

# Electrical Cable Thermometers for Shipbuilding Industry

## Model TC191, Thermocouples with Compression Fitting

## Model TR191, Resistance Thermometers with Compression Fitting

WIKA Data Sheet TE 69.01



### Applications

- Exhaust gas temperature measurement on diesel engines and turbines
- For onshore / offshore applications

### Special Features

- Ingress protection IP 67
- Shock and vibration resistant per DIN 60 751 and IEC 751
- Quick response time, tapered thermowell
- Media temperatures:
  - TC191: 0 °C ... 850 °C
  - TR191: 0 °C ... 600 °C
- Approvals:
  - TC191: DNV, Germanischer Lloyd and Lloyd's Register
  - TR191: Germanischer Lloyd

### Description

The thermowells are designed for loads on small to medium sized machines.

The adjustable process connection is compression gland fitted to the thermowell, thus allowing a variable insertion length which can be easily adapted to different insertion dimensions.

These thermocouples are available in two designs – straight and 90° angled.



Fig. above: Cable Thermometer Model TC191 or TR191, Angled Design

Fig. below: Cable Thermometer Model TC191 or TR191, Straight Design

## Sensor Thermocouples with Model TC191

### Type

- K (NiCr-Ni) application range up to 850 °C
- J (Fe-CuNi) application range up to 600 °C

Available as simplex thermocouple. The hot junction of the probe is supplied ungrounded.

### Sensor limited error

A cold junction temperature of 0 °C is taken as basis with the definition of the sensor limited error of thermocouples.

#### Type K DIN EN 60 584 part 2

Class	Temperature range	Limited error
2	-40 °C ... +333 °C	± 2.5 °C
2	+333 °C ... +1200 °C	± 0.0075 ·  t  <sup>1)</sup>

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

#### Typ J DIN EN 60 584 Teil 2

Class	Temperature range	Limited error
2	-40 °C ... +333 °C	± 2.5 °C
2	+333 °C ... +750 °C	± 0.0075 ·  t  <sup>1)</sup>

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

### Limited error with selected temperatures in °C

Temperature (ITS 90) °C	Limited error DIN EN 60 584 class 2	
	Type K °C	Type J °C
0	± 2.5 °C	± 2.5 °C
200	± 2.5 °C	± 2.5 °C
400	± 3 °C	± 3 °C
600	± 4.5 °C	± 4.5 °C
800	± 6 °C	not defined

## Sensor Pt100 with Model TR191

### Sensor limited error

- Class B per DIN EN 60 751

### 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.

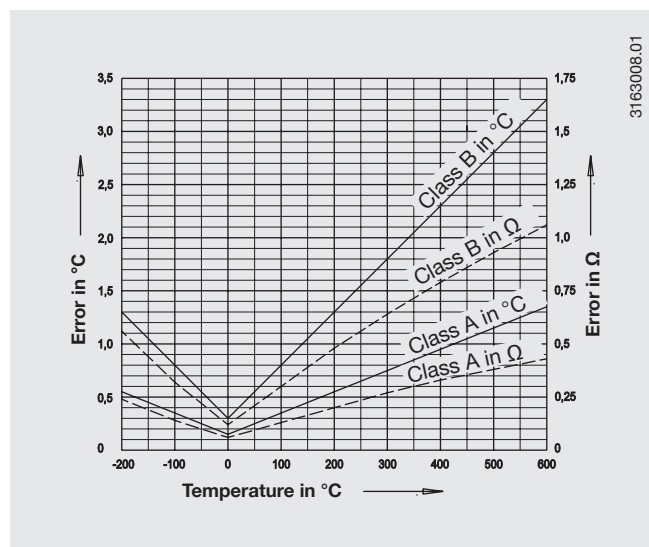
The temperature coefficient α can be stated simply to be between 0 °C and 100 °C with:

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

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	Limited error in °C
A	0.15 + 0.002 ·  t  <sup>1)</sup>
B	0.3 + 0.005 ·  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 °C		Class B °C	
0	100	± 0.15	± 0.06	± 0.3	± 0.12
100	138.51	± 0.35	± 0.13	± 0.8	± 0.30
200	175.86	± 0.55	± 0.20	± 1.3	± 0.48
400	247.09	± 0.95	± 0.33	± 2.3	± 0.79
600	313.71	± 1.35	± 0.43	± 3.3	± 1.06

