Operating Instructions
for
Bi-metal Thermometers
all Stainless Steel Construction

Model: TBE

We don’t accept warranty and liability claims neither upon this publication nor in case of improper treatment of the described products.

The document may contain technical inaccuracies and typographical errors. The content will be revised on a regular basis. These changes will be implemented in later versions. The described products can be improved and changed at any time without prior notice.

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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.
The instruction manuals on our website www.kobold.com are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email (info.de@kobold.com) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

The instrument described in this manual has been designed and produced in conformity to the following standards EN 13190 and ASME B40.3. All components are submitted to severe quality and traceability controls.
The quality management system is certified according to the ISO 9001 standard. This manual contains important information about the use and the installation of the thermometer in safe conditions. Therefore, it is highly recommended to read carefully the following instructions before using the instrument.

The instrument works in safe conditions when correctly selected and installed in the system and when the rules concerning the product as well as the maintenance procedures established by the manufacturer are respected.
The staff charged with the selection, installation and maintenance of the instrument must be able to recognize the conditions that may negatively affect the instrument's ability to work and which may lead to premature breakage. Therefore, the staff in charge must be qualified technically and properly trained, and must carry out the procedures called for in the plant regulations.

Conformity to standards
KOBOLD instruments are designed and manufactured according to the safety rules included in the safety international standards in force. In terms of
Directive 2014/68/EU (P.E.D.) KOBOLD thermometers must be designed and manufactured according to a “Correct Construction Practice” (SEP Œ - Sound Engineering Practice)

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.
Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:
The standard delivery includes:

- Bi-metal Thermometers all Stainless Steel Construction model: TBE

4. Regulation Use

Any use of the Bi-metal Thermometers all Stainless Steel Construction, model: TBE, which exceeds the manufacturer's specification may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

These instruments are designed for a use in food, beverage, pharmaceutical, cryogenics, chemical and petrochemical processing industries environment and the process medium. The instrument is intended for indicated the temperature locally and remote.

Warning! Before installation be sure that the right instrument has been selected following the working conditions and in particular the range, the working temperature and the compatibility between the material used and the process fluid.

Caution! This manual does not concern the instruments conforming to standard 2014/34/EU (ATEX)

Caution! The product warranty is no longer valid in case of non-authorized modifications and of wrong use of the product.

Warning! The manufacturer disclaims all responsibility in case of damages caused by the improper use of the product and by the non-respect of the instructions reported in this manual.

Warning! Follow carefully the specific safety rules in case of measuring oxygen pressure, acetylene, inflammable or toxic gas or liquids.

Caution! The user is totally responsible for the instrument installation and maintenance.

Warning! Disconnect the instruments only after depressurization of the system.

Warning! The process fluids residuals in the disassembled thermometer could affect people, the environment and the system. It is highly recommended to take proper precautions.

5. Operating Principle

The bi-metal thermometers are built from a stainless steel tube inside of which a bi-metal helicoidal spiral is placed. This spiral is welded to the tip of the tube and on the other side to a transmission shaft directly connected to the pointer. The temperature vibrations generate a deformation of the bi-metal which is transmitted to the pointer through a shaft rotation.

5.1 General

These instruments are designed for use in food, beverage, pharmaceutical, chemical, petrochemical processing industries. They are built to resist the most severe operating conditions created by the ambient environment and the process medium. An Argon arc welded case/bulb strengthens the whole construction. A leak tight fit is ensured if the instrument is filled with a dampening fluid to prevent damage due to vibration.

6. Installation

All instruments must be installed with the indication dial in vertical position with the exception of different instructions on the label. The thermometer's bulb length should be enough that the sensing element is exposed to the temperature to measure. In case of installation on pipes the sensing element must be centred compared to the central axe of the pipe.

Bulb (mm)	**Sensing element TBE (mm)**	
	≤300°C	>300°C
6…6,4	150	
8…9,6	100	150

The installation with thermowell causes a delay of the response time which can be decreased filling up the thermometer with a heat transmission fluid (mineral oil or aluminium dust or copper dust or graphite, graphite and glycerine) compatible with the process fluid temperature.
Check that the internal thermowell diameter is always wider than the external diameter of the thermometer bulb.

6.1 Local mounting

The case temperature should not be higher than 65°C. For that reason, the case should be far enough from the process by lengthening the thermometric bulb or by choosing the back connection for horizontal mounting:

Case-process (mm) Distance	**Process fluid temperature**
50	80
75	95
100	130
150	195
200	290
250	440

Screw the connection through special wrench without forcing on the case or on the stem because inside there is the sensing element which could be damaged and could not indicate the right temperature anymore.

6.2 Remote mounting

Also, in this case the case should not be exposed to the process heat. It is also necessary to consider the delay in the response time caused by the capillary according to its extension.
Do not fold the capillary roughly in order to prevent any crick or pinch. The minimum folding diameter is 30 cm.

7. Application limits

7.1 Ambient temperature

This instrument is designed to be used in safety conditions in an ambient temperature between –40…+65°C.

7.2 Thermowells

For a correct mounting, thermowells are recommended as a protection in case of corrosion, of higher pressures than those indicated in the working limits and/or in case of high velocity.
In case of high temperatures, it is possible to order an extension as a thermal insulation of the instrument to dissipate the process heat. Moreover, thermowells allow to remove the instrument for cleaning or maintenance without affecting the plant.

7.3 Working temperature

We recommend to choose an instrument nominal range which allows the maximum value of the measured temperature to stay within the measure range.
The instrument is designed to measure temperatures included within the measure range which is delimited by two triangles on the dial according to standard EN 13190.

