



KROHNE

▶ measure the facts

Temperature measurement

Product overview



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KROHNE trademarks:

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KROHNE – your global partner

KROHNE is your reliable partner for process instrumentation and automation. As our client, you benefit from our ability to solve your applications with matching measurement solutions; we offer a complete product portfolio, industry specific system solutions and complementary services for instrumentation projects of any size.

By having specialised in industrial process measurement since 1921, we have gained an enormous amount of application knowledge in various industries that is integrated into our products, solutions and services. We have truly mastered the physical principles our meters are based on: our ability to utilise physical effects and to find a matching measuring solution time after time are the reasons we are trusted by clients worldwide. The primary measured value is as accurate as possible to avoid consecutive faults that might affect your process control. It also enables our meters to measure reliably, even under changing or difficult process conditions. Both aspects are reflected by our claim “**Measure the facts**”.

The innovative technologies we employ for your benefit are based on our extensive R&D activities: 10 % of the >3700 KROHNE employees work in research and development. Next to sensor physics, their focus is on device communication and enabling technologies for the Internet of Things (IoT) in process industry, e.g. ethernet communication to transmit process and device diagnostic data for evaluation and process optimisation.

Our “Technology Icons” perfectly sum up the above mentioned advantages for you. You will find them highlighted within our complete portfolio in this brochure. If you don't find a matching solution for your measurement application, feel free to contact us, we look forward to solving it.

Temperature assembly selection

These tables will help you select the right measuring solution for your application, a selection from our product portfolio

	Industrial			High temperature	Advanced requirements		
	OPTITEMP TRA/TCA-P10	OPTITEMP TRA/TCA-S12, -S22	OPTITEMP TRA/TCA-F13, -F42	OPTITEMP TCA-P62, -P64	OPTITEMP TRA/TCA-S34, -TS35, -S50, -TS53, -TS54	OPTITEMP TRA/TCA-TF31, -TF33, -TF56, -TF57	OPTITEMP TRA/TCA-T30
Page	10/20	10/20	10/21	11/21	12/13/22/23	12/13/22/23	12/22
Design							
Process connection	Plug-in	Screw-in	Flange	Plug-in	Screw-in	Flange	Weld-in
Standard material	Stainless steel	Stainless steel	Stainless steel	Kantahl, ceramic	Stainless steel*	Stainless steel*	Stainless steel*
Operating temperature	≤+600°C/ +1100°F	≤+600°C/ +1100°F	≤+600°C/ +1100°F	P62: ≤+750...+1150°C/ +1350...+2100°F P64: ≤+750...+1600°C/ +1350...+2900°	≤+600°C/ +1100°F	≤+600°C/ +1100°F	≤+600°C/ +1100°F
High pressure	-	-	-	-	x	x	x
High flow	-	-	-	-	x	x	x
Ex approvals	x	x	x	-	x	x	x
Medium							
Solid	x	x	-	-	x	-	-
Liquid	x	x	x	-	x	x	x
Gas	x	x	x	x	x	x	x
Steam	-	x	-	-	x	x	x
Accessories							
	Compression fittings	Weld-in fittings	Coatings and covers	Gas-tight threaded sleeves, sliding flange	Weld-in fittings	Coatings and covers	Thermowell in different material

	Compact			
	OPTITEMP TRA-C20	OPTITEMP TRA-C61	OPTITEMP TRA-C65	OPTITEMP TRA-C30
Page	14/24	14/24	14/24	14/24
Design				
Process connection	Screw-in	G1/2 hyg.	DN25/38 acc. ISO2852	Screw-in
Standard material	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Operating temperature	with transmitter -50...+150°C/ -58...+302°F without transmitter -50...+200°C/ -58...+400°F	with transmitter -50...+150°C/ -58...+302°F without transmitter -50...+200°C/ -58...+400°F	with transmitter -50...+150°C/ -58...+302°F without transmitter -50...+200°C/ -58...+400°F	with transmitter -50...+150°C/ -58...+302°F without transmitter -50...+200°C/ -58...+400°F
High pressure	-	-	-	-
High flow	-	-	-	-
Hygienic approvals	-	EHEDG	3A (in preparation)	-
Medium				
Solid	x	x	-	x
Liquid	x	x	x	x
Gas	x	x	x	x
Steam	x	x	-	x
Accessories				
	Cable with valve connector EN175301-803	Hygienic adapters, cable with M12 connector	Hygienic adapters, cable with M12 connector	Cable with M12 connector

x = suitable , - = not suitable , * also available in Barstock

Temperature assembly selection

These tables will help you select the right measuring solution for your application, a selection from our product portfolio

	Hygienic		
	OPTITEMP TRA-H30	OPTITEMP TRA-H61	OPTITEMP TRA-H65
Page	14/25	14/25	14/25
Design			
Process connection	DN25/38 acc. to ISO 2852	G1/2 hyg.	DN25/38 acc. ISO2852
Standard material	Stainless steel	Stainless steel	Stainless steel
Operating temperature	300°C/ 550°F	≤+200°C/ +400°F	≤+200°C/ + 400°F
High pressure	-	-	-
High flow	-	-	-
Hygienic approvals	-	EHEDG	3A (in preparation)
Medium			
Solid	-	-	-
Liquid	x	x	x
Gas	x	x	x
Steam	-	-	-
Accessories			
	-	Hygienic adapters	Hygienic adapters

	Mineral insulated	Cable		HVAC
	OPTITEMP TCA-M50, -M70	OPTITEMP TRA-W30, -W40	OPTITEMP TRA-W50, -W70	OPTITEMP TRA-V20
Page	14/27	15/26	15/26	15/27
Design				
Process connection	Plug-in	Skin sensor	W50: screw-in W70: bayonet	Wall mount
Standard material	Inconel®	Copper	Stainless steel	Brass
Operating temperature	≤+750...+1250°C/ +1350...+2300°F	≤+200...+300°C/ +400...+550°F	≤+200°C/ +400°F	≤+75°C/ +170°F
High pressure	-	-	-	-
High flow	-	-	-	-
Ex approvals	-	-	-	-
Medium				
Solid	x	x	x	-
Liquid	x	-	-	-
Gas	x	-	-	x
Steam	-	-	-	-
Accessories				
	Compression fitting, connectors	Clamp-on connection	Bayonet nipple	-

x = suitable , - = not suitable

Temperature transmitter selection

These tables will help you to select the right transmitter for your application.
For technical details, datasheets can be found at www.krohne.com

	Conventional	Programmable		
	OPTITEMP TT 10	OPTITEMP TT 22	OPTITEMP TT 31	OPTITEMP TT 32
Page	28/34/36	28/34/36	28/36	28/36
Design (powered by)				
Head-mounted transmitter	x	x	-	-
Intrinsically-safe head-mounted transmitter, Ex	x	x	-	-
Rail-mounted transmitter	x	x	x	x
Intrinsically-safe rail-mounted transmitter, Ex	-	-	x	-
SIL2	-	-	-	-
Input				
Resistance thermometer	3-wire	3-wire	3- or 4-wire	3- or 4-wire
Thermocouples	J, L, T, K, N	-	B, C, E, J, K, L, N, R, S, T, U	B, C, E, J, K, L, N, R, S, T, U
Other	-	-	mV, Ω	mV, Ω
Channels/inputs				
1 measuring channel	x	x	x	x
2 measuring channels	-	-	x	-
2 inputs	-	-	x	-
Output				
4-20 mA	x	x	x	x
0-10 V	-	-	-	x
HART®	-	-	-	-
Accuracy				
Accuracy classes	±0.15%	±0.10%	±0.10%	±0.10%
Circuit design				
Galvanic isolation	-	-	1500 VAC	4000 VAC
Power supply				
24 VDC	x	x	x	x
230 VAC	-	-	-	x
Accessoires				
Loop powered LED und LCD display, loop powered isolator and repeaters, transmitter configuration kit	x	x	x	x

	Programmable		Smart	
	OPTITEMP TT 33	OPTITEMP TT 40	OPTITEMP TT 51	OPTITEMP TT 53
Page	29/34/37	29/35/37	29/35/37	29/35/37
Design (powered by)				
Head-mounted transmitter	x	x	x	x
Intrinsically-safe head-mounted transmitter, Ex	x	-	x	x
Rail-mounted transmitter	x	x	x	x
Intrinsically-safe rail-mounted transmitter, Ex	x	-	x	x
SIL2	-	-	x	-
Input				
Resistance thermometer	3- or 4-wire	3- or 4-wire	3- or 4-wire	3- or 4-wire
Thermocouples	B, C, E, J, K, L, N, R, S, T, U	B, C, E, J, K, L, N, R, S, T, U	B, C, D, E, J, K, N, R, S, T	B, C, D, E, J, K, L, N, R, S, T, U
Other	mV, Ω	mV, Ω	mV, Ω	mV, Ω
Channels/inputs				
1 measuring channel	x	x	x	x
2 measuring channels	-	-	-	-
2 inputs	-	-	x	x
Output				
4-20 mA	x	x	x	x
0-10 V	-	-	-	-
HART®	-	-	x	x
Accuracy				
Accuracy classes	±0.08%	±0.05%	±0.05%	±0.08%
Circuit design				
Galvanic isolation	1500 VAC	3750 VAC	1500 VAC	1500 VAC
Power supply				
24 VDC	x	x	x	x
230 VAC	-	-	-	-
Accessoires				
Loop powered LED und LCD display, loop powered isolator and repeaters, transmitter configuration kit	x	x	x	x

