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TEMATEC
Temperature · Technology

Operating Manual

CE Ex

Industrial pressure transmitter DMK / DMP, screw-in transmitter LMK / LMP and OEM pressure transmitter

(DMK 331, DMK 331 P, DMK 351, DMK 351 P, DMP 331, DMP 331i, DMP 331 P, DMP 333, DMP 333i, DMP 334, DMP 343, LMK 331, LMK 351, LMP 331, LMP 331i, 17.6XX, 18.6XX, 26.6XX, 30.6XX)

DMP 331
G1/2" flush (DIN 3852)
connector DIN 43650

DMK 331
G1/2" open port of PVDF
connector DIN 43650

Important notes:

☞ Please read this operating manual carefully before installing and starting up the pressure measuring device.

☞ This operating manual must be kept for further use at an easy accessible location.

⚠ The device may only be installed, used and serviced by persons who are familiar with this operating manual as well as with the current regulations on occupational safety and accident prevention.

Table of contents

1. General information

1.1 Information on the intended use

- The pressure transmitters have, according to the type, been developed for applications in overpressure and vacuum as well as for absolute pressure measurement.
- The screw-in transmitters LMK and LMP are particularly used in level and process measurement.
- Permissible media are gases or liquids, specified in the data sheet and compatible with the media wetted parts.
- The device shall be used according to the area of application specified in the data sheet!
- No liability is assumed and warranty claims are excluded in case of improper application, modification of or damage to the device.

1.2 Target group

This operating manual is intended for qualified technical personnel.

1.3 Symbols used

⚠ : Caution ☞ : Note

1.4 Safety notes

The following notes must be observed to avoid hazards for the operator and his environment:

⚠ The device may only be installed, used and serviced by persons who are familiar with this operating manual!

⚠ Applicable regulations regarding occupational safety, accident prevention and national installation standards must be complied with!

⚠ For a device with ATEX-approval, used in IS-areas, the manual "Installation of pressure transmitters and screw-in transmitters in intrinsic safe areas" must additionally be regarded. Therefore both manuals are only valid when used together!

⚠ The product must only be used within the specifications!
(Compare the technical data in the current data sheet.)

⚠ Install the device only when depressurized and currentless!

1.5 Package contents

Please verify that all listed parts are included in the delivery and check the consistency specified in your order:

- industrial pressure transmitter or screw-in transmitter
- this operating manual
- for a device with ATEX approval additionally the manual "Installation of pressure transmitters and screw-in transmitters in intrinsic safe areas"

2. Product identification

The device can be identified by its type plate. It provides the most important data. By the ordering code the product can be clearly identified.

