

# User Instructions Pressure Transmitters

## Models PTMEx, PTMExFB, PTMExFG, PTMExFBFG



### General Instructions

This operating manual contains notes on installation, commissioning, maintenance and adjustment. In addition to this operating manual, the following should be observed: statutory legislation, existing standards, the supplementary technical data of the datasheet in question, additional certificates where appropriate.

### ⚠ Safety Instructions

- The device may only be fitted, commissioned and maintained by qualified and authorised technical personnel using suitable equipment.
- Caution: the improper use of the device can lead to severe physical injuries or property damage!
- Only dismantle the pressure measurement system in pressure-free state. To achieve this, shut off all supply lines to the pressure transmitter and relief them.
- Mechanically defective pressure transmitters can cause injuries or faults in the process. Suitable measures should be taken to avoid this.
- Only expert, trained personnel may install and operate electrical equipment in areas where there is an explosion hazard. Modifications to devices and electrical connections jeopardise the explosion protection and operating safety and lead to the voiding of the guarantee. The limit values of the EC type examination certification (Appendix) must be observed! The X at the end of the examination number refers to special conditions (Appendix).

### Transport and Storage

Store and transport pressure transmitters under dry, clean conditions and if possible in their original packaging. Permissible storage temperature: -40°C to +90°C  
Impacts and vibration should be avoided.

### Mounting and Operating

- Prior to fitting it should be ensured that the device is suitable for the process in terms of pressure range, overpressure resistance, media compatibility, temperature resistance and pressure connection.
- Add into the process before the electrical installation.
- Do not remove the protective cap or cover in front of the separating membrane until immediately before fitting in order to avoid contamination or damage.
- Do not touch the separating membrane that is flush with the front. For measuring ranges up to 10 bar / 150 psi there is a danger of deformation. This can influence the zero point and measuring characteristics of the device.
- Seals must be suitable for the process connection and resistant to the pressure medium. In the case of cylindrical threads, the seal is created using a flat seal on the back of the seal. In the case of conical threads the seal is created when the thread is screwed up; normally a sealant is applied to the external thread. During fitting it should be ensured that the seals are faultless. Badly fitting seals can lead to faults.
- Check the measuring transmitter for pressure tightness during commissioning.
- Do not isolate the temperature decoupler since this would reduce the decoupling effect. Observe DIN 32676.
- Connect the electrical connections up with the supply voltage switched off.

- For housing protection type IP67 and pressure ranges up to 16 bar / 250 psi the devices are ventilated by means of the connection cable. Lay this ventilable connection cable into a ventilated room to balance atmospheric variations.
- Protection against the electro-magnetic interference (EMC) is only achieved if the conditions for shielding, earthing, arrangement of cables and electrical isolation are fulfilled during installation and fitting.
- When checking the zero point signal the fitting position should be taken into account. In the standard variant the pressure transmitter is set for vertical fitting at the factory. Changes to the fitting position shift the zero point (approx. 1 to 5 mbar) in the pressure ranges  $\leq 2$  bar. These shifts can be corrected by subsequent calibration (see zero adjustment).
- After the device has been opened there is the danger of the signal being influenced by the touching of the electrical connections. This can be avoided by switching off the supply voltage or disconnecting the signal power circuit.
- Maintenance of the device is in principle not necessary.

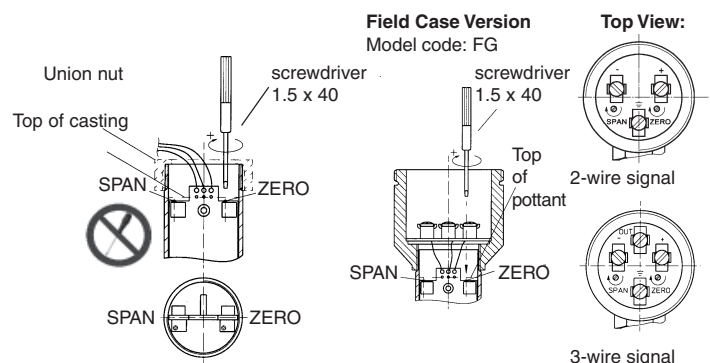
### CE Marking

The CE marking of the device certifies the adherence to the applicable EU directives for putting products into circulation within the European Community. The following directives are applied: EMC 98/13/EC, PED 97/23/EC, ATEX 94/9/EG. PED: Pressure transmitters are pressurised equipment in the sense of the Pressure Equipment Directive. The CE marking is undertaken after classification into the appropriate categories. Devices not requiring marking in accordance with PED ( $< 200$  bar) comply with the Pressure Equipment Directive and are manufactured according to "good engineering practice".