x = suitable, - = not suitable

Industrial temperature assemblies



OPTITEMP TRA/TCA-P10*
Temperature assembly
for compression fitting



OPTITEMP TRA/TCA-S12*
Temperature assembly
for screw-in



OPTITEMP TRA/TCA-F13*
Temperature assembly
with process flange



OPTITEMP TRA/TCA-S22
Temperature assembly
for screw-in



OPTITEMP TRA/TCA-F42*
Temperature assembly
with process flange



*Also available
with Ex approval

High temperature assemblies



OPTITEMP TCA-P62
High temperature
assembly for plug-in



OPTITEMP TCA-P64
High temperature
assembly for plug-in

Temperature assemblies – Selection from our product portfolio

Temperature assemblies for advanced requirements, DIN standard



OPTITEMP TRA/TCA-T30*
Temperature assembly
for weld-in



OPTITEMP TRA/TCA-S34*
Temperature assembly
without thermowell



OPTITEMP TRA/TCA-TF33*
Temperature assembly
with process flange



OPTITEMP TRA/TCA-TF31*
Temperature assembly
with process flange

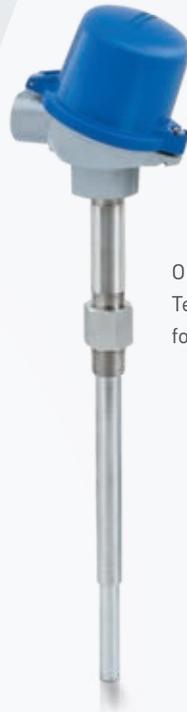


OPTITEMP TRA/TCA-TS35*
Temperature assembly
for screw-in

Temperature assemblies for advanced requirements, ASME standard



OPTITEMP TRA/TCA-S50
Temperature assembly
without thermowell



OPTITEMP TRA/TCA-TS54*
Temperature assembly
for screw-in



OPTITEMP TRA/TCA-TF57*
Temperature assembly
with process flange



OPTITEMP TRA/TCA-TS53*
Temperature assembly
for screw-in



OPTITEMP TRA/TCA-TF56*
Temperature assembly
with process flange



*Also available
with Ex approval

Compact sensors



OPTITEMP TRA-C20
Compact sensor
for screw-in with
valve connector



OPTITEMP TRA-C30
Compact sensor
for screw-in with
M12 connector



OPTITEMP TRA-C61
Resistance (RTD) compact
sensor with G1/2 thread with
hygienic adapters (VARIVENT®,
weld-in-sleeve, DN 11851,
SMS 1145 etc.)



OPTITEMP TRA-C65
Resistance (RTD)
compact sensor with
welded clamp connection
for hygienic applications

Hygienic temperature assemblies



OPTITEMP TRA-H30
Temperature assembly with
Hygienic clamp or VARIVENT®
connection with in-situ
calibration capability



OPTITEMP TRA-H61
Resistance (RTD) temperature
assembly with G1/2 thread with
hygienic adapters (VARIVENT®,
DIN 11851, SMS 1145)



OPTITEMP TRA-H65
Resistance (RTD) temperature
assembly with welded clamp
connection for hygienic
applications

Mineral insulated thermocouples



OPTITEMP TCA-M70
Mineral insulated cable thermocouple



OPTITEMP TCA-M50
Mineral insulated thermocouple
with mini thermo plug

Cable sensors and HVAC temperature sensors



OPTITEMP TRA-W30
Cable sensor for clamp-on



OPTITEMP TRA-W40
Cable sensor for screw-on



OPTITEMP TRA-W50
Cable sensor for screw-in



OPTITEMP TRA-W70
Cable sensor with bayonet fitting



OPTITEMP TRA-V20
HVAC temperature sensor
for wall mounting

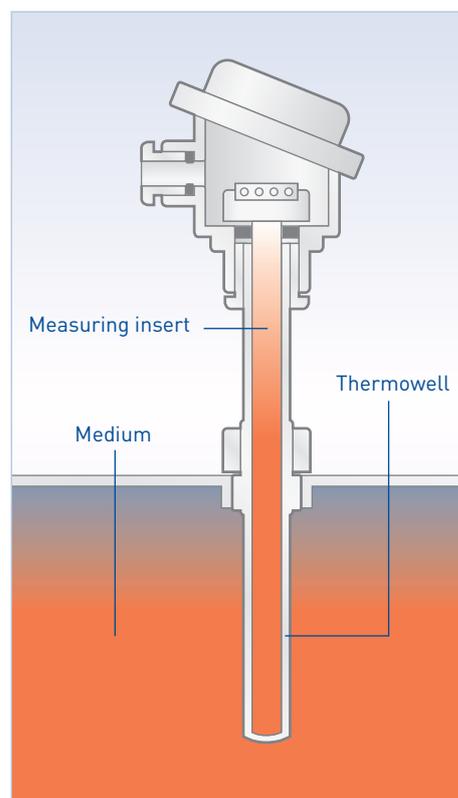
Highlights:

- Wide range of products
- Standardised and customer-specific temperature assemblies
- Thermowells made from both standard and special materials
- Coated thermowells for use in aggressive media
- Replaceable measuring inserts made of mineral insulated cable
- Pt100 RTD and thermocouples as well as customer specific elements
- Connection heads for a wide variety of requirements
- Extensive range of accessories

Exact temperature measurement: Perfect interaction of elements

The history of temperature measurement starts at the end of the 16th century: In 1596, the thermoscope of none other than Galileo Galilei becomes one of the first devices designed to measure temperature. It functioned by heating up and expanding water in small glass tubes and considered the predecessor to today's temperature assembly.

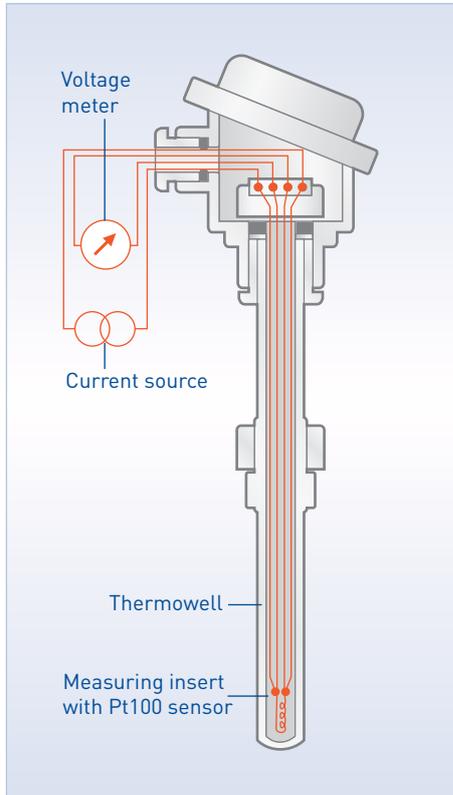
The technology behind temperature measurement has been refined and improved over the centuries and the interaction of the elements, especially when it comes to extremely demanding, industrial applications, has been continuously perfected. KROHNE has played a special role in the research and development of this field.



The measuring principle

Contact temperature assemblies that come into direct contact with the product to be measured are predominantly used in industry today. The physical foundation for its function is described by the zeroth law of thermodynamics.

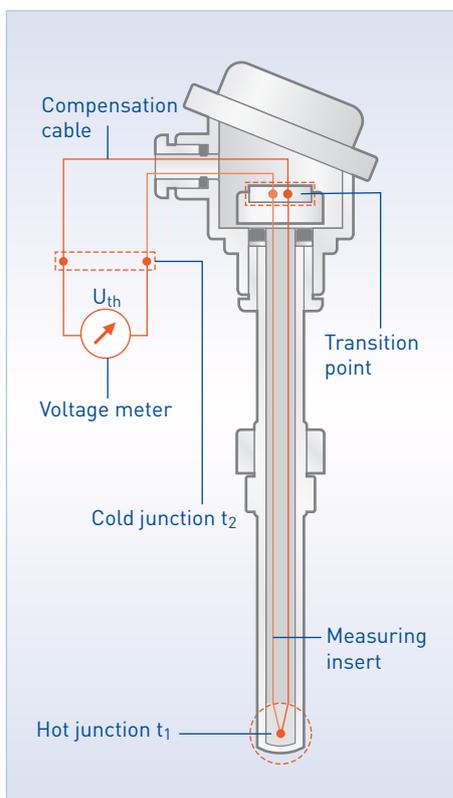
When measuring temperature, the temperature assembly must assume the temperature of the medium – the medium, thermowell and the measuring insert with the sensor element must be brought into thermal equilibrium. The precondition for this is good and above all rapid heat exchange amongst all components involved. Since temperature can only be indirectly measured as, for example, via the temperature dependency of the electrical resistance of metals or via thermoelectric effects, this can be used to construct sensor elements: these are usually Pt resistance sensors or thermocouples built into the appropriate measuring insert.



Resistance sensor

For a measuring insert with a Pt100 resistance sensor, the temperature-sensitive sensor element is made from a platinum RTD whose value at 0 °C/+32 °F is 100 Ω. The electrical resistance of metals increases according to a mathematical function as the temperature rises.

This effect is used with resistance temperature assembly to measure the temperature: a constant current I flows through the Pt100 RTD, creating a voltage drop U . The resistance " R " follows Ohm's law: $R = U/I$ and corresponds to a specific temperature. The temperature dependency is repeatable and is standardised in a characteristic curve.



Thermocouples

With a thermocouple, two different electrical conductors are connected at one end to the measuring point, the hot junction. The free ends at the transition point are connected to the measuring device with a compensation cable via the so-called cold junction. Only when the hot junction t_1 and the cold junction t_2 have different temperatures is a thermovoltage U_{th} measured. The thermovoltage is then dependent on the difference $t_2 - t_1$ as well as on the material combination of the thermocouple.

Very simply put, think of the thermocouple as a voltage source whose voltage increases with the temperature. The temperature, dependent on the thermovoltage, is standardised and can thus be precisely determined.



Optimal solutions: For any industry and any application

Whether it's reliable temperature measurement in steam pipelines at power plants or the exact determination of process temperatures in chemical plants, KROHNE temperature assemblies are as versatile as the requirements and specific applications of our customers need them to be. Both tried and tested methods and the latest in production technology come into play. Thanks to this unique connection, we ensure that we can provide our customers not only with standard temperature assemblies but that we can also meet our customers' requirements for customised temperature measurement equipment.

Highly resistant and gas-tight thermocouples in the OPTITEMP series are highly insensitive to rapid temperature changes and boast good stability in reducing atmospheres. This means that the enormous thermal and mechanical loads occurring on a daily basis in many industries pose no problems.

OPTITEMP flue gas thermocouples are used in combustion processes such as those found e.g. in the iron and steel industry. They are highly resistant to abrasion. Similar elements can also be used in ovens.

It makes no difference if there are high temperatures, extreme pressures or high flow velocities: KROHNE meets virtually every need when it comes to temperature measuring technology, ensuring maximum process certainty at the same time. Thermowells with tapered tips are as much a part of the line as metallic thermowells featuring an additional titanium or tantalum casing used, for example, in the event of high chemical exposure.

Suitable temperature assembly materials are always selected based on the various process media as regards corrosion and abrasion. Strength calculations when it comes to customer-specific thermowells can always be performed on an individual basis.

