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Resistance Thermometer Measuring Insert Model TR002, flexible

Applications

- Suitable for all industrial and laboratory applications

Special Features

- Application ranges from -200 °C to +600 °C
- Made of mineral-insulated sheathed cable
- Suitable for all standard thermowell designs
- Spring-loaded design
- Intrinsically safe versions to complement thermometers with type-examination certificate

Resistance Thermometer Measuring Insert, flexible Model TR002

Description

The measuring inserts for resistance thermometers described here are designed for installation in a protection assembly. Operation without thermowell is only recommended in certain applications. These measuring inserts are made from flexible, mineral insulated sheathed cable. The sensor is fitted in a rigid tube on the end of the measuring insert. Apart from being flexible this model has outstanding resistance to vibration.
This model is spring loaded to ensure that the measuring insert is firmly pressed down on the thermowell bottom and conforms to DIN 43 762. Apart from the DIN versions, customer specific versions are available, for example:

- to suit inner diameter of the thermowell
- tapered tip
- without terminal block
- with transmitter

Models with rigid insert tube are also available.
Type and number of sensors, accuracy and method of connection can be selected individually for the appropriate application. Adequate heat transfer between thermowell and measuring insert is only ensured when the measuring insert is of correct length and diameter.
Selection of standard lengths enables short delivery time and lower costs.

Intrinsically safe designs are available for applications in hazardous areas. These measuring inserts are suitable for mounting (replacement demand) in type-examined thermometers. Manufacturer's Declarations in accordance with EN 50 020 are also available.
The range of applications is completed by designs without terminal block for direct transmitter installation. Optionally we can fit analogue or digital transmitters from the WIKA range.

Resistance thermometer with thread	*Model TR201*	*see data sheet TE 60.15*
Weld-in resistance thermometer	*Model TR302*	*see data sheet TE 60.21*
Flange resistance thermometer	*Model TR401*	*see data sheet TE 60.25*

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Sensor

The sensor is located in the tip of 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
- class A to DIN EN 60 751 (-50 °C ... +450 °C)
- ⅓ DIN B at 0 °C

It makes no sense to combine 2 wire connection with class A or 2 wire connection with ⅓ DIN B, because the lead resistance 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 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:

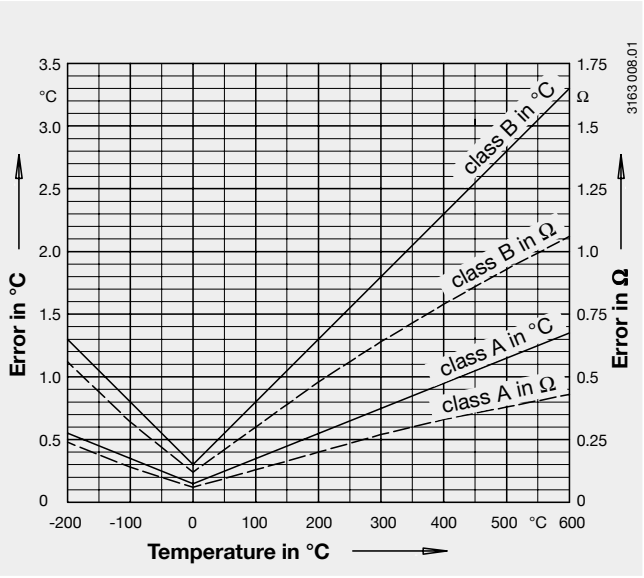
$$\alpha = 3.85 \cdot 10^{-3}\ °C^{-1}$$

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 • |t| [1]
B	0.3 + 0.005 • |t|

