

## Resistance thermometer with protection tube, to DIN

**Sensor Pt 100 to DIN EN 60 751**

**Protection tubes to DIN 43 763**

**Terminal heads to DIN 43 729**

**High doomed lid for transmitter**

**Exchangeable measuring insert**

**Duplex sensor**

### PROFILE

Depending on version, platinum resistance thermometers can be used between -200 and +850 °C, whereby the sensor as also the protection tube is exposed directly to the temperature measured.

The type of sensor and the design of the protection tube are essential factors for the useful life of the sensor and for the stability of the measurement.

### DESCRIPTION

Protective fittings for industrial thermometers always consists of a protection tube and the termination head. Fitted inside the protection tube are one or two sensors. The termination head contains the connector block for connecting the leads (copper). The connector block can be replaced by a two-wire head transmitter.

More suitable and easier for mounting and service is the use of a head with high doomed lid which will take the transmitter instead.

This transmitter converts the RTD signal into a standardized temperature linear 4...20 mA signal.

Depending from application, resistance thermometers can be mounted in various ways, by means of an adjustable flange or an adjustable sheath mounting fitting; with a welded bush or by welding (the thermowell).

For the last mentioned type, the measuring insert is screwed into the the thermowell.

To reduce effects to the head and possibly to a built-in transmitter, a distance between mounting fitting and head is necessary. For fixed bushes this is between 120 and 140 mm.

### PRINCIPLE OF OPERATION

The resistance that electrical conductors exhibit to the flow of an electric current is related to their temperature. To measure the temperature, a constant current is passed through the sensor and the voltage developed across the sensor is measured. The passage of such a current will produce a heating effect and the temperature of the sensing element will be raised, thus the current should be kept as small as possible.

For temperature measurement, resistance thermometers are connected in 2-, 3- or even 4-wire configuration.

### THE 2-WIRE CONFIGURATION

Between sensor and electronics a two wire connection is used. The resistance of the connecting wires is always included with that of the sensor. To compensate for, with modern transmitters, the lead resistance is programmed during commissioning of the transmitter, which corrects the output signal accordingly. The temperature effect of the lead resistance cannot be compensated for.

THE 3-WIRE CONFIGURATION

Here the two leads to the sensor are on either side of the measuring input and thus effectively cancel, while the third lead functions as the extended supply lead. This works under the condition that the characteristics of all three leads is similar. Temperature effects will be compensated for.

THE 4-WIRE CONFIGURATION

The best method of resistance determination. The measuring result is neither effected by lead resistance nor by temperature effects onto the leads.

- It must be considered, that with 3- as also with 4-wire configuration the leads are not always connected to the sensor itself. Is the connection from the terminal block to the sensor done with two leads, the effects, as described above, to a very small extent, are still present.

TECHNICAL DATA

RESISTANCE THERMOMETER DETECTOR (RTD)

MEASURING SENSOR:

Platinum resistance sensor to DIN EN 60 751 Pt100 Ω at 0°C, class B

Tolerance: ± (0.3+0.005\*[t])°C

Coefficient: α = 0.385 Ω/K

Depending on version, there can be up to two sensors mounted inside one protection tube.

PROTECTION TUBE

FORM BM

For temperatures ≤ 600 °C, Stainless steel SS 316 Ti (material no. 1.4571), 15 x 2 mm (fig.1)

Mounting: with adjustable flange or adjustable compression fitting (fig 5, 8)

