

10/10-3.01 EN



Temperature sensors with exchangeable measuring inset

- Designs welded from tube for low loads; thermowells made from bar stock material for high loads
- For applications under pressure in vessels and piping with aggressive, explosible and gaseous media
- The measuring insets can be exchanged without intervening in the process
- Explosion protection classes Ex i and Ex d

Measuring insets

- Standard design with great electrical variety
- Used as an exchangeable measuring inset in thermowells

Sheathed thermocouples and resistance thermometers

- Can be produced in large lengths, can be bent subsequently
- For applications with low mechanical and aggressive load

Straight thermocouples

- Up to 1200 °C protection tubes of heat-resist. steels are used
- Above 1200 °C ceramic protection tubes are used
- Used in hot gases, furnaces, combustion plants

Head-mounted transmitter

- Amplifies the relatively weak measuring signals to ensure interference-immune transmission.
- Used in long transmission sections and in electromagnetic environments (EMC)

Temperature sensors for heating, air-conditioning and ventilation engineering

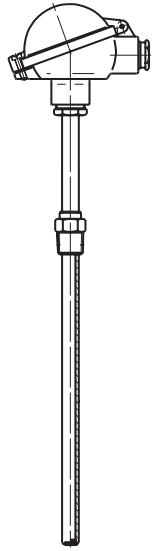
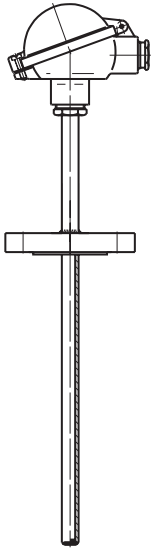
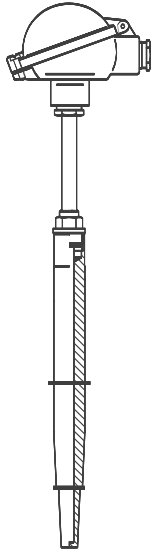
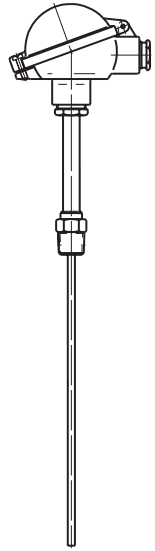
- Fast response
- Used in air ducts, piping and rooms

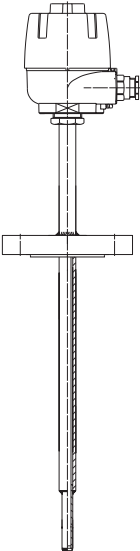
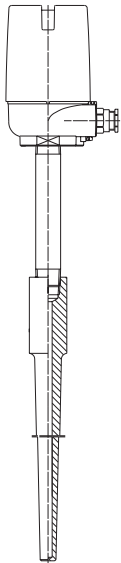
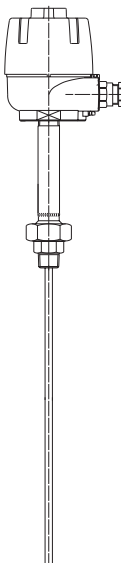
Temperature sensors for the food industry and allied industries

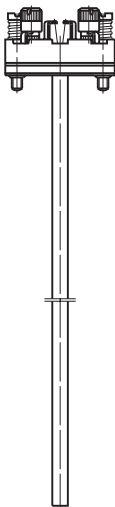
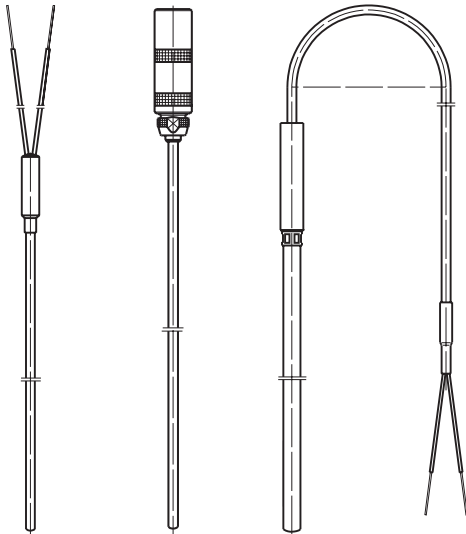
- Sensor and connection head of stainl. steel, degr. of prot. IP 66
- Materials suitable for food, surface polished smooth, installation suitable for CIP