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

Temperature (ITS 90)	Basic value	Limiting error DIN EN 60 751 Class A		Class B	
°C	Ω	°C	Ω	°C	Ω
-200	18.52	± 0.55	± 0.24	± 1.3	± 0.56
-100	60.26	± 0.35	± 0.14	± 0.8	± 0.32
-50	80.31	± 0.25	± 0.10	± 0.55	± 0.22
0	100	± 0.15	± 0.06	± 0.3	± 0.12
50	119.40	± 0.25	± 0.10	± 0.55	± 0.21
100	138.51	± 0.35	± 0.13	± 0.8	± 0.30
200	175.86	± 0.55	± 0.2	± 1.3	± 0.48
300	212.05	± 0.75	± 0.27	± 1.8	± 0.64
400	247.09	± 0.95	± 0.33	± 2.3	± 0.79
500	280.98	± 1.15	± 0.38	± 2.8	± 0.93
600	313.71	± 1.35	± 0.43	± 3.3	± 1.06



Measuring insert

The measuring insert is made of a vibration-resistant sheathed measuring cable (MI cable). The diameter of the measuring insert shall be approx. 1 mm smaller than the bore diameter of the thermowell.
Gaps of more than 0.5 mm between thermowell and measuring insert will have a negative effect on the heat transfer, and they will result in an unfavourable response behaviour of the thermometer.

It is possible to ensure a spring-loaded installation of the measuring insert by means of two screws and springs in a connection head (form B). Due to this installation method, the measuring insert is easily exchangeable.

When fitting the measuring insert with a thermowell, it is very important to determine the correct insertion length (= thermowell length with bottom thicknesses of ≤ 5.5 mm). In this connection the fact that the measuring insert is spring-loaded (spring travel: max. 10 mm) has to be taken into account in order to ensure that the measuring insert presses against the bottom of the thermowell.

The standard material used for the measuring insert sheath is stainless steel. Other materials may be offered on inquiry.

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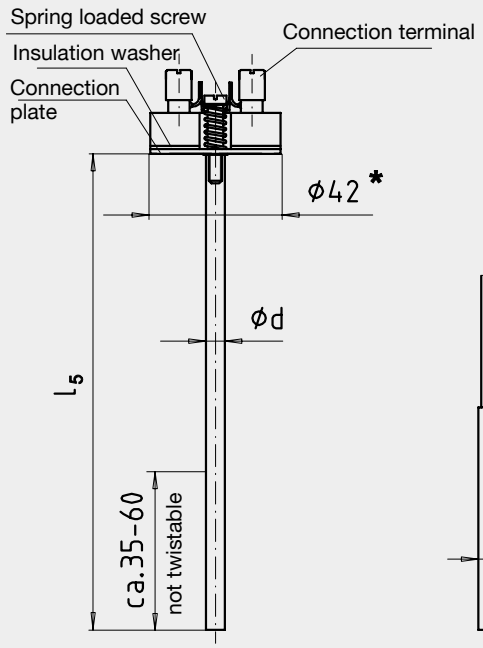
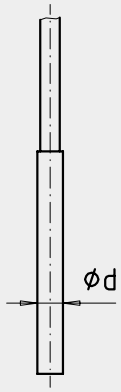
Dimensions in mm

Standard design

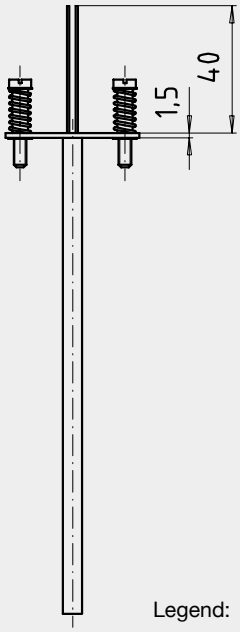


* 45 mm diameter with 2 x Pt 100 in 4 wire connection

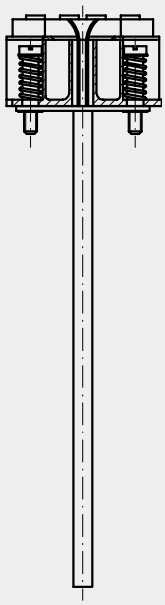


Measuring insert with tube (Model TR002 Ø d = 8 mm)

Design prepared for transmitter mounting



Design with mounted transmitter



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Legend:

l_5 Measuring insert length
Ø d Measuring insert diameter

Standard measuring insert length

Measuring insert Ø in mm	Standard measuring insert length in mm										
3	275	315		375		435					
6	275	315	345	375	405	435	525	555	585	655	735
8	275	315	345	375	405	435	525	555	585	655	735

The lengths specified in this table correspond to the standard lengths. Intermediate lengths or excess lengths are possible without any problems.

