

## 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-examination certificate for "intrinsically safe" type of protection according to directive 94/9/EC (ATEX), EEx-i, for gases and dust.

Manufacturer's Declarations in accordance with EN 50 020 are 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.

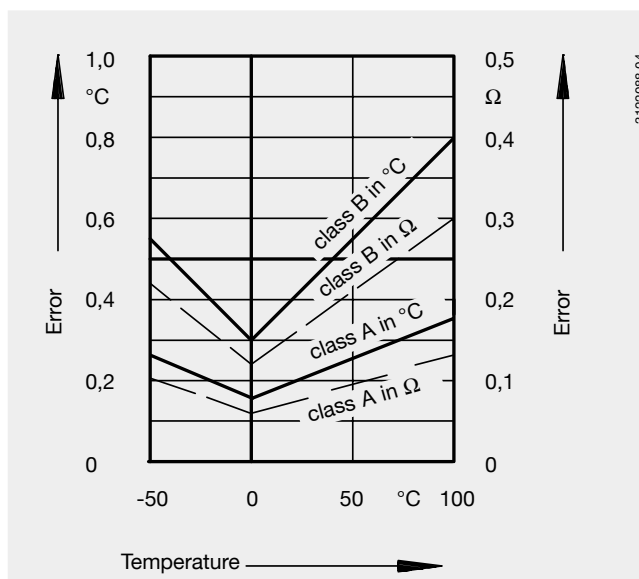
Class	Limiting error in °C
A	$0.15 + 0.002 \cdot  t $ <sup>1)</sup>
B	$0.3 + 0.005 \cdot  t $

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	± 0.10	± 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

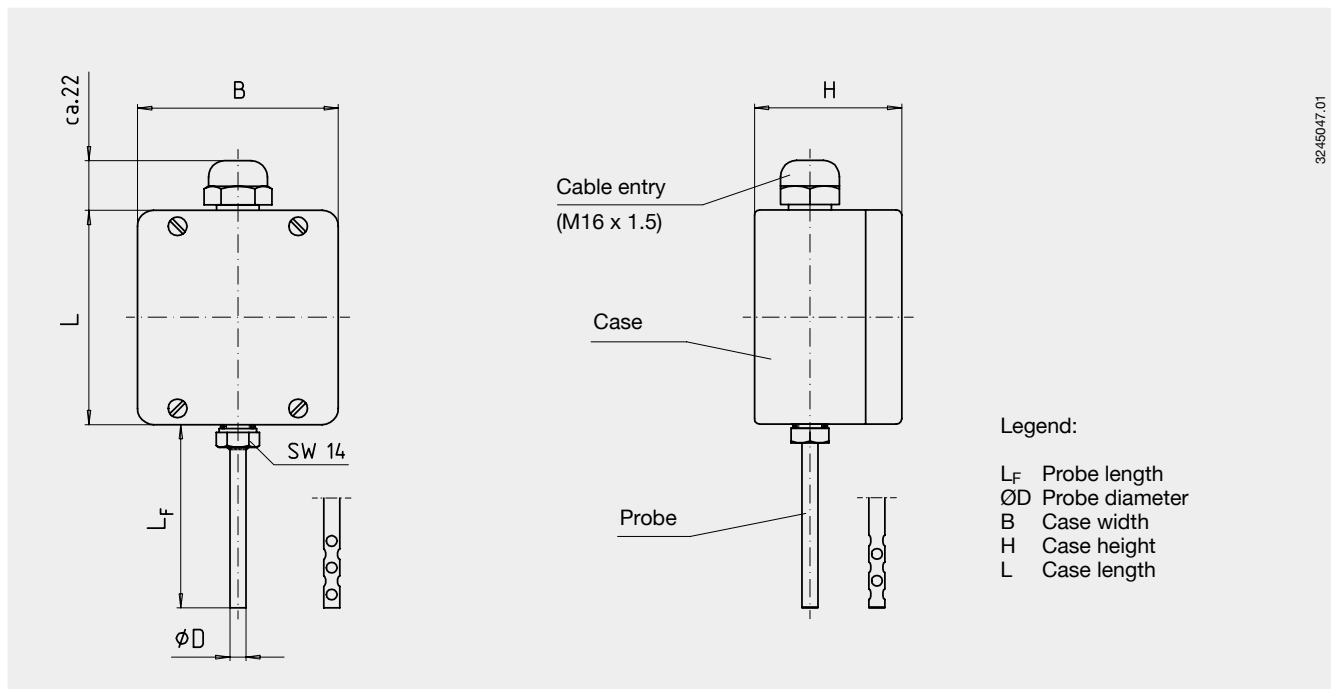
The standard probe has a 6 mm diameter and is available with 1 x Pt100 or 2 x Pt100, in 2-wire, 3-wire or 4-wire format.

