

### MECHANICAL CONSTRUCTION

Dimensions	<p>DIMENSIONS IN INCHES [mm]</p> <p>0.197 [5] (top hole diameter)          0.28 [7] (terminal hole diameter)          1.3 [33] (height to top hole)          1.73 [44] (total height)          0.89 [23] (height to bottom hole)</p>
Weight	approximately 40 g
Materials	Housing: Polycarbonate • Potting: Polyurethane
Terminals	15 AWG (maximum)

### Terminal Connections

<p>Power supply and current output</p> <p>2 (-) 1 (+)</p> <p>(8 to 30) V dc (4 to 20) mA</p>	<p>SETUP socket</p>			
<p>Sensor Connection</p> <p>6 5 4 3</p>	<p>TC</p> <p>6 4</p>	<p>2-Wire</p> <p>RTD <math>\Omega</math></p> <p>6 <math>\Omega</math> 6 3 3</p>	<p>3-Wire</p> <p>RTD <math>\Omega</math></p> <p>6 <math>\Omega</math> 6 5 5 3 3</p>	<p>4-Wire</p> <p>RTD <math>\Omega</math></p> <p>6 <math>\Omega</math> 6 5 5 4 4 3 3</p>

### Remote Operation

Configurable parameters	Sensor type and connection type, engineering units ( $^{\circ}\text{C}/^{\circ}\text{F}$ ), measurement range, internal/external cold junction compensation, cable resistance compensation on 2 wire connection, fault conditioning, output signal (4 to 20) mA or (20 to 4) mA, digital filter (damping), offset, measurement point identification (8 characters), output simulation
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### Approvals

	Unit complies with the legal requirements set forth by the EU regulations.
	UL Recognized Component
	General Purpose and non-incendive for use in hazardous locations Class I, Division 2 Groups A, B, C and D

### ACCURACY (continued)

#### Thermocouple (TC)

TYPE	MEASUREMENT ACCURACY
K, J, T, E, L, U N, C, D S, B, R MoRe5-MoRe41	$\pm 0.5\text{ }^{\circ}\text{C}$ or 0.08% <sup>[1]</sup> $\pm 1.0\text{ }^{\circ}\text{C}$ or 0.08% <sup>[1]</sup> $\pm 2.0\text{ }^{\circ}\text{C}$ or 0.08% <sup>[1]</sup>
Influence of the internal reference junction	$\text{Pt100} \pm (0.30 + 0.005  t )\text{ }^{\circ}\text{C}$  t  = value of temperature without regard to sign $^{\circ}\text{C}$

#### Voltage (mV)

TYPE	MEASUREMENT ACCURACY	MEASUREMENT RANGE
Millivolt (mV)	$\pm 20\text{ }\mu\text{V}$ or 0.08% <sup>[1]</sup>	(-10 to 100) mV

#### General Accuracy

Influence of power supply	$\pm 0.01\%/V$ deviation from 24 V <sup>[2]</sup>
Load influence	$\pm 0.02\%/100\ \Omega$ <sup>[2]</sup>
Temperature drift	Resistive thermometer (RTD): $T_d = \pm (15\text{ ppm}/^{\circ}\text{C} \times \text{range end value} + 50\text{ ppm}/^{\circ}\text{C} \times \text{measurement range}) \times \Delta\theta$  Resistive thermometer Pt100: $T_d = \pm (15\text{ ppm}/^{\circ}\text{C} \times (\text{range end value} + 200) + 50\text{ ppm}/^{\circ}\text{C} \times \text{measurement range}) \times \Delta\theta$  Thermocouple (TC): $T_d = \pm (50\text{ ppm}/^{\circ}\text{C} \times \text{range end value} + 50\text{ ppm}/^{\circ}\text{C} \times \text{measurement range}) \times \Delta\theta$  $\Delta\theta$ = Deviation of the ambient temperature according to the reference condition
Long term stability	$\leq 0.1\text{ }^{\circ}\text{C}/\text{year}$ <sup>[3]</sup> or $\leq 0.05\%/ \text{year}$ <sup>[1][3]</sup>
<p>[1] % is related to the adjusted measurement range (the value to be applied is the greater)</p> <p>[2] All data is related to a measurement end value of 20 mA</p> <p>[3] Under reference conditions</p>	