Other features such as the explosion-proof characteristic through intrinsic safety and flameproof enclosures or the SIL compliant design, contribute to the technical reliability of a wide variety of installations.

With the compact sensor range we are also able to provide advanced temperature measuring in tight areas due to its small form factor. Another benefit is no moving parts. The fast build-in transmitter is already set by factory and therefore easy to order and install without any configuration or training.

Industries:

- Chemical
- Petrochemical
- Oil and gas
- Energy supply
- Machine building
- Pharmaceutical
- Food and beverage
- Water and wastewater
- Iron and steel
- Pulp and paper
- Heating, Ventilation & Air Conditioning (HVAC)



Temperature assemblies

Selection from our product portfolio

	Industrial temperature assemblies		
	Temperature assembly for compression fitting. Welded multipart thermowell, form 2	Temperature assembly for screw-in. Welded multipart thermowell, form 2G	Temperature assembly for screw-in. Welded multipart thermowell with reduced tip
	OPTITEMP TRA/TCA-P10	OPTITEMP TRA/TCA-S12	OPTITEMP TRA/TCA-S22
			
			
Connection head			
Models	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, BUZ-HK	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, BUZ-HK	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, BUZ-HK
Cable gland/conduit thread	M20 x 1.5	M20 x 1.5	M20 x 1.5
Process thread	M24 x 1.5	M24 x 1.5	M24 x 1.5
Sensitive element			
Sensor	1, 2x Pt100 or 1, 2x TC J, K	1, 2x Pt100 or 1, 2x TC J, K	1, 2x Pt100 or 1, 2x TC J, K
Circuit type	3- or 4-wire, 3-wire with SmartSense	3- or 4-wire, 3-wire with SmartSense	3- or 4-wire, 3-wire with SmartSense
Tolerance class	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584
Design	Replaceable spring loaded mineral isolated measuring insert	Replaceable spring loaded mineral isolated measuring insert	Replaceable spring loaded mineral isolated measuring insert
Connection type	Ceramic terminal block, flying leads or temperature transmitter	Ceramic terminal block, flying leads or temperature transmitter	Ceramic terminal block, flying leads or temperature transmitter
Thermowell			
Process connection	Plug-in	G1/2, 3/4, 1, 1/2", 3/4" NPT	G1/2, 3/4, 1, 1/2", 3/4" NPT
Diameter/dimensions	Ø9, 10, 11, 12 mm/ 0.35, 0.39, 0.43, 0.47"	Ø9, 10, 11, 12 mm/ 0.35, 0.39, 0.43, 0.47"	Ø11, 12 mm/ 0.43, 0.47"
Material	1.4571/316Ti, 1.4404/316L	1.4571/316Ti, 1.4404/316L	1.4571/316Ti, 1.4404/316L
Standard length	305, 395, 545 mm/12, 15.5, 21.5"	160, 250, 400 mm/6.3, 9.8, 15.8"	160, 250, 400 mm/6.3, 9.8, 15.8"
Neck tube/holding tube			
Length	-	145 mm/5.7" (other on request)	145 mm/5.7" (other on request)
Connection thread	-	-	-
Approvals			
	ATEX Ex-i, IECEx Ex-i	ATEX Ex-i, IECEx Ex-i	-

Industrial temperature assemblies		High temperature assemblies	
Temperature assembly with process flange. Welded multi-part thermowell, form 2F	Temperature assembly with process flange. Welded multi-part thermowell, form 3F	High temperature assembly for plug-in. Metal welded multipart thermowell, $t \leq +1150^{\circ}\text{C}/+2102^{\circ}\text{F}$	High temperature assembly for plug-in. Ceramic thermowell, $t \leq +1600^{\circ}\text{C}/+2912^{\circ}\text{F}$
OPTITEMP TRA/TCA-F13	OPTITEMP TRA/TCA-F42	OPTITEMP TCA-P62	OPTITEMP TCA-P64
			
BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, BUZ-HK	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, BUZ-HK	BUZ-T, BUZ-S, AA	BUZ-T, AA
M20 x 1.5	M20 x 1.5	M20 x 1.5	M20 x 1.5
M24 x 1.5	M24 x 1.5	Ø22.3 mm/0.9"	Ø22.3 mm/0.9"
1, 2x Pt100 or 1, 2x TC J, K	1, 2x Pt100 or 1, 2x TC J, K	1, 2x TC J, K	1, 2x TC S, K
3- or 4-wire, 3-wire with SmartSense	3- or 4-wire, 3-wire with SmartSense	2-wire TC	2-wire TC
Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584	Class 1 acc. EN 60584	Class 1 acc. EN 60584
Replaceable spring loaded mineral isolated measuring insert	Replaceable spring loaded mineral isolated measuring insert	Replaceable spring loaded mineral isolated measuring insert	Replaceable spring loaded mineral isolated measuring insert and ceramic insert
Ceramic terminal block, flying leads or temperature transmitter	Ceramic terminal block, flying leads or temperature transmitter	Ceramic connection block, flying leads or temperature transmitter	Ceramic connection block, flying leads or temperature transmitter
DN25/PN40, DN50/PN40, ASME 1", 1 1/2", 150 lb, 300 lb	DN25/PN40, DN50/PN40, ASME 1", 1 1/2", 150 lb, 300 lb	Mounting flange acc. EN 50446 or gas tight compression fitting G3/4, 1	Mounting flange acc. EN 50446 or gas tight compression fitting G3/4, 1
Ø9, 10, 11, 12 mm/ 0.35, 0.40, 0.43, 0.47"	Ø12 mm/ 0.5"	Ø19, 22 mm/ 0.75, 0.9"	Ø15 mm/ 0.6"
1.4571/316Ti, 1.4404/316L	1.4571/316Ti	1.4762, 1.4767	C799, C610
225, 315, 465 mm/8.9, 12.4, 18.3"	225, 315, 465 mm/8.9, 12.4, 18.3"	500, 710, 1000, 1400, 2000 mm/ 19.7, 27.9, 39.4, 55.1, 78.7"	500, 710, 1000, 1400, 2000 mm/ 19.7, 27.9, 39.4, 55.1, 78.7"
80 mm/3.1" (other on request)	82 mm/3.2" (other on request)	-	150 mm/5.9" (other on request)
-	-	-	-
ATEX Ex-i, IECEx Ex-i	ATEX Ex-i, IECEx Ex-i	-	-

Temperature assemblies

Selection from our product portfolio

	Temperature assemblies for advanced requirements, DIN standard				
	Temperature assembly for weld-in. Barstock thermowell, form 4	Temperature assembly with process flange. Barstock thermowell, form 4F	Temperature assembly with process flange. Welded multipart thermowell	Temperature assembly for screw-in. Welded multipart thermowell, form 8 for union nut	Temperature assembly without thermowell
	OPTITEMP TRA/TCA-T30	OPTITEMP TRA/TCA-TF31	OPTITEMP TRA/TCA-TF33	OPTITEMP TRA/TCA-TS35	OPTITEMP TRA/TCA-S34
					
Connection head					
Models	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, AXD, BUZ-HK, SXD	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, AXD, BUZ-HK, SXD	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, AXD, BUZ-HK, SXD	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, AXD, BUZ-HK, SXD	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, AXD, BUZ-HK, SXD
Cable gland/ conduit thread	M20 x 1.5	M20 x 1.5	M20 x 1.5	M20 x 1.5	M20 x 1.5
Process thread	M24 x 1.5	M24 x 1.5	M24 x 1.5	M24 x 1.5	M24 x 1.5
Sensitive element					
Sensor	1, 2x Pt100 or 1, 2x TC J, K	1, 2x Pt100 or 1, 2x TC J, K	1, 2x Pt100 or 1, 2x TC J, K	1, 2x Pt100 or 1, 2x TC J, K	1, 2x Pt100 or 1, 2x TC J, K
Sensor connection	3- or 4-wire, 3-wire with SmartSense	3- or 4-wire, 3-wire with SmartSense			
Tolerance class	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584
Design	Replaceable spring loaded mineral isolated measuring insert	Replaceable spring loaded mineral isolated measuring insert			
Connection type	Ceramic terminal block, flying leads or temperature transmitter	Ceramic terminal block, flying leads or temperature transmitter	Ceramic terminal block, flying leads or temperature transmitter	Ceramic terminal block, flying leads or temperature transmitter	Ceramic terminal block, flying leads or temperature transmitter
Thermowell					
Process connection	Weld-in fitting	DN25/PN40, DN50/PN40 ASME 1", 1 1/2", 150 lb, 300 lb	DN25/PN40, DN50/PN40 ASME 1", 1 1/2", 150 lb, 300 lb	G 1/2, 3/4, 1, 1/2" NPT, 3/4" NPT	-
Diameter/ dimensions	Ø24 mm/0.94"	Ø24 mm/0.94"	Ø9, 10, 11, 12 mm/ 0.35, 0.39, 0.43, 0.47"	Ø9, 10, 11, 12 mm/ 0.35, 0.39, 0.43, 0.47"	Ø6 mm/0.24"
Material	1.4571/316Ti, 1.4404/316L, 1.7335/13CrMo44, 1.0460/C22.8	1.4571/316Ti, 1.4404/316L, 1.7335/13CrMo44, 1.0460/C22.8	1.4571/316Ti, 1.4404/316L	1.4571/316Ti, 1.4404/316L	1.4404/316L, Inconel® 600
Standard length	140, 200, 260 mm/ 5.51, 7.87, 10.24"	130, 190 mm/5.12, 7.48"	100, 170, 260, 410 mm/ 3.94, 6.69, 10.24, 16.14"	100, 170, 260, 410 mm/ 3.94, 6.69, 10.24, 16.14"	100, 140, 200, 260, 300, 350, 400 mm/ 3.94, 5.51, 7.87, 10.24, 11.81, 13.78, 15.75"
Neck tube/holding tube					
Length	80, 145, 165, 200 mm/ 3.15, 5.71, 6.50, 7.87"	80, 145, 165, 200 mm/ 3.15, 5.71, 6.50, 7.87"	80, 145, 165, 200 mm/ 3.15, 5.71, 6.50, 7.87"	80, 145, 165, 200 mm/ 3.15, 5.71, 6.50, 7.87"	80, 145, 165, 200 mm/ 3.15, 5.71, 6.50, 7.87"
Connection thread	M18 x 1.5, G1/2	M18 x 1.5, G1/2	M18 x 1.5, G1/2	G1/2, 3/4 cap nut	M18 x 1.5, G1/2, 3/4 cap nut
Approvals					
	ATEX Ex-i, -d, IECEx-i, -d	ATEX Ex-i, -d, IECEx-i, -d	ATEX Ex-i, IECEx-i	ATEX Ex-i, IECEx-i	ATEX Ex-i, IECEx-i

