

Operating Manual



PT-FR

● Content

1.	General	2
2.	Safety	2
3.	Design and function	4
4.	Transport, Packaging, Storage	4
5.	Starting, Operation	5
6.	Adjustment of zero point and span	7
7.	Technical data	8
8.	Troubleshooting	10
9.	Other (Maintenance, Cleaning, Taking out of service, Return, Disposal)	11
10.	Annex (Conformy declaration)	12

● 1 General

For information

- The pressure transmitter, described in this operating manual, is carefully designed and manufactured using state-of-the-art technology. All components are subject to stringent quality and environmental criteria during production. Our management system is certified to ISO 9001.
- This operating manual includes important information on handling the pressure transmitter. Basis for safe workings is the observance of all given safety and work instructions.
- Observe the relevant local accident prevention regulations and general safety regulations for the instrument's range of use.
- The operating instructions are part of the product and must be kept in the immediate vicinity of the instrument and readily accessible to skilled personnel at any time.
- Skilled personnel must have carefully read and understood the operating instructions, prior to beginning any work.
- The manufacturer's liability is void in the case of any damage caused by using the product contrary to its intended use, non-compliance with these operating instructions, assignment of insufficiently qualified skilled personnel or unauthorised modifications to the instrument.
- The general terms and conditions contained in the sales documentation shall apply.
- The level probe is subject to technical modifications.
- Further information: Data sheet: PT-FR
Consulting: Please contact your supplier

Signs



Warning!

A non-observance can cause injuries to persons and/or can be a dangerous to life.



Caution!

A non-observance can cause potentially dangerous situation that can result in light injuries or damage to equipment or the environment, if not avoided.



Information!

A non-observance can have influence on the operation of the device or cause unintentional reactions of the device.



CE marking

Pressure transmitters bearing this mark comply with the relevant European directives.

Abbreviations

- 2-wire: The two connection lines are used for the voltage supply. The measurement signal also provides the supply current.
- 3-wire: The two connection lines are used for the voltage supply. One connection line is used for the measurement signal.
- U+: Positive supply connection
- U-: Negative supply connection (reference potential)
- S+: Analog output

● 2 Safety



Before installation, commissioning and operation, ensure that the appropriate pressure transmitter has been selected in terms of measuring range, design and specific measuring conditions.

Non-observance can result in serious injury and/or damage to the equipment.



- Open the connections only after the system has been depressurised.
- Observe the working conditions in accordance with chapter 7 „Technical data“.
- Always operate the pressure transmitter within the overpressure limit.



Further important safety instructions can be found in the individual chapters of these operating instructions.

● 2 Safety (continued)

Intended use

The pressure transmitter is used to convert pressure into an electrical signal indoors and outdoors.

The instrument has been designed and built solely for the intended use described here and may only be used accordingly.

The technical specifications contained in these operating instructions must be observed. Improper handling or operation of the pressure transmitter outside of its technical specifications requires the instrument to be taken out of service immediately and inspected by an authorised service engineer.

The manufacturer shall not be liable for claims of any type based on operation contrary to the intended use.

Personnel qualification



Warning

Risk of injury if qualification is insufficient!

- Improper handling can result in considerable injury and damage to equipment.
- The activities described in these operating instructions may only be carried out by skilled personnel who have the qualifications described below.

Keep unqualified personnel away from hazardous areas.

Skilled personnel

Skilled personnel are understood to be personnel who, based on their technical training, knowledge of measurement and control technology and on their experience and knowledge of country-specific regulations, current standards and directives, are capable of carrying out the work described and independently recognising potential hazards.

Special operating conditions require further appropriate knowledge, e.g. of aggressive media.

Special hazards



Warning

For hazardous media such as oxygen, acetylene, flammable or toxic gases or liquids, and refrigeration plants, compressors, etc., in addition to all standard regulations, the appropriate existing codes or regulations must also be followed.



Warning

Residual media in the dismantled pressure transmitter can result in a risk to persons, the environment and equipment. Take sufficient precautionary measures.

Do not use this instrument in safety or emergency stop devices. Incorrect use of the instrument can result in injury.

