



More than **sensors + automation**



# Temperature

Innovative solutions for the most demanding standards



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## Dear Reader,

Temperature one of the most commonly measured physical parameters in the world.

The mid 1960s were the beginning of an era during which JUMO perfected the manufacturing of high-quality precise and long-term-stable temperature probes as a core competence. Since this time, JUMO has produced top-rate RTD temperature probes and thermocouples. We are now one of the leading manufacturers worldwide.

Our customers benefit from our excellent experience in design and our first-rate manufacturing know-how.

These two advantages allow us to manufacture batches with small quantities, but also large quantities for series production with a high level of automation. JUMO has achieved an extraordinary quality standard through motivated employees, statistical process control and optimum processes.

High standards are imposed starting with the design process. This leads to innovative, economical solutions that are right for the market. Another important factor is extensive qualification measures for our products. Especially in series production, we conduct these measures together with our customers. We keep our products at the state of

the art through continuous new and ongoing development.

Our competence is further reinforced by our DAkkS laboratory where highly precise measurements are possible, and by our own temperature sensor thin film manufacturing. We have been manufacturing platinum-chip temperature sensors in complex production processes for 30 years.

Today JUMO temperature sensors are used in many areas of industry and services where they guarantee consistent, high quality in products.

The customer is always the focus of attention in all we do. Customer satisfaction and long-term collaboration are matters of prime concern for us. They are the driving force for our continued top-class performance.

This brochure will give you an overview of our products. Of course we would also be happy to develop individual solutions for you, completely customized to your requirements.

You can find detailed information about our products under the specified type / product group number at [www.jumo.net](http://www.jumo.net).

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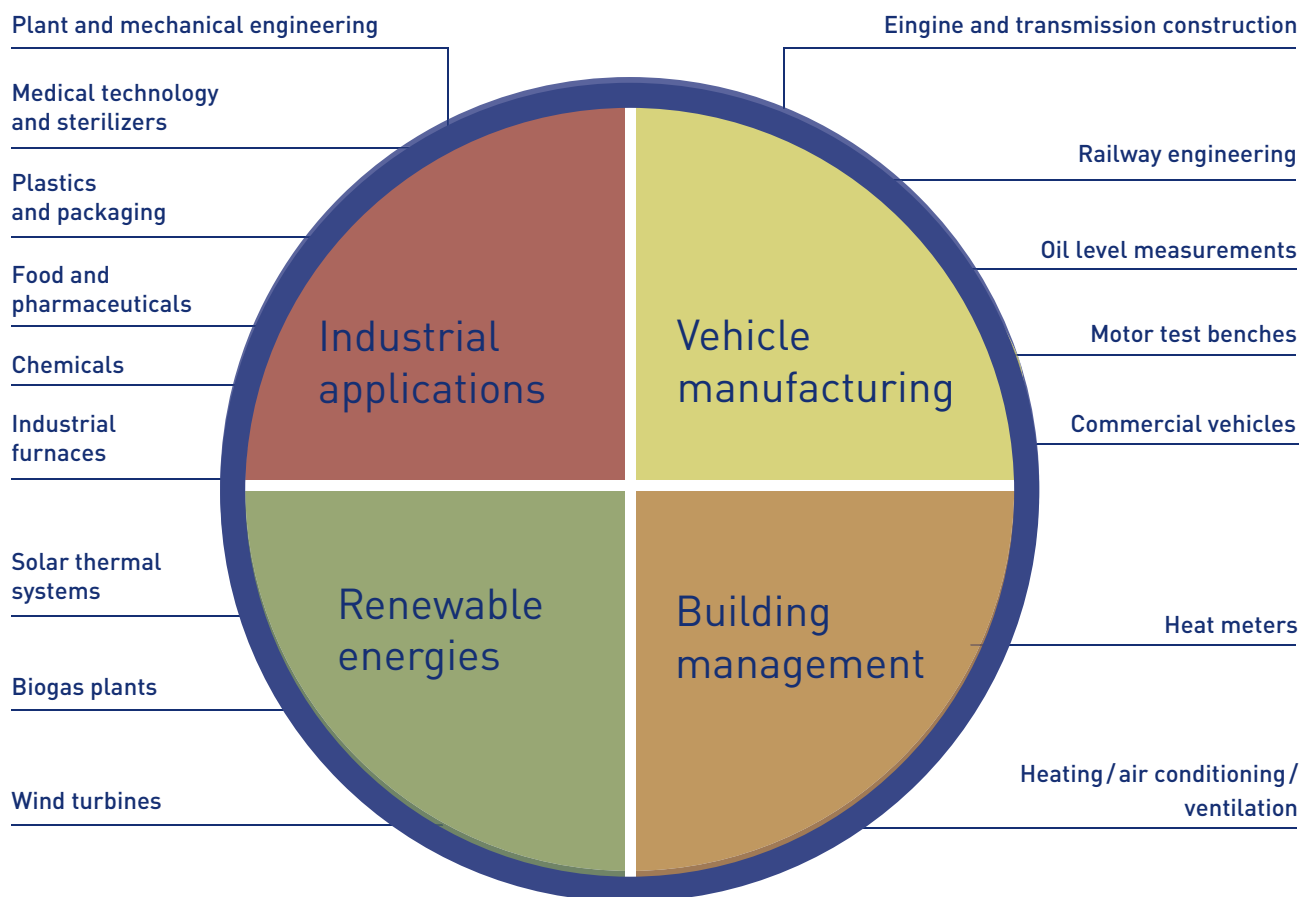
# Temperature measurements

Temperature is one of the most important process variables in the industry. Temperatures must be recorded and processed for numerous manufacturing processes.