Possible combinations of measuring insert diameter, number of sensors and sensor method of connection

Measuring insert Ø in mm	Sensor / sensor method of connection 1 x Pt100			Sensor / sensor method of connection 2 x Pt100		
	2 wire	3 wire	4 wire	2 wire	3 wire	4 wire
3	x	x	x	x	x	-
6	x	x	x	x	x	x
8	x	x	x	x	x	x

Transmitter (option)

It is possible to build a transmitter onto the measuring insert. Doing so, the transmitter replaces the terminal block and is directly attached to the connection plate of the measuring insert.

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
T5350	Digital transmitter FOUNDATION Fieldbus and PROFIBUS PA	standard	TE 53.01

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Explosion protection (option)

Intrinsically safe designs are available for applications in hazardous areas. These measuring inserts are suitable for mounting (replacement demand) in type-examined thermometers. 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.

Attention!
In hazardous areas the use of a measuring insert without a suitable connection head (case) is not permissible!
Where required a suitable thermowell is to be used.

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Electrical connection

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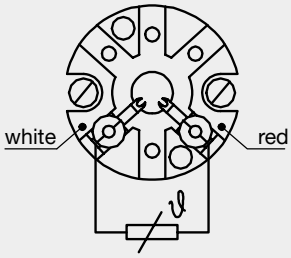
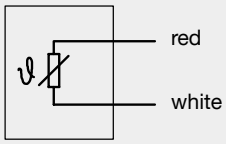
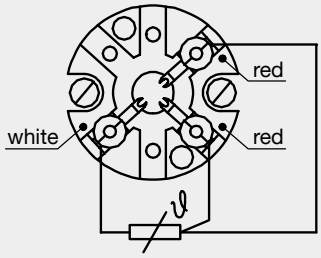
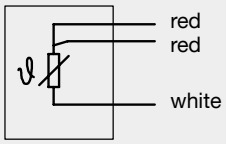
1 x Pt100, 2 wire