Should a failure occur, aggressive media with extremely high temperature and under high pressure or vacuum may be present at the instrument.

Type plate (Example)

Logo	UF003-C2-000100	
Contact	SN : 774.04/10-4.0-001	Art.Nr.: 200-00422
P : 0...16 bar	OUT : 4...20 mA	+IN : 1
Pmax : 80 bar	IN : 10...30 VDC	POUT : 3
PNr : 13408748		Date : 44/12

UF... : Product code
Pmax : Over pressure safety
OUT : Signal
+IN : Connection U+
SN : Serial number

P : Pressure range
PNr : Product number
IN : Supply
POUT : Connection U-
Art.Nr.: Part number

● 3 Design and function

Description:

The prevailing pressure is measured at the sensor element through the deformation of a diaphragm. By supplying power, this deformation of the diaphragm is converted into an electrical signal. The output signal from the pressure transmitter is amplified and standardised. The output signal is proportional to the measured pressure.

Scope of delivery

Complete assembled pressure transmitter, operating manual
Cross-check the scope of delivery with the delivery note.

● 4 Transport, packaging and storage

Transport

Check the pressure transmitter for any damage that may have been caused during transportation.
Obvious damage must be reported immediately.

Packaging

Do not remove packaging until just before mounting.
Keep the packaging as it will provide optimum protection during transport (e.g. change in installation site, sending for repair).

Storage

Permissible conditions at the place of storage:

- Storage temperature: see „Technical data“
- Humidity: 45 ... 75 % relative humidity

Avoid exposure to the following factors:

- Mechanical vibration, mechanical shock (putting it down hard)
- Soot, vapour, dust and corrosive gases
- Potentially explosive environments, flammable atmospheres

Store the pressure transmitter in its original packaging in a location that fulfils the conditions listed above. If the original packaging is not available, pack and store the instrument as described below:

1. Place the protection cap on the process connection
2. Place the instrument, along with shock-absorbent material, in the packaging.



Warning

Before storing the instrument (following operation), remove any residual media. This is of particular importance if the medium is hazardous to health, e.g. caustic, toxic, carcinogenic, radioactive, etc..

● 5 Starting, operation

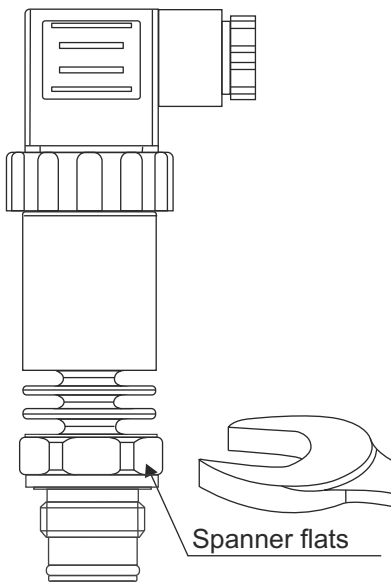
Test for your safety

Prior to commissioning, the pressure transmitter must be subjected to a visual inspection.



- Leaking fluid is indicative of damage.
- Check the diaphragm of the process connection for any damage.
- Only use the pressure transmitter if it is in perfect condition with respect to safety.

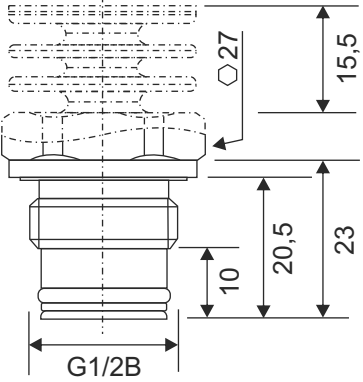
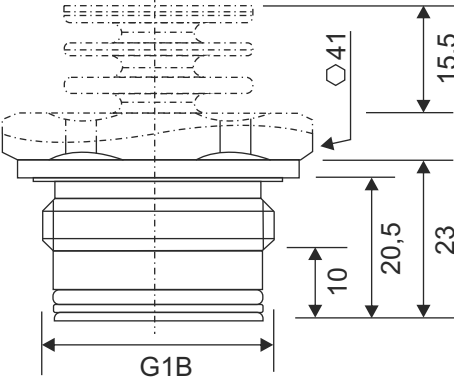
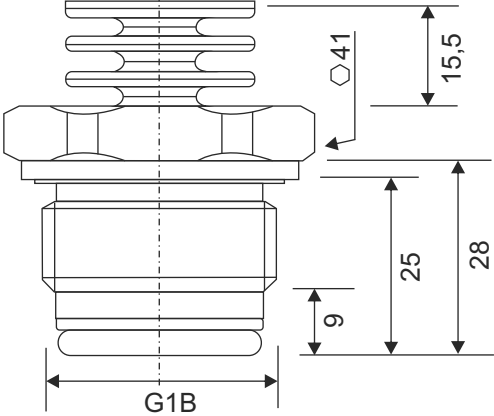
Mechanical mounting



