

Resistance Thermometers

Model TR812, Outdoor Thermometer

Model TR813, Indoor Thermometer

WIKA Data Sheet TE 60.45

Applications

- Ambient temperature measurement
- Air conditioned rooms, cold storage rooms, storehouses, grain storages, malt storages etc.

Special Features

- Application ranges from -40 °C to +80 °C
- Optional transmitter available
- Impact resistant plastic case
- Intrinsically safe versions (ATEX) for Model TR812



Fig. left: Outdoor thermometer Model TR812
Fig. right: Indoor thermometer Model TR813

Description

Model TR812

These models feature a closed probe tube and are intended for damp or humid rooms and outdoor applications.

Intrinsically safe designs are also available for applications in hazardous areas. For such applications, models in the TR812 range are provided with a type test certificate for "intrinsically safe" protection according to directive 94/9/EC (ATEX).

An ATEX Manufacturer's Declaration in accordance with EN 50 020 is also available.

Model TR813

These models are intended for dry rooms. The probe tube around the sensor is perforated, and as a result of this perforation the sensor is in direct contact with the ambient air. This considerably improves the response time.

The range of applications is enhanced by the addition of optional analogue or digital transmitters.

Sensor

The sensor is located at the tip of the probe.

Sensor method of connection

- 2 wire
- 3 wire
- 4 wire

With 2-wire connection the lead resistance of the cable compounds the error.

Sensor limiting error

- class B to DIN EN 60 751
- class A to DIN EN 60 751
- 1/3 DIN B at 0 °C

It makes no sense to combine 2-wire connection with class A or 2-wire connection with 1/3 DIN B, because the lead resistance error of the measuring insert over-rides the higher sensor accuracy.

Basic values and limiting errors

Basic values and limiting errors for the platinum measurement resistances are laid down in DIN EN 60 751.

The nominal value of Pt100 sensors is 100 Ω at 0 °C. The temperature coefficient α can be stated simply to be between 0 °C and 100 °C with:

$$\alpha = 3.85 \cdot 10^{-3} \text{ } ^\circ\text{C}^{-1}$$

The relationship between the temperature and the electrical resistance is characterised by polynomials which are defined in DIN EN 60 751. Furthermore, this standard lays down the basic values in °C stages.

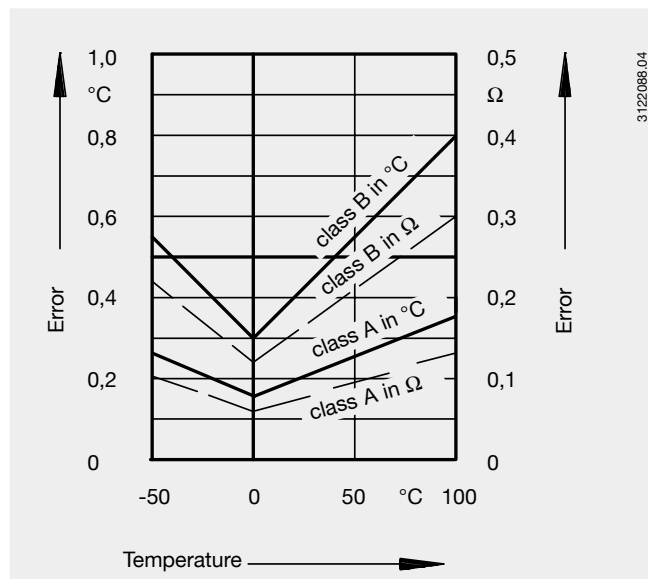
| Class | Limiting error in °C |
|-------|----------------------------------------|
| A | $0.15 + 0.002 \cdot t $ ¹⁾ |
| B | $0.3 + 0.005 \cdot t $ |