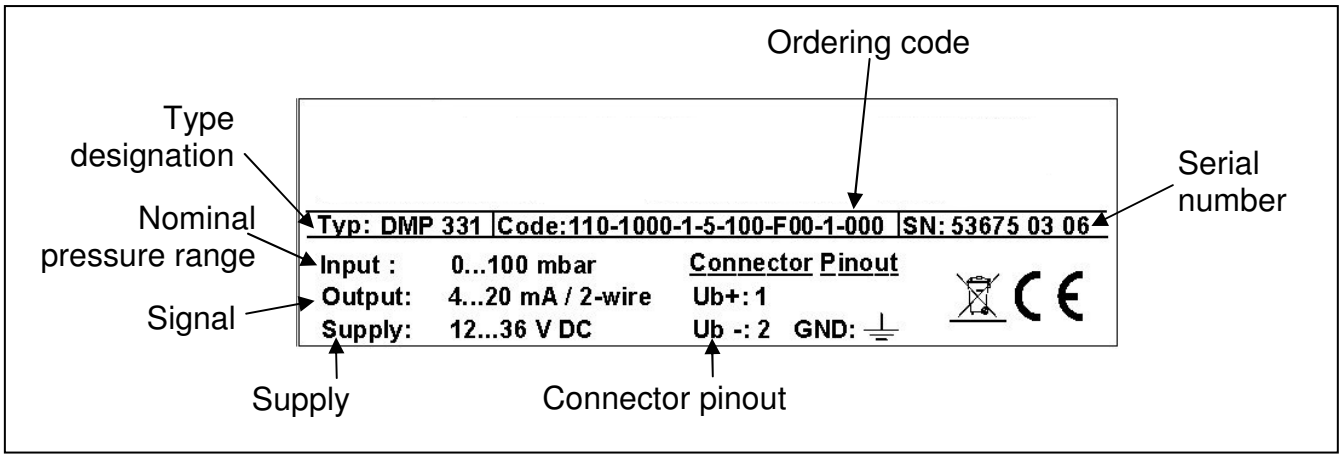


Fig. 1 type plate

☞ If you have a device with ATEX approval, its type plate differs from the one above. A corresponding type plate is shown in the manual "Installation of pressure transmitters and screw-in transmitters in intrinsic safe areas".

3. Installation

3.1 General notes

- Handle this electronic precision measuring device carefully in packed as well as in unpacked condition!
- The device may not be thrown!
- To avoid damaging the diaphragm, remove packaging and protective cap only before starting up the device.
- A delivered protective cap must be stored!
- Place the protective cap on the pressure port again immediately after disassembling.
- Handle the unprotected diaphragm very carefully - it is very sensitive and may be easily damaged.
- Do not use any force when installing the devices!

3.2 Special notes

- Take care that no mechanical stresses occur at the pressure port as a result of the installation, since this may cause a shifting of the characteristic curve. This is especially important for very small pressure ranges as well as for devices with a pressure port made of plastic.
- In hydraulic systems, position the device in such a way that the pressure port points upward (venting).
- Provide a cooling line when using the device in steam lines.
- If there is any danger of damage by lightning or overpressure when the device is installed outdoor, we suggest putting a sufficiently dimensioned overpressure protection between the supply or switch cabinet and the device.

- For installations outdoor or in moist surroundings, the following points have to be observed:
  - If possible choose a position for the installation which allows the condensation water to flow off. Permanent fluid at sealing surfaces should be avoided!
  - When using devices with a cable gland, the outgoing cable should be turned down. In case the cable has to be turned up, it must be curved downwards so that moisture can flow off.
  - Install the device in such a way that it is protected from direct solar irradiation. Direct solar irradiation can lead to the permissible operating temperature being overstepped in the worst case. By this the operability of the device can be affected or damaged. If the internal pressure increases due to solar irradiation, measurement errors may be caused.
- For devices for the gauge pressure measurement with gauge reference (small hole next to the electrical connection), the following must be adhered to:
  - Check if the warranted ingress protection of the device is adequate for your application.
  - Install the device so that the gauge reference (small hole next to the electrical connection) which is necessary for the measurement is protected from dirt and moisture. Should the pressure transmitter be exposed to fluid admission, the compensation of air pressure will be blocked by the gauge reference. An exact measurement in this condition is not possible. Furthermore it can lead to damages on the pressure transmitter.

  ☞ If temporary fluid admission of a device for gauge pressure is assumed, we suggest a cable gland with air tube (IP 67) or a cable outlet with air tube (IP 68) as an electrical connection. You may have the device re-equipped by TEMATEC.
- For using the special versions for oxygen-applications without danger, the following points must be adhered to:
  - Make sure that your device has been ordered as a special version for oxygen applications and that it has been delivered conformably. You can check this easily by reading the type plate (see figure 1). If your ordering code ends with the numbers "007", your device is suitable for the oxygen application
  - When being dispatched the device is packed into a plastic bag to keep it from impurity. The indication label with the text "Device for oxygen, unpack only directly before assembling" has to be observed! Furthermore any skin contact must be avoided during unpacking and installing the device, so that no fatty residue remains on the device!
  - For installing the respective regulations for explosion protection have to be fulfilled. Please check if an ATEX-approval is necessary for the application in addition to the acceptability for oxygen.
  - Consider that the entire construction must correspond to the standards of BAM (DIN 19247).
  - For transmitters with oxygen acceptability up to 50 bar, O-rings of V747-75 with BAM-approval are used. The upper limiting values allowed are 40 bar/ 130° C and 50 bar/ 100° C.
  - For transmitters with oxygen acceptability over 50 bar, O-rings of FKM 90 are used which were tested for acceptability up to 95° C and 215 bar in the scientific coal research institute in Ostrava – CZ.