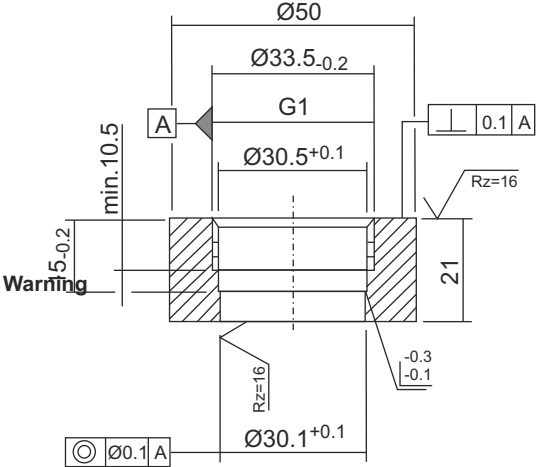
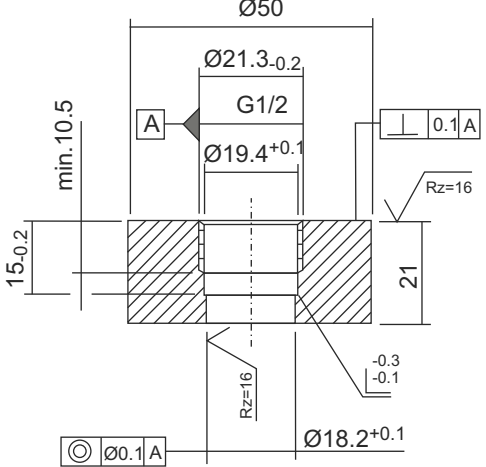
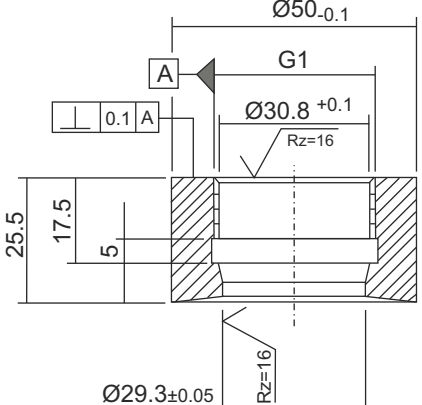
- Remove the protection cap not until shortly before installation.
- Ensure that the diaphragm of the process connection is not damaged during installation.
- The sealing faces at the pressure transmitter and the measuring point always have to be clean.
- Only ever screw in, or unscrew, the instrument using the spanner flats. Never use the case or the cooling element as a working surface.
- The correct torque depends on the dimensions of the process connection and the gasket used (form/material).
- When screwing in, do not cross the threads.
- Attach the connector and screw it in hand-tight. The assembly of the angular connector is described on page 7.
- Information on tapped holes and welding sockets on request.