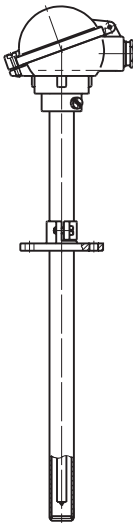
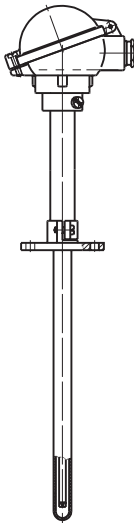
Infrared measuring systems for contactless temperature measurement







- Compact, robust 2-wire design for industrial applications
- Wide temperature measuring range: -18...2000 °C

Temperature sensor with exchangeable measuring insets				
	For standard and Ex i measuring circuits (intrinsically safe)			
Thermowell characteristic	Tube, bottom and process connection welded		Drilled and lathed from bar stock material	Without thermowell, for installation in existing thermowells
Design example				
Type	SensyTemp WT R SensyTemp WT T		SensyTemp TW R SensyTemp TW T	SensyTemp ET R SensyTemp ET T
Resistance thermometers				
Thermocouples				
Standard process connection	Mounting thread G $\frac{1}{2}$ " , $\frac{1}{2}$ " NPT G $\frac{3}{4}$ " , $\frac{3}{4}$ " NPT, G1"	Flange C 25 PN 40 C 50 PN 40	Compression fitting G $\frac{1}{2}$ "	Welded mounting thread \varnothing 24 (D1, D2, D4, D5)
Into thermowells				
Thermowell \varnothing (shaft/tip)	9, 11, 12, 14 11/6, 12/6, 12/9, 14/9, 16/10	12, 14 12/6, 12/9, 14/9	24 /12	Extension tubes \varnothing 11, 14, 22 with G $\frac{1}{2}$ " , $\frac{1}{2}$ " NPT M14 / M18 \times 1.5
Standard nominal lengths	290, 380, 530 (insertion length selectable)			
Standard thermowell materials	1.4571		1.7335 1.4571	1.4571
Standard extension tube materials	1.4571			
Connection heads	Aluminium BUZ BUZH	Polyamid BUKH		
Standard transmitters	TR 04-Eco Ex i: TR 04-Ex	TS 02 TS 02-Ex	TH 02 TH 02-Ex	TF 12 TF 12-Ex
Standard measuring elements	Resist. thermometers	1x and 2x Pt 100 acc. to EN 60751 (IEC 60751) in 2-, 3-, 4-wire circuit		Tolerance class B, A
	Thermocouples	1x and 2x type K acc. to EN 60584 (IEC 60584)		Tolerance class 2 and 1
Explosion protection class	II 1 G EEx ia IIC T6, PTB 01 ATEX 2200 X, thermowell in zone 0			
Application	Temperature measurements in vessels and piping in liquids and gases			
Temperature	Resistance thermometers < 400 °C, thermocouples < 1100 °C			
Pressure (dependent on material, connection and load data)	Approx. 40...100 bar		Approx. 660 bar	
Data Sheet No.				
Resistance thermometers	10/10-3.22 EN		10/10-3.23 EN	
Thermocouples	10/10-3.25 EN		10/10-3.26 EN 10/10-3.27 EN	

