

Instruction Manual Bimetal Thermometer and Diaphragm Thermometer

General

Please read this instruction manual before using the bimetal or diaphragm thermometer.

Should you still encounter problems, please send your apparatus back to the factory including a detailed description of the problem. (see „Maintenance/Repair“)

! Beware that the metering materials of disassembled equipment are dangerous for humans, the environment as well as the surrounding facilities. Take sufficient precautionary measures.

Please refer to the original manufacturer or the supplier of your thermometer if you have questions or experience any problems. We are interested in receiving any information that could lead to the improvement of this instruction manual and will gladly accept any suggestions.

**Inadmissible manipulations of this apparatus will lead to a loss of guarantee!
The apparatus may not be opened!**

Designated Use:

Our bimetal and diaphragm thermometers are intended for the measurement of temperature of liquids or gases. Any other use of the apparatus is contrary to the stated designated use.

Safety Guidelines

The user is responsible for ensuring the correct use of the thermometer:

- The maximum temperature of the media to be measured must lie within the indicated range of the device.
- Make sure that the thermometer is appropriate for the operating conditions and media to be measured.
 - Note the protection class!
 - Use the protective tube!
 - Note the maximal permissible operational pressure!
- Bimetal and diaphragm thermometers should generally be used in vibration- and shock-free locations. If vibrations are present at the place of measurement, a long distance line should be used in order to keep the thermometer at a distance from the source of vibration. By filling glycerin or oil into the device the indicator needle will react more smoothly, but this does not protect the thermometer against increased wear!

Storage and Handling

The following points should be noted for preventing damage during storage and handling of measuring device/thermometers until assembly:

- Permissible storage temperature $-10...60^{\circ}\text{C}$
Permissible storage temperature may deviate depending on the model of the measuring device and is noted in the data sheet.
- Measuring device/thermometer must be protected from mechanical damage, humidity and dust during transportation and storage. It should remain in the original packaging until being used.
- Avoid vacuum (i.e. transportation by plane) and very quick changes in temperature (measuring device/thermometer in a cold state being introduced to a very hot environment). The glycerin could be sucked out of the housing.
- The packaging may be disposed of as paper. The measuring device/thermometer must be packaged adequately to protect it from damage for further transportation.

The standard packaging is only designed for transportation within a parcel service vehicle (cargo compartment with spring suspension, such as a Sprinter) within Germany and not for transportation within a truck or a trailer. The measurement devices are very sensitive and the introduction of vibrations due to transportation by truck should be avoided. Special packaging able to absorb vibrations may be used to provide better protection during transportation. If necessary, the package should be marked with a transportation indicator ("Shockwatch").

If you have special requirements regarding transportation, packaging or storage, please contact us.

Installation

Only trained and authorized personnel may complete the installation and startup. The temperature sensitive parts of the thermometer, such as the tip, may not be bent during installation. Do not exert pressure on the casing while screwing and use an appropriate wrench. Hold rotating connector pins and nuts at the neck tube. The devices must be assembled so that they cannot vibrate and the internal display is protected from condensation. Condensation can occur due to temperature fluctuation.

When using the protective tube with cylindrical screw connections, aluminum or brass washers should be used.

NPT-screw connections (tapered thread) are able to seal at the thread in combination with an appropriate sealant such as PTFE (note operational temperature!)

No matter which method of assembly is used, the connection should be sealed and secure according to standard technical as well as local regulations. The thermometer should have a sufficient heat exchange surface area in contact with the media to be measured and be sufficiently isolated at the measuring point. In addition, minimizing heat dissipation via the protective tube will minimize the error in measurement. This is possible when the following overall lengths are considered:

in water / fluid	temperature sensitive length is at least 120 mm
in air / gas / steam	temperature sensitive length is at least 160 mm

Using shorter tubes could lead to considerable deviation in measurement accuracy depending on the range of measurement and arrangement of measuring points. When using a long distance line, this line should be protected from fluctuations in temperature as this could lead to measurement error. The bending radius of the long distance line must be accordingly larger than 200 mm and may not be bent at a 90° angle.

The temperature of a pipe or vessel may be approximated using a surface probe for applications, which do not allow the measuring sensor to be in direct contact with the media to be measured. **Adhesive thermometers** (such as a magnetic-adhesive thermometers, adhesive thermometers with a spiral spring fixation or flexible-tube thermometer with surface probe) can be used for this purpose. The measurements are not exact due to the high amount of heat radiation as well as the influence of the temperature of the surroundings. In order to get more exact measurements we recommend isolating the measuring sensor well at the point of measurement.

We provide preliminary suitability analyses for cases in which special devices are necessary or operating conditions deviate from those described. The analysis can be provided at request and at extra cost. For accuracy, we also offer factory calibration according to a test point at extra cost.

Operation

Safe operation is guaranteed if installation is executed properly. In order to read the temperature accurately, the device should be mounted at eye level. To avoid reading error, please look at the thermometer frontally and not from the side.

Ambient Temperatures

The permissible ambient temperature indicated the temperature range in which the thermometer may be used without incurring damage.

Within the nominal range of use, the stated defect class is met. Outside the nominal range of use, further errors may occur.

- permissible ambient temperature: -20...60°C
- nominal range of use: 22° C ± 2° C

The above values are refer to the following standard conditions unless otherwise agreed upon (in a written statement):

- ambient conditions: indoors at 22°C, air pressure 10123 mbar, humidity 50 % r.F.
- for gaseous media: air, dry
- for liquids: i.e. drinking water in containers or pipes (neither positive nor negative pressure with regard to standard conditions 1013 mbar)
- resistance of material: the media to be measured and the surroundings may not chemically corrode the materials listed in the price lists and data sheets

Deviation of measurement and ambient conditions - especially for distilled or fully desalinated water as well as seawater or other substances - can cause corrosion of materials.

This can lead to leakage and thermometer defects.

Maintenance and Repair

The bimetal and diaphragm thermometers are maintenance-free. You may not replace any elements nor repair them. The device should be checked regularly, after one year of use and once every year thereafter, to ensure accuracy. It may be necessary to adjust the needle indicator as the thermometer gets older.

Repairs may only be made at our factory. The device may not have been opened!
The indicator display should be checked regularly to ensure accuracy.

For any maintenance and repair work please contact your supplier or our factory with a written request and wait for a written reply before sending the device to our factory in a clean and well-packaged state.

The customer is required to follow the Ordinance on Hazardous Substances strictly when returning the device.
Condensation is not grounds for a claim!

Do not attempt any inadmissible manipulations of the device otherwise you will lose your guarantee!

Only the original manufacturer may repair the device!

Decommissioning

To take the device out of operation, please completely remove the thermometer from the protective tube or place of operation.
Have a pressureless pipe or container ready. Note what was stated in maintenance and repair section.

Disposal

Please help to protect the environment by disposing and recycling materials according to regulations.

We reserve the right for technical changes.