Temperature assemblies for advanced requirements, ASME standard					
	Temperature assembly without thermowell	Temperature assembly for screw-in. Tapered barstock tip	Temperature assembly for screw-in. Reduced barstock tip	Temperature assembly with process flange. Tapered barstock tip	Temperature assembly with process flange. Reduced barstock tip
	OPTITEMP TRA/TCA-S50	OPTITEMP TRA/TCA-TS53	OPTITEMP TRA/TCA-TS54	OPTITEMP TRA/TCA-TF56	OPTITEMP TRA/TCA-TF57
					
Connection head					
Models	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, AXD, SXD	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, AXD, SXD	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, AXD, SXD	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, AXD, SXD	BA, BUZ-T, BUZ-S, BUZ-H, BUZ-HW (display), BGK, BBK, BVA, AXD, SXD
Cable gland/ conduit thread	1/2" NPT, M20 x 1.5				
Process thread	1/2" NPT, G1/2				
Sensitive element					
Sensor	1, 2x Pt100 or 1, 2x TC J, K	1, 2x Pt100 or 1, 2x TC J, K	1, 2x Pt100 or 1, 2x TC J, K	1, 2x Pt100 or 1, 2x TC J, K	1, 2x Pt100 or 1, 2x TC J, K
Sensor connection	3- or 4-wire, 3-wire with SmartSense				
Tolerance class	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584	Class A, B, 1/3 DIN B, 1/10 DIN B acc. EN 60751, class 1 acc. EN 60584
Design	Replaceable spring loaded mineral isolated measuring insert				
Connection type	Ceramic terminal block, flying leads or temperature transmitter	Ceramic terminal block, flying leads or temperature transmitter	Ceramic terminal block, flying leads or temperature transmitter	Ceramic terminal block, flying leads or temperature transmitter	Ceramic terminal block, flying leads or temperature transmitter
Thermowell					
Process connection	-	G1/2, 3/4, 1, 1/2" NPT, 3/4" NPT	G1/2, 3/4, 1, 1/2" NPT, 3/4" NPT	DN25/PN40, DN50/PN40, ASME 1", 1 1/2", 2", 150, 300, 600 lb	DN25/PN40, DN50/PN40, ASME 1", 1 1/2", 2", 150, 300, 600 lb
Diameter/ dimensions	Ø6 mm/0.24"	Ø16, 22 mm/0.63, 0.87"	Ø16, 22 mm/0.63, 0.87"	Ø22, 25 mm/0.87, 0.98"	Ø12, 19, 23 mm/0.47, 0.75, 0.91"
Material	1.4404/316L, Inconel® 600	1.4571/316Ti, 1.4404/316L	1.4571/316Ti, 1.4404/316L	1.4571/316Ti, 1.4404/316L	1.4571/316Ti, 1.4404/316L
Standard length	100, 150, 200, 250, 300, 350, 400 mm/ 3.94, 5.91, 7.87, 9.84, 11.81, 13.78, 15.75"	100, 150, 200, 250, 300, 350, 400 mm/ 3.94, 5.91, 7.87, 9.84, 11.81, 13.78, 15.75"	100, 150, 200, 250, 300, 350, 400 mm/ 3.94, 5.91, 7.87, 9.84, 11.81, 13.78, 15.75"	100, 150, 200, 250, 300, 350, 400 mm/ 3.94, 5.91, 7.87, 9.84, 11.81, 13.78, 15.75"	100, 150, 200, 250, 300, 350, 400 mm/ 3.94, 5.91, 7.87, 9.84, 11.81, 13.78, 15.75"
Neck tube/holding tube					
Length	76, 102, 152, 165 mm/ 3, 4, 6, 6.5"	76, 102, 152, 165 mm/ 3, 4, 6, 6.5"	76, 102, 152, 165 mm/ 3, 4, 6, 6.5"	76, 102, 152, 165 mm/ 3, 4, 6, 6.5"	76, 102, 152, 165 mm/ 3, 4, 6, 6.5"
Connection thread	G1/2, 1/2" NPT				
Approvals					
	ATEX Ex-i, -d, IECEx-i	ATEX Ex-i, -d, IECEx-i, -d			

Temperature assemblies

Selection from our product portfolio

	Compact sensors			
	Compact sensor for screw-in with valve connector	Compact sensor for screw-in with M12 connector	Resistance (RTD) compact sensor with G1/2 thread with hygienic adapters (VARIVENT®, weld-in-sleeve, DN 11851, SMS 1145 etc.)	Resistance (RTD) compact sensor with welded clamp connection for hygienic applications
	OPTITEMP TRA-C20	OPTITEMP TRA-C30	OPTITEMP TRA-C61	OPTITEMP TRA-C65
				
Connection head				
Models	With or without integrated transmitter	With or without integrated transmitter	With or without integrated transmitter	With or without integrated transmitter
Cable gland/ electrical connection	Valve connector EN 175301-803	M12 connector	M12 connector	M12 connector
Sensitive element				
Sensor connection	1 x Pt100	1 x Pt100	1 x Pt100	1 x Pt100
Circuit type	3-wire RTD, 4-wire on request	3-wire RTD, 4-wire on request	4-wire RTD	4-wire RTD
Tolerance class	Class A acc. EN 60751	Class A acc. EN 60751	Cl. A acc. to EN 60751	Cl. A acc. to EN 60751
Design	Non replaceable RTD	Non replaceable RTD	Fast responding sensor tip	Fast responding sensor tip
Connection type	–	–	Non replaceable RTD	Non replaceable RTD
Thermowell				
Process connection	G1/2 (other on request)	G1/2 (other on request)	G 1/2 hygienic	ISO2852 DN25/38, DN50
Diameter/dimensions	Ø6 mm/0.24"	Ø6 mm/0.24"	Ø6 reduced to 3 mm	Ø6 reduced to 3 mm
Material	1.4404/316L	1.4404/316L	1.4404/316L, Ra < 0.8 µm, optional Ra < 0.5 µm	1.4404/316L, Ra < 0.8 µm, optional Ra < 0.5 µm
Standard length	50, 100 mm/2, 4" (other on request)	50, 100 mm/2, 4" (other on request)	50, 70, 80, 90, 100, ... , 200 mm	50, 70, 80, 90, 100, ... , 200 mm
Neck tube/holding tube				
Length	35.5mm	56 mm w/o transmitter 72 mm with transmitter	97 mm w/o transmitter 147 mm with transmitter	79 mm w/o transmitter 129 mm with transmitter
Approvals				
	–	–	EHEDG	3A (in preparation)

Hygienic temperature assemblies			
	Temperature assembly with Hygienic clamp or VARIVENT® connection with in-situ calibration capability	Resistance (RTD) temperature assembly with G1/2 thread with hygienic adapters (VARIVENT®, DIN 11851, SMS 1145)	Resistance (RTD) temperature assembly with welded clamp connection for hygienic applications
	OPTITEMP TRA-H30	OPTITEMP TRA-H61	OPTITEMP TRA-H65
			
Connection head			
Models	BHY	BHY	BHY
Cable gland/ electrical connection	M20 x 1.5, Add on M16 x 1,5 mm, M12 connector	M16 x 1,5 mm, M12 connector	M16 x 1,5 mm, M12 connector
Sensitive element			
Sensor connection	1, 2 x Pt100	1 x Pt100	1 x Pt100
Circuit type	3- or 4-wire RTD	4-wire RTD	4-wire RTD
Tolerance class	Class A acc. EN 60751	Class A acc. EN 60751	Class A acc. EN 60751
Design	Replaceable spring loaded mineral isolated measuring insert	Replaceable-/ non replaceable inserts, fast responding	Replaceable-/ non replaceable inserts, fast responding
Connection type	Ceramic terminal block, flying leads or temperature transmitter	Ceramic terminal block, flying leads or temperature transmitter	Ceramic terminal block, flying leads or temperature transmitter
Thermowell			
Process connection	VARIVENT® N, others	G 1/2 hygienic	ISO 2852 DN25/38
Diameter/dimensions	Ø6, 10 mm/ 0.24, 0.39"	Ø6 reduced to 4 mm, Ø 6 reduced to 3 mm	Ø6 reduced to 4 mm, Ø6 reduced to 3 mm
Material	1.4404/316L optional Ra < 0.8µm and optional Ra < 0.5µm	1.4404/316L, optional Ra < 0.8 µm optional Ra < 0.5 µm	1.4404/316L, optional Ra < 0.8 µm optional Ra < 0.5 µm
Standard length	50, 100 mm/2, 4" (other on request)	20, 30, 50, 70, 80, 90, 100, ... , 200 mm	20, 30, 50, 70, 80, 90, 100, ... , 200 mm
Neck tube/holding tube			
Length	50 mm/2"	58 mm, 98 mm	64 mm, 104 mm
Approvals			
	–	EHEDG	3A (in preparation)

Temperature assemblies

Selection from our product portfolio

	Cable sensors			
	Cable sensor for clamp-on. Surface temperature $t \leq +200^{\circ}\text{C}/+392^{\circ}\text{F}$	Cable sensor for screw-on. Surface temperature $t \leq +300^{\circ}\text{C}/+572^{\circ}\text{F}$	Cable sensor for screw-in. M6 or M8 bolt	Cable sensor with bayonet fitting
	OPTITEMP TRA-W30	OPTITEMP TRA-W40	OPTITEMP TRA-W50	OPTITEMP TRA-W70
				