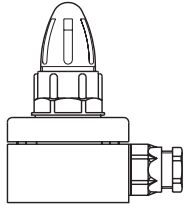
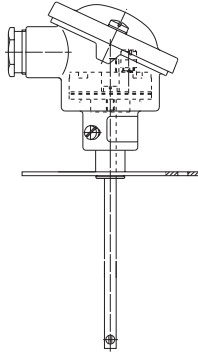
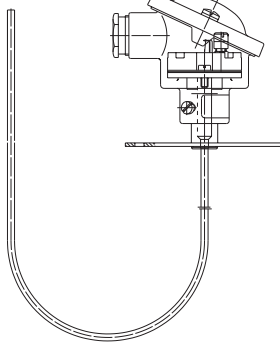
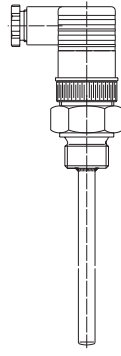
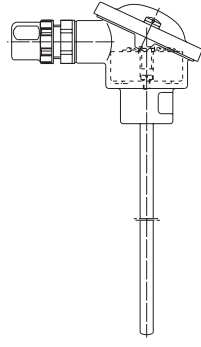
Heavy Duty Temperature sensor with exchangeable measuring inset			
	For standard, Ex i measuring circuits and Ex d applications		
Models	<ul style="list-style-type: none"> • with welded thermowell • with drilled thermowell • for installation in a thermowell 	<ul style="list-style-type: none"> • without display • with display 	<ul style="list-style-type: none"> • Non-Ex • Ex i • Ex d
Design example			
Type	SensyTemp WT Heavy Duty	SensyTemp TW Heavy Duty	SensyTemp ET Heavy Duty
Resistance thermometers Thermocouples			
Standard process connection	<ul style="list-style-type: none"> – into thermowells – thread connection – Flange connection 	– for weld-in	
Thermowell Ø (shaft/tip)	welded thermowells 14/9, 14/6	drilled thermowells special versions	Extension tubes Ø 14 mm
Standard nominal lengths	N = 275, 365, 515 (insertion length selectable)	U = 150, 300	U = 125, 215, 365
Standard thermowell materials	1.4571	1.4404	
Standard extension tube materials	1.4571		
Connection heads	without display with display	Aluminium AGL AGLHD	Stainless steel AGS AGSHD
Installable transmitters	TR 04-Eco Ex i: TR 04-Ex	TS 02 TS 02-Ex	TH 02 TH 02-Ex
			TF 12 TF 12-Ex
Standard measuring elements	Resistance thermometers Thermocouples	1x and 2x Pt 100 acc. to EN 60751 (IEC 60751) in 2-wire, 3-wire, 4-wire circuit 1x and 2x type K acc. to EN 60584 (IEC 60584)	
Explosion protection class	II 1 G EEx ia IIC T6, PTB 01 ATEX 2200 X, thermowell in zone 0	EEx d IIC T6, PTB 99 ATEX 1144, thermowell in zone 0	
Application	Temperature measurements in vessels and piping in liquids and gases for particularly rough environments		
Temperature	Resistance thermometers < 400 °C, thermocouples < 1100 °C		
Pressure (dep. on material, connection and load data)	Approx. 40...100 bar Approx. 660 bar	Approx. 660 bar	
Data Sheet No. Resistance thermometers Thermocouples	10/10-3.28 EN		

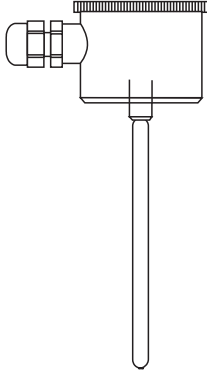
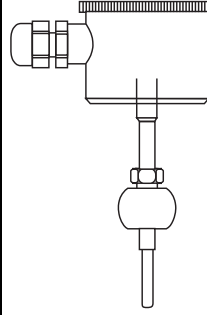
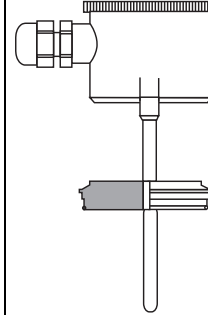
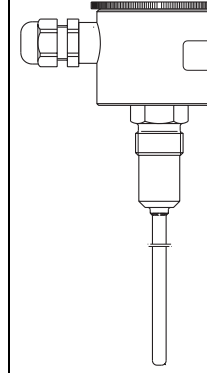
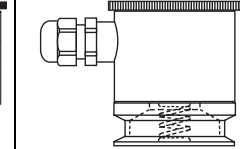
	Measuring insets	Sheathed temperature sensors
		Sheathed thermocouples and sheathed resistance thermometers
Sensor characteristic		Flexible, bendable, vibration-resistant
Design example		
Type Resistance thermometers Thermocouples	SensyTemp IS R SensyTemp IS T	SensyTemp MI R SensyTemp MI T
Installation connection	Installation in connection heads	Compression fitting M8 x 1, G¼"
Mineral Insulated Cable (MIC) diameter	3 Ø 6 Ø 6 Ø (tip with 8 mm sleeve)	Resistance thermometer: 3, 6 Ø Thermocouple: 3, 6 Ø
Approximate standard lengths depending on selected connection	275, 290, 315, 375, 405, 435, 525, 555, 655, 735, 1025	Resistance thermometer: 300, 500, 1000, 2000 Thermocouple: 300, 500, 1000, 2000
Standard materials of MIC	Resistance thermometer: 1.4571 Thermocouple, type K: Inconel 600	
Electrical connection	Connection terminals	Flying leads, cables, plugs, head Type F
Standard measuring elements	Resistance thermometers: 1x and 2x Pt 100 acc. to EN 60751 (IEC 60751) Tolerance class B, A in 2-wire, 3-wire, 4-wire circuit Thermocouples: 1x and 2x type K acc. to EN 60584 (IEC 60584) Tolerance class 2 and 1	
Explosion protection	II 1 G EEx ia IIC T6, PTB 01 ATEX 2200 X (in thermowells)	Ex i according to VDI 0165/2.91 with manufacturer's declaration for zone 1
Application	In thermowells or in direct medium contact in vessels, piping, solids (under observance of technical guidelines)	
Temperature	Resistance thermometers: -200...+600 °C, -50...+400 °C as standard Thermocouples type K: approx. 0...1100 °C	
Data Sheet No. Resistance thermometers Thermocouples	10/10-3.41 EN 10/10-3.43 EN	10/10-3.56 EN 10/10-3.57 EN