### INSTALLATION CONDITIONS

#### Ambient Conditions

Ambient temperature	(-40 to 85) $^{\circ}\text{C}$ [-40 to 185] $^{\circ}\text{F}$
Storage temperature	(-40 to 100) $^{\circ}\text{C}$ [-40 to 212] $^{\circ}\text{F}$
Climatic class	To EN 60 654-1, Class C
Moisture condensation	Allowable
Vibration protection	4 g / (2 to 150) Hz according to IEC 60 068-2-6
EMC immunity	Interference immunity and interference emission as per EN 61 326-1 (IEC 1326)

### OUTPUT

#### Output (Analog)

Output signal	(4 to 20) mA or (20 to 4) mA
Transmission as	Temperature linear, resistance linear, voltage linear
Maximum load	$(V_{\text{power supply}} - 8 \text{ V}) / 0.025 \text{ A}$ (current output)
Digital filter 1st degree	(0 to 8) s
Induced current required	$\leq 3.5 \text{ mA}$
Current limit	$\leq 25 \text{ mA}$
Switch on delay	4 s (during power up $I_a = 3.8 \text{ mA}$ )
Electronic response time	1 s

#### Failure Mode

Undershooting measurement range	Decrease to 3.8 mA
Exceeding measurement range	Increase to 20.5 mA
Sensor breakage/short circuit <sup>[1]</sup>	$\leq 3.6 \text{ mA}$ or $\geq 21.0 \text{ mA}$

#### Electrical Connection

Power supply	$U_b = (8 \text{ to } 30) \text{ V}$ dc, polarity protected
Galvanic isolation (In/out)	$\hat{U} = 2 \text{ kV}$ ac
Allowable ripple	$U_{ss} \leq 5 \text{ V}$ at $U_b \geq 13 \text{ V}$ , $f_{\text{max}} = 1 \text{ kHz}$

### ACCURACY

Reference conditions	Calibration temperature $(23 \pm 5) \text{ }^\circ\text{C}$ $[73 \pm 9] \text{ }^\circ\text{F}$
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#### Resistance Thermometer (RTD)

TYPE	MEASUREMENT ACCURACY
Pt100, Ni100	$\pm 0.2 \text{ }^\circ\text{C}$ or 0.08% <sup>[2]</sup>
Pt500, Ni500	$\pm 0.5 \text{ }^\circ\text{C}$ or 0.20% <sup>[2]</sup>
Pt1000, Ni1000	$\pm 0.3 \text{ }^\circ\text{C}$ or 0.12% <sup>[2]</sup>

#### Resistance ( $\Omega$ )

TYPE	MEASUREMENT ACCURACY	MEASUREMENT RANGE
Resistance	$\pm 0.1 \text{ } \Omega$ or 0.08% <sup>[2]</sup>	(10 to 400) $\Omega$
	$\pm 1.5 \text{ } \Omega$ or 0.12% <sup>[2]</sup>	(10 to 2000) $\Omega$

[1] Not for thermocouple

[2] % is related to the adjusted measurement range (the value to be applied is the greater)

### INPUT

#### Resistance Thermometer (RTD)

TYPE	MEASUREMENT RANGE	MINIMUM RANGE
Pt100 ( $\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$ )	(-200 to 850) °C [-328 to 1562] °F	10° C [18 °F]
Pt500	(-200 to 250) °C [-328 to 482] °F	10° C [18 °F]
Pt1000	(-200 to 250) °C [-328 to 482] °F	10° C [18 °F]
Ni100 ( $\alpha = 0.00618 \text{ } ^\circ\text{C}^{-1}$ )	(-60 to 180) °C [-76 to 356] °F	10° C [18 °F]
Ni500	(-60 to 150) °C [-76 to 302] °F	10° C [18 °F]
Ni1000	(-60 to 150) °C [-76 to 302] °F	10° C [18 °F]
Connection type	2-, 3- or 4-wire connection cable. Resistance compensation possible in the 2-wire system (0 to 20) $\Omega$	
Sensor cable resistance	maximum 11 $\Omega$ per cable	
Sensor current	$\leq 0.6 \text{ mA}$	