1) |t| is the value of the temperature in °C without consideration of the sign

| Temperature (ITS 90) °C | Basic value Ω | Limiting error DIN EN 60 751 | | | |
|-------------------------------|------------------|------------------------------|--------|---------|--------|
| | | Class A | | Class B | |
| | | °C | Ω | °C | Ω |
| -40 | 84.27 | ± 0.23 | ± 0.09 | ± 0.5 | ± 0.19 |
| -30 | 88.22 | ± 0.21 | ± 0.08 | ± 0.45 | ± 0.18 |
| -20 | 92.16 | ± 0.19 | ± 0.08 | ± 0.4 | ± 0.16 |
| -10 | 96.09 | ± 0.17 | ± 0.07 | ± 0.35 | ± 0.14 |
| 0 | 100 | ± 0.15 | ± 0.06 | ± 0.3 | ± 0.12 |
| 10 | 103.90 | ± 0.17 | ± 0.07 | ± 0.33 | ± 0.14 |
| 20 | 107.79 | ± 0.19 | ± 0.07 | ± 0.4 | ± 0.16 |
| 30 | 111.67 | ± 0.21 | ± 0.08 | ± 0.45 | ± 0.17 |
| 40 | 115.54 | ± 0.23 | ± 0.09 | ± 0.5 | ± 0.19 |
| 50 | 119.40 | ± 0.25 | ± 0.09 | ± 0.55 | ± 0.21 |
| 60 | 123.24 | ± 0.27 | ± 0.10 | ± 0.6 | ± 0.23 |
| 70 | 127.08 | ± 0.29 | ± 0.11 | ± 0.65 | ± 0.25 |
| 80 | 130.89 | ± 0.31 | ± 0.12 | ± 0.7 | ± 0.27 |

In addition to the limiting errors defined in DIN EN 60 751 historical data defines further limits, for example: 1/3 DIN B at 0 °C.

It should be noted that the limiting error restriction to 1/3 does not refer to the entire application range but only to the 0 °C value. If the restriction in limiting error refers to a temperature range, this range must be stated.



Probe

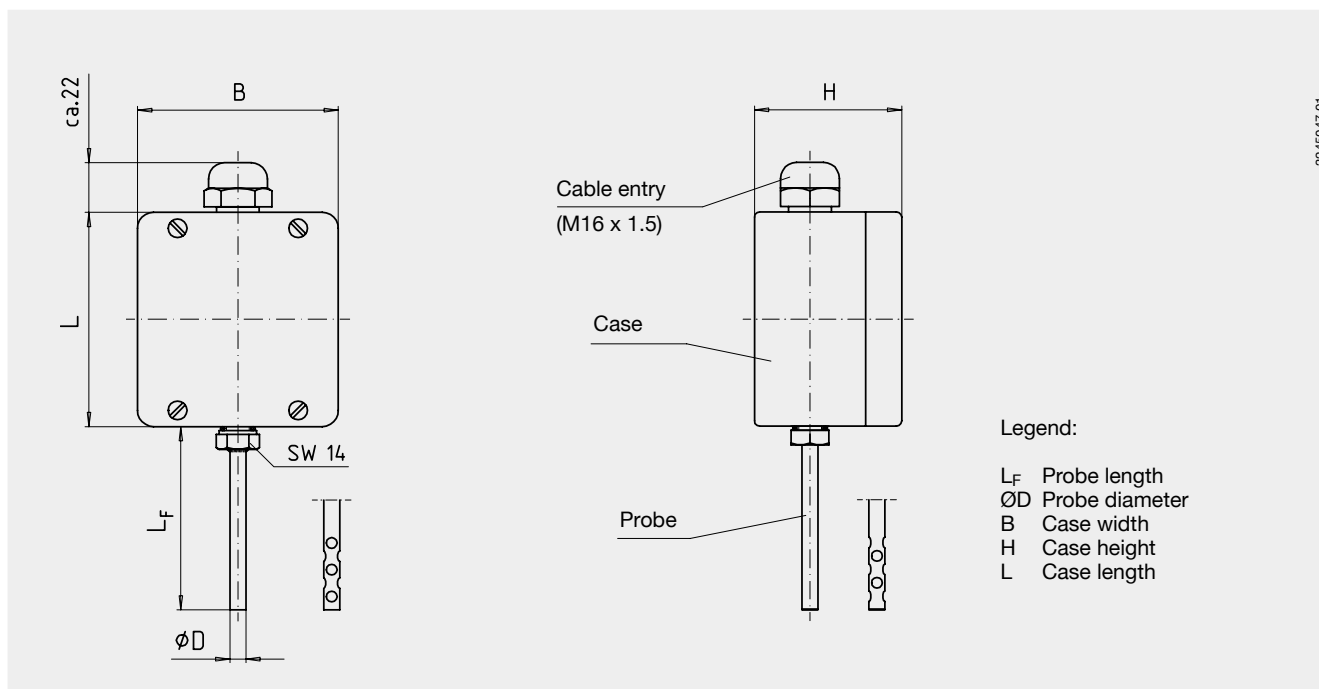
The standard probe has a 6 mm diameter and is available with 1 x Pt100 or 2 x Pt100, in 2-wire, 3-wire or 4-wire format.

