

Tixi Alarm Modem GSM Hardware Manual

HG100 and HG400 Series

Version 1.0.1

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Security Advice

Intended Target Audience

This manual is aimed exclusively at suitably qualified electrical engineering personnel being 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 manuals, any intervention in the hardware and software of our products must be carried out by our specialists only.

Proper Use

Tixi devices 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 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 8 MB non-volatile Flash memory. This can be expanded by up to 72 MB, thus providing enough space for your requirements.

Tixi Alarm Modems are fully automatic and can

- send alarm and status messages via SMS, Express E-Mail, E-mail or fax
- receive switch commands via SMS or Express E-Mail and forward them to a PLC,
- send the data of a connected PLC/system,
- exchange data between PLC/systems

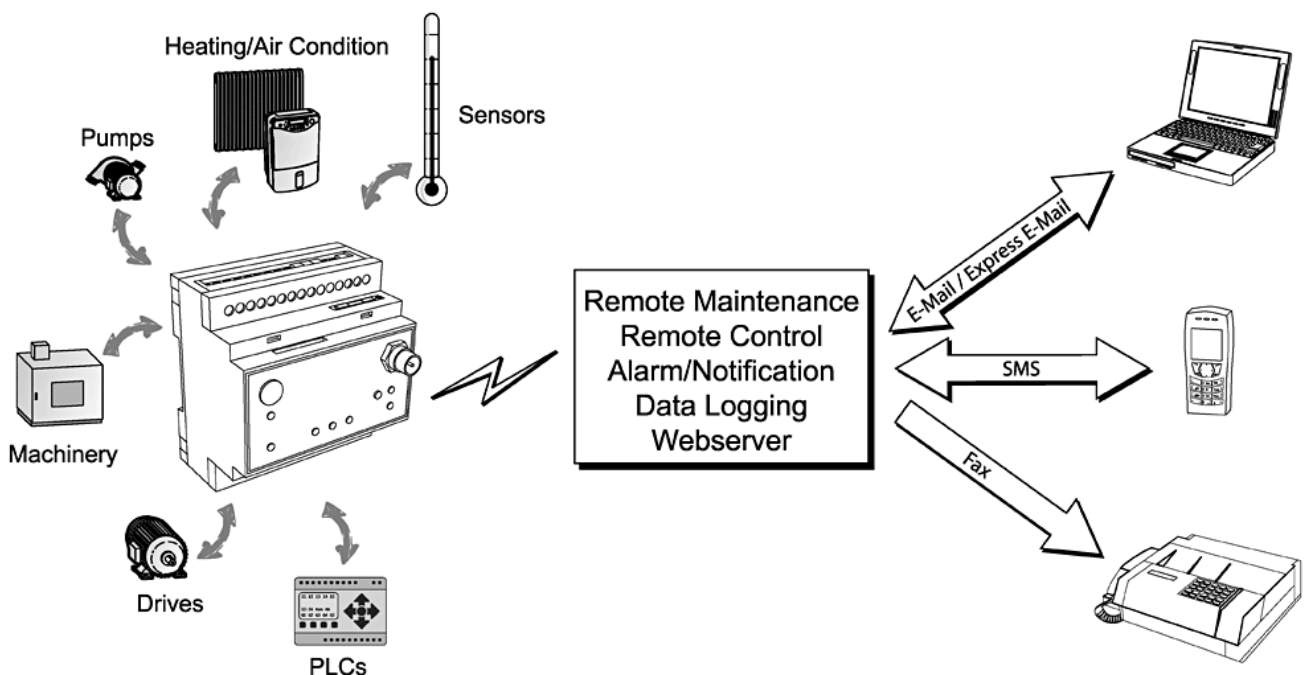
What's more:

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

The Tixi Alarm Modems of the HG series utilize a quadband GSM modem for usage in GSM networks (850/900/1800/1900 MHz). Additionally, it complies to GPRS Class 10.

1.1 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 wide range of features 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.

1.2 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.

2 Function Overview

2.1 Integrated PLC Protocols

Tixi devices 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.

These protocols are supported:

Mitsubishi	Moeller	Siemens	ABB	Saia-Burgess
Alpha XL	Easy400	S7-200	AC010	PCD1
FX1S	Easy500	S7-300	AC31	PCD2
FX1N	Easy600	S7-400	AC500	PCD3
FX2N	Easy700		AC800	PCS
FX2NC	Easy800		CL	
FX3U	MFD-Titan	VIPA		Allen-Bradley
	PS4-Serie	100V	Theben	Serie A
	EasyControl	200V	Pharao2	Serie B
	XC/XVC	300V		GFX
		SPEED7		

OEM Protocols

Manufacturers (OEM) and customers with special PLCs may utilize one of these options:

- Common access to Modbus industrial standard or to the TixiBus protocol
- Tixi.Com implements the appropriate protocol into the Tixi device.

2.2 Alarm Notification with Confirmation

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.

Address book:

The SMS, fax and E-mail addresses (max. 100) are managed in an address book.

Messages:

The message texts (max. 100) can contain up to 100 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, other recipients can be notified. This can be cascaded as required.

2.3 Remote switching via SMS, E-Mail and CallerID

A short command via SMS 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 be acknowledged, too. 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.

2.4 PLC Data Logging

Tixi Alarm Modems may record any PLC data (variables, ports) and system data with timestamp inside the non-volatile Flash memory (8 MB - 72 MB). The poll cycle may be adjusted at will, as well as the extent of data being logged.

The logged data is sent as XML text file or as Excel-compliant CSV via E-mail, Express E-Mail or Fax. This may be triggered periodically via scheduler, or by a specific event occurring. There may be several logfiles in use at the same time. The memory acts as a ring buffer.

2.5 Teleservice via PC

A Tixi Alarm Modem can be used to handle the remote maintenance of several controllers via a GSM connection. 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 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-in and dial-in attempts are recorded.

2.6 Web Server inside the Tixi Alarm Modem

Web server functionality is implemented inside the Tixi Alarm Modem, so any web browser may be used to visualize facility status, PLC data and logfiles respective alter these by mouse click.

For that purpose, merely some HTML pages need to lodge inside the modem. Access is done via GSM or GPRS. Static IP addresses are not necessary.

2.7 Web Portal with Database and Facility Record

A variety of PLC systems and Tixi Alarm Modems may me administered by means of a SQL database. Logged data may be stored, analyzed and visualized here.

Authorized users only are granted access to these data. The database may be adapted to custom needs with ease and is open to other systems as well.

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 10 minutes for a confirmation via SMS. Service technicians can query status values by SMS (or dial-in and PC).
- Wait for a switching command for 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 output 17 (or a relay).
- After 5 minutes, send a status message via SMS and E-mail if pump 2 is running or not.
- If not so, send SMS, fax and E-mail to fire brigade and others. Send an alarm notification to a web-based SQL database.
- Send the last 72 hours logged data as Excel-compliant CSV file to two E-mail recipients or to a web-based SQL database.

3 Model and Equipment Versions

3.1 Interfaces and Terminals

Tixi devices are available in different configurations. Their basic functions identical; only the type and number of interfaces and I/Os may vary, according to the model used.

Interface	HG120 HG420	HG121 HG421	HG127 HG427	HG13x HG43x	HG141 HG441	HG147 HG447	HG171 HG471	HG176 HG476	HG123-M HG423-M	HG125-2S0 HG425-2S0
COM1	RS232	RS232	RS232	RS232	RS232	RS232	RS232	RS232	RS232	RS232
COM2	-	RS232	RS232	RS232	RS485/ 422	RS485/ 422	MPI	MPI	RS232	RS232
Digital In	-	-	2	0...12	-	2	-	2		
Analog In	-	-	1	1	-	1	-	1		
Digital Out	-	-	2	0...4	-	2	-	2		
Relay Out	-	-	1	-	-	1	-	-		
M-Bus									1	
S0										1

The HG400 models vary from the HG100 in that they come with an additional SD card reader.

3.2 Tixi I/O Modules

As accessories, there are Tixi I/O modules available for Tixi devices, which allow the device being expanded by up to 128 additional in- or output ports. Using the Tixi-I/O-Bus, up to 8 extension modules (with up to 128 I/Os at large) may be connected to the Tixi device. The Tixi-I/O-Bus may be used for custom applications, too.

I/O Module	Description
XP84D	8 digital inputs, 4 digital outputs
XP88D	8 digital inputs, 8 digital outputs
XP84DR	8 digital inputs, 4 relay outputs
XJ06	interfaces for up to 4 power meters

3.3 Memory Modules

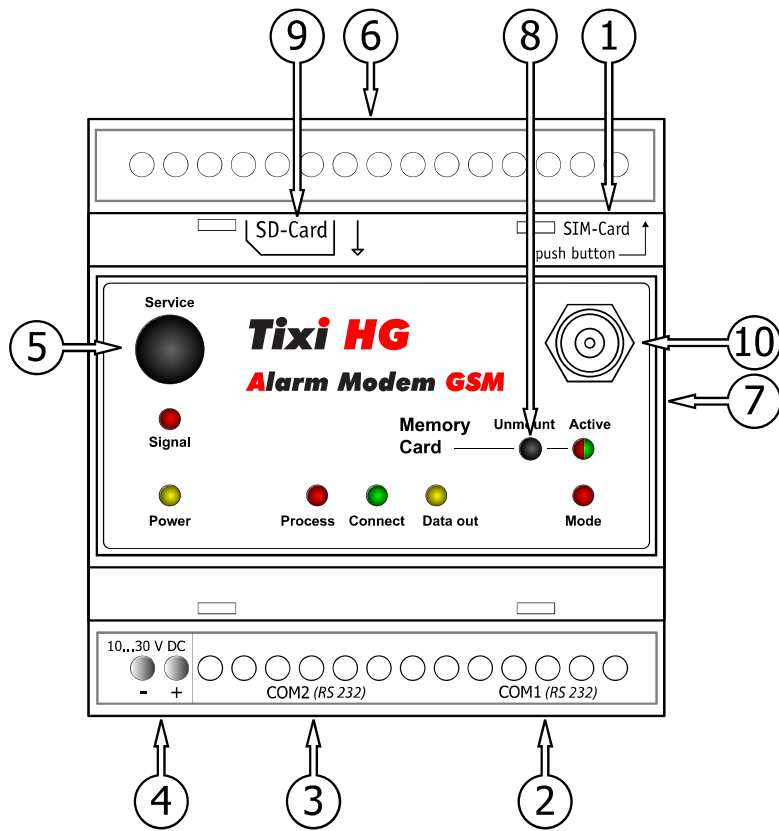
Tixi devices are equipped with 8 MB flash memory which saves data even without power supply. Additional flash memory modules allow to expand this memory to up to 72 MB.

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

For additional information and purchase of these flash memory modules, please contact your retailer or Tixi.Com GmbH directly.

4 Installation and Mounting

4.1 Overview of Terminals
















Nr.	Labelling	Meaning
1	SIM-Card	SIM card slot
2	COM1 (RS232)	9 pin D-Sub jack
3	COM2 (RS232)	9 pin D-Sub plug (HG2x and HG3x only)
3	COM2 (RS485/422)	5 screw terminals (configurable via DIP switches, HG4x only)
3	COM2 (S7-MPI)	9 pin D-Sub jack (HG7x only)
4	DC 10...30V	Power supply (2 screw terminals, for HG123/423: 18...30 V DC)
5	Service	Button
6	I/Os and LEDs	(depending on device type)
7	Tixi I/O-Bus	6 pin precision jack for I/O modules
8	Unmount	Button to unmount SD card
9	SD-Card	SD card slot
10	Antenna	FME antenna plug




A detailed depiction of all connectors of all Tixi Alarm Modem models is to be found within chapter 13.4 of this manual.

4.2 Meaning of LEDs





The following table holds an overview of the LED indicators meaning.

LED	Status	Meaning
Power (yellow)		Device operational
		No power supply
Process (red)		Processing in progress: message generation, variable changes etc.
		Normal Operation, no processing in progress
Line (green)		GSM connection present
		Modem is not logged onto the GSM network
	 (flash 1x)	Modem is logged onto the GSM network
	 (flashes)	Outgoing/incoming call: establishing connection
Data out (yellow)		Message ready to send waits inside the device
		No message in outbox
Modem Mode (red)		TiXML Mode (standard mode)
		Modem Mode (device usable as generic modem via COM1)
		Transparent Mode (device provide transparent connection)




HE17x/47x only:

Connect Data		connection to PLC established
	 (flashes)	transmits data to/from PLC
Active Param.		modem is configured correctly and logged onto the MPI network

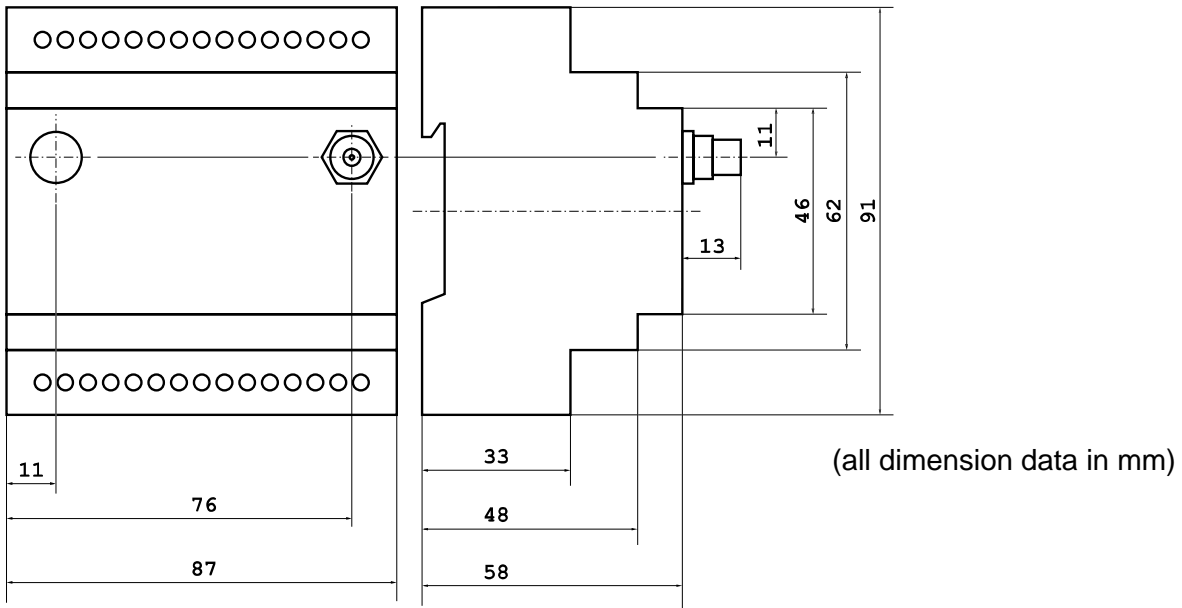
HE400 only:

Signal (red)		Freely programmable, for custom use
Active		No SD Card present
		SD Card mounted
	 (flashes)	SD Card access

HE121/421, HE127/427, HE141/441 and HE147/447 only:

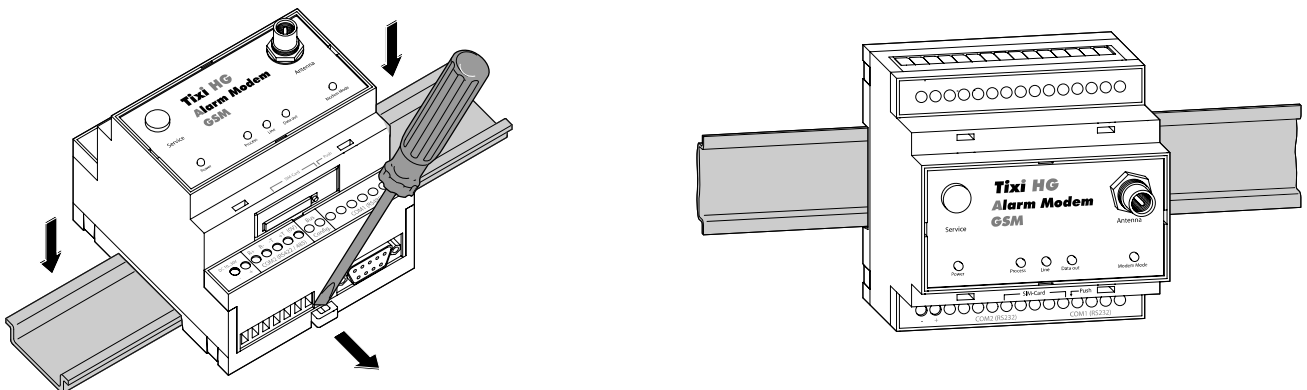
Data		no communication at COM2
		PLC or transmode data transmission from COM1 to COM2
		PLC or transmode data transmission from COM2 to COM1

4.3 Dimensions



4.4 Installation

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



DANGER:

- 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 shock or severe vibration.

4.5 Connecting GSM Antenna

First of all, find a suitable location for mounting the GSM antenna outside of the control cabinet. In order to find a suitable location with a good reception quality, you may use the software Tixi Alarm Editor (TILA) to display the signal quality.

We recommend to conduct several measurements and calculate an average value, as signal quality may range substantially at the intended place of installation. If signal quality is too low, use an antenna with high signal gain. Especially, E-mail and fax transmission requires a more reliable connection than sending SMS only.

In order to reliably establish data connection (such as for remote config or sending E-mail), signal level shall be at least -77...-53 dBm. With levels between -95...-79 dBm, SMS will still work but data connections may break frequently. Below -97 dBm, GSM operation is usually not possible.

Screw the antenna or antenna cable into the antenna plug at the front-side of the modem.

Standard GSM antenna usable

Standard GSM antennas with an FME plug can be used. The GSM antenna is not supplied with the modem and can be ordered separately. A list of available antennas is to be found at chapter 0 of this manual.

Use the correct antenna!

Ensure that you buy an antenna with the correct frequency range for your mobile communications network. Further information on this is provided in the Appendix of this manual in chapter 13.1.4.

Extending the antenna cable

If the length of the antenna cable is not sufficient for your requirements, you can use a suitable extension cable purchased as an accessory from a GSM outlet. Take into account the attenuation of these cables that will reduce the antenna gain and observe the relevant specifications of the manufacturer.

4.6 Inserting the SIM card

To insert the SIM card in the modem, open the SIM card holder on the Tixi Alarm Modem by pressing the small button beneath the holder with a pen or a pointed object.

You can now carefully pull out the card holder and insert your SIM card. Then push the SIM card holder back into the modem until it snaps into position. Do not use force, as the whole thing isn't designed to withstand abuse: If it doesn't seem to fit, rather check again for correct positioning of the SIM card inside the SIM holder.



ATTENTION:

- The SIM card should only be removed when the modem is in a power-off state. Otherwise, the SIM card may be damaged.
- Avoid touching the contacts of the SIM card as electrostatic discharge may otherwise damage it.
- If you are not using a new and unused SIM card, use a mobile phone to first ensure that the SIM card does not contain any saved SMS messages (read or unread), as this may otherwise cause malfunctions.
- When using a SIM card inside a TAM that was operated with a different SIM card/different PIN before, a project with the new PIN shall be uploaded to the TAM as soon as possible.
(Otherwise, the old PIN is used to initialize the new SIM card. Submitting a wrong PIN to initialize the SIM card may result in blocking of that SIM card.)

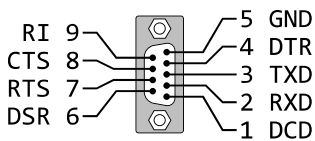
SIM cards come with very different features, which need to be taken into account when used along with a Tixi Alarm Modem. When in doubt, contact your GSM provider for details.

- Old SIM cards (5V) do not work. They are to be replaced by modern SIM cards (V3).
- Some SIM cards may be incapable of transmitting data. When in doubt, ask your GSM provider.
- Note that some prepaid cards may suppress transmission of the own number.
- Because of the support of prepaid cards, with some cards you will not hear a calling tone if you dial the modem.

5 Interfaces

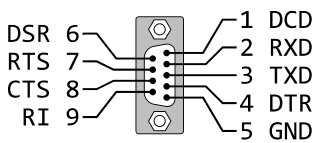
The serial interfaces COM1 und COM2 are to connect a PC, a PLC or other devices.

5.1 COM1 - RS232 (Jack)



The RS232 interface COM1 (9-pole D-Sub socket) is provided on all Tixi Alarm Modem models. 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).

5.2 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.

Tixi.Com offers several adapters to use with the RS232 interface. Detailed information on these adapters can be found in chapter 0 of this manual.

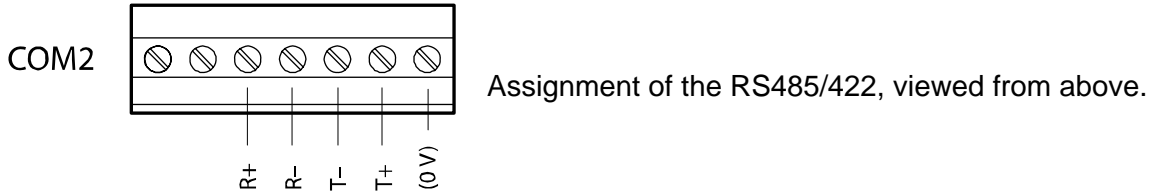
NOTE:

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

Details on how to connect each PLC can be found in chapter 11 of this manual.

5.3 COM2 - RS485 / RS422

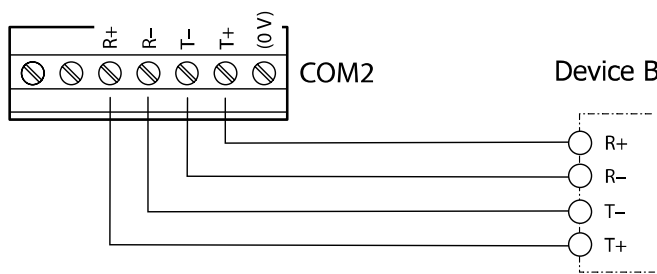
The HG400 series of Tixi Alarm Modems is equipped with a RS485/422 interface in order to connect 2- and 4-wire bus systems. This interface is implemented as a 5 pin screw terminal, which is not galvanically insulated.



NOTE:

We recommend using "Twisted-Pair" cables. For RS422 and 4-wire RS485, two twisted pair cables are to be used.

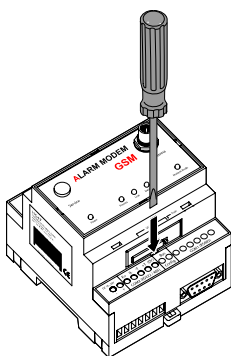
RS422 Connection



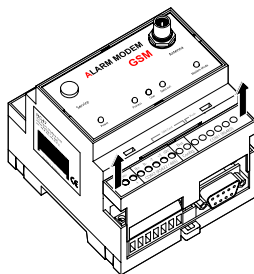
The **Receiving Lines** are to be connected to
R+ (remote: T+) and R- (remote: T-),
 the **Sending Lines** to
T+ (remote: R+) and T- (remote: R-)
 according to adjacent figure.

5.3.1 Accessing the DIP Switches

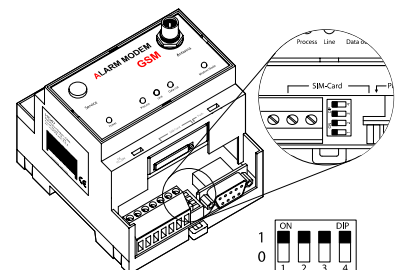
In order to set the operating mode of the RS485/422 interface, DIP switches are to be used. These are located right beneath the COM2 interface and may be accessed after removing the terminal cover:



Put a screw driver (with 3 mm blade) into the slit between case and terminal cover and rotate the screw driver a little bit.



With an audible click, the terminal cover snaps out of the case and may be removed now.



Below this cover, you will find the DIP switches. Their exact meaning is described in the following table.

5.3.2 Setting operating mode via the DIP switches

Operating mode	Switch 1	Switch 2	Switch 3	Switch 4	DIP
2-wire RS485 with termination	1	1	1	1	1111
2-wire RS485 w/o termination	0	0	1	1	0011
4-wire RS485 w/o termination	0	0	0	0	0000
4-wire RS485 with termination	1	1	0	0	1100
RS422	0	0	0	0	0000

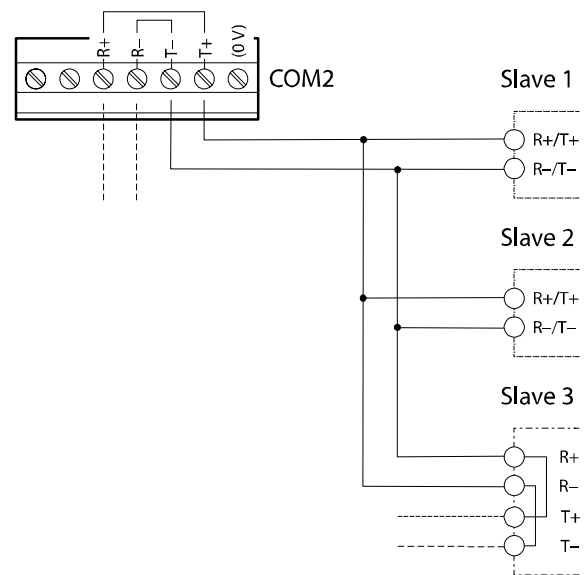
NOTE:

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.

5.3.3 RS485 2-wire connection

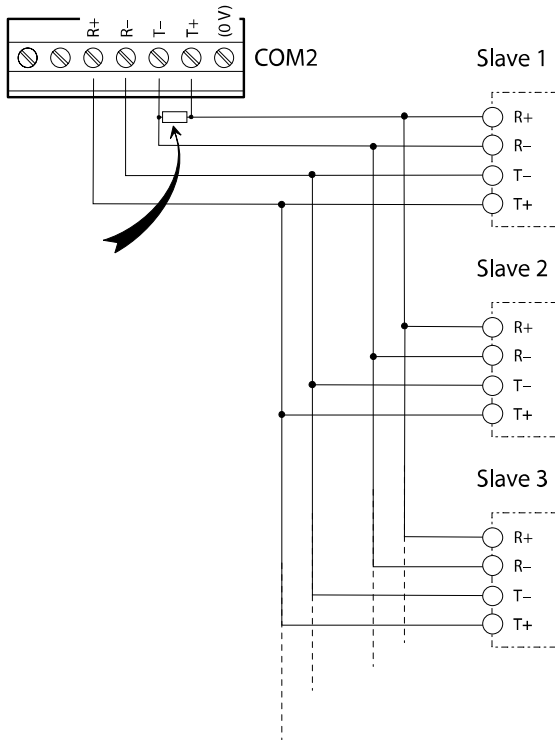
In this operating mode, transmit cables and receive cables are interconnected. If the Tixi Alarm Modem is installed at the beginning (first station) or end (last station) of the bus system, the bus system must be terminated by setting the DIP switches accordingly.



The twisted pair cable is to be connected to
T+ to T+ or R+ and for
T- to T- or R-
according to the adjacent figure.

5.3.4 RS485 4-wire connection

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, arrow).



The twisted pair cables are to be connected according to the opposite sketch.

For termination of the sending line, put a resistor (120 Ohm/0,5 W) between the T+ and T- terminals.



ATTENTION:

Always ensure that the end devices are terminated correctly. Incorrect or missing termination may give rise to communication faults.

5.4 COM2 - MPI (Multi Point Interface)

The MPI is a specific bus and is used to cross-link devices which comply to the Siemens S7-MPI. The MPI bus features RS485 levels and transmission rates of 19,2 or 187,5 kbaud.

The COM2-MPI is implemented as a 9-pin Sub-D jack with pin assignment as follows:

Pin	D-Sub jack MPI
1	n.c.
2	M24V
3	DATA.B
4	RTS AS
5	0V (M5V)
6	n.c.
7	+24V
8	DATA.A
9	RTS PG

NOTE:

Connection to the S7 PLC is done by means of a Profibus plug, which is not included in delivery. We recommend using the Siemens Profibus plug (6ES7-972-0BB12-0XA0) or any compliant one.

Detailed information on using the MPI can be found in chapter 12 of this manual.



ATTENTION:

Make sure the S7 PLC cable is connected correctly to the COM2. Confusing RS232 (COM1) and MPI (COM2) cables may damage the interfaces.

5.5 COM3 - M-Bus

The M-Bus is a 2-wire bus system intended for the automatic readout of resource meters, eg. for heating, water supply or electricity.

The M-Bus complies to DIN EN 13757-2 and DIN EN 13757-3. It acts as a master for up to 25/60/100 slaves (depends on Tixi device model).

M-Bus current usually is 36 V and symmetrically to grounding.