3.3 General installation steps

- Carefully remove the pressure measuring device from the package.
- Then go ahead as detailed below according to the design.

3.4 Installation steps for connections according to DIN 3852

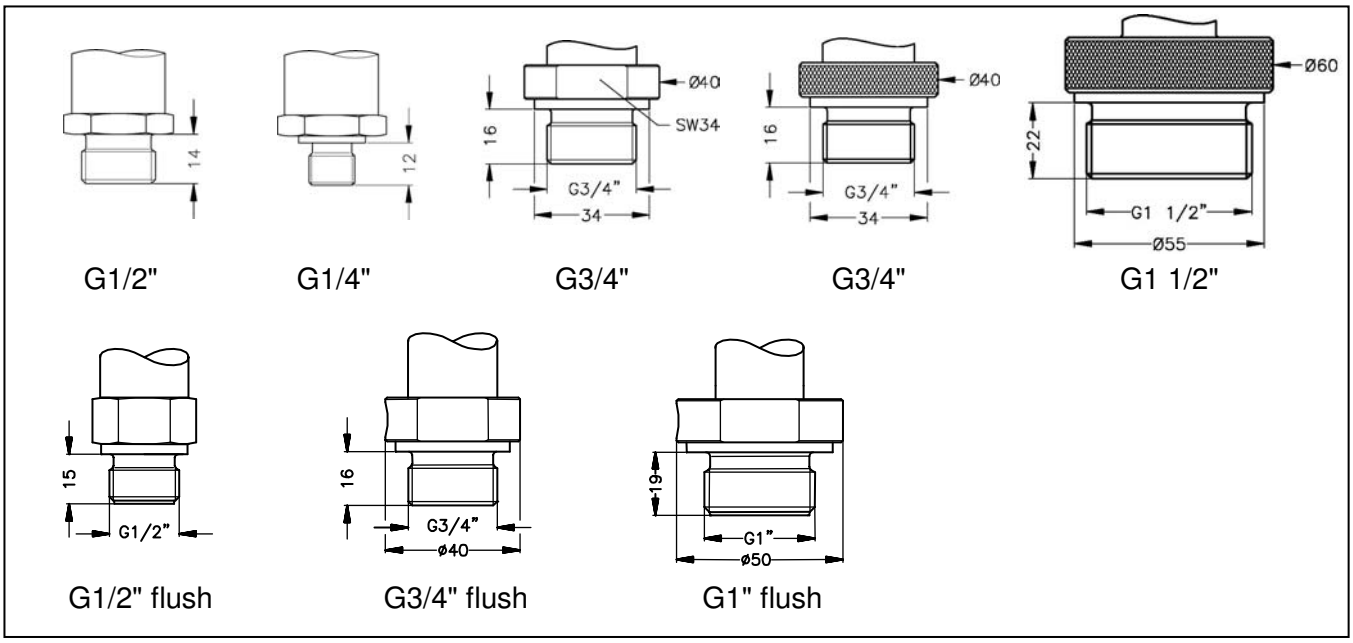


Fig. 2 Connections according to DIN 3852

- Check to ensure that the O-ring fits properly into the groove.
  - O-ring is included in the scope of delivery -
- Ensure that the sealing surface of the taking part is perfectly smooth and clean.
- Screw the device into the corresponding thread by hand.
- If you have a device with a knurled ring, the transmitter only has to be screwed in by hand.
- Devices with a spanner flat have to be tightened with an open-end wrench (for G1/4", M10x1, M12x1 und M12x1.5: max. 20 Nm; for G1/2" and M20x1.5: max. 50 Nm).