Fig. 1 protective tube form BM

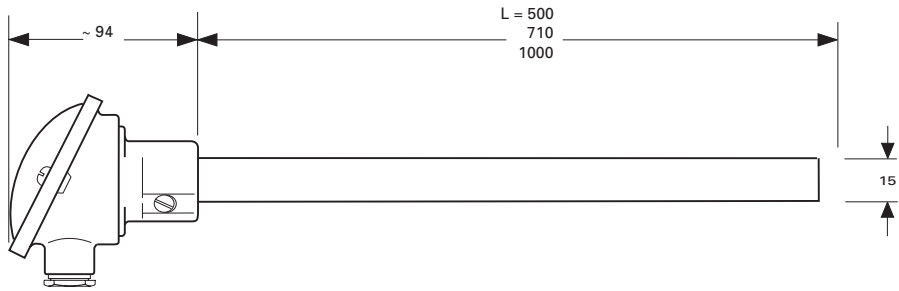


Fig. 2 protective tube form B

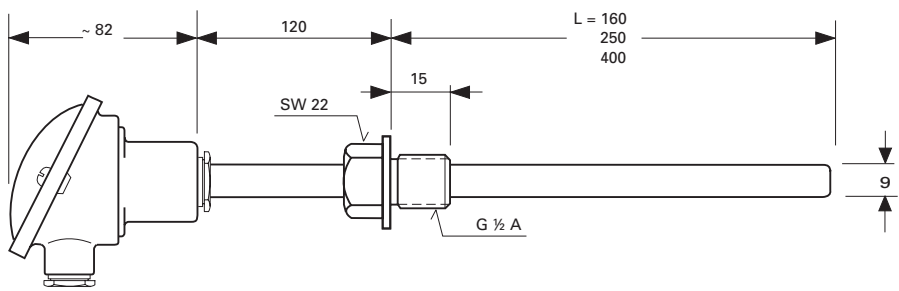
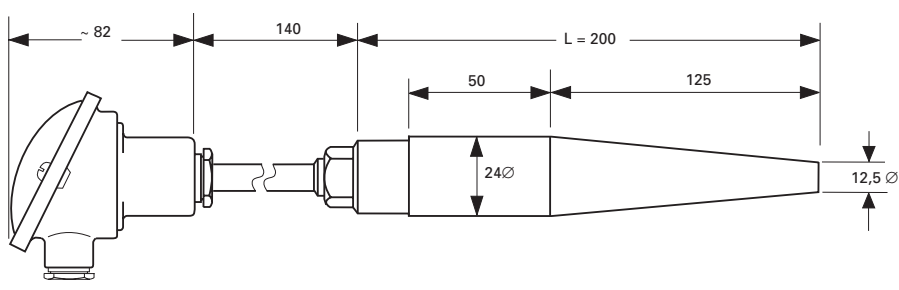


Fig. 3 protective tube form D (2)



FORM B

Stainless steel 1.4571 (SS316Ti), 9 x 1 mm (fig. 2)

Operating limits

Medium	Temperature	Pressure
Water	200 °C	43 bar
Air	400 °C	36.5 bar

Mounting: tapered bush, welded to stem, G 1/2 A

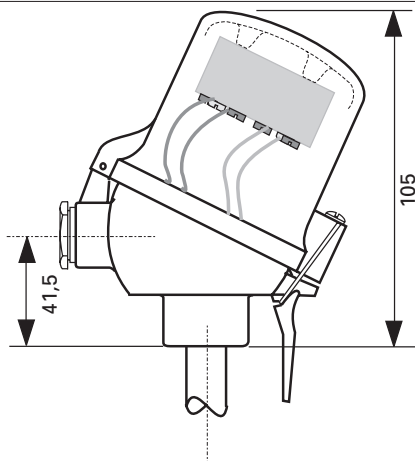
FORM D (2)

Steel 13CrMo 44, material no. 1.7335 (fig. 3)

Operating limits

Medium / speed	Temperature	Pressure
In water, V <sub>max</sub> ≤ 5 m/s	350 °C	450 bar
In steam respect. air, V <sub>max</sub> ≤ 60 m/s	500 °C	225 bar
	525 °C	180 bar
	540 °C	136 bar

Fig. 4 Termination head high doomed



### TERMINATION HEAD

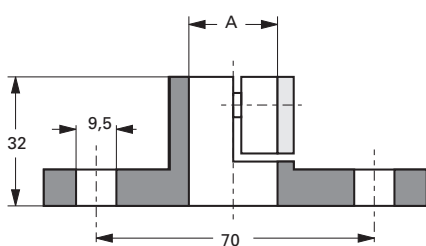
Weather proof die cast alloy to DIN 43 729, M24 x 1.5 tube entry  
Mode of protection to IP 54, cable entry PG 16

Either with standard cover (flat, fig. 1 to 3) or for mounting of one or two head transmitters with high doomed cover IP 65 (fig. 4).

### ACCESSORIES

Adjustable flange (fig. 5)  
Adjustable compression fitting (fig. 8)  
Head transmitter (see separate data sheets for RT-Flex, UNIFLEX T, Tiso)

Fig. 5 adjustable flange



A	Tube	Order-no
16 mm	15	9404-193-50031
22 mm	22	9404-193-50041
33 mm	32	9404-193-50051

Fig. 6 Connections 2-wire configuration

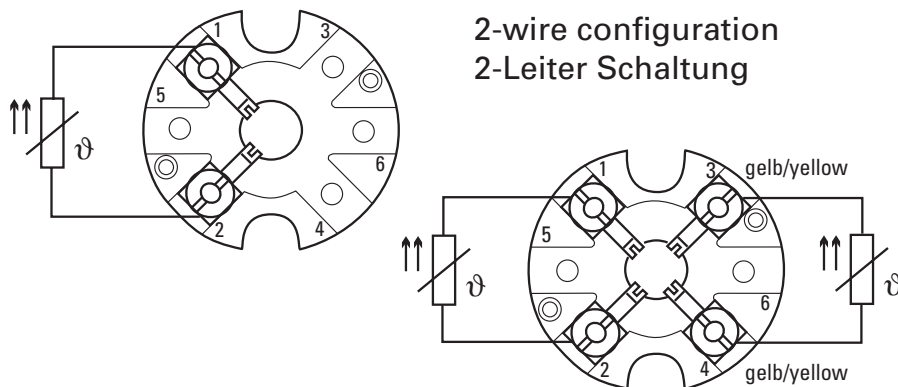
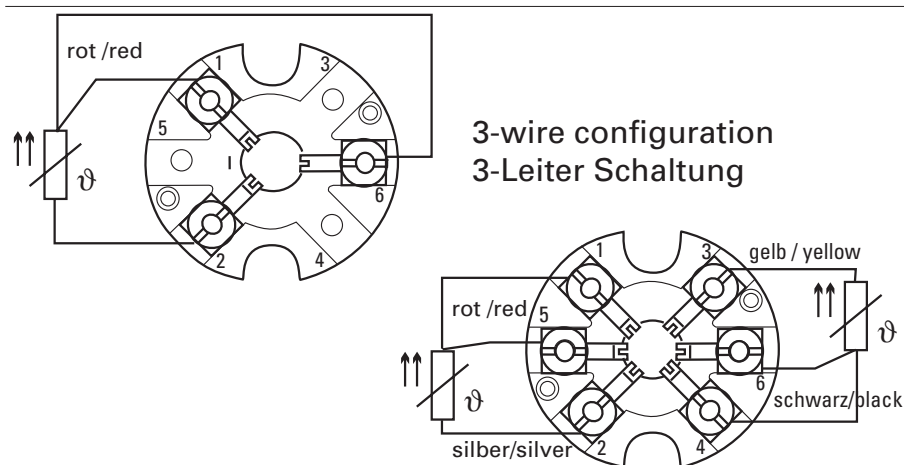


