



Technical Manual

TERMEX 220/230
320/330

TERM 220/230
320/330

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1 Important information

1.1 General information

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1.2 Symbols used in this manual



Warning:

The indicated specifications may not be modified. Non-compliance may result in dangerous situations and damages.

Caution:

Careful installation: do not replace electrical fuses with fuses from different manufacturers. Non-compliance may result in dangerous situations and damages.

Danger:

The product may possibly be negatively impacted or damaged by foreign influences.



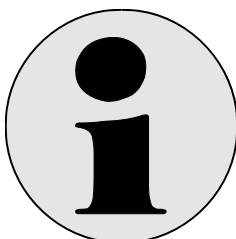
Non-hazardous area:

Assembly and installation only in **non-hazardous areas**.



Danger:
Hazardous area
(Zone 1+2)

All safety regulations as well as **compliance certificates for hazardous areas** must be observed. In addition, all regulations (VDE) published by the respective authorities for the application of the devices in **hazardous areas (zone 1 and 2) must** be complied with at all times.



Additional Info:

Information and notices that must be observed **additionally**.



Pressure load:

Significant mechanical **pressure** or **impact loads** may result in damages.

no mechanical Force

1.3 Safety instructions

- ⇒ These devices are only allowed to be installed and operated by trained and qualified personnel who have received suitable instruction in their use.
- ⇒ These devices represent state-of-art technology. They are only allowed to be connected to systems that have been approved by Pepperl+Fuchs GmbH.
- ⇒ Never open the devices yourself. They are only allowed to be opened by authorized Pepperl+Fuchs GmbH personnel.
Pepperl+Fuchs **GmbH is not liable for any resulting damages.**
- ⇒ The devices are not allowed to be modified or otherwise altered in any way.
Pepperl+Fuchs GmbH is not liable for any resulting damages.
- ⇒ Please study the "**Technical Manual**" carefully prior to starting up the devices.
- ⇒ The most recent version of the "**Technical Manual**" is always valid. It is available for downloading on our web site: <http://www.pepperl-fuchs.com>
- ⇒ The operating voltage of the devices **must not exceed the limits** indicated in the **technical data** section of the "**Technical Manual**".
In the event of failure to comply, **Pepperl+Fuchs GmbH is not liable for any resulting damages.**
- ⇒ The **user guideline RL 1999/92 EG**, the specifications EN 60079-14 and the **accident prevention regulations (UVV)** must be observed.

The technical data specified for the hazardous area corresponds to the certified values for the European Ex approval. The user is responsible for ensuring that the devices are suitable for their intended application and for the prevailing ambient conditions.
No warranty can be given by Pepperl+Fuchs GmbH in this connection.

Data subject to change without notice

2 Startup

This description of the startup procedure only contains information that is relevant to the TERMEX terminals. Please refer to the respective manuals for details of how to start up the peripheral devices, the ENT-DC power supply unit and the host computer.

Proceed as follows to start up the equipment:

- Switch off the system or machine.
- Make sure that the installation area is non-hazardous for the duration of the startup procedure if any non-intrinsically safe voltages need to be wired and/or non-intrinsically safe devices opened.
- This device is designed for use in the hazardous area (Zones 1 and 2).
- The requirements of the applicable explosion protection codes (EN 50014 and following) and the installation requirements specified in EN 50039 must be observed when these devices are installed. In addition, the technical and electrical data stated in the certificate of conformity for this device must be complied with.
- This device is only allowed to be started up by trained personnel. The applicable explosion protection codes must be observed. Please study the current versions of the "TERMEX 22X / 32X Technical Manual" and the "TERMEX 2xx / 3xx Firmware Manual" carefully prior to starting up the device (you can download the latest versions from www.pepperl-fuchs.com).
- The maximum cable length between the intrinsically safe terminal and the ENT-DC mains buffer stage is 230 m. If peripherals are connected to the terminal, this length is reduced by the length of the cable between the terminal and the peripheral. Other lengths are subject to special approval by Pepperl+Fuchs.



Important

The maximum cable length between the intrinsically safe terminal and the ENT-... may not exceed defined length.
(see Technical manual ENT-DC-30, technical data X3 Exi interfaces)

- The device must be connected to the equipotential bonding conductor (wire cross-section $\geq 4 \text{ mm}^2$, PA connection on the TERMEX terminal).



Warning

The case must be earthed. The earth wire must have a cross-section of at least 4 mm^2 and be as short as possible.

- The device is not allowed to be modified or otherwise altered in any way. In particular, soldering operations or repairs are not permissible. Such work may only be carried out by the manufacturer or by other authorized persons. If this warning is ignored, the approval for the hazardous area is no longer valid.
- Since these devices are intrinsically safe, the connecting leads may also be connected or disconnected when the unit is live. This is not recommended for the following reasons, however:
 - Order when connecting:
Connect the GND cables first, then the communication cables and finally the supply voltage.
 - Order when disconnecting:
Disconnect the supply voltages and the communication cables first, then disconnect the GND cables.

- Connect the terminal and the power supply unit. Please refer to the section entitled "Terminal assignment" for the wiring diagram.



Warning

Only ENT-DC power supply units are allowed to be used.
 Only the components listed in section 4 are allowed to be used as peripherals, and only in the specified configurations. All other components require the written approval of Pepperl+Fuchs.
 All wiring must conform to the latest state of the art as well as to the wiring diagrams approved by Pepperl+Fuchs.

- If the terminal is installed in a front panel, make sure that the mounting depth is sufficient to guarantee the minimum cable radius (please also refer to the dimension drawings and technical documentation provided by the cable manufacturer).
 Please also make sure that the front panel is not warped, as otherwise proper sealing cannot be guaranteed (IP protection). The 4 or 6 clips for fastening onto the front panel should only be tightened gently to achieve an optimum sealing contact.
- Check that all connectors are correctly assigned prior to starting up the device. An assignment plan showing all the terminal signals together with the wire or connection numbers can be found on the rear of the terminal.
- Only now should you switch on the system or machine.
- The terminal runs an internal self-test when the auxiliary voltage is activated on the mains buffer stage (e.g. ENT-DC). The display goes dark for approximately 1 second (all pixels are energized) and the internal hardware is tested. The startup message, the firmware version number and the EXTEC logo are displayed for this time (approximately 4 seconds). The terminal then switches to the normal operating mode. If the project design data is already loaded, 'screen 1' is automatically displayed in ASCII mode.
- If you are using the device for the first time, you should branch to the internal setup menu with the shortcut <Shift ↑ > + < F1 > during the self-test phase in order to check that the values of all the most important parameters are correct ("TERMEX 2xx / 3xx Firmware Manual").
- To load the project design data, the terminal must be connected to a PC via the mains buffer stage (e.g. ENT-DC). The mains buffer stage and the PC must be connected to the power supply and switched on. You must select 'Protocols: EXTEC' in the terminal setup menu in order to load the project design software, because you are now using a standard ASCII protocol. After the data has been loaded successfully, the terminal performs a reset, displays the startup message and runs a self-test. If you want to use a protocol other than the standard ASCII protocol, select the required protocol under 'Protocols...' in the setup menu.
- The terminal is now ready to use and can be controlled from the connected control computer.
- Check the functions on the control panel.
- Check the interaction of the functions with the complete system or machine step by step.



Warning

The system or machine may malfunction if the TERMEX terminal is not correctly connected and configured.



Warning

The TERMEX terminal is intended solely for installation in another machine. It is not allowed to be started up until the conformity of the final product with the 94/9/EC and 99/92/EC Directives has been established and this product inspected by an authorized expert in accordance with EN 60079 and EN 50014 ff.



Warning Zone 22

After installation cable glands have to be saved with a suitable adhesive (e. g. Screw stop varnish or Loctite metal adhesive). So the unintentional opening and occurrence of dust is prevented.

2.1 Shielding of data cables

2.1.1 Shielding concept

The purpose of cable shielding is usually to improve the signal quality and reduce interference as well as radiation from electromagnetic fields.

The data cables (RS485, TTY, intrinsically safe circuits, digital inputs/outputs, Ethernet) must be shielded. The shields must be continuously connected and grounded in order to guarantee the necessary interference suppression.

One of the following three techniques should be used:

1. Connect and hard ground both ends of the shield. This method achieves the greatest reduction in electromagnetic interference. There is, however, a risk of current loops with high compensating currents. These currents can lead to safety problems if their values are excessive.
2. Connect and hard ground one end of the shield. This method achieves a reduction in electromagnetic interference while simultaneously preventing the above-mentioned current loops.
3. Provide a hard connection at one end of the shield (TERMEX) and capacitive grounding at the other end in the safe area. This method achieves a relatively large reduction in electromagnetic interference while simultaneously preventing current loops with high compensating currents. A capacitor (approx. 10 nF) with a fixed dielectric (ceramic) and a test voltage > 1500 V can be installed in the safe area for this purpose.

The final decision regarding the most suitable shielding concept must be based on a detailed observation of the equipotential bonding system.

Furthermore always observe the clauses 12.2.2.3 and 12.2.2.4 of EN 60079-14.

Example 1:

If a low-impedance equipotential bonding system (building grounding system) is effective under all operating conditions, both ends of the shield must be connected and grounded. Caution is necessary, however, if transients that cannot be statically measured are produced when machines are switched.

Example 2:

If there is no equipotential bonding system or only a poor system, or if the equipotential bonding system does not have a very low impedance or has a high noise voltage, variant 2 or 3 should be preferred.

Which of these three concepts is used must be determined by the user on a case-to-case basis (best interference suppression and safety).

No liability can be accepted by the manufacturer for this decision.

A non-connected shield at the VisuNet RM/PC end must always be properly insulated in order to prevent sparking!

The Box-10-A (Ethernet patch panel) allows the shield to be optionally connected or not connected to ground. It is connected by means of a small contact spring on the DIN rail.

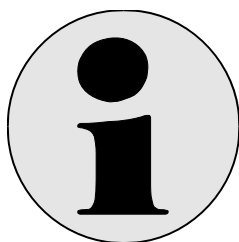
Each user must ascertain which form of EMC protection is necessary, and offers sufficient reliability for their particular installation. In systems that are relatively unsusceptible to electromagnetic interference, it may be adequate to connect and ground only one end of the shield.

3 TERMEX Exi terminal

TERMEX 220	Text terminal
TERMEX 320	Text terminal with large keyboard
TERMEX 230	Graphics terminal
TERMEX 330	Graphics terminal with large keyboard

3.1 Important characteristics

- Intrinsically safe control panel for Zones 1 and 2 (EEx ib IIC T4)
- Classification according to ATEX 95 RL94/9/EG: Ex II 2G EEx ib IIC T4
- combined with mounting case ABG-1 or ABG-3 for Zone 22
- Classification for Zone 22 Ex II 3 D X T 134°C IP65 (Declaration of Conformity)
- Simple to connect directly to many PLC and computer systems
- Typical applications:
 - In processes in the chemical, pharmaceutical and petrochemical industries, in industrial plant engineering, in weighing systems and in metering and filling stations
- Industry-standard design, suitable for:
 - Graphics based control and display functions (TERMEX 220 / 320: text only)
 - Simple visualization tasks
 - Output of fault messages
 - Input of set values
 - Display of actual values
 - Collection of plant data, also with barcode readers
 - Gravimetric filling and metering applications
- Easy-to-read LC display 148 x 74 mm, optional with backlight
 - TERMEX 230 / 330: text and graphics can be combined as desired
 - TERMEX 220 / 320: 4 x 20 characters, character height 12 mm, plus softkey bar (5 mm)
- 4 standard fonts, additional fonts can be loaded (TERMEX 230 / 330 only)
- Background bitmaps can be loaded (TERMEX 230 / 330 only)
- Graphic elements: pixel, line, block, border, window (TERMEX 230 / 330 only)
- Automatic bar graph display (TERMEX 230 / 330 only)
- High EMI resistance
- Non-volatile storage of project displays (TERMEX 220 / 320: text, TERMEX 230 / 330: text and graphics)
- PC based project design of pictures and texts with TERMEXpro for Windows[®]
- Project data can also be loaded when the control panel is installed
- Degree of protection: IP 65 (front)
- Several versions for panel and surface mounting
- Additional binary inputs (NAMUR) and outputs (isolated) as well as serial ports for the hazardous area available as options
- All system parameters verified and selected by means of integrated setup and remote setup on the PC
- Only one cable used to connect data and power for all device versions



Note

All terminals are referred to below in this manual simply as 'TERMEX' unless the differences between the individual models are significant.

3.2 Overview of models

Additional Ex devices can be connected to the TERMEX terminals via serial ports. These ports can be provided on the terminal as options.



Important

The ports must be designed to withstand the power requirement of the connected devices. A maximum of 3 supply circuits can be used with the TERMEX terminal.

Connections:

Marking	For interface	Device	Manufacturer	Possible ENT-DC voltages
D	Digital I/O			<u>7.0 V</u> / <u>8.0 V</u> / <u>8.5 V</u>
S	Barcode reader	PSCAN-D PSCAN-M	P+F	7.0 V / <u>8.0 V</u> (<u>7.0 V</u> for EXDS-40)
WMx				
WMa	GD130x	TBRICK, k-cell	Mettler Toledo	7.0 V / <u>8.0 V</u> / 8.5 V
WMb	GD13x	TBRICK, k-cell	Mettler Toledo	7.0 V / <u>8.0 V</u> / 8.5 V
WMc		ID5sx	Mettler Toledo	7.0 V / <u>8.0 V</u> / 8.5 V
WMd		ID5 / 083	Mettler Toledo	7.0 V / <u>8.0 V</u> / 8.5 V
WMe		PM, SM, AM	Mettler Toledo laboratory scales	7.0 V / <u>8.0 V</u> / 8.5 V
WMg		ID5	Mettler Toledo	
WMh	EXDK-LWL	Puma / ST3xx	Mettler Toledo	7.0 V / <u>8.0 V</u> / 8.5 V
WMi	20 mA pp	Puma / ST3xx	Mettler Toledo	7.0 V / <u>8.0 V</u> / 8.5 V
WMj	TERMEX = aa		ID5sx	
WML	PSUx	TBRICK Ex	Mettler Toledo	<u>7.0 V</u> / <u>8.0 V</u> / 8.5 V
WMm		Point Ex	Mettler Toledo	8.5 V, 240mA ENT-DC-30 Exi port version 7
WMn	PSU non ex	ID-7sx	Mettler Toledo	7.0 V / <u>8.0 V</u> / 8.5 V
WMo	PSU non ex	Viper Ex	Mettler Toledo	7.0 V / <u>8.0 V</u> / 8.5 V
WA		EXAWUx-5	DMS scale	<u>8.5 V</u>
WE		MVS-1.1	DMS scale	<u>8.0 V</u> / 8.5 V
WSarx				
WSara		F-/ L-/ QS-/ X149-/ I1200S scales	Sartorius	7.0 V / <u>8.0 V</u> / 8.5 V
WSarb	20 mA pp (ENT-DC)		Sartorius	7.0 V / <u>8.0 V</u> / 8.5 V
Wsard*	Ex-PW-SAR-10 Interface no longer available!	FC-/ IS scales	Sartorius	7.0 V / <u>8.0 V</u> / 8.5 V
WBa		ITE	Bizerba	7.0 V / <u>8.0 V</u> / 8.5 V
WBb		ITL	Bizerba	7.0 V / <u>8.0 V</u> / 8.5 V
ZT		Expansion keyboard	TERMEX K36 / KL36	7.0 V / <u>8.0 V</u> / 8.5 V

Default values are underlined

* only as spare equipment available

Connection for safe area

B1	RS 232	PSCAN	For TERM (only for safe area) and PSCAN (only for safe area)
WMk	WMk RS 323	Mettler Toledo	RS 232 (only for safe area)

3.3 Technical data

Type of protection TERMEX 22x 23x / 32x 33x	Intrinsically safe (acc. to EN 50020), EEx ib IIC T4 ATEX 95, RL94/9 EG: II 2G EEx ib IIC T4 DMT 02 ATEX E 239 Dust explosion proof acc. EN50281 ⊕ II 3 D X T134°C IP65 in case of mounting ABG-1 or ABG-3
Degree of protection acc. to EN 60529/IEC 529	IP 65 (front) IP 20 (case) IP 54 (installed in polyester case ABG-P) IP 65 (installed in stainless steel case ABG-V2A)
Calibration certificate TERMEX 2x0 / 3x0	Acc. to DIN EN 45501 No. D09-95.32 Addendum 2 As a module for class III and IIII scales
TERMEX 2x5 / 3x5	No calibration certificate


Display	LCD, supertwisted nematic, with or without backlight Active display area: 148 mm x 74 mm
TERMEX 22x / 32x	4 lines x 20 characters, character height 12 mm plus 1 line for softkeys, character height 4.5 mm
TERMEX 23x / 33x	240 x 128 pixels, 4 standard fonts, additional fonts can be loaded 12 lines x 40 characters, character height 4.5 mm 8 lines x 26 characters, character height 5.5 mm 4 lines x 20 characters, character height 12 mm 4 lines x 13 characters, character height 12 mm Text and graphics freely designable Background bitmaps can be loaded Pixels, lines, blocks, borders and bar graphs can be designed.

Front plate	Anodized aluminium Display cutout with non-reflecting glass cover Polyester front foil, printed on reverse Chemical resistance: see below
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Keyboard	- Short-stroke keys - Number block
TERMEX 22X, 23X	- 5 function keys (dual assignment with Shift key) Either standard layout or customized layout with insertable label strips (ex works)
TERMEX 32X, 33X	-10 function keys (dual assignment with Shift key) Either standard layout or customized layout with insertable label strips (not ex works) - 3 special keys S1 .. S3 - Shift and Alt keys - Cursor block

<p>LEDs (TERMEX 32X, 33X only)</p>	<p>F keys with 10 green LEDs for application-specific programming</p> <p>LED array (6 red LEDs, parallel) to indicate alarms</p>
<p>LEDs TERMEX 22X 23X / 32X 33X</p>	<p>ON LED to indicate the power supply</p> <p>COM LED to indicate a host communication fault</p> <p>! LED to indicate that messages are pending</p> <p>A..Z LED to indicate that alphabetical input modes are allowed</p>
<p>Configuration</p>	<p>Integrated setup menu for setting all device parameters</p>
<p>Project design data</p>	<p>Downloadable from a PC via a serial port PC port (RS232) connected to mains buffer stage, type ENT-DC-xxx</p>
<p>Port parameters X1 (TERMEX <--> ENT <--> host)</p>	<p>TERMEX <--> ENT: 20 mA current loop, passive/passive</p> <p>ENT <--> host: RS232 / 20 mA current loop, active/passive, settable / optional RS485</p> <p>1200 - 19,200 baud, settable (setup)</p> <p>Parity: even, odd, mark, space, none (setup)</p> <p>7 / 8 data bits, settable (setup)</p> <p>1 / 2 stop bits, settable (setup)</p> <p>Default: 9600 baud, 8 data bits, even parity, 1 stop bit</p>
<p>Firmware</p>	<p>The firmware is stored in a FLASH chip and is updatable. The latest version can be downloaded from the Pepperl+Fuchs web site. The firmware can be loaded onto TERMEX 2xx/3xx terminals using the TERMEX PRO Loader software. Additional information about firmware updates is enclosed.</p>
<p>Functional test</p>	<p>Integrated detection of all hardware components during start/reset and self-test.</p>

Dimensions of TERMEX 22X/23X chassis	Front plate (WxH): 288 x 144 mm Cutout (WxH): 277 x 137 mm Mounting depth: 72 mm incl. terminals, without connector
Weight	Approx. 1.5 kg
Dimensions of TERMEX 32X/33X chassis	Front plate (WxH): 288 x 220 mm Cutout (WxH): 276 x 208 mm Mounting depth: 72 mm incl. terminals, without connector
Weight	Approx. 1.9 kg

<p>Ambient conditions Do not expose the display to direct sunlight (UV)</p> 	<p>Operation: -20 °C to +50 °C Storage: -20 °C to +70 °C Rel. humidity: 0% - 75%, without condensation 48 h endurance test</p>
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EMC declaration	<p>The manufacturer, Pepperl+Fuchs GmbH, certifies that this product conforms to the relevant EMC directive.</p> <p>Interference emission: EN 55011: 1998 + A1: 1999 Noise immunity: EN 61000-6-2: 1999</p>
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Chemical resistance of the front foil

Polyester foil with biaxial alignment, resistant to the following chemicals in accordance with DIN 42 115 Part 2, when exposed for more than 24 hours without any visible change:

Ethanol Cyclohexanol Diaceton alcohol Glycol Isopropanol Glycerin Methanol Triacetin Dowandol DRM/PM	Formaldehyde 37% - 42% Acetaldehyde Aliphatic hydrocarbons Toluene Xylene Thinner (white spirit)	1.1.1. trichloroethane Ethyl acetate Diethyl ether N-butyl acetate Amyl acetate Butyl Cellosolve Ether
Acetone Methyl ethyl ketone Dioxan Cyclohexanol MIBK Isophorone	Formic acid < 50% Acetic acid < 50% Phosphoric acid < 30% Hydrochloric acid < 36% Nitric acid < 10% Trichloroacetic acid < 50% Sulphuric acid < 10%	Chlomatron < 20% Hydrogen peroxide < 25% Potassium soap Detergent Tensides Softener Ferric chloride (FeCl ₃) Ferric chloride (FeCl ₂) Dibutyl phtalate Dioctyl phtalate Sodium carbonate
Ammonia < 40% Sodium hydroxide solution < 40% Potassium hydroxide Alkali carbonate Bichromate Potassium prussiate Acetonitrile Sodium bisulphate	Cutting emulsions Diesel oil Varnish Paraffin oil Castor oil Silicone oil Turpentine oil substitute Brake fluid Decon Aviation fuel Benzine Water, brine	

Resistant in accordance with DIN 42 115 Part 2 when exposed to acetic acid for < 1 hour without any visible damage

Not resistant to:

Concentrated mineral acids Concentrated alkaline solutions High-pressure vapour hotter than 100 °C	Benzyl alcohol Methylene chloride
--	--------------------------------------

Like all polyester foils, not resistant to long-term exposure to direct sunlight (UV)

Chemical resistance of the front plate seal

Material: Foam rubber (EPDM)

- Good resistance to weather and ozone
- Very good resistance to hot detergent solutions
- Operating temperature: 50 ... +120 °C

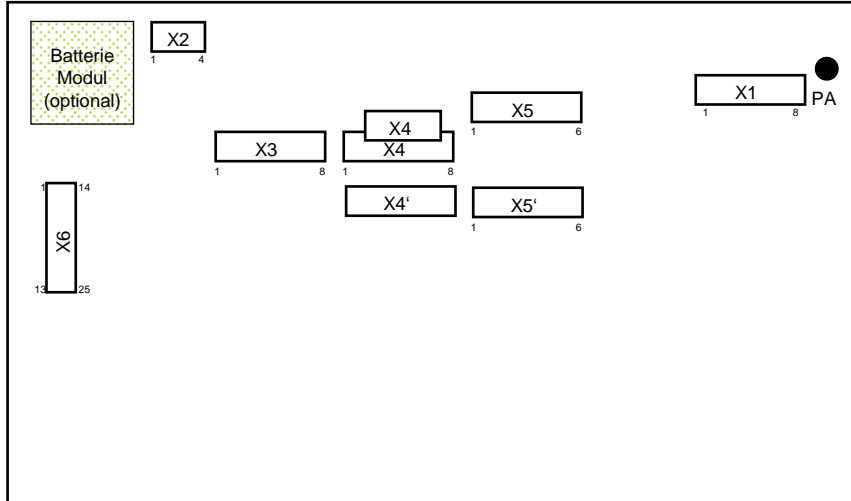
1 = very good; 2 = good; 3 = medium; 4 = poor; 5 = not suitable, n.n. = not known

Mineral oils + greases	3	Ketones	n.n.
Alcohols	n.n.	Chlorinated solvents	n.n.
Benzine	3	Sulphuric acid	1
Water	1	Ozone	1

3.4 Terminal assignment

On the rear of the TERMEX 22X / 32X case with terminal designations

Terminals X1 to X5 and X9 are designed as a terminal block. Terminal X6 is a sub-D socket / plug.



Port X1 Supply and data port (ENT-DC)																	
8-pole terminal block 0.5 mm ² to 2.5 mm ²	<table border="0"> <tr><td>X1.1</td><td>Tx</td></tr> <tr><td>X1.2</td><td>Rx</td></tr> <tr><td>X1.3</td><td>Us1</td></tr> <tr><td>X1.4</td><td>GND</td></tr> <tr><td>X1.5</td><td>Us2 (only assigned for 2 supply circuits)</td></tr> <tr><td>X1.6</td><td>GND (only assigned for 2 supply circuits)</td></tr> <tr><td>X1.7</td><td>GND (only assigned for 3 supply circuits)</td></tr> <tr><td>X1.8</td><td>Us3 (only assigned for 3 supply circuits)</td></tr> </table>	X1.1	Tx	X1.2	Rx	X1.3	Us1	X1.4	GND	X1.5	Us2 (only assigned for 2 supply circuits)	X1.6	GND (only assigned for 2 supply circuits)	X1.7	GND (only assigned for 3 supply circuits)	X1.8	Us3 (only assigned for 3 supply circuits)
X1.1	Tx																
X1.2	Rx																
X1.3	Us1																
X1.4	GND																
X1.5	Us2 (only assigned for 2 supply circuits)																
X1.6	GND (only assigned for 2 supply circuits)																
X1.7	GND (only assigned for 3 supply circuits)																
X1.8	Us3 (only assigned for 3 supply circuits)																

Port X1 with backlight
 For the backlight a separate supply circuit is needed. For the backlight. X1.5/X1.6 (supply circuit 2) or X1.7/1.8 (supply circuit 3) can be used.
 If a barcode reader is applied, must be used the X1.7/X1.8 (supply circuit 3).

Port X2 (optional) 5 mA CL (barcode reader, expansion keyboard type EXTA)									
4-pole terminal block 0.5 mm ² to 2.5 mm ²	<table border="0"> <tr><td>X2.1</td><td>Rx</td></tr> <tr><td>X2.2</td><td>Tx</td></tr> <tr><td>X2.3</td><td>Us2</td></tr> <tr><td>X2.4</td><td>GND</td></tr> </table> 	X2.1	Rx	X2.2	Tx	X2.3	Us2	X2.4	GND
X2.1	Rx								
X2.2	Tx								
X2.3	Us2								
X2.4	GND								

Port X3 (optional) Interface module (scales, scanners)	
8-pole terminal block 0.5 mm ² to 2.5 mm ²	Refer to "Interface modules" for assignment

Port X4 (optional) Interface module (scales, scanners)	
8-pole terminal block 0.5 mm ² to 2.5 mm ²	Refer to "Interface modules" for assignment

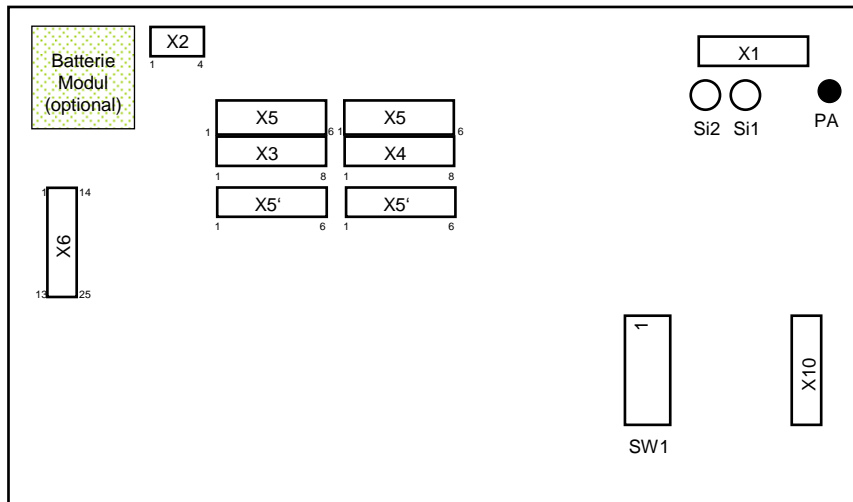
Ports X5 & X5' (optional) Module																			
2 x 6-pole terminal block 0.5 mm ² to 2.5 mm ² (see 3.7.2)	<table> <tr><td>X5.1 / X5.2</td><td>Output 1</td></tr> <tr><td>X5.3 / X5.4</td><td>Output 2</td></tr> <tr><td>X5.5 / X5.6</td><td>Output 3</td></tr> <tr><td>X5'.1</td><td>Input 1</td></tr> <tr><td>X5'.2</td><td>Frame 1</td></tr> <tr><td>X5'.3</td><td>Input 2</td></tr> <tr><td>X5'.4</td><td>Frame 2</td></tr> <tr><td>X5'.5</td><td>Input 3</td></tr> <tr><td>X5'.6</td><td>Frame 3</td></tr> </table>	X5.1 / X5.2	Output 1	X5.3 / X5.4	Output 2	X5.5 / X5.6	Output 3	X5'.1	Input 1	X5'.2	Frame 1	X5'.3	Input 2	X5'.4	Frame 2	X5'.5	Input 3	X5'.6	Frame 3
X5.1 / X5.2	Output 1																		
X5.3 / X5.4	Output 2																		
X5.5 / X5.6	Output 3																		
X5'.1	Input 1																		
X5'.2	Frame 1																		
X5'.3	Input 2																		
X5'.4	Frame 2																		
X5'.5	Input 3																		
X5'.6	Frame 3																		

Port X6 (optional) External extensions (TERMEX K36 / KL36)																																									
Sub-D, 25-pole socket contacts																																									
	<table> <tr><td>X6.1</td><td>Vcc</td></tr> <tr><td>X6.2</td><td>Out 0</td></tr> <tr><td>X6.3</td><td>Out 1</td></tr> <tr><td>X6.4</td><td>Out 2</td></tr> <tr><td>X6.5</td><td>Out 3</td></tr> <tr><td>X6.6</td><td>Out 4</td></tr> <tr><td>X6.7</td><td>Out 5</td></tr> <tr><td>X6.8</td><td>Out 6</td></tr> <tr><td>X6.9</td><td>Out 7</td></tr> <tr><td>X6.10 - .13</td><td>n.u.</td></tr> <tr><td>X6.14</td><td>Gnd</td></tr> <tr><td>X6.15</td><td>In 0</td></tr> <tr><td>X6.16</td><td>In 1</td></tr> <tr><td>X6.17</td><td>In 2</td></tr> <tr><td>X6.18</td><td>In 3</td></tr> <tr><td>X6.19</td><td>In 4</td></tr> <tr><td>X6.20</td><td>In 5</td></tr> <tr><td>X6.21</td><td>In 6</td></tr> <tr><td>X6.22</td><td>In 7</td></tr> <tr><td>X6.23 - .25</td><td>n.u.</td></tr> </table>	X6.1	Vcc	X6.2	Out 0	X6.3	Out 1	X6.4	Out 2	X6.5	Out 3	X6.6	Out 4	X6.7	Out 5	X6.8	Out 6	X6.9	Out 7	X6.10 - .13	n.u.	X6.14	Gnd	X6.15	In 0	X6.16	In 1	X6.17	In 2	X6.18	In 3	X6.19	In 4	X6.20	In 5	X6.21	In 6	X6.22	In 7	X6.23 - .25	n.u.
X6.1	Vcc																																								
X6.2	Out 0																																								
X6.3	Out 1																																								
X6.4	Out 2																																								
X6.5	Out 3																																								
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X6.9	Out 7																																								
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X6.15	In 0																																								
X6.16	In 1																																								
X6.17	In 2																																								
X6.18	In 3																																								
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X6.21	In 6																																								
X6.22	In 7																																								
X6.23 - .25	n.u.																																								

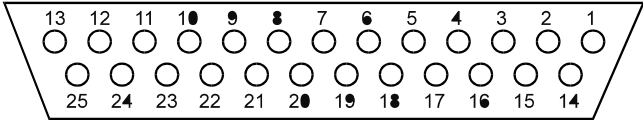
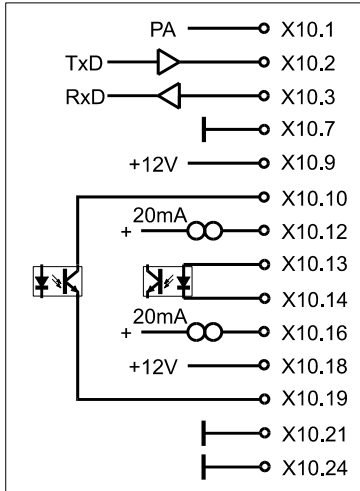
3.5 Terminal assignment TERM

On the rear of the TERMEX 22X / 32X case with terminal designations

Terminals X1 to X5 and X9 are designed as a terminal block. Terminal X6 is a sub-D socket / plug.



Port X1 (non Ex-Version) Supply interface (24V DC)		
2-pin terminal block	0,5 mm ² bis 2,5 mm ²	X1.1 + 24V DC X1.2 GND

Port X10 (only not Ex-Version) Data interface			
D-Sub, 25 pin, receptacle contacts			
			
			
X10.1	PA		
X10.2	TxD RS 232		
X10.3	RxD RS 232		
X10.4	nu		
X10.5	nu		
X10.6	nu		
X10.7	GND RS 232		
X10.8	nu		
X10.9	+12V		
X10.10	Tx1-		
X10.11	nu		
X10.12	Source 20mA for Tx		
X10.13	Rx1-		
X10.14	Rx1+		
X10.15	nu		
X10.16	Source 20mA for Rx		
X10.17	nu		
X10.18	+12V		
X10.19	Tx1+		
X10.20	nu		
X10.21	GND for Tx		
X10.22	nu		
X10.23	nu		
X10.24	GND for Rx		
X10.25	nu		

Assignment examples interface X10

Transmitter passive:

- X10.10 Tx1- transmitter input (technical current direction)
- X10.19 Tx1+ transmitter output (technical current direction)

Transmitter active:

- jumper X10.12 (source 20mA) to X10.10 (Tx1)
- X10.21 Tx- (GND for Tx) Transmitter input (technical current direction)
- X10.19 Tx1+ Transmitter output (technical current direction)

Receiver passive:

- X10.13 Rx1- Receiver input (technical current direction)
- X10.14 Rx1+ Receiver output (technical current direction)

Receiver active:

- Jumper X10.16 (source 20 mA) to X10.13 (Rx1-)
- X10.24 Rx- (GND for Rx) receiver input (technical current direction)
- X10.14 Rx1+ receiver output (technical current direction)

3.5.1 Fuses

The fuses Si1 and Si2 are only available in the non ex version of the terminal.

Si1	1A T (4x20mm)	für 24V DC supply voltage
Si2	1A T (4x20mm)	reserve

3.5.2 DIP Switch

The DIP Switch is only available in the not ex version of the terminal.

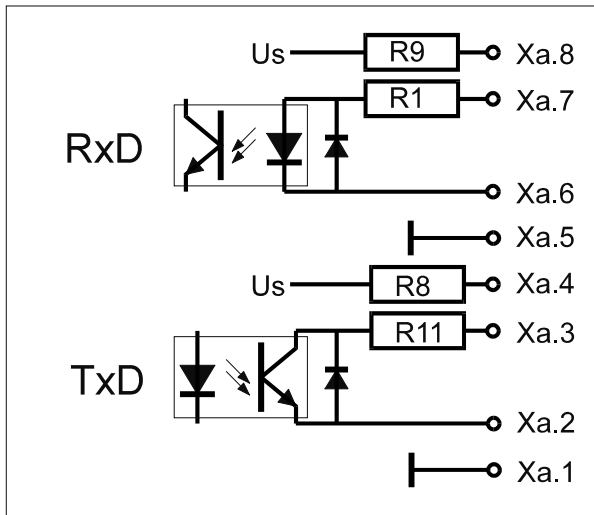
	Kommunikation RS232	Kommunikation 20mA CL
SW1.1	ON	OFF
SW1.2	OFF	ON
SW1.3	nu	nu
SW1.4	nu	nu
SW1.5	ON	OFF
SW1.6	OFF	ON
SW1.7	nu	nu
SW1.8	nu	nu

The terminal assignment of further interfaces please take from chapter 3.4

3.6.2 Interface module type UART_A:



Warning
 The specified jumpers are part of the terminal and are set in the factory. If jumpers are removed or modified, the terminal approval is no longer valid.



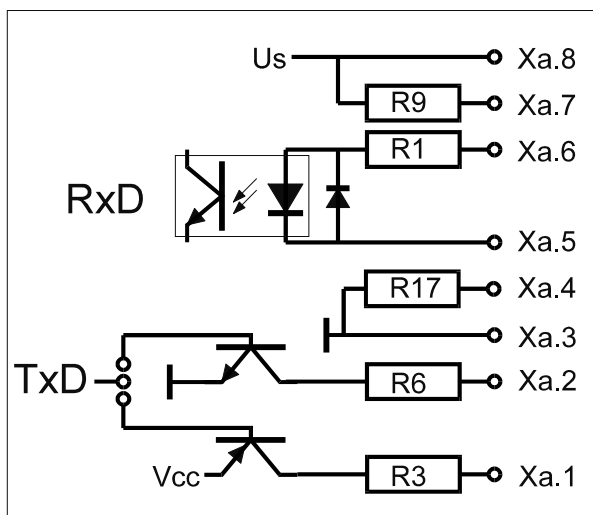
Tx / Rx	pa.. /pa..	mp.. /pa..	ma.. /pa..	pa.. /mp..	mp.. /mp..	ma.. /mp..	pa.. /ma..	mp.. /ma..	ma.. /ma..	pf.. /pf..
	]	]	]	nc	nc	nc	Rx+	Rx+	Rx+	nc
				Rx+	Rx+	Rx+	Rx-	Rx-	Rx-	Rx+
	Rx+	Rx+	Rx+	]	]	]	]	]	]	Rx-
	Rx-	Rx-	Rx-	]	]	]	]	]	]	nc
	]	nc	Tx+	]	nc	Tx+	]	nc	Tx+	nc
		Tx+	Tx-	]	Tx+	Tx-	]	Tx+	Tx-	Tx+
	Tx+	]	]	Tx+	]	]	Tx+	]	]	Tx-
	Tx-	]	]	Tx-	]	]	Tx-	]	]	nc

3.6.3 Interface module Type UART_B:



Warning

The specified jumpers are part of the terminal and are set in the factory. If jumpers are removed or modified, the terminal approval is no longer valid.

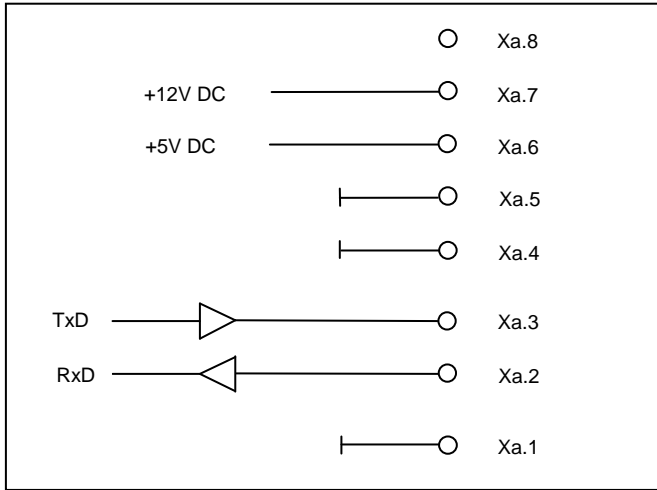


Tx / Rx	pa.. /pa..	ma.. /pa..	pa.. /mp..	ma.. /mp..	pa.. /ma..	ma.. /ma..
		Tx+		Tx+		Tx+
			nc	nc	Rx+	Rx+
			Rx+	Rx+	Rx-	Rx-
	Rx+	Rx+				
	Rx-	Rx-	Rx-	Rx-		
	Tx-		Tx-		Tx-	
	nc	Tx-	nc	Tx-	nc	Tx-
	Tx+	nc	Tx+	nc	Tx+	nc

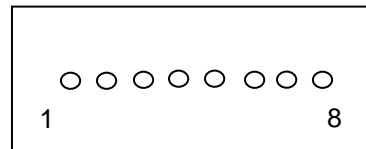
3.6.4 Interface module Type UART_C: (only for safe area version TERM)



Assembly and installation only in **safe area!**
UART_C is not intrinsically safe.

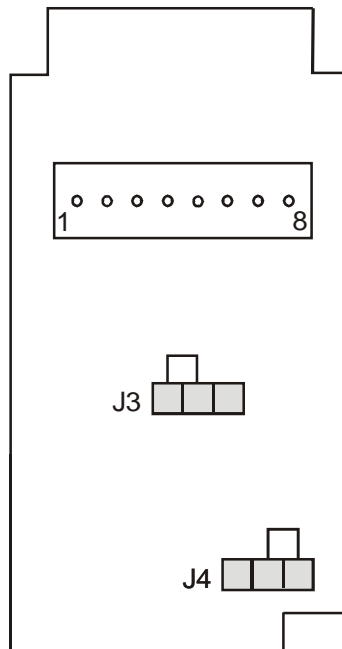
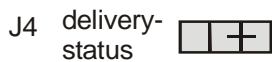
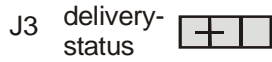


PIN	
1	GND
2	RxD (zum TERM)
3	TxD (vom TERM)
4	GND
5	GND
6	+5V
7	+12V
8	n.c.