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 <sup>1)</sup>	
■ Probe diameter	mm 6 <sup>1)</sup>	
Case		
■ Design	for wall mounting	
■ Material	plastic ( ABS ) or aluminium	
■ Dimensions	see dimensions <sup>1)</sup>	
Cable entry	M16 x 1.5 <sup>1)</sup>	
Permissible temperature of		
■ Ambient	°C -40 ... +80 <sup>2)</sup>	
■ 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

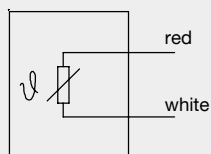


Case	Dimensions in mm				
	L	B	H	L <sub>F</sub>	ØD
<b>Plastic (ABS)</b>	82	80	55	60	6
<b>Aluminium</b>	80	75	57	60	6

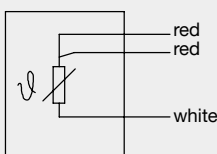
## Electrical connection

Connection terminals are located in the case

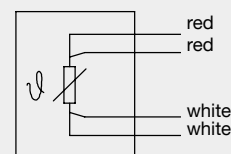
1 x Pt 100,  
2 wire



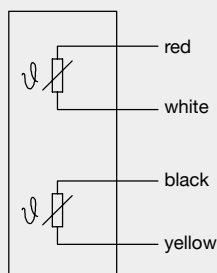
1 x Pt 100,  
3 wire



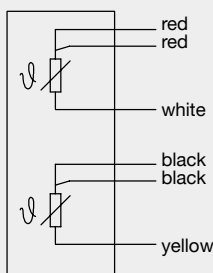
1 x Pt 100,  
4 wire



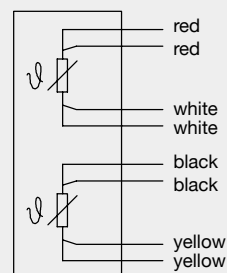
2 x Pt 100,  
2 wire



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
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
T53	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. Manufacturer's Declarations in accordance with EN 50 020 are 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	
		<b>Explosion protection</b>	
	Z	without	
	Y	according to directive 94/9/EC (ATEX) EEx-i G for gases <sup>1)</sup>	
	H	according to directive 94/9/EC (ATEX) EEx-i GD for gases und dust <sup>1)</sup>	
1	K	according to directive 94/9/EC (ATEX) EEx-n	
		<b>Type and number of sensors</b>	
	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>	
		<b>Sensor method of connection</b>	
	2	2 wire	
	3	3 wire	
3	4	4 wire	
		<b>Sensor limiting error</b>	
	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>	
		<b>Probe material</b>	
	1	Stainless steel 1.4571	
5	??	other <i>please state as additional text</i>	
		<b>Probe diameter</b>	
	3	6 mm	
6	?	other <i>please state as additional text</i>	
		<b>Probe length</b>	
	1	60 mm	
7	?	other <i>please state as additional text</i>	
		<b>Case</b>	
	3	plastic (ABS) <i>not with explosion protection</i>	
	1	aluminium	
8	?	other <i>please state as additional text</i>	
		<b>Cable entry</b>	
	9	M16 x 1.5, plastic	
9	?	other <i>please state as additional text</i>	
		<b>Transmitter</b>	
	ZZ	without	
10	TH	mounted in the connection box	
		<b>Additional order info</b>	
	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		11	12		
TR812	-	<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:**

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**Ordering information for indoor thermometer Model TR813**

Field No.	Code	Features	
<b>Type and number of sensors</b>			
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>	
<b>Sensor method of connection</b>			
2	2	2 wire	
	3	3 wire	
	4	4 wire	
<b>Sensor limiting error</b>			
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>	
<b>Probe material</b>			
4	1	Stainless steel 1.4571	
	??	other <i>please state as additional text</i>	
<b>Probe diameter</b>			
5	3	6 mm	
	?	other <i>please state as additional text</i>	
<b>Probe length</b>			
6	1	60 mm	
	?	other <i>please state as additional text</i>	
<b>Case</b>			
7	3	plastic (ABS) <i>not with explosion protection</i>	
	1	aluminium	
	?	other <i>please state as additional text</i>	
<b>Cable entry</b>			
8	9	M16 x 1.5, plastic	
	?	other <i>please state as additional text</i>	
<b>Transmitter</b>			
9	ZZ	without	
	TH	mounted in the connection box	
<b>Additional order info</b>			
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:**

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

**Additional text:** \_\_\_\_\_

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