

TE2

Compact RTD temperature sensor

TE2-#.###.###.0

Overview

- Compact and rugged design
- Customer-specific immersion depth down to 3000 mm
- Precision measurement from -50 ... 250 °C
- Integrated 4 ... 20 mA transmitter or Pt100 output
- Easy process implementation from DN 25 or in tank



EN 50155

Technical data

Performance characteristics

Pt100 accuracy class (EN 60751)	B ($\pm 0.3\text{ °C at }0\text{ °C}$) $\pm (0.3 + 0.005 \times t)\text{ °C}$ A ($\pm 0.15\text{ °C at }0\text{ °C}$) $\pm (0.15 + 0.002 \times t)\text{ °C}$ 1/3 B ($\pm 0.1\text{ °C at }0\text{ °C}$) $\pm 1/3 \times (0.3 + 0.005 \times t)\text{ °C}$ 1/6 B ($\pm 0.05\text{ °C at }0\text{ °C}$) $\pm 1/6 \times (0.3 + 0.005 \times t)\text{ °C}$
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Thermal response time, T50	RTD element only $\leq 1.0\text{ s}$, conical sensor $\leq 1.3\text{ s}$, Ø3 mm $\leq 2.5\text{ s}$, Ø4 mm $\leq 3.0\text{ s}$, Ø6 mm
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Thermal response time, T90	RTD element only $\leq 3.0\text{ s}$, Ø3 mm $\leq 3.6\text{ s}$, Ø4 mm $\leq 8.5\text{ s}$, Ø6 mm
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Process pressure	Refer to section "Operating conditions"
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Process temperature	Refer to section "Operating conditions"
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Process connection

Connection variants	Refer to section "Dimensional drawings"
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Sensor length	$\leq 3000\text{ mm}$
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Sensor diameter outside	Ø 6 mm
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Mounting position	Any, top, bottom, side
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Standard response tip	Ø 6 mm
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Fast response tip	Ø 3 mm Ø 4 mm
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Sensor tube material	AISI 316L (1.4404)
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Surface roughness wetted parts	$Ra \leq 0.8\text{ µm}$
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Ambient conditions

Operating temperature range	-40 ... 125 °C, with Pt100 -40 ... 85 °C, with transmitter
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Ambient conditions

Storage temperature range	-55 ... 90 °C
Degree of protection (EN 60529)	IP 65, with DIN EN 175301-803 A (DIN 43650 A), 4-pin IP 67, with M12-A, 4-pin
Humidity	$\leq 100\%$ RH, condensing
Long-term test (transmitter)	IEC 770 6.3.2
Vibration (sinusoidal) (EN 60068-2-6)	1.6 mm p-p (2 ... 25 Hz), 4 g (25 ... 100 Hz), 1 octave / min.

Output signal

Without transmitter	1 x Pt100, 4-wire
With transmitter	4 ... 20 mA, 2-wire

Housing

Style	Compact transmitter
Overall size	Refer to section "Dimensional drawings"
Material	AISI 304 (1.4301)

Electrical connection

Connector	DIN EN 175301-803 A (DIN 43650 A), 4-pin M12-A, 4-pin
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Power supply

Voltage supply range	8 ... 35 V DC
Power-up time	< 20 s
Reverse polarity protection	Yes

Factory settings

Output range	0 ... 150 °C
Damping	0 s
Output at sensor fault	23 mA

Compliance and approvals

EMC	EN 61000-6-2 EN 61000-6-3 EN 61326-1 NE21
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Compliance and approvals

Hygiene	FDA (21 CFR 177.2415) 3-A (74-07)
Railway applications	EN 50155

Compliance and approvals

Explosion protection	Ex ia Simple apparatus, gas and dust
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Transmitter

