

Analogue Temperature Transmitter

Configurable Ranges, Head Mounting

for Pt100 Resistance Thermometers

for Thermocouples

Model T19

Electrical Temperature Measurement



Applications

- Plant construction
- Power engineering
- Heating, ventilation, air-conditioning, refrigeration

Special Features

- Designs for Pt100 or thermocouples
- Configurable measuring ranges (bridges)
- Output 4 ... 20 mA, 2 wire design
- Fault signal for sensor burnout and sensor short circuiting
- Large ambient temperature range
- Compact and reasonably priced



Description

The transmitters in the T19 series are provided with configurable ranges. One of several available measuring ranges can be selected simply by setting solder bridges. Therefore, these transmitters are especially suitable for applications where frequently changing requirements have to be taken into account.

These temperature transmitters serve to convert temperature-dependent changes in resistance in the case of resistance thermometers or temperature-dependent changes in voltage in the case of thermocouples into a 4 ... 20 mA loop signal. This method guarantees an easy and reliable transmission of the temperature values measured.

Accuracy, sensor monitoring and the permissible ambient conditions are matched to the requirements of industrial applications. The case is designed as a head-mounted transmitter for direct installation into the temperature probe and can be mounted into any DIN connection head of form B with no problem.

Also available as rail mounting version:
model T19.30, see data sheet TE 19.02.

Specifications

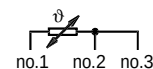
Specifications		Model T19			
Input		Pt 100	DIN IEC 751	2- or 3-lead	thermocouples DIN IEC 584
possible measuring ranges, configurable		measuring ranges small from - 50 °C up to +200 °C	measuring ranges large from - 50 °C up to +400 °C	measuring ranges for HVAC from - 30 °C up to + 120 °C	type T, J, K, S dependent upon type of thermocouple, see last page from - 100 °C up to + 1500 °C
selection of measuring range		via solder bridges			
standard measuring ranges		see last page			
special measuring ranges		on request (special measuring ranges cannot be reconfigured)			
adjustment range					
zero potentiometer (Z)		approx. ± 10 °C	approx. ± 25 °C	approx. ± 30 °C	approx. ± 40 °C
span potentiometer (SP)		approx. 10 %			
sensor current		approx. 0.8 mA			—
cold junction compensation		—			yes
input connection leads					
effect		± 0.2 K / 10 Ω ¹⁾			± 0.2 K / 10 Ω
permissible load resistance		30 Ω	each lead, 3-lead symmetric		500 Ω total resistance
Analogue output		4 ... 20 mA 2 wire design			
linearisation		proportional to temperature per DIN IEC 751			proportional to voltage
measuring deviation per DIN IEC 770		± 0.5 % ²⁾			
linearity error		± 0.1 % ³⁾			—
amplification error		—			± 0.1 %
temperature coefficient T_C	zero	± 0.1 % / 10 K T_{amb} or ⁴⁾ ± 0.2 K / 10 K T_{amb}			± 0.1 % / 10 K T_{amb} or ⁴⁾ ± 25 µV / 10 K T_{amb}
	span	0.2 % / 10 K T_{amb}			0.2 % / 10 K T_{amb}
error effect of cold junction compensation		—			at T_{amb} -20 ... +60 °C ± 1.0 K at T_{amb} -40 ... +85 °C ± 2.0 K
rising time t_{90}		< 1 ms			
switch-on delay, electric		< 10 ms			
signalling with sensor burnout		down scale, < 3 mA ⁵⁾			up scale, > 23.5 mA
with sensor short circuit		down scale, < 3 mA ⁶⁾			—
load R_A		$R_A \leq (U_B - 10 V) / 0.02 A$ with R_A in Ω and U_B in V			
load effect		± 0.05 % / 100 Ω			
power supply effect		± 0.025 % / V			
Power supply U_B		DC 10 ... 30 V by 4 ... 20 mA-loop			
input power supply protection		reverse polarity			
Electromagnetic compatibility (EMC)		CE- Conformity per EN 50 082-2 (March 95)			
Special features					
ambient and storage temperature		-40 ... +85 °C			
climate class		Cx (-40 ... +85 °C, 5 % up to 95 % relative humidity) DIN EN 60654-1			
maximum permissible humidity		95 % relative humidity, noncondensing DIN IEC 68-2-30 Var. 2			
vibration		10 ... 2000 Hz 5 g DIN IEC 68-2-6			
shock		DIN IEC 68-2-27 $g_N = 15$			
Case		head mounting design			
material		polyamide, glass fibre reinforced			
ingress protection	case	IP 40	IEC 529 / EN 60 529		
	terminal con.	IP 00	IEC 529 / EN 60 529		
cross section of terminal connectors		0.14 ... 1.5 mm ²			
weight		approx. 0.03 kg			
dimensions		see drawings			

