



OPTITEMP TT 12 C/R Technical Datasheet

2-wire transmitter with NFC technology



The documentation is only complete when used in combination with the relevant documentation for the sensor.

1	Product features	3
1.1	Smart 2-wire universal temperature transmitter with NFC technology	3
1.2	Options and variants	5
1.3	Measuring principles	6
2	Technical data	7
2.1	Technical data	7
2.2	Dimensions	9
2.3	Output load diagram	10
2.4	RTD accuracy table	10
3	Installation	11
3.1	In-head transmitter	11
3.2	Rail mounting kit for in-head transmitters	12
3.3	Rail-mount transmitter	14
4	Electrical connections	15
4.1	Safety instructions	15
4.2	Electrical connections of in-head transmitter	16
4.3	Connection diagram of in-head transmitter	16
4.4	Electrical connections of rail-mount transmitter	17
4.5	Connection diagram of rail-mount transmitter	18
5	Order information	19
5.1	Order code	19
6	Notes	21
7	Notes	23

1.1 Smart 2-wire universal temperature transmitter with NFC technology

The OPTITEMP TT 12 signal conditioner is non-isolated, 2-wire transmitter for temperature measurements in an industrial environment.

The OPTITEMP TT 12 series consists of two different versions. TT 12 C is primarily intended to be mounted in a DIN-B housing whereas TT 12 R is the rail-mount version.

NFC features enables wireless communication and configuration between transmitter and a portable device such a smartphone. Typical characteristics are the high accuracy, stability and reliability.

Highlights**Compact design**

- TT 12 C is 10.5 mm high / TT 12 R is 6.5 mm wide.

Long term stability

- Max. drift $\pm 0.05\%$ of span/year.

Easy to configure

- Wireless configuration with your smartphone via NFC®.

Highest quality

- Built on our latest transmitter platform to leverage efficiencies.

Designed for harsh conditions

- Designed for up to 10 g vibrations, 95 % RH (non-condensing).

Application range

Typical industrial applications are in:

- Chemicals
- Oil & Gas
- Power
- Iron, Steel & Metal
- Pulp & Paper
- Food & Beverage
- Pharmaceuticals

1.2 Options and variants

TT 12 C: in-head transmitter



The TT 12 C is a non-isolated, 2-wire in-head transmitter for temperature measurements in an industrial environment.

The TT 12 C is intended for installation in a DIN B head or larger according to DIN EN 50446.

TT 12 R: rail-mount transmitter



The TT 12 R is a non-isolated, 2-wire rail-mount transmitter for temperature measurements in an industrial environment.

The TT 12 R is intended for installation on a DIN rail according to EN 60715 / DIN 50022.

1.3 Measuring principles

The kind of measuring principle depends on the measuring insert that you combine with the transmitter. In matters of the thermometre type the manufacturer offers two different measuring inserts, either with a resistance thermometer or with a thermocouple. This transmitter support both types.

2.1 Technical data

- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Downloadcenter).

Measuring system

Application range	Temperature measurements of solids, liquids and gases in industrial environment.
-------------------	--

Design

Versions	
TT 12 C, RTD	In-head transmitters which are intended for installation in a DIN B-head or larger according to DIN EN 50446.
TT 12 R, RTD	Rail-mount transmitters which are intended for installation on a DIN-rail according to DIN 50022 / EN 60715, 35 mm / 1.38".

Measuring accuracy

Accuracy & stability	Typical accuracy is max. of $\pm 0.15^{\circ}\text{C}$ or $\pm 0.15\%$ of span.(Pt100, 3- or 4-wire connection)
Ambient temperature influence	For detailed information refer to <i>RTD accuracy table</i> on page 10
Supply voltage influence	$< \pm 0.005\%$ of span per V
Long-term drift	Max. of $\pm 0.05^{\circ}\text{C}$ or $\pm 0.05\%$ of span per year

Operating conditions

Temperature	
In-head transmitter	Operating and storage temperature: Standard version: $-40\dots+85^{\circ}\text{C}$ / $-40\dots+185^{\circ}\text{F}$
Rail-mount transmitter	Operating and storage temperature: Standard version: $-40\dots+85^{\circ}\text{C}$ / $-40\dots+185^{\circ}\text{F}$
Humidity	0...95% RH (non-condensing)
Protection category	
In-head transmitter	Housing: IP65
	Terminals: IP00
Rail-mount transmitter	Housing: IP20
	Terminals: IP20

Installation conditions

Mounting	In-head transmitter: DIN B-head or larger, DIN-rail (with adapter)
	Rail-mount transmitter: DIN-rail according to DIN 50022 / EN 60715, 35 mm / 1.38"
	For detailed information refer to <i>Installation</i> on page 11.
Weight	In-head transmitter: 25 g / 0.1 lb
	Rail-mount transmitter: 50 g / 0.1 lb
Dimensions	.

