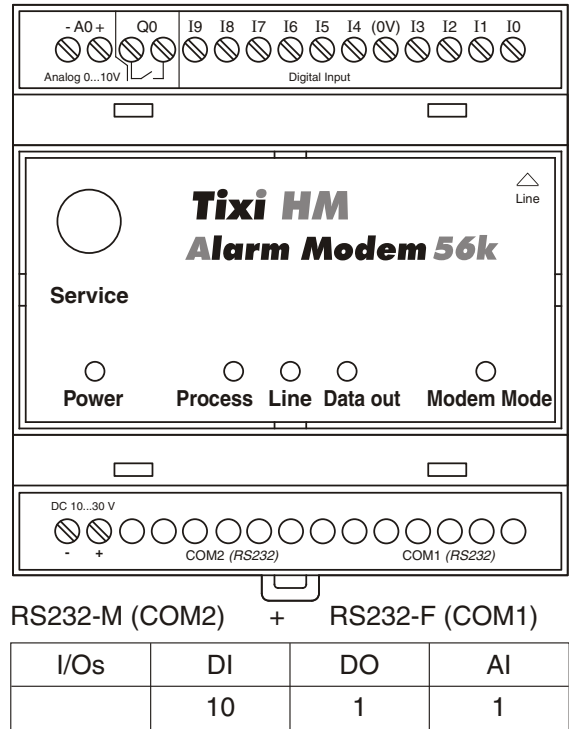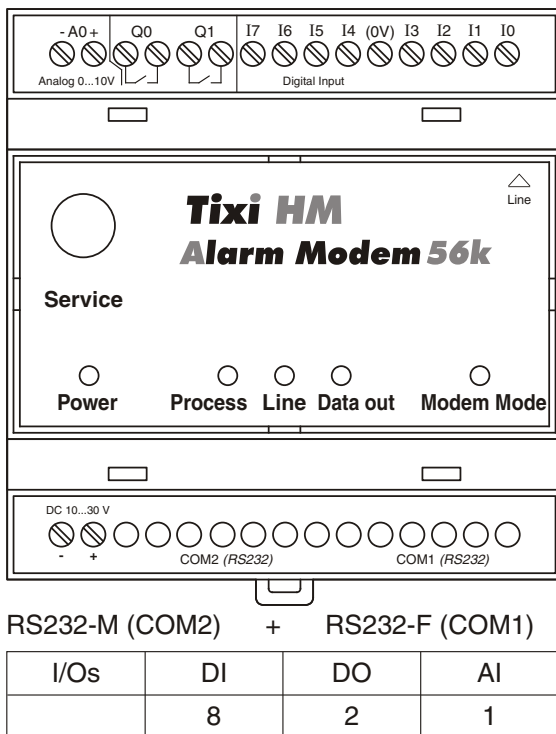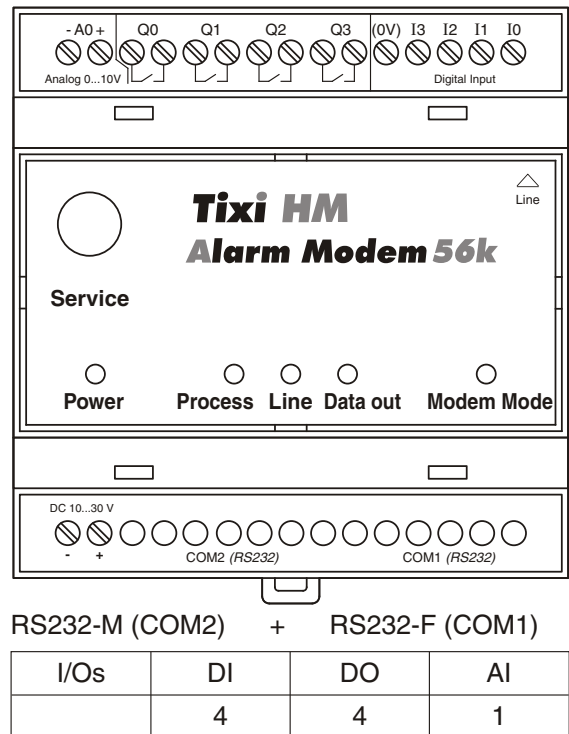
I/Os	DI	DO	AI
	4	4	1

HM33 without figure   RS232-M (COM2)   +   RS232-F (COM1)

I/Os	DI	DO	AI
	6	3	1

6.6.3 HM4x: Tixi Alarm Modems with RS485/422 and up to 6 I/Os

HM41
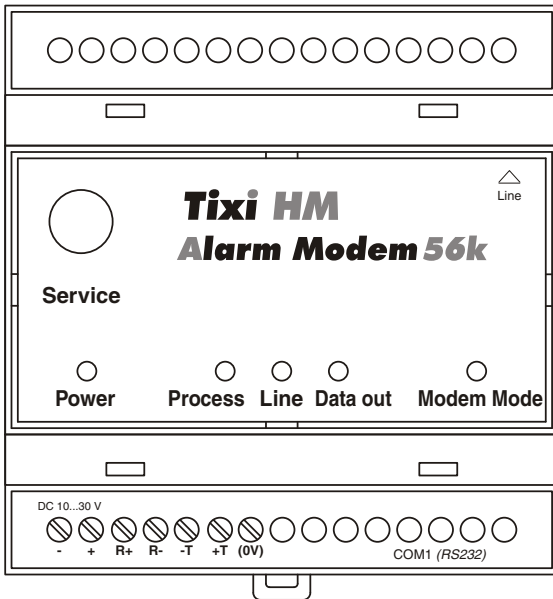
RS485/422 (COM2) + RS232-F (COM1)
no I/Os