3.5 Installation steps for connections according to EN 837 (prior DIN 16288)

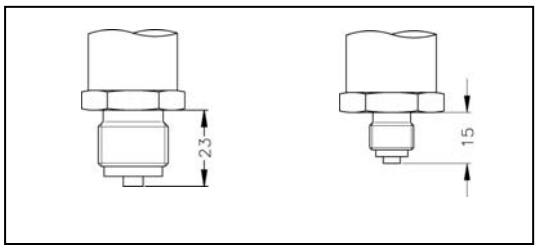


Fig. 3 Connections according to EN 837

- Use a suitable seal, e. g. a cooper gasket, corresponding to the medium and the pressure input. - Seal is not included in the scope of delivery -
- Ensure that the sealing surface of the taking part is perfectly smooth and clean.
- Screw the device into the corresponding thread by hand.
- Tighten it with a wrench (for G1/4": max. 20 Nm; for G1/2": max. 50 Nm).

3.6 Installation steps for NPT connections

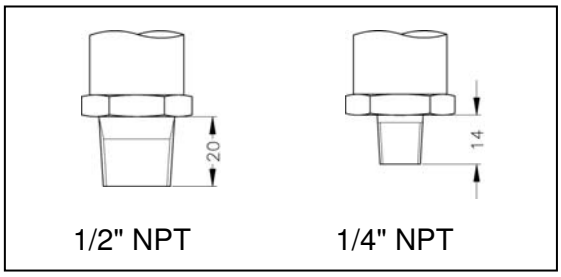


Fig. 4 NPT connections

- Use a suitable seal, e. g. a PTFE-strip, corresponding to the medium and the pressure input. - Seal is not included in the scope of delivery -
- Screw the device into the corresponding thread by hand.
- Tighten it with a wrench (for 1/4" NPT: approx. 30 Nm; for 1/2" NPT: approx. 70 Nm).

3.7 Installation steps for internal threads M20x1.5 and 9/16" UNF (for DMP 334)

- Screw the high pressure connection into the internal thread of the DMP 334 according to the description of the manufacturer and tighten it properly.

  The high pressure tube seals metal-to-metal in the chamfer of the pressure port. No further seal is allowed with this high pressure connection. A wrong installation can cause enormous danger!

3.8 Installation steps for dairy pipe connections

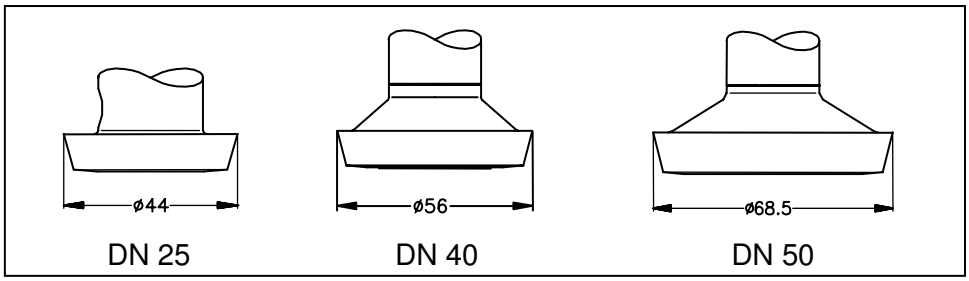


Fig. 5 Dairy pipe connections

- Check to ensure that the O-ring fits properly into the mounting part.
  - O-ring is not included in the scope of delivery -
- Center the dairy pipe connection in the counterpart.
- Screw the cup nut onto the mounting part.
- Then tighten it with a hook wrench.