Materials

Housing	PC/ABS + PA
Flammability according to UL	In-head transmitter: V0
	Rail-mount transmitter: V0/HB

Electrical connections

Power supply	Standard version: 6.0...32 VDC
Connection	Single/stranded wires: max. 1.5 mm ² / AWG 16
Reverse Polarity Protection	Yes

Inputs / Outputs

Input - RTD	
Pt100 (IEC 60751, $\alpha = 0.00385$)	-200...+850°C / -328...+1562°F
Sensor current	≤300 μA
Maximum sensor wire resistance	3-wire and 4-wire connection 50 Ω/wire 2-wire connection Compensation for 0 to 100 Ω loop resistance
Adjustment	Minimum span 20°C / 36°F
Output	
Output signal	4...20 mA, linear temperature.
Permissible load	Supply voltage U-6.0/0.022
NAMUR compliance	Output limits and failure currents according to NAMUR NE 43
Adjustable filtering level	0.4...26 s, (3-wire RTD)
Monitoring	Sensor break and short circuit monitoring, selectable, upscale ≥21.0 mA or downscale ≤3.6 mA action, individually configurable.
Configuration	
OPTICHECK Temperature mobile	The app OPTICHECK Temperature mobile for portable devices (smartphones) is a versatile and user-friendly tool for wireless configuration through NFC [®] technology.

Approvals and certifications

CE	The device fulfils the statutory requirements of the EU directives. The manufacturer certifies that these requirements have been met by applying the CE marking.
Ex approvals	
Standard version	Without
Other standards and approvals	
Electromagnetic compatibility	Directive: 2014/30/EU
	Harmonized standards: EN 61326-1 and EN 61326-2-3
	EN 61326-1 and -2-3: Criteria A
RoHS	Directive: 2011/65/EU Harmonized standard: EN 50581
Vibration resistance	According to IEC 60068-2-6, test Fc, 10...2000 Hz, 10 g for in-head mounted / 5 g for rail mounted transmitter
Radio Equipment Directive	This product contains NFC communication and conforms to the requirements of the Radio Equipment Directive (RED) 2014/53/EU

2.2 Dimensions

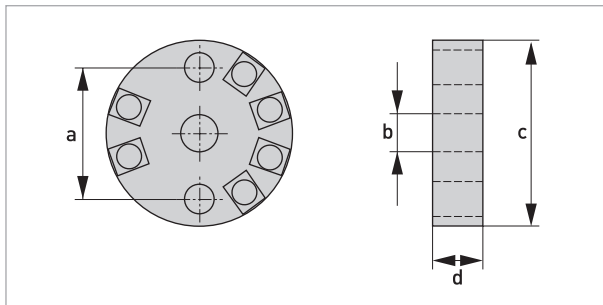


Figure 2-1: In-head transmitter

	Dimensions	
	[mm]	[inch]
a	33.0	1.30
b	7.0	0.28
c	44	1.73
d	10.5	0.41

Table 2-1: Dimensions in mm and inch

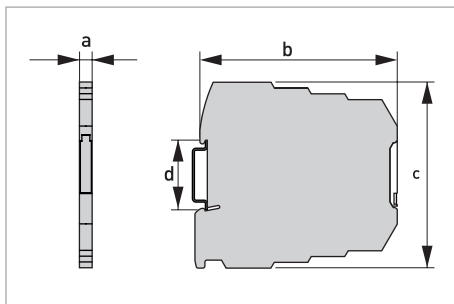


Figure 2-2: Rail-mount transmitter

	Dimensions	
	[mm]	[inch]
a	6.3	0.25
b	101.2	3.98
c	93.1	3.67
d	35	1.38

Table 2-2: Dimensions in mm and inch

2.3 Output load diagram

Formula for the maximum permissible output load for TT 12 C/R:
 permissible $R_{Load} [\Omega] = (U-6.0)/0.022$

