

Pipe surface resistance thermometers Model TR51, for clamping

WIKA data sheet TE 60.51

Applications

- Sanitary applications
- Pharmaceutical industry
- Food and beverage

Special features

- No intrusion into the pipeline
- High accuracy measurement of the surface temperature of a pipeline
- Measuring insert removable and calibrateable



Pipe surface resistance thermometer, model TR51

Description

Resistance thermometers in this series have been developed for process control and monitoring of temperature, mainly in the sterile process industry sector and the pharmaceutical industry.

The TR51 resistance thermometer can be retrofitted to an existing pipe, without opening or interrupting the process. The pipe surface resistance thermometer can be used in a temperature range from -20 ... +160 °C.

The measuring resistor is pressed onto the pipe by a clamping fixture. The plastic clamping ring serves as the attachment and the thermal insulation from the ambient temperature.

The measuring insert can be removed for calibration.

Sensor

The sensor is located in the measuring insert. This is exchangeable and spring-loaded.

Sensor method of connection

- 2-wire The lead resistance is recorded as an error in the measurement.
- 3-wire With a cable length of approx. 30 m or longer measuring deviations can occur.
- 4-wire The inner lead resistance of the connecting wires is negligible.

Tolerance value of the sensor to DIN EN 60751

- Class B
- Class A

The combination of a 2-wire connection with Class A is not permissible, because the lead resistance of the measuring insert overrides the higher sensor accuracy.

For detailed specifications for Pt100 sensors, see Technical Information IN 00.17 at www.wika.com.

Explanatory notes on measurement accuracy and calibration

As far as the TR51 series of pipe surface resistance thermometers are concerned, these must be treated as different to a thermometer, whose vulnerable tip extends into the process. How significant the pipe surface temperature is for the process temperature (inside the pipeline) depends on many factors.

The accuracy of the thermometer's sensor components therefore have the lowest influence!

The following parameters are important:

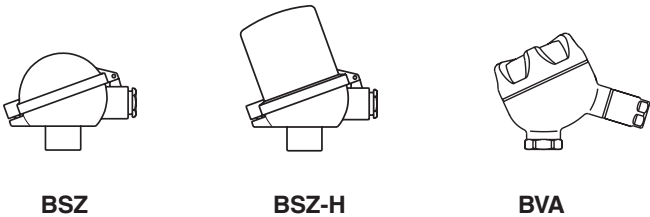
- Temperature difference between measuring point – environment
- Fluctuations in the ambient temperature
- Pipe material
- Insulation of the measuring point

The unavoidable and physical "Heat Dissipation Error" can also be taken into account through the recalibration of the TR51. As a rule, the temperature on the pipe's surface differs from internal temperature, thus an 'internal against external' calibration is not permitted!

Only a calibration with a reference sensor on the surface of the relevant pipe is meaningful, though more-accurate results can be obtained through removing the measuring inserts and checking them in a calibration bath or block calibrator.

Following an external calibration, the measuring insert should have fresh thermal grease applied.

Connection head



Model	Material	Cable entry	Ingress protection	Cap	Surface finish
BSZ	Aluminium	M20 x 1.5 ¹⁾	IP 65	Flap cap with screw	blue, painted ²⁾
BSZ-H	Aluminium	M20 x 1.5 ¹⁾	IP 65	Flap cap with screw	blue, painted ²⁾
BVA	Stainless steel	M20 x 1.5 ¹⁾	IP 65	Screw cap	blank

¹⁾ Standard

²⁾ RAL5022, polyester paint saltwater-proof

Connection head with digital indicator (option)

As an optional alternative to the standard connection head, the thermometer may be fitted with a DIH10 digital indicator. The connection head used in this case is similar to the model BSZ-H head. For operation, a 4 ... 20 mA transmitter is required, which is fitted to the measuring insert. The indication range is configured identically to the measuring range of the transmitter.