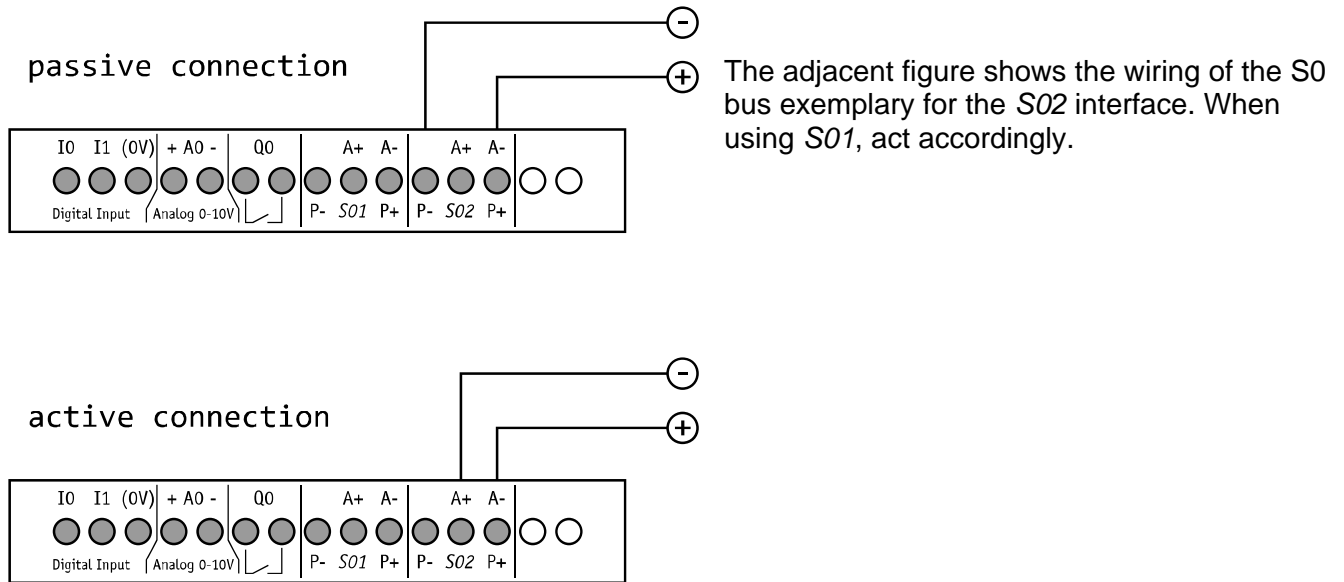
Data communication takes place in both directions with 8 data bits, 1 start bit, 1 stop bit and 1 parity bit (even parity). Baud rates may be 300, 2400, 9600 and 38400.

Maximum M-Bus length is ca. 1 km. Twisted telephone cables (unshielded) with 0,8 mm diameter are to be used.

5.6 S0 Power Interface

The power interface S0 is intended for secure transmission of consumption-proportional pulses towards the Alarm Modem, which then sums up these pulses in order to estimate counter readings etc.

The Alarm Modem got 2 S0 interfaces which comply to DIN 43864. Active or passive S0 devices are to be connected to these interfaces. For active connection, the Alarm Modem provides the current, while with passive connection, the S0 device supplies the current necessary for the S0 interface.



Technical data of the S0 interface are to be found within the appendix of this manual.

Both S0 interfaces may be adjusted regarding pulse frequency, pulse width, detection and debouncing time. Details on this matter are to be found within chapter 5.1 of the TiXML reference.

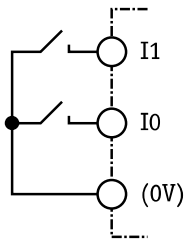
6 Digital and analog I/Os

The Input ports may detect and analyze digital and analog signals. Output and relay ports allow execution of switching commands.

NOTE:

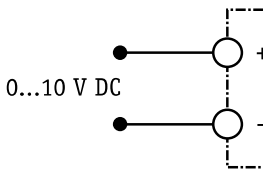
Number and type of I/Os depend on modem type. Detailed overview of modem types and I/O configurations can be found in chapters 3 and **Fehler! Verweisquelle konnte nicht gefunden werden.** of this manual.

6.1 Digital Input



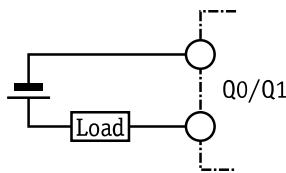
The digital input ports may be switched via *potential-free* switches or relay contacts. We recommend to keep lines short as possible.

6.2 Analog Input



Analog input ports may detect currents ranging from 0...10 V DC. Typical input power at 10 V is approx. 100 μ A.

6.3 Digital Output



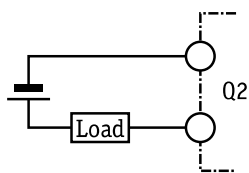
The digital outputs are potential-free and may switch voltages up to 125 V. Maximum load is 0,12 A.



ATTENTION: $I_{\max} = 0,12$ A; $U_{\max} = 125$ V AC/DC!

The maximum output load must not be exceeded in any case, as otherwise the output ports may be destroyed.

6.4 Relay Output



Ohm resistive and inductive loads may be connected to the relay outputs directly. Maximum load is 3 A / 230 V AC resp. 0,3 A / 110 V DC.



ATTENTION: $I_{\max} = 3$ A at 230 V AC / 0,3 A at 110 V DC

The maximum output load must not be exceeded in any case, as otherwise the output ports may be destroyed.

7 Power Supply

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



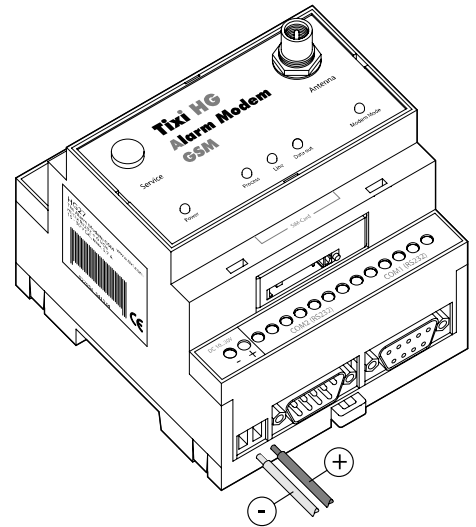
ATTENTION: U = 10...30 V DC!

Ensure correct polarity of power supply terminals.

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: Watch these points when installing the device!

- Use leads with sufficient diameter only.
- Do not use flexible leads with soldered tips.
- Watch the polarity and currency parameters (10...30 VDC, max.0,7A)
- In order to avoid damages, fasten the terminal screws with a torque momentum of 0,5...0,6 Nm.
- Wiring must be done wit power off only.

8 Operation

Once all installation steps have been completed, you can start operating the Tixi Alarm Modem.

LEDs during the self test on power-up

Power	Process	Line	Data Out	Modem Mode	
					Start self test
					Testing LEDs
			 (flashes)		Memory test
					TAM is operational
Duration: approx. 12 sec					

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.

Tixi Alarm Modem is operational

The device is then operational once the self-test is completed. If the Tixi Alarm Modem was correctly configured with a project and with the SIM card, it will log into its mobile network provider and “start work”.

Line-LED when functioning correctly

The Tixi Alarm Modem is logged in if the green Line LED flashes at regular intervals.

NOTE:

PIN and project required

If the Tixi Alarm Modem is being commissioned for the first time or after a complete delete operation, a project must be loaded with the correct PIN for the SIM card. Note the following instructions.

9 Configuration and projects

9.1 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.

9.2 Loading projects in the TAM

You can create projects with TILA or TICO (see chapter 10). 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 PIN of the SIM card is also entered via the software and into the project file. The project must then be loaded onto the Tixi Alarm Modem via the 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.

9.3 Loading projects remotely in the TAM

Once a functional configuration has been loaded on the TAM, this can also be modified or transferred by remote dial-in. Every reconfiguration (remotely or locally) can be protected from unauthorized access by means of a password.

9.4 Operating the GSM Modem

As with a mobile phone, the PIN of the SIM card has to be entered in order to correctly configure the Tixi Alarm Modem for GSM operation. The TAM can only log in automatically and become functional if the correct PIN has been entered. Refer to the documentation of your mobile network supplier for the PIN. Once the SIM card has been inserted in a mobile phone, the PIN can also be modified there.

9.4.1 PIN entry with TILA software

When using TILA software, the PIN can be entered when creating the project.

9.4.2 PIN OK, network available, TAM logged in

The TAM logs in like a normal mobile phone if the PIN entered is correct, and network reception for the respective provider is available. The Line LED will then flash at regular intervals.

9.4.3 PIN OK, no network, TAM not logged in

The TAM cannot log in if there is no network reception available for the provider concerned, even if the PIN is correct. The Line LED will not flash and will remain off.

The Line LED will flash again, if the reception quality is sufficient, by using a stronger antenna for example.

9.4.4 PIN incorrect, TAM not logged in

If the PIN is incorrect, the TAM will not be able to log in, and will indicate this by flashing the Process, Line and Mail-out LEDs.

The same will happen if after initial commissioning or after a factory reset no project and therefore no PIN is loaded onto the TAM.

Ensure that a valid SIM card was inserted, that it is seated correctly and the PIN used is correct.

9.4.5 SIM card disabled, entry of the SUPER PIN

If the PIN was entered incorrectly 3x, the SIM card will be disabled. The card can be unlocked again by entering the SUPER PIN. To do this, insert the disabled SIM card into a mobile phone and enter the SUPER PIN and PIN as described in the operating instructions of the mobile phone. Once the phone has logged in properly with the SIM card, the unlocked SIM card can then be reinserted in the Tixi Alarm Modem.

9.4.6 SIM Card Service Center

Additionally, use a mobile phone to check if the SMSC (Short Message Service Center) number is stored on the SIM card. If not so, sending SMS from the Tixi Alarm Modem will not be possible. In that case, contact your mobile service provider for details on how to save this number on the SIM card.

9.4.7 Caution in border regions: Logging in abroad

Like a mobile phone, the TAM also searches for the strongest mobile network provider in the area. In areas up to 10 kilometers from international borders, this may be a foreign mobile phone provider. Considerably higher costs may be incurred if the TAM logs into one of these (roaming). Moreover, problems may also occur with the sending of SMS messages and E-mails. You can prevent the logging into "foreign" networks by allocating a "home network" to the SIM card.

9.4.8 Call acceptance, mailbox and calling tones

Because of a special GSM module initialization for pre paid cards, with some SIM cards the modem will not generate a calling tone if you dial it for remote connection or remote switching. If you hear no calling rone on "remote switching via caller ID" we therefore recommend to wait 5s and drop the line. We recommend to disable the mailbox.

10 Configuration and projects

10.1 Initial configuration

You can regard a Tixi Alarm Modem 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 Tixi device "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 Tixi device 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.

10.2 Loading projects in the Alarm Modem

You can create projects with TILA or TICO. 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 PIN of the SIM card is also entered via the software and into the project file. The project must then be loaded onto the Tixi device via the 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.

10.3 TiXML Console: TICO

For implementation of complex tasks, the Windows-based TICO software is available. Experience with programming in TiXML is recommended but not imperative.

TICO comes with a comprehensive step-by-step tutorial including demo projects, and with a detailed TiXML command reference.

NOTE:

As an introduction to TiXML and TICO, we recommend a 1...2 day training. Please contact Tixi.Com GmbH directly for more information on such training.

Additionally, Tixi.Com offers the service of creating custom projects appropriate to custom needs. Therefore, a project form is to be found at www.tixi.com.

11 PLC Communication

Tixi Alarm Modems may communicate with a PLC in these 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 can speak the language of the Tixi Alarm Modem.
Technical feature: The **Tixi Driver** is loaded upon the PLC.
- The Tixi Alarm Modem and the PLC can speak a joint language.
Technical feature: Tixi Alarm Modem and PLC use the **same protocol**, e.g. Modbus or TixiBus.

The following sections provide information on how to connect the wide variety of PLCs supported to the Tixi Alarm Modem.

11.1 PLC Drivers inside the Tixi Alarm Modem

In order to enable communication between PLC and Tixi Alarm Modem, you need to select the appropriate feature pack for the PLC to be used. Drivers for PLCs not listed here may be developed by Tixi.Com upon custom need and/or specification.

PLC Manufacturer	PLC Type	Tixi Feature Pack
Tixi Electric	Alpha XL	FP-MIT-AI
	MELSEC FX1S/FX1N, FX2N/FX2NC, FX3U	FP-MIT-FX
Moeller Electric	EASY 400-800, MFD-Titan	FP-ML-EASY
	PS4-Serie	FP-ML-PS4
Siemens	Simatic S7-200	FP-S72
	Simatic S7-300/400	in HG7x integriert
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 (Serie A + B, GFX)	FP-AB-PI
Theben	Pharao2	FP-TH-P2
Fieldbus Standards		
Modbus	RTU	FP-MOD-RTU
	ASCII	FP-MOD-ASC
Other Features		
Simultaneous use of 2 PLC protocols at the same Alarm Modem		FP-PLC2

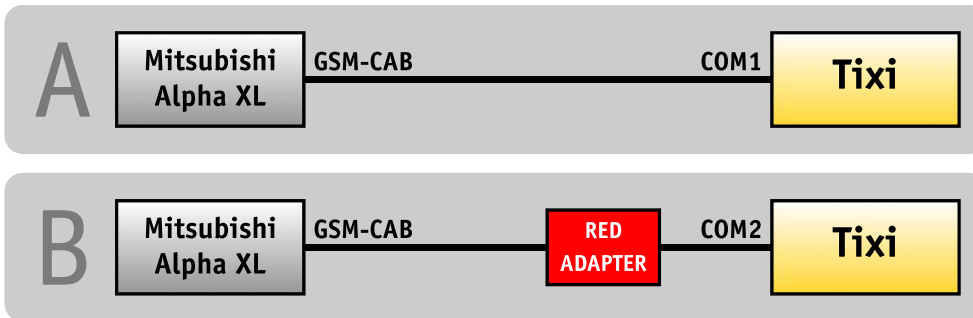
11.2 Mitsubishi Alpha XL

The Tixi device is connected to the Alpha XL using a Tixi GSM-CAB cable.

Please note the following:

- The Alpha XL must hold a program with "serial communication" enabled (9600/8N1). See Alpha XL Programming Software online-help for details. After activating such a program, the Alpha XL must be restarted.
- The GSM-CAB may be connected directly to the COM1 RS232 interface of the Tixi device.
- When using the GSM-CAB for a connection to the COM2 RS232 interface of the Tixi device, the Red Adapter must be used.