Standard transmitter

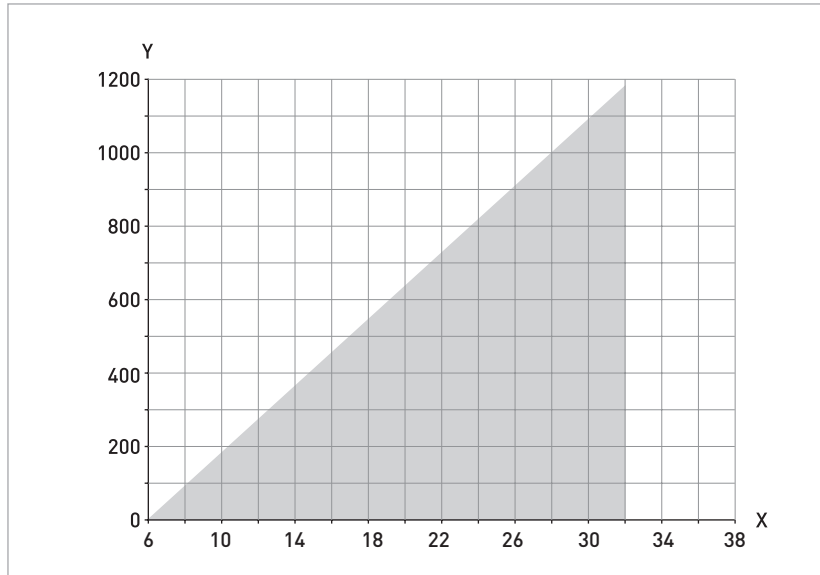


Figure 2-3: Output load diagram

X: Power supply U [VDC]
 Y: Total output load R [Ω]

2.4 RTD accuracy table

Typical accuracy $\pm 0.15\%$ of span, max. of ± 0.15 K or $\pm 0.15\%$ of span
 (Pt100, 3- or 4-wire connection)

Conformance level 95% (2σ)

Input type	Temp. range	Min. span	Accuracy (maximum of)	Temp. influence (Dev. from ref. temp. 20°C)
	[°C]	[°C]	[°C]	
RTD Pt100, Pt1000	-200...+850	20	$\pm 0.15^\circ\text{C}$ or $\pm 0.15\%$ of span.	$\pm 0.015\%$ of span per °C

Table 2-3: Accuracies in °C

Input type	Temp. range	Min. span	Accuracy (maximum of)	Temp. influence (Dev. from ref. temp. 68°F)
	[°F]	[°F]	[°F]	
RTD Pt100, Pt1000	-328...+1562	36	$\pm 0.027^\circ\text{F}$ or $\pm 0.15\%$ of span.	$\pm 0.008\%$ of span per °F

Table 2-4: Accuracies in °F

3.1 In-head transmitter

The transmitter is intended for installation in DIN B connection head or larger.

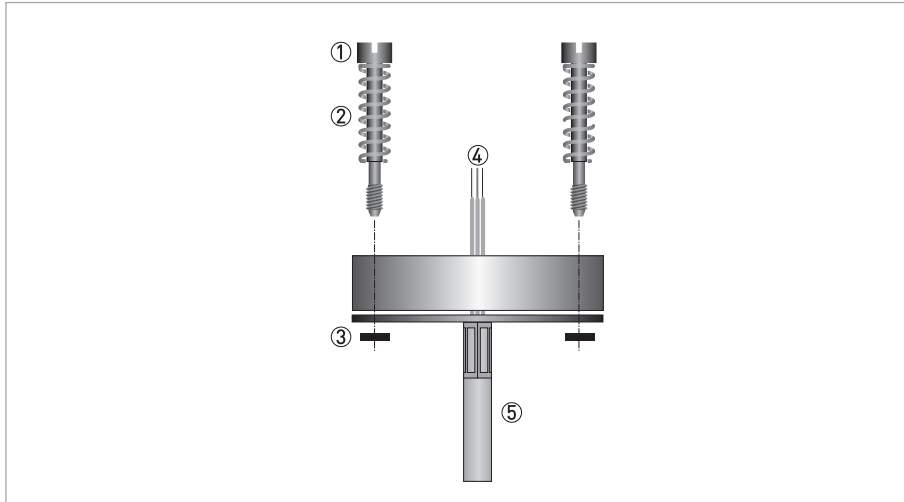


Figure 3-1: Connection head installation kit

- ① M4 screw
- ② Spring
- ③ Lock washer
- ④ Wires from the measuring insert.
- ⑤ MI cable

The connection head installation kit does not belong to the standard scope of delivery of the transmitter, you have to order it separately.