HM47
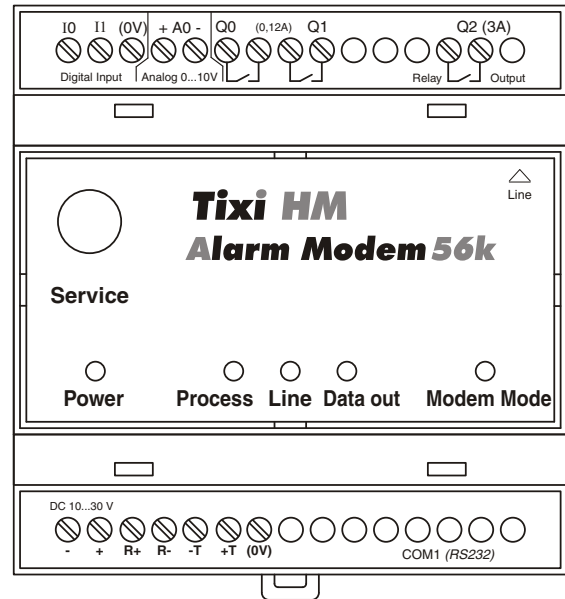
RS485/422 (COM2) + RS232-F (COM1)

I/Os	DI	DO	AI	RO
	2	2	1	1

Meaning of abbreviations:

RS232-F = Buchse (Female)
AI = Analog input
DI = Digital input
DO = Digital output
RO = Relay output

6.7 Express E-Mail

Fernwirken per Express E-Mail
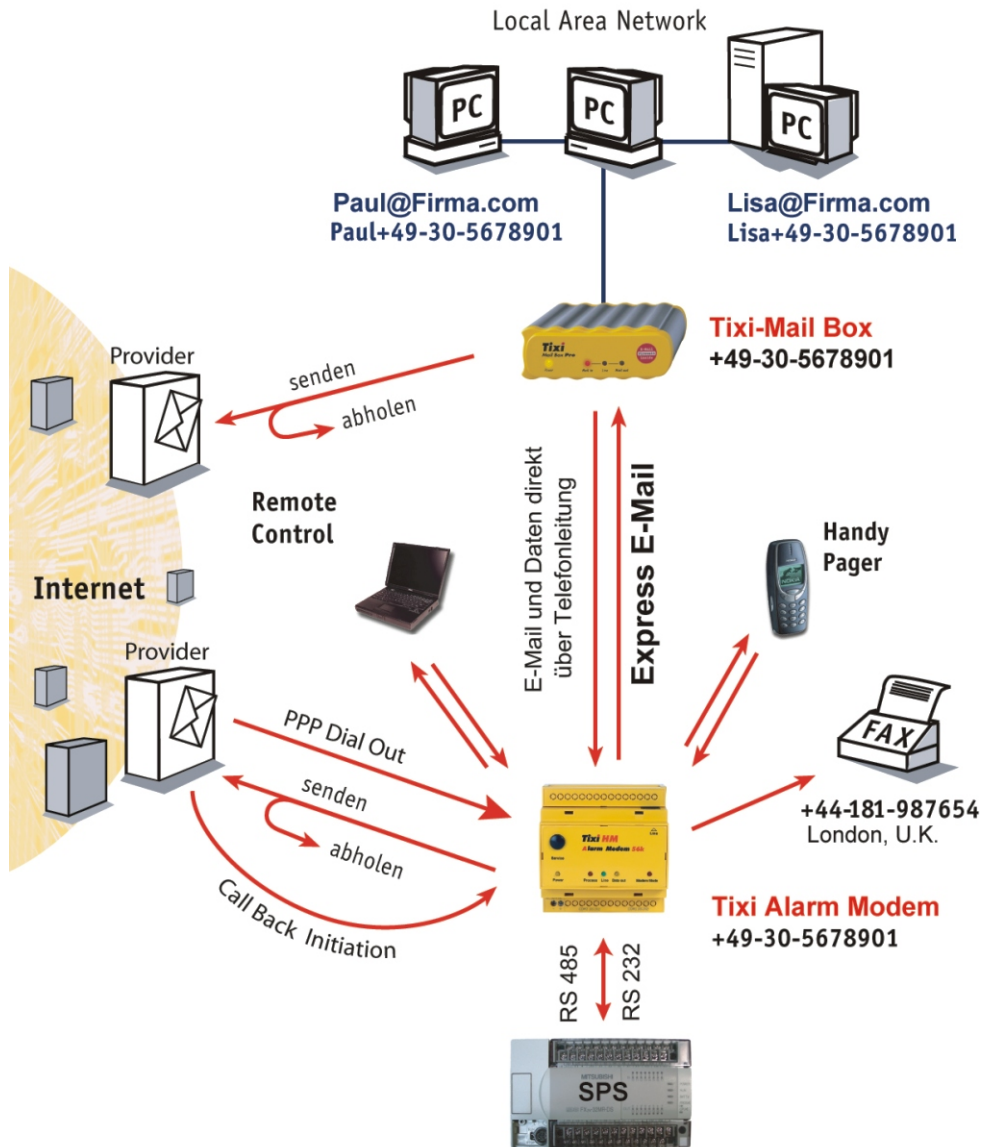
Was bietet die Express E-Mail?

- Versand Punkt zu Punkt ohne Internet
- sofortige Zustellung
- schnell, sicher, vertraulich
- Adresse = Name + Telefonnummer

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ZM-HM-D   www.Tixi.Com

Handbuch HM (deutsch)

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CE