Input

Measuring unit	°C °F
Min. measuring span	25 °C
Sample time	< 0.7 s
Accuracy	< 0.25 °C , @ ≤ 100 °C
Repeatability	< 0.1 °C
Resolution	14 bit
Ripple immunity	IEC 770 6.2.4.2
Error detection delay	< 10 s
Offset adjustment	± 10 °C , max.
Isolation, sensor to case	50 V AC , test 500V
Protection	± 35 V DC
Suppression	50 Hz 60 Hz

Output

Output signal	4 ... 20 mA , 2-wire
Accuracy	< 0.1 % , measuring span < 0.016 mA
Temperature drift	< 0.003 %/K , typ. < 0.01 %/K , max.
Resolution	12 bit
Effect of variations in supply voltage	< 0.01 %/V
Ripple immunity	3 Vrms
Shunt resistance	$R_s \leq (V_{DC} - 8 V)/0.023 A$
Damping	0.0 ... 30.0 s , programmable
Up/Down scaling limits	23 mA / 3.5 mA

Operating conditions

Ordering key	Process connection	BCID	Process pressure	Continuous Process temperature Standard @ Tamb ≤ 20 °C	Process temperature With cooling neck @ Tamb ≤ 20 °C
			(bar)	(° C)	(° C)
TE2-#.1.####.####.#	Sleeve Ø 6	T65	-1 ... 40	-50 ... 125	-50 ... 250
TE2-#.3.####.####.#	G 1/2 A ISO 228-1	G06	-1 ... 100	-50 ... 125	-50 ... 250
TE2-#.4.####.####.#	G 1/2 A hygienic	A03	-1 ... 40	-50 ... 125	-50 ... 250
TE2-#.5.####.####.#	M12 × 1.5 hygienic	A02	-1 ... 40	-50 ... 125	-50 ... 250
TE2-#.6.####.####.#	M12 × 1.5 hygienic, with PEEK cone	A02	-1 ... 10	-50 ... 115	N/A
TE2-#.7.####.####.#	G 1/8 female thread hygienic	A01	-1 ... 40	-50 ... 205	-50 ... 250
TE2-#.8.####.####.#	G 1/4 A DIN 3852-E	G50	-1 ... 100	-50 ... 125	-50 ... 250
TE2-#.9.####.####.#	ISO 2852 (Tri-Clamp), DN 33.7; 38, Ø 50.5	C04	-1 ... 40	-50 ... 125	-50 ... 250
TE2-#.A.####.####.#	Tri-Clamp Ø 24.9	C01	-1 ... 40	-50 ... 125	-50 ... 250
TE2-#.B.####.####.#	BHC 3A DN 38	B01	-1 ... 40	-50 ... 125	-50 ... 250
TE2-#.D.####.####.#	1/2-14 NPT	N02	-1 ... 100	-50 ... 125	-50 ... 250
TE2-#.E.####.####.#	1/4-18 NPT	N01	-1 ... 100	-50 ... 125	-50 ... 250
TE2-#.F.####.####.#	G 1/2 A DIN 3852-E	G51	-1 ... 100	-50 ... 125	-50 ... 250
TE2-#.G.####.####.#					

For further information on permissible process and ambient temperatures, please refer to the operating instructions.

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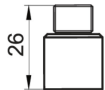
Compliance and approvals

Ordering key	Process connection	BCID	EN 10/2011	EN 1935/2004 EN 2023/2006	FDA	3-A
TE2-#.1.####.####.#	Sleeve Ø 6	T65				
TE2-#.3.####.####.#	G 1/2 A ISO 228-1	G06				
TE2-#.4.####.####.#	G 1/2 A hygienic	A03		■		
TE2-#.5.####.####.#	M12 × 1.5 hygienic	A02		■		
TE2-#.6.####.####.#	M12 × 1.5 hygienic, with PEEK cone	A02	■	■	■	
TE2-#.7.####.####.#	G 1/8 female thread hygienic	A01		■		
TE2-#.8.####.####.#	G 1/4 A DIN 3852-E	G50				
TE2-#.9.####.####.#	ISO 2852 (Tri-Clamp), DN 33.7; 38, Ø 50.5	C04		■		■
TE2-#.A.####.####.#	Tri-Clamp Ø 24.9	C01		■		
TE2-#.B.####.####.#	BHC 3A DN 38	B01		■		■
TE2-#.D.####.####.#	1/2-14 NPT	N02				
TE2-#.E.####.####.#	1/4-18 NPT	N01				
TE2-#.F.####.####.#						
TE2-#.G.####.####.#	G 1/2 A DIN 3852-E	G51				