The transmitter has been developed for an operating temperature of $-40...+85^{\circ}\text{C}$ / $-40...+185^{\circ}\text{F}$. To avoid destruction or damage of the device, always assure that the operating temperature or ambient temperature does not exceed the permissible range. The thermowell also transfer the process temperature to the transmitter housing. If the process temperature is close to or exceeds the maximum temperature of the transmitter, then the temperature in the transmitter housing can rise above the maximum permissible temperature. One way to decrease the head transfer via thermowell is to install the transmitter further away from the heat source. Inversely similar measurements can be done if the temperature gets below specified minimum temperature.

3.2 Rail mounting kit for in-head transmitters

The rail mounting kit allows to install the in-head transmitter on a rail according to EN 60715 / DIN 50022.

The kit does not belong to the standard scope of delivery. You have to order it separately.

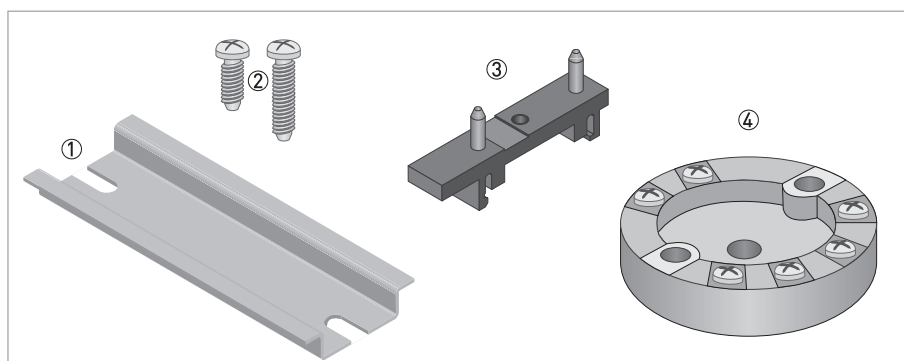


Figure 3-2: Rail mounting kit for in-head transmitters

- ① Rail (not include in the kit)
- ② Screws (not needed)
- ③ Clip
- ④ Transmitter

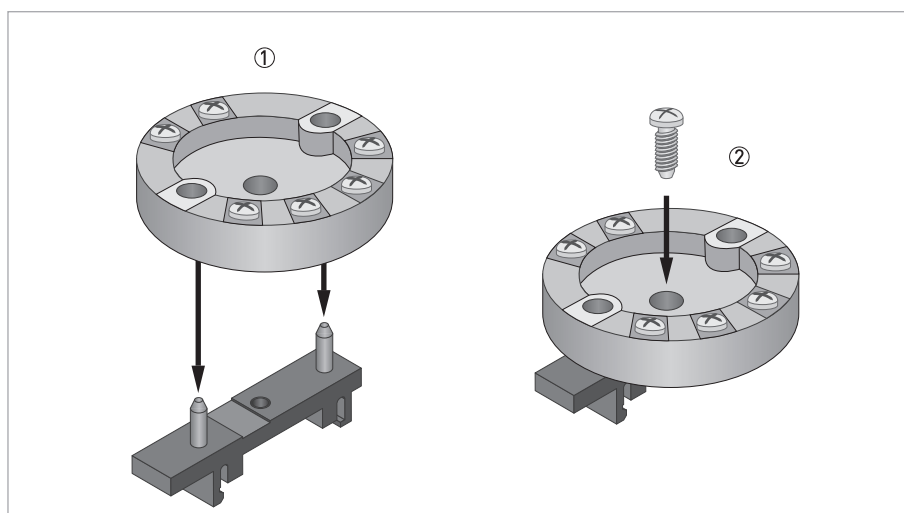


Figure 3-3: Installation procedure: Step 1

- ① Place the transmitter on the clip.
- ② Press down the transmitter until it is attached to the clip.
- ③ Screw the transmitter on to the clip.

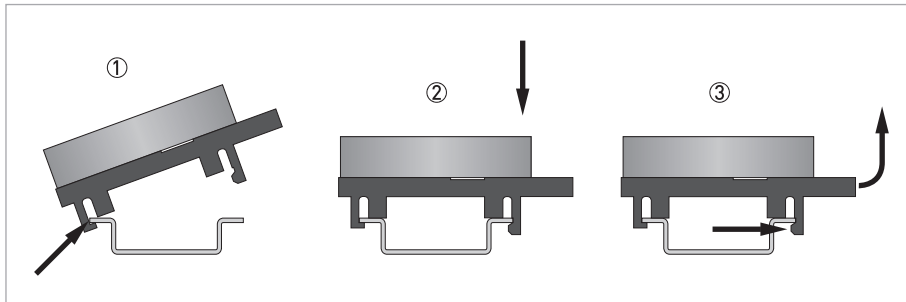


Figure 3-4: Installation procedure: Step 2

- ① Hook one end of the clip into the rail.
- ② Push the other end down until it snaps onto the rail.
- ③ Release by pushing the hook, and at the same time lift the clip out of the rail.