3.9 Installation steps for Clamp and Varivent connections

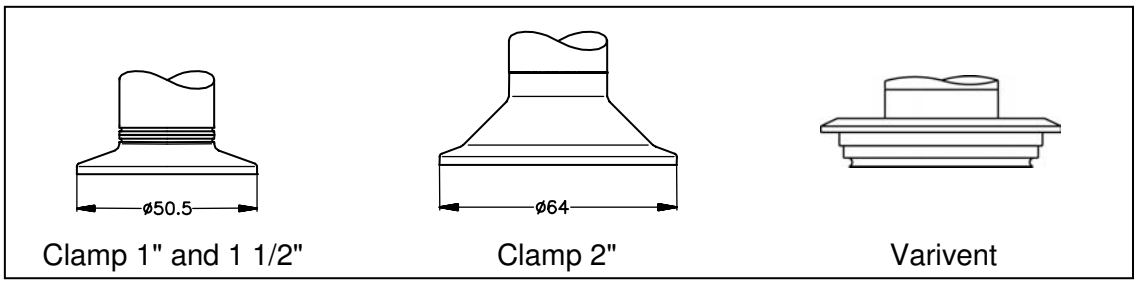


Fig. 6 Clamp and Varivent connection

- Use a suitable seal corresponding to the medium and the pressure input.
  - Seal is not included in the scope of delivery -
- Put the seal onto the corresponding mounting part.
- Then fit the device with a suitable fastening element (e. g. semi-ring or retractable ring clamp) according to the supplier's instructions.

3.10 Installation steps for connecting flanges

- Use a suitable seal corresponding to the medium and the pressure input.
  (e. g. a fiber gasket) - Seal is not included in the scope of delivery -
- Put the seal between connecting flange and counter flange.
- Install the device with 4 resp. 8 screws (depending on flange version) on the counter flange.

3.11 Electrical installation

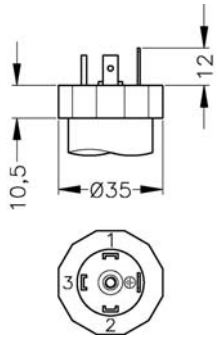
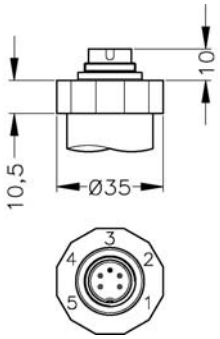
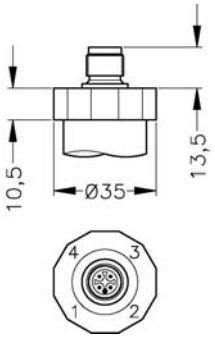
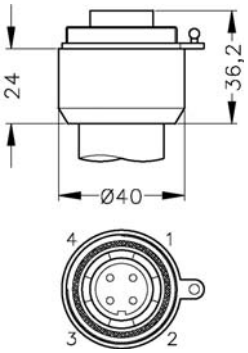
Establish the electrical connection of the device according to the technical data shown on the type plate, the following table and the respective wiring diagram.

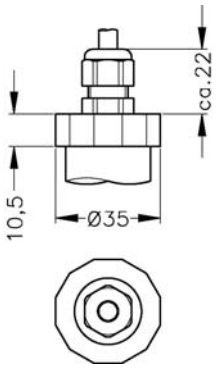
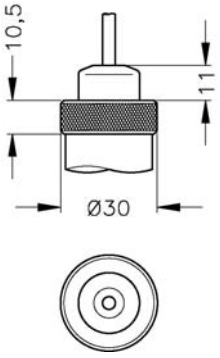
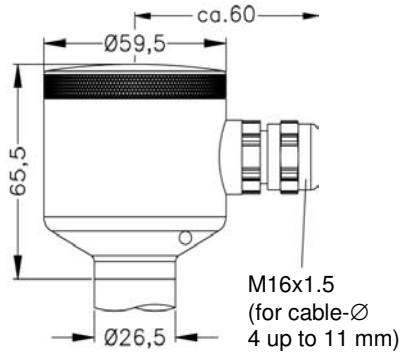
☞ For devices with cable gland as well as cable socket, you have to make sure that the external diameter of the used cable is within the allowed clamping range. Moreover you have to ensure that it lies in the cable gland firmly and cleftlessly.

☞ Please note for devices with ISO 4400 plug and cable socket, that the socket has to be mounted properly to ensure the ingress protection, mentioned in the data sheet. Please check if the delivered seal is placed between plug and cable socket. Fasten the cable socket on the device by using the screw, after connecting the cable.