## Process connection

### Model TC191 and Model TR191

Connection design: Male thread  
Material: Stainless steel 1.4571  
Thread: G ½ B, G ¾ B or M18 x 1.5  
other versions on request

## Thermowell

### Model TC191 and Model TR191

Design: Of bar stock  
Material: Stainless steel 1.4571  
Diameter: 15 mm, tapered to 12 mm  
18 mm, tapered to 12 mm  
22 mm, tapered to 15 mm  
Insertion length: 100 mm, 120 mm, 150 mm, 160 mm,  
200 mm, 250 mm  
other versions on request

## Cable

### Model TC191

Isulation: Silicone-glass filament  
Armour: Steel braid, zinc galvanized  
Cable relief: Spring  
Permissible ambient temperature: -50 °C ... +200 °C  
Core material: Compensating cable according to type  
of sensor (lead)  
Core cross section: 1.5 mm<sup>2</sup>  
Number of cores: 2  
Wire ends: blank / end sleeve / cable shoe  
(option)  
Cable length: to customer's specification

### Model TR191

Isulation: PTFE- glass filament  
Armour: Steel braid, zinc galvanized  
Cable relief: Spring  
Permissible ambient temperature: -200 °C ... +250 °C  
Core material: Cu (lead)  
Core cross section: 0.5 mm<sup>2</sup>  
Number of cores: 4  
Wire ends: blank / end sleeve / cable shoe  
(option)  
Cable length: to customer's specification

## Cable probes with field case (option)

### Model TC191 and Model TR191

Material: Aluminium, epoxy coated  
Cap: Detachable, 2 fixing screws,  
EPDM flat seal  
Cable glands: Pg 16  
Ingress protection: IP 67  
Terminal block: Ceramic, max. 1.5 mm<sup>2</sup>,  
screws captive  
Ground terminal: included

## Transmitter (option)

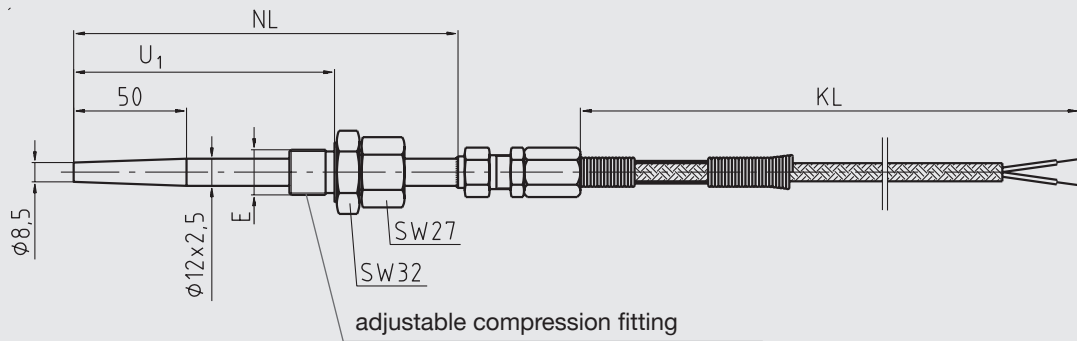
### Model TR191

An optional transmitter can be mounted in the junctionbox.  
The T24 is available with a separate GL-approval.