● 5 Starting, operation (continued)

Pressure connection (in mm)

G1/2 B with or without cooling element 0...2,5 up to 0...600 bar	G1 B with or without cooling element 0...0,1 up to 0...1,6 bar	G1 B Hygienic with cooling element 0...0,1 up to 0...25 bar
		
Sealings (Standard is supplied with the sensor)		
Without cooling element: NBR (Standard) Option: FPM/FKM, EPDM With cooling element: FPM/FKM (Standard) Option: EPDM		EPDM (Standard)

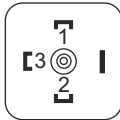
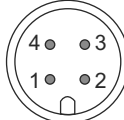
Tapped holes, welding sockets (in mm)

<p style="text-align: center;">G1 (with O-Ring)</p> 	<p style="text-align: center;">G1/2 (with O-Ring)</p> 
<p style="text-align: center;">G1 Hygienic</p> 	<ul style="list-style-type: none"> - The tapped holes provided by the customer have to be drilled after the tapping. - Finished welding sockets on request.

● 5 Starting, operation (continued)

Electrical installation

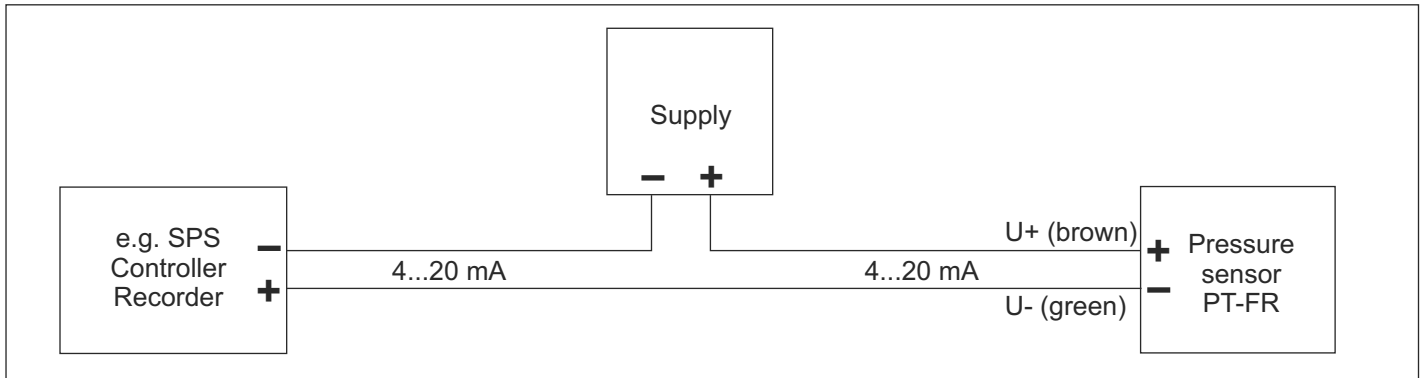
- The instrument must be earthed via the process connection.
- For instruments with voltage output, use shielded cable, and, if the cables are longer than 30 m or they leave the building, earth the shield at least at one end of the cable.
- Select a cable diameter that matches the cable gland of the plug. Make sure that the cable gland of the mounted plug has a tight fit and that the seals are present and undamaged. Tighten the threaded connection and check that the seal is correctly seated, in order to ensure a tight seal.
- For cable outlets, make sure that no moisture enters at the cable end.

	L-connector (valve) DIN 175301-803 A	Circular connector M12x1	Cable 4-pole
4...20 mA (2-wire)	U+ = 1 U- = 2	U+ = 1 U- = 3	U+ = brown U- = green
0...20 mA / 0...5 V / 0...10 V (3-wire)	U+ = 1 U- = 2 S+ = 3	U+ = 1 U- = 3 S+ = 4	U+ = brown U- = green S+ = white
Wire gauge	up to maximum 1,5 mm ²		3x 0,5 mm ²
Diameter of cable	6...8 mm		6,8 mm
Length of cable			1,5 m, 3m, 10 m, 15 m
Ingress protection IEC 60529	IP 65	IP 67	IP67 or IP 68 ¹⁾
			

The specified protection only apply with female connectors that provide the corresponding ingress protection.