Connection head				
Models	No head required	No head required	No head required	No head required
Cable gland/ electrical connection	-	-	-	-
Process thread	-	$\varnothing 5.5 \text{ mm}/$ $0.22''$ assembly hole	-	Bayonet nipple
Sensitive element				
Sensor connection	1, 2 x Pt100 / 1 x Pt1000	1, 2 x Pt100 / 1 x Pt1000	1, 2 x Pt100 or 1 x Pt1000	1 x Pt100
Circuit type	3- or 4-wire RTD	3-, 4-wire RTD	2-, 3-, 4-wire RTD	3-wire RTD
Tolerance class	Class A acc. EN 60751	Class A, acc. EN 60751	Class A, acc. EN 60751	Class A, acc. EN 60751
Design	Non replaceable RTD sensor	Non replaceable RTD sensor	Non replaceable RTD sensor	Non replaceable RTD sensor
Connection type	Flying leads, Teflon cable	Flying leads, Elexar cable	Flying leads, PVC, Silicon, Teflon cables	Flying leads, Teflon cable
Thermowell				
Process connection	Clamp-on	Screw-on	Screw-in bolt	Bayonet nipple M12 x 1
Diameter/dimensions	Block 26x18x50 mm/ 1.02x0.71x1.97"	Block 8x10x40 mm/ 0.31x0.39x1.57"	M6, M8	$\varnothing 6 \text{ mm}/0.24''$
Material	PTFE/Copper	Copper, 1.4404/316L	1.4404/316L	Brass, Ni-coated
Standard length	-	-	15, 25, 30 mm/ 0.6, 1.0, 1.2"	25 mm/1.0"
Neck tube/holding tube				
Cable length	5, 10, 15, 20, 25, 30 m	5, 10, 15, 20, 25, 30 m	5, 10, 15, 20, 25, 30 m	5, 10, 15, 20, 25, 30 m
Approvals				
	-	-	-	-

	HVAC temperature sensors	Mineral insulated thermocouples	
	HVAC temperature sensor for wall mounting	Mineral insulated thermocouple with mini thermo plug	Mineral insulated cable thermocouple
	OPTITEMP TRA-V20	OPTITEMP TCA-M50	OPTITEMP TCA-M70
			
Connection head			
Models	64x58x34 mm/ 2.52x2.28x1.34", Alu box, IP65	No head required	No head required
Cable gland/ electrical connection	PG9	–	–
Process thread	–	–	–
Sensitive element			
Sensor connection	1 x Pt100 / Pt1000	1, 2 x TC J, K, N, grounded/isolated	1, 2 x TC J, K, N, grounded/isolated
Circuit type	3-wire RTD	2-wire TC	2-wire TC
Tolerance class	Class A, acc. EN 60751	Class 1 acc. EN 60584	Class 1 acc. EN 60584
Design	Non replaceable RTD sensor	Non replaceable TC sensor	Non replaceable TC sensor
Connection type	Ceramic terminal block or temperature transmitter	Mini thermo plug	Flying leads or thermo plug
Thermowell			
Process connection	Wall-mounted	Plug-in, compression fitting M8, G1/8, 1/4, 1/2	Plug-in, compression fitting M8, G1/8, 1/4, 1/2
Diameter/dimensions	Ø6 mm/0.24"	Ø1, 1.5, 3 mm/ 0.04, 0.06, 0.12"	Ø1, 1.5, 3, 4.5, 6 mm/ 0.04, 0.06, 0.12, 0.16, 0.20, 0.24"
Material	Brass (perforated as option)	AISI 310/ 1.4841, Inconel® 600/ 2.4816, Pyrosil®	AISI 310/ 1.4841, Inconel® 600/ 2.4816, Pyrosil®
Standard length	50, 150 mm/2, 6"	500, 1000, 1500, 2000, 2500, 3000, 5000, 7500, 10000 mm; 20, 40, 59, 79, 98, 118, 197, 295, 394"	500, 1000, 1500, 2000, 2500, 3000, 5000, 7500, 10000 mm; 20, 40, 59, 79, 98, 118, 197, 295, 394"
Neck tube/holding tube			
Cable length	5, 10, 15, 20, 25, 30 m	5, 10, 15, 20, 25, 30 m	5, 10, 15, 20, 25, 30 m
Approvals			
	–	–	–



OPTITEMP TT 10 C, TT 10 C Ex* OPTITEMP TT 10 R
 Analogue, adjustable 2-wire transmitters for Pt100
 or thermocouple with current output



OPTITEMP TT 22
 PC-Programmable 2-wire Transmitter dedicated
 for Pt100 sensors



OPTITEMP TT 31 R, TT 31 R Ex*
 1- or 2-channel universal, programmable
 2-wire transmitters for thermocouples and
 resistance sensors with current output



OPTITEMP TT 32 R
 Universal, programmable 4-wire
 transmitter for thermocouples
 and resistance sensors with
 current and voltage output



SmartSense insulation monitoring

Temperature assemblies with Pt100 or thermocouple sensors can produce erroneous measurements due to humidity in the measuring insert, e.g. caused by wear, corrosion or cracks. OPTITEMP temperature transmitters with SmartSense monitor the temperature sensor and warn for isolation errors.

 *Also available
 with Ex approval



OPTITEMP TT 33 C, TT 33 C Ex* OPTITEMP TT 33 R, TT 33 R Ex*

Universally, programmable 2-wire transmitters for thermocouples and resistance sensors with current output, NFC® and Bluetooth communication



OPTITEMP TT 40 C OPTITEMP TT 40 R

Highly precise, universal, programmable 2-wire transmitters for thermocouples and resistance sensors with current output



OPTITEMP TT 51 C, TT 51 C Ex* OPTITEMP TT 51 R, TT 51 R Ex*

Highly precise, universal, programmable 2-wire HART® transmitters for thermocouples and resistance sensors with current output, full assessment on SIL2 according to IEC 61508:2010



OPTITEMP TT 53 C, TT 53 C Ex* OPTITEMP TT 53 R, TT 53 R Ex*

With universal input, galvanic isolation, HART® 7, NFC and Bluetooth® communication

Accessories



OPTITEMP TT-CON
Transmitter configuration
kit for PC configuration of
OPTITEMP transmitters



OPTITEMP TT-CON BT
Transmitter configuration
kit for Bluetooth®
configuration and
monitoring of temperature
transmitter

Temperature transmitters



Precision that stands the test of time

Our engineers are constantly researching and developing with the goal of combining innovative technology, superior user friendliness and above all, long-lasting reliability. The success is tangible! With the OPTITEMP TT 53 temperature transmitters, KROHNE has once again set the standard when it comes to measuring accuracy and maximum measurement stability.



OPTITEMP TT 53 C

OPTITEMP TT 53 R

OPTITEMP TT 53 – Universal HART® 7 temperature transmitter

OPTITEMP TT 53 is a modern HART® temperature transmitter developed to meet the highest standards of accuracy and reliability. A universal transmitter compatible with RTD, thermocouples, voltage and potentiometer, offering high flexibility and reducing the number of installed product variants.

It is fully compatible with HART® 7 and offers extended diagnostic information (for example, device error, sensor and wiring conditions) making it reliable and highly precise.

OPTITEMP TT 53 supports communication via NFC® (Near Field Communication) and Bluetooth® which makes it possible to configure and monitor the transmitter remotely.

Configure OPTITEMP TT 53 wirelessly

Configure your OPTITEMP TT 53 wirelessly via NFC® by using the new app OPTITEMP Connect. The intuitive and easy-to-use interface in the app makes your job easier.

Complement with our new TT-CON BT and you can configure and monitor your OPTITEMP TT 53 also via Bluetooth®. Thanks to the extended range that Bluetooth® offers, you can connect to the transmitter without removing it from the process.

High reliability

The robust design of the TT 53 makes it highly reliable even under the most demanding conditions. External influences such as ambient temperature, vibrations up to 10 g, moisture and EMC interference have minimal influence on the measuring result.

Full control of your process via HART® 7

OPTITEMP TT 53 helps you to get full control of the process. In addition to enhanced diagnostics via HART® 7, the transmitter can also measure the ambient temperature and supply voltage it has been exposed to. This allows you to detect peaks that could damage the process control.

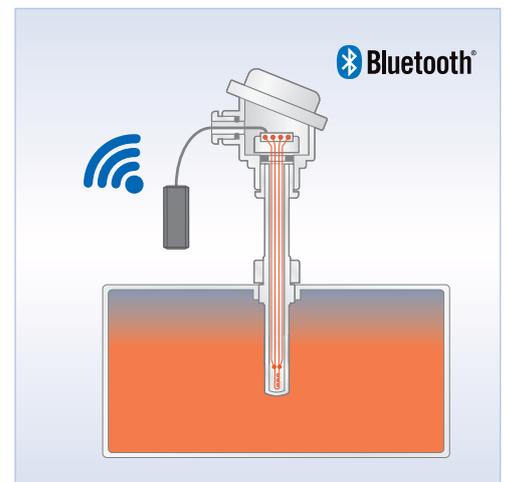
Quick configuration via NFC®

Quick configuration of the transmitter without power supply and wiring.



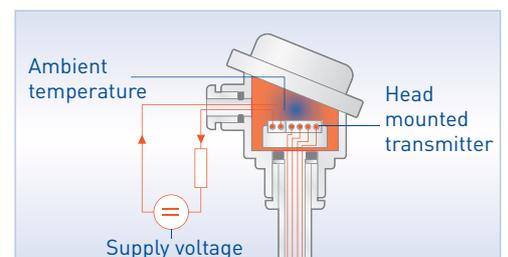
Bluetooth® communication via TT CON-BT

Monitor and configure your transmitter even in the tightest mounting locations.



Enhanced diagnostics

See what ambient temperature and supply voltage the TT 53 has been exposed to.



Minimal tolerance for maximum accuracy

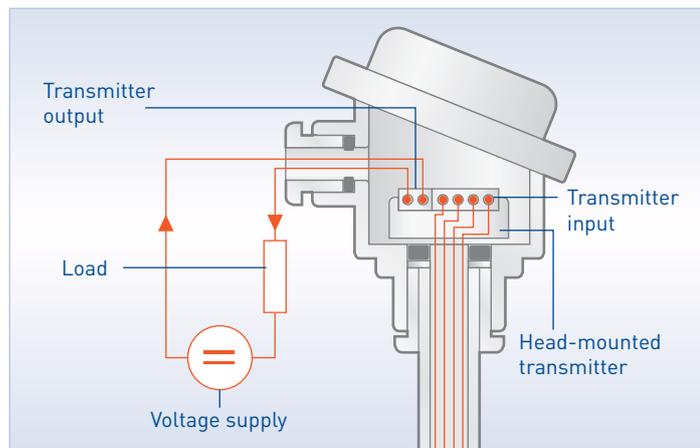
In 1974, INOR launched the world's first temperature transmitter that could be built into the connection head of a temperature assembly. This breakthrough made it possible to convert the sensitive sensor signal directly at the measuring station into a fail-safe current and to relay it undisturbed over long distances. This also meant that special compensating lines and thermocouple wires could be eliminated for thermocouples.