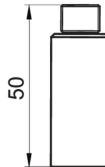
The requirements of the respective 3-A Sanitary Standard will be only fulfilled in combination with appropriate mounting accessories. Those are marked with the 3-A logo.

Dimensional drawings (mm)

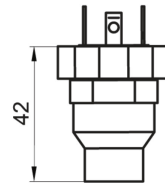
Housing



Housing with connector M12-A, 4-pin



Housing with transmitter and connector M12-A, 4-pin



Housing with connector DIN EN 175301-803 A (DIN 43650 A), 4-pin

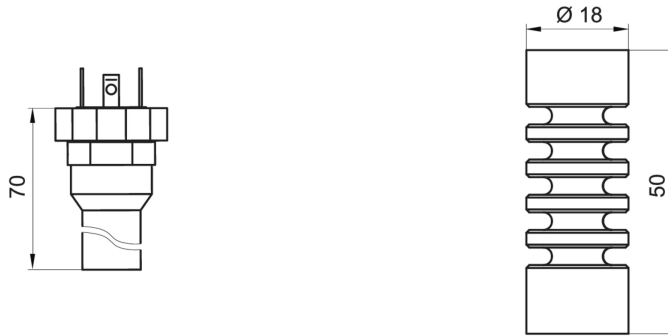
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Dimensional drawings (mm)

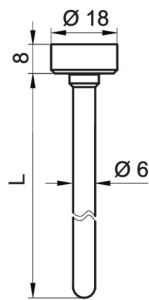
Housing



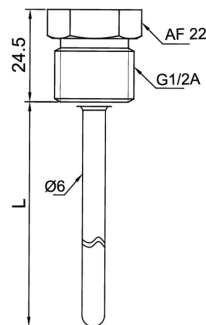
Housing with transmitter and connector DIN
EN 175301-803 A (DIN 43650 A), 4-pin

Cooling neck

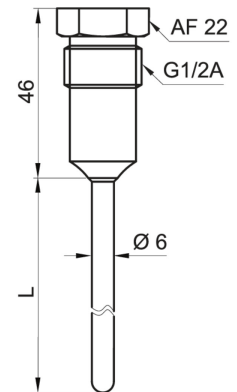
Process connection



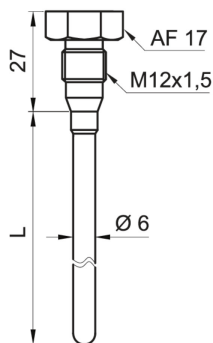
Without thread (BCID: T65)



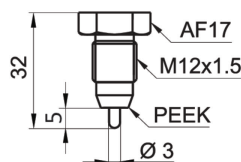
G 1/2 A ISO 228-1 (BCID: G06)



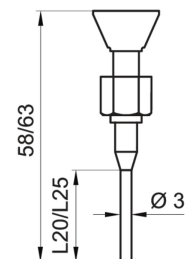
G 1/2 A hygienic (BCID: A03)



M12 × 1.5 hygienic (BCID: A02)



M12 × 1.5 hygienic, PEEK cone, tip Ø 3 x 5
mm (BCID: A02)



G 1/8 female thread hygienic (BCID: A01)