Fig. connection head with digital indicator, model DIH10

Transmitter (option)

Depending on used connection head a transmitter can be mounted into the thermometer.

- Fitted instead of terminal block
- Mounted within the cap of the connection head
- Fitting not possible

Mounting of 2 transmitters on request.

Connection head	Transmitter model				
	T12	T19	T24	T32	T53
BS	-	○	○	-	○
BSZ / BSZ-K	○	○	○	○	○
BSZ-H / BSZ-HK	●	●	●	●	●
BSS	○	○	○	○	○
BSS-H	●	●	●	●	●
BVA	○	○	○	○	○

Model	Description	Data sheet
T19	Analogue transmitter, configurable	TE 19.03
T24	Analogue transmitter, PC-configurable	TE 24.01
T12	Digital transmitter, PC-configurable	TE 12.03
T32	Digital transmitter, HART® protocol	TE 32.04
T53	Digital transmitter FOUNDATION™ Fieldbus and PROFIBUS® PA	TE 53.01

Neck tube

The neck tube is screwed into the connection head, where M24 x 1.5 is the usual industry standard. The neck length depends on the intended use. Usually an isolation is bridged by the neck tube. Also, in many cases, the neck tube serves as a cooling extension between the connection head and the medium, in order to protect any possible built-in transmitter from high medium temperatures. The standard material for neck tubes is stainless steel.

Design and sensors

The pipe surface resistance thermometers of the TR51 series consist of a connection head with neck tube and a spring-loaded measuring insert, and also a clamp body in plastic, which sits tightly against the pipe.

Process connection

The pipe surface resistance thermometers are individually manufactured to customer wishes for fitting to existing pipelines. For a TR51 order, the specification of the correct external pipe diameter is essential.

The measurement accuracy will be significantly influenced by the choice of mounting site.

Thus you should take into account that the installation on non-cylindrical pipes or pipe elbows leads to heat losses and a higher measurement uncertainty. Optimum measurement results are achieved through installation on precise, round pipe sections.

In the vicinity of heavy, metallic components (such as valves, etc.) there can be a delayed response time in these circumstances.

Mounting

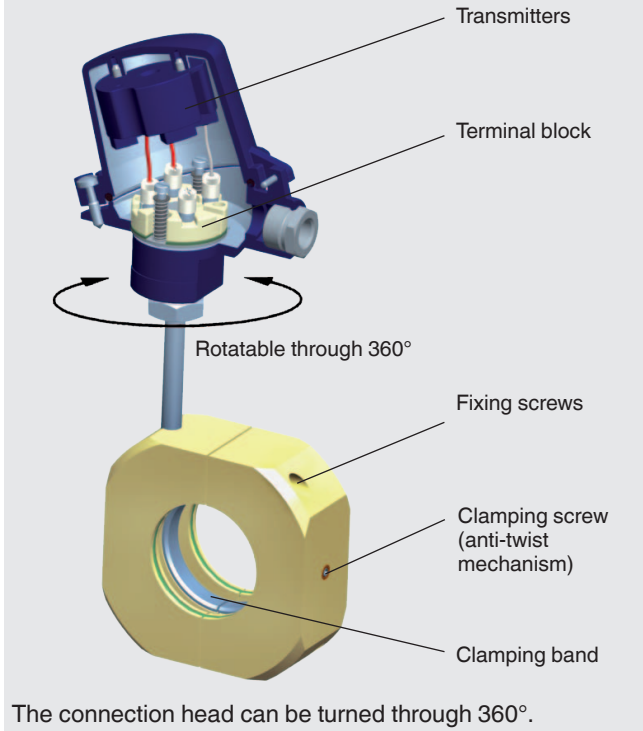
The plastic terminal block can be split into two halves by loosening the internal nuts.

Side A holds the clamping band to hold on the sensors and the thermometer connection head, Side B acts as the mounting and thermal insulation.