J3 Rx Invertierungs-jumper

J4 Tx Invertierungs-jumper



3.6.5 Sub versions of the interface modules

Interface type **pa** (sender / receiver positive-switching and active) or interface type **ma** (sender / receiver negative-switching and active):

Subversion	Internal power source			R9 / R8	R1 / R11
	U _{max}	I _{Kmax} ≈	P _{max} ≈		
03	9.0 V	62 mA	137 mW	150 Ω	0 Ω
04	9.0 V	42 mA	94 mW	220 Ω	0 Ω
05	9.0 V	34 mA	76 mW	270 Ω	0 Ω
06	9.0 V	26 mA	57 mW	360 Ω	0 Ω
07	9.0 V	20 mA	44 mW	470 Ω	0 Ω
08	9.0 V	14 mA	32 mW	680 Ω	0 Ω
09	9.0 V	10 mA	21 mW	1 kΩ	0 Ω
10	9.0 V	7 mA	14 mW	1.5 kΩ	0 Ω
11	9.0 V	5 mA	10 mW	2.2 kΩ	0 Ω

Interface type **mp** (sender / receiver negative-switching and passive) or interface type **pf** (sender / receiver passive and isolated):

Subversion	External power source			R9 / R8	R1 / R11
	U _{max}	I _{Kmax}	P _{max}		
01	20 V	350 mA	1.2 W	nc	0 Ω
02	20 V	350 mA	1.2 W	nc	22 Ω
03	20 V	350 mA	1.2 W	nc	150 Ω
04	20 V	350 mA	1.2 W	nc	220 Ω
05	20 V	350 mA	1.2 W	nc	270 Ω
06	20 V	350 mA	1.2 W	nc	360 Ω
07	20 V	350 mA	1.2 W	nc	470 Ω
08	20 V	350 mA	1.2 W	nc	680 Ω
09	20 V	350 mA	1.2 W	nc	1 kΩ
10	20 V	350 mA	1.2 W	nc	1.5 kΩ
11	20 V	350 mA	1.2 W	nc	2.2 kΩ

3.7 Modules

Interface modules can be integrated into the TERMEX terminal. These modules are installed in the terminal in the factory. Interface modules cannot be exchanged later.

3.7.1 Type code for modules

TERMEX 22X -

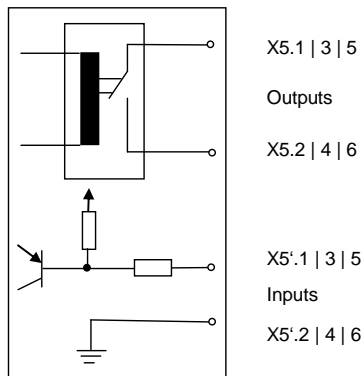
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 /

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D1 S DIGIO33 module
Supply circuit 1, 2 or 3

3.7.2 DIGIO33 module



3.7.3 Input and output parameters

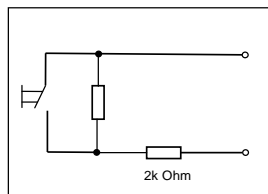
Maximum switching capacity of the output relays x5.1/2 x5.3/4 x5.5/6

Maximum switching voltage	U_{max}	60 V
Maximum switching current	I_{max}	500 mA
Maximum switching power	P_{max}	5 W

Input switch

The input circuit is specified according to NAMUR (IEC 60947-5-6). It is monitored for interruptions and short-circuits.

Required switch:



Maximum values of the input circuit

Maximum switching voltage	U_{max}	9 V
Maximum switching current	$I_{k_{max}}$	13 mA
Maximum switching power	$P_{O_{max}}$	30 mW

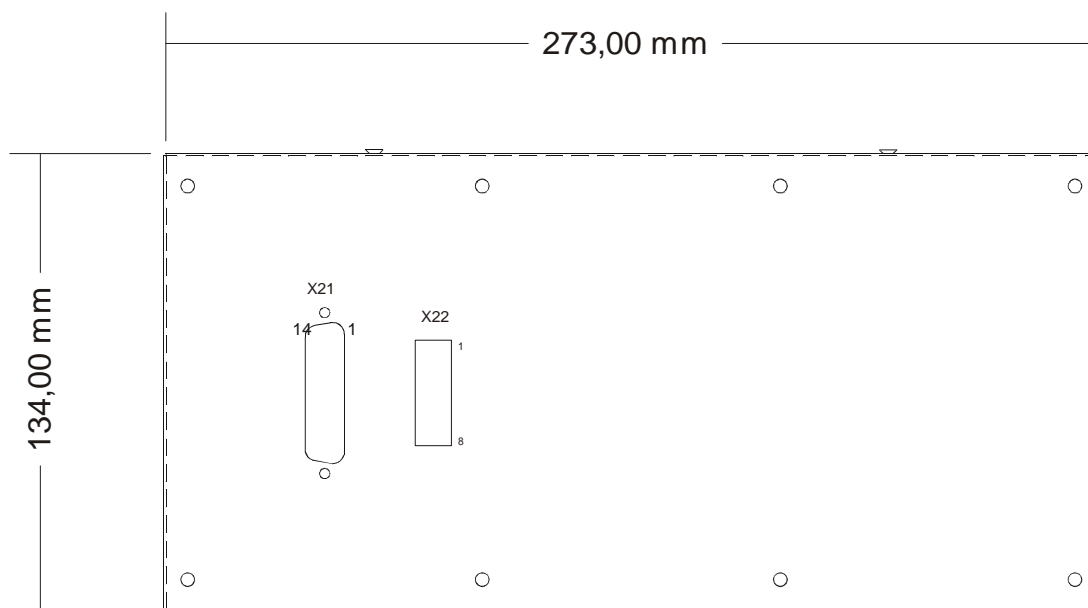
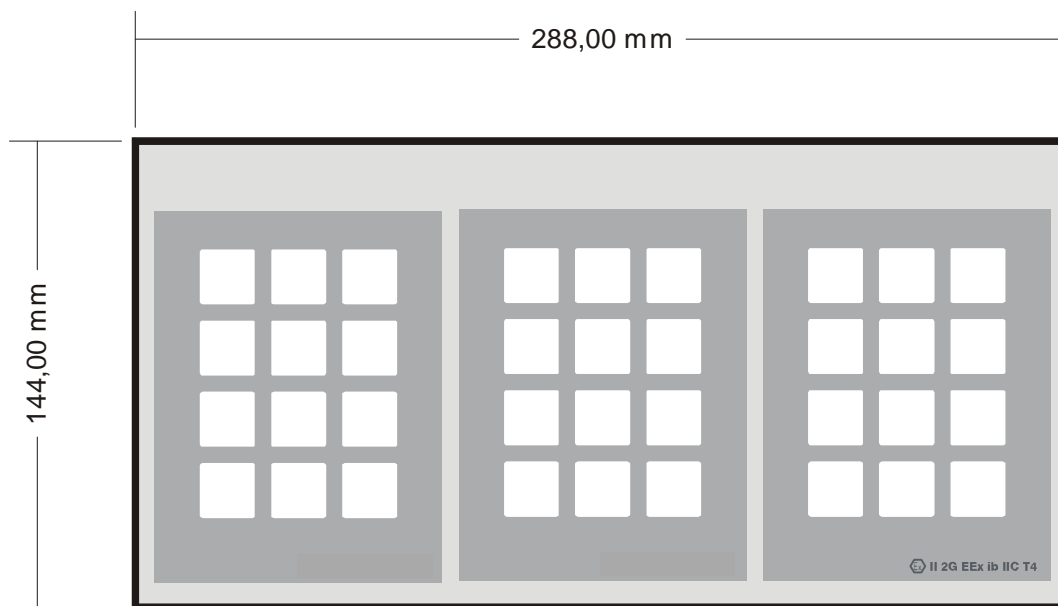
3.8 TERMEX K36 / KL36 Extended Keyboards

An extended keyboard can be connected to the terminals in the TERMEX 22x / 23x, 32x / 33x series to facilitate extended operation.

The TERMEX 22x and 23x can be equipped either with a TERMEX K36 keyboard or with a TERMEX KL36 with LEDs. The TERMEX 32x and 33x can only be used with the TERMEX K36 keyboard.

The TERMEX 22X / 32X (port X6) and the TERMEX K36 / KL36 (port X21) are connected together using the enclosed flat cable.

Front view



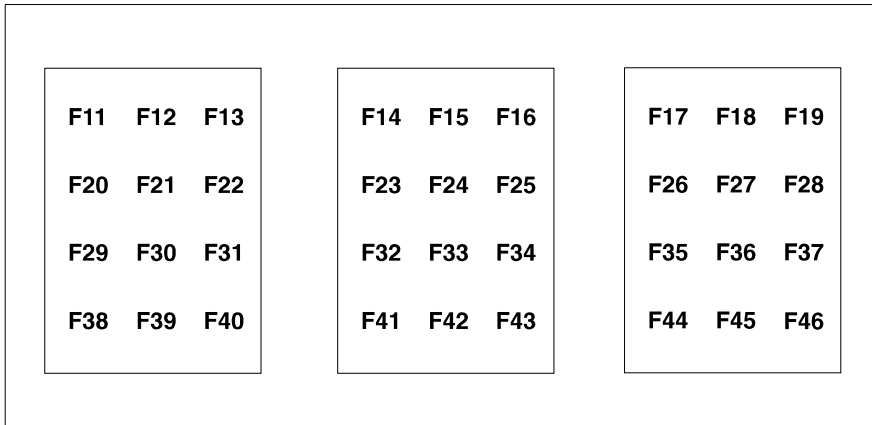
3.9 Key Assignment for Extended Keyboard

The extended keyboard has 36 keys and up to 64 LEDs. On the keyboard comes the standard module strips specified down. In addition, an individual allocation of the module strips is possible for each time.

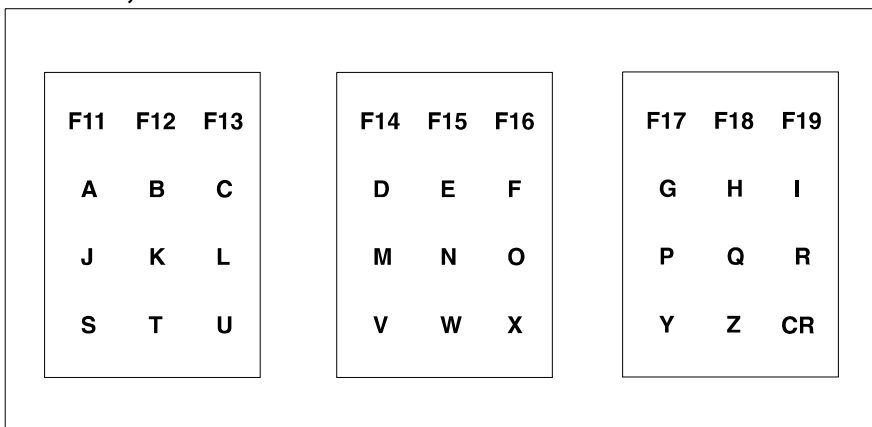
The terminal must be factory preset to be used with an extended keyboard.

Standard module strips:

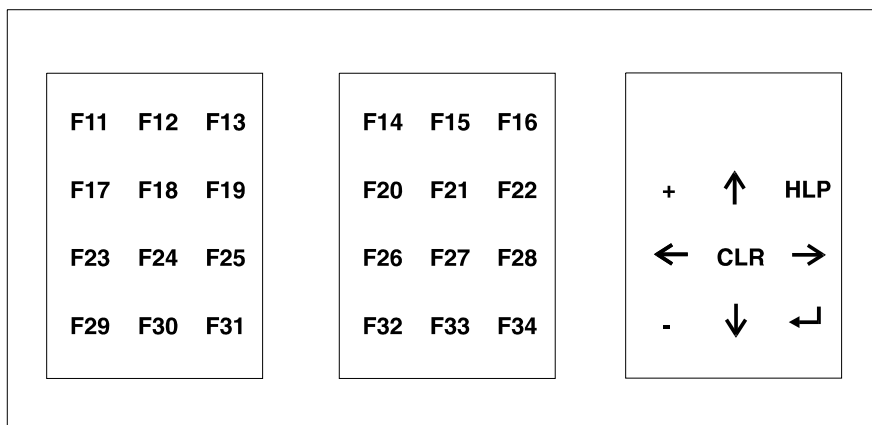
F11-F46

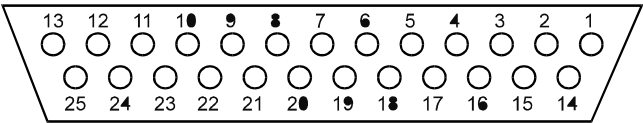


F11-F19, A-Z



CU-Extension

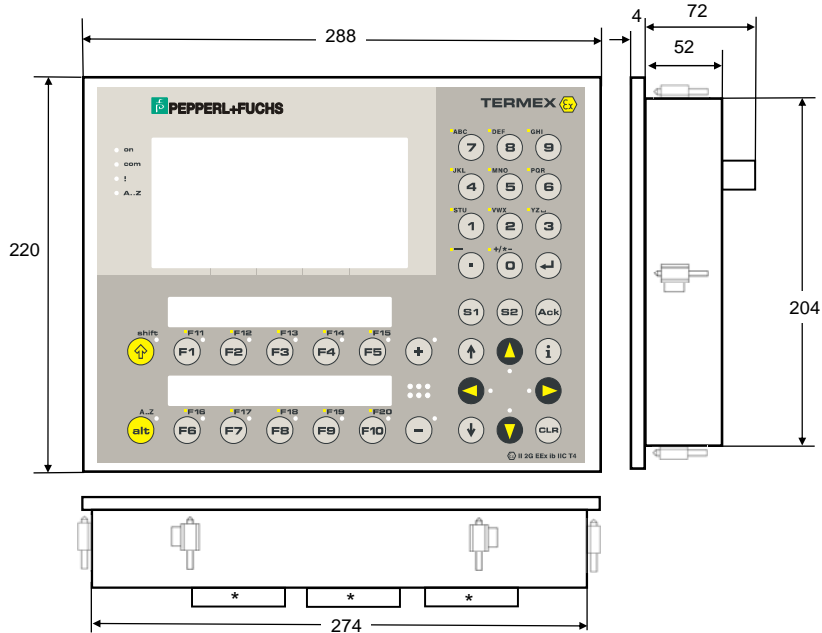


Port X21 (TERMEX K36 / KL36)																																									
Sub-D, 25-pole plug contacts 	<table border="0"> <tr><td>X21.1</td><td>Vcc</td></tr> <tr><td>X21.2</td><td>Out 0</td></tr> <tr><td>X21.3</td><td>Out 1</td></tr> <tr><td>X21.4</td><td>Out 2</td></tr> <tr><td>X21.5</td><td>Out 3</td></tr> <tr><td>X21.6</td><td>Out 4</td></tr> <tr><td>X21.7</td><td>Out 5</td></tr> <tr><td>X21.8</td><td>Out 6</td></tr> <tr><td>X21.9</td><td>Out 7</td></tr> <tr><td>X21.10 - .13</td><td>n.u.</td></tr> <tr><td>X21.14</td><td>Gnd</td></tr> <tr><td>X21.15</td><td>In 0</td></tr> <tr><td>X21.16</td><td>In 1</td></tr> <tr><td>X21.17</td><td>In 2</td></tr> <tr><td>X21.18</td><td>In 3</td></tr> <tr><td>X21.19</td><td>In 4</td></tr> <tr><td>X21.20</td><td>In 5</td></tr> <tr><td>X21.21</td><td>In 6</td></tr> <tr><td>X21.22</td><td>In 7</td></tr> <tr><td>X21.23 - .25</td><td>n.u.</td></tr> </table>	X21.1	Vcc	X21.2	Out 0	X21.3	Out 1	X21.4	Out 2	X21.5	Out 3	X21.6	Out 4	X21.7	Out 5	X21.8	Out 6	X21.9	Out 7	X21.10 - .13	n.u.	X21.14	Gnd	X21.15	In 0	X21.16	In 1	X21.17	In 2	X21.18	In 3	X21.19	In 4	X21.20	In 5	X21.21	In 6	X21.22	In 7	X21.23 - .25	n.u.
X21.1	Vcc																																								
X21.2	Out 0																																								
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X21.20	In 5																																								
X21.21	In 6																																								
X21.22	In 7																																								
X21.23 - .25	n.u.																																								
Port X22 (TERMEX K36 / KL36) External buttons	<table border="0"> <tr><td>X22.1</td><td>Out 1</td></tr> <tr><td>X22.2</td><td>In 1</td></tr> <tr><td>X22.3</td><td>Out 2</td></tr> <tr><td>X22.4</td><td>In 2</td></tr> <tr><td>X22.5</td><td>Out 3</td></tr> <tr><td>X22.6</td><td>In 3</td></tr> <tr><td>X22.7</td><td>Out 4</td></tr> <tr><td>X22.8</td><td>In 4</td></tr> </table>	X22.1	Out 1	X22.2	In 1	X22.3	Out 2	X22.4	In 2	X22.5	Out 3	X22.6	In 3	X22.7	Out 4	X22.8	In 4																								
X22.1	Out 1																																								
X22.2	In 1																																								
X22.3	Out 2																																								
X22.4	In 2																																								
X22.5	Out 3																																								
X22.6	In 3																																								
X22.7	Out 4																																								
X22.8	In 4																																								
Weight:	1.2 kg																																								

3.10 Case

3.10.1 TERMEX 32X / 33X chassis (panel-mounting case)

Mounting cutout: 278 x 208



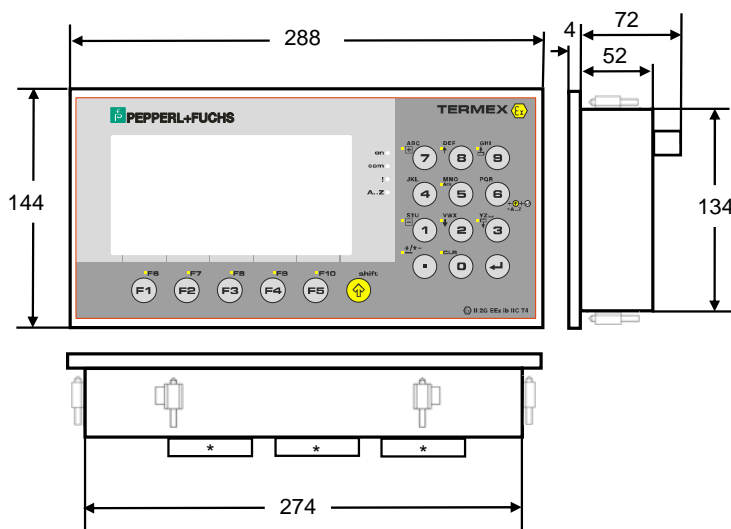
All dimensions in mm

* Clamp

Fastened with 6 clamping mounting plates (included in the scope of supply)