| Specification | Model TR812 Outdoor thermometer | Model TR813 Indoor thermometer |
|----------------------------|------------------------------------|--------------------------------------------------|
| Probe | | |
| ■ Design | rigid tube, closed | rigid tube, perforated in the area of the sensor |
| ■ Material | stainless steel 1.4571 | |
| ■ Probe length | mm 60 ¹⁾ | |
| ■ Probe diameter | mm 6 ¹⁾ | |
| Case | | |
| ■ Design | for wall mounting | |
| ■ Material | plastic (ABS) or aluminium | |
| ■ Dimensions | see dimensions ¹⁾ | |
| Cable entry | M16 x 1.5 ¹⁾ | |
| Permissible temperature of | | |
| ■ Ambient | °C -40 ... +80 ²⁾ | |
| ■ Storage | °C -40 ... +80 | |
| Ingress protection | IP 65 per EN 60 529 / IEC 529 | IP 20 per EN 60 529 / IEC 529 |
| Weight | kg approx. 0.4 | |

1) Other on request

2) The working temperature of the resistance thermometer is limited by the permissible ambient temperature of the case

Dimensions in mm

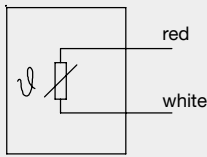


| Case | Dimensions in mm | | | | |
|----------------------|------------------|----|----|----------------|----|
| | L | B | H | L _F | ØD |
| Plastic (ABS) | 82 | 80 | 55 | 60 | 6 |
| Aluminium | 80 | 75 | 57 | 60 | 6 |

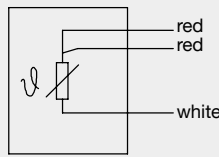
Electrical connection

Connection terminals are located in the case

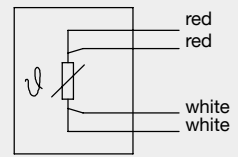
1 x Pt 100,
2 wire



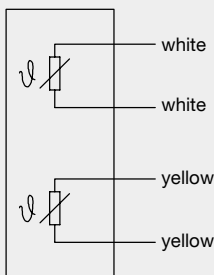
1 x Pt 100,
3 wire



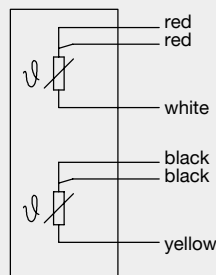
1 x Pt 100,
4 wire



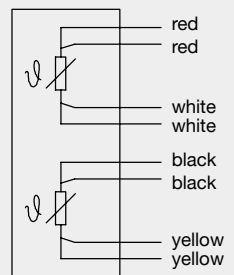
2 x Pt 100,
2 wire



2 x Pt 100,
3 wire



2 x Pt 100,
4 wire



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Transmitter (option)

A transmitter can be fitted into the case. This is done by mounting the transmitter in place of the connection terminals.

| Model | Description | Explosion protection | Data sheet |
|-------|---------------------------------------------------------|----------------------|------------|
| T19 | Analogue transmitter, configurable | without | TE 19.01 |
| T24 | Analogue transmitter, PC configurable | optional | TE 24.01 |
| T31 | Analogue transmitter, fixed range | optional | TE 31.01 |
| T12 | Digital transmitter, PC configurable | optional | TE 12.01 |
| T32 | Digital transmitter, HART protocol | optional | TE 32.01 |
| T42 | Digital transmitter, PROFIBUS PA | optional | TE 42.01 |
| T5350 | Digital transmitter FOUNDATION Fieldbus and PROFIBUS PA | standard | TE 53.01 |

Explosion protection (optional, only with Model TR812)

Model TR812 resistance thermometers are available with a type test certificate for "intrinsically safe" ignition protection (TÜV 02 ATEX 1793 X). These thermometers comply with the requirements of directive 94/9/EC (ATEX), EEx-i, for gases and dust. An ATEX Manufacturer's Declaration in accordance with EN 50 020 is also available.

The classification / suitability of the instrument (permissible power P_{max} and permissible ambient temperature) for the respective category can be seen on the type test certificate

and in the operating instructions.

The responsibility for using suitable thermowells rests with the user.

The permissible ambient temperature ranges of the built-in transmitters can be taken from the corresponding transmitter approval.

