

# PI-EX-TB(/T)

## Ex Basic Terminal Blocks for Intrinsically Safe Signals With Knife Disconnection and Test Connections

### INTERFACE

Data Sheet  
102957\_00\_en

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## 1 Description

**PI-EX-TB** and **PI-EX-TB/T** Ex basic terminal blocks are used as base elements for the wiring for plug-in PI Ex modules.

The base elements can be snapped onto the popular EN DIN rails. They must be installed in the safe area or zone 2. The signal cables are connected to the module safely using screw connections.

The integrated test sockets and isolating connectors enable devices for measurements, loop checks, and calibration tasks to be coupled in the current loop without interrupting the signal path.

The PI-EX-TB/T basic terminal block has integrated cold junction compensation and is therefore used as the base element for the PI-EX-THC-I (Order No. 2835079) and PI-EX-THC-I-NC (Order No. 2835600) temperature measuring transducers.



**NOTE:** The **PI-EX-TB/T** basic terminal block is **not suitable** for the PI-EX-RPSS-I/I, PI-EX-DO/REL-S, and PI-EX-RTD-I electronic modules.

### 1.1 Properties

- Single-channel
- Integrated test sockets
- Integrated isolating connectors
- Integrated cold junction compensation with the PI-EX-TB/T
- Installation in zone 2



#### **WARNING: Explosion hazard**

**The device is an associated item of equipment. It is designed for use in zone 2, if the specific conditions are observed.**

When installing and operating the device, the applicable safety directives (including national safety directives), accident prevention regulations, as well as general technical regulations, must be observed.



#### **WARNING: Explosion hazard**

**Observe the safety regulations and installation notes on page 4.**



Make sure you always use the latest documentation.

It can be downloaded at [www.download.phoenixcontact.com](http://www.download.phoenixcontact.com).

A conversion table is available on the Internet at

[www.download.phoenixcontact.com/general/7000\\_en\\_00.pdf](http://www.download.phoenixcontact.com/general/7000_en_00.pdf).



This data sheet is valid for all products listed on the following page:

## Table of Contents

1	Description.....	1
2	Ordering Data .....	2
3	Technical Data.....	3
4	Safety Regulations and Installation Notes.....	4
5	Structure .....	5
6	Installation .....	5
7	Isolation and Testing Options .....	6
8	PI-EX-TB/T Method of Operation.....	6

## 2 Ordering Data

### Basic Terminal Blocks

Description	Type	Order No.	Pcs./Pck.
Ex basic terminal block for intrinsically safe signals with knife disconnection and test connections	PI-EX-TB	2835901	1
Ex basic terminal block for intrinsically safe signals with knife disconnection and test connections for the PI-Ex-THC-I(-NC) temperature measuring transducer	PI-EX-TB/T	2835927	1

### Bridges

Description	Type	Order No.	Pcs./Pck.
<b>Continuous plug-in bridge</b> , 500 mm long, insulated, can be cut to length, for potential distribution with PLC...			
Blue	FBST 500-PLC BU	2966692	1
Gray	FBST 500-PLC GY	2966838	1
Red	FBST 500-PLC RD	2966786	1

### Marking

Description	Type	Order No.	Pcs./Pck.
<b>Zack marker sheet</b> , flat, 100-section, for all terminal blocks with a pitch of 6.2 mm, color: white			
Printed horizontally with consecutive numbers from 1 - 100	ZBFM 6/WH,LGS:1-100	0800284	1
Printed horizontally with consecutive numbers from 1 - 10, 11 - 20, etc. up to 91 - 100, 10 identically labeled strips per flat Zack marker sheet	ZBFM 6/WH,LGS:FORTL.ZAHLEN	0803621	1
Unprinted: 10 strips with 10 labels each, sufficient for 100 terminal blocks	ZBFM 6/WH:UNBEDRUCKT	0803618	1
Labeled according to customer specifications, can be separated	ZBFM 6:SO/CMS	0803650	1

### Assembly

Description	Type	Order No.	Pcs./Pck.
<b>Insulating plate</b> , 2 mm thick, black, must be installed at the start and end of each PI terminal strip, if continuous plug-in bridges are used.	PI-ATP	2835969	1

### Connectors/Adapters

Description	Type	Order No.	Pcs./Pck.
<b>Insulating sleeve</b> for MPS metal part to be ordered separately (0201744)			
Blue	MPS-IH BU	0201689	1
Gray	MPS-IH GY	0201728	1
Red	MPS-IH RD	0201676	1

**Tools**

Description	Type	Order No.	Pcs./Pck.
<b>Screwdriver</b> , bladed, with graduated blade, suitable for all screw terminal blocks with a diameter of 2.3 mm, test socket screws and test sockets, blade width: 3.5 mm	SZG 0,6X3,5	1205121	1



For additional accessories, please refer to the "INTERFACE" catalog from Phoenix Contact.