Specifications in % refer to the measuring span

R_A load
 T_{amb} ambient temperature
 T_C temperature coefficient
 U_B loop power supply voltage, see power supply

- 1) for Pt100 in 3-lead connection, for Pt100 in 2-lead connection lead resistance counts fully towards error
- 2) with factory configured measuring range, value is valid at ambient temperature 23 °C ± 5 K
- 3) ± 0.15 % with measuring range 0 ... 50 °C, 0 ... 300 °C, 0 ... 350 °C
- 4) whichever is greater
- 5) up scale, in case only lead no. 1 open
- 6) temperature value, in case of short between leads no. 2 and no. 3 (operation of Pt100 in 2-lead connection)

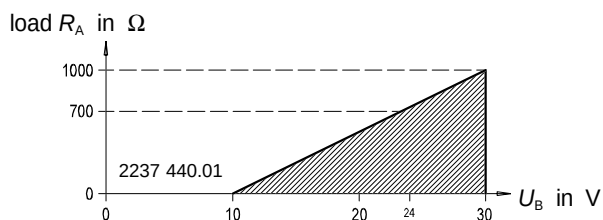
legend of lead number:



1375 890

Load diagram

The permissible load is dependent upon the loop power supply voltage.



Transmitter configuration

- ① Remove case bottom
- ② Set solder bridges for desired measuring range in accordance with the tables
- ③ Snapfit bottom to the case again
- ④ Adjust zero and span by means of potentiometer

Pt 100 meas. ranges small Model T19.10.1P0-1	
measuring range	bridge
- 50 ... + 50 °C	1●●2 50●6 3●●4 70●8
0 ... 50 °C	1●●2 50●6 3●●4 70●8
0 ... 100 °C	1●●2 50●6 3●●4 70●8
0 ... 120 °C	1●●2 50●6 3●●4 70●8
0 ... 150 °C	1●●2 50●6 3●●4 70●8
0 ... 200 °C	1002 5006 3004 7008

Pt 100 meas. ranges large Model T19.10.1P0-2	
measuring range	bridge
- 50 ... + 200 °C	1●●2 50●6 3●●4 70●8
0 ... 200 °C	1●●2 50●6 3●●4 70●8
0 ... 250 °C	1●●2 50●6 3●●4 70●8
0 ... 300 °C	1●●2 50●6 3●●4 70●8
0 ... 350 °C	1●●2 50●6 3●●4 70●8
0 ... 400 °C	1002 5006 3004 7008

Pt 100 meas. ranges for HVAC Model T19.10.1P0-3	
measuring range	bridge
- 30 ... + 30 °C	1●●2 50●6 3●●4 70●8
- 30 ... + 50 °C	1●●2 50●6 3●●4 70●8
0 ... 60 °C	1●●2 50●6 3●●4 70●8
0 ... 80 °C	1●●2 50●6 3●●4 70●8
0 ... 100 °C	1●●2 50●6 3●●4 70●8
0 ... 120 °C	1002 5006 3004 7008