3.3 Rail-mount transmitter

These transmitters are intended for installation on a 35 mm rail according to EN 60715 / DIN 50022.

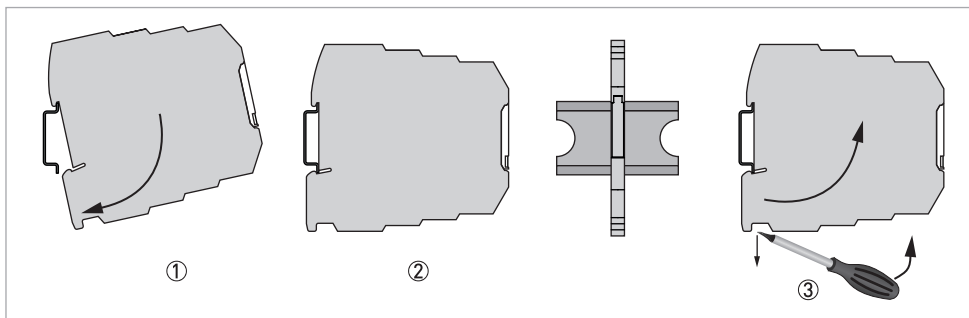


Figure 3-5: Rail installation

- ① Fix the upper part of the transmitter onto the rail.
- ② Press the lower part of the transmitter against the rail.
- ③ To remove the transmitter, bend the locking device using a small screwdriver. Carefully pull the transmitter in the forward direction.

The manufacturer has developed the TT 12 R for an operating temperature range of -40...+85°C / -40...+185°F.

To avoid destruction or damage of the device, always note the following items:

- *Assure that the operating temperature or the ambient temperature does not exceed the permissible range.*

4.1 Safety instructions

All work on the electrical connections may only be carried out with the power disconnected.

Observe the corresponding regulations, declarations of conformity, the type test certificate of the device and the relevant instructions of this document.

Observe without fail the local occupational health and safety regulations.

Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

Look at the device nameplate to ensure that the device is delivered according to your order.

4.2 Electrical connections of in-head transmitter

The input and output signals and the power supply must be connected in accordance with the following illustrations. The transmitter is easy to install with the connection head installation kit. To avoid measuring errors, all cables must be connected properly and the screws tightened correctly.

Pt100 and Pt1000 2-wire connection	Pt100 and Pt1000 3-wire connection	Pt100 and Pt1000 4-wire connection

Table 4-1: RTD measurement

*Connect terminals 1 and 2 on the transmitter, make the connection as short as possible.

4.3 Connection diagram of in-head transmitter

Always establish the electrical connections according to the following diagrams. Otherwise it can come to destruction or damage of the transmitter. Note that the maximum output load always depends on the power supply. If the maximum output load is exceeded, then the measured value will become incorrect.

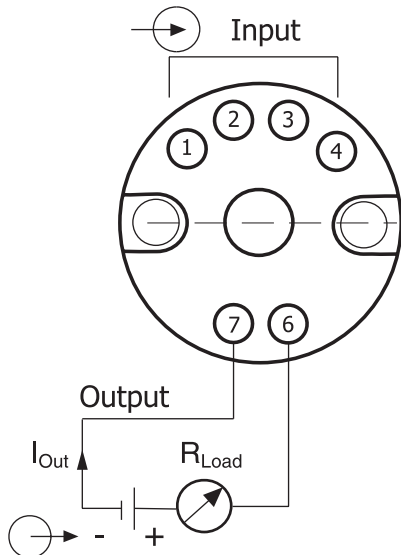


Figure 4-1: Connection diagram for RTD

4.4 Electrical connections of rail-mount transmitter

The input and output signals and the power supply must be connected in accordance with the following illustrations. To avoid measuring errors, all cables must be connected properly.

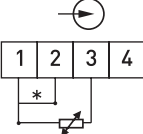
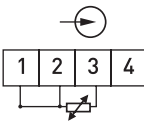
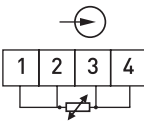
Pt100 and Pt1000 2-wire connection	Pt100 and Pt1000 3-wire connection	Pt100 and Pt1000 4-wire connection
		

Table 4-2: RTD measurement

* Connect terminals 1 and 2 on the transmitter, make the connection as short as possible.