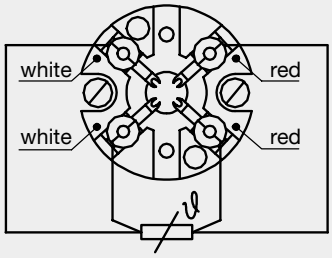


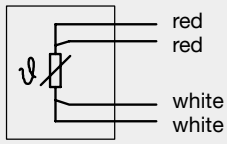
1 x Pt100, 3 wire



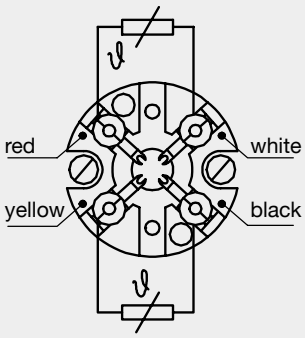


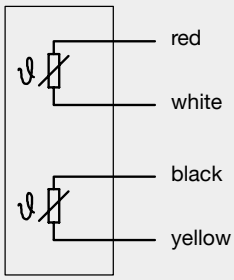
1 x Pt100, 4 wire



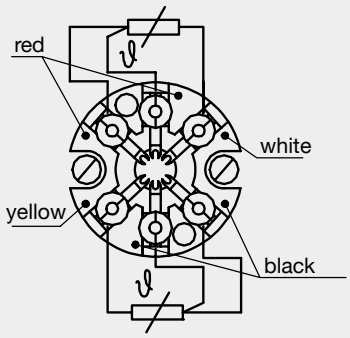


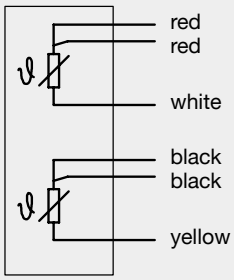
2 x Pt100, 2 wire



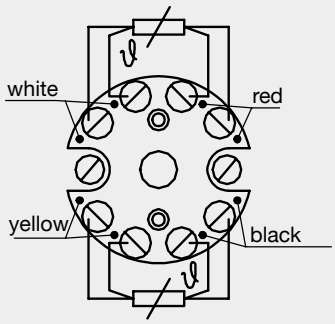


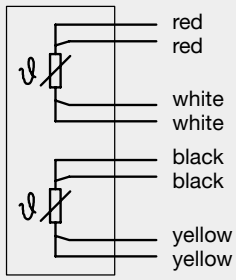
2 x Pt100, 3 wire





2 x Pt100, 4 wire





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Ordering information

Field No.		Code	Features	
			Explosion protection	
		Z	without	
1		**Y**	according to directive 94/9/EC (ATEX) EEx-i G for gases [1]	
			Type and number of sensors	
		1	1 x Pt 100 application range -50 °C ... +250 °C	
		2	2 x Pt 100 application range -50 °C ... +250 °C [2]	
		R	1 x Pt 100 application range -50 °C ... +450 °C	
		S	2 x Pt 100 application range -50 °C ... +450 °C [2]	
		5	1 x Pt 100 application range -200 °C ... +450 °C	
		6	2 x Pt 100 application range -200 °C ... +450 °C [2]	
		3	1 x Pt 100 application range -200 °C ... +600 °C	
		4	2 x Pt 100 application range -200 °C ... +600 °C [2]	
2		**?**	other	*please state as additional text*
			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 (-50 °C ... +450 °C)	*not with 2 wire connection*
		C	1/3 DIN B at 0 °C	*not with 2-wire connection*
4		**?**	other	*please state as additional text*
			Cable sheath material	
		T	stainless steel	
5		**?**	other	*please state as additional text*
			Measuring insert diameter	
		1	3 mm	*not with sensor 2 x Pt 100 with method of connection 4-wire*
		3	6 mm	
		4	8 mm	*tubing*
6		**?**	other	*please state as additional text*
			Measuring insert length	
		0275	275 mm	
		0285	285 mm	
		0315	315 mm	
		0345	345 mm	
		0375	375 mm	
		0405	405 mm	
		0435	435 mm	
		0525	525 mm	
		0555	555 mm	
		0585	585 mm	
		0655	655 mm	
			length in mm, e.g. 0290 for 290 mm	
7		**????**	longer than 9999 mm	
			Connection socket	
		1	42 mm diameter for connection head form B	
		2	replaced by transmitter	
8		**?**	other	*please state as additional text*
			Transmitter	
		ZZ	without	
9		**TA**	mounted on the measuring insert	

		Additional order info			
		YES	**NO**		
10		**T**	**Z**	quality certificates	*see price list*
11		**T**	**Z**	additional text	*Please state as clearly understandable text!!*

1) Please observe the operating instructions and the type examination certificate.
2) The combination of 2xPt100 / transmitter is not permissible.

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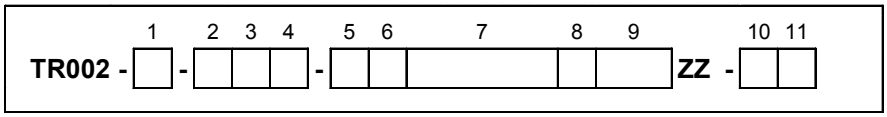
Order code:



Additional text: _____

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9015825 02/2005 GB

WIKA Alexander Wiegand GmbH & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg/Germany
Phone (+49) 93 72/132-0
Fax (+49) 93 72/132-406
E-Mail info@wika.de
www.wika.de