

## Screw-in thermometer with connection lead Model TF37

WIKA data sheet TE 67.12

### Applications

- Mobile hydraulics
- Machine building
- Compressors
- Automotive
- Cooling, 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



Screw-in thermometer with connection lead,  
model TF37

### Description

The model TF37 screw-in thermometer, which is highly resistant to vibration, is used in applications with strong vibrations and where, due to their high media temperature, a decoupling of the electrical connection point and the measuring point is necessary. The transition point from the thermowell to the connection lead is dust and watertight - IP65 or IP66/IP67.

## Measuring element

WIKA standardly uses the following measuring elements for the model TF37 screw-in thermometer:

- Pt1000, class B per DIN EN 60751
- Pt100, class B per DIN EN 60751
- NTC,  $R_{25} = 10 \text{ k}\Omega$ ,  $B(25/85) = 3976$
- NTC,  $R_{25} = 5 \text{ k}\Omega$ ,  $B(25/85) = 3976$
- Ni1000, DIN 43760
- KTY81-210

Others on request

Platinum elements offer the advantage of meeting international standards (IEC 751 / DIN EN 60751). Nickel elements are also standardised, but not international. Due to material- and production-specific criteria, a standardisation of semiconductor elements, e.g. NTC's 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 NTC's, but only in a limited temperature range.

### Strengths and weaknesses of the different measuring elements

|                                 | NTC | Pt100 | Pt1000 | Ni1000 | KTY |
|---------------------------------|-----|-------|--------|--------|-----|
| Temperature range               | -   | ++    | ++     | +      | -   |
| Accuracy                        | -   | ++    | ++     | +      | -   |
| Linearity                       | -   | ++    | ++     | +      | ++  |
| Long-term stability             | +   | ++    | ++     | ++     | +   |
| International standards         | -   | ++    | ++     | +      | -   |
| Temperature sensitivity [dR/dT] | ++  | -     | +      | +      | +   |
| Influence of the supply line    | ++  | -     | +      | +      | +   |

### Connection method

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  $0.22 \text{ mm}^2$  the following value applies:  $0.162 \text{ }\Omega/\text{m} \rightarrow 0.42 \text{ }^\circ\text{C}/\text{m}$  for Pt100

With a Pt1000 measuring element, the influence of the connection lead of  $0.04 \text{ }^\circ\text{C}/\text{m}$  is a factor of 10 lower. The same applies to an Ni1000 measuring element.

The lead resistance becomes still less significant in relation to the basic resistance  $R_{25}$  with a KTY or NTC element.

For all versions WIKA offers a 2-wire connection as standard.

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. With Pt1000, a class A measuring element in a 2-wire connection is more effective and more cost-efficient than a lead wire in 4-wire connection.

Example:

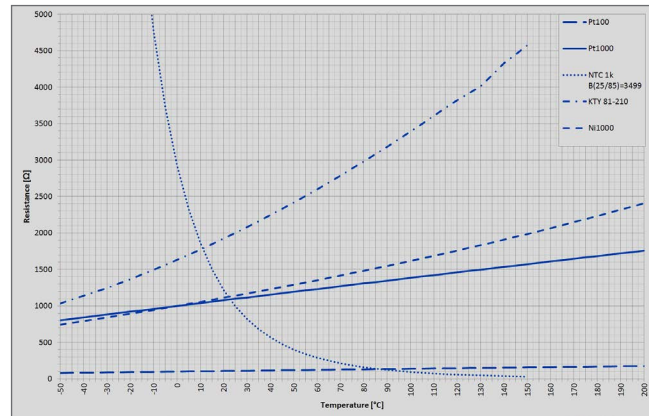
Measuring error at  $150 \text{ }^\circ\text{C}$ , lead length 10 m, conductor cross-section  $0.22 \text{ mm}^2$ :

| Measuring element | Connection method | Tolerance class | Measuring error in $^\circ\text{C}$ |
|-------------------|-------------------|-----------------|-------------------------------------|
| Pt100             | 2-wire            | B               | 5.25                                |
|                   | 2-wire            | A               | 4.65                                |
|                   | 4-wire            | B               | 1.05                                |
|                   | 4-wire            | A               | 0.45                                |
| Pt1000            | 2-wire            | B               | 1.47                                |
|                   | 2-wire            | A               | 0.87                                |
|                   | 4-wire            | B               | 1.05                                |
|                   | 4-wire            | A               | 0.45                                |