The spectrum of applications ranges from measurements in building services to measuring a temperature of up to 1600 °C in industrial furnace construction and foundry technology. Because so many different applications are involved, the thermal and mechanical requirements for temperature probes vary widely and have changed over the years. Instruments can be adapted for specific measuring tasks with various protection fittings and materials as well as terminal heads, cables and connectors. This makes it possible to produce reliable results even with extreme vibrations, atmospheres containing steam and under pressure, and aggressive media.



## Industrial sectors



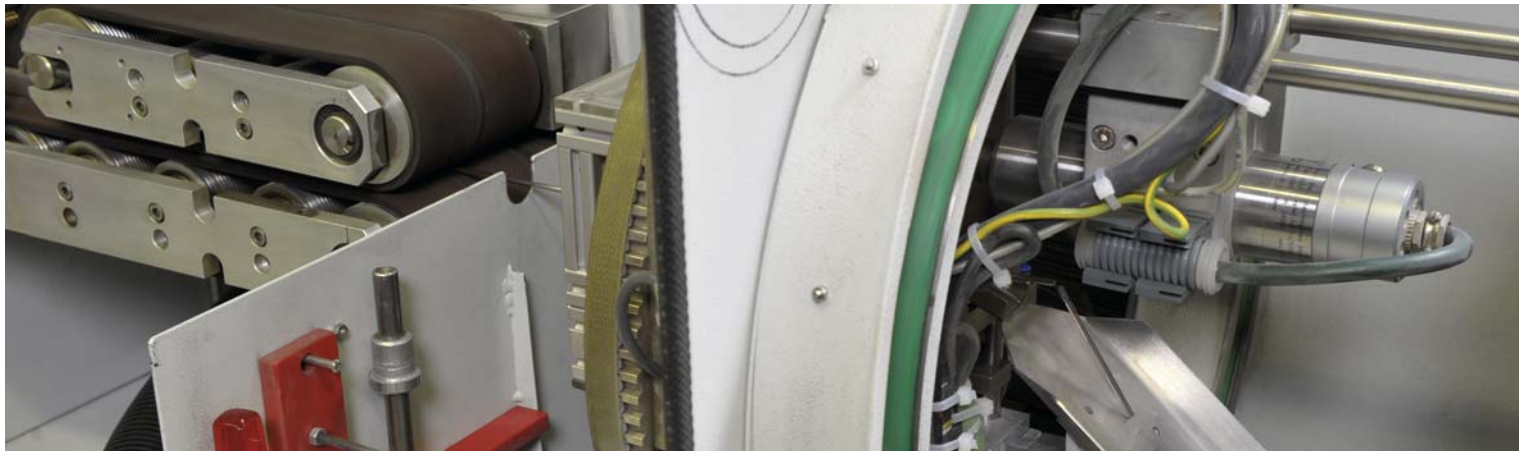
In addition to products for these industries, our portfolio also includes many other design types for other applications. To find the right product for you, just contact us!