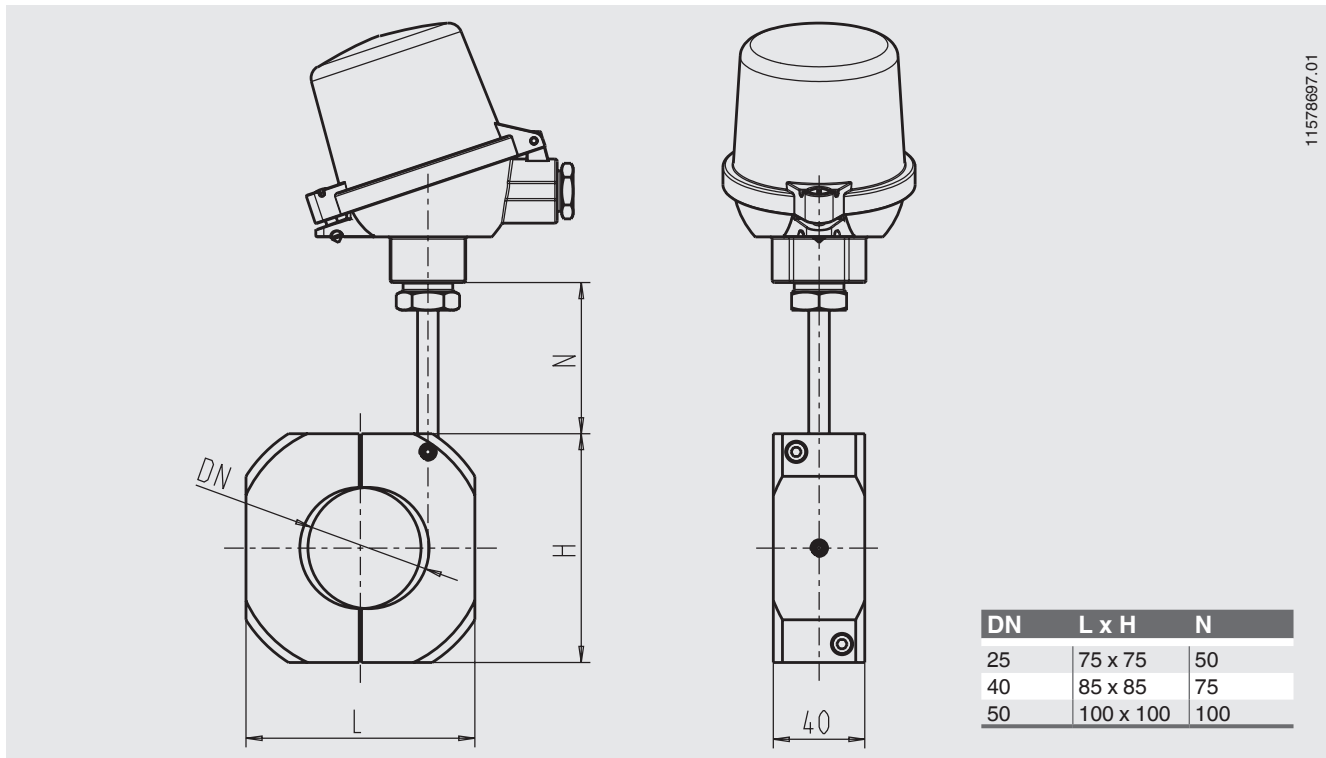
For pipelines which are not entirely full, the clamping band must be placed on the underside of the pipe. The heat transfer from the pipe can be improved by the application of a suitable thermal grease.

Bringing together the two halves (A+B), the pipe will be clamped. The anti-twist mechanism prevents the equipment slipping on heating.