☞ On devices with field housings, the terminal clamps are situated under the metal cap. To install the device electrically, the cap must be screwed off. Before the cover is screwed on again, the O-ring and the sealing surface on the housing have to be checked for damages and if necessary to be changed! Afterwards screw the metal cap on by hand and make sure that the field housing is firmly locked again.

Pin configuration

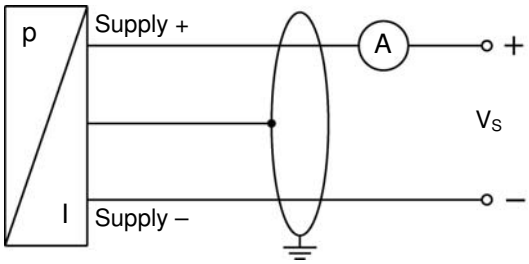
	Electrical connections			
	ISO 4400	Binder 723 (5-pin)	M12x1 (4-pin)	Buccaneer (4-pin)
				
2-wire-system				
Supply +	1	3	1	1
Supply –	2	4	2	2
Ground	ground contact	5	4	4
3-wire-system				
Supply +	1	3	1	1
Supply –	2	4	2	2
Signal +	3	1	3	3
Ground	ground contact	5	4	4

	Electrical connections / cable colours		
	cable gland	cable outlet	field housing
			
2-wire-system			
Supply +	white		VS +
Supply –	brown		VS –
Ground	yellow / green (shield)		⏚
3-wire-system			
Supply +	white		VS +
Supply –	brown		VS –
Signal +	green		OUT+
Ground	yellow / green (shield)		⏚

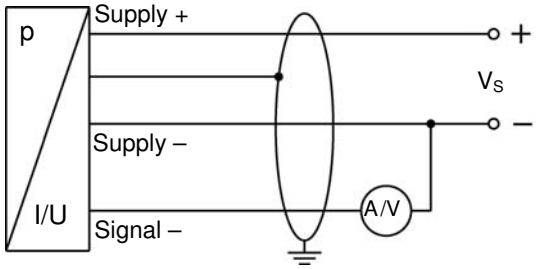
Wiring diagrams:

⚠ With Ex-protection, the max. supply is 28 V_{DC}.

2-wire-system (current)



3-wire-system (current/supply)



☞ For the electrical connection a shielded and twisted multicore cable is recommended.

☞ If a transition is desired from a transmitter cable with gauge tube to a cable without gauge tube, we recommend our terminal box KL 1 or KL 2.

Prevent the damage or removal of the PTFE filter which is fixed over the end of the air tube on devices with cable outlet and integrated air tube.

☞ An exception is a modification of the cable. In this case you must once more attach a PTFE filter assembly to the cable end. Humidity may otherwise enter the level transmitter through the gauge reference. This can lead to malfunctions and irreparable damages. Matching filter assemblies can be ordered from TEMATEC. Proceed as follows to mount the PTFE filter assembly:

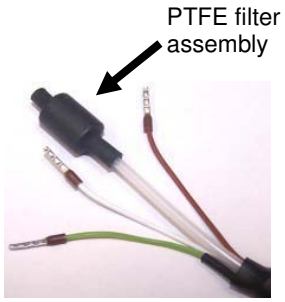


Fig. 7 PTFE filter

- Push the plastic tube with the affixed PTFE filter over the end of the air tube.
- Put the shrinking tube over the pushed-on plastic tube and the air tube until the shrinking tube is approximately centered over the filter assembly.
- Bend the connecting lines back and make sure that they will not be damaged by the subsequent treatment of the shrinking tube.
- Heat the shrinking tube using a hot-air blower. The temperature must be between 90 °C and 110 °C for the tube beginning to shrink. Keep this temperature until the tubing tightly encloses the filter assembly and the air tube. You must then stop the heat application immediately.

  ☞ Please note that the hot-air blower can cause damages on the air tube or the connection lines. To avoid this, you should heat the shrinking tube only as long as necessary.