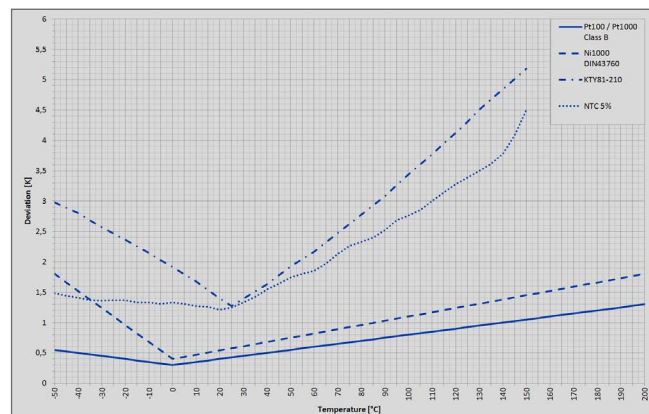
### Characteristic curves

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



#### ■ Typical tolerance curves



## Temperature ranges

### Medium temperature (measuring range)

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

| Insulation material of the connection lead | Permissible ambient temperature |
|--|---------------------------------|
| PVC  | -20 ... +105 °C                 |
| Silicone                                   | -50 ... +200 °C                 |
| PTFE                                       | -50 ... +260 °C                 |

| Measuring element | Measuring range |
|-------------------|-----------------|
| NTC               | -30 ... +130 °C |
| Pt100             | -50 ... +260 °C |
| Pt1000            | -50 ... +260 °C |
| Ni1000            | -50 ... +250 °C |
| KTY               | -50 ... +150 °C |

### 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 1.4571

### Diameter F<sub>1</sub>

- 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
- M12 x 1.5
- M14 x 1.5
- R ¼-ISO7
- R ⅜-ISO7
- R ½-ISO7
- ¼" NPT

Others on request

### Insertion length U<sub>1</sub>

- 20 mm
- 30 mm
- 40 mm
- 50 mm
- 60 mm

Others on request

### Note:

Flush mounting of the measuring element is also possible. In this case the thermowell diameter is equal to the thread size and the overall length equals the thread length.

## Response time

The response time is strongly influenced by

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

Due to the design of the model TF37 screw-in 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 ends can also be supplied with bare stranded wires, end splices or ready-made with customer-specific plug connector.

The following table gives an overview of the main characteristics of insulation materials available from WIKA. The values given in the table are only given as guide values, and are not to be used as the minimum requirements in specifications.

| Insulation material         | PVC                | Silicone           | PTFE          |
|-----------------------------|--------------------|--------------------|---------------|
| Highest working temperature | 105 °C             | 200 °C             | 260 °C        |
| Flammability                | Self-extinguishing | Self-extinguishing | Not flammable |
| Water absorption            | Slight             | Slight             | None          |
| Suitability for steam       | Good               | Limited            | Very good     |
| Chemical resistance against | Dilute bases       | +                  | +             |
|                             | Dilute acids       | +                  | +             |
|                             | Alcohol            | +                  | +             |
|                             | Petrol             | +                  | -             |
|                             | Benzene            | -                  | -             |
|                             | Mineral oil        | +                  | +             |

Legend:  
+ resistant  
- not resistant

## Vibration resistance

Due to the specific assembly of the measuring elements used, the vibration resistance of the model TF37 screw-in thermometer is very high.

The defined acceleration value of 3 g for higher demands, as per DIN EN 60751 (IEC 751), has been significantly improved upon.

Depending on version, installation situation, medium and temperature, the vibration resistance is up to 10 g.

## Shock resistance

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

## Operating pressure

Max. 50 bar

For applications with higher pressures, please contact your WIKA contact person.