The following figure shows the possible connections:



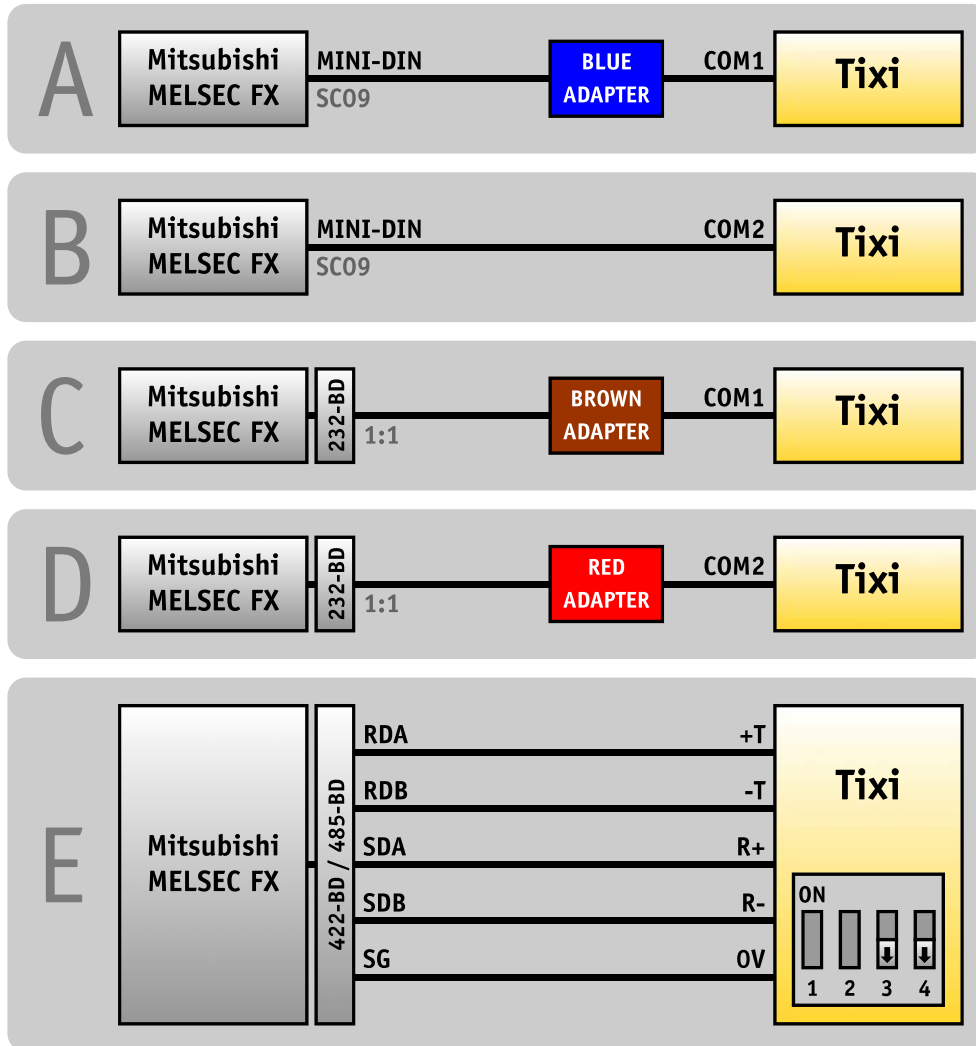
Details on obtaining the Red Adapter can be found in chapter 0 of this manual.

11.3 Mitsubishi MELSEC FX

The Tixi device may be connected to the FX-internal RS422 interface, or to an additional interface extension RS232-BD/RS422-BD/RS485-BD.

When using the BD extension, this interface must be activated with 9600/7E1 by means of the GX Developer Software. Both interfaces may be used simultaneously, e.g. to connect the FX to an Tixi device and a display unit at the same time.

The following figure shows the possible connections:

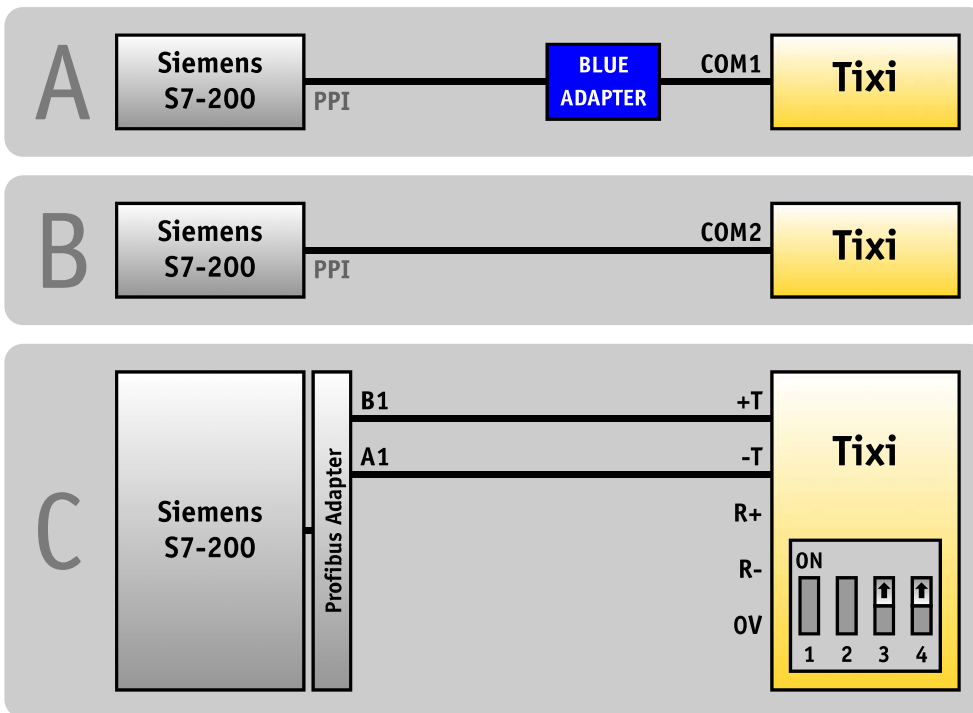


Details on obtaining the Tixi Adapters can be found in chapter 0 of this manual.

11.4 Siemens Simatic S7-200 (RS485)

The Siemens S7-200 may be connected via PPI cable (RS232C) or via the Profibus Adapter (RS485 extension card).

The following figure shows the possible connections:

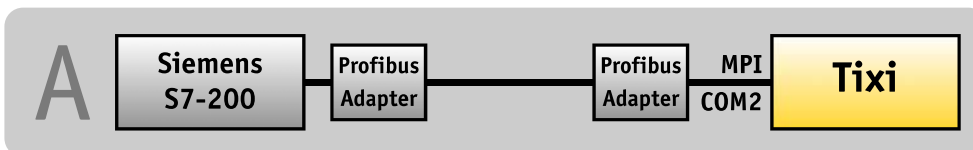


Details on obtaining the Red Adapter can be found in chapter 0 of this manual.

11.5 Siemens Simatic S7-300/400 (MPI)

The S7-300/400 may be connected to the MPI of a Tixi HG17x/47x model.

The following figure shows the connection:



Detailed information for operating the Alarm Modem with a S7-300/400 can be found in chapter 12.

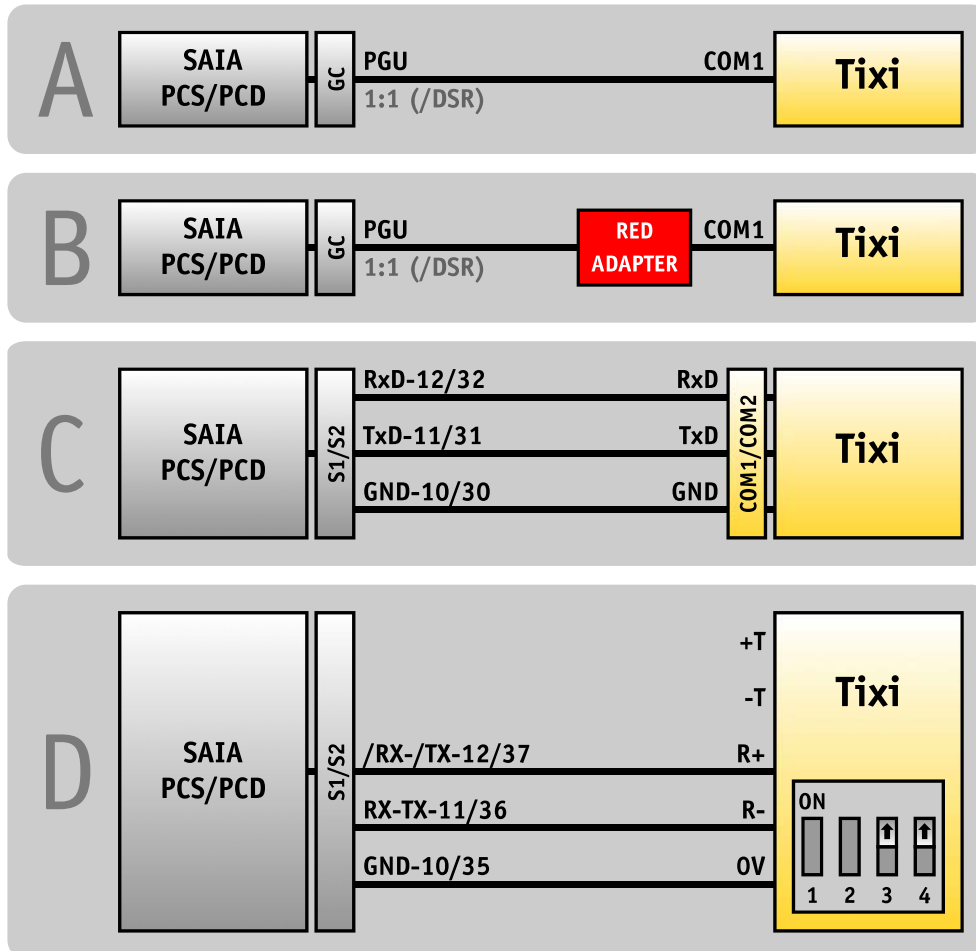
11.6 SAIA Burgess S-Bus

The Tixi device can be connected to any of the 3 serial interfaces S0...S2 of these PLCs. Only a 3-wire cable (RX, TX, GND) is necessary therefore.

Please note:

- When connecting the Tixi device to the PGU port (S0) of the PCD2, the DSR line must *not* be connected, as otherwise the PCD2 will deactivate the S-BUS.
- When connecting the Tixi device COM1 RS232 interface to the PCD2, the DTR line must *not* be connected, as otherwise the PCD2 will deactivate the S-BUS.

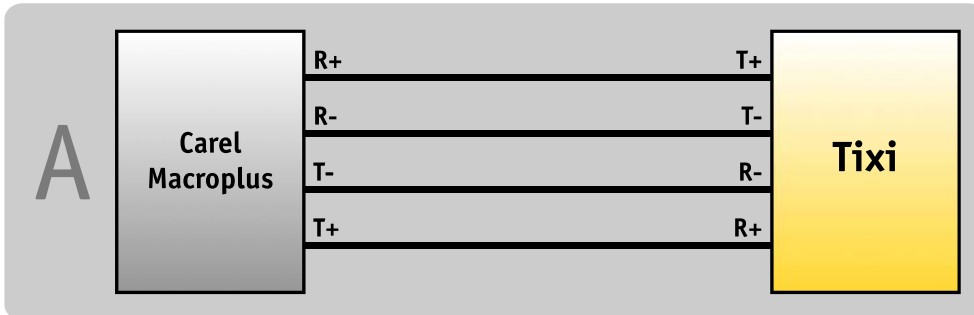
The following figure shows the possible connections:



Details on obtaining the Red Adapter can be found in chapter 0 of this manual.

11.7 Carel Macroplus

The Macroplus may be connected to any Tixi device RS232 interface using a RS422-RS232 adapter, or directly to the RS485/422 interface of a HE14x/44x model:

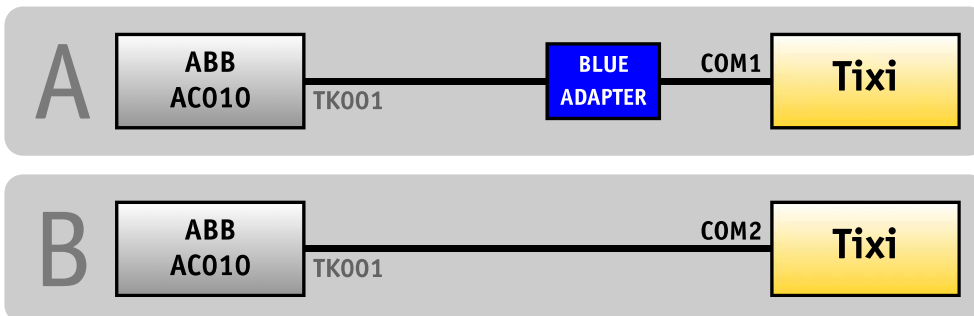


11.8 ABB AC010

The ABB AC010 is connected to the COM1 RS232 interface of the Tixi device using the "TK001" programming cable along with a Blue Adapter.

When connecting to the COM2 RS232 interface of the Tixi device, the Blue Adapter is not necessary.

The following figure shows the possible connections:



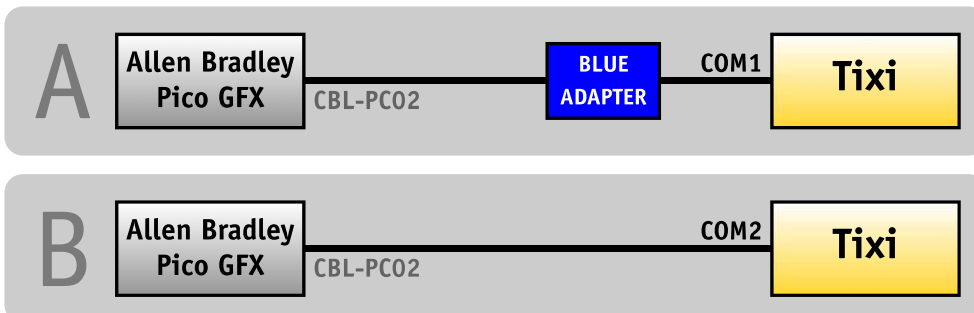
Details on obtaining the Red Adapter can be found in chapter 0 of this manual.

11.9 Allen Bradley Pico GFX

The Allen Bradley Pico GFX is connected to the COM1 RS232 interface of the Tixi device using the "CBL-PC02" cable along with a Blue Adapter.

When connecting the Pico GFX to COM2 of the Tixi device, the Blue Adapter is not necessary.