Straight thermocouples		
Thermowell characteristic	Heat-resistant steel	Ceramic
Design example		
Type	SensyTemp ST B-AM/ST B-AMK	SensyTemp ST P-AK/ST P-AKK
Standard process connection	Adjustable flange, threaded bushing, mating flange for welding or with G1½" bushing	
Protection tube diameter	22	15, 16, 24
Standard nominal lengths	500, 710, 1000, 1400	
Standard thermowell materials	1.4762 (AISI 446) 1.4841 (AISI 314) 1.0308 (ASTM 105 enamelled) Without/with ceramic inner tube	C 530 C 610 C 799 Without/with ceramic inner tube
Connection heads	Aluminium A, AUZ, AUZH	Grey cast iron AUG
Installable transmitters	TS 11 (LKS/FSK), TS 02, TH 02, TF 12	
Standard measuring elements	1x and 2x type K Tolerance class 2, 1 acc. to EN 60584 (IEC 60584)	1x and 2x type S, B Tolerance class 2, (3), IEC 60584 acc. to EN 60584
Application	Industrial furnaces, hot gas lines	
Temperature	max. 1200 °C	max. 1800 °C
Pressure	Unpressurised	
Data Sheet No. Thermocouples	10/10-3.58 EN	10/10-3.59 EN

Head-mounted temperature transmitters				
			 	 
	TR 04-Eco / TR 04	TS 02 / TS 02-Ex	TH 02 / TH 02-Ex	TF 12 / TF 12-Ex
Input (sensor type)				
RTD type (2-, 3 and 4-wire)/ min. span	Pt100 / 40 K	Pt100...1000 / 20 K Ni100, Ni500 / 20 K		Pt50...Pt100...1000/20 K Ni100 / 20 K
TC type (internal CJC)	–	B, E, J, K, L, N, R, S, T, U		B, C, D, E, J, K, L, N, R, S, T, U
Voltage	–	-125...1200 mV		-15...115 mV
Resistance	–	0...5000 Ω		0...4000 Ω
Electrical isolation (input/output)	–	Yes		Yes
Supply voltage	10.5...30 V DC Ex: 10.5...29.4 V DC	11.5...30 V DC Ex: 11.5...29.4 V DC	8.5...30 V DC Ex: 8.5...29.4 V DC	9...32 V Ex: 9...17.5 V
Output	4...20 mA	4...20 mA + digital signal	4...20 mA + HART signal	Up to 4 digital values + status
Explosion protection				
Ex-N	PTB: II 3G EEx n A IIC T6			–
Non-Incendive	FM, CSA: class I; div. 2; groups A, B, C, D			–
Intrinsically safe	PTB/ATEX II 2G EEx ia IIC T6	PTB/ATEX II (1) 2G EEx [ia] ib IIC T6	PTB/ATEX II 2G EEx [ia] ib IIC T6	Zelma/ATEX EEx ia IIC T4/T6
	FM, CSA: class I; div. 1; groups: A, B, C, D; T6; IS and zone 0			
Special features	–	Diagnostics, arithmetic functions (mean, difference, etc.), custom linearization capabilities		Dual channel, diagnostics, redundancy, arithmetic functions, custom linearization
Indicator/ local configurator	Yes ¹⁾ / –	Yes ¹⁾ / –	Yes ¹⁾ / Yes ¹⁾	Yes / Yes
Configuration – software tools	–	SMART VISION PARASOFT	SMART VISION	
Configuration – Handheld	–	–	STT04, HHT275	–
Data Sheet No.	10/11-8.14 EN	10/11-8.17 EN	10/11-8.19 EN	10/11-8.26 EN