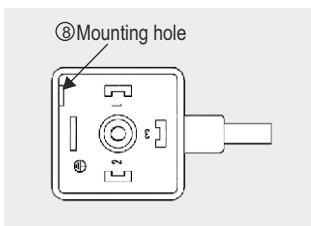
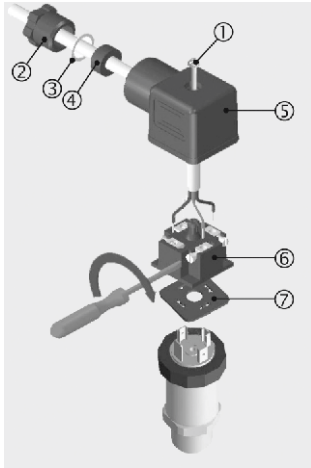
1) Adjustment is not possible for cable outlet with ingress protection IP68

Example of connection (4...20 mA current loop)



● 5 Starting, operation (continued)

Fitting a DIN 175301-803 angular connector

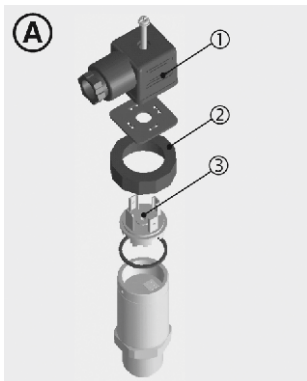


1. Loosen the screw (1).
2. Loosen the cable gland (2)
3. Pull the angled socket (5) and (6) from the instrument.
4. Via the mounting hole (8) lever the terminal block (6) out of the case (5).
5. Pass the cable with the appropriate cable outer diameter (see page 6) through the cable gland (2), ring (3), sealing (4) and the case (5).
6. Connect the cable ends to the connection terminals on the terminal block (6) in accordance with the pin assignment (assignment see page 6).
7. Press the terminal block (6) into the case (5).
8. Tighten the cable gland (2) around the cable. Make sure that the cable gland and seal are not damaged and that they are assembled correctly in order to ensure ingress protection.
9. Place the flat, square gasket (7) over the pressure transmitter's connection pins.
10. Slide the assembled angled socket (5) and (6) onto the pressure transmitter's connection pins.
11. Using the screw (1), screw the angled socket to the pressure transmitter, hand-tight.

● 6 Adjustment of zero point and span



Only adjust the span-setting potentiometer if calibration equipment is available which has at least three times the accuracy of the pressure transmitter.



Preparation (figure A)

To gain access to the potentiometers, open the instrument as follows:

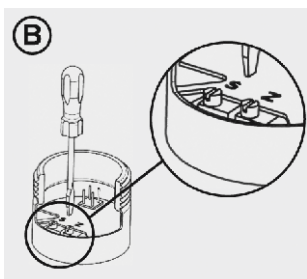
- Disconnect the electrical connection (1) from the instrument.
- Remove the clamping nut (2).
- Carefully pull the instrument connector (3) from the instrument.
- Connect the instrument connector (3) to the power supply and a display unit (e.g. ammeter, voltmeter) according to the connection diagram.

Adjustment of zero point (figure B)

- Go to the start of the measuring range.
- Using potentiometer "Z", adjust the minimum output signal (e.g. 4 mA).

Setting the span (figure B)

- Go to the end of the measuring range.
- Using potentiometer "S", adjust the maximum output signal (e.g. 20 mA).
- Check the zero point and if there is any deviation, re-adjust it.
- Repeat the procedure until the zero point and the span are set correctly.



Finish the adjustment (figure A)

- Disconnect the instrument connector (3) from the power supply and the display unit.
- Carefully push the instrument connector (3) onto the instrument, without damaging the wires or the seals. The seals must be clean and undamaged in order to guarantee the given ingress protection.
- Tighten the clamping nut (2).

After the adjustment, check that the system is functioning correctly.
Recommended recalibration cycle: 1 year

● 7 Technical data

Pressure input

Relative pressure:	0...0,1 up to 0...600 bar / -1...0 bar
Absolute pressure:	0...0,25 up to 0...16 bar
Vacuum:	-0,1...0 up to -1...0 bar
± pressure range:	-1...+0,6 up to -1...+24 bar
Ranges:	see table page 2 (with overpressure safety and burst pressure)

Analog output

4...20 mA:	2-wire	Load: maximum (U+ - 10 V) / 0,02 A
0...20 mA:	3-wire	Load: maximum (U+ - 3 V) / 0,02 A
0...10 V:	3-wire	Load: >10 kΩ
0...5 V:	3-wire	Load: >5 kΩ
Adjustability:	±5% with potentiometer inside the instrument (zero / span) (not possible with cable connection IP68)	
Setting time:	<10 ms	