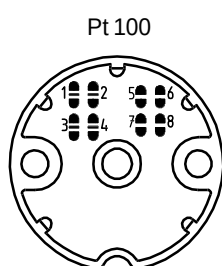
Thermocouple type T Model T19.10.3T0-4	
measuring range	bridge
- 100 ... + 200 °C	1●●03
- 100 ... + 300 °C	10003
0 ... 400 °C	100●3

Thermocouple type J Model T19.10.3J0-4	
measuring range	bridge
0 ... 350 °C	1●●03
0 ... 550 °C	10003
0 ... 700 °C	10003

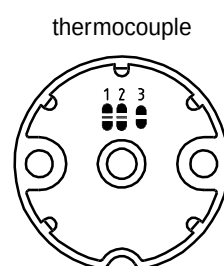
Thermocouple type K Model T19.10.3K0-4	
measuring range	bridge
0 ... 300 °C	1●●03
0 ... 600 °C	10003
0 ... 1200 °C	10003

Thermocouple type S Model T19.10.3S0-4	
measuring range	bridge
0 ... 1500 °C	10003

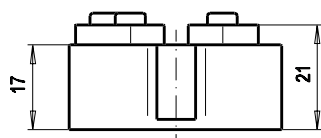
Bridge positions



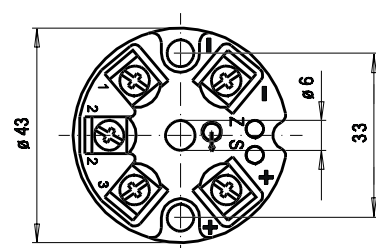
2225 328.01



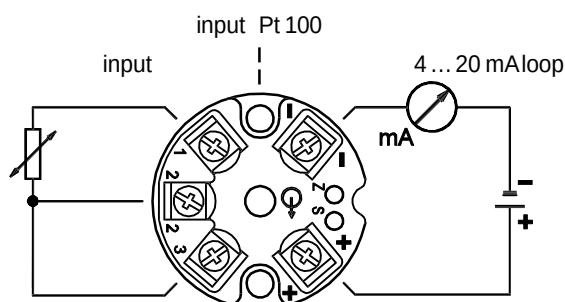
Dimensions in mm



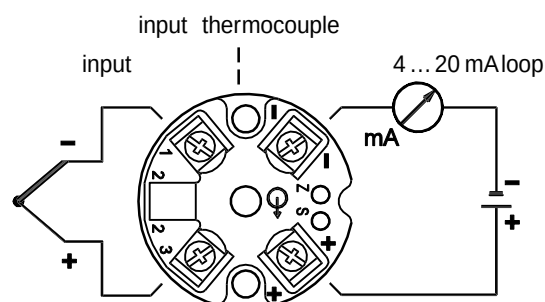
2226 120.02



Designation of terminal connectors



2225 352.01



Order code for temperature transmitter Model T19

Field No.	Code	Instrument design
		Input
	1P	resistance thermometer Pt 100
	3T	thermocouple type T (Cu-CuNi)
	3J	thermocouple type J (Fe-CuNi)
	3K	thermocouple type K (NiCr-Ni)
	3S	thermocouple type S (PtRh-Pt)
1	??	other <i>please state as additional text</i>
		Application
	1	Pt100 measuring ranges small up to 200 °C (configurable through solder bridges)
	2	Pt100 measuring ranges large up to 200 °C (configurable through solder bridges)
	3	Pt100 measuring ranges for HVAC up to 120 °C (configurable through solder bridges)
	4	thermocouple measuring ranges (configurable through solder bridges)
2	9	special measuring ranges (not reconfigurable)
		Measuring range
	NK	not configured
		configured (standard measuring range) <i>codes see below</i>
3	??	configured (special measuring range) <i>please state as additional text</i>
		Additional order details
	YES	NO
4	T	Z
		additional text <i>Please state in clearly understandable text !</i>

Order code for Model T19

T19.10	-	1	0	-	2	3	-	4
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Additional text: _____

