Threaded thermometer
With connection lead
Model TF37

Applications

- Mobile hydraulics
- Machine building
- Compressors
- Refrigeration technology
- Heating, ventilation and air-conditioning

Special features

- Measuring ranges from -50 ... +260 °C
- Customer-specific designs
- Very high vibration resistance
- Connection lead from PVC, silicone, PTFE

Description

The model TF37 threaded thermometer, which is highly resistant to vibration, is used in applications with strong vibrations and where, due to high medium temperature, a decoupling of the electrical connection point and the measuring point is necessary.

A thermowell made of brass or stainless steel prevents the measuring element from coming into contact with the medium, thus enabling direct installation of the instrument in the process. The fixed mounting thread guarantees quick and easy installation in the process.

The transition point from the thermowell to the connection lead is dust and waterproof (IP65 or IP66/IP67).
Measuring element

WIKA standardly uses the following measuring elements for the model TF37 threaded thermometer:

- Pt1000, class F 0.3 per IEC 60751
- Pt100, class F 0.3 per IEC 60751
- NTC, R<sub>25</sub> = 10 kΩ, B(25/85) = 3976
- NTC, R<sub>25</sub> = 5 kΩ, B(25/85) = 3976
- KTY81-210
- Others on request

Platinum elements offer the advantage of meeting international standards (IEC/EN 60751). Due to material- and production-specific criteria, a standardisation of semiconductor elements, e.g. NTCs and KTY, is not possible. For this reason their interchangeability is limited.

Further advantages of platinum elements are: better long-term stability and better behaviour over temperature cycles, a wider temperature range as well as a high measurement accuracy and linearity.

High measurement accuracy and linearity are also possible with NTCs, but only in a very limited temperature range.

Connection method

The model TF37 threaded thermometers have a 2-wire connection design as standard. The lead resistance of the connection lead affects the measured value of 2-wire connections and must be taken into consideration.

For copper cable with cross-section 0.22 mm<sup>2</sup> the following value applies: 0.162 Ω/m → 0.42 °C/m for Pt100

Alternatively, a version with Pt1000 can be chosen, with which the influence of the supply line (at 0.04 °C/m) is smaller by a factor of 10.

The lead resistance becomes still less significant in relation to the basic resistance R<sub>25</sub> with a KTY or NTC element.

With a Pt100 measuring element, there is the additional possibility of selecting a 4-wire connection, thus eliminating the influence of the lead resistance on the measuring result.

<table>
<thead>
<tr>
<th>Strengths and weaknesses of the different measuring elements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
</tr>
<tr>
<td>Accuracy</td>
</tr>
<tr>
<td>Linearity</td>
</tr>
<tr>
<td>Long-term stability</td>
</tr>
<tr>
<td>International standards</td>
</tr>
<tr>
<td>Temperature sensitivity [dR/dT]</td>
</tr>
<tr>
<td>Influence of the supply line</td>
</tr>
</tbody>
</table>
**Characteristic curves**
The following characteristic curves show the typical curve shapes for the standard WIKA measuring elements, depending on the temperature and the typical tolerance curves.

- **Typical characteristic curves**

![Characteristic curves graph]

- **Typical tolerance curves**

![Tolerance curves graph]

**Temperature ranges**

**Medium temperature (measuring range)**
The permissible measuring range is dependent on the combination of measuring element and connection lead.

<table>
<thead>
<tr>
<th>Insulation material of the connection lead</th>
<th>Permissible ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>-20 ... +105 °C</td>
</tr>
<tr>
<td>Silicone</td>
<td>-50 ... +200 °C</td>
</tr>
<tr>
<td>PTFE</td>
<td>-50 ... +260 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring element</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTC</td>
<td>-30 ... +130 °C</td>
</tr>
<tr>
<td>Pt100</td>
<td>-50 ... +260 °C</td>
</tr>
<tr>
<td>Pt1000</td>
<td>-50 ... +260 °C</td>
</tr>
<tr>
<td>KTY</td>
<td>-50 ... +150 °C</td>
</tr>
</tbody>
</table>

**Ambient temperature**
The max. permissible ambient temperature depends upon the insulation material of the connection lead and on the connector fitted, as required.

