

# Resistance Thermometers

## Model TR221, Compact Design

## Model TR223, Compact Design with Transmitter

WIKA Data Sheet TE 60.18

### Applications

- Machinery, plant and tank construction
- Power transmission engineering
- Air-conditioning and refrigeration systems

### Special Features

- Application ranges from -50 °C to +200 °C
- Transmitter included (Model TR223)
- Measuring insert exchangeable
- Compact design

### Description

This series of resistance thermometers is designed for the measurement of liquid or gaseous media. They are suitable for a max. pressure of 36 bar (depending on insertion length and diameter). All electrical parts are protected against splash water and are mounted vibration-proof. The measuring inserts of the standard version can be exchanged very quickly and easily without opening the process. Insertion length, process connection and sensor can be selected for the respective application from the order information text.

#### Model TR221

This model is complete with a thermowell (welded construction) and a fixed process connection. The resistance thermometer is screwed directly into the process and standard DIN plug is used for electrical connection.

#### Model TR223

The basic design is similar to model TR221. Additionally the TR223 model contains an integrated transmitter with output signal 4 ... 20 mA resp. 0 ... 10 V. This guarantees an easy and reliable transmission of the temperature values measured.



Resistance Thermometer, Compact Design Model TR221

# Sensor

The sensor is located in the tip of the measuring insert.

## Sensor method of connection

- 2 wire
- 3 wire
- 4 wire

With 2 wire connection the lead resistance of the measuring insert compounds the error.

## Sensor limiting error

- class B to DIN EN 60 751

Temperature (ITS 90) °C	Basic value Ω	Limiting error DIN EN 60 751 Class B	
		°C	Ω
-50	80.31	± 0.55	± 0.21
0	100	± 0.3	± 0.12
50	119.40	± 0.55	± 0.21
100	138.51	± 0.8	± 0.30
150	157.33	± 1.05	± 0.39
200	175.86	± 1.3	± 0.48

## Basic values and limiting errors

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

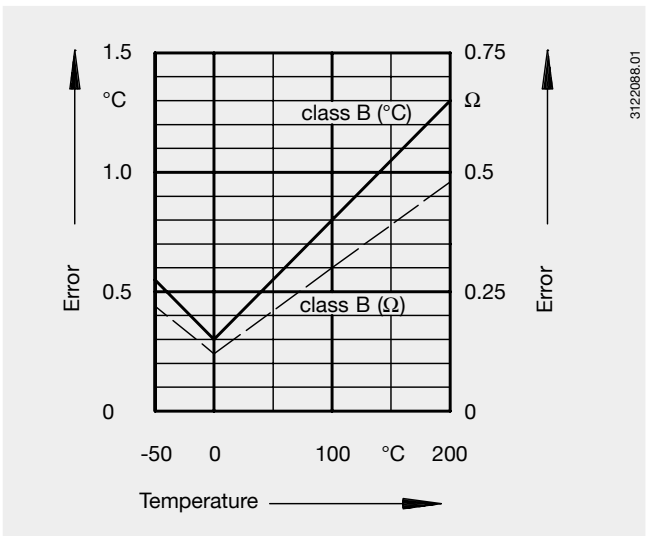
The nominal value of Pt 100 sensors is 100 Ω at 0 °C. The temperature coefficient α can be stated simply to be between 0 °C and 100 °C with:

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

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

Class	Limiting error in °C
B	0.3 + 0.005 •  t  <sup>1)</sup>

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



# Measuring insert

The measuring insert is exchangeable.