### Approvals

ATEX, GOST, DIN EN 14597, GL, EHEDG



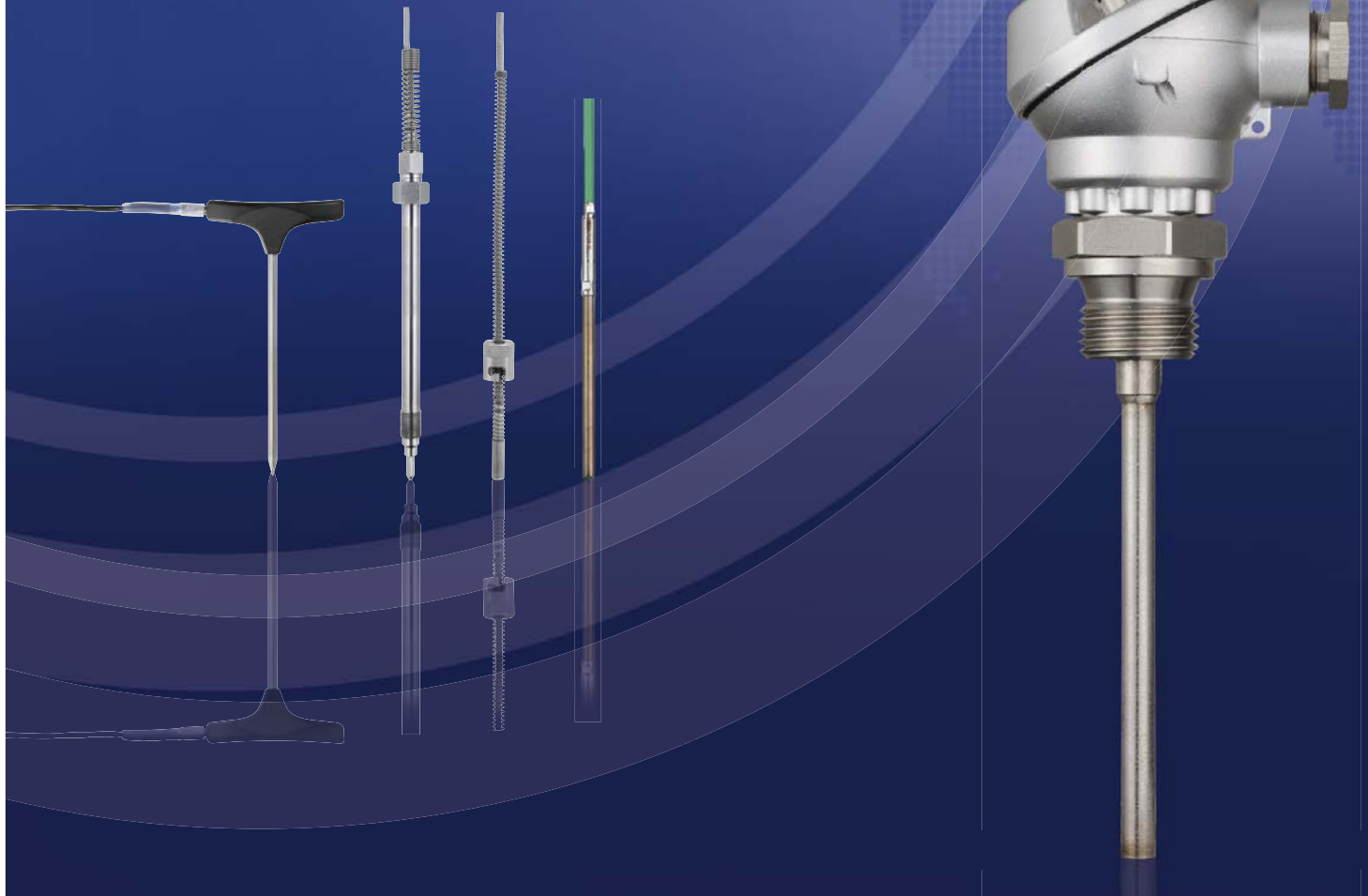




# Thermocouples

Thermocouples are used to measure hotter temperatures. Different thermal pairs can be used depending on the requirement. Available types are L, J, K, N, S and B. The corresponding voltage series and limit deviations are standardized according to DIN EN 60584 and DIN 43710. Compensating cables and thermal cables must be used for the connection. The different lines (casing tube and stranded wire) are color coded depending on the type. Applications above 800°C require the use of protection fittings made of heat-resistant steel or ceramic.

If extended transmission paths need to be covered, a transmitter in the terminal head with an output of 4 to 20 mA is generally recommended.



## Sample application



**JUMO mineral-insulated thermocouples**  
with standard tab connectors according to DIN 43 710  
and DIN EN 60 584  
type 901221



The soil freezing system under construction



The soil freezing system in operation

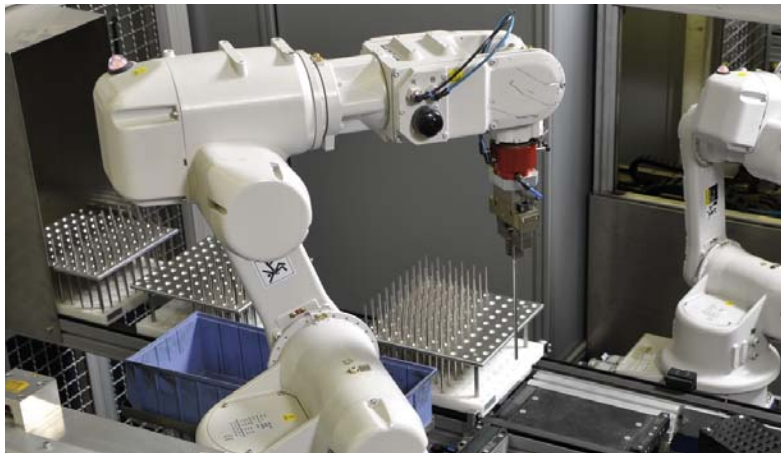
### Safeguarding a construction method in civil engineering with freezing soil

To make it possible to connect a wastewater pipe to a shaft on-site and to concrete it in, the national roads administration in Oslo, Norway decided to apply a waterproof seal