Highlights:

- Fits any B-connection head and on the rail
- NFC® and Bluetooth® configuration
- Digital, universally programmable state-of-the-art transmitters for demanding applications
- HART® 7 compatible transmitter variants
- SIL2-approved design
- High accuracy, reliability and long-term stability
- Extensive diagnostics functions
- Intrinsically safe design with ATEX, IECEx, FM and CSA approval
- High galvanic isolation
- Easy installation
- Rugged design
- Extended functionality

The measuring principle

Temperature assemblies have just one small, sensitive output signal. Temperature transmitters convert that signal into a standardised current signal, proportional to the temperature, that can be transported over long distances without problem. 2-wire transmitters get the required energy from the loop. Their output current of 4...20 mA corresponds to the measuring signal and is always proportional to the temperature. Resistance sensors and different types of thermocouples can be connected to the transmitter input. Head-mounted transmitters are built into the connection head of a temperature assembly. If the ambient temperature is too high, a rail-mounted variant is used for the control cabinet.



Maximum reliability for permanent best results

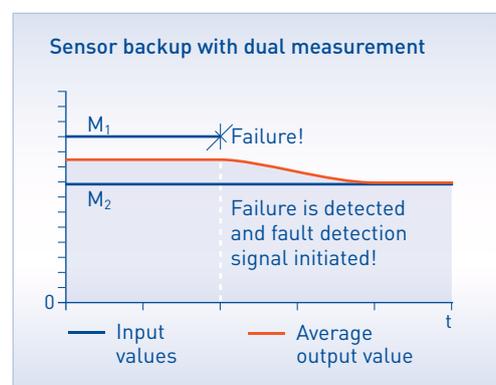
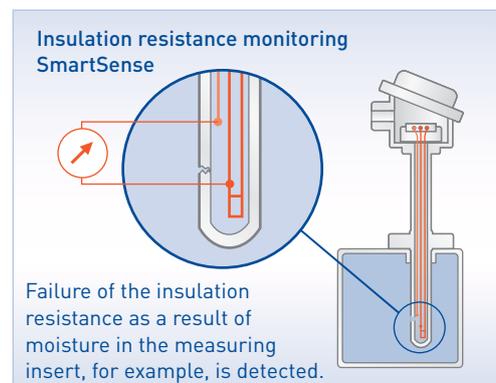
With the OPTITEMP series, KROHNE always offers customers more than just temperature measuring devices. Depending on the type, our transmitters feature a variety of diagnostic functions which allow users to address the following problems with a high degree of certainty:

- low sensor isolation resistance
- sensor break
- sensor short-circuit
- sensor drift

In addition, our dual-input transmitters feature a sensor backup function which allows them to actively intervene in the case of a malfunction of one sensor by automatically switching to the other sensor. With the help of the sensor error correction, temperature measurement errors can be corrected by adjusting the transmitter. Furthermore, depending on the type of transmitter there is the option of an individual linearisation of characteristics to help achieve maximum compliance to any connected sensor.

Industries:

- Chemical
- Petrochemical
- Oil & gas
- Energy supply
- Machine building
- Pharmaceutical
- Food & beverage
- Water & wastewater
- Iron & steel
- Pulp & paper
- Heating, Ventilation & Air Conditioning (HVAC)



Head-mounted transmitters

	Analogue, adjustable 2-wire transmitter for Pt100 with current output	PC-Programmable 2-wire Transmitter dedicated for Pt100 sensors	Universally, programmable 2-wire transmitters for thermocouples and resistance sensors with current output, NFC and Bluetooth® communication
	OPTITEMP TT 10 C, OPTITEMP TT 10 C Ex	OPTITEMP TT 22 C, OPTITEMP TT 22 C Ex	OPTITEMP TT 33 C, OPTITEMP TT 33 C Ex
			
Resistance sensor	Pt100	Pt100	Pt10/50/100/200/500/1000, Ni100/120/1000, Cu10
Input	3-wire	3-wire	2-, 3- and 4-wire
Thermocouples	J, L, T, K, N	–	B, C, E, J, K, L, N, R, S, T
Miscellaneous	–	–	-10...+1000 mV, potentiometer 100...10000 Ω
2nd input	–	–	–
Smallest measuring span	+50°C/+122°F	+20°C/+68°F	+10°C/+50°F
Outputs	4...20 mA	4...20 mA	4...20 mA/20...4 mA
Communication	–	–	NFC, Bluetooth®*
Measurement accuracy	0.15% of the measuring span	0.1% of the measuring span	0.08% of the measuring span
Galvanic isolation	–	–	1500 VAC
Power supply	6.5...32 VDC	6...32 VDC	8...36 VDC
Configuration	Solder bridges	PC configuration	PC configuration App OPTITEMP Connect
Ambient temperature	-40...+85°C/-40...+185°F	-40...+85°C/-40...+185°F	-40...+85°C/-40...+185°F
Diagnostic functions			
Sensor failure detection	x	x	x
Isolation monitoring SmartSense	–	–	–
Sensor drift detection	–	–	–
Sensor backup function	–	–	–
Sensor error correction	–	x	x
NAMUR conformity	NE 21*	NE 21*	NE 21*, 43
Approvals	Ex	Ex	Ex
	OPTITEMP TT 10 C Ex	OPTITEMP TT 22 C Ex	OPTITEMP TT 33 C Ex
ATEX	x	x	x
IECEX	–	x	x
FM	–	–	x
CSA (cFMus)	–	–	x
Ex power supply	8.5...30 VDC	8...30 VDC	8...30 VDC

	Highly precise, universally, programmable 2-wire transmitters for thermocouples and resistance sensors with current output	Highly precise, universally, programmable 2-wire HART® transmitters for thermocouples and resistance sensors with current output, full assessment on SIL2 according to IEC 61508:2010	Universally programmable 2-wire HART® transmitters for thermocouples and resistance sensors with current output
	OPTITEMP TT 40 C	OPTITEMP TT 51 C, OPTITEMP TT 51 C Ex	OPTITEMP TT 53 C, OPTITEMP TT 53 C Ex
			
Resistance sensor	Pt100, Pt1000, Ni100, Ni120, Ni1000, Cu10	Pt10/50/100/200/500/1000, Ni100/120/1000, Cu10	Pt10/50/100/200/500/1000, Ni100/120/1000, Cu10
Input	3- and 4-wire	2-, 3- and 4-wire	2-, 3- and 4-wire
Thermocouples	B, C, E, J, K, L, N, R, S, T, U	B, C, D, E, J, K, L, N, R, S, T, U	B, C, D, E, J, K, N, R, S, T
Miscellaneous	-10...+500 mV, potentiometer 0...2000 Ω	-10...+1000 mV, potentiometer 0...4000 Ω 2 x Pt100 (2/3-wire)	-10...+1000 mV, potentiometer 100...10000 Ω
2nd input	-	x	-
Smallest measuring span	+10°C/+50°F	+10°C/+50°F	+10°C/+50°F
Outputs	4...20 mA/20...4 mA	4...20 mA/20...4 mA	4...20 mA/20...4 mA
Communication	-	HART®	HART®, NFC, Bluetooth®*
Measurement accuracy	0.05% of the measuring span	0.05% of the measuring span	0.08% of the measuring span
Galvanic isolation	3750 VAC	1500 VAC	1500 VAC
Power supply	6.5...36 VDC	10...36 VDC	8.5...36 VDC
Configuration	PC configuration	PC configuration/HART®	PC configuration/HART® App OPTITEMP Connect
Ambient temperature	-40...+85°C/-40...185°F	-40...+85°C/-40...185°F	-40...+85°C/-40...185°F
Diagnostic functions			
Sensor failure detection	x	x	x
Insulation monitoring SmartSense	x	x	-
Sensor drift detection	-	x	-
Sensor backup function	-	x	-
Sensor error correction	x	x	x
NAMUR conformity	NE 21*, 43	NE 21, 43, 53, 89, 107	NE 21*, 43
Approvals	-	Ex, SIL2	Ex
		OPTITEMP TT 51 C Ex	OPTITEMP TT 53 C Ex
ATEX	-	x	x
IECEX	-	x	x
FM	-	-	x
CSA (cFMus)	-	-	x
Ex power supply	-	10...30 VDC	8.5...30 VDC

x = suitable, - = not suitable

* Tested from 150 kHz in accordance with EN 61000-4-6, Bluetooth® communication is only supported with TT-CON BT

Rail-mounted transmitters

	Analogue, adjustable, 2-wire transmitters for thermocouples with current output	PC-Programmable 2-wire Transmitter dedicated for Pt100 sensors	1- or 2-channel universally programmable 2-wire transmitters for thermocouples and resistance sensors with current output	Universally programmable 4-wire transmitter for thermocouples and resistance sensors with current and voltage output
	OPTITEMP TT 10 R	OPTITEMP TT 22 R	OPTITEMP TT 31 R, OPTITEMP TT 31 R Ex	OPTITEMP TT 32 R
				
Resistance sensor	–	Pt100, Pt1000	Pt100, Pt1000, Ni100, Ni120, Ni1000, Cu10	Pt100, Pt1000, Ni100, Ni120, Ni1000, Cu10
Input	–	3-wire	3- and 4-wire	3- and 4-wire
Thermocouples	J, K, L, N, T	–	B, C, E, J, K, L, N, R, S, T, U	B, C, E, J, K, L, N, R, S, T, U
Miscellaneous	–	–	-10...+ 500 mV, potentiometer 0...2000 Ω	-10...+ 500 mV, -10...+50 V, -1...50 mA, potentiometer 0...8000 Ω
2nd input	–	–	1 or 2 separate channels	–
Smallest measuring span	+50°C/+122°F	+10°C/+50°F	+10°C/+50°F	+10°C/+50°F°
Outputs	4...20 mA	4...20 mA	4...20 mA/20...4 mA	4...20 mA/20...4 mA/ 0/2...10 V/10...2/0 V
Communication	–	–	–	–
Measuring accuracy	±0.5 % to ±1.0 % of the temperature span	0.1% of the measuring span	0.1% of the measuring span	0.10% of the measuring span
Galvanic isolation	–	–	1500 VAC	4000 VAC
Power supply	6.5...32 VDC	6...32 VDC	8...36 VDC	20 ... 30 VDC/110 ... 220 VDC, 90 ... 250 VAC
Configuration	Solder bridges	PC configuration	PC configuration	PC configuration
Ambient temperature	-20...+70°C/-4...+158°F	-40...+85°C /-40...+185°F	-20...+70°C/-4...+158°F	-20...+70°C/-4...+158°F
Diagnostic functions				
Sensor failure detection	x	x	x	x
Isolation monitoring SmartSense	–	–	–	x
Sensor drift detection	–	–	–	–
Sensor backup function	–	–	–	–
Sensor error correction	–	x	x	x
NAMUR conformity	NE 21*	NE 21*	NE 21*, 43	NE 21*, 43
Approvals	–	–	Ex	–
			OPTITEMP TT 31 R Ex	
ATEX	–	–	x	–
IECEX	–	–	–	–
FM	–	–	–	–
CSA	–	–	–	–
Ex ambient temperature	–	–	-20...+60°C/-4...+140°F	–
Ex power supply	–	–	8...36 VDC	–