3.10.2 TERMEX 22X / 23X chassis (panel-mounting case)

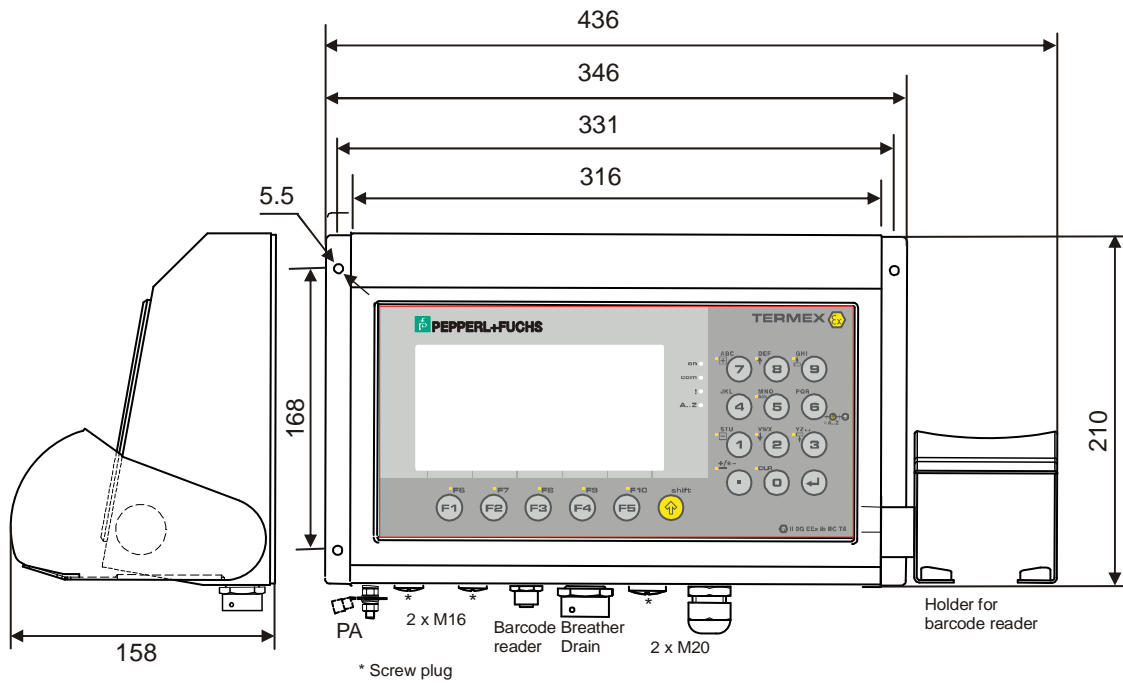
Mounting cutout: 277 x 137



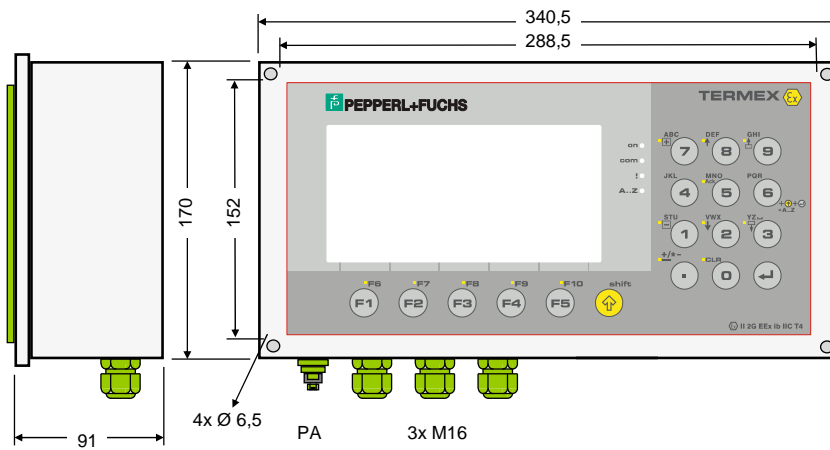
All dimensions in mm

Fastened with 4 clamping mounting plates (included in the scope of supply)

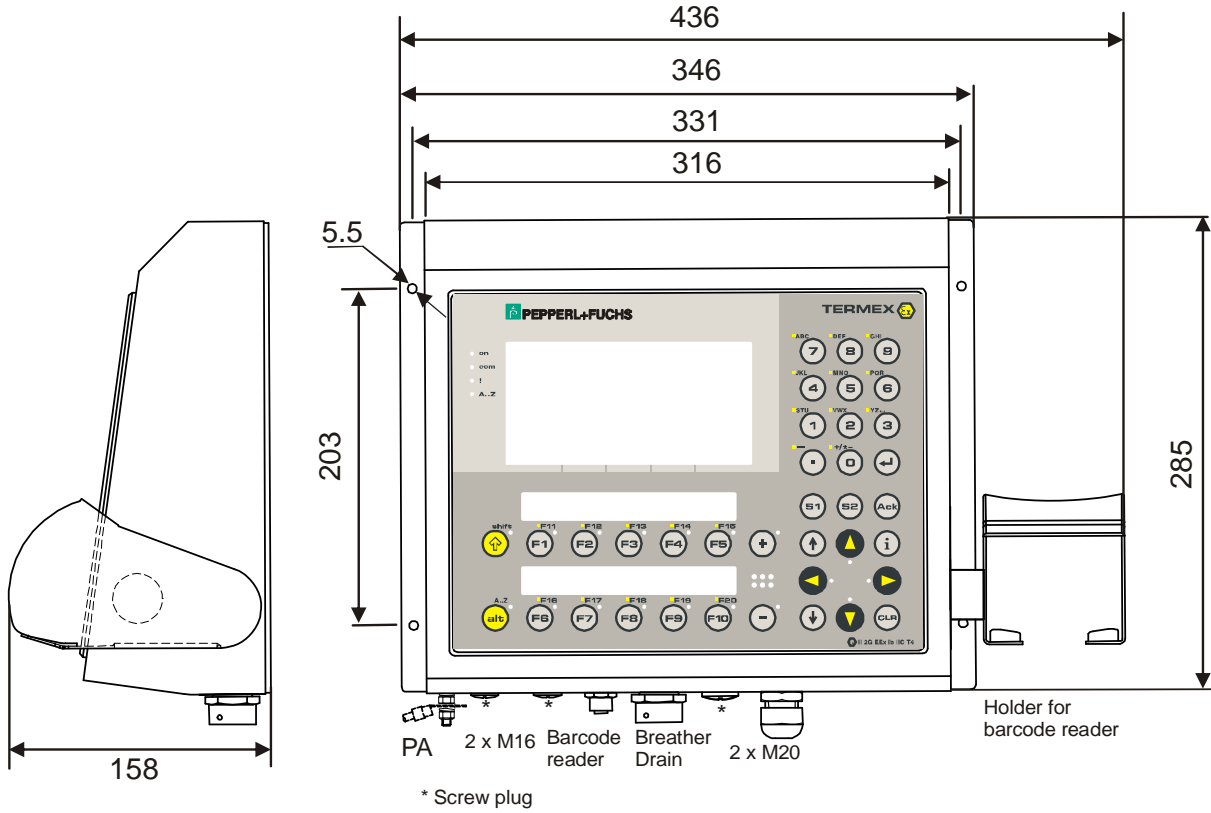
3.10.3 Wall-mounting case V2A (ABG-V2A-W) for TERMEX 2xx



3.10.4 Polyester wall-mounting case (ABG-P-W) for TERMEX 2xx

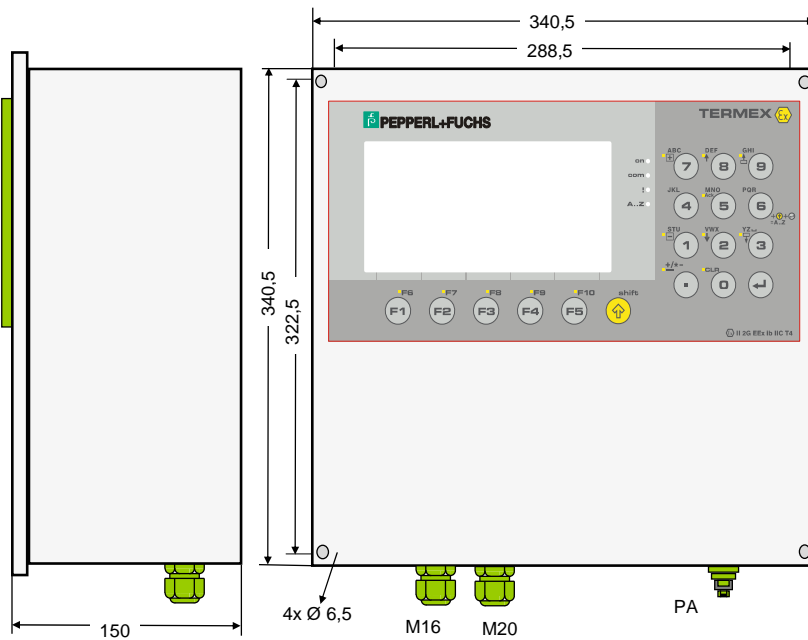


3.10.5 Wall-mounting case V2A (ABG-V2A-W) for TERMEX 3xx



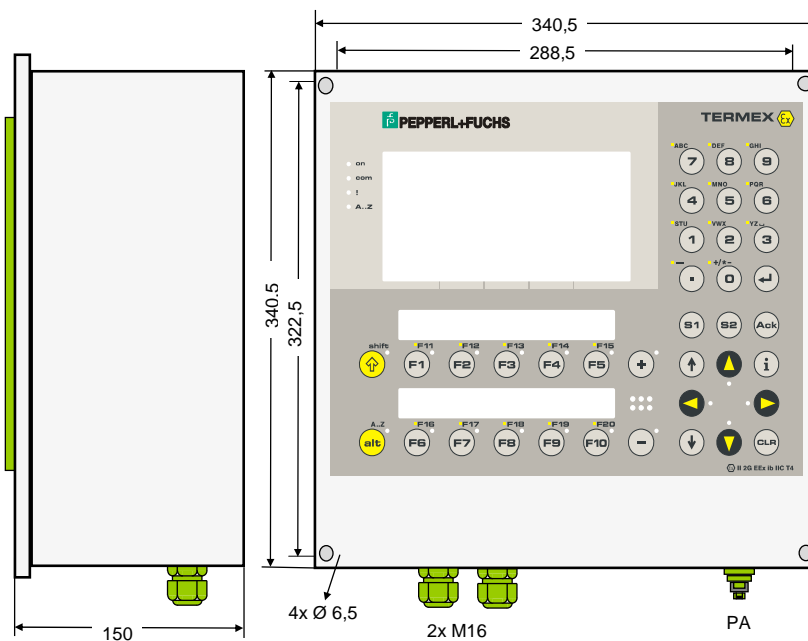
3.10.6 Polyester wall-mounting case with heating (ABG- P-H) for TERMEX 2xx

This case is only for TERMEX 22X / 23X with heating.



3.10.6.1 Polyester wall-mounting case with heating (ABG-P-H) for TERMEX 3xx

(Application with heating)



3.11 Special equipment with heating

A heating can be built into the following case:

ABG-P-H (for TERMEX 220, TERMEX 230, TERMEX 320 and TERMEX 330)

Technical Data EX MINITHERM DBA T4 ATEX

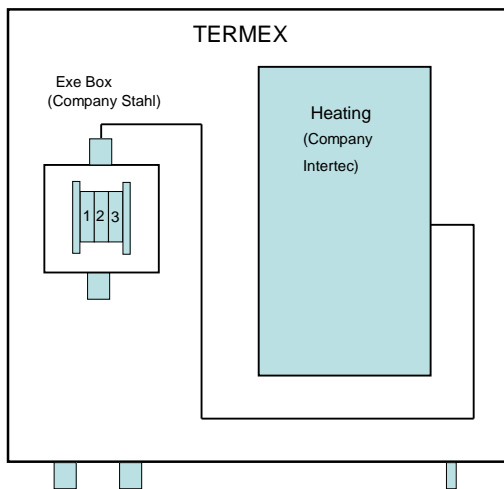
Ignition protection class:	II 2 GD EEx d II C T4
Temperature Class:	T4
EC Type-examination certificate:	PTB-Nr. 02 ATEX 1116 X
Nominal voltage:	110 to 265 V
Nominal power:	70W
Ambient temperature range:	-50 to +180°C
Protection degree:	IP 68, NEMA 4X
Material:	Seewater-proof aluminium, black anodized

The ambient temperature range of the MINITHERM heating (-50 - +180°C) applies for exact this heating. For the TERMEX the limit values determined in the EC type Examination Certificate are to be considered.
(TERMEX Ambient conditions operation: -20 - +50°C)

*** The temperatures lower than -20°C the following is to be considered:**

The display must be warmed up in warmer environment by at least -20°C, for 1.5 hours. Only then the display may be switched on.

Terminal compartment Exe Box (company Stahl) for the power supply of the heating



Further information
(certificates, technical data,...)

for the heating:
company Intertec

for the Exe box:
company Stahl
Junction Box 8118

Clamp:	
1	L
2	N
3	PE

3.12 Configuration using the internal setup menu

The TERMEX 22X / 23X and TERMEX 32X / 33X terminals feature an integrated setup menu (configuration program). All the most important terminal parameters can be verified and selected here. The parameters are set to default values when the equipment is delivered. Please refer to the 'TERMEX 2xx / 3xx Firmware Manual' for a more detailed description.



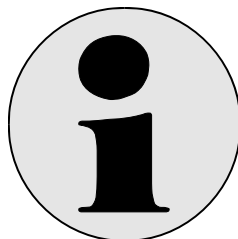
Warning

The system or machine may malfunction if the TERMEX 22X/ 23X or TERMEX 32X / 33X terminal is not correctly connected and configured or if an existing configuration is changed.

The setup menu can be accessed in two steps by using keyboard shortcuts and entering a password (optional).

- First, press the shortcut <SHIFT ↑>+<ENTER ↵>+<9>. This action triggers a reset on the control panel and interrupts communication with the host computer connected to X1. The startup message with the software version number and the hardware configuration is displayed for approximately 4 seconds and the system runs an internal self-test on all hardware components belonging to the control panel.
- Press the shortcut <SHIFT ↑>+<F1> while the startup message is displayed (approximately 4 seconds). This takes you to the internal setup menu. If a password was specified in a previous configuration, the system will ask for this four-digit number before it opens the setup menu.

You are now in the main setup menu. You can check, and if necessary correct, the various settings on the control panel using the function keys (softkeys) that appear on the display:



Note

Changes made in the setup menu take effect as soon as the menu is exited. When you exit the setup menu, all changes are saved.



Warning

If SETUP attitudes are stored, supply voltage may be interrupted in no case, otherwise it can come to durable malfunctions.

1. Serial Ports...

You can verify all the parameters of the 4 serial ports here and change them if necessary: Check the baud rate, the parity, the number of data bits, the number of stop bits and the hardware configuration in the "USE" line (e.g. 'Scanner' for the model with a barcode reader connection or 'n.u.' if the serial port is not used in your configuration). The entries in USE cannot be changed.

2. Protocols...

You can display and select the protocol that is used on the interface to the host computer (X1) here.

The following protocols are currently available:

- EXTEC
- Siemens S5 / AS511 (S5 progr.) The communication block in the PLC (DB) can be selected.
- 3964R / RK512 The communication block in the PLC (DB) can be selected.
- Modbus RTU (slave) The slave address can be set.
- Modbus RTU (master) The slave address can be set.
- Allen-Bradley DF1 The SLC 500, PLC 5, CompactLogix and ControlLogix families can be selected
- ET-1 emulation The communication block (file) in the PLC can be selected. Emulation of the ET-1 terminal
- BAZ-03/1 emulation Emulation of the BAZ-03/1 terminal (ASCII version, F1-F5, Shift, V600146)

3. General Settings...

You can set general control panel functions here (e.g. key repeat on/off, date and time, message management).

In addition the brightness of the backlight can be placed here in 16 levels.

This basic adjustment is then durably saved. In addition a temporary adjustment can be made with the combination of keys <Shift> <Enter> 3 . (outside of the setup).

4. You can parameterize and configure the intelligent peripherals connected to serial ports X3, X4 and X5 here (e.g. Mettler-Toledo, Bizerba or Sartorius scales, barcode readers, etc.).

5. Status

You can display terminal status information here (firmware version, operating hours, file name of the loaded project design software including the date and time compiled, resources (memory map), number of variables, number of message texts, etc.).

6. Test

You can choose between 9 different test programs here:

Keyboard test, interface test (loopback), interface monitors, I/O test

7. EPCA / OS

You can enter EPCA programming system settings here. Status information is displayed. EPCA can be activated or deactivated.

8. Quit Setup and Save

This closes the setup menu. The terminal asks whether you want to save your changes and then returns to the normal operating mode (port X1 to the host computer is activated again). 'SCREEN 1' is automatically displayed in ASCII mode if it exists in the internal project memory (refer to the "TERMEX 2xx / 3xx Software Manual").

3.13 TERMEXpro project design software

Application-specific pictures and text can be created on a Windows PC. TERMEXpro is a graphics-oriented programming environment with the characteristics of a drawing program (WYSIWYG) and mouse control. The project design data generated with this program is transferred from the PC (COM1 or COM2) via the mains buffer stage ENT-DCxx to serial port X1 on the terminal, where it is stored in non-volatile memory. It can also be transferred when the system is already installed. Please refer to the latest version of the "TERMEXpro Technical Manual" for further details (this manual can be downloaded from the Pepperl+Fuchs web site: www.pepperl-fuchs.com):

3.14 Computer link (PC, PLC, PCS, etc.)

The TERMEX 22x/23x and TERMEX 32x/33x control panels have various operating modes for the different computer links used in process control and automation engineering.

3.14.1 ASCII protocol

A pure ASCII protocol can be used for links to PCs, workstations and simple serial ports (internal setup menu, Protocol: EXTEC). The control panel can be controlled by means of command sequences (preceded by ESC) and ASCII characters (or character strings). Keystrokes and peripheral equipment data are transferred to the computer as ASCII characters. Suitable for point-to-point connections.

3.14.2 PLC interfaces

The protocols of all major PLC manufacturers are supported to allow the terminals to be linked to a programmable controller. The control panel is the PLC master. It automatically writes the required data into the PLC and reads it from the PLC. Communication with the PLC takes place using an intelligent protocol specified by the PLC manufacturer. Data is exchanged via a selectable data block in the PLC. The following protocols are currently implemented.

AS511 (Siemens S5 programming interface)

Control panels can be connected directly to the programmer interface of the Siemens S5 90U, 95U, 100U, 115U, 135U and 155U families.

3964R protocol with RK512 procedure

This protocol is offered by several manufacturers. In most cases, either special modules/drivers are required in the PLC or a second port is used in the CPU of the PLC (e.g. Siemens S5: CP524/CP525/CP544, CPU 945, CPU 928B, CPU 948, etc.).

Allen Bradley: DF1 protocol (DH485, DH+)

The DF1 protocol can be used for point-to-point connections via the RS232 interface of the CPU (programming interface) for all programmable controllers in the Allen-Bradley SLC 500 and PLC 5 families. The DH485 and DH+ data highway protocols of the Allen-Bradley SLC, PLC, ControlLogix and CompactLogix families can also be connected with the above protocol and an additional Allen-Bradley bus coupling unit.

3.14.3 Modbus/RTU (slave)

Many manufacturers of programmable controllers and process control systems support the Modbus/RTU protocol for point-to-point connections or bus coupling (e.g. ABB, AEG, Alfa Laval, Allen-Bradley, Eckardt, Foxboro, Hartmann&Braun, HIMA, Honeywell, Modicon, Yokogawa, etc.).

In the slave variant, the TERMEX 22x/23x and TERMEX 32x/33x control panels are passive, in other words they act as the bus slave. The slave address can be set between 1 and 32.

The following Modbus functions are supported:

- | | |
|----|-------------------------|
| 1 | Read coils |
| 3 | Read output register |
| 4 | Read input register |
| 6 | Load register |
| 8 | Loopback test |
| 15 | Force multiple coils |
| 16 | Load multiple registers |

3.14.4 Modbus/RTU (master)

The terminal exchanges the data block data with a connected slave. Function 3 is used for reading and function 16 for writing.

The terminal controls all communication with the slave, in other words it is active.

Data is exchanged in the directions specified in the description of the communication data block contained in the Firmware Manual. The terminal uses Modbus function 16 to send data to the slave (PLC) and function 3 to read data.

The maximum length of the variable area that can be exchanged in a screen is 125 DW (also a Modbus condition).

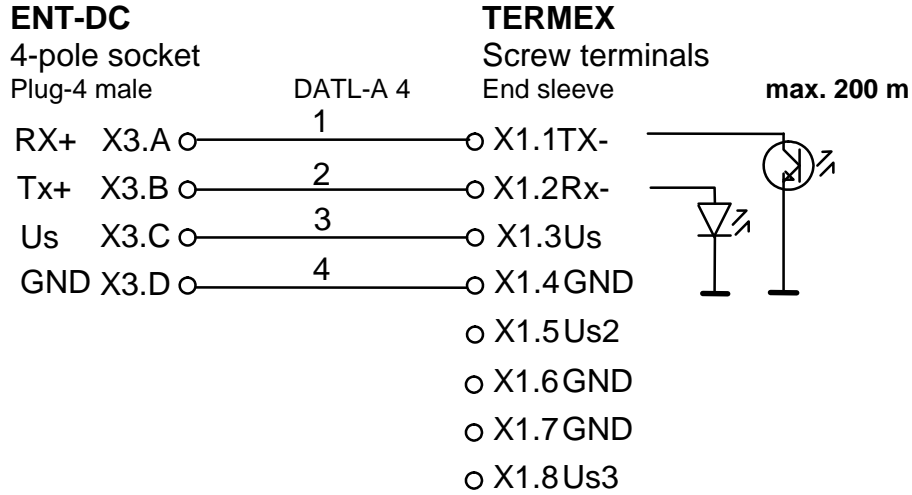
The slave data must be organized so that the read and write areas are mapped onto one another, in other words it is not allowed to be in different data areas. This is particularly important when (set) variable data is exchanged, because otherwise your set value inputs will not be accepted.

You can set the slave address in the setup menu, in other words the address of the remote end with which the terminal is required to communicate as master.