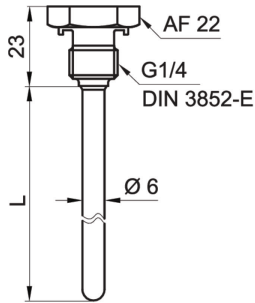
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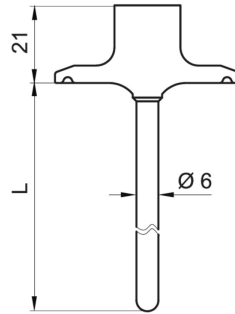
TE2-#. #.####.####.0

Dimensional drawings (mm)

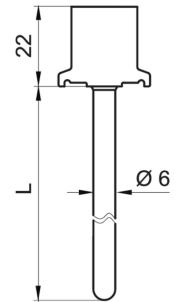
Process connection



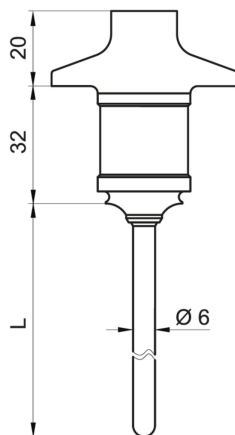
G 1/4 A DIN 3852-E (BCID: G50)



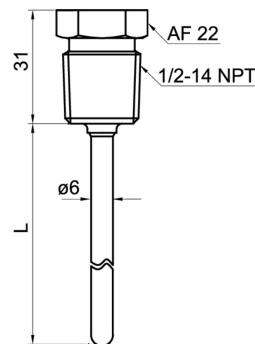
Tri-Clamp Ø 50.5 (BCID: C04)



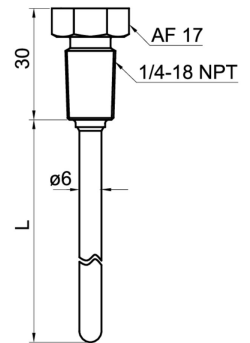
Tri-Clamp Ø 24.9 (BCID: C01)



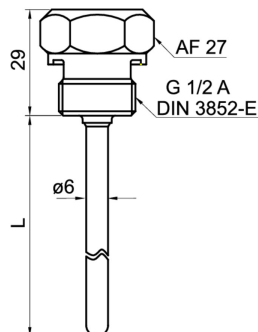
BHC 3A DN 38 (BCID: B01)



1/2-14 NPT (BCID: N02)



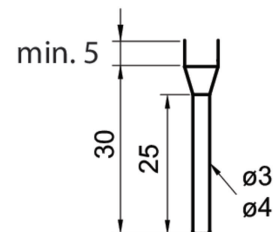
1/4-18 NPT (BCID: N01)



G 1/2 A DIN 3852-E (BCID: G51)



Standard response tip



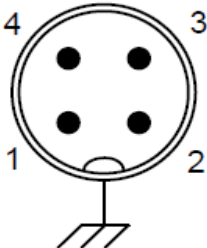
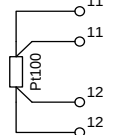
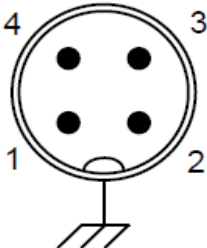
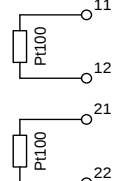
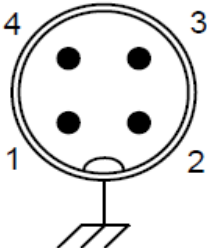
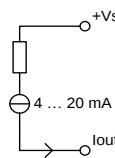
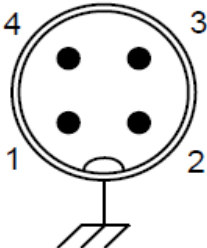
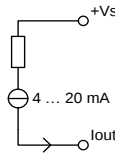
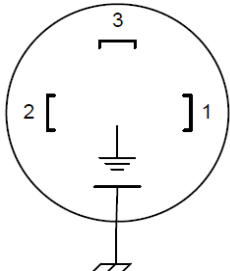
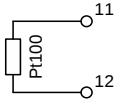
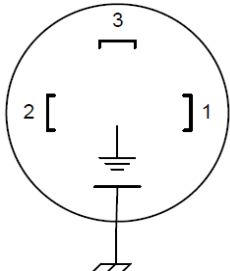
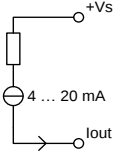
Fast response tip