## Electrical connection

- Bare stranded wires
- End splices

Customer-specific connectors available on request

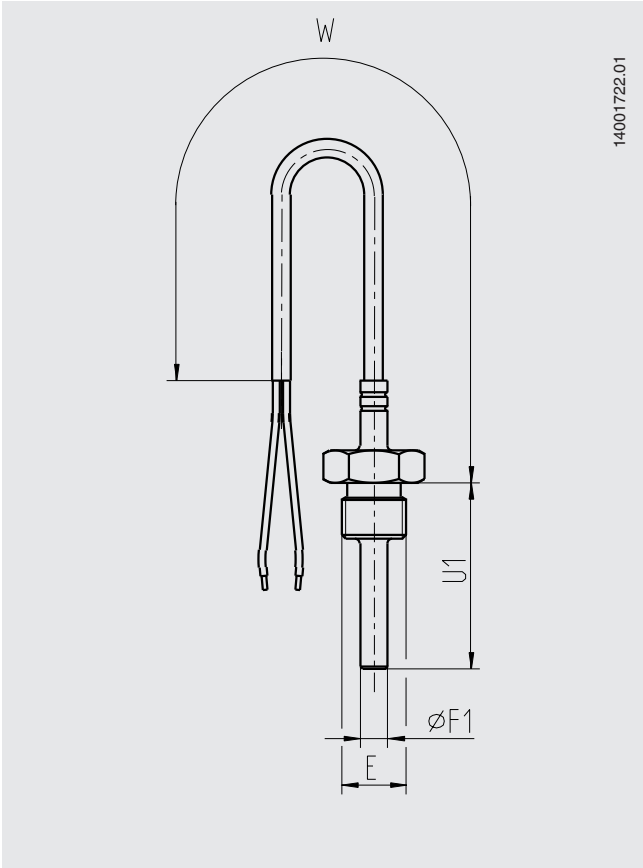
## Ingress protection

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

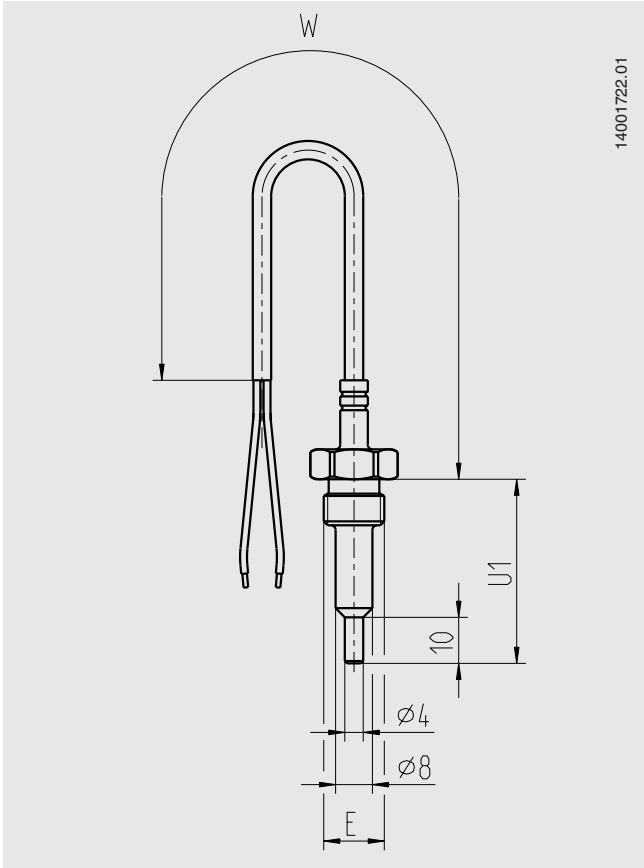
| Insulation material | Ingress protection |
|---------------------|--------------------|
| PVC                 | IP65               |
| Silicone            | IP66, IP67         |
| PTFE                | IP65               |

# Dimensions in mm

Model TF37 with standard thermowell



Model TF37 with fast-response thermowell



- Legend:
- Ø F<sub>1</sub> Thermowell diameter
  - U<sub>1</sub> Insertion length
  - W Lead length
  - E Thread

## Ordering information

When ordering choose one criterion from each category.

### Measuring element / Connection method / Tolerance

- 1x Pt1000 / 2-wire / class B, EN 60751
- 1x Pt100 / 2-wire / class B, EN 60751
- 1x NTC 10 kOhm, B(25/85) = 3976 / 2-wire / 5 %
- 1x NTC 5 kOhm, B(25/85) = 3976 / 2-wire / 5 %
- 1x KTY81-210 / 2-wire

Others on request

### Thermowell material

- Brass
- Stainless steel 1.4571

### Thermowell diameter F<sub>1</sub>

- Standard: 6.0 mm
- Fast response: 8.0 mm / tapered tip 4.0 mm

### Process connection E

- Mounting thread G ¼ B
- Mounting thread G ⅜ B
- Mounting thread M12 x 1.5
- Mounting thread M14 x 1.5
- Mounting thread R ¼-ISO7
- Mounting thread R ⅜-ISO7
- Mounting thread ¼ NPT
- Mounting thread ⅜ NPT

Others on request

### Insertion length U<sub>1</sub>

- 20 mm
- 30 mm
- 40 mm
- 50 mm
- 60 mm

Others on request

### Connection lead

- Silicone / silicone
- PVC / PVC
- PTFE / PTFE

### Lead length W

- 1,000 mm
- 3,000 mm
- 5,000 mm

Others on request (in 500 mm steps)

### Electrical connection

- Bare stranded wires
- End splices

Others on request

## Ordering information

Model / Measuring element / Connection method / Tolerance / Thermowell material and diameter F<sub>1</sub> / Process connection E / Insertion length U<sub>1</sub> / Connection lead / Lead length W / Electrical connection

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