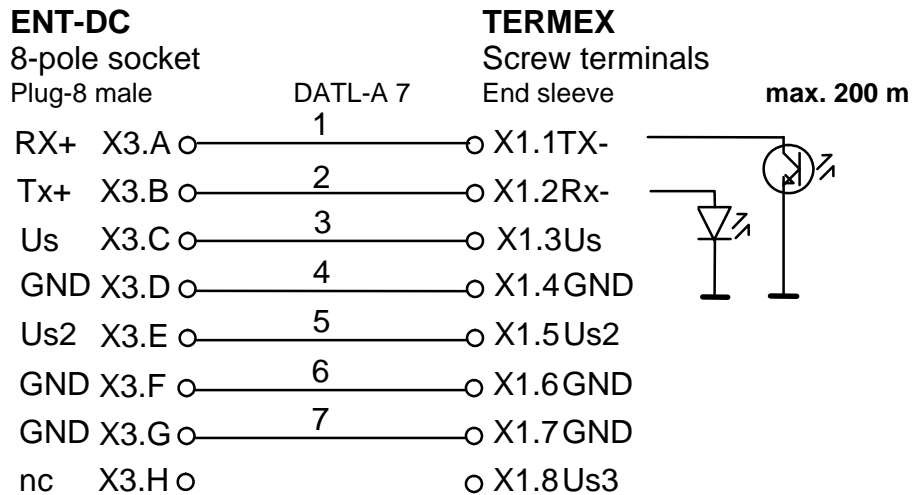
A communication timeout can be specified here as an option. If a message from the master is not answered with a request from the slave before this time expires, the terminal triggers an error and the COM LED lights up. The settable address offset allows matching to the memory area of the controller.

4 Connecting cables

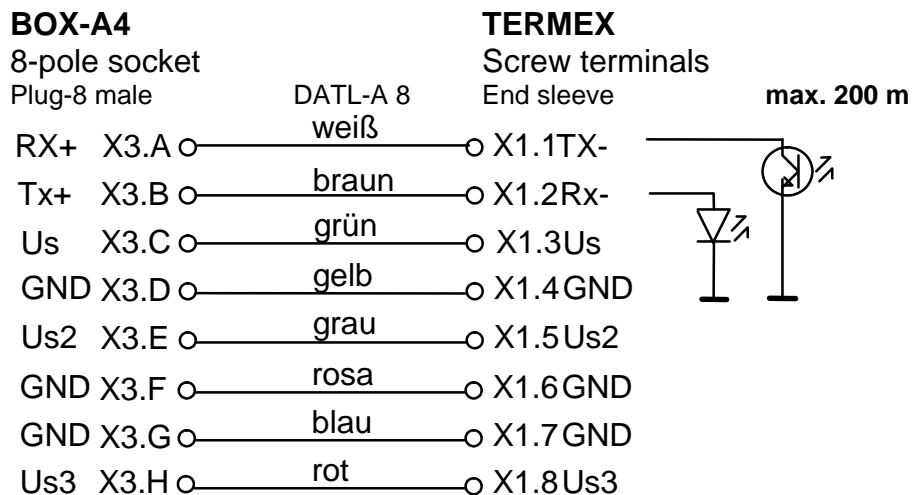
4.1 ENT-DC - TERMEX 22X / 23X / 32X / 33X 1 supply circuit



4.2 ENT-DC - TERMEX 22X / 23X / 32X / 33X 2 supply circuits

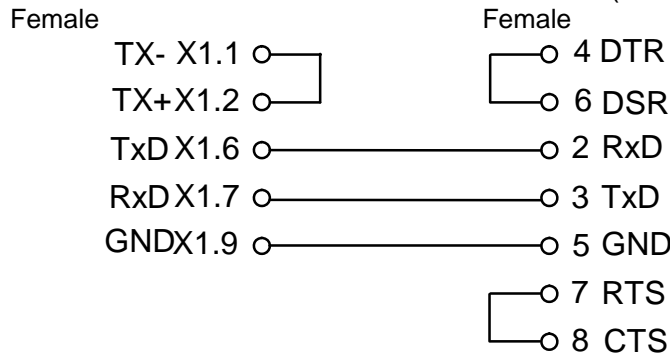


4.3 ENT-DC - TERMEX 22X / 23X / 32X / 33X 3 supply circuits



4.4 S-ENT/PC-9, S-ENT-AB SLC 500

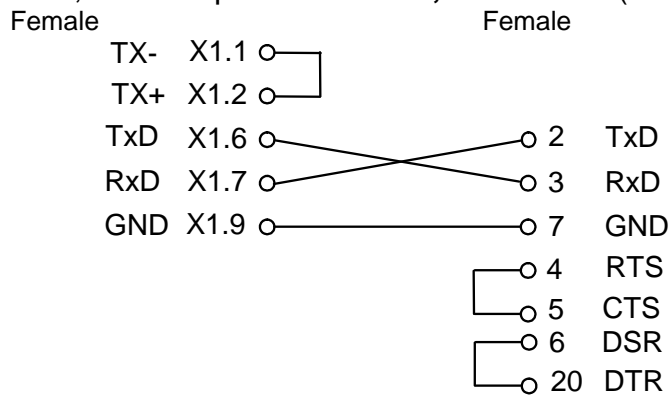
ENT sub-D 9-pole -- **PC, A-B SLC 500, MPI interface, (RS232) sub-D 9-pole**



Note: The Tx jumpers for the 20 mA interface in the ENT-DC-1 must be set to "active". The Rx jumper setting is not relevant (see ENT-DC Technical Manual).

4.5 S-ENT/PC-25, S-ENT-AB PLC 5

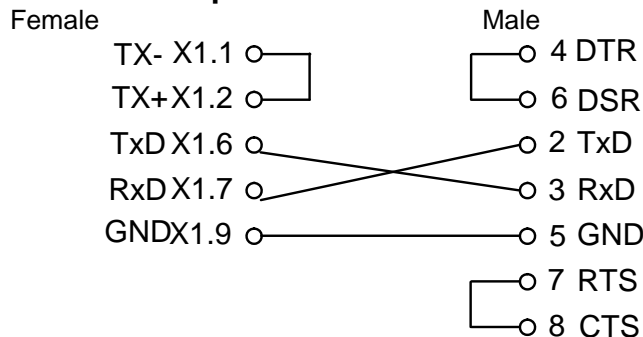
ENT, sub-D 9-pole -- **PC, A-B PCS 5 (RS232) sub-D 25-pole**



Note: The Tx jumpers for the 20 mA interface in the ENT-DC-1 must be set to "active". The Rx jumper setting is not relevant (see ENT-DC Technical Manual).

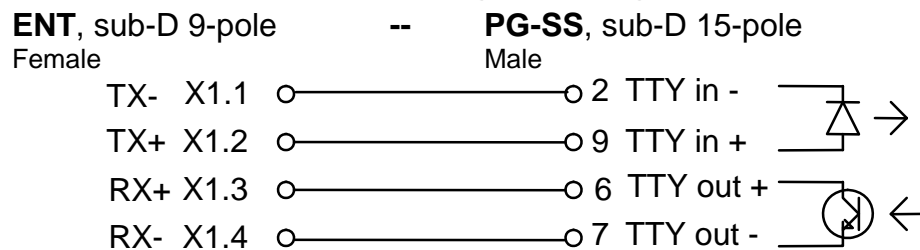
4.6 S-ENT/SPI3

ENT sub-D 9-pole -- **SK-PROFIBUS-DP-SPI3 sub-D 9-pole**



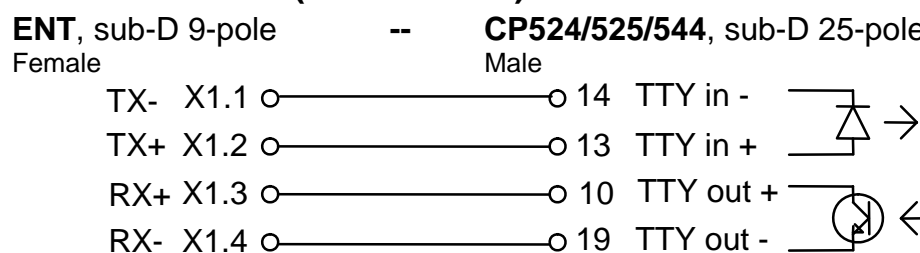
Note: The Tx jumpers for the 20 mA interface in the ENT-DC-1 must be set to "active". The Rx jumper setting is not relevant (see ENT-DC Technical Manual).

4.7 S-ENT/PGSSaa (Siemens S5 programming interface)



Note: The jumpers for the 20 mA interface in the ENT-DC must be set to "active, active" (see ENT-DC Technical Manual).

4.8 S-ENT/CP524/525/544 (Siemens S5)



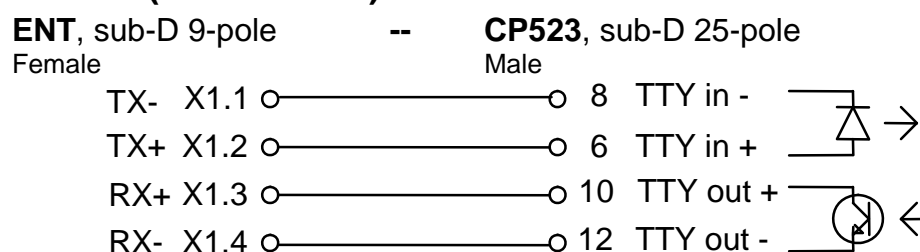
Note: The jumpers for the 20 mA interface in the ENT-DC must be set to "active, active" (see ENT-DC Technical Manual).

4.9 S-ENT/CP521 (Siemens S5)



Note: The jumpers for the 20 mA interface in the ENT-DC must be set to "active, active" (see ENT-DC Technical Manual).

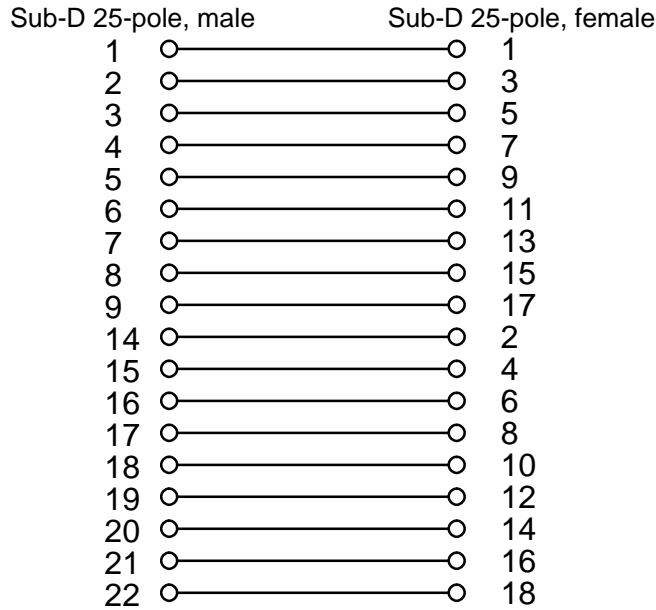
4.10 S-ENT/CP523 (Siemens S5)



Note: The jumpers for the 20 mA interface in the ENT-DC must be set to "active, active" (see ENT-DC Technical Manual).

4.11 S-TERMEX/TERMEX K36 / KL36

TERMEX 22X / 23X -- **TERMEX K36 / KL36**
32X / 33X



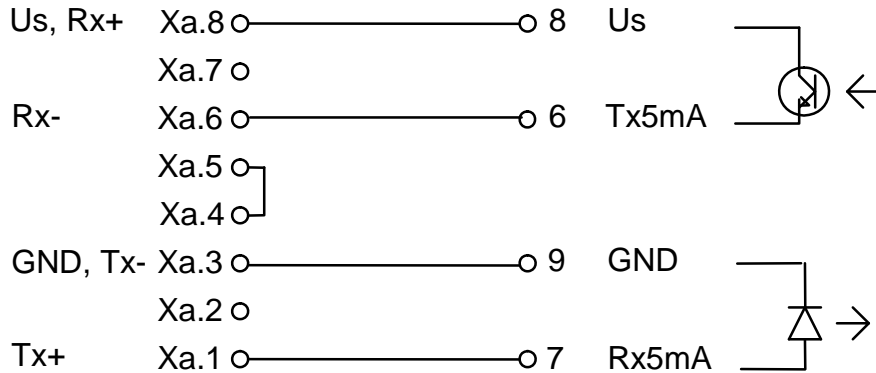
Note: All contacts not shown are not assigned

4.12 TERMEX 22X / 23X / 32X / 33X - MVS-1.1-5 (marked WE)

TERMEX -- **MVS-1.1-5**

Interface type: UART_B -pa08/mp01-
X3, X4 DATL-A 4 PG/screw terminal

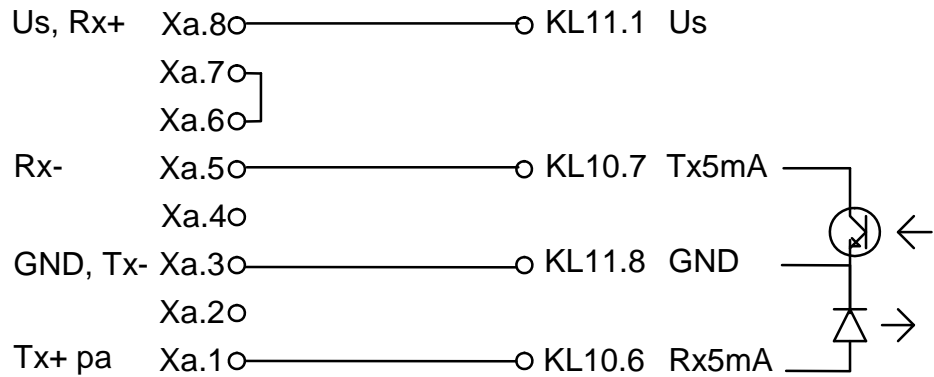
Xa = X3 or X4



4.13 TERMEX 22X / 32X – AWU-Ex 3/6 - 5 (marked WA)

TERMEX -- **EXAWU3-5**

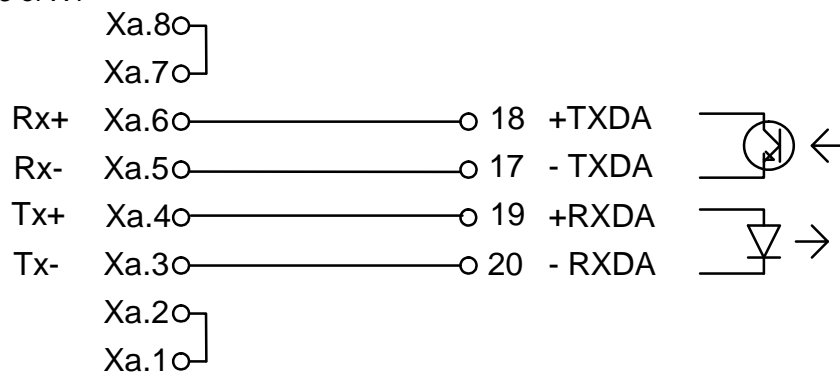
Interface type: UART_B -pa08/mp01-
 X3, X4 DATL-A 4 PG/screw terminal
 Xa = X3 or X4



4.14 TERMEX 22X / 32X - Mettler GD130X (marked WMa)

TERMEX -- **GD130X**

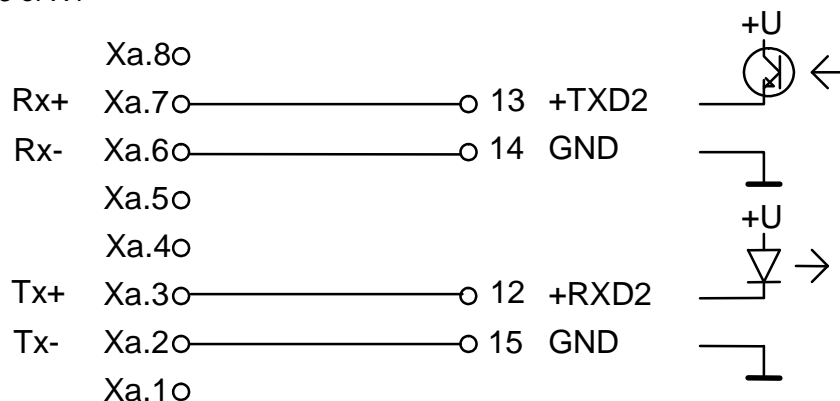
Interface type: UART_A -ma05/pa05-
 X3, X4 DATL-A 4 PG/screw terminal
 Xa = X3 or X4



4.15 TERMEX 22X / 32X - Mettler GD13X (marked WMb)

TERMEX -- **GD13X**

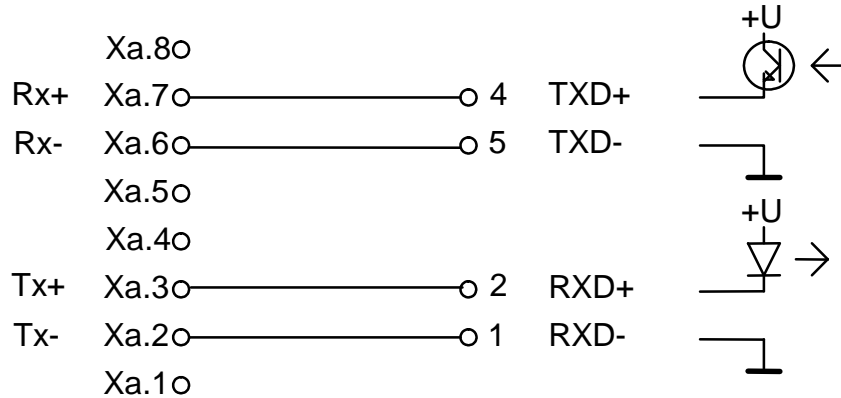
Interface type: UART_A -pf01/pf01-
 X3, X4 DATL-A 4 PG/screw terminal
 Xa = X3 or X4



4.16 TERMEX 22X / 32X - Mettler ID 5 with 083 option (marked WMd)

TERMEX -- **ID 5, CL 083 active**

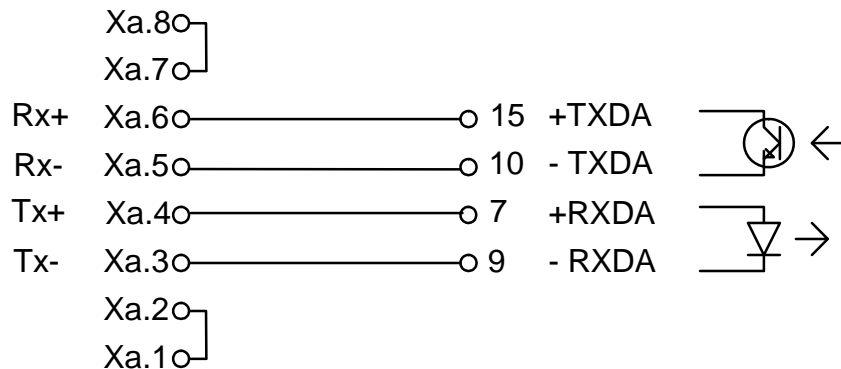
Interface type: UART_A -pf01/pf01-
X3, X4 DATL-A 4
Xa = X3 or X4



4.17 TERMEX 22X / 32X - Mettler SM-/PM-/AM (marked WMe)

TERMEX -- **SM-/PM-/AM-, plug**

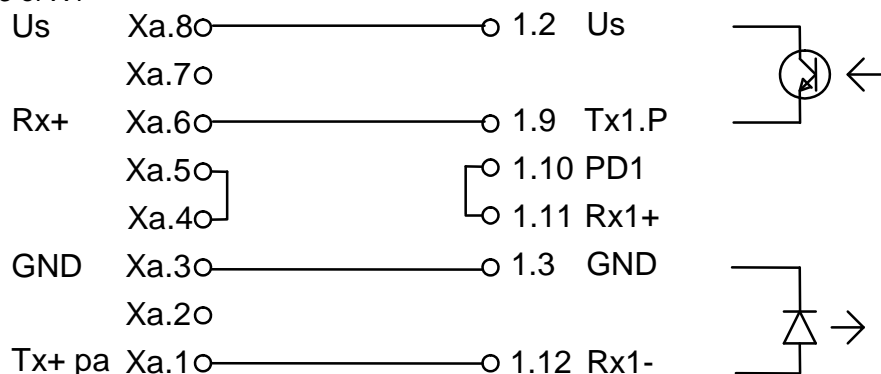
Interface type: UART_A -ma05/pa05-
X3, X4 (DATL-A 4) "MiniMETTLER" connector, male
Xa = X3 or X4