Ordering information for outdoor thermometer Model TR812

| Field No. | Code | Features | |
|-----------|------|-----------------------------------------------------------------------|---------------------------------------------------------------------|
| | | Explosion protection | |
| | Z | without | |
| | Y | according to directive 94/9/EC (ATEX) EEx-i G for gases ¹⁾ | |
| 1 | H | according to directive 94/9/EC (ATEX) EEx-i D for dusts ¹⁾ | |
| | | Type and number of sensors | |
| | P | 1 x Pt100 application range -40 °C ... +80 °C | |
| | Q | 2 x Pt100 application range -40 °C ... +80 °C | |
| 2 | ? | other <i>please state as additional text</i> | |
| | | Sensor method of connection | |
| | 2 | 2 wire | |
| | 3 | 3 wire | |
| 3 | 4 | 4 wire | |
| | | Sensor limiting error | |
| | B | class B per DIN EN 60751 | |
| | A | class A per DIN EN 60751 <i>not with 2-wire connection</i> | |
| | C | 1/3 DIN B at 0 °C <i>not with 2-wire connection</i> | |
| 4 | ? | other <i>please state as additional text</i> | |
| | | Probe material | |
| | 1 | Stainless steel 1.4571 | |
| 5 | ?? | other <i>please state as additional text</i> | |
| | | Probe diameter | |
| | 3 | 6 mm | |
| 6 | ? | other <i>please state as additional text</i> | |
| | | Probe length | |
| | 1 | 60 mm | |
| 7 | ? | other <i>please state as additional text</i> | |
| | | Case | |
| | 3 | plastic (ABS) <i>not with explosion protection</i> | |
| | 1 | aluminium | |
| 8 | ? | other <i>please state as additional text</i> | |
| | | Cable entry | |
| | 9 | M16 x 1.5, plastic | |
| 9 | ? | other <i>please state as additional text</i> | |
| | | Transmitter | |
| | ZZ | without | |
| 10 | TH | mounted in the connection box | |
| | | Additional order info | |
| | YES | NO | |
| 12 | T | Z | quality certificates <i>see price list</i> |
| 13 | T | Z | additional text <i>Please state as clearly understandable text!</i> |

1) Please pay attention to the table of exclusions, see price list.

Order code:

| | | | | | | | | | | | | |
|---------|---|---|---|---|---|---|---|---|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | ZZ | 11 | 12 |
| TR812 - | - | - | - | - | - | - | - | - | - | - | - | - |

Additional text:

Ordering information for indoor thermometer Model TR813

| Field No. | Code | Features | |
|------------------------------------|------|------------------------------------------------------------|---------------------------------------------------------------------|
| Type and number of sensors | | | |
| 1 | P | 1 x Pt100 application range -40 °C ... +80 °C | |
| | Q | 2 x Pt100 application range -40 °C ... +80 °C | |
| | ? | other <i>please state as additional text</i> | |
| Sensor method of connection | | | |
| 2 | 2 | 2 wire | |
| | 3 | 3 wire | |
| | 4 | 4 wire | |
| Sensor limiting error | | | |
| 3 | B | class B per DIN EN 60751 | |
| | A | class A per DIN EN 60751 <i>not with 2-wire connection</i> | |
| | C | 1/3 DIN B at 0 °C <i>not with 2-wire connection</i> | |
| | ? | other <i>please state as additional text</i> | |
| Probe material | | | |
| 4 | 1 | Stainless steel 1.4571 | |
| | ?? | other <i>please state as additional text</i> | |
| Probe diameter | | | |
| 5 | 3 | 6 mm | |
| | ? | other <i>please state as additional text</i> | |
| Probe length | | | |
| 6 | 1 | 60 mm | |
| | ? | other <i>please state as additional text</i> | |
| Case | | | |
| 7 | 3 | plastic (ABS) <i>not with explosion protection</i> | |
| | 1 | aluminium | |
| | ? | other <i>please state as additional text</i> | |
| Cable entry | | | |
| 8 | 9 | M16 x 1.5, plastic | |
| | ? | other <i>please state as additional text</i> | |
| Transmitter | | | |
| 9 | ZZ | without | |
| | TH | mounted in the connection box | |
| Additional order info | | | |
| 10 | YES | NO | |
| | T | Z | quality certificates <i>see price list</i> |
| 11 | T | Z | additional text <i>Please state as clearly understandable text!</i> |

Order code:

| | | | | | | | | | | | |
|-----------|---|----------------------|----------------------|----------------------|---|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| TR813 - Z | - | <input type="text"/> | <input type="text"/> | <input type="text"/> | - | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| | | | | | | | | | | ZZ | - |
| | | | | | | | | | | <input type="text"/> | <input type="text"/> |

Additional text:

Specifications and dimensions given in this leaflet represent the state of engineering at the time of printing. Modifications may take place and materials specified may be replaced by others without prior notice.



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