The following figure shows the possible connections:



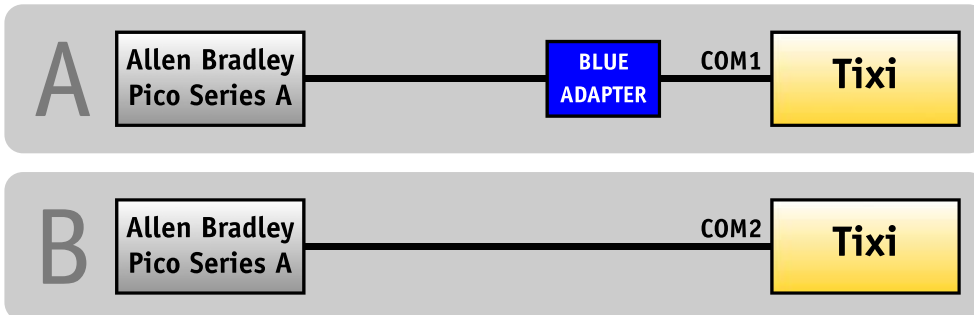
Details on obtaining the Red Adapter can be found in chapter 0 of this manual.

11.10 Allen Bradley Pico Series A + B

The Allen Bradley Pico Series A + B is connected to the COM1 RS232 interface of the Tixi device using a serial 1:1 cable along with a Blue Adapter.

When connecting the Pico Series A + B to COM2 of the Tixi device, the Blue Adapter is not necessary.

The following figure shows the possible connections:



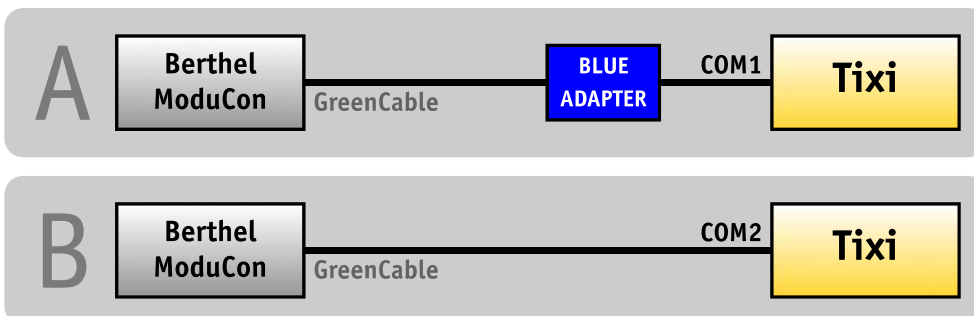
Details on obtaining the Red Adapter can be found in chapter 0 of this manual.

11.11 Berthel ModuCon

The Berthel ModuCon is connected to the COM1 RS232 interface of the Tixi device using the "GreenCable" along with a Blue Adapter.

When connecting the Moducon to COM2 of the Tixi device, the Blue Adapter is not necessary.

The following figure shows the possible connections:



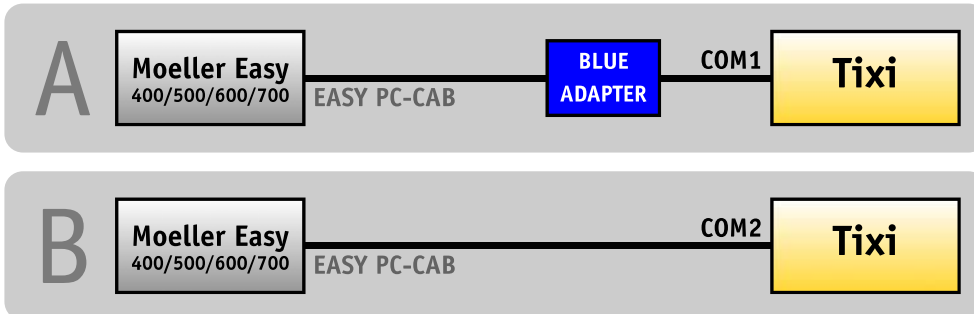
Details on obtaining the Red Adapter can be found in chapter 0 of this manual.

11.12 Moeller Easy 400/500/600/700

The Moeller Easy 400/500/600/700 is connected to the COM1 RS232 interface of the Tixi device using the EASY PC-CAB cable along with a Blue Adapter.

When connecting the Easy to COM2 of the Tixi device, the Blue Adapter is not necessary.

The following figure shows the possible connections:



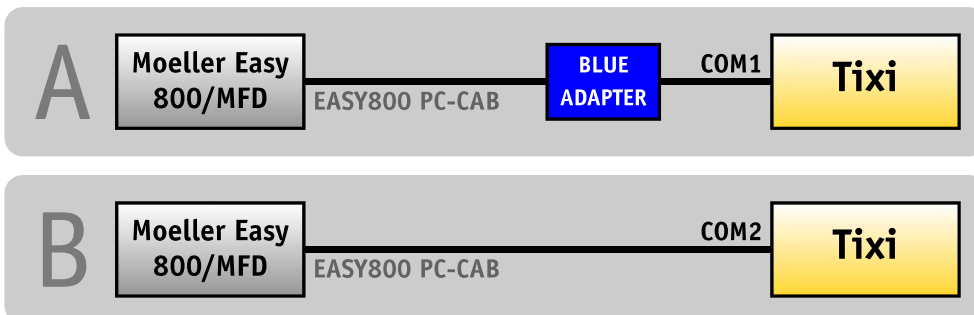
Details on obtaining the Red Adapter can be found in chapter 0 of this manual.

11.13 Moeller Easy 800/MFD

The Moeller Easy 800/MFD is connected to the COM1 RS232 interface of the Tixi device using the EASY800 PC-CAB cable along with a Blue Adapter.

When connecting the Easy/MFD to COM2 of the Tixi device, the Blue Adapter is not necessary.

The following figure shows the possible connections:



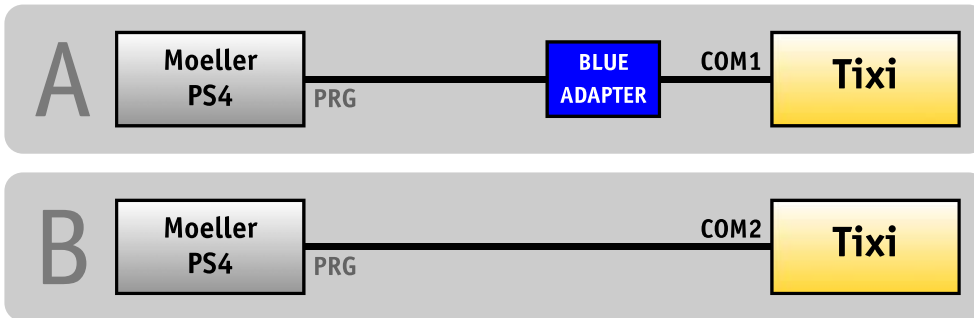
Details on obtaining the Red Adapter can be found in chapter 0 of this manual.

11.14 Moeller PS306/316, PS4-200 und PS4-300

The Moeller PS4 is connected to the COM1 RS232 interface of the Tixi device using the ZB4-303-KB1 cable along with a Blue Adapter.

When connecting the PS4 to COM2 of the Tixi device, the Blue Adapter is not necessary.

The following figure shows the possible connections:



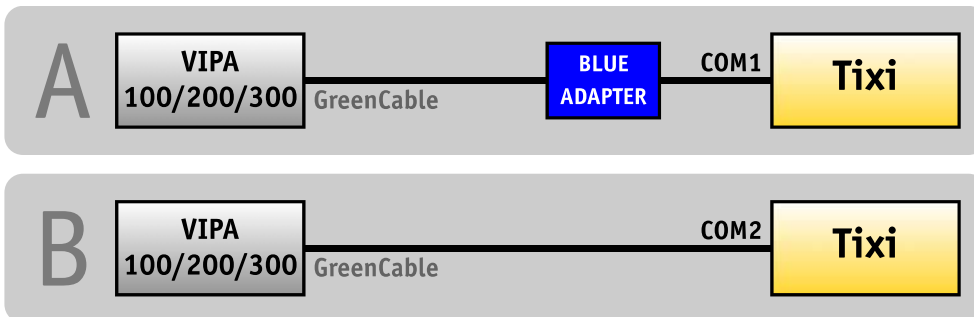
Details on obtaining the Red Adapter can be found in chapter 0 of this manual.

11.15 VIPA

The VIPA is connected to the COM1 RS232 interface of the Tixi device using the "GreenCable" along with a Blue Adapter.

When connecting the VIPA to COM2 of the Tixi device, the Blue Adapter is not necessary.

The following figure shows the possible connections:



Details on obtaining the Red Adapter can be found in chapter 0 of this manual.

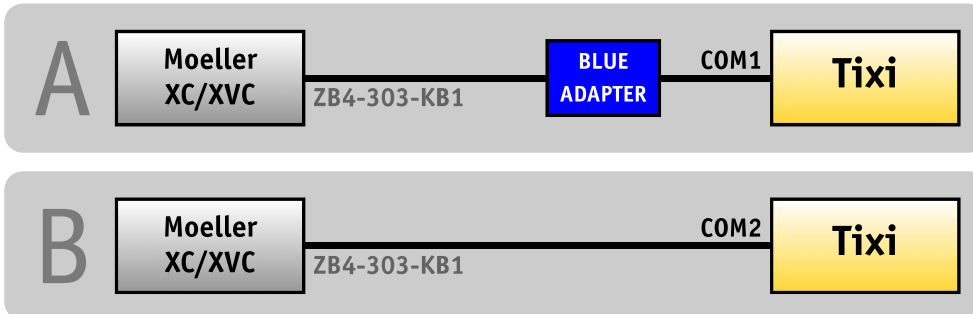
The S7-compliant VIPA can be connected to the MPI of an HE17x or HE47x, too. Detailed information on that can be found in chapter 12 of this manual.

11.16 Moeller XC/XVC

The Moeller Moeller XC/XVC is connected to the COM1 RS232 interface of the Tixi device using the "ZB4-303-KB1" cable along with a Blue Adapter.

When connecting the Moeller XC/XVC to COM2 of the Tixi device, the Blue Adapter is not necessary.

The following figure shows the possible connections:



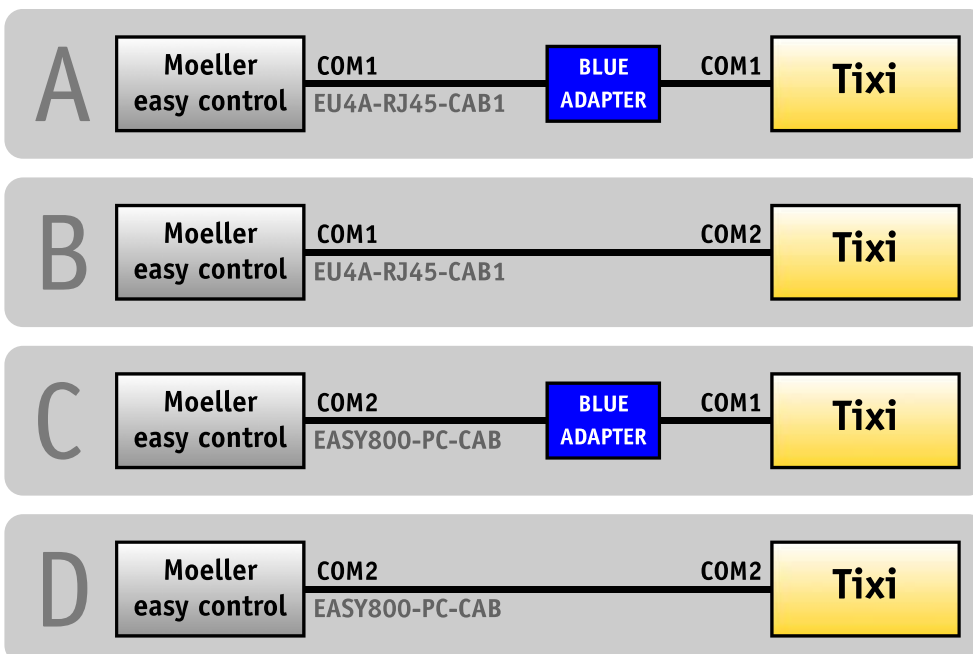
11.17 Moeller easy control

The COM1 interface of the Moeller easy control is connected to the COM1 RS232 interface of the Tixi device using the "EU4A-RJ45-CAB1" cable along with a Blue Adapter.

When connecting the COM1 interface of the Moeller easy control to COM2 of the Tixi device using the "EU4A-RJ45-CAB1" cable, the Blue Adapter is not necessary.

Alternately, the COM2 interface of the Moeller easy control may be connected to the COM1 interface of the Tixi device by means of the "EASY800-PC-CAB" cable along with a Blue Adapter.

When connecting the COM2 interface of the Moeller easy control to COM2 of the Tixi device using the "EASY800-PC-CAB" cable, the Blue Adapter is not necessary.



12 S7-300/400 TS Adapter, MPI (HG17x/47x)

The HG17x/47x Alarm Modem models are designed for being connected to a Siemens S7-300/400 PLC. They come with integrated **TS Adapter**, got the MPI protocol implemented and do comply to the **Siemens TeleService Software**. This option of the S7 programming software serves as an intelligent address book and for administration of contact data. Additionally, it allows modem connection to facilities by mouse click, using a local modem connected to the PC.