4.18 TERMEX 22X / 32X - Puma / ST3x via EXDK (marked WMh)

TERMEX -- **EXDK**

Interface type: UART_B -pa08/mp01-
X3, X4 Coiled cable Connected ex works
Xa = X3 or X4



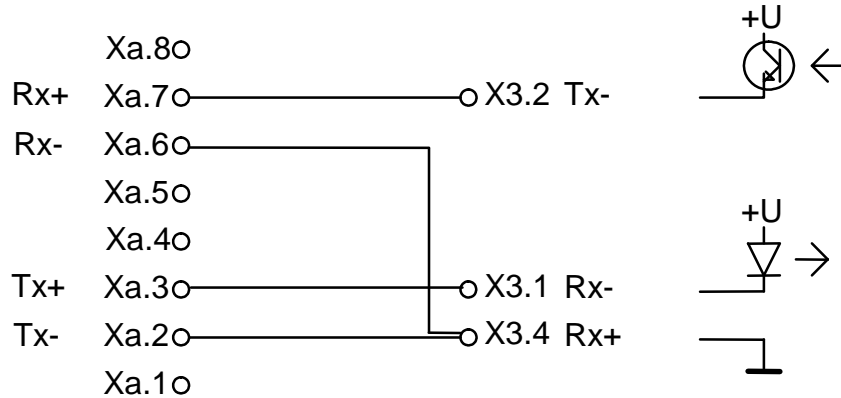
4.19 TERMEX 22X / 32X - Puma / ST3x via ENT-DC-3.0 (marked WMi)

TERMEX

Interface type: UART_A -pf05/pf05-
X3, X4 DATL-A 4
Xa = X3 or X4

-- **ENT-DC-3.0 as barrier**

Screw terminal



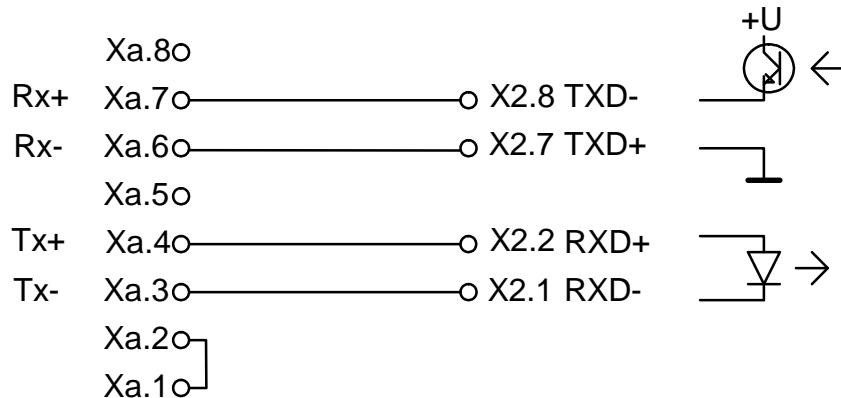
4.20 TERMEX 22X / 32X - Bizerba ITE-Ex (marked WBa)

TERMEX

Interface type: UART_A -ma05/pf01-
X3, X4 (DATL-A 4)
Xa = X 3 or X4

-- **ITE-Ex, terminal blocks**

Terminal



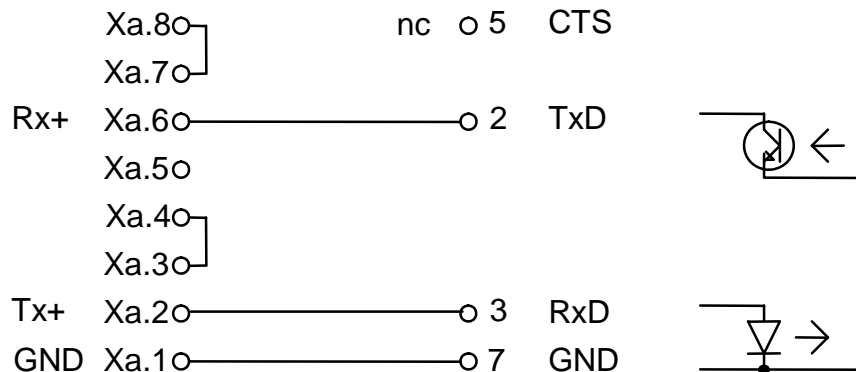
4.21 TERMEX 22X / 32X - Sartorius-Ex (marked WSara)

TERMEX

Interface type: UART_A -pa06/pa06-
X3, X4 DATL-A 4-0
Xa = X3 or X4

-- **Sartorius F scale**

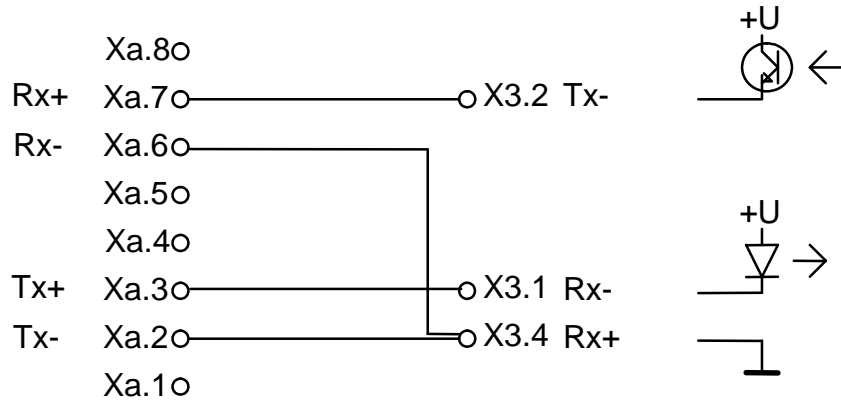
Plug, sub-D 25-pole, female



4.22 TERMEX 22X / 32X - Sartorius Ex via ENT-DC-3.0 (marked WSarb)

TERMEX -- **ENT-DC-3.0 as barrier**

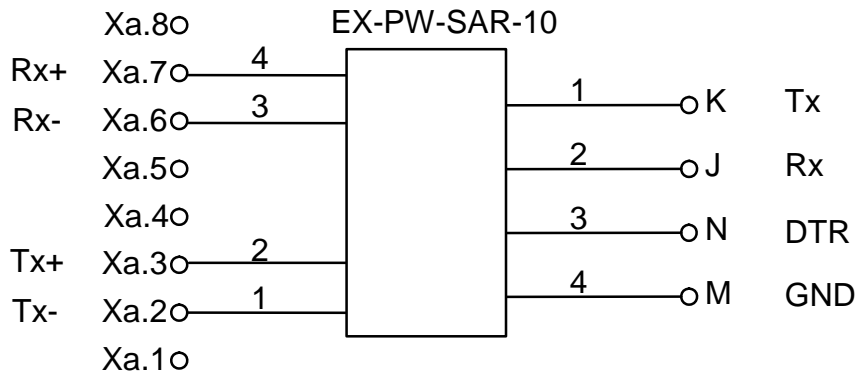
Interface type: UART_A -pf05/pf05-
X3, X4 DATL-A 4 Screw terminal
Xa = X3 or X4



4.23 TERMEX 22X / 32X - Sartorius Ex via EX-PW-SAR-10 (marked WSard)

TERMEX -- **Sartorius FC scale**

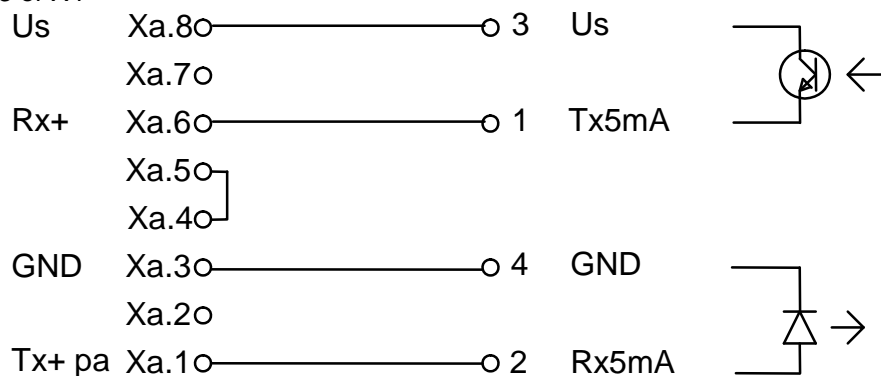
Interface type: UART_A -pf01/pf01-
(data negated)
X3, X4 14-pole socket
Xa = X3 or X4



4.24 TERMEX 22X / 32X - 2nd scanner (marked 2S)

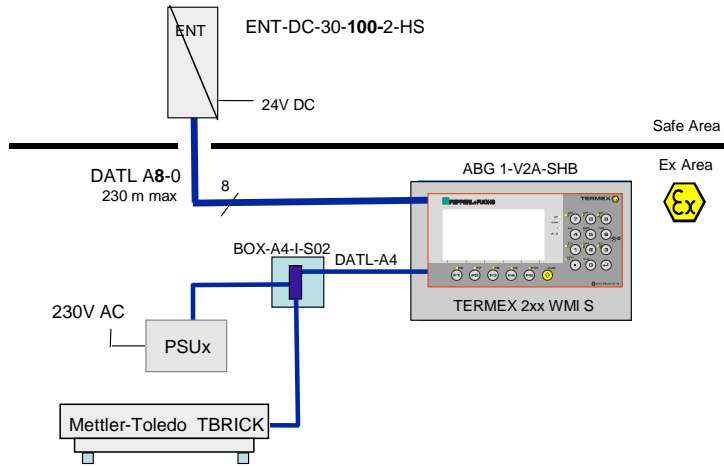
TERMEX -- **Scanner**

Interface type: UART_B -pa08/mp01-
X3, X4 Coiled cable Connected ex works
Xa = X3 or X4

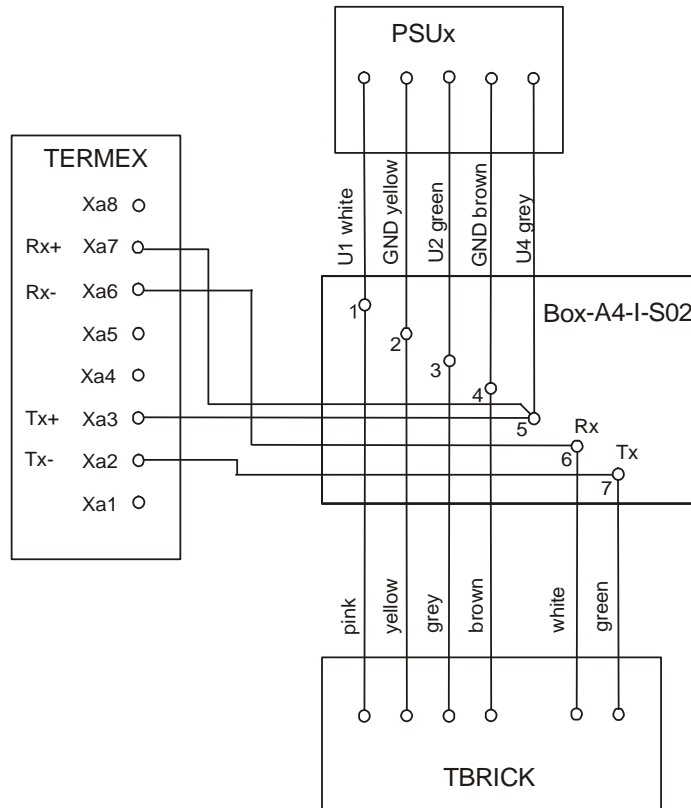


4.25 TERMEX 22X / 32X – Mettler TBRICK 15-Ex / 32-Ex (marked WML)

TERMEX **TBRICK / PSUx**
Interface type: UART_A –pf01/pf01
X3, X4

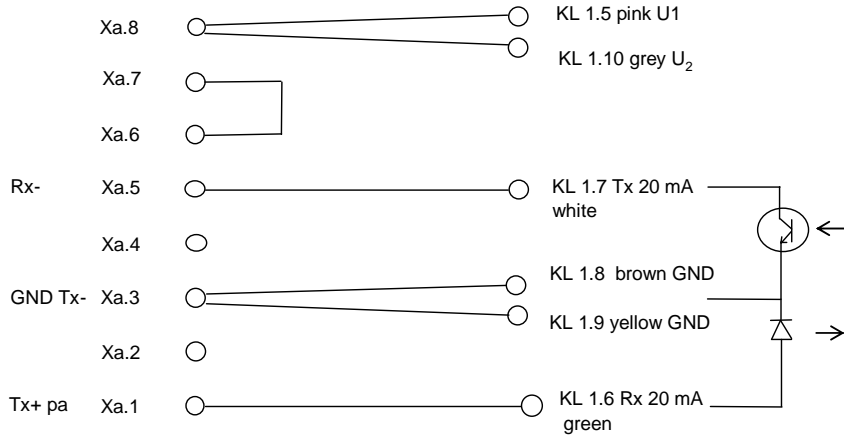


Xa = X3 or X4



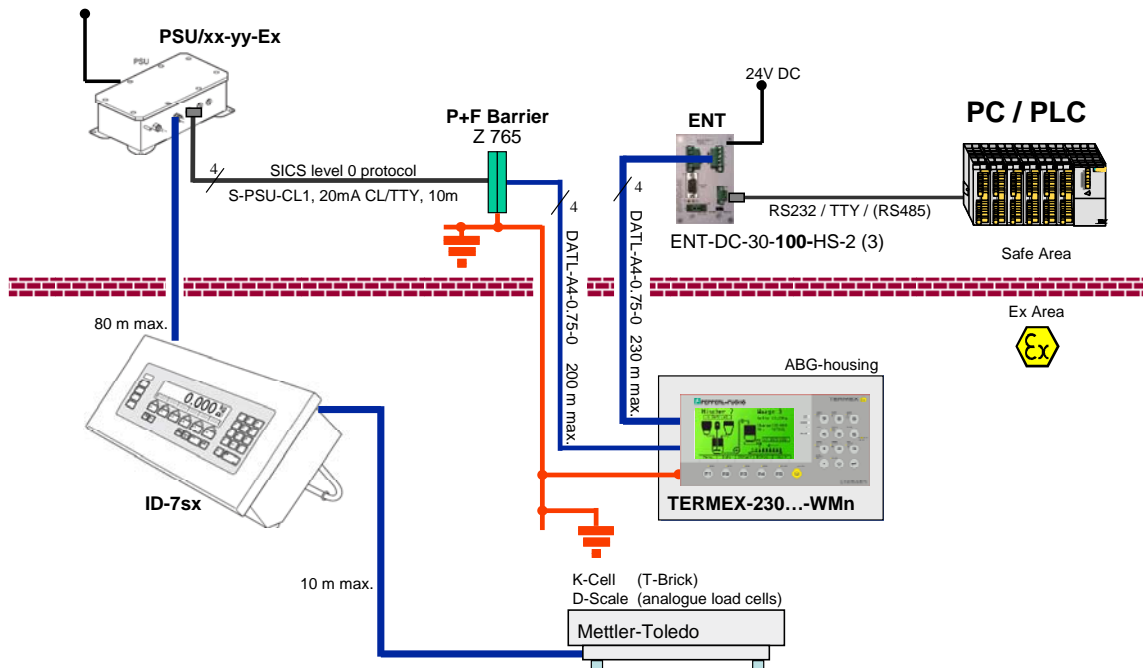
4.26 TERMEX 22X / 32X – Point Ex (marked WMm)

TERMEX	--	Point Ex
Interface type: UART_B -pa05/pa05- X3, X4	DATL-A 4	PG/screw terminal
Xa = X3 or X4		

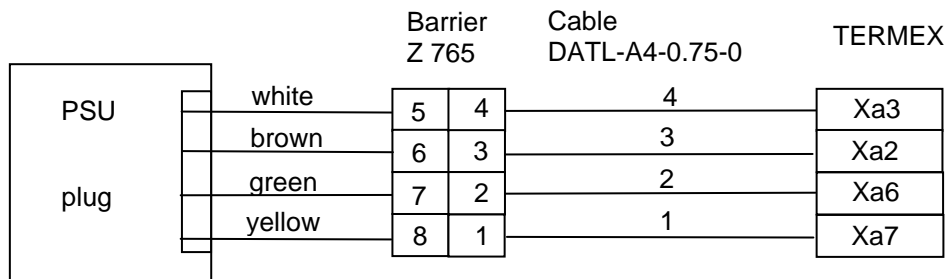


4.27 TERMEX 22X / 32X – Mettler Toledo ID-7sx (marked WMn)

With protocol MetPu (SICS level 0) via P+F Barrier Z 765
 TERMEX --- ID7sx
 Interface type: UART_A -pf05/pf05-
 X3, X4 Xa = X3 or X4



Connection



Accessories

Part name	Part code	Order number
P+F Barrier Z 765	Z 765	071799
Cable: PSU---Barrier	S-PSU-CL1	222570
Cable: Barrier---TERMEK	DATL-A4-0.75-0	193063



Warning

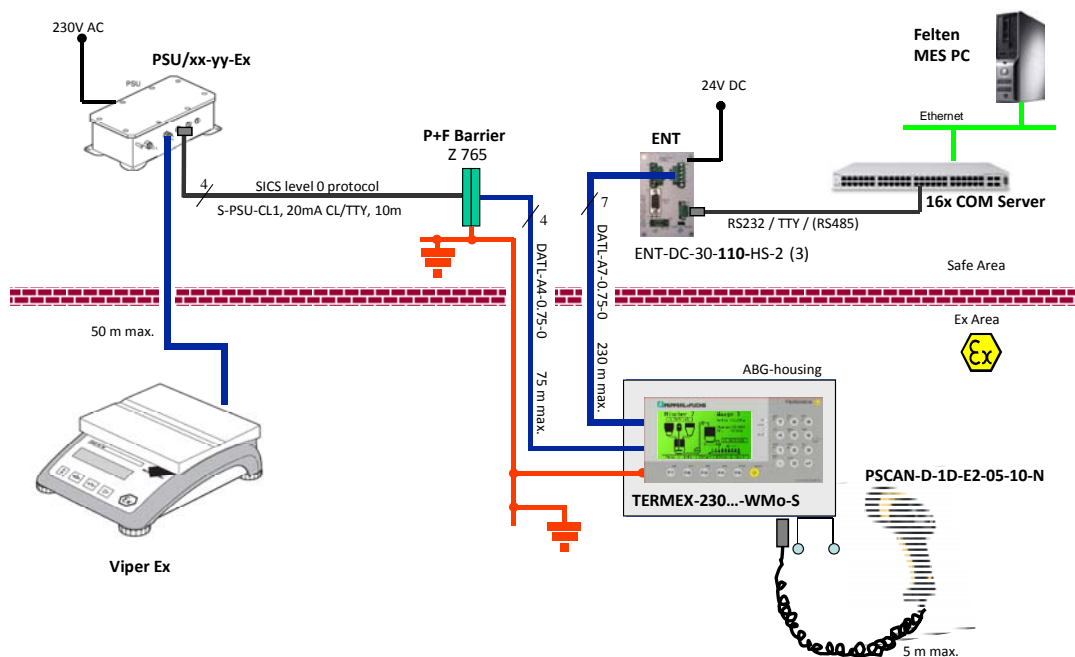
The respective peak values of the field device and the associated device with regard to explosion protection should be considered when connecting intrinsically safe field devices with the intrinsically safe circuits of Zener Barriers (demonstration of intrinsic safety)

The appropriate clauses of EN 60079-14 plus manuals and certificates of the used equipment must be observed.

4.28 TERMEX 22X / 32X – Mettler Toledo Viper EX / PSU via P+F Barrier Z765 (marked WMo)

With protocol METID via P+F Barrier Z 765

TERMEX --- Viper
 Interface type: UART_A –pf05/pf05-
 X3, X4 Xa = X3 or X4



5 Interface test

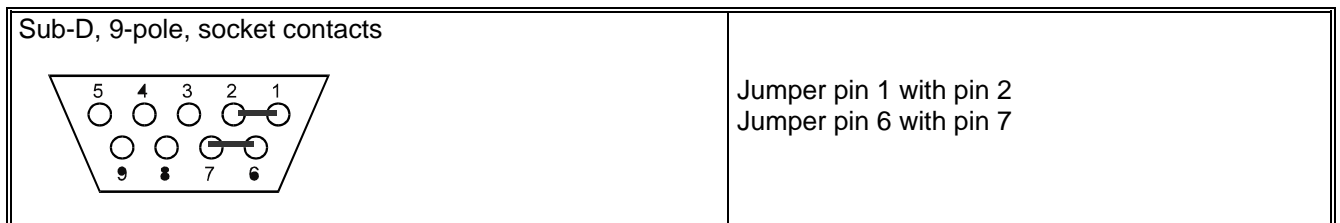
It is possible to test the functionality of port X1 (via ENT-DC). The send and receive lines are short-circuited downstream of the ENT-DC for this purpose. This allows the terminal to check whether the characters it sends actually arrive in the input buffer. A loopback connector is connected to the sub-D socket of the ENT-DC in order to short-circuit the lines. It may be necessary to use a special loopback connector, depending on the interface mode (RS232, 20 mA CL).