### Zero Adjustment

Should a subsequent zero adjustment be necessary then, in the variant with field housing, the potentiometer in the casting is reached through the terminal board in the connection area. When using the plug version or the version with cable connection, first unscrew the union nut and pull out the plug carefully upwards. The internal potentiometers for ZERO and SPAN are accessible from above through the casting and are adjusted with a screwdriver (1.5x40). (10 turns correspond with approx.  $\pm 5\%$  of the measuring range). A precise reference pressure should be applied for the calibration of the measuring span.

⚠ The final value (SPAN) should never be adjusted!



**ARMATURENBAU GmbH**  
Manometerstraße 5 • D-46487 Wesel - Ginderich  
Phone: (0 28 03) 9130-0 • Fax: (0 28 03) 10 35  
armaturenbau.com • mail@armaturenbau.com



Subsidiary Company and Sales East Germany and Eastern Europe  
**MANOTHERM Beierfeld GmbH**  
Am Gewerbepark 9 • D-08344 Grünhain-Beierfeld  
Phone: (0 37 74) 58-0 • Fax: (0 37 74) 58-545  
manotherm.com • mail@manotherm.com

**B28**  
**8/04**  
P 1 of 4

# Technical Data / Data Sheet 9812

Pressure transmitters model PTMEx are suitable for fluid and gaseous media that do not corrode stainless steel 316 L (1.4404). The equipment when connected to a certified intrinsically safe electric circuit comply with type of protection II2 G EEx ib IIC T6 in accordance with ATEX. Two basic models are available:

**Relative pressure (r) Model PTMEx 0-1 bar to 0-160 bar**  
**Model PTMExFB 0-100 mbar to 0-400 bar**  
Both models are also suitable for vacuum and compound ranges (with ventilation to the atmosphere)

**Absolute pressure (a) 0-1 bar to 0-25 bar**  
(absolute zero based measurements)

## Application

The pressure transmitters are temperature compensated and supply a calibrated output signal. The rugged design allows the pressure transmitters to be installed under aggravated conditions, e.g. in ships.

## EMC Test

The pressure transmitters comply with the electromagnetic interference requirements for residential, commercial and industrial areas in accordance with European standards and ensure thus their electromagnetic compatibility.

## Construction

The piezoresistive sensor filled with silicone oil has been welded in to the process connection. A thin diaphragm made of stainless steel separates the actual sensor from the medium.

## Standard Configuration

### Housing

Material: 1.4404/1.4305 (~316 L / 303 stainl. steel)  
Protection type: IP 65

Ventilation of inside volume for pressure ranges <16 bar through the plug connector [for versions (r) only]

### Electrical Connection

Angled plug connector DIN EN 175301-803, 3 terminals and ground terminal; to guarantee electromagnetical conformity(EMC) please use a shielded cable (e.g. LP/LiMYCY). The shielding must be connected to the case.

### Reverse Polarity Protection

Standard

### Electronics

Potted with silicone

### Sensor Filling

Silicone-free, synthetic oil

### Wetted Parts

Process connection stainless steel 316 L (1.4404),

PTMEx: G ½ B (½" BSP)

PTMExFB: Process connection with flush diaphragm  
G ½ B (½" BSP) in accordance with DIN 3852, but  
G 1 B (1" BSP) with O-ring NBR for pressure ranges ≤ 1 bar

Diaphragm: stainless steel 316 L (1.4404)

### Temperature Limitations

Storage temperature: -40...+ 90 °C (-40...+194 °F)

Operating temperature: -10...+ 70 °C (+14...+158 °F)

Medium temperature: -10...+ 80 °C (+14...+186 °F)

with temperature decoupling: -10...+140 °C (+14...+284 °F)

### Temperature Influence

Zero point: ≤ 0.2 % of the measurement span/10 K (18 °F)

Span: ≤ 0.2 % of measurement span/10 K (18 °F)

### Overrange Protection

Pressure range dependent, typically at least two-fold, for details see pressure range table overleaf



### Available Pressure Ranges

See table on page 2

### Settling Time

≤ 20 ms

### Accuracy

better than ± 0.2%, for pressure ranges > 60 bar ± 0.3%

### Output Signal

4...20 mA, two-wire system (others see "Special Configurations")

### Current Limiting in the Output Signal

Maximum output current approx. 30 mA

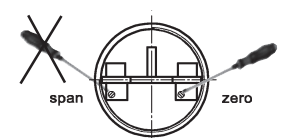
### Calibration Potentiometers

Our pressure transmitters are calibrated in the factory. For this reason the potentiometers should not be adjusted. If even so a zero point correction should become necessary this can be done after removing the upper part of the plug (loosen knurled nut and fold the plug to the side).