**3 Technical Data****Connection Data**

Conductor cross-section	
Solid (minimum/maximum)	0.2 mm <sup>2</sup> /2.5 mm <sup>2</sup>
Stranded (minimum/maximum)	0.2 mm <sup>2</sup> /2.5 mm <sup>2</sup>
AWG/kcmil (minimum/maximum)	24/14
Stripping length	12 mm
Thread	M3
Connection method	Plug-in screw connection
Tightening torque	0.5 Nm, minimum/0.6 Nm, maximum

**General Data**

Nominal voltage $U_N$	20 V ... 30 V
Nominal current $I_N$	≤ 250 mA (depends on the plugged-in module)
Housing material	PBT
Color	Gray
Degree of protection	IP20
Dimensions	
Without electronic module (width x height x length)	12.4 mm x 86.5 mm x 145 mm
With electronic module (width x height x length)	12.4 mm x 147 mm x 145 mm
Inflammability class according to UL 94	V0
Ambient temperature (operation)	-20°C ... +60°C

**EC Conformance**

EMC directive 89/336/EEC	Yes
Ex directive (ATEX)	Yes

**Safety Data According to ATEX for Intrinsically Safe Circuits**

Intrinsically safe input or output circuit (+, -), $U$	30 V (90 V when using the PI-ATP insulating plate, Order No. 2835969)
Power supply (UB+, UB-), $U_m$	265 V AC, $I < 4$ A
Non-intrinsically safe circuit (+, -), $U_m$	265 V AC, $I < 4$ A
Effective internal capacitance	1 nF
Effective internal inductance	1 μH

**Approvals**

ATEX	II (1) GD [EEx ia] IIC, KEMA 01 ATEX 1231 II 3G Ex nA II T4X
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## 4 Safety Regulations and Installation Notes

### 4.1 Installation and Operation

Follow the installation instructions.



**NOTE:** Installation, operation, and maintenance may only be carried out by qualified specialist personnel.

When installing and operating the device, the applicable safety directives (including national safety directives), accident prevention regulations, as well as general technical regulations, must be observed.



**NOTE:** Installation, operation, and maintenance may only be carried out by qualified specialist personnel.

Do not repair the device yourself, replace it with an equivalent device. Repairs may only be carried out by the manufacturer.



**NOTE:** The device is designed to meet IP20 protection when:

- It is installed outside potentially explosive areas.
- The environment is clean and dry.

In order to provide protection against mechanical or electrical damage, install the device in corresponding housing with a suitable degree of protection according to IEC 60529.

### 4.2 Safety Regulations for Installation in Potentially Explosive Areas

#### Regulations for Intrinsically Safe Circuits



**WARNING: Explosion hazard**  
When carrying out **measurements** on the intrinsically safe side, observe the relevant regulations regarding the connection of intrinsically safe equipment.

**Only use devices approved for use in intrinsically safe circuits.**




**WARNING: Explosion hazard**  
If the **device has been used in non-intrinsically safe circuits**, it must **not** be used again in intrinsically safe circuits.  
The module must be clearly labeled as non-intrinsically safe.

For the safety data, please refer to the operating instructions and certificates (EC-type examination, other approvals, if necessary).

#### Installation in Zone 2



##### **WARNING: Explosion hazard**

The device is an associated item of equipment with "intrinsically safe" explosion protection and is designed for installation in zone 2, if the  symbol is printed on the block.

Observe the specified conditions for use in potentially explosive areas.



##### **WARNING: Explosion hazard**

Install the device in suitable **housing that meets IP54 protection, minimum.**

Observe the requirements of IEC 60079-14/ EN 60079-14, e.g., steel housing with a wall thickness of 3 mm.



##### **WARNING: Explosion hazard**

Disconnect the block power supply **before**:

- Snapping it on or disconnecting it.
- Connecting or disconnecting cables of non-intrinsically safe circuits.



##### **WARNING: Explosion hazard**

Only use category 3G PI EX modules (ATEX 94/9/EC).

#### Installation in Areas With a Danger of Dust Explosions



##### **WARNING: Explosion hazard**

The device is **not** designed for use in areas with a danger of dust explosions.

Connection to the **intrinsically safe circuit in areas with a danger of dust explosions** (zone 20, 21, and 22) is **only** permitted if the equipment connected to this circuit is approved for this zone (e.g., category 1D, 2D or 3D).

### 4.3 Use in Safety-Related Applications

When using the PI-EX-TB in safety-related applications, observe the requirements specified in the data sheets for the relevant modules.