After the connector has been plugged in, the interface test can be started in the terminal setup menu:

- Reset the terminal with the shortcut <Shift><Enter><9>
- Open the setup menu while the startup message is displayed by pressing <Shift><F1>
- Select the "Status & Test" submenu
- Click <NEXT> to open the "Test Terminal" page
- Select "Ser 1 Loopback Test" with the arrow keys
- Click <ENTER> to start the test

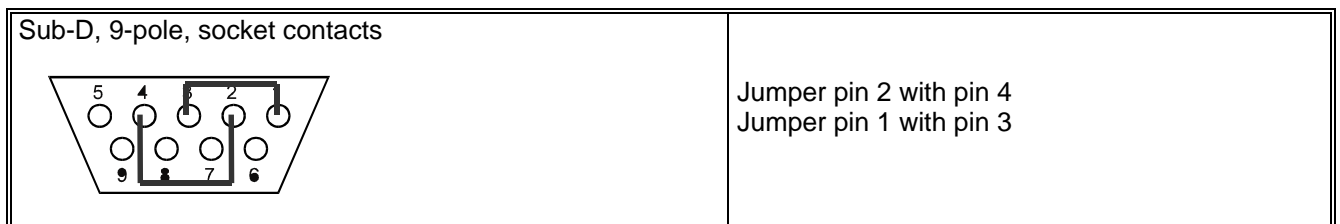
The test is repeated automatically until you stop it again by clicking <EXIT>.

5.1.1 Loopback connector for RS 232



Note: The Tx jumpers for the 20 mA interface in the ENT-DC must be set to "active". The Rx jumper setting is not relevant (see ENT-DC Technical Manual).

5.1.2 Loopback connector for 20 mA CL



The 20 mA CL loopback connector can be used for the following configurations: active/active, active/passive and passive/active. The interface test does not work for a passive/passive configuration.

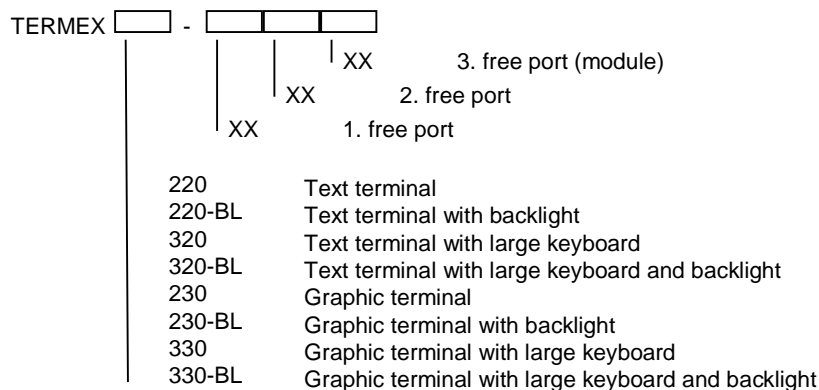
6 Type code / rating plate

A rating plate is provided on each control panel on the rear of the chassis case. It indicates, among other things, the name of the manufacturer, the serial number and the permissible limit values for operation in hazardous areas. These limits must be observed if the control panel is integrated into a system or machine, and especially if other peripherals are also connected to the TERMEX 320 or TERMEX 330 terminal.



Warning

The information specified on the rating plate refers to the maximum values for the hazardous area. Compliance with the maximum electrical values is necessary to ensure reliable operation of the device (see also "Technical data").



Special features:

X3Va/xxaas/yybbs

3rd serial port

Va: Type of the interface module
(V1 = UART A, V2 = UART B)

XX: Sender configuration

aa: Sender subversion

s: 0,1,2,3 for supply circuit used, if passive: 0

yy: Receiver configuration

bb: Receiver subversion

s: 0,1,2,3 for supply circuit used, if passive: 0

4th serial port (see above)

5th serial port (see above) or module designation

TERMEX 32X without LEDs

⇒ higher $C_{a\ max}$ (Vcc) for TERMEX 32X

25-pole sub-D socket for expansion unit
(expansion keyboard)

Beeper (x: i = internal, e = external, nu = not used)

DIGIO33 module slot

s: 1,2,3 for supply circuit used

With expansion keyboard, without LEDs

With expansion keyboard, without LEDs

(TERMEX 22x only)

-X4Va/xxaas/yybbs

-X5Va/xxaas/yybbs

-LEDnu

-ZT

-BPx

-D1/s

-K36

-KL36

If special features are not implemented, they are either omitted from the type code or indicated by the suffix "nu" (not used)


- The option "-LED..." is always indicated for TERMEX 32X:
 With LEDs: -LED -
 Without LEDs and drive circuit: -LEDnu-
 The different $C_{i,max}$ and $C_{a,max}$ values are thus also readily apparent from the type code
- The type code for the TERMEX 22x does not include the suffix -LEDnu because this terminal is always supplied without LEDs

The type code may also include other information, providing it does not refer to safety-relevant modifications.

Free ports can be assigned as described in 'Overview of models'.

Example of a rating plate:

(Optionally, depending on the equipment)

X6	X3								X4							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
 68301 Mannheim, Germany www.pepperl-fuchs.com Terminal TERMEX © II 2G EEx ib IIC T4 DMT 02 ATEX E 239 CE0102 Umgebungstemperatur/ ambient temperature: -20°C ≤ T _a ≤ +60°C Herstellungsjahr/ year of manufacture: 2008 Chargen-No: 080903037101	Termex 230 BL X1 Speisestromkreis $U_{S1,max} = +9V$ DC $I_{S1,max} = 350mA$ $C_i(U_{S1}) = 0$; $L_i(U_{S1}) = 0$ Part No. 193710-0227								Optionally, depending on interface module							
	- D1/2 (X5) DIGIO33 - Aktive Eingänge Passive Relaiskontakte $U_{max} = 9,0V$, $I_{k,max} = 13mA$ $U_{max} = 60V$, $I_{k,max} = 500mA$, $P_{O,max} = 30mW$, $C_i = 0$, $L_i = 0$ $P_{max} = 5W$ $C_{O,max} = 4,9\mu F$, $L_{O,max} = 0,5mH$ $C_i = 0$, $L_i = 0$															
	-X3V2/pa052/pa052 Speisekreis 2 (Kennung: WMm) Sender: plusschaltend, aktiv $U_{max} = 9,0V$ $I_{k,max} = 34mA$ $P_{max} = 73mW$ Empfänger: plusschaltend, aktiv $U_{max} = 9,0V$ $I_{k,max} = 34mA$ $P_{max} = 73mW$															

7 Applied harmonized standards of the applicable directives for TERMEX

This is an addition to Pepperl+Fuchs Declaration of Conformity in accordance with EN 45014:1998 in appendix.

Directive		Applied harmonized standards
Directive	94/9EG (ATEX)	EN 50014:1997 EN 50020:2002

8 Order designation

EX / Non-Ex Terminal Version	Terminal Type	Housing Option	EX Protection	Expansion Keyboard	1. Interface Option	2. Interface Option	3. Interface Option
TERMEX	Ex Versions II 2 G (EEx ib IIC T4) or II 3 D (Zone 22, non conductive dusts, only in combination with housing type ABGxxx)						
TERM	Non-Ex version of operator panel						
	Text / Graphics terminal						
	-220	Text Terminal, 4 x20 chars, 12mm, 5 Function keys, ambient: -20°C – +50°C					
	-230	Graphics Terminal, 5 Function keys, ambient: -20°C – +50°C					
	-320	Text Terminal, 4 x20 chars, 12mm, 12 Function keys, ambient: -20°C – +50°C					
	-330	Graphics Terminal, 12 Function keys, ambient: -20°C – +50°C					
	-220B	Text Terminal, LED Backlight, 4 x20 chars, 12mm, 5 Function keys, ambient: -20°C – +50°C					
	-230B	Graphics Terminal, LED Backlight, 5 Function keys, ambient: -20°C – +50°C					
	-320B	Text Terminal, LED Backlight, 4 x20 chars, 12mm, 12 Function keys, ambient: -20°C – +50°C					
	-330B	Graphics Terminal, LED Backlight, 12 Function keys, ambient: -20°C – +50°C					
	-22S	Text Terminal, Customized Strip for F-Keys, 4 x20 chars, 12mm, 5 Function Keys, ambient: -20°C – +50°C					
	-23S	Graphics Terminal, Customized Strip for F-Keys, 4 x20 chars, 12mm, 5 Function Keys, ambient: -20°C – +50°C					
	-22SB	Text Terminal, LED Backlight, Stripe for F-Keys, 4 x20 chars, 12mm, 5 Function keys, ambient: -20°C – +50°C					
	-23SB	Graphics Terminal, LED Backlight, Stripe for F-Keys, 4 x20 chars, 12mm, 5 Function keys, ambient: -20°C – +50°C					
	ABG-... Housing for Terminal, Option						
	-0	no housing					
	-W	Stainless Steel enclosure, Wall mount					
	-T	Stainless Steel enclosure, Desktop mount					
	Ex-Protection						
	-C	Gas Ex version, II 2 G (EEx ib IIC T4) Zone 1					
	-E	Gas and Dust Ex version, II 2 G and II 3 D, Zone 1 and Zone 22; Only deliverable with ABG-x-V2A-xx					
	-N	Non EX version, only available as TERM					
	Expansion Keyboard, Option						
	-K0	no expansion keyboard attached					
	-K	expansion Keyboard TERMEX-K36, no LEDs, 36 keys					
	1. Interface type "Port200-xxx", Option						
	-NO	no 1st interface					
	-S	1. Barcode Reader Interface					
	-D3/3	digital I/O: 3x Inputs, 3x Outputs (NAMUR) (P+F HMI: PORT200-D1/1-33)					
	-D3/0	digital Inputs: 3x Inputs (NAMUR), no Outputs (P+F HMI: PORT200-D1/1-30)					
	-W A	EX-AWU load cell interface					
	-W ML	for Mettler-Toledo T-Brick platform weighing scale with PSUx power supply					
	-W Mm	for Mettler-Toledo Point-SX Load Cell interface (P+F HMI: EX-Point7-...)					
	-W Mn	for Mettler-Toledo ID-5sx + PSU-EX + Barrier (MetPu)					
	-W Mo	for Mettler-Toledo Viper EX + PSU EX + Barrier (MetID)					
	-W SARa	for SARTORIUS weighing scales types F.-X, L.-X, X.-X, QS.-X, I12000S-X					
	-W SARb	for SARTORIUS weighing scales types with -20mA pp interface					
	-W SARc	for SARTORIUS weighing scales types with RS232 interface (non Ex)					
	2. Interface type "Port200-xxx", Option						
	-NO	no 2nd interface					
	-S	Barcode Reader Interface					
	-D3/3	digital I/O: 3x Inputs, 3x Outputs (NAMUR) (P+F HMI: PORT200-D1/1-33)					
	-D3/0	digital Inputs: 3x Inputs (NAMUR), no Outputs					
	-W A	EX-AWU load cell interface					
	-W ML	for Mettler-Toledo T-Brick platform weighing scale with PSUx power supply					
	-W Mm	for Mettler-Toledo Point-SX Load Cell interface (P+F HMI: EX-Point7-...)					
	-W Mn	for Mettler-Toledo ID-5sx + PSU-EX + Barrier (MetPu)					
	-W Mo	for Mettler-Toledo Viper EX + PSU EX + Barrier (MetID)					
	-W SARa	for SARTORIUS weighing scales types F.-X, L.-X, X.-X, QS.-X, I12000S-X					
	-W SARb	for SARTORIUS weighing scales types with -20mA pp interface					
	-W SARc	for SARTORIUS weighing scales types with RS232 interface (non Ex)					
	3. Interface type "Port200-xxx", Option						
	-NO	no 3rd interface					
	-S	Barcode Reader Interface					
	-D3/3	digital I/O: 3x Inputs, 3x Outputs (NAMUR)					
	-D3/0	digital Inputs: 3x Inputs (NAMUR), no Outputs					
	-W A	EX-AWU load cell interface					
	-W ML	for Mettler-Toledo T-Brick platform weighing scale					
	-W Mm	for Mettler-Toledo Point-SX Load Cell interface					
	-W Mn	for Mettler-Toledo ID-5sx + PSU-EX + Barrier (MetPu)					
	-W Mo	for Mettler-Toledo Viper EX + PSU EX + Barrier					
	-W SARa	for SARTORIUS weighing scales types...					
	-W SARb	for SARTORIUS weighing scales types with -20mA					
	-W SARc	for SARTORIUS weighing scales types...					

Not all features can be combined. Please contact your local Pepperl+Fuchs partner.

9 Index

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10 Appendix

10.1 Repair send back form (in case of repair)

Repair send back form

10.2 Test certificates

Declaration of Conformity Pepperl+Fuchs (1page)

DMT 02 ATEX E 239 (6 pages in German, 6 pages in English)

DMT 02 ATEX E 239, 1. Addendum
(1 page in German, 1 page in English)

Declaration of Conformity, use in Zone 22 (1 page)

Certification No.: D09-95.32 (12 pages in German, 12 pages in English)

Konformitätserklärung / Declaration of Conformity

nach EN 45014:1998 / in accordance with EN 45014:1998

Diese Konformitätserklärung gilt nur in Zusammenhang mit dem gültigen Pepperl+Fuchs Datenblatt für alle Pepperl+Fuchs Produkte, die unter die Richtlinie 89/336/EWG (EMV) fallen.

This Declaration of Conformity is only valid in connection with the valid datasheet of Pepperl+Fuchs, for all Pepperl+Fuchs products that are relevant to the EC-directive 89/336/EWG (EMV)

Die Pepperl+Fuchs GmbH in 68301 Mannheim erklärt hiermit in alleiniger Verantwortung, daß alle richtlinienrelevanten Produkte mit den angegebenen Normen oder normativen Dokumenten übereinstimmen und, wenn notwendig, von einer zuständigen Stelle freigegeben wurden.

We, Pepperl+Fuchs GmbH at 68301 Mannheim hereby declare under our sole responsibility that all directive relevant products are in accordance with the listed harmonized standards or normative documents and, where necessary, a competent body has been released.

Angewandte harmonisierte Normen :
Applied harmonized standards

Siehe gültiges Datenblatt
See valid datasheet



Reg. Nr. 14 760-02

Hersteller Unterschrift :
Signature of manufacturer

Dr. Adolph
Dr. Adolph

Funktion des Unterzeichners :
Function of the signer

Geschäftsführer
Managing Director

Dr. Kegel
Dr. Kegel
Geschäftsführer
Managing Director

Datum / date : September 2003



(1) **EG-Baumusterprüfbescheinigung**

(2) **- Richtlinie 94/9/EG -**
Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung
in explosionsgefährdeten Bereichen

(3) **DMT 02 ATEX E 239**

(4) **Gerät:** Bedien- und Anzeigegerät Typ TERMEX **0-***

(5) **Hersteller:** EX TEC Oesterle GmbH

(6) **Anschrift:** D 73730 Esslingen

(7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.

(8) Die Zertifizierungsstelle der Deutsche Montan Technologie GmbH, benannte Stelle Nr. 0158 gemäß Artikel 9 der Richtlinie 94/9/EG des Europäischen Parlaments und des Rates vom 23. März 1994, bescheinigt, dass das Gerät die grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie erfüllt.

Die Ergebnisse der Prüfung sind in dem Prüfprotokoll BVS PP 02.2124 EG niedergelegt.

(9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit

EN 50014:1997 + A1 – A2 Allgemeine Bestimmungen
EN 50020:1994 Eigensicherheit 'i'

(10) Falls das Zeichen „X“ hinter der Bescheinigungsnummer steht, wird in der Anlage zu dieser Bescheinigung auf besondere Bedingungen für die sichere Anwendung des Gerätes hingewiesen.

(11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf die Konzeption und die Baumusterprüfung des beschriebenen Gerätes in Übereinstimmung mit der Richtlinie 94/9/EG.
Für Herstellung und Inverkehrbringen des Gerätes sind weitere Anforderungen der Richtlinie zu erfüllen, die nicht durch diese Bescheinigung abgedeckt sind.

(12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

II 2G EEx ib IIC T4

Deutsche Montan Technologie GmbH

Essen, den 20. Dezember 2002

DMT-Zertifizierungsstelle

Fachbereichsleiter



(13) Anlage zur

(14) **EG-Baumusterprüfbescheinigung**

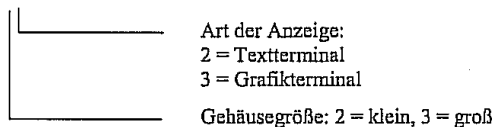
DMT 02 ATEX E 239

(15) 15.1 Gegenstand und Typ

Bedien- und Anzeigegerät Typ TERMEX, **0-***

Anstelle der *** werden in der vollständigen Benennung Buchstaben und Ziffern eingefügt, die unterschiedliche Ausführungen kennzeichnen :

Typ TERMEX **0-***



Die *** nach dem Bindestrich kennzeichnen die eingebauten Baugruppen sowie die Belegung der äußeren Anschlüsse und es können, je nach Ausführung, die folgenden Kennzeichen eingesetzt sein:
-XaVb/xxaas/yybbs

- a = Schnittstellennummer
- b = Version des Schnittstellenmoduls
- xx = Konfiguration Sender
- aa = Sub-Version Sender
- yy = Konfiguration Empfänger
- bb = Sub-Version Empfänger
- s = Ziffer für verwendeten Speisekreis

- LEDnu Ausführung bei Typ 320-*** ohne Leuchtdioden
- ZT Belegung Anchl. X6 für Zusatzastatur
- BP* Verwendung des Signalgebers: x = intern, e = extern, nu = nicht vorhanden
- D1/s Modul mit 3 Eingängen und 3 Ausgängen
s = Ziffer für verwendeten Speisekreis
- K36 mit Zusatzastatur ohne Leuchtdioden
- KL36 mit Zusatzastatur mit Leuchtdioden, nur bei Typ 220-***

15.2 Beschreibung

Das Bedien- und Anzeigegerät dient in explosionsgefährdeten Bereichen zur Anzeige von Daten und Messwerten sowie zur Datenübertragung.

Die elektrischen Bauteile des Bedien- und Anzeigegerätes sind in einem Metallgehäuse gesichert befestigt. An der Frontseite des Gehäuses sind Anzeigen und eine Tastatur angeordnet.

Der elektrische Anschluss der eigensicheren Stromkreise erfolgt über Klemmen bzw. Steckverbinder an der Rückseite des Gehäuses.

Bei der Ausführung Typ TERMEX **0-***-BPe kann außen ein Signalgeber Typ EXBP-1.0 angeschlossen werden.



15.3 Kenngrößen

15.3.1 Anschluss an X1

15.3.1.1 Speisekreis 1 (Anschl. X1.3 (Us1) und X1.4 (GND))

Spannung	U _i	DC	9	V
Stromstärke	I _i		350	mA
Leistung	P _i			
bei Ta -20 °C bis +40 °C			1,3	W
bei Ta -20 °C bis +60 °C			1,2	W
wirksame innere Kapazität	C _i			vernachlässigbar
wirksame innere Induktivität	L _i			vernachlässigbar

15.3.1.2 Speisekreis 2 (Anschl. X1.5 (Us2) und X1.6 (GND))

Spannung	U _i	DC	9	V
Stromstärke	I _i		350	mA
Leistung	P _i		1,5	W
wirksame innere Kapazität	C _i			vernachlässigbar
wirksame innere Induktivität	L _i			vernachlässigbar

15.3.1.3 Speisekreis 3 (Anschl. X1.8 (Us3) und X1.7 (GND))

Spannung	U _i	DC	9	V
Stromstärke	I _i		350	mA
Leistung	P _i		1,5	W
wirksame innere Kapazität	C _i			vernachlässigbar
wirksame innere Induktivität	L _i			vernachlässigbar

15.3.1.4 Signalstromkreise RX20 (Anschl. X1.2) – GND und TX20 (Anschl. X1.1) – GND

Sender und Empfänger passiv zum Anschluss jeweils eines eigensicheren Stromkreises mit den folgenden Höchstwerten:

Spannung	U _i	DC	9	V
Stromstärke	I _i		350	mA
Leistung	P _i			
bei Ta -20 °C bis +40 °C			1,3	W
bei Ta -20 °C bis +60 °C			1,2	W
wirksame innere Kapazität	C _i			vernachlässigbar
wirksame innere Induktivität	L _i			vernachlässigbar

Die Stromkreise sind intern über GND miteinander verbunden. Der Summenstrom für die Kreise Us1, RX20 und TX20 darf 350 mA nicht überschreiten.