Performance

Accuracy:	<0,5% of span
Option:	<0,25% of span (for ranges >0,25 bar) Including non-linearity, hysteresis, zero and full scale error (corresponds to error of measurement per IEC 61298-2)
Adjustment:	in vertical mounting position with lower pressure connection
Non-linearity:	<0,2% of span (BFSL per IEC 61298-2)
Non-repeatability:	<0,1% of span
1-year stability:	<0,2% of span

Supply

Output:	4...20 mA / 0...20 mA / 0...5 V: 10...30 VDC 0...10 V: 14...30 VDC
Insulation voltage:	500 VDC with NEC Class 02 power supply (low voltage and low current maximum 100 VA even under fault condition)
Wiring protection:	Overvoltage protection: 36 VDC Short-circuit: S+ towards U- Reverse polarity: U+ towards U-

Ambient conditions

Ambience temperature:	-20...+80 °C
Storage temperature:	-40...+100 °C / -20...+100 °C (with cooling element)
Medium:	-30...+100 °C / -20...+150 °C (with cooling element) -30...+70 °C for ranges 0...400 bar and 0...600 bar
Option:	-40...+125 °C for sensors without cooling element
Rated temperature range:	0...+80 °C
Temperature coefficient:	mean temperature coefficient (TC) within rated temperature range
TC zero:	<0,2% of span / 10 K <0,4% span / 10 K for ranges <250 mbar
TC span:	<0,2% span / 10 K
CE-conformity:	Pressure equipment directive: 97/23/EG EMC directive: 2004/108/EG with EN 61326:Emission (Group 1, Class B) and immunity for industrial locations
Shock resistance:	without cooling element: 1000 g according IEC 60068-2-27 (mechanical shock) with cooling element: 400 g according IEC 60068-2-27 (mechanical shock)
Vibration resistance:	without cooling element: 20 g according IEC 60068-2-6 (vibration under resonance) with cooling element: 10 g according IEC 60068-2-6 (vibration under resonance)

Mechanics

Material	Medium wetted parts:	CrNi steel sealing see page 3
Transmission fluid:	Standard:	syntetic oil (internal)
	Option:	Food-compatible system fill fluid per FDA 21 CFR 178.3750
Pressure connection:	see page 3	
Electrical connection:	see page 4	
Ingress protection:	IP65, IP67, IP68 (see page 3)	
Weight:	approx. 200 g (G1/2 B)	

● 7 Technical data (continued)

Pressure table

Relative pressure

Nominal range	0,1	0,16	0,25	0,4	0,6	1	1,6	2,5
Overpressure safety	1	1,5	2	2	4	5	10	10
Burst pressure	2	2	2,4	2,4	4,8	6	12	12
Nominal range	4	6	10	16	25	40	60	100
Overpressure safety	17	35	35	80	50	80	120	200
Burst pressure	20,5	42	42	96	96	400	550	600
Nominal range	160	250	400	600				
Overpressure safety	320	500	800	1200				
Burst pressure	600	600	1600	1600				

Absolute pressure

Nominal range	0,25	0,4	0,6	1	1,6	2,5	4	6
Overpressure safety	2	2	4	5	10	10	17	35
Burst pressure	2,4	2,4	4,8	6	12	12	20,5	42
Nominal range	10	16						
Overpressure safety	35	80						
Burst pressure	42	96						

Vacuum and \pm -measuring range

Nominal range	-0,1...0	-0,16...0	-0,25...0	-0,4...0	-0,6...0	-1...0	-1...+0,6	-1...+1,5
Overpressure safety	1	1,5	2	2	4	5	10	10
Burst pressure	2	2	2,4	2,4	4,8	6	12	12
Nominal range	-1...+3	-1...+5	-1...+9	-1...+15	-1...+24			
Overpressure safety	17	35	35	80	80			
Burst pressure	20,5	42	42	96	96			

● 8 Troubleshooting

Please verify in advance if pressure is being applied (valves/ ball valve etc. open) and if the right voltage supply and the right type of wiring (2-wire, 3-wire) has been chosen.