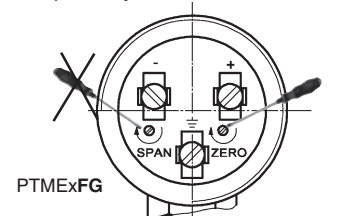
### Adjustment Range

Zero and Span approximately ± 5%

ZERO and SPAN can be adjusted separately, but the SPAN should never be readjusted!



PTMEx



PTMExFG

### Auxiliary Power

6 ... 30 VDC, maximum permissible operating voltage 30 VDC (others see "Special Configurations")

### Influence of the Supply Voltage

≤ 0.2% of full span / 10 V

### Load

2-wire circuit (others see "Special Configurations"):

$$R_{Bmax} = (U_B - 6V) / 0.02 A$$

### Load Influence

For a load change of 500 Ohm < 0.1 % of f.s.

### Fitting Position

Any (standard position is vertical)

### Ex Approval

CENELEC approval ATEX

Explosion protection, intrinsically safe TÜV 04 ATEX 2432 X

⊕ II2 G EEx ib IIC T6

$U_{max} < 30 VDC$

$I_{max} < 150 mA$

$P_{max} < 1W$

$C_i < 49 nF$

$L_i < 33 \mu H$

<sup>1)</sup> ± 0.3% for pressure ranges > 60 bar

## Pressure Ranges/Overpressure Limits

Relative pressure (r)		Absolute pressure (a)	Overpressure limit***
0- 100 mbar*	-100/0 mbar*	—	2 bar
0 - 160 mbar*	-160/0 mbar*	—	
0 - 250 mbar*	-250/0 mbar*	—	
0 - 400 mbar*	-400/0 mbar*	—	6 bar
0 - 0,6 bar*	-0,6/0 bar*	—	
0 - 1 bar	-1/0 bar	0 - 1 bar abs	10 bar
0 - 1,6 bar	-1/+0,6 bar	0 - 1,6 bar abs	
0 - 2,5 bar	-1/+1,5 bar	0 - 2,5 bar abs	16 bar
0 - 4 bar	-1/+3 bar	0 - 4 bar abs	
0 - 6 bar	-1/+5 bar	0 - 6 bar abs	30 bar
0 - 10 bar	-1/+9 bar	0 - 10 bar abs	
0 - 16 bar	-1/+15 bar	0 - 16 bar abs	50 bar
0 - 25 bar		0 - 25 bar abs	
0 - 40 bar		—	70 bar
0 - 60 bar		—	
0 - 100 bar**		—	200 bar
0 - 160 bar**		—	
0 - 250 bar**		—	500 bar
0 - 400 bar**		—	

\* only PTMExFB with connection G 1 B

\*\* Accuracy  $\pm 0,3\%$  f.s.

\*\*\* for intermediate ranges upon request

The pressure transmitters are available also with the corresponding psi pressure ranges without extra charges.

## Special Configurations

- Model with **temperature decoupling** for temperatures of  $-10\text{ }^{\circ}\text{C}$  to  $+140\text{ }^{\circ}\text{C}$  ( $+14$  to  $284\text{ }^{\circ}\text{F}$ ), code letters **TE**

- **Electrical connection** IP 67, cable venting; **round connector** with screw plug M 12, IP 65

- **Field case, ordering code: ..FG** (e.g. PTMExFG, PTMExFBFG), Solid construction, screwed-on cover ring with O-ring seal for adjustment potentiometers accessible from the outside, screw-on cover for connection chamber with O-ring thread protection, terminals  $4\text{ mm}^2$ , cable fitting M 16x1.5 for cable diameters of  $4.5\text{--}10\text{ mm}$  ( $.18\text{--}.39\text{"})$ , protection type IP 65 or optionally IP 67, inside chamber venting through integrated sinter filter (IP65) respectively vented connection cable in the case of IP 67

### ● Output signal

0... 20 mA, 3-wire

Auxiliary power: 9...30 V DC,  
max. permissible operating voltage 30 VDC

Load:  $R_{Bmax} = (U_B - 9\text{ V}) / 20\text{ mA}$

( $U_B$  = Operating voltage,  $R_{Bmax}$  = max. perm. load resistance including cable)