# Dimensions in mm

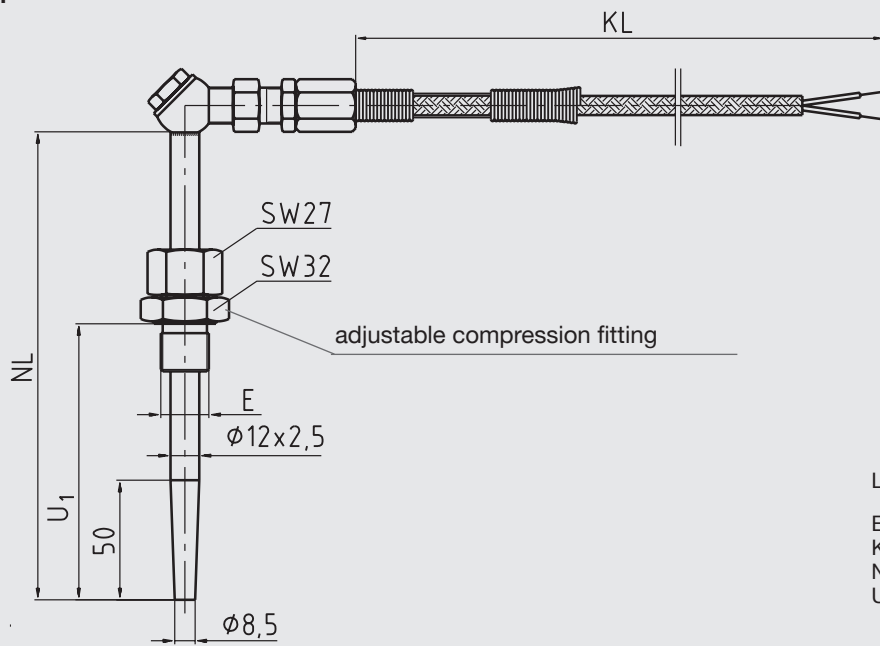
## Model TC191 and TR191

### Straight design



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### Angled design

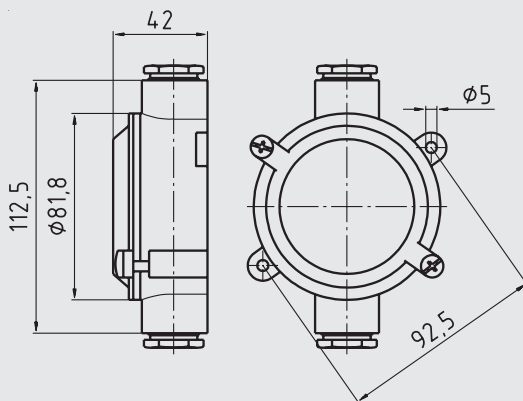


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Legend:

- E Thread
- KL Cable length
- NL Nominal length
- U<sub>1</sub> Insertion length

### Field case

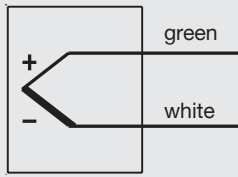


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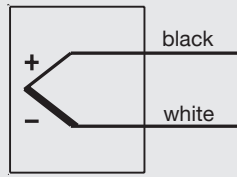
# Electrical connection

## Model TC191 with cable

Sensor Type K



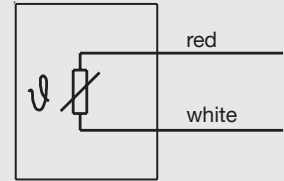
Sensor Type J



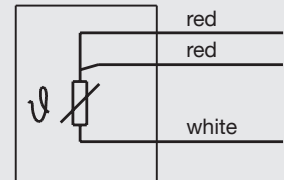
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## Model TR191 with cable

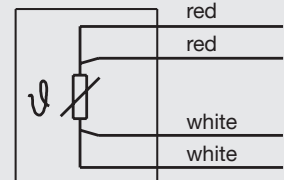
1 x Pt100  
2-wire



1 x Pt100  
3-wire



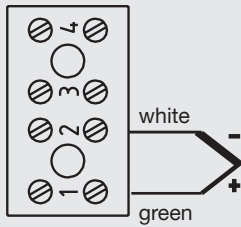
1 x Pt100  
4-wire



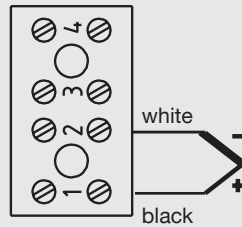
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## Model TC191 with terminal block in field case

Sensor Type K



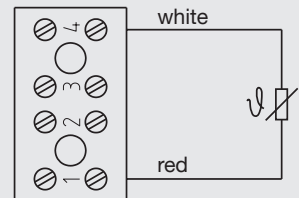
Sensor Type J



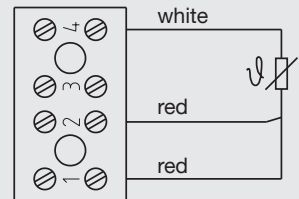
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## Model TR191 with terminal block in field case

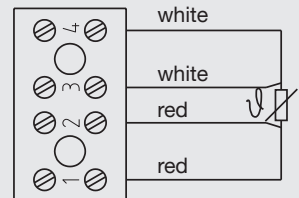
1 x Pt100  
2-wire



1 x Pt100  
3-wire



1 x Pt100  
4-wire



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Modifications may take place and materials specified may be replaced by others without prior notice.  
Specifications and dimensions given in this leaflet represent the state of engineering at the time of printing.



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