Application range: -50 ... + 200 °C

## Possible combinations of thermowell outer diameter, number of sensors and sensor method of connection

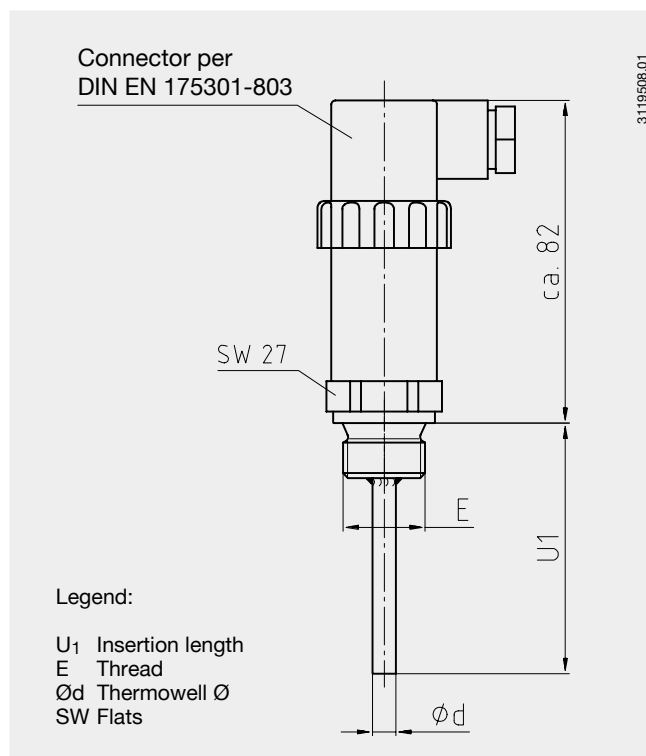
### Model TR221

Thermowell Ø in mm	Sensor 1 x Pt100 Sensor method of connection			Sensor 2 x Pt100 Sensor method of connection
	2 wire	3 wire	4 wire	2 wire
3	x	-	-	-
6	x	x	x	x
6, tapered to 3 mm	x	x	-	-
8	x	x	x	x
8, tapered to 6 to 3 mm	x	x	-	-

### Model TR223

A sensor 1 x Pt100, 2 wire is used.

## Dimensions



## Process connection

- Male thread, material: stainless steel 1.4571

Thermowell Ø in mm	Male thread			
	G 1/4 B	G 3/8 B	G 1/2 B	1/2 NPT
3	x	-	-	-
6	x	x	x	x
6, tapered to 3 mm	x	x	x	x
8	-	x	x	x
8, tapered to 6 to 3 mm	-	x	x	x

## Thermowell

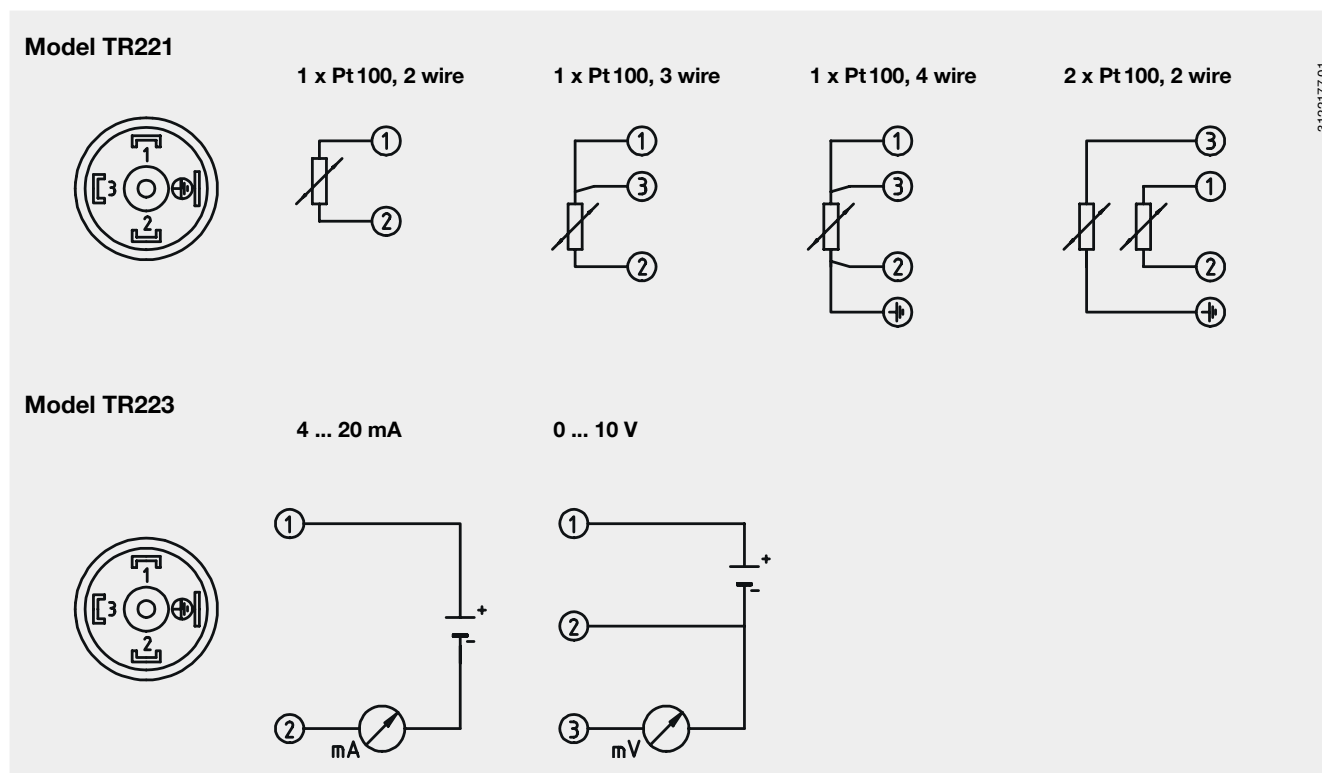
- Material: stainless steel 1.4571

Thermowell Ø in mm	Insertion length U <sub>1</sub> in mm								
	25	50	75	100	160	200	300	400	500
3	x	-	-	-	-	-	-	-	-
6	-	x	x	x	x	x	x	x	x
6, tapered to 3 mm	-	x	x	x	-	-	-	-	-
8	-	-	x	x	x	x	x	x	x
8, tapered to 6 to 3 mm	-	-	-	x	x	x	x	x	x