	Universally, programmable 2-wire transmitters for thermocouples and resistance sensors with current output, NFC and Bluetooth® communication	Highly precise, universally, programmable 2-wire transmitters for thermocouples and resistance sensors with current output	Highly precise, universally, programmable 2-wire HART® transmitters for thermocouples and resistance sensors with current output, full assessment on SIL2 according to IEC 61508:2010	Universally programmable 2-wire HART® transmitters for thermocouples and resistance sensors with current output
	OPTITEMP TT 33 R, OPTITEMP TT 33 R Ex	OPTITEMP TT 40 R	OPTITEMP TT 51 R, OPTITEMP TT 51 R Ex	OPTITEMP TT 53 R, OPTITEMP TT 53 R Ex
				
Resistance sensor	Pt10/50/100/200/ 500/1000, Ni100/120/1000, Cu10	Pt100, Pt1000, Ni100, Ni120, Ni1000, Cu10	Pt10/50/100/200/ 500/1000, Ni100/120/1000, Cu10	Pt10/50/100/200/ 500/1000, Ni100/120/1000, Cu10
Input	2-, 3- and 4-wire	3- and 4-wire	2-, 3- and 4-wire	2-, 3- and 4-wire
Thermocouples	B, C, D, E, J, K, N, R, S, T	B, C, E, J, K, L, N, R, S, T, U	B, C, E, J, K, L, N, R, S, T, U	B, C, D, E, J, K, N, R, S, T
Miscellaneous	-10...+1000 mV, potentiometer 100...10000 Ω	-10...+ 500 mV, potentiometer 0...2000 Ω	-10...+ 1000 mV, potentiometer 0...4000 Ω; 2 x Pt100 (2/3/4-wire)	-10...+1000 mV, potentiometer 100...10000 Ω
2nd input	-	-	x	-
Smallest measuring span	+10°C/+50°F	+10°C/+50°F	+10°C/+50°F	+10°C/+50°F
Outputs	4...20 mA/20...4 mA	4...20 mA/20...4 mA	4...20 mA/20...4 mA	4...20 mA/20...4 mA
Communication	-	-	HART®	HART®
Measuring accuracy	0.08% of the measuring span	0.05% of the measuring span	0.05% of the measuring span	0.08% of the measuring span
Galvanic isolation	1500 VAC	3750 VAC	1500 VAC	1500 VAC
Power supply	7.5...36 VDC	8...36 VDC	10...36 VDC	8.5...36 VDC
Configuration	PC configuration, App OPTITEMP Connect	PC configuration	PC configuration/HART®	PC configuration/HART® App OPTITEMP Connect
Ambient temperature	-40...+85°C/ -40...+185°F	-20...+70°C/-4...+158°F	-20...+70°C/-4...+158°F	-40...+85°C/ -40...+185°F
Diagnostic functions				
Sensor failure detection	x	x	x	x
Isolation monitoring SmartSense	-	x	x	-
Sensor drift detection	-	-	x	-
Sensor backup function	-	-	x	-
Sensor error correction	x	x	x	x
NAMUR conformity	NE 21*, 43	NE 21*, 43	NE 21, 43, 53, 89, 107	NE 21*, 43
Approvals	Ex	-	Ex, SIL2	Ex
	OPTITEMP TT 33 R Ex		OPTITEMP TT 51 R Ex	OPTITEMP TT 53 R Ex
ATEX	x	-	x	x
IECEx	x	-	x	x
FM	x	-	-	x
CSA	x	-	-	x
Ex ambient temperature	-40...+85°C/-40...+85°F	-	-20...+70°C/-4...+158°F	-40...+85°C/-40...+85°F
Ex power supply	8...30 VDC	-	10...30 VDC	8.5...30 VDC

x = suitable, - = not suitable

* Tested from 150 kHz in accordance with EN 61000-4-6, Bluetooth® communication is only supported with TT-CON BT



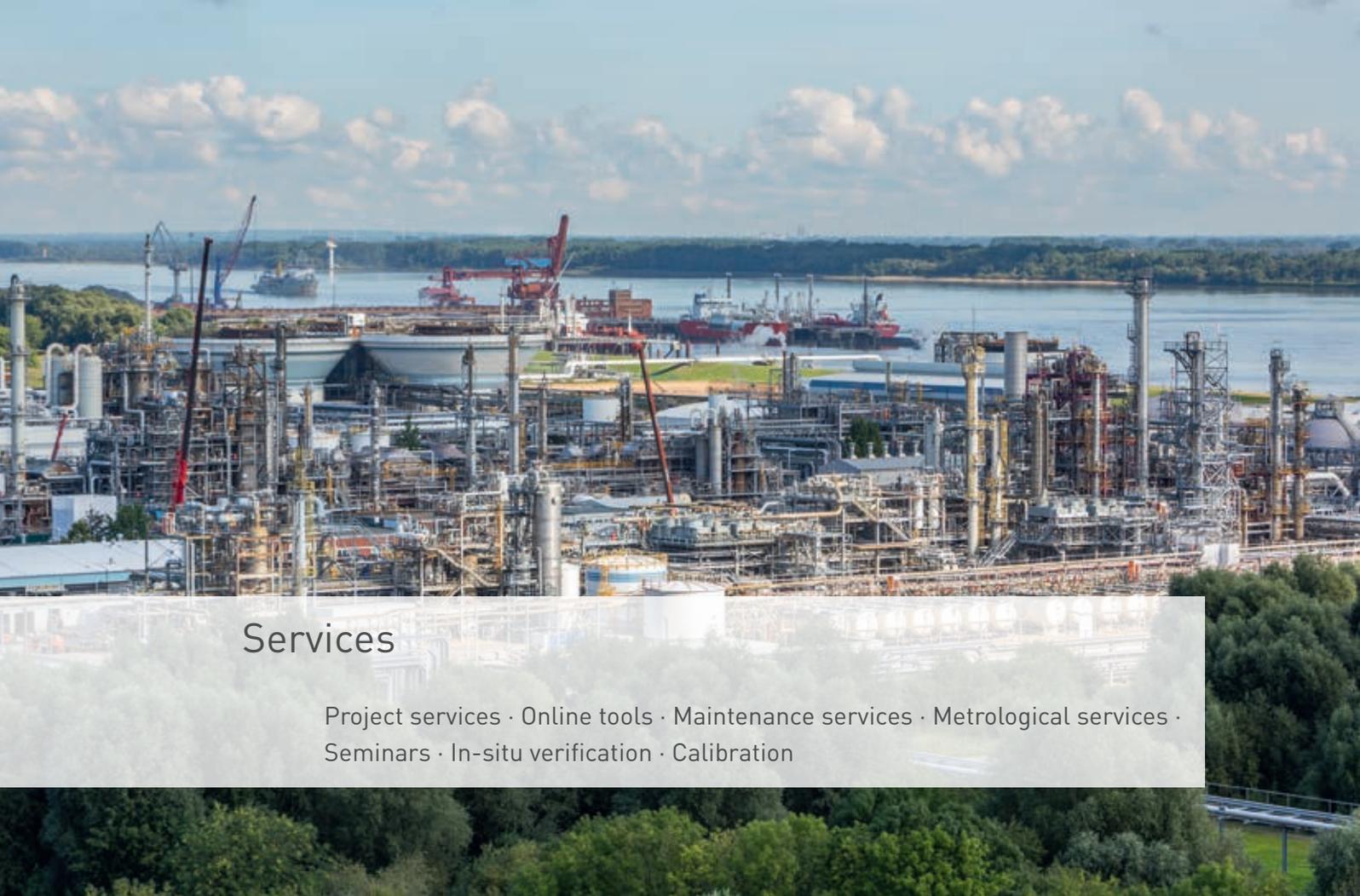


Beyond the highest requirements

Erklärung

Bedienung

III



Services

Project services · Online tools · Maintenance services · Metrological services · Seminars · In-situ verification · Calibration

Beyond the highest requirements

From engineering and planning to commissioning, training and documentation: our services cover all project stages, and can be offered for all enterprise sizes:

- Complete project management for instrumentation projects
- Engineering
- Commissioning
- On-site start-up
- Product training (on-site)
- Calibration, (in-situ) verification and documentation
- Maintenance services
- Seminars and trainings on various topics

Please see right page for more details on selected services.



Commissioning of flowmeters

Online tools:



PiCK

Enter the serial number and get device specific documents, e.g. manuals, handbooks, calibration certificates, etc.:
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Configure It

Configure It

Configure flow and level devices and get free 2D/3D CAD data:
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Maintenance services

Choose from maintenance and service contracts tailored to suit all business sizes and needs:

- Spare parts and consumables
- Field service and on-site repair
- Returns
- Workshop repair
- Helpdesk

Metrological accreditation of custody transfer applications

We offer special services for metrological accreditation of measuring and loading systems for liquids and gases, according to local fiscal regulations:

- Project management from planning to commissioning, training and documentation
- For mobile and stationary measuring systems

Seminars: KROHNE Academy & KROHNE Academy online

KROHNE Academy is a series of seminars in collaboration with leading automation companies. Taking place in various countries, it addresses key operating issues, from plant safety to ways of increasing efficiency and controlling costs, and shows possible solutions. Should your interest be more towards working "hands-on" with our devices, then our service academy is what you are looking for. Learn more about KROHNE Academy at www.krohne.com

KROHNE Academy online is an online eLearning platform, focusing on industrial process instrumentation. It comprises electronic learning content with full audio, explaining measuring technology without relation to specific manufacturers. Register now for free and start your training at academy-online.krohne.com



Large team of field service engineers and technicians



MID MI-005 tanker filling system for liquefied gas



Funcfios

In-situ verification

OPTICHECK is the essential tool to assure that your process measuring devices are performing according to specification. When connected to an installed meter (in-situ), it gathers data to ensure that the meter is performing within 1 % of the factory calibration.