Fig. 7 Connections 3-wire configuration



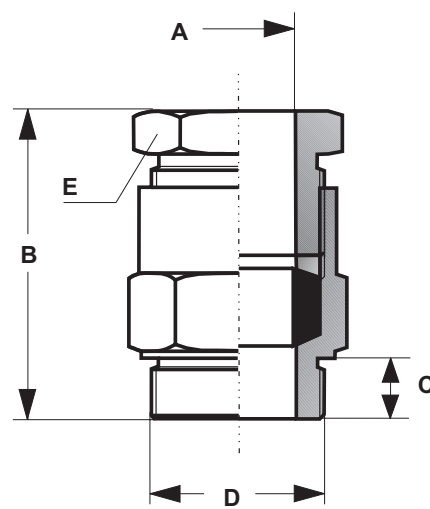
### ELECTRICAL CONNECTION

Connection to measuring and control system with copper leads.  
With built-in head transmitter - copper.

**Weight:** see version list

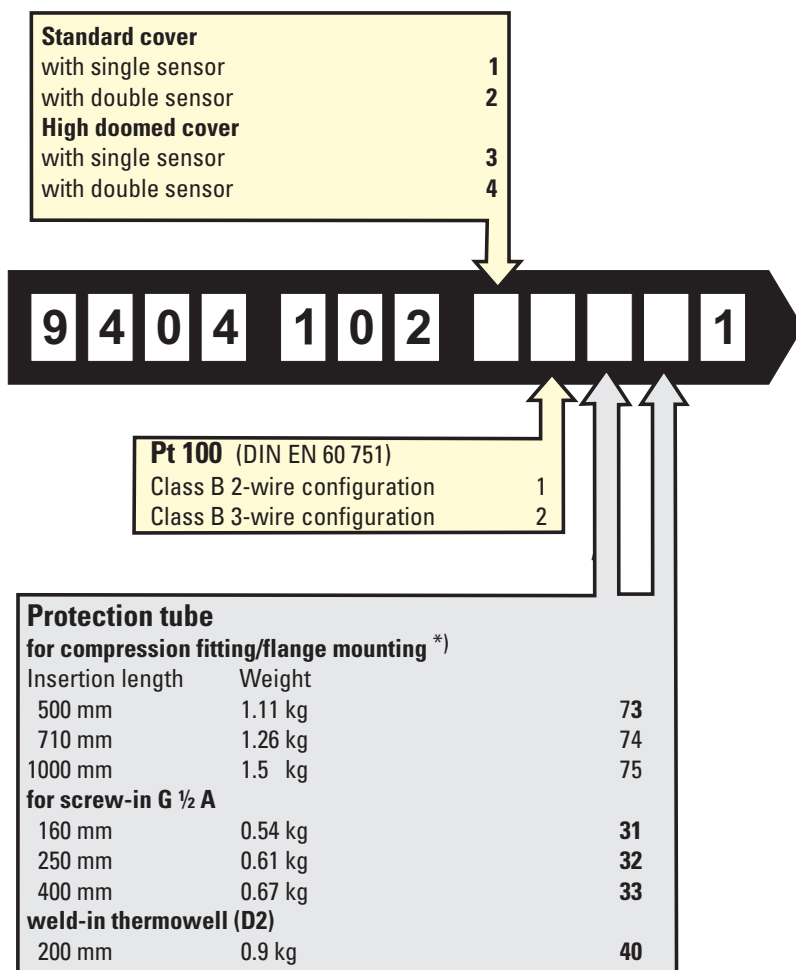
**Operating conditions:** see protection tube

Fig. 8 adjustable compression fitting



A	B	C	D	E	Order-no
16.5	78	17	G½A	SW27	9404-193-50231
23.5	88	20	G1A	SW36	9404-193-50241
33	111	25	G1¼A	SW46	9404-193-50251

## ORDERING STRUCTURE



\*) Standard = 3-wire configuration



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