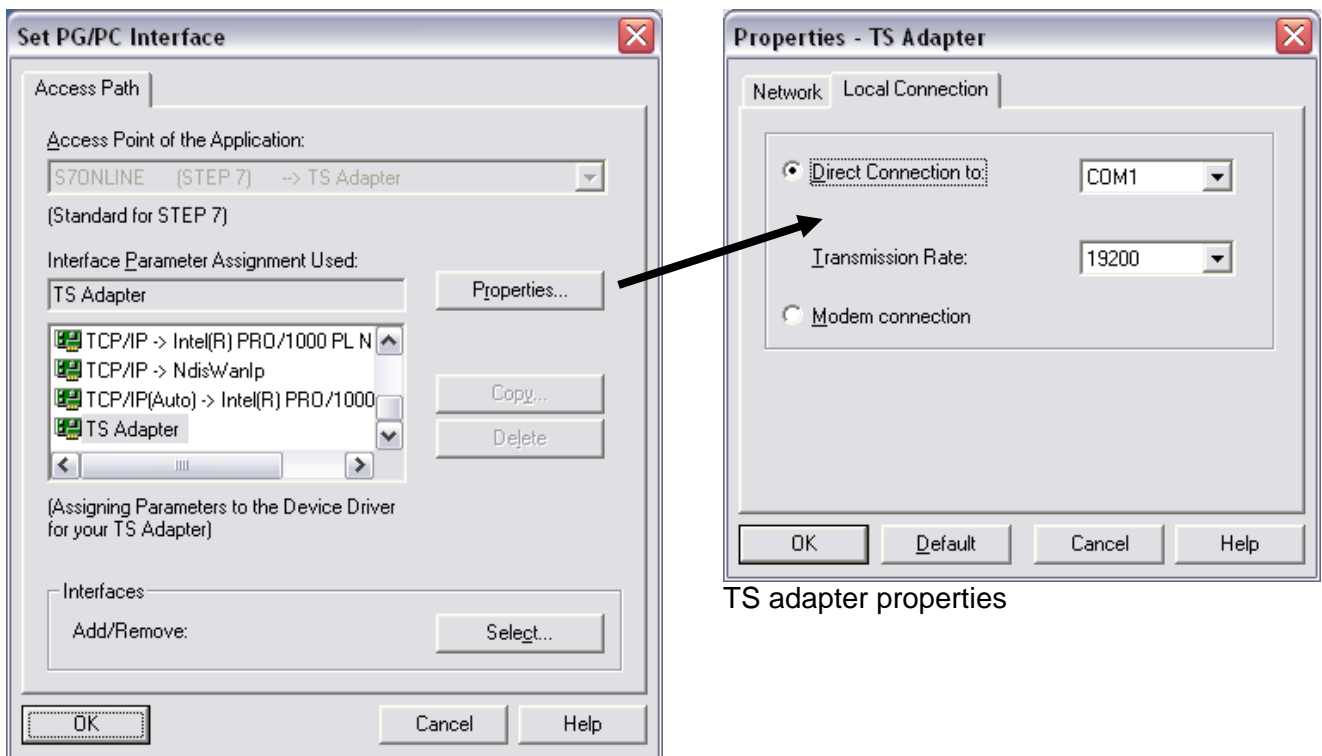
The remote Tixi Alarm Modem offers full access (password protected) to the PLC program for remote service - just as there was a local connection to the PLC.

Continuous monitoring of the PLC via the MPI protocol will not be interrupted during TeleService access, thus no alarm conditions and log data will be lost.

12.1 Simatic PG/PC Interface

The TS Adapter and connected MPI devices can be accessed via the Step7 Simatic Manager using the PG/PC interface "TS Adapter", which is installed along with the Siemens TeleService application. The TS Adapter driver requires selecting the COM port by which the Alarm Modem is connected to the programming PC. For TeleService connection (remote dialup), the driver must be set to "Modem Connection". Such connection is done via a TAPI modem connected to the PC.

We recommend using the "Tixi Super Modem AT V.90 - SM03" for that purpose.



Selecting the PG/PC interface

After closing the direct connection to the CPU the TiXML access to the modem is locked for 10s.

12.2 TS Adapter Parameters

When using the Tixi Alarm Modem without a project, the integrated TS Adapter is configured via the Siemens TeleService Software. This software allows setting MPI parameters and access protection (with callback). The TD Adapter parameters will be deleted during a factory reset.

The screenshot shows the 'Assign Adapter Parameters' dialog box with the 'Network' tab selected. The 'Station Parameters' section includes a checkbox for 'Programming device / PC is the only master on the bus' and an 'Address' field set to 10. The 'Network Parameters' section includes 'Network type' set to MPI, 'Transmission rate' set to 187.5 Kbps, and 'Highest station address' set to 31. Buttons for 'OK', 'Abbrechen', and 'Hilfe' are at the bottom.

Network Parameters

The screenshot shows the 'Assign Adapter Parameters' dialog box with the 'Access Protection' tab selected. It features two rows of fields for 'Administrator', 'Password', and 'Callback number'. The first row has 'ADMIN', '*****', and '0301234567'. The second row has 'SUPPORT', '*****', and an empty field. Buttons for 'OK', 'Abbrechen', and 'Hilfe' are at the bottom.

Access Protection

If the Tixi Alarm Modem holds a PLC project with S7-300/400 connection, the parameters provided by the TeleService software are deactivated. In such case, only the MPI parameters provided in the Tixi Alarm Modem project are valid.

Currently, TeleService access protection with callback can be configured using the TICO software only.

Further details on the MPI interface can be found in chapter 5.4 of this manual.

13 Appendix

13.1 Technical Data

13.1.1 Basic Features

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 of 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 is possible by SMS and Express E-Mail.
Alarm Cascade	Several levels of alarm actions and recipients for when alarm messages are not acknowledged in time. Alarm actions can be sending SMS, E-mail, fax or Express E-Mail.
Event	Event, such as: button actuation, fault, incoming call, PLC communication aborted, alarm acknowledgment, PLC variable or port change 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 E-mails (SMTP).
Express E-Mail	Send and receive E-mail via direct telephone connections. Secure E-mail transfer without Internet and with immediate delivery.
Remote Switching	Remote switching of outputs or changing of variable values of the connected PLCs by sending switch commands as SMS 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 (country dependant).
Teleservice	Configuration of the Tixi Alarm Modem and a connected PLC by remote dial-in via modem.
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.

13.1.2 System Architecture

CPU	32-bit RISC processor
Program memory	2 MB Flash-ROM, 1 MB SRAM
Data memory	8 MB Flash Memory onboard, non-volatile
Expansions	16 MB, 32 MB, 64 MB Flash memory modules
System clock	Real-time clock, battery-backed

13.1.3 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, XML-based protocol for modem configuration. External applications can create events / alarms by sending event commands.

13.1.4 GSM-Modem

Network Types	GSM/GPRS Class 10, Quad Band 850/900/1800/1900 MHz
Connection	FME plug (male), coaxial, Impedance: 50 Ohm. Receive freq.: 869...894, 925...960, 1805...1880, 1930...1990 MHz Sending freq.: 824...849, 880...915, 1710...1785, 1850...1910 MHz Output: 2W (900/850 MHz), 1 W (1800/1900 MHz)

13.1.5 M-Bus

Conformity	DIN EN 13757-2, DIN EN 13757-3
Connection	M-Bus-Master for up to 25, 60 or 100 Slaves, shortage-proof M-Bus current: 36 V, Bus length: ca. 1 km (telephone cable, 2 x 0,8 mm diameter, unshielded) 3 screw terminals, grid dimension 5,08 mm, diameter max. 2,5 mm ²

13.1.6 S0 Power Interface

Conformity	DIN 43864
Connection	2 connectors active and passive devices may be connected Current: usually 24 V, range 12-24 V, 30 mA Amperage: inactively: 0...2 mA, actively: 10...27 mA Debouncing time: 13 ms, line length: max. 3 m, unshielded 6 screw terminals, grid dimensions 5,08 mm, diameter max. 2,5 mm ²


13.1.7 I/O Ports

Input	digital	to be switched via potential-free contacts
	analog	0...10 V DC, resolution: 12 bit
Output	digital	potential-free, AC/DC 125 V, 120 mA
	relay	potential-free, 230 V AC 3 A oder 110 V DC 0,3 A
I/O Terminals	screw terminals (grid dimensions: 5,08 mm), cross-section max. 2,5 mm ²	

13.1.8 Serial Interfaces

COM1	ITU-T V.24, V.28, Hardware-Handshake D-Sub 9-pole jack 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
COM2 (RS485/422)	To EIA/TIA-485 5-pole screw terminal for T+, T-, R+, R-, 0 V max 230 kbit/s, not isolated Termination integrated, activated via DIP switches Transmission distance: max.1200 m depending on the transmission rate, bus system and cable type
COM2 (S7-MPI) (HG17x/47x only)	9-pole D-Sub jack, RS485, galvanically insulated transmission rate 19,2 or 187,5 kbit/s, no ferrule resistor Bus length: according to installation guidelines of the connected device (HG7x only) supported network type: MPI no AGDial feature

13.1.9 General Data

Power supply	10 – 30 V DC, max. 0.7 A, screw terminal 2.5 mm ² (HG123/423: 18...30 V DC)						
LED-Anzeige	Power, Process, Line (connection), Data out, Modem Mode, Connect Data, Active Param., Data						
Operating elements	Button						
Gehäuse/Montage	DIN-Rail Casing, for rail 35mm (EN50022) vertical or horizontal						
Conformity	 <table style="margin-left: 20px;"> <tr> <td>EMV:</td> <td>EN55022 (9:2003), EN55024 (10:2003) EN301489-1/7 (2000 GSM)</td> </tr> <tr> <td>Safety:</td> <td>EN60950</td> </tr> <tr> <td>Telecom:</td> <td>GPP TS 51.010-1 (9:2002, v5.0.0.0) GCF-CC (10:2002, v3.8.1)</td> </tr> </table>	EMV:	EN55022 (9:2003), EN55024 (10:2003) EN301489-1/7 (2000 GSM)	Safety:	EN60950	Telecom:	GPP TS 51.010-1 (9:2002, v5.0.0.0) GCF-CC (10:2002, v3.8.1)
EMV:	EN55022 (9:2003), EN55024 (10:2003) EN301489-1/7 (2000 GSM)						
Safety:	EN60950						
Telecom:	GPP TS 51.010-1 (9:2002, v5.0.0.0) GCF-CC (10:2002, v3.8.1)						
Temperature range	Operation: 0 to +50 °C , Storage: -30...+70°C						
Permissible air humidity	5 to 95 % relative humidity, non-condensing						
Schutzart	IP20						
Degree of protection	Degree 2						
Dimensions	Width 88mm x Height 58mm x Depth 91mm						
Weight	225g						
Mechanical fastness	Vibration (sinus) according to IEC 60068-2-6 Vibration (broadband) according to IEC 60068-2-64 Shock according to IEC 60068-2-27						

13.1.10 SD Card operation

The HE400 series of Tixi devices come with an integrated SD card slot. It can be utilized for transmitting projects and firmware into the device, and in order to download logfile content. You may use SD or MMC cards with up to 2 GB size, being formatted under Windows (FAT or FAT32).











To insert a SD card into the device, push it into the appropriate slot. In order to remove it, push it a little further inside; thereupon, the card is released and will be ejected somewhat from the slot.

If a memory card is inserted into the running device, it will be mounted automatically. In order to prevent this, just press the "unmount" button while inserting the memory card.





Before removing the memory card, press the "Unmount" button and wait for all read- or write access to be finished. This will be noticeable by the "Active" LED going out.

13.1.11 LEDs on restart

A restart with memory test of the Tixi device takes place after power-on, after factory reset and after updating the firmware.

Power (yellow)	Process (red)	Connect (green)	Data Out (yellow)	Mode (red)	
					Start self-test
					Testing all LEDs
			 (flashes)		Memory test
					device is operational
Duration: approx. 12 sec					

13.1.12 LEDs on error

Process (red)	Line (green)	Data Out (yellow)	
 (flashes)	 (flashes)	 (flashes)	Communication Error with GSM module Possible cause: wrong PIN, no project, GSM module defective
	 off		No carrier, very low signal quality Modem is not connected if no GSM network is available or the signal quality is too low. Check your antenna connection and the placement of the antenna.

13.1.13 The Signal LED

The HG400 models are equipped with a Signal LED, which can be freely controlled by the user. Therefore, the variable

`Process/MB/SignalLED`

is to be set to a value between 0 and 27; the meaning of these values is described as follows::

Value	Signal LED behaviour
0	off
Flashing periodically: red	
1	on
2	Flashing (200ms on, 200ms off)
3	Flashing (50ms on, 50ms off)
4	Flashing (200ms on, 600ms off)
5	Flashing (600ms on, 200ms off)
6	double Flashing (50ms on, 50ms off, 50ms on, 50ms off, 600ms off)
7	Flashing every 3s
8	double Flashing every 3s
Flashing periodically: green	
9	on
10	Flashing (200ms on, 200ms off)
11	Flashing (50ms on, 50ms off)
12	Flashing (200ms on, 600ms off)
13	Flashing (600ms on, 200ms off)
14	double Flashing (50ms on, 50ms off, 50ms on, 50ms off, 600ms off)
15	Flashing every 3s
16	double Flashing every 3s
Flashing periodically: red and green	
17	double Flashing (50ms green, 50ms off, 50ms red, 50ms off, 600ms off)
18	Flashing (200ms green, 600ms red)
19	Flashing (200ms red, 600ms green)
20	Flashing (50ms green, 50ms off, 50ms red, 50ms off)
Flashing once: red	
21	Flashing
22	Flashing for 4 sec (200ms on, 200ms off)
23	Flashing twice (50ms on, 50ms off)
Flashing once: green	
24	Flashing
25	Flashing for 4 sec (200ms on, 200ms off)
26	Flashing twice (50ms on, 50ms off)
Flashing once: red and green	
27	Flashing once

13.1.14 Factory Reset













A factory reset deletes all the data stored in the Tixi device and overwrites it with factory settings. The GSM settings (PIN) are retained.

Procedure:

1. Switch off the Tixi device.
2. Press the Service button and keep depressed.
3. Switch on the Tixi device and wait for the Power LED to flash.
4. Release the Service button momentarily and
5. Press again until the Power LED visibly flashes at a faster rate.
6. Release the Service button.




















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

LEDs on factory reset and restart

Power (yellow)	Process (red)	Connect (green)	Data Out (yellow)	Modem Mode (red)		Duration
 (flashes)					Service button pressed upon power-on	1...2 s
 (flashes rapidly)					Service button pressed again, until Power LED flashes somewhat faster	1...2 s
					Test of all LEDs	
			 (flashes)		Memory test, formatting data memory (complete deletion)	25 s
					Device is operational	
Duration: approx. 30 s						

13.1.15 Firmware-Update

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

Power (yellow)	Process (red)	Connect (green)	Data Out (yellow)	Modem Mode (red)		Duration
					Device is operational.	
 (flashes)					Start of update.	2 s
					Device waiting for commands.	
		 (flashes)	 (flashes)		After start of update: Transfer of firmware	250 s
	 (flashes)				Possibly during the update: Processing of transferred firmware in Device.	
					Test of all LEDs	
			 (flashes)		Memory test	25 s
					Device 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).



DANGER:

During a firmware updates the outputs of the Tixi device are set. Therefore an update must not be executed with connected periphery.