## 5 Structure

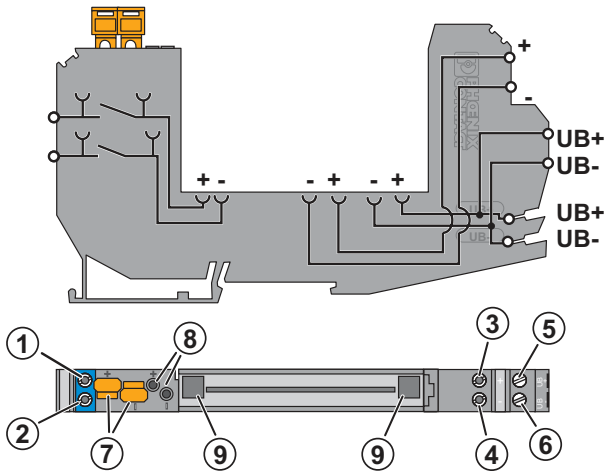


Figure 1 Structure

- ① Field signal "+", (Ex area)
- ② Field signal "-", (Ex area)
- ③ Signal "+", (non-Ex)
- ④ Signal "-", (non-Ex)
- ① - ④ Terminal screw with integrated test socket
- ⑤ Voltage supply "+", UB+
- ⑥ Voltage supply "-", UB-
- ⑦ Isolating connectors
- ⑧ Test sockets
- ⑨ Holder for keying pin

### Dimensions

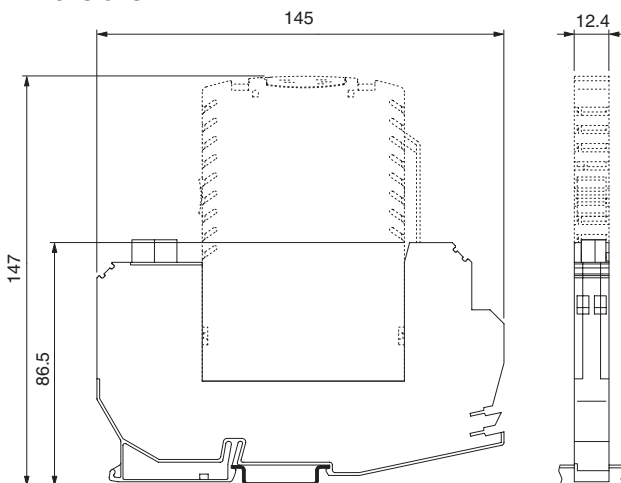


Figure 2 Dimensions (in mm)

## 6 Installation



### NOTE: Electrostatic discharge

The device contains components that can be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1 and EN 61340-5-2.



### WARNING: Explosion hazard

When used as equipment in **zone 2**, the electronic module must **not be disconnected** from the base element when **connected to the power supply**.

Cables of non-intrinsically safe circuits must only be connected and disconnected **when the power is disconnected**.

### 6.1 Basic Terminal Block Wiring

The PI-EX-TB and PI-EX-TB/T basic terminal blocks can be snapped onto popular EN DIN rails.

On the field side (intrinsically safe side), the sensors and limit switches are connected to the terminal points marked "+" and "-" (① and ②).

On the system side, the cables are inserted into the terminal points marked "+" and "-" on the top of the terminal block (③ and ④).

The power supply is connected to the connection terminal blocks marked "UB-" and "UB+" (⑤ and ⑥).

When several PI basic terminal blocks are installed side-by-side, power can be supplied using FBST 500-PLC... plug-in bridges.



### WARNING: Explosion hazard

If the device has been used in **non-intrinsically safe circuits**, it must **not** be used again in intrinsically safe circuits.

The module must be clearly labeled as non-intrinsically safe.

## 6.2 Automatic Keying of Electronic Modules

The basic terminal block is not keyed by default upon delivery. The user-friendly keying is located in the electronic module and consists of four plastic parts, which are joined together. When the electronic module is first removed, the lower part of the keying pins remains in the basic terminal block (⑨ in Figure 1 on page 5). In this way, it is automatically keyed to the relevant electronic module.

If an electronic module is accidentally inserted in the wrong place, any plastic parts remaining in the basic terminal block can be removed using a screwdriver.

## 7 Isolation and Testing Options

On the field side, the circuit can be interrupted by two isolating connectors (⑦ in Figure 1 on page 5).



The intrinsically safe circuits can also be isolated when the power is connected.

Both screws (① and ②) are designed as test connectors, which means that both the voltage and current can be measured. Furthermore, additional test sockets (⑧) are located behind the isolating connectors, which enable the current to be measured without interrupting the measuring process.

The two screws on the system side (③ and ④) are also designed as test connectors, which means that the voltage can be measured.

## 8 PI-EX-TB/T Method of Operation

The PI-EX-TB/T basic terminal block is used as the basic terminal block for the PI-Ex-THC-I(-NC) temperature measuring transducer when measuring temperatures with thermocouple sensors.

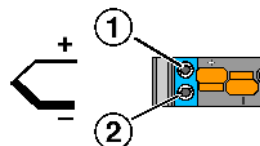


Figure 3 Temperature measurement

A PT100 sensor integrated in the area of connection points ① and ② records the temperature of the corresponding clamping part. The basic terminal block transmits this signal to the electronic module via the spring fork contacts.

Cold junction compensation is then carried out in the electronic module.