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Electrical connection

Output type	Electrical connection	Equivalent circuit	Function	Pin assignment
M12-A, 4-pin, stainless steel				
Pt100 (Single element)			Pt100 11	1, 2
			Pt100 12	3, 4
			Frame ground	Plug thread
Pt100 (Double element)			Pt100 11	1
			Pt100 12	4
			Pt100 21	2
			Pt100 22	3
		Frame ground	Plug thread	
4 ... 20 mA, 2-wire, Iout at pin 2			+Vs	1
			Iout	2
			N.C.	3, 4
			Frame ground	Plug thread
4 ... 20 mA, 2-wire, Iout at pin 2, 3			+Vs	1
			Iout	2, 3
			N.C.	4
			Frame ground	Plug thread
DIN EN 175301-803 A (DIN 43650 A), 4-pin				
Pt100 (Single element)			N.C.	1
			Pt100 11	2
			Pt100 12	3
			Frame ground	Grounding lug
4 ... 20 mA, 2-wire			+Vs	1
			Iout	2
			N.C.	3
			Frame ground	Grounding lug

Ordering information

Ordering key - Configuration possibilities see website

Product	TE2	-	#	.	#	.	#	#	#	.	####	.	#
Sensor tip	TE2												
Not specified											0		
Standard response tip, Ø 6 mm											1		
Fast response tip, Ø 4 mm											2		
Fast response tip, Ø 3 mm											3		

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Ordering information

Ordering key - Configuration possibilities see website

	TE2	-	#	.	#	.	#	#	#	#	.	####	.	#
Process Connection														
Tube without connection														1
G 1/2 A ISO 228-1 (G06)														3
G 1/2 A hygienic (A03)														4
M12 × 1.5 hygienic (A02)														5
M12 × 1.5 hygienic, PEEK cone, sensor tip Ø 3x5 mm (A02)														6
G1/8 ISO 228/1 female thread, Hygienic (A01)														7
G 1/4 A DIN 3852-E, with NBR seal (G50)														8
ISO 2852 (Tri-Clamp), DN 25; 33.7; 38, Ø 50.5 (C04)														9
DIN 32676-C (Tri-Clamp), DN 3/4, Ø 24.9 (C01)														A
BHC 3A DN 38 (B01)														B
1/2-14 NPT (N02)														D
1/4-18 NPT (N01)														E
G 1/2 A DIN 3852-E, with FKM seal (G51)														F
G 1/2 A DIN 3852-E, with EPDM seal (G51)														G
Sensor element														
1/1 B EN 60751, single														1
1/1 B EN 60751, duplex														2
1/3 B EN 60751, single														3
1/3 B EN 60751, duplex														4
1/6 B EN 60751, single														5
1/6 B EN 60751, duplex														6
1/1 A EN 60751, single														7
1/1 A EN 60751, duplex														8
Cooling neck														
Without cooling neck														0
With cooling neck														4
Electrical connection														
M12-A, 4-pin, stainless steel														1
M12-A, 4-pin, stainless steel, with integrated transmitter														2
DIN EN 175301-803 A (DIN 43650 A), 4-pin ⁽¹⁾														4
DIN EN 175301-803 A (DIN 43650 A), 4-pin, with integrated transmitter ⁽¹⁾														5
M12-A, 4-pin, stainless steel, with integrated transmitter, out pin 2+3														A
Certificates														
Not specified														0
Railway EN 50155														4
Ex ia Simple apparatus, gas and dust														9
Sensor tube length (mm)														
5 - 3000													####	
Configuration														
No configuration														0
Configuring according to customer specification														C

(1) Including female power connector