Mounting accessories <i>(please order separately)</i>	Order No.
mounting kit for mounting on a measuring insert	31 68281
mounting kit for mounting in the top of a connection head	31 87633
adapter for mounting on a DIN rail, plastic	35 93789
adapter for mounting on a DIN rail, metal	36 19851

Codes of the configurable standard measuring ranges, special measuring ranges and other thermocouples on request

Pt 100 meas. ranges small Model T19.10.1P0-1		Pt 100 meas. ranges large Model T19.10.1P0-2		Pt 100 meas. ranges for HVAC Model T19.10.1P0-3	
Measuring range	Code	Measuring range	Code	Measuring range	Code
- 50 ... + 50 °C	EA	- 50 ... + 200 °C	EL	- 30 ... + 30 °C	CA
0 ... 50 °C	1A	0 ... 200 °C	1L	- 30 ... + 50 °C	CB
0 ... 100 °C	1E	0 ... 250 °C	1M	0 ... 60 °C	1C
0 ... 120 °C	1F	0 ... 300 °C	1N	0 ... 80 °C	1D
0 ... 150 °C	1H	0 ... 350 °C	1P	0 ... 100 °C	1E
0 ... 200 °C	1L	0 ... 400 °C	1Q	0 ... 120 °C	1F

Thermocouple type T Model T19.10.3T0-4		Thermocouple type J Model T19.10.3J0-4		Thermocouple type K Model T19.10.3K0-4		Thermocouple type S Model T19.10.3S0-4	
Measuring range	Code	Measuring range	Code	Measuring range	Code	Measuring range	Code
- 100 ... + 200 °C	KA	0 ... 350 °C	1P	0 ... 300 °C	1N	0 ... 1500 °C	15
- 100 ... + 300 °C	KB	0 ... 550 °C	1T	0 ... 600 °C	1U		
0 ... 400 °C	1O	0 ... 700 °C	1W	0 ... 1200 °C	12		

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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Analogue Temperature Transmitter

Configurable Ranges, Head Mounting

for Pt100 Resistance Thermometers

for Thermocouples

Model T19

Electrical Temperature Measurement



Applications

- Plant construction
- Power engineering
- Heating, ventilation, air-conditioning, refrigeration

Special Features

- Designs for Pt100 or thermocouples
- Configurable measuring ranges (bridges)
- Output 4 ... 20 mA, 2 wire design
- Fault signal for sensor burnout and sensor short circuiting
- Large ambient temperature range
- Compact and reasonably priced



Description

The transmitters in the T19 series are provided with configurable ranges. One of several available measuring ranges can be selected simply by setting solder bridges. Therefore, these transmitters are especially suitable for applications where frequently changing requirements have to be taken into account.

These temperature transmitters serve to convert temperature-dependent changes in resistance in the case of resistance thermometers or temperature-dependent changes in voltage in the case of thermocouples into a 4 ... 20 mA loop signal. This method guarantees an easy and reliable transmission of the temperature values measured.

Accuracy, sensor monitoring and the permissible ambient conditions are matched to the requirements of industrial applications. The case is designed as a head-mounted transmitter for direct installation into the temperature probe and can be mounted into any DIN connection head of form B with no problem.

Also available as rail mounting version:
model T19.30, see data sheet TE 19.02.