3.12 Specific characteristics

Devices with an accuracy of 0.1 % FSO have micro-controlled electronics for processing and improving the signal. Principally, the processing takes more time as for analogue sensors, which have only an amplifier. Due to this longer response time, the output signal follows the measured value discontinuously. For nearly stable measured values, this characteristic is secondary. Please compare the specification of the response time in the data sheet.

Intelligent devices with optional communication interfaces can also be configured by these electronics. Offset, span and damping are programmable within the limits given in the data sheet. For configuring the device, the programming kit CIS 510 consisting of Adapt 1, Windows® compatible programming software P-Scale 510, power supply and connecting cable is necessary. This can be ordered additionally from TEMATEC.

4. Error handling

Malfunction	Possible cause	Error detection / corrective
Little shift of the output signal	- the diaphragm is highly contaminated	- careful cleaning with non-aggressive cleaning solution and brush or sponge ☞ Incorrect cleaning can cause irreparable damages on diaphragm or seals.
	- the diaphragm is calcified or coated with deposit	- it is recommended to send the device to TEMATEC for decalcification or cleaning
Large shift of the output signal	- diaphragm is damaged (caused by overpressure or manually)	- check the diaphragm; if it is damaged, please send the device to TEMATEC for repair
Wrong or no output signal	- manually damaged cable - thermically damaged cable (cable not suitable for the current thermical stress) - chemically damaged cable (cable is not suitable with the medium)	- check the cable (a possible consequence of a damaged cable is pitting corrosion on the stainless steel housing); please return the device to TEMATEC for repair

If you detect an error, please try to eliminate it by using this table or send the device to our service address for repair.

⚠ **Repairs on the device may only be executed by the manufacturer!**

5. Placing out of service

⚠ **When dismantling the device, it must always be done in the depressurized and currentless condition!**

6. Service

This device is maintenance-free. If desired, the device can be cleaned using non-aggressive cleaning solutions.

If the diaphragm is contaminated, please clean it carefully with a non-aggressive cleaning solution and a brush or sponge. If the diaphragm is calcified, it is recommended to send the device to TEMATEC for decalcification, if possible.

☞ Never use spiky objects or pressured air for cleaning the diaphragm.

☞ If the diaphragm has been contaminated with harmful substances, this must be attended when cleaning the device, and corresponding protective arrangements have to be taken.

☞ An incorrect cleaning can cause irreparable damages on diaphragm or seal.

7. Recalibration

During the life-time of a transmitter, the offset may shift. As a consequence, a deviating signal value in reference to the nominal pressure range starting point may be transmitted. The full scale may also shift. This would cause a signal value that deviates from the end point of the nominal pressure range.

If one of these two phenomena occurs after prolonged use, a recalibration is recommended to ensure furthermore high accuracy.

You can send us the device for recalibration.

8. Repair

If there are malfunctions which cannot be eliminated the device should be sent to us for repair. Before that the device has to be cleaned carefully and packed shatter-proofed. You have to enclose a notice of return with detailed defect description when sending the device. If your device came in contact with harmful substances, a declaration of decontamination is additionally required. Appropriate forms can be downloaded from our homepage **www.tematec.de**. Should you dispatch a device without a declaration of decontamination and if there are any doubts in our service department regarding the used medium, repair will not be started until an acceptable declaration is sent.

⚠ **If the device came in contact with hazardous substances, certain precautions have to be complied with for purification!**

Our service address:

TEMATEC GmbH

Löhestraße 37

D-53773

Hennef Germany

9. Disposal

The device must be disposed according to the European Directives 2002/96/EC and 2003/108/EC (on waste electrical and electronic equipment). Waste of electrical and electronic equipment may not be disposed by domestic refuse.

⚠ **Special consideration is required for the disposal if the device has been in contact with hazardous substances!**

10. Warranty conditions

The warranty conditions are subject to the legal warranty period of 24 months from the date of delivery. In case of improper use, modifications of or damages to the device, we do not accept warranty claims. Furthermore, defects due to normal wear are not subject to warranty services.