Failure	Possible cause	Procedure
Signal span dropping off Signal span too small	Mechanical overload caused by overpressure Diaphragm damage Sealing/sealing face damaged or soiled, sealing does not have a tight fit, threads jammed	Replace instrument Replace instrument Clean the sealing/sealing face, replace sealing
No output signal	Line break No/wrong power supply	Check the through drilling Correct the power supply
No/wrong output signal	Wiring error	Rectify the wiring
Constant output signal upon change in pressure	Mechanical overload caused by overpressure	Replace instrument
Signal span varies/inaccurate	EMC interference sources in the environment (e. g. frequency converter) Operating temperature too high/low Instrument not earthed Strongly varying pressure of process medium	Shield instrument, shield cable, remove source of interference Observe the permissible temperatures Earth the instrument Damping, consulting necessary
Deviating zero point signal	Operating temperature too high/low Other mounting position Overpressure limit exceeded	Observe the permissible temperatures Adjust the zero point Replace instrument

Make sure that after changes in system the unit is working properly. In case the error continues to exist send in the instrument for reparation (or replace the unit).

!
Attention If faults cannot be eliminated by means of the measures listed above, shut down the pressure transmitter immediately, and ensure that pressure and/or signal are no longer present, and secure the instrument from being put back into operation inadvertently. In this case, contact the manufacturer. If a return is needed, follow the instructions given in the notes for return.

Note: In case of unjustified reclamation we charge the reclamation handling expenses.

● 9 Other

Maintenance

- - The level probe PT-FR requires no maintenance.
- Have repairs performed by the manufacturer only.

Accessories

For details about necessary accessories (e.g. welding sockets) please contact your supplier.

Cleaning



- Before cleaning, correctly disconnect the instrument from the pressure supply, switch it off and disconnect it from the power supply.
- Do not use any pointed or hard objects for cleaning, as they may damage the diaphragm of the process connection.
- Clean the instrument with a moist cloth.
- Electrical connections must not come into contact with moisture.
- Wash or clean the dismantled instrument before returning it in order to protect personnel and the environment from exposure to residual media.
- Residual media in the dismantled pressure transmitter can result in a risk to persons, the environment and equipment. Take sufficient precautionary measures.

Taking out of service



Residual media in dismantled pressure transmitters can result in a risk to persons, the environment and equipment. Take sufficient precautionary measures.



Risk of burns! Let the instrument cool down sufficiently before dismantling! During dismantling there is a risk of dangerously hot pressure media escaping.

Only disconnect the pressure transmitter once the system has been depressurised!

During removal, do not damage the diaphragm of the process connection. After removal and cleaning (see section „Cleaning“ above), place the protection cap on the instrument to protect the diaphragm.

Return



Absolutely observe when shipping the pressure transmitter:

All pressure transmitters delivered to supplier/manufacturer must be free from any kind of hazardous substances (acids, bases, solutions, etc.).

When returning the instrument, use the original packaging or a suitable transport package. Be sure to include detailed information about the problem.

Disposal

Incorrect disposal can put the environment at risk. Dispose of instrument components and packaging materials in an environmentally compatible way and in accordance with the country-specific waste disposal regulations.

● 10 Annex (Conformity declaration)

We MÜLLER INDUSTRIE-ELEKTRONIK GMBH

(supplier's name)

Justus-von-Liebig-Straße 24
31535 Neustadt
GERMANY

(address)

declare that the product

Flush Pressure Transmitter Standard, Type: PT-FR

(name, type or model, batch or serial number, possibly sources and number of items)

is (are) in conformity with the following European CE-directives:

2004/108/EC (EMC)
97/23/EC (DGRL)¹⁾

by the application with the following standard(s)

EN 61326-1:2006, EN 61326-2-3:2006

Notes:

1) PS > 200 bar, Module A, pressure accessory

Neustadt, 31.1.2013

(Place and date of issue)


Müller Industrie-Elektronik GmbH
Matthias Müller

(name and signature or equivalent marking of authorized person)