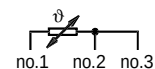
Specifications		Model T19			
Input		Pt 100	DIN IEC 751	2- or 3-lead	thermocouples DIN IEC 584
possible measuring ranges, configurable		measuring ranges small from - 50 °C up to +200 °C	measuring ranges large from - 50 °C up to +400 °C	measuring ranges for HVAC from - 30 °C up to + 120 °C	type T, J, K, S dependent upon type of thermocouple, see last page from - 100 °C up to + 1500 °C
selection of measuring range		via solder bridges			
standard measuring ranges		see last page			
special measuring ranges		on request (special measuring ranges cannot be reconfigured)			
adjustment range					
zero potentiometer (Z)		approx. ± 10 °C	approx. ± 25 °C	approx. ± 30 °C	approx. ± 40 °C
span potentiometer (SP)		approx. 10 %			
sensor current		approx. 0.8 mA			—
cold junction compensation		—			yes
input connection leads					
effect		± 0.2 K / 10 Ω ¹⁾			± 0.2 K / 10 Ω
permissible load resistance		30 Ω	each lead, 3-lead symmetric		500 Ω total resistance
Analogue output		4 ... 20 mA 2 wire design			
linearisation		proportional to temperature per DIN IEC 751		proportional to voltage	
measuring deviation per DIN IEC 770		± 0.5 % ²⁾			
linearity error		± 0.1 % ³⁾		—	
amplification error		—		± 0.1 %	
temperature coefficient T_C		zero	± 0.1 % / 10 K T_{amb} or ⁴⁾ ± 0.2 K / 10 K T_{amb}		± 0.1 % / 10 K T_{amb} or ⁴⁾ ± 25 µV / 10 K T_{amb}
		span	0.2 % / 10 K T_{amb}		0.2 % / 10 K T_{amb}
error effect of cold junction compensation		—		at T_{amb} -20 ... +60 °C ± 1.0 K at T_{amb} -40 ... +85 °C ± 2.0 K	
rising time t_{90}		< 1 ms			
switch-on delay, electric		< 10 ms			
signalling with sensor burnout		down scale, < 3 mA ⁵⁾		up scale, > 23.5 mA	
with sensor short circuit		down scale, < 3 mA ⁶⁾		—	
load R_A		$R_A \leq (U_B - 10 V) / 0.02 A$ with R_A in Ω and U_B in V			
load effect		± 0.05 % / 100 Ω			
power supply effect		± 0.025 % / V			
Power supply U_B		DC 10 ... 30 V by 4 ... 20 mA-loop			
input power supply protection		reverse polarity			
Electromagnetic compatibility (EMC)		CE- Conformity per EN 50 082-2 (March 95)			
Special features					
ambient and storage temperature		-40 ... +85 °C			
climate class		Cx (-40 ... +85 °C, 5 % up to 95 % relative humidity) DIN EN 60654-1			
maximum permissible humidity		95 % relative humidity, noncondensing DIN IEC 68-2-30 Var. 2			
vibration		10 ... 2000 Hz 5 g DIN IEC 68-2-6			
shock		DIN IEC 68-2-27 $g_N = 15$			
Case		head mounting design			
material		polyamide, glass fibre reinforced			
ingress protection		case	IP 40	IEC 529 / EN 60 529	
		terminal con.	IP 00	IEC 529 / EN 60 529	
cross section of terminal connectors		0.14 ... 1.5 mm ²			
weight		approx. 0.03 kg			
dimensions		see drawings			

Specifications in % refer to the measuring span

R_A load
 T_{amb} ambient temperature
 T_C temperature coefficient
 U_B loop power supply voltage, see power supply

- 1) for Pt100 in 3-lead connection, for Pt100 in 2-lead connection lead resistance counts fully towards error
- 2) with factory configured measuring range, value is valid at ambient temperature 23 °C ± 5 K
- 3) ± 0.15 % with measuring range 0 ... 50 °C, 0 ... 300 °C, 0 ... 350 °C
- 4) whichever is greater
- 5) up scale, in case only lead no. 1 open
- 6) temperature value, in case of short between leads no. 2 and no. 3 (operation of Pt100 in 2-lead connection)

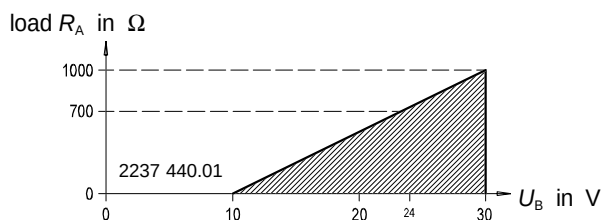
legend of lead number:



1375 890

Load diagram

The permissible load is dependent upon the loop power supply voltage.