- Printed individual verification certificate
- Preventive maintenance and service features
- Storage of verification data
- Download factory calibration settings from KROHNE manufacturing database



Open for the future

KROHNE is committed to making communication convenient. Which is why our field devices communicate reliably with controllers, control systems and PCs, and can also be used for a variety of control and regulating tasks.

Protocols and interfaces

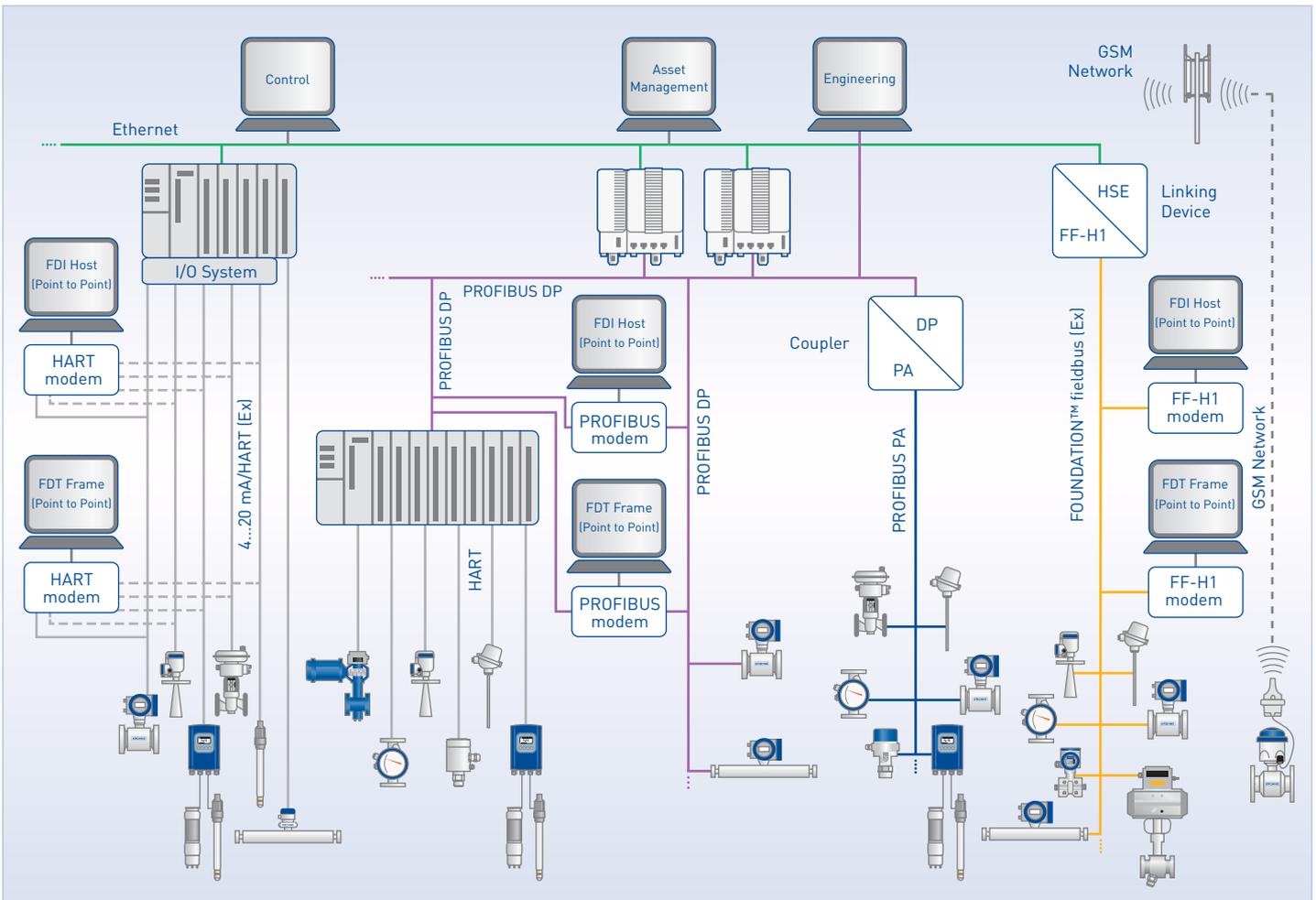
We support proven and established protocols as well as new ones for certain industries, e.g. EtherNet/IP™ for the food and beverage industries, or PROFINET® for the water and wastewater sector.

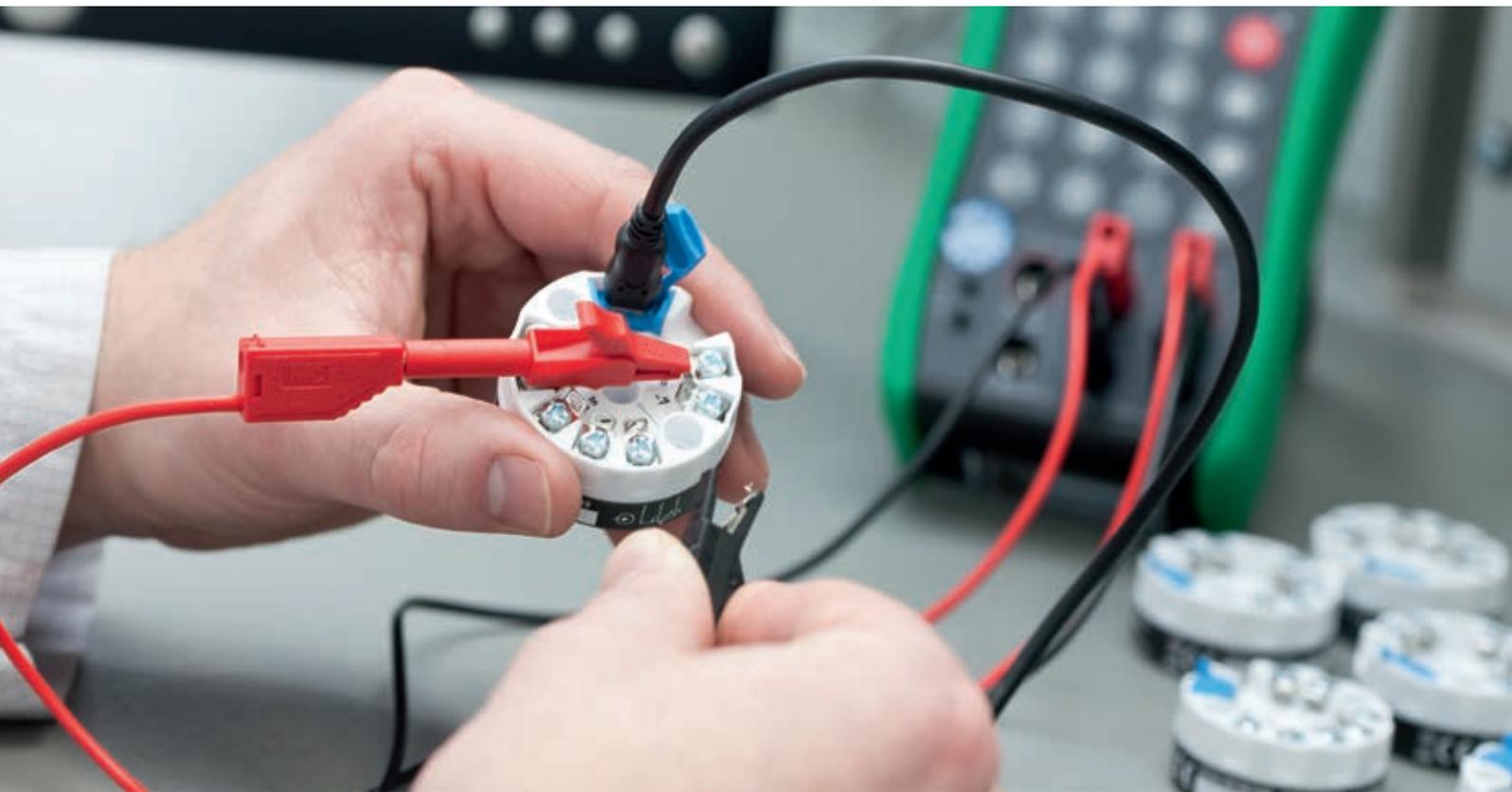
Device integration

KROHNE meets all of the prerequisites for integration into modern plant asset management systems, based on integration technologies such as DD/EDD and FDT/DTM.

We are a longstanding member of PACTware™ and the FDT Group®. Since 2003, we provide DTMs and EDDs for our field devices with HART®, PROFIBUS® or FOUNDATION™ fieldbus interfaces.

Fast and convenient access to process and device data from any level





Configuring an OPTITEMP transmitter

KROHNE proved: Expect more – achieve more

Every one of our temperature assemblies is given a thorough inspection before leaving one of our global manufacturing facilities.

We call these specific measurements, tests and factory inspections "KROHNE proved". They go well beyond any legal requirements, thus guaranteeing our customers not only compliance with specified technical data but also the precise and reliable use of our devices under extremely difficult conditions.

The true quality of a temperature assembly can only be judged under the most difficult conditions such as rapid temperature changes, high ongoing temperatures, vibration, high pressures and flow velocities as well as aggressive products. That is why we at KROHNE do everything to ensure that our temperature assemblies come out shining even in extreme conditions, demonstrating maximum accuracy, reliability and repeatability.

And we pay special attention to the careful manufacture of our measuring inserts as they are instrumental to the accuracy of our temperature assemblies. They are manufactured using mineral isolated cables and are subject to strict quality controls including the measurement of insulation resistance and checking for adherence to the required tolerance class.

Customising temperature assemblies have for a long time been our expertise area, everything from high volume OEM sensor to multipoint sensors for advanced applications.

So not only can we support you with quality assured production of sensor but also design solutions for your temperature measurement. Welcome, challenge us.

KROHNE – Products, Solutions and Services

- Complete product portfolio: flow, level, temperature, pressure, process analytics
- Application-specific system solutions for various industries
- Services for instrumentation projects



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