¹⁾ Displays and meters are available in conjunction with complete sensor assemblies only.

Resistance thermometer for heating, air-conditioning and ventilation engineering					
Design examples					
Type SensyTemp	Ambient temperature sensor BA R-750	Air duct temperature sensor BA R-300	Air duct average temperature sensor BA R-900	Pipeline temperature sensor BA R-150	Pipeline temperature sensor Quick
Properties	Small design	Transmitter installed directly at the sensor 2-wire technology of head-mounted transmitter Low cabling expenditure Interference-immune transmission of the 4...20 mA signal, even over large distances		Vibration resistance Fast response	Rapid connection technology Fast response Tough protection tube design Autom. pull relief
Applications	Cold stores Storerooms Production halls Cellars	Air ducts Mechanical engineering	Air ducts Air shafts Environmental protection	Mechanical engineering Water pipes Heating pipes Sewage pipes	Pipes, airducts, processing apparatus
Data Sheet No.	10/10-3.61 EN				10/10-3.75 EN

Resistance thermometer for the food and beverage industries					
Design examples					
Type SensyTemp	HY R-1E	HY R-2E	HY R-5E	HY R-7E	HY R-4E
Properties	Fast response Hygienic process connection Suitable for CIP, cleaning possible during operation Transmitter optional				Pressure force > 15 N Indirect temperature measurement Transmitter optional
Model	Variable insertion length; various process connections	Fixed insertion length high operating pressures	Fixed insertion length Inline mounting	Fixed insertion length metal-type sealing system	With welding ring of stainless steel
Nominal length/insertion length	100, 250, 450 mm	20, 60 mm	25 mm	25, 50, 100, 250 mm	–
Data Sheet No.	10/10-3.64 EN				10/10-3.65 EN

Infra-red measurement systems for non-contact measurement of temperature				
				
Type	IR-P	IR-C	IR-M	IR-X4
Properties	Universal process devices for applications in the paper, textile, chemical petrochemical, automotive, plastics, foodstuffs, luxury foodstuffs and glass industries, etc.		The infrared process measuring device for monitoring temperature in metal, cement and glass processing	IR manual fast measuring device for quality control, maintenance, service, etc.
Highlights	<ul style="list-style-type: none"> • Sturdy construction for rough industrial use • Ex approvals • Special model for measuring combustion temperatures 	<ul style="list-style-type: none"> • Miniature measuring head for reaching the smallest spaces • Ambient temperature up to 85 °C/200 °C without cooling • Simple parameterization on the sensor itself 	<ul style="list-style-type: none"> • Temperature measurement on strongly reflecting and glowing surfaces • Unimpaired temperature measurement with smoke, vapor and suspended particles in the line of sight • Precise temperature recording even with small or wandering hot spots 	<ul style="list-style-type: none"> • Precise temperature measurement for universal use • Round laser hologram for highlighting the target • Pre-programmed emission-degree table enables fast adjustment to changing materials
Technical data				
Temperature range	-18...2000 °C (depending on type)	-40...1200 °C (depending on type)	100...3000 °C (depending on type)	-30...900 °C
Output signal	4...20 mA	0...5 V / 4...20 mA / 0...20 mA / TCJ / TCK	0/4...20 mA	
Response time	typ. 165 ms	typ. 150 ms	typ. 1 ms / 10 ms	250 ms
Interface				digital: RS 232 analog: mV / °C
Data Sheet	10/10-5.11 EN	10/10-5.11 EN	10/10-5.15 EN	10/10-5.11 EN