**Thermowell**

**Material**
- Brass
- Stainless steel

**Diameter $F_1$**
- Standard: 6.0 mm
- Fast response: 8.0 mm / tip tapered to 4 mm

Others on request

**Process connection E**

Mounting thread:
- G ¼ B
- G ⅜ B
- G ½ B
- M14 x 1.5
- M14 x 1.5 per ISO 9974-2
- R ¼-ISO7
- R ⅜-ISO7
- ⅛ NPT
- ⅜ NPT

Others on request

**Insertion length $U_1$**
- 20 mm
- 30 mm
- 40 mm
- 50 mm
- 60 mm

Others on request
Response time

The response time is strongly influenced by

- the thermowell used (diameter, material, insertion length)
- the heat transfer from thermowell to the measuring element
- the flow rate of the medium

Due to the design of the model TF37 threaded thermometer, there is optimum heat transfer from the medium to the measuring element.

Connection lead

In order to be matched to the prevailing environmental conditions, connection leads are available with different insulation materials.

The lead end is supplied as standard with stripped wires. In addition, there is the possibility to fit end splices or customer-specific connectors.

The following table gives an overview of the main characteristics of the insulation materials available for the TF37.

<table>
<thead>
<tr>
<th>Insulation material</th>
<th>PVC</th>
<th>Silicone</th>
<th>PTFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest working temperature</td>
<td>105 °C</td>
<td>200 °C</td>
<td>260 °C</td>
</tr>
<tr>
<td>Flammability</td>
<td>self-extinguishing</td>
<td>self-extinguishing</td>
<td>not flammable</td>
</tr>
<tr>
<td>Water absorption</td>
<td>low</td>
<td>low</td>
<td>none</td>
</tr>
<tr>
<td>Suitability for steam</td>
<td>good</td>
<td>limited</td>
<td>very good</td>
</tr>
<tr>
<td>Chemical resistance against</td>
<td>Dilute bases</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Dilute acids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Alcohol</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Petrol</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Benzene</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Mineral oil</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Legend:
+ resistant
- not resistant

The values given in the table are only given as guide values, and are not to be used as the minimum requirements in specifications.
**Vibration resistance**

Due to the specific assembly of the measuring elements used, the vibration resistance of the model TF37 threaded thermometer is very high. The defined acceleration values of 3 g for higher demands, as per IEC/EN 60751, have been far exceeded.

Depending on the thermowell design, the mounting situation, medium and temperature, the vibration resistance can be up to 30 g.

**Shock resistance**

Up to 500 g, depending on version, installation situation, medium and temperature

**Static operating pressure**

The model TF37 standard instrument is suitable for static pressures up to a maximum of 50 bar. For higher pressure ranges, please contact a WIKA contact person.

**Electrical connection**

- Stripped wires
- End splices
  
  Customer-specific connectors available on request

**Ingress protection**

The specification of the ingress protection refers to the thermowell/connection lead transition. This is dependent on the insulation material of the connection lead.

<table>
<thead>
<tr>
<th>Insulation material</th>
<th>Ingress protection</th>
</tr>
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<tbody>
<tr>
<td>PVC</td>
<td>IP65</td>
</tr>
<tr>
<td>Silicone</td>
<td>IP66, IP67</td>
</tr>
<tr>
<td>PTFE</td>
<td>IP65</td>
</tr>
</tbody>
</table>
Dimensions in mm

Model TF37 with standard thermowell

Model TF37 with fast-response thermowell

Legend:
Ø F1  Thermowell diameter
U1   Insertion length
W    Cable length
E    Thread

Approvals

<table>
<thead>
<tr>
<th>Logo</th>
<th>Description</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EU declaration of conformity</td>
<td>European Union</td>
</tr>
<tr>
<td></td>
<td>RoHS directive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uzstandard (option)</td>
<td>Uzbekistan</td>
</tr>
<tr>
<td></td>
<td>Metrology, measurement technology</td>
<td></td>
</tr>
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</table>

Approvals and certificates, see website
Manufacturer's information and certificates

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<thead>
<tr>
<th>Logo</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>China RoHS directive</td>
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</tbody>
</table>

Ordering information

Model / Measuring element / Connection method / Tolerance / Thermowell material and diameter $F_1$ / Process connection $E$ / Insertion length $U_1$ / Connection lead / Cable length $W$ / Electrical connection