7.4 Overtemperature

Instruments resist to temporary temperature values as shown in the table below:

Nominal range (°C)	**Overtemperature**	
	TBE	-
≤400	+30% VFS	-
>400	500°C	-

7.5 Working pressure

If the installation is in contact, the maximum pressure supported by the bulb is 15 bar for the bi-metal thermometers and 25 bar for the inert gas models. If the installation is carried out using a thermowell it is necessary to check which temperature it can resist to on the thermowell catalogue sheet.
The instrument is designed to work with atmospheric pressures between 0,8 and 1,1 bar.

7.6 Protection degree

The protection degree value is established in accordance with standards EN 60529. This value concerns the hermetic tightness of the ring, the whole taps properly placed in their seat: IP55; IP65 for liquid filled instruments.

8. Wrong application

8.1 Vibration rupture

Vibrations most commonly cause an abnormal deterioration of the parts in mouvement bringing to a gradual lost of accuracy and then to a total block of the pointer.
In case of radial mounting especially if the case is filled up with dampening liquid and the vibrations are very strong it is very likely that the instrument breaks for the serious mass of vibrations.

8.2 Liquid filled cases

The dampening liquid is commonly used to dampen the vibrations of the moving parts due to vibrations. If the atmosphere is affected by oxidant agents there is a possible risk of a chemical reaction, of inflammability or explosion of the instrument.
So it is very important to consider attentively the nature of the dampening liquids and their use limits according to the ambient temperature and the measuring range.

Dampening liquid	**Ambient temperature**
Glycerine 98%	+15…+65°C (+60…+150°F)
Silicon oil	-20…+65°C (-4…+150°F)

Dampening liquid	**Measuring range (°C)**
	TBE
Glycerine 98%	≤160
Silicon oil	≤250
Fluorinated fluid	

8.3 Overtemperature rupture

It is caused by a higher temperature than the maximum limit or lower than the minimum limit declared for the sensing bulb. This could bring to permanent functional damages of the instrument.

8.4 Mechanical stress

Instruments should not be stressed. If the installation points are mechanically stressed, instruments should be remote mounted and connected through capillary.
Instruments should be inert gas model and supplied of fixing device for wall or surface mounting.

8.5 Vibrations

When the instrument support is under vibrations it is possible to consider different solutions such as:
a) use of liquid filled instruments with threaded process connection _ 1/2”
b) remote mounted instruments connected through flexible pipes (for strong and irregular vibrations). Vibrations can be noticed through continuous oscillations, often irregular, of the pointer point.

9. Maintenance

The maintenance during time of the original features of the mechanical products should be guaranteed by an accurate maintenance program optimized and run by qualified technicians. Every 3/6 months it is recommended to check the indication accuracy, the filling fluid level and/or the presence of condensate inside the case. If the instrument does not work correctly an unscheduled check is requested.

9.1 Routine check

The glass should not be cracked. The filling up and blow out vent should be properly placed in their seats. The pointer should be within the graduated scale. In order to check the sensing element conditions it is necessary to install the instrument on the temperature generator. In order to check indication accuracy a stable temperature value is generated in laboratory and applied to the instrument to be checked and to primary /sample thermo-element. As for instruments used on heavy work conditions plants (vibrations, corrosive fluids) it is necessary to schedule their replacement following the maintenance program. If the instrument is not working correctly a non-scheduled check is necessary. It is also recommended to control the possible sediments which could generate around the thermowell or the thermometer bulb due to the nature of the fluid to measure: in this case proceed to the periodic removal of the sediments.

9.2 Recalibration

If after recalibration results are different from the nominal values declared on the catalogue sheet the recalibration procedure should be repeated. It is recommended to return the instrument to KOBOLD for this procedure.

10. Technical Information

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

11. Order Codes

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

12. Dimensions

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

13. Disposal and demolition

Instruments mounted with thermowell can be disassembled even with the fluid in pressure. During remounting follow the recommendations for installation. If the instruments are mounted without thermowell, be sure that the pressure working on the thermometric bulb is the same as the atmospheric one.
The process fluid remaining outside the thermometric bulb should not pollute the environment and should not harm people. In case the fluid is dangerous or toxic be careful in manipulating it during removal.
We recommend to remove the glass and the blow out vents and then dispose it as aluminium or stainless steel.

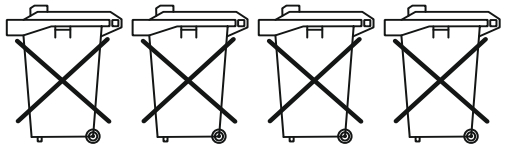
14. Disposal

Note!

- Avoid environmental damage caused by media-contaminated parts
- Dispose of the device and packaging in an environmentally friendly manner
- Comply with applicable national and international disposal regulations and environmental regulations.

Batteries

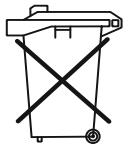
Batteries containing pollutants are marked with a sign consisting of a crossed-out garbage can and the chemical symbol (Cd, Hg, Li or Pb) of the heavy metal that is decisive for the classification as containing pollutants:



Cd[1] Hg[2] Pb[3] Li[4]

1. „Cd" stands for cadmium
2. „Hg" stands for mercury
3. „Pb" stands for lead
4. „Li" stands for lithium

Electrical and electronic equipment



15. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Nordring 22-24, 65719 Hofheim, Germany, declare under our sole responsibility that the product:

Bi-metal Thermometers all Stainless Steel Construction Model: TBE

to which this declaration relates is in conformity with the following EU directives stated below:

2011/65/EU **RoHS** (category 9)

Hofheim, 22 Sept 2023

H. Volz
General Manager

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Compliance Manager