13.2 Accessories

For completion of your Tixi device system, you may order these parts from your distributor or directly from Tixi.Com:

Accessories	Description
ZP-DC24-2A	Power Supply for DIN rail installation (24 V DC, 2 A)
ZM-Manset	Tixi Manual Set (contains all manuals on CDROM <i>and</i> as brochures)
ZK-R9M9F180	Serial RS232 cable (D-Sub-9 plug / D-Sub-9 jack, length: 180cm)
ZK-BA	Blue Adapter (nullmodem genderchanger RS232 D-Sub-9 plug/plug)
ZK-RA	Red Adapter (nullmodem adapter RS232 D-Sub-9 jack/jack)
ZK-BRA	Brown Adapter (for MELSEC FX/BD-Board at TAC COM1)

Wiring of Tixi Adapters

Blue Adapter		Red Adapter		Brown Adapter	
male	male	female	female	male	female
2	2	2	2	1	1
3	3	3	3	2	2
4	4	4	4	3	3
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
G	G	G	G	9	9
				G	G

13.3 Mobile networks in Europe - USA - worldwide

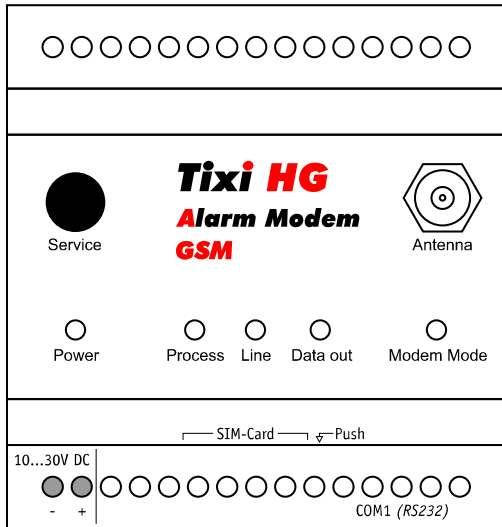
- Europe: GSM networks with 900 MHz and 1800 MHz
Only GSM mobile networks are available in Europe. All networks are compatible. The network standard only depends on the contract of your mobile network provider.
- USA: GSM networks with 850 MHz and 1900 MHz
Appropriate devices are required for GSM networks in the USA. There are additional mobile network standards in the USA (e.g. CDMA) that are not compatible with GSM. However, GSM is becoming more frequently used in the USA. For example, T-Mobile is using the GSM standard in the USA.
- Worldwide: GSM is used in most countries of the world. However, some countries only use CDMA or both mobile standards.

More information on mobile networks is to be found at www.gsmworld.com.

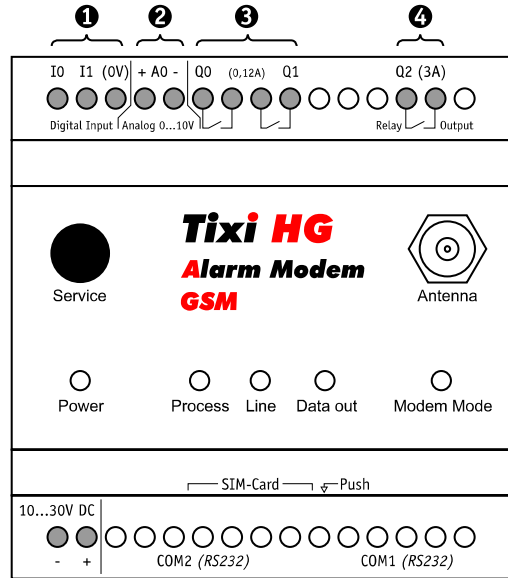
13.4 Tixi Data Gateway Models

Tixi Data Gateways provide identical basic features, but come in a variety of models regarding type and number of I/Os and interfaces. These variants are depicted in the following figures.

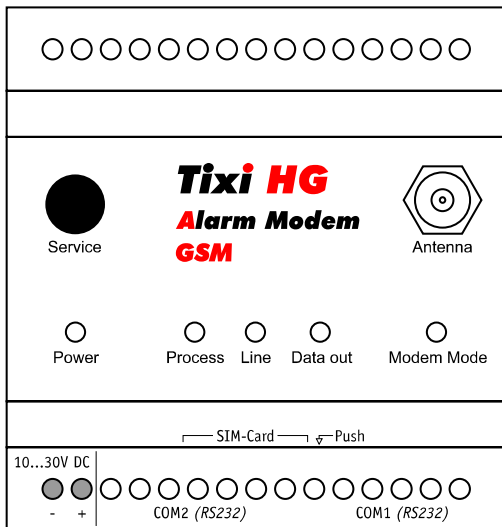
13.4.1 HG100 Series



HG120

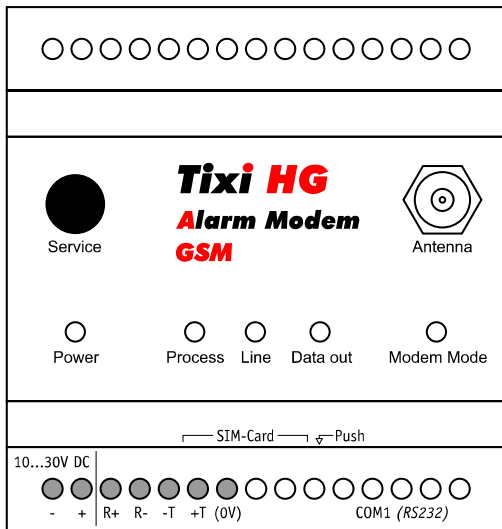


HG127

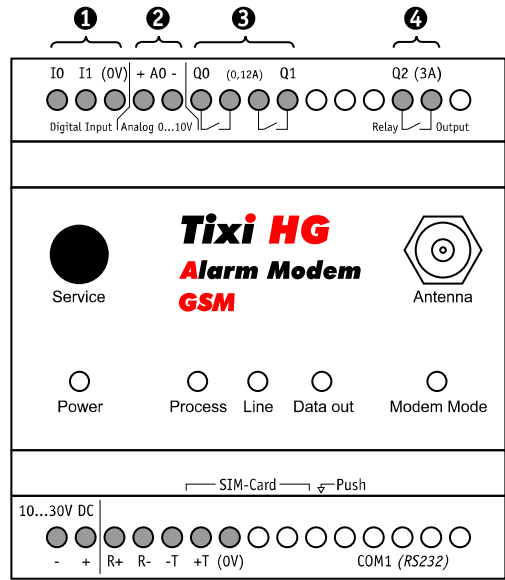


HG121

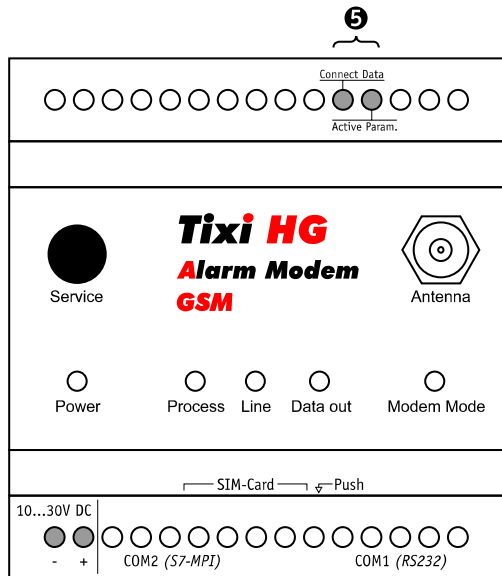
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- ② Analog Inputs
- ③ Digital Outputs
- ④ Relay Output
- ⑤ LED Indicators



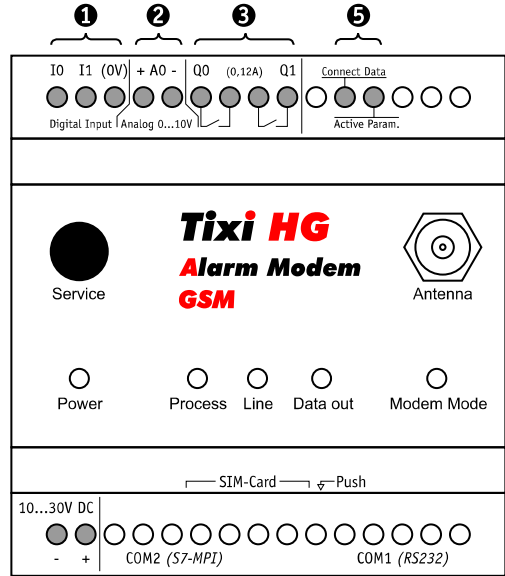
HG141



HG147

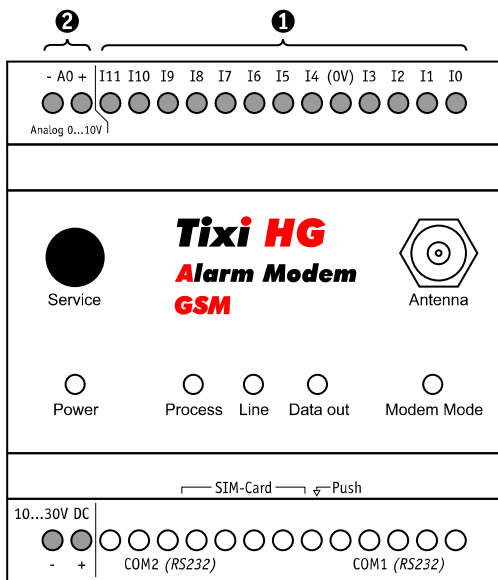


HG171

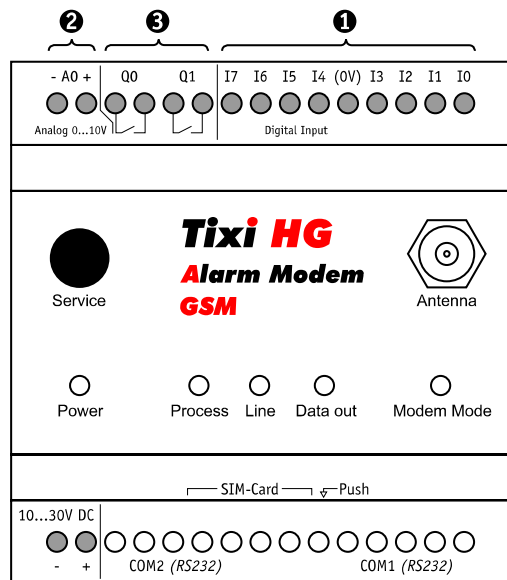


HG176

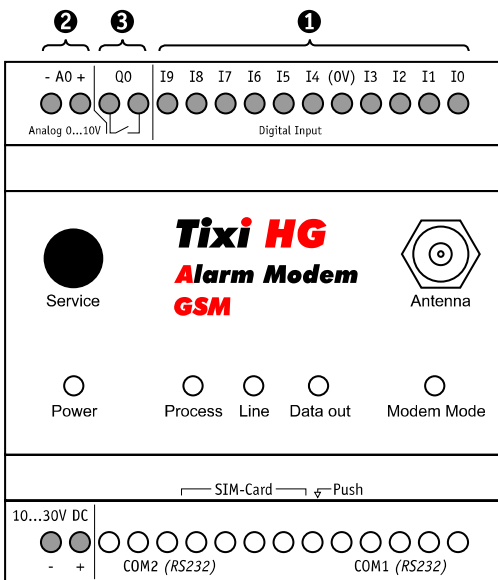
- ① Digital Inputs
- ② Analog Inputs
- ③ Digital Outputs
- ④ Relay Output
- ⑤ LED Indicators



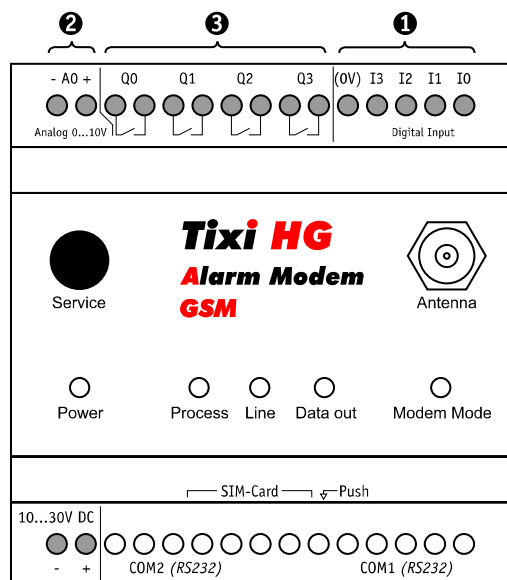
HG130



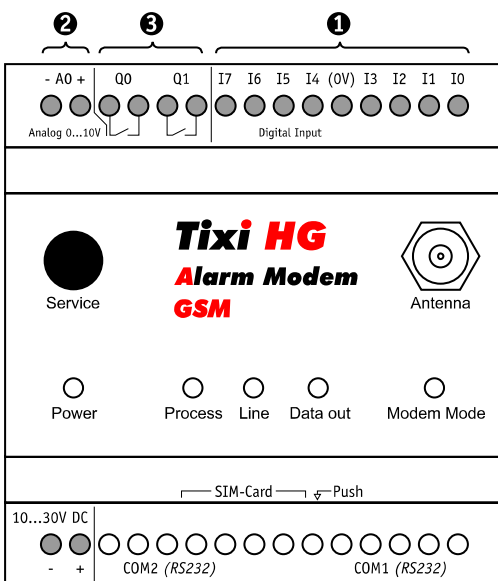
HG133



HG131

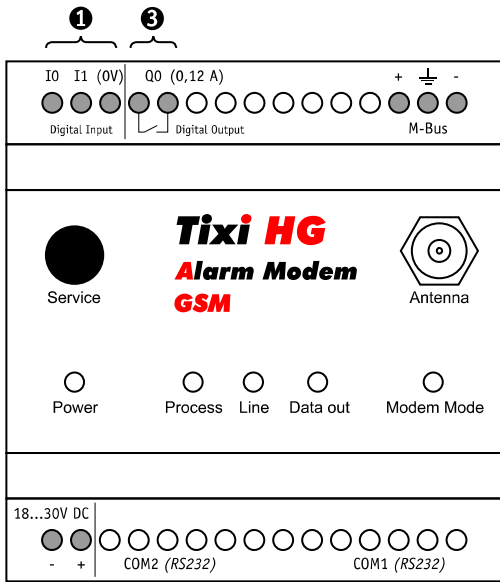


HG134

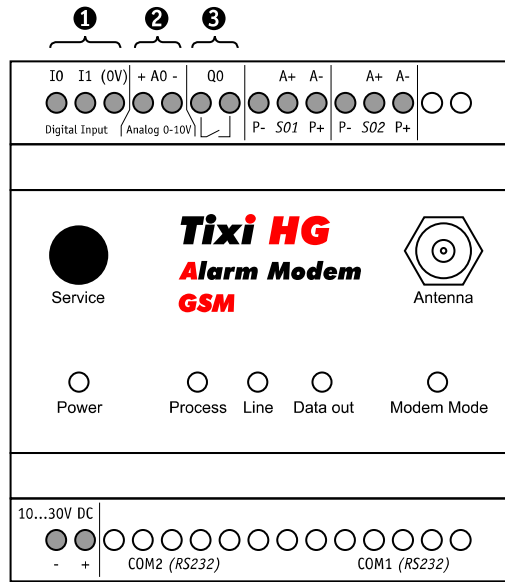


HG132

- ① Digital Inputs
- ② Analog Inputs
- ③ Digital Outputs
- ④ Relay Output
- ⑤ LED Indicators