Specification	Model TR221		Model TR223
Connector			
■ L-plug per DIN EN 175301-803 (DIN 43 650)		Silicone sealing between plug and socket	
Transmitter (Model TR223)			
■ Standard measuring ranges	°C		-50 ... +50
	°C		0 ... +50
	°C		0 ... +80
	°C		0 ... +100
	°C		0 ... +120
	°C		0 ... +150
	°C		0 ... +200
	°C		{Other on request}
■ Measuring span	K		Maximum: 250 / minimum: 50
■ Power supply U <sub>B</sub>	DC V		10 < U <sub>B</sub> ≤ 30, dual ripple < 10 %, protected against polarity crossing
■ Output signal			4 ... 20 mA, 2 wire
			{0 ... 10 V, 3 wire}
■ Failure signaling	mA		Sensor burnout: 23 / sensor short circuiting: 3.3
■ Measuring deviation	% of span		≤ 0.5 at ambient temperature 20 °C
■ Electromagnetic compatibility (EMC)			Per EN 61 326
Permissible temperature of			
■ Ambient	°C	Maximum 125, at the connector	-40 ... +85, for the transmitter
■ Storage	°C	-40 ... +85	-40 ... +85
Ingress protection		IP 65 per EN 60 529 / IEC 529	
Weight	kg	Approx. 0.15 to 0.4 ( subject to design )	

{ } Items in curved brackets are optional extras for additional price.

## Electrical connection



3122177.01

## Ordering information

Field No.	Code	Features
1		<b>Model</b>
	TR221	TR221
	TR223	TR223, with integrated transmitter
2		<b>Type and number of sensors</b>
	1	1 x Pt100 application range -50 °C ... +200 °C
	2	2 x Pt100 application range -50 °C ... +200 °C
3		<b>Sensor method of connection</b>
	2	2 wire
	3	3 wire
	4	4 wire <i>not with 2 x Pt100</i> <i>not with 2 x Pt100</i>
4		<b>Process connection</b>
	GD	G 1/2 B
	GB	G 1/4 B
	GC	G 3/8 B
	ND	1/2 NPT
5		<b>Thermowell outer diameter</b>
	L	3 mm <i>only insertion length 25 mm</i>
	3	6 mm <i>min. insertion length 50 mm</i>
	M	6 mm, tapered to 3 mm <i>min. insertion length 50 mm</i>
	E	8 mm <i>min. insertion length 75 mm</i>
	S	8 mm, tapered to 6 mm, tapered to 3 mm <i>min. insertion length 100 mm</i>
6		<b>Insertion length</b>
	0025	25 mm
	0050	50 mm
	0075	75 mm
	0100	100 mm
	0160	160 mm
	0200	200 mm
	0250	250 mm
	0300	300 mm
	0400	400 mm
	0500	500 mm
		<b>Output signal</b>
	P	Pt100 <i>only with TR221</i>
7		<b>Connector</b>
	W	4 ... 20 mA <i>with TR223 selectable</i>
	V	0 ... 10 V <i>with TR223 selectable</i>
8		<b>Transmitter measuring range</b>
	W	standard design
	?	other <i>please state as additional text</i>
	ZZ	without <i>only with TR221</i>
	EA	-50 °C ... +50 °C <i>with TR223 selectable</i>
	1A	0 °C ... 50 °C <i>with TR223 selectable</i>
	1B	0 °C ... 80 °C <i>with TR223 selectable</i>
	1E	0 °C ... 100 °C <i>with TR223 selectable</i>
	1F	0 °C ... 120 °C <i>with TR223 selectable</i>
	1H	0 °C ... 150 °C <i>with TR223 selectable</i>
	1L	0 °C ... 200 °C <i>with TR223 selectable</i>
	??	Customers specification (please take account of the application range of the sensor)
9		<b>Additional order info</b>
	Yes	NO
	T	Z
10		additional text <i>Please state as clearly understandable text!</i>

Attachable indicator for TR223 (4 ... 20 mA) for local indication of the measuring value, see price list.

### Order code:

1	2	3	4	5	6	7	8	9	10
	-Z-		B-	-1					

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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