Load influence:  $< 0.1\%/100\text{ Ohm}$

### ● Other process connections:

– **Model PTMEx:**  $\frac{1}{2}$ " NPT in accordance with DIN EN 837-1

– **Model PTMExFB, pressure ranges from 1.6 to 25 bar**

(standard at  $\leq 1$  bar):

G 1 B (1" BSP) with NBR O-ring

pressure ranges from 1 bar to 60 bar

G  $\frac{1}{2}$  B ( $\frac{1}{2}$ " BSP) or M 22 x 1.5 with NBR O-ring

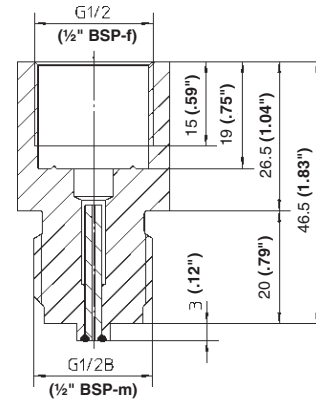
### ● Connection to Zone 0

with usage of our adapter "Adapt-FS" (see right column at the top); connection to Zone 0 using a correspondingly approved diaphragm chemical seal upon request

## Accessories

Flame arrester "Adapt-FS" version 1 in accordance with data sheet I-11001, made of 316 Ti (1.4571) / channel 304 stainl. steel (1.4301), process connection G  $\frac{1}{2}$  B ( $\frac{1}{2}$ " BSP) in accordance with EN 837-1, with EG type approval certificate PTB 99 ATEX 4023 X in accordance with directive 94/9/EG, marking of this protection system:

Ⓔ II G II C



## How to Order

Model code:	Inside diaphragm Flush welded diaphragm	<b>PTMEx</b> <b>PTMExFB</b>
Housing:	Standard: Field case:	<b>without</b> code letter <b>FG</b>
Medium temperature:	Standard version, up to $+80\text{ }^{\circ}\text{C}$ with temperature decoupling, up to $+140\text{ }^{\circ}\text{C}$ ( $+284\text{ }^{\circ}\text{F}$ ):	<b>without</b> code letter <b>TE</b> (see left)
Ignition protection type:		<b>ib</b>
Marking with temperature class:		<b>T4, T5, or T6</b>
Pressure type:	Relative pressure: Absolute pressure:	<b>(r)</b> <b>(a)</b>
Pressure range:	see table above, e.g.	<b>0-4 bar</b>
Output signal:	Standard: Option:	<b>4 ... 20 mA,</b> <b>0 ... 20 mA</b>
Special configurations:	e.g. process connection $\frac{1}{2}$ " NPT, M 22x1.5 and others., <b>see on the left</b> ; special fitting position, other special configurations upon request	

### Examples for Ordering Information:

#### PTMEx ib T6 (r) -1/+3 bar, 4...20 mA

i.e.: PTMEx pressure transmitter with explosion protection, standard version for max. medium temperature  $+80\text{ }^{\circ}\text{C}$  ( $+176\text{ }^{\circ}\text{F}$ ), ignition protection type ib, temperature class T6, for relative pressure  $-1/+3$  bar, output signal 4...20 mA (2-wire), process connection G  $\frac{1}{2}$  B ( $\frac{1}{2}$ " BSP)

#### PTMExFG TE ib T6 (a) 0-6 bar, 0...20 mA

i.e.: PTMExFG pressure transmitter in field case with explosion protection, with temperature decoupling for max. medium temperature  $+140\text{ }^{\circ}\text{C}$  ( $+284\text{ }^{\circ}\text{F}$ ), ignition protection type ib, temperature class T6, for absolute pressure 0-6 bar, output signal 0...20 mA (3-wire), process connection G  $\frac{1}{2}$  B ( $\frac{1}{2}$ " BSP)

#### PTMExFB ib T5 (r) 0-400 mbar, 4...20 mA, G1B

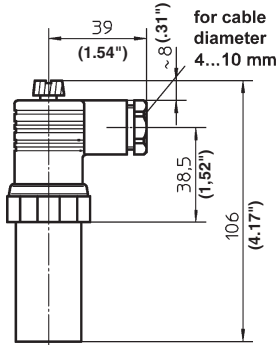
i.e.: PTMExFB pressure transmitter with explosion protection, standard version for max. medium temperature  $+80\text{ }^{\circ}\text{C}$  ( $+176\text{ }^{\circ}\text{F}$ ), ignition protection type ib, marking with temperature class T5, for relative pressure 0-400 mbar, output signal 4...20 mA (2-wire), process connection G 1 B with flush diaphragm