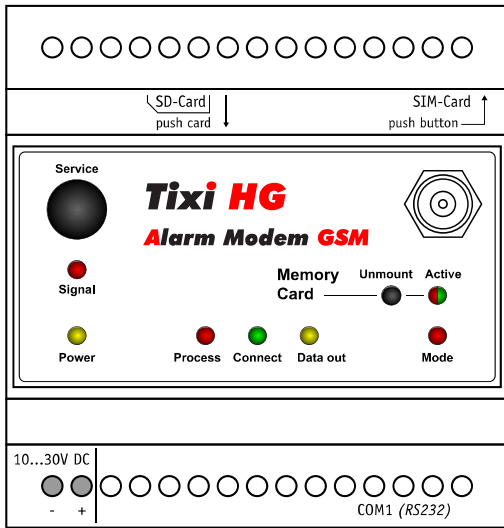
HG123-M25
HG123-M60
HG123-M100



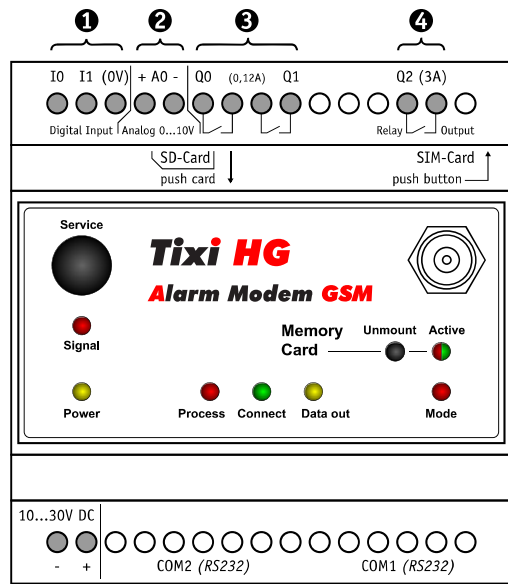
HG125-2S0

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- ② Analog Inputs
- ③ Digital Outputs
- ④ Relay Output
- ⑤ LED Indicators

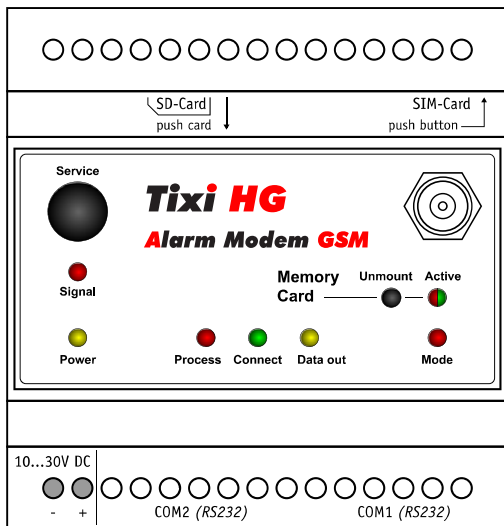
13.4.2 HG400 Series



HG420

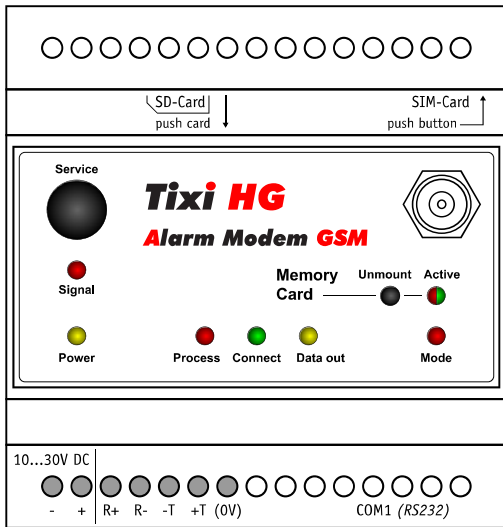


HG427

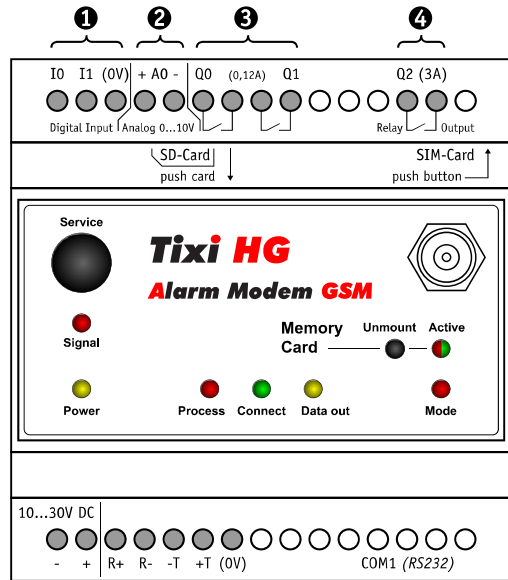


HG421

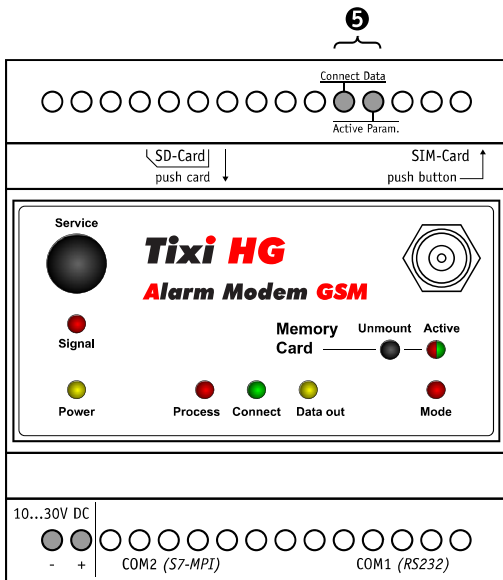
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- ② Analog Inputs
- ③ Digital Outputs
- ④ Relay Output
- ⑤ LED Indicators



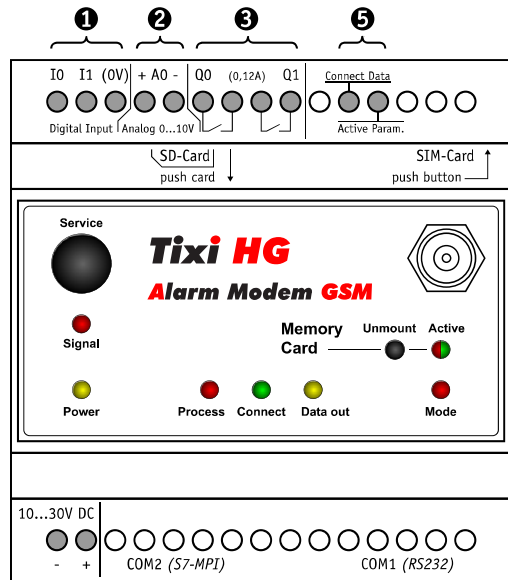
HG441



HG447

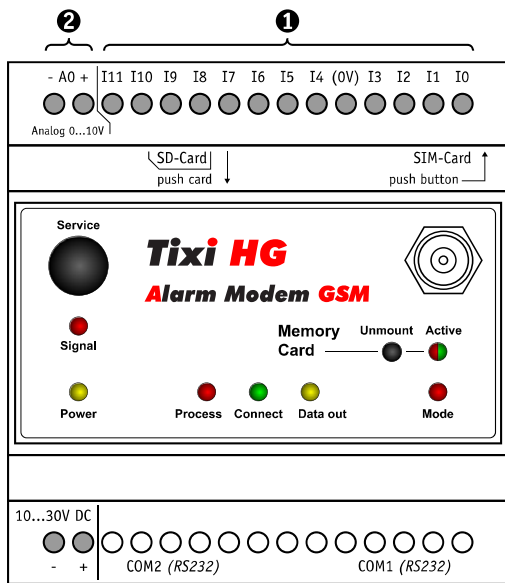


HG471

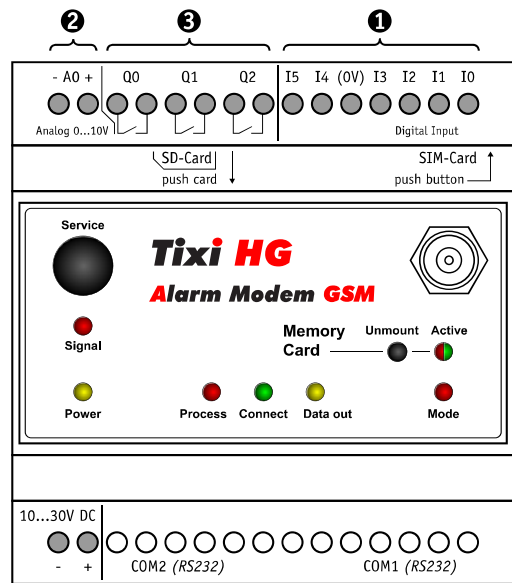


HG476

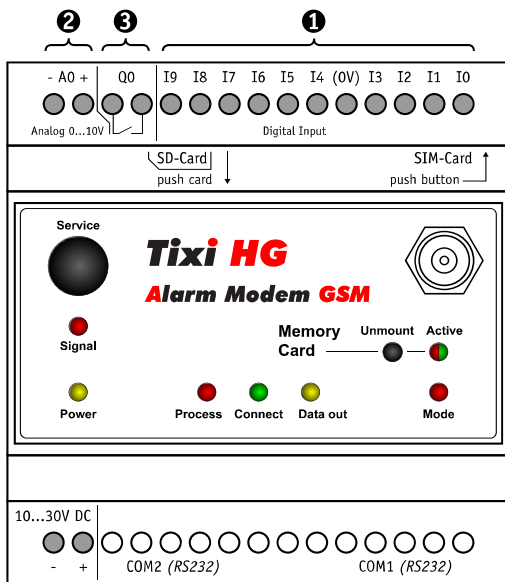
- ❶ Digital Inputs
- ❷ Analog Inputs
- ❸ Digital Outputs
- ❹ Relay Output
- ❺ LED Indicators



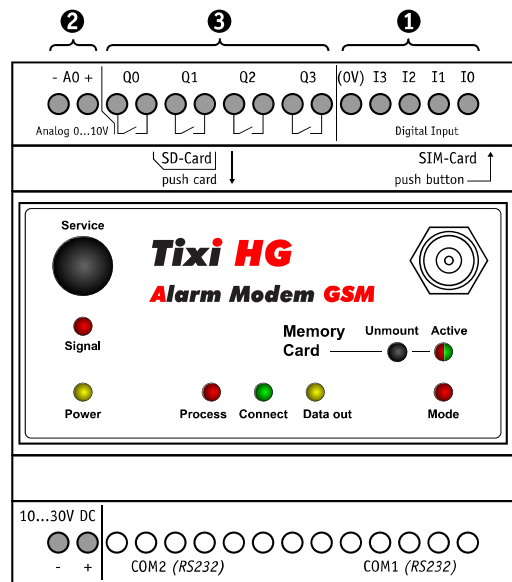
HG430



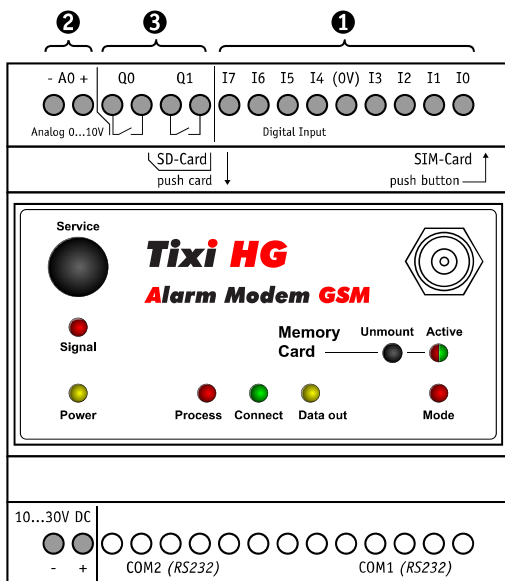
HG433



HG431

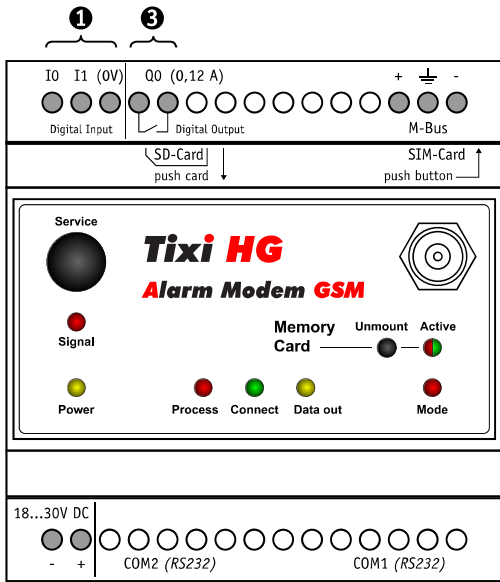


HG434

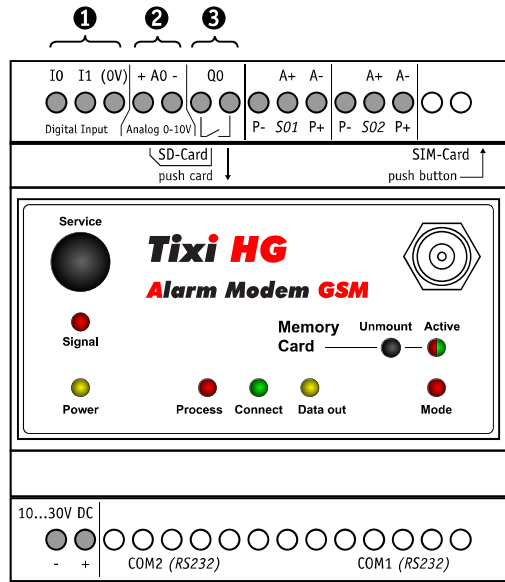


HG432

- ① Digital Inputs
- ② Analog Inputs
- ③ Digital Outputs
- ④ Relay Output
- ⑤ LED Indicators



HG423-M25
HG423-M60
HG423-M100



HG425-2S0

- ① Digital Inputs
- ② Analog Inputs
- ③ Digital Outputs
- ④ Relay Output
- ⑤ LED Indicators