#### Resistance ( $\Omega$ )

TYPE	MEASUREMENT RANGE	MINIMUM RANGE
Resistance ( $\Omega$ )	(10 to 400) $\Omega$ (10 to 2000) $\Omega$	10 $\Omega$ 100 $\Omega$

#### Thermocouples (TC)

TYPE	MEASUREMENT RANGE	MINIMUM RANGE
B (PtRh30-PtRh6) <sup>[4]</sup>	(0 to 1820) °C [32 to 3308] °F	500 °C [900 °F]
C (W5Re-W26Re)	(0 to 2320) °C [32 to 4208] °F	50 °C [90 °F]
D (W3Re-W25Re) <sup>[3]</sup>	(0 to 2495) °C [32 to 4523] °F	50 °C [90 °F]
E (NiCr-CuNi)	(-200 to 915) °C [-328 to 1679] °F	50 °C [90 °F]
J (Fe-CuNi)	(-200 to 1200) °C [-328 to 2192] °F	50 °C [90 °F]
K (NiCr-Ni)	(-200 to 1372) °C [-328 to 2501] °F	50 °C [90 °F]
L (Fe-CuNi) <sup>[2]</sup>	(-200 to 900) °C [-328 to 1652] °F	50 °C [90 °F]
N (NiCrSi-NiSi)	(-270 to 1300) °C [-454 to 2372] °F	50 °C [90 °F]
R (PtRh13-Pt)	(0 to 1768) °C [32 to 3214] °F	500 °C [900 °F]
S (PtRh10-Pt)	(0 to 1768) °C [32 to 3214] °F	500 °C [900 °F]
T (Cu-CuNi)	(-200 to 400) °C [-328 to 752] °F	50 °C [90 °F]
U (Cu-CuNi) <sup>[2]</sup>	(-200 to 600) °C [-328 to 1112] °F	50 °C [90 °F]
MoRe5-MoRe41 <sup>[1]</sup>	(0 to 2000) °C [32 to 3632] °F	500 °C [900 °F]
Cold junction	internal (Pt100) or external (0 to 80) °C [32 to 176] °F	
Cold junction accuracy	$\pm 1 \text{ } ^\circ\text{C}$	
[1] no reference [2] according to DIN 43710 [3] according to ASTM E1751 [4] higher measurement error for temperatures below 300 °C (572) °F		

#### Voltage (mV)

TYPE	MEASUREMENT RANGE	MINIMUM RANGE
Millivolt (mV)	(-10 to 100) mV	5 mV

## ORDER CODES

**Unconfigured Order Number:** 441-00<sup>[1]</sup>

**Example Configured Order Number:**

**4 4 1**

**1 J U - S (50-300) F**

**1**

CODE	DESCRIPTION
1	Thermocouple (TC)
2	RTD (2-wire)
3	RTD (3-wire)
4	RTD (4-wire)

**2**

CODE	DESCRIPTION
J	Type J thermocouple
K	Type K thermocouple
T	Type T thermocouple
N	Type N thermocouple
E	Type E thermocouple
R	Type R thermocouple
S	Type S thermocouple
B	Type B thermocouple
85	100 ohm platinum ( $\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$ )
55	500 ohm platinum ( $\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$ )
95	1000 ohm platinum ( $\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$ )
MV	Millivolts
W	Resistance

**3**

CODE	DESCRIPTION
U	Upscale Burnout $\geq 21.0 \text{ mA}$
D	Downscale Burnout $\leq 3.5 \text{ mA}$

**4**

RANGE
S ( lower limit – upper limit )

**5**

CODE	DESCRIPTION
C	Celsius
F	Fahrenheit

### Accessories

CODE	DESCRIPTION
10303	Communication cable and software (USB)
10307	35 mm DIN-rail mounting clip

[1] Default setting for unconfigured transmitter is 3-wire Pt100 (0 - 100) °C.