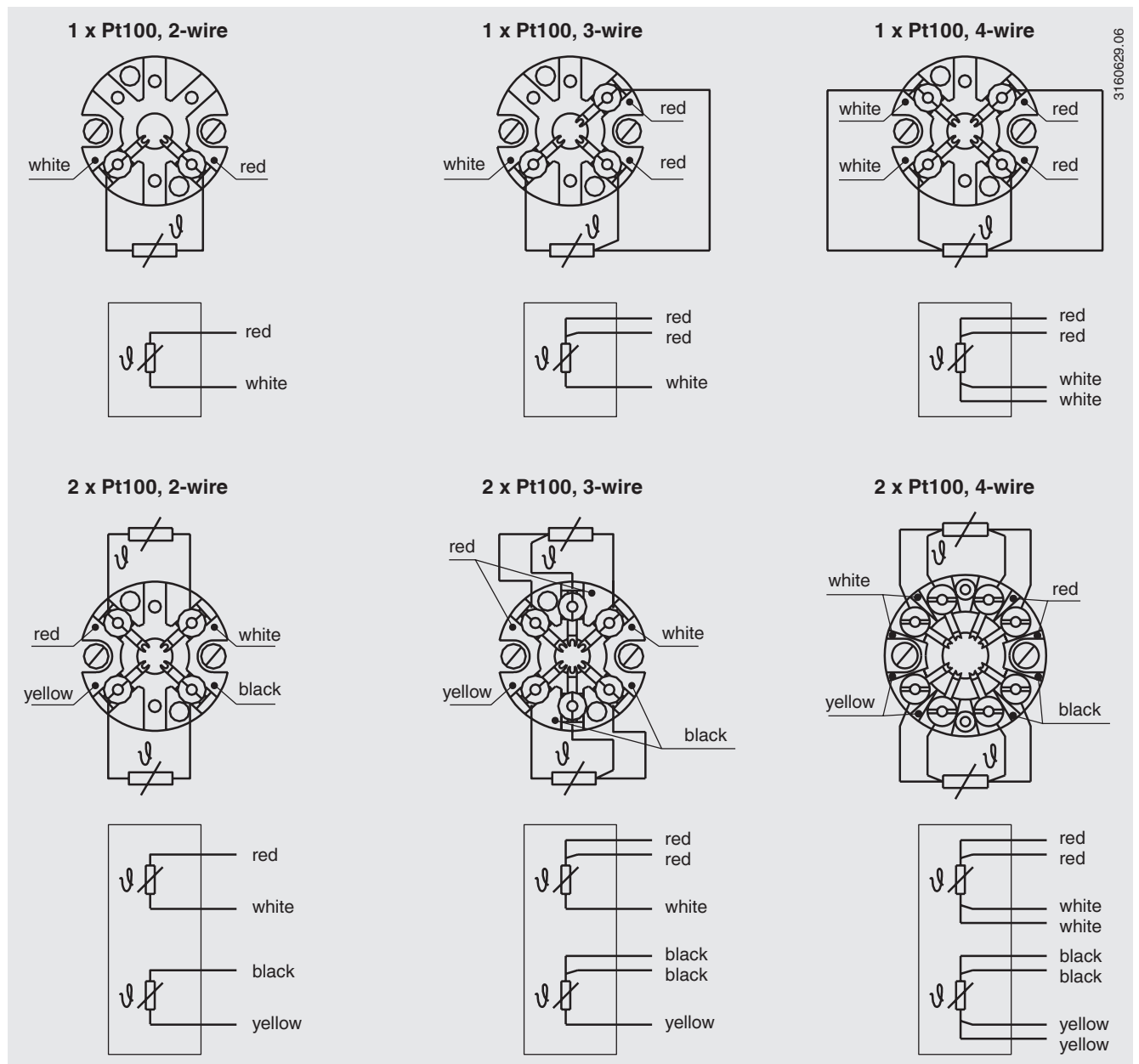
Mounting example



Dimensions in mm



Electrical connection



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For the electrical connections of built-in temperature transmitters see the corresponding data sheets or operating instructions.

Ordering information

Model / Connection head / Female thread at the connection head / Terminal block, transmitter / Process connection, outer diameter of the pipe / Neck tube, neck tube length / Measuring element / Connection method / Temperature range / Certificates / Options

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