15.3.2 Anschluss an X2

15.3.2.1 Speiseausgang Us2 (X2.3) – GND (X2.4), direkt verbunden mit Us2 an Anschluss X1

Die Werte für diesen Stromkreis hängen von dem verwendeten Speisegerät am Anschluss X1 Us2 – GND ab, betragen jedoch höchstens

Spannung	U _o	DC	9	V
Stromstärke	I _o		350	mA
Leistung	P _o		1,5	W

Die Werte für die max. äußere Kapazität C_o und die max. äußere Induktivität L_o können nur in Verbindung mit dem verwendeten Speisegerät angegeben werden.

wirksame innere Kapazität	C _i			vernachlässigbar
wirksame innere Induktivität	L _i			vernachlässigbar

15.3.2.2 Signalstromkreis RX5 (X2.1) – GND (X2.4), Empfänger passiv

zum Anschluss eines eigensicheren Stromkreises mit den folgenden Höchstwerten:

Spannung	U _i	DC	9	V
Stromstärke	I _i		350	mA
Leistung	P _i			
bei Ta -20 °C bis +40 °C			1,3	W



bei Ta -20 °C bis +60 °C
 wirksame innere Kapazität Ci 1,2 W
 vernachlässigbar
 wirksame innere Induktivität Li vernachlässigbar

15.3.2.3 Signalstromkreis TX5 (X2.2) – GND (X2.4), Sender aktiv

Spannung Uo DC 5,2 V
 Stromstärke Io 12 mA
 Leistung Po 34 mW
 wirksame innere Kapazität Ci vernachlässigbar
 wirksame innere Induktivität Li vernachlässigbar

Die Stromkreise sind intern über GND miteinander verbunden. Der Summenstrom für die Kreise Us2, RX5 und TX5 darf 350 mA nicht überschreiten.

15.3.3 Anschluss an X3, X4 und X5, Schnittstellenstromkreise

15.3.3.1 Kennbuchstaben ma = Minusschaltend aktiv
 potentialmäßig mit dem gemäß Kennzeichnung (Ziffer 1, 2 oder 3 anstelle des Buchstaben a)
 festgelegten Speisekreis verbunden

Version	Spannung Uo [V]	Stromstärke Io [mA]	Leistung Po [mW]
ma03	9	62	137
ma04	9	42	94
ma05	9	34	73
ma06	9	26	57
ma07	9	20	44
ma08	9	14	32
ma09	9	10	21
ma10	9	7	14
ma11	9	5	10

max. äußere Kapazität Co 4,9 µF
 max. äußere Induktivität Lo 1 mH

15.3.3.2 Kennbuchstaben pf = potentialfrei

zum Anschluss eines eigensicheren Stromkreises mit den folgenden Höchstwerten:

Spannung Ui DC 20 V
 Stromstärke Ii 350 mA
 Leistung Pi 1,2 W
 wirksame innere Kapazität Ci vernachlässigbar
 wirksame innere Induktivität Li vernachlässigbar

15.3.3.3 Kennbuchstaben mp = minusschaltend passiv

zum Anschluss eines eigensicheren Stromkreises mit den folgenden Höchstwerten:

Spannung Ui DC 20 V
 Stromstärke Ii 350 mA
 Leistung Pi 1,2 W
 wirksame innere Kapazität Ci vernachlässigbar
 wirksame innere Induktivität Li vernachlässigbar



- 15.3.3.4 Kennbuchstaben pa = plusschaltend aktiv
potentialmäßig mit dem gemäß Kennzeichnung (Ziffer 1, 2 oder 3 anstelle des Buchstaben a)
festgelegten Speisekreis verbunden

Version	Spannung U _o [V]	Stromstärke I _o [mA]	Leistung P _o [mW]
pa03	9	62	137
pa04	9	42	94
pa05	9	34	73
pa06	9	26	57
pa07	9	20	44
pa08	9	14	32
pa09	9	10	21
pa10	9	7	14
pa11	9	5	10

max. äußere Kapazität Co 4,9 μF
max. äußere Induktivität Lo 1 mH

- 15.3.4 Kennzeichnung -ZT, Anschluss an Stecker X6, Anschluss Erweiterungsgeräte
potentialmäßig mit dem Speisekreis 1 (Us1 -GND) verbunden

Spannung U_o DC 5,2 V
Stromstärke I_o 350 mA
Leistung P_o 1,2 W
max. äußere Kapazität Co
bei Typ Termex 220-*** 67 μF
bei Typ Termex 230-*** 67 μF
bei Typ Termex 320-*** 13 μF
bei Typ Termex 330-*** 13 μF

- 15.3.5 Kennzeichnung -BPe, Anschluss an Stecker X9, Anschluss externer Signalgeber Typ EXBP-1.0
potentialmäßig mit dem Speisekreis 1 (Us1 -GND) verbunden

Spannung U_o DC 5,2 V
Stromstärke I_o 350 mA
Leistung P_o 1,2 W

- 15.3.6 Kennzeichnung -D1/s, Anschluss an Klemmen X5 und X5'

- 15.3.6.1 potentialfreie Relaiskontakt-Stromkreise, Anschlüsse KL1, KL2 und KL3

zum Anschluss jeweils eines eigensicheren Stromkreises mit den folgenden Höchstwerten:

Spannung U_i DC 60 V
Stromstärke I_i 500 mA
Leistung P_i 5 W
wirksame innere Kapazität C_i vernachlässigbar
wirksame innere Induktivität L_i vernachlässigbar

- 15.3.6.2 Eingangstromkreise, Anschluss an X5' Klemmen KL1 bis KL6

potentialmäßig mit dem gemäß Kennzeichnung (Ziffer 1, 2 oder 3 anstelle des Buchstaben s)
festgelegten Speisekreis verbunden

Werte je Eingangskreis

Spannung U_o DC 9 V
Stromstärke I_o 13 mA
Leistung P_o 30 mW
max. äußere Kapazität Co 4,9 μF
max. äußere Induktivität Lo 0,5 mH



15.3.7	Kennzeichnung TERMEX **0-K36, Zusatzastatur, Anschluss an Stecker X6		
	Spannung U_i	DC 5,2 V	
	wirksame innere Kapazität	Ci	vernachlässigbar
	wirksame innere Induktivität	Li	vernachlässigbar
15.3.8	Kennzeichnung TERMEX **0-KL36, Zusatzastatur, Anschluss an Stecker X6		
	Spannung U_i	DC 5,2 V	
	wirksame innere Kapazität	Ci	53,1 μ F
	wirksame innere Induktivität	Li	vernachlässigbar
15.3.9	Kapazität des Gesamtgerätes gegen Gehäuse		230 nF
15.3.10	Umgebungstemperaturbereich	Ta	-20 °C bis +60 °C

- (16) Prüfprotokoll
BVS PP 02.2124 EG, Stand 20.12.2002
- (17) Besondere Bedingungen für die sichere Anwendung
Entfällt



1. Nachtrag

(Ergänzung gemäß Richtlinie 94/9/EG Anhang III Ziffer 6)

zur EG-Baumusterprüfbescheinigung DMT 02 ATEX E 239

Gerät: Bedien- und Anzeigegerät Typ TERMEX **0-***
Hersteller: Pepperl+Fuchs - EXTEC GmbH
Anschrift: 73730 Esslingen

Beschreibung

Das Bedien- und Anzeigegerät kann auch nach den im zugehörigen Prüfprotokoll aufgeführten Prüfungsunterlagen gefertigt werden und auch die Ausführungen

Typ TERMEX **0-BL
sind möglich.

Die grundlegenden Sicherheits- und Gesundheitsanforderungen der geänderten Ausführung werden erfüllt durch Übereinstimmung mit
EN 50014:1997 + A1 – A2 Allgemeine Bestimmungen
EN 50020:2002 Eigensicherheit 'I'

Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

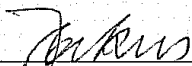
 II 2G EEx ib IIC T4

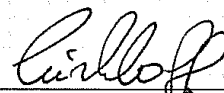
Besondere Bedingungen für die sichere Anwendung bzw. Verwendungshinweise
Entfällt

Prüfprotokoll
BVS PP 02.2124 EG, Stand 23.05.2006

EXAM BBG Prüf- und Zertifizier GmbH

Bochum, den 23. Mai 2006


Zertifizierungsstelle


Fachbereich

○
E

CERTIFIED TRANSLATION

DMT

(1) **EC Type Examination Certificate**

(2) **- Directive 94/9/EC -**

**Equipment and protective systems for use to the intended purpose
in potentially explosive atmospheres**

(3) **DMT 02 ATEX E 239**

(4) **Equipment:** Operator Control and Display unit Type TERMEX **0-***

(5) **Manufacturer:** EXTEC Oesterle GmbH

(6) **Address:** D 73730 Esslingen

(7) The design of this equipment and the various permissible variants are specified in the Appendix to this Type Examination Certificate.

(8) The certification body of Deutsche Montan Technologie GmbH, accredited as body no. 0158 in accordance with Article 9 of Directive 94/9/EC of the European Parliament and the Council dated March 23rd 1994, hereby certifies that the equipment conforms with the basic safety and health requirements relating to the design and construction of equipment and protective systems for use to the intended purpose in potentially explosive atmospheres in accordance with Annex II of the same Directive.
The results of the test are recorded in Test Report No. BVS PP 02.2124 EG.

(9) The basic safety and health requirements are satisfied through conformance with:

EN 50014:1997 + A1 - A2	General requirements
EN 50020:1994	Intrinsic safety 'i'

(10) If the mark "X" appears after the certificate number, it means that this equipment is subject to the special conditions for safe usage specified in the Appendix to this certificate.

(11) This EC Type Examination Certificate only refers to the design of, and the type examination for, the equipment described here in conformance with Directive 94/9/EC.
The manufacture and introduction into circulation of the equipment are subject to other Directive requirements which are not covered by this certificate.

(12) The marking on the equipment must include the following information:

E Ex II 2G EEx ib IIC T4

Deutsche Montan Technologie GmbH

Essen, December 20, 2002

DMT certification body

Department head

Page 1 of 6 of DMT 02 ATEX E 239

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EXTEC Oesterle GmbH

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Appendix to
EC Type Examination Certificate

DMT 02 ATEX E 239

(15) 15.1 Subject and type

Operator Control and Display Unit Type TERMEX **0-***
In the full designation the ** are replaced by letters and numbers which identify the different variants and have the following meanings:

Type TERMEX **0-***	Type of display: 2 = Text terminal 3 = Graphics terminal
	Case size: 2 = small, 3 = large

The ** after the hyphen refer to the integrated assemblies and to the assignment of the external connectors; the following markings may be used depending on the variant:
-XaVb/xxaas/ybbs

- a = Interface number
- b = Version of the interface module
- xx = Sender configuration
- aa = Sender subversion
- yy = Receiver configuration
- bb = Receiver subversion
- s = Code for supply circuit used

- LEDnu Type 320-*** variant without light-emitting diodes
- ZT Assignment of connector X6 for expansion keyboard
- BP* Use of the signal generator: x = internal, e = external, nu = not used
- DI/s Module with 3 inputs and 3 outputs
s = Code for supply circuit used
- K36 With expansion keyboard, without light-emitting diodes
- KL36 With expansion keyboard, with light-emitting diodes, type 220-*** only

15.2 Description

The operator control and display unit is used in potentially explosive atmospheres to display data and measured values as well as to transmit data.

The electrical components of the operator control and display unit are securely fastened inside a metal case. Displays and a keyboard are arranged on the front of the case.
The electrical connections for the intrinsically safe circuits take the form of terminals and plug connectors on the rear of the case.

A signal generator type EXBP-1.0 can be connected externally in the case of the TERMEX **0-***-BPe variant.

Page 2 of 6 of DMT 02 ATEX E 239
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15.3 Parameters

15.3.1 Connection to X1				
15.3.1.1	Supply circuit 1 (terminals X1.3 (Us1) and X1.4 (GND))			
	Voltage	U _i	DC 9	V
	Current	I _i	350	mA
	Power	P _i	1.3	W
	for T _a = -20 °C to +40 °C		1.2	W
	for T _a = -20 °C to +60 °C			
	Effective internal capacitance	C _i	negligible	
	Effective internal inductance	L _i	negligible	
15.3.1.2 Supply circuit 2 (terminals X1.5 (Us2) and X1.6 (GND))				
	Voltage	U _i	DC 9	V
	Current	I _i	350	mA
	Power	P _i	1.5	W
	Effective internal capacitance	C _i	negligible	
	Effective internal inductance	L _i	negligible	
15.3.1.3 Supply circuit 3 (terminals X1.8 (Us3) and X1.7 (GND))				
	Voltage	U _i	DC 9	V
	Current	I _i	350	mA
	Power	P _i	1.5	W
	Effective internal capacitance	C _i	negligible	
	Effective internal inductance	L _i	negligible	
15.3.1.4 Signal circuits RX20 (terminal X1.2) – GND and TX20 (terminal X1.1) – GND				
Sender and receiver passive. Each designed for connecting one intrinsically safe circuit with the following maximum values:				
	Voltage	U _i	DC 9	V
	Current	I _i	350	mA
	Power	P _i	1.3	W
	for T _a = -20 °C to +40 °C		1.2	W
	for T _a = -20 °C to +60 °C			
	Effective internal capacitance	C _i	negligible	
	Effective internal inductance	L _i	negligible	
The circuits are connected to one another internally via GND. The total current for the Us1, RX20 and TX20 circuits must not exceed 350 mA.				
15.3.2 Connection to X2				
15.3.2.1	Supply output Us2 (X2.3) – GND (X2.4), connected directly to Us2 at connector X1			
The values for this circuit are dependent on the power supply unit connected to X1 Us2 – GND, but are limited to the following maximum values:				
	Voltage	U _o	DC 9	V
	Current	I _o	350	mA
	Power	P _o	1.5	W
The values for the maximum external capacitance C _o and the maximum external inductance L _o can only be specified in conjunction with the particular power supply unit which is used.				
	Effective internal capacitance	C _i	negligible	
	Effective internal inductance	L _i	negligible	
15.3.2.2	Signal circuit RX5 (X2.1) – GND (X2.4), receiver passive			
Designed for connecting one intrinsically safe circuit with the following maximum values:				
	Voltage	U _i	DC 9	V
	Current	I _i	350	mA
	Power	P _i	1.3	W
	for T _a = -20 °C to +40 °C			

Page 3 of 6 of DMT 02 ATEX E 239

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for Ta = -20 °C to +60 °C
 Effective internal capacitance
 Effective internal inductance

Ci
 Li

1.2 W
 negligible
 negligible

15.3.2.3 Signal circuit TX5 (X2.2) – GND (X2.4), sender active

Voltage Uo
 Current Io
 Power Po
 Effective internal capacitance Ci
 Effective internal inductance Li

DC 5.2 V
 12 mA
 34 mW
 negligible
 negligible

The circuits are connected to one another internally via GND. The total current for the Us2, RX5 and TX5 circuits must not exceed 350 mA.

15.3.3 Connection to X3, X4 and X5, interface circuits

15.3.3.1 Marking ma = negative-switching active

Equipotential bonding connection to the supply circuit specified by the marking (number 1, 2 or 3 instead of letter a)

Version	Voltage Uo[V]	Current Io [mA]	Power Po [mW]
ma03	9	62	137
ma04	9	42	94
ma05	9	34	73
ma06	9	26	57
ma07	9	20	44
ma08	9	14	32
ma09	9	10	21
ma10	9	7	14
ma11	9	5	10

Max. external capacitance
 Max. external inductance

Co
 Lo

4.9 µF
 1 mH

15.3.3.2 Marking pf = isolated

Designed for connecting one intrinsically safe circuit with the following maximum values:

Voltage Ui DC 20 V
 Current Ii 350 mA
 Power Pi 1.2 W
 Effective internal capacitance Ci negligible
 Effective internal inductance Li negligible

15.3.3.3 Marking mp = negative-switching passive

Designed for connecting one intrinsically safe circuit with the following maximum values:

Voltage Ui DC 20 V
 Current Ii 350 mA
 Power Pi 1.2 W
 Effective internal capacitance Ci negligible
 Effective internal inductance Li negligible

Page 4 of 6 of DMT 02 ATEX E 239

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15.3.3.4 Marking pa = positive-switching active
Equipotential bonding connection to the supply circuit specified by the marking (number 1, 2 or 3 instead of letter a)

Version	Voltage U _o [V]	Current I _o [mA]	Power P _o [mW]
pa03	9	62	137
pa04	9	42	94
pa05	9	34	73
pa06	9	26	57
pa07	9	20	44
pa08	9	14	32
pa09	9	10	21
pa10	9	7	14
pa11	9	5	10

Max. external capacitance Co 4.9 μF
Max. external inductance Lo 1 mH

15.3.4 Marking -ZT, connection to connector X6, for connecting expansion units
Equipotential bonding connection to supply circuit 1 (Us1 - GND).

Voltage U_o DC 5.2 V
Current I_o 350 mA
Power P_o 1.2 W
Max. external capacitance Co
for type Termex 220-*** 67 μF
for type Termex 230-*** 67 μF
for type Termex 320-*** 13 μF
for type Termex 330-*** 13 μF

15.3.5 Marking -BPe, connection to connector X9, for connecting external signal generators
type EXBP-1.0

Equipotential bonding connection to supply circuit 1 (Us1 - GND)
Voltage U_o DC 5.2 V
Current I_o 350 mA
Power P_o 1.2 W

15.3.6 Marking -D1/s, connection to terminals X5 and X5'

15.3.6.1 Isolated relay contact circuits, terminals KL1, KL2 and KL3

Designed for connecting one intrinsically safe circuit with the following maximum values:
Voltage U_i DC 60 V
Current I_i 500 mA
Power P_i 5 W
Effective internal capacitance C_i negligible
Effective internal inductance L_i negligible

15.3.6.2 Input circuits, connection to X5' terminals KL1 to KL6

Equipotential bonding connection to the supply circuit specified by the marking (number 1, 2 or 3 instead of letter s)

Values per input circuit
Voltage U_o DC 9 V
Current I_o 13 mA
Power P_o 30 mW
Effective internal capacitance Co 4.9 μF
Effective internal inductance Lo 0.5 mH

Page 5 of 6 of DMT 02 ATEX E 239

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DMT

- | | | | | |
|---------|---|----------------|----|------------------|
| 15.3.7 | Marking TERMEX **0-K36, expansion keyboard, connection to connector X6 | | | |
| | Voltage | U _i | DC | 5.2 V |
| | Effective internal capacitance | C _i | | negligible |
| | Effective internal inductance | L _i | | negligible |
| 15.3.8 | Marking TERMEX **0-KL36, expansion keyboard, connection to connector X6 | | | |
| | Voltage | U _i | DC | 5.2 V |
| | Effective internal capacitance | C _i | | 53.1 μF |
| | Effective internal inductance | L _i | | negligible |
| 15.3.9 | Capacitance of complete device to case | | | 230 nF |
| 15.3.10 | Ambient temperature range | T _a | | -20 °C to +60 °C |
- (16) Test report
BVS PP 02.2124 EG, dated 20.12.2002
- (17) Special conditions for safe usage
Not applicable

Page 6 of 6 of DMT 02 ATEX E 239
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Ex

EXAM

BBG Prüf- und Zertifizier GmbH

Addendum 1
(Amendment in accordance with Directive 94/9/EC Annex III Clause 6)

to EC Type Examination Certificate
DMT 02 ATEX E 239

Equipment: Operator Control and Display Panel Type TERMEX**0-***
Manufacturer: Pepperl+Fuchs - EXTEC GmbH
Address: D – 73730 Esslingen

Description

The operator control and display panel can also be manufactured in accordance with the test documentation mentioned in the associated Test Report as well as in the following versions:

Type TERMEX **0-BL

The basic safety and health requirements of the modified version are satisfied through conformance with
EN 50014:1997 + A1 - A2 General requirements
EN 50020:2002 Intrinsic safety 'i'

The marking on the device must contain the following information:

Ex II 2G EEx ib HC T4

Special conditions for safe usage
Not applicable

Test Report
BVS PP 02.2124 EG, dated May 23, 2006

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, May 23, 2006

(Signature illegible)

(Signature illegible)

Certification body

Department

Page 1 of 1 of DMT 02 ATEX E 239 / N1
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Dinnendahlstrasse 9, D-44809 Bochum, Phone +49 (0)234/3696-105, Fax +49 (0)234/3696-110
(Until May 31, 2003: Deutsche Montan Technologie GmbH, Am Technologiepark 1, D-45307 Essen)

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