# Housing Types, Dimensions, Weight, Connection Diagrams

## Standard housing

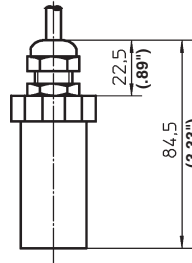
(without additional code letters)

Plug connector DIN EN 175301-803  
Venting through connector  
Protection type IP 65

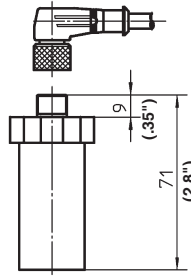


**Weight** Standard housing: approx. 0.20 kg (0.44 lb),  
with temperature decoupling approx. +0.05 kg (+0.11 lb)

Cable connection  
Venting through cable  
Protection type IP 67



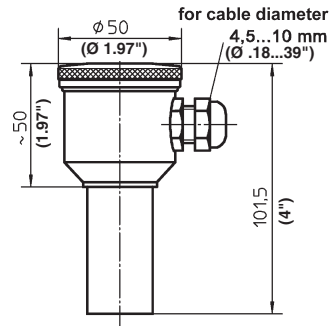
Round connector with screw plug  
Venting through cable  
Protection type IP 65



## Field case

Code letters FG

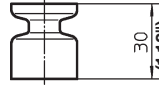
Screwed cable gland M 16x1.5  
Venting through sinter filter, IP 65  
Option: venting through cable, IP 67



## Weight

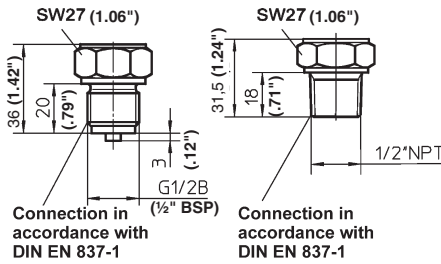
Field case: approx. 0.46 kg (1.01 lb),  
with temperature decoupling approx. +0.05 kg (+0.11 lb)

## Option: Temperature decoupling

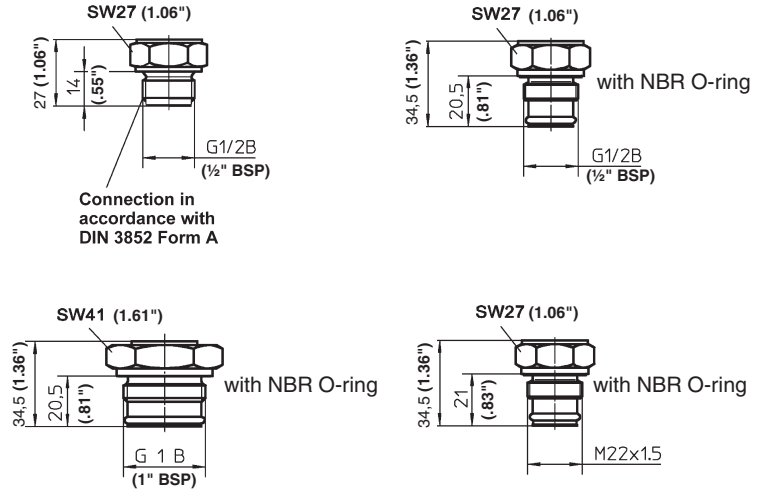


Temperature decoupling for  
process temperatures up to 140° C (+ 284 °F)

## Process connections PTMEx



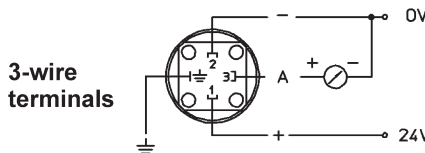
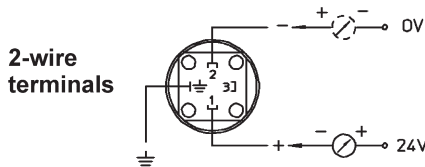
## Process connections PTMExFB



## Connection Diagrams:

### Angled plug

DIN EN 175301-803

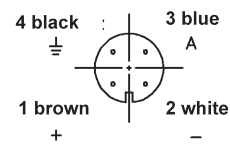
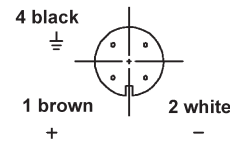


### Cable connection

brown + Supply  
white = Ground  
green - Supply

brown + Supply  
white = Ground  
green - Supply  
black A Output

### Round connector



### Field case

Screwed cable gland M 16x1.5