4.5 Connection diagram of rail-mount transmitter

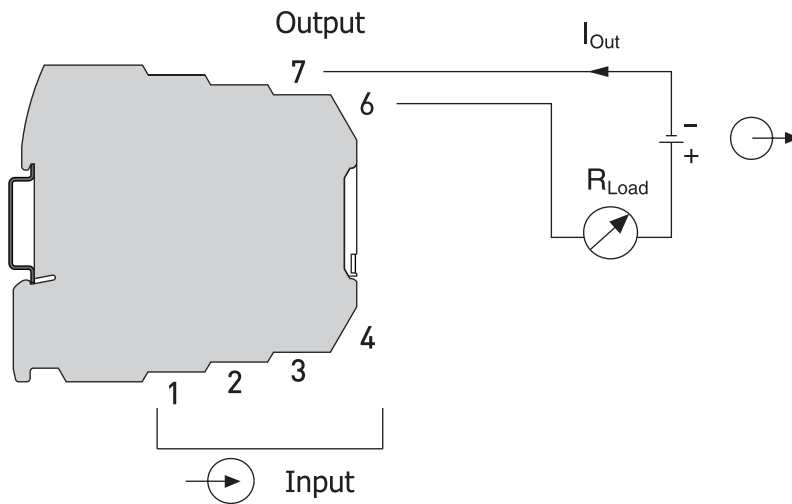


Figure 4-2: Connection diagram for RTD

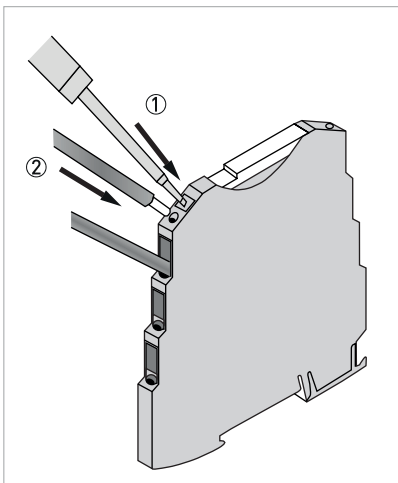


Figure 4-3: Springcage connection

1. Insert a screwdriver into the opening above the connection terminal block.
2. Insert the wire into the corresponding connection terminal block.

5.1 Order code

The characters of the order code highlighted in light grey describe the standard.

VTT1	4	Design
	1	Head mounting (type C)
	2	DIN-rail mounting, 35 mm / 1.38" (type R)
		Type
	4	TT 12 digital, RTD transmitter
		Approvals
	0	Without
		Sensor
	0	Without
	3	Pt100 ($\alpha = 0.00385$)
	8	Pt1000 ($\alpha = 0.00385$)
		Wiring
	0	Without
	2	2-wire (1 x sensor)
	3	3-wire (1 x sensor)
	4	4-wire (1 x sensor)
		Measuring range
	0	Without
	1	-50...+50°C / -58...+122°F
	2	-50...+100°C / -58...+212°F
	3	-50...+150°C / -58...+302°F
	4	0...+50°C / +32...+122°F
	5	0...+100°C / +32...+212°F
	6	0...+150°C / +32...+302°F
	7	0...+200°C / +32...+392°F
	8	0...+250°C / +32...+482°F
	A	0...+300°C / +32...+572°F
	B	0...+350°C / +32...+662°F
	C	0...+400°C / +32...+752°F
	D	0...+450°C / +32...+842°F
	E	0...+500°C / +32...+932°F
	F	0...+600°C / +32...+1112°F
	G	0...+800°C / +32...+1472°F
	H	0...+1000°C / +32...+1832°F
	K	0...+1200°C / +32...+2192°F
	Z	Customized







KROHNE – Products, Solutions and Services

- Process instrumentation for flow, level, temperature, pressure measurement and process analytics
- Flow metering, monitoring, wireless and remote metering solutions
- Engineering, commissioning, calibration, maintenance and training services

Head Office KROHNE Messtechnik GmbH
Ludwig-Krohne-Str. 5
47058 Duisburg (Germany)
Tel.: +49 203 301 0
Fax: +49 203 301 10389
info@krohne.de

The current list of all KROHNE contacts and addresses can be found at:
www.krohne.com