Transmitter configuration

- ① Remove case bottom
- ② Set solder bridges for desired measuring range in accordance with the tables
- ③ Snapfit bottom to the case again
- ④ Adjust zero and span by means of potentiometer

Pt 100 meas. ranges small Model T19.10.1P0-1	
measuring range	bridge
- 50 ... + 50 °C	1●●2 50●6 3●●4 70●8
0 ... 50 °C	1●●2 50●6 3●●4 70●8
0 ... 100 °C	1●●2 50●6 3●●4 70●8
0 ... 120 °C	1●●2 50●6 3●●4 70●8
0 ... 150 °C	1●●2 50●6 3●●4 70●8
0 ... 200 °C	1002 5006 3004 7008

Pt 100 meas. ranges large Model T19.10.1P0-2	
measuring range	bridge
- 50 ... + 200 °C	1●●2 50●6 3●●4 70●8
0 ... 200 °C	1●●2 50●6 3●●4 70●8
0 ... 250 °C	1●●2 50●6 3●●4 70●8
0 ... 300 °C	1●●2 50●6 3●●4 70●8
0 ... 350 °C	1●●2 50●6 3●●4 70●8
0 ... 400 °C	1002 5006 3004 7008

Pt 100 meas. ranges for HVAC Model T19.10.1P0-3	
measuring range	bridge
- 30 ... + 30 °C	1●●2 50●6 3●●4 70●8
- 30 ... + 50 °C	1●●2 50●6 3●●4 70●8
0 ... 60 °C	1●●2 50●6 3●●4 70●8
0 ... 80 °C	1●●2 50●6 3●●4 70●8
0 ... 100 °C	1●●2 50●6 3●●4 70●8
0 ... 120 °C	1002 5006 3004 7008

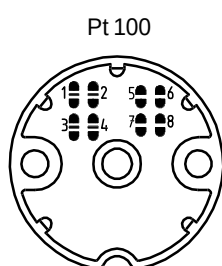
Thermocouple type T Model T19.10.3T0-4	
measuring range	bridge
- 100 ... + 200 °C	1●●03
- 100 ... + 300 °C	10003
0 ... 400 °C	100●3

Thermocouple type J Model T19.10.3J0-4	
measuring range	bridge
0 ... 350 °C	1●●03
0 ... 550 °C	10003
0 ... 700 °C	10003

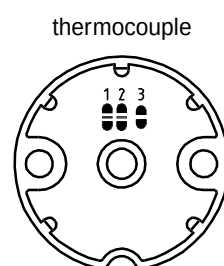
Thermocouple type K Model T19.10.3K0-4	
measuring range	bridge
0 ... 300 °C	1●●03
0 ... 600 °C	10003
0 ... 1200 °C	10003

Thermocouple type S Model T19.10.3S0-4	
measuring range	bridge
0 ... 1500 °C	10003

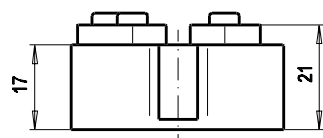
Bridge positions



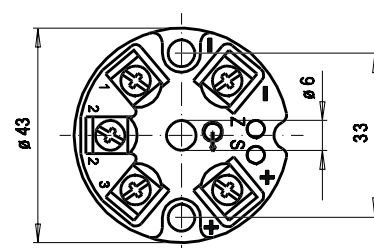
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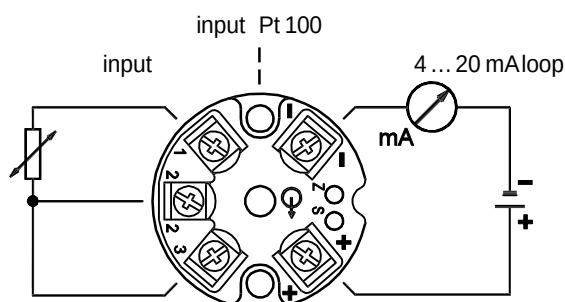
Dimensions in mm



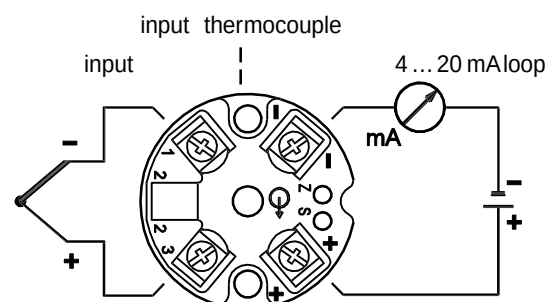
2226 120.02



Designation of terminal connectors



2225 352.01



Order code for temperature transmitter Model T19

Field No.	Code	Instrument design
		Input
	1P	resistance thermometer Pt 100
	3T	thermocouple type T (Cu-CuNi)
	3J	thermocouple type J (Fe-CuNi)
	3K	thermocouple type K (NiCr-Ni)
	3S	thermocouple type S (PtRh-Pt)
1	??	other <i>please state as additional text</i>
		Application
	1	Pt100 measuring ranges small up to 200 °C (configurable through solder bridges)
	2	Pt100 measuring ranges large up to 200 °C (configurable through solder bridges)
	3	Pt100 measuring ranges for HVAC up to 120 °C (configurable through solder bridges)
	4	thermocouple measuring ranges (configurable through solder bridges)
2	9	special measuring ranges (not reconfigurable)
		Measuring range
	NK	not configured
		configured (standard measuring range) <i>codes see below</i>
3	??	configured (special measuring range) <i>please state as additional text</i>
		Additional order details
	YES	NO
4	T	Z
		additional text <i>Please state in clearly understandable text !</i>

Order code for Model T19

	1		2	3	4
T19.10	-		0	-	

Additional text: _____

Mounting accessories <i>(please order separately)</i>	Order No.
mounting kit for mounting on a measuring insert	31 68281
mounting kit for mounting in the top of a connection head	31 87633
adapter for mounting on a DIN rail, plastic	35 93789
adapter for mounting on a DIN rail, metal	36 19851

Codes of the configurable standard measuring ranges, special measuring ranges and other thermocouples on request

Pt 100 meas. ranges small Model T19.10.1P0-1		Pt 100 meas. ranges large Model T19.10.1P0-2		Pt 100 meas. ranges for HVAC Model T19.10.1P0-3	
Measuring range	Code	Measuring range	Code	Measuring range	Code
- 50 ... + 50 °C	EA	- 50 ... + 200 °C	EL	- 30 ... + 30 °C	CA
0 ... 50 °C	1A	0 ... 200 °C	1L	- 30 ... + 50 °C	CB
0 ... 100 °C	1E	0 ... 250 °C	1M	0 ... 60 °C	1C
0 ... 120 °C	1F	0 ... 300 °C	1N	0 ... 80 °C	1D
0 ... 150 °C	1H	0 ... 350 °C	1P	0 ... 100 °C	1E
0 ... 200 °C	1L	0 ... 400 °C	1Q	0 ... 120 °C	1F

Thermocouple type T Model T19.10.3T0-4		Thermocouple type J Model T19.10.3J0-4		Thermocouple type K Model T19.10.3K0-4		Thermocouple type S Model T19.10.3S0-4	
Measuring range	Code	Measuring range	Code	Measuring range	Code	Measuring range	Code
- 100 ... + 200 °C	KA	0 ... 350 °C	1P	0 ... 300 °C	1N	0 ... 1500 °C	15
- 100 ... + 300 °C	KB	0 ... 550 °C	1T	0 ... 600 °C	1U		
0 ... 400 °C	1O	0 ... 700 °C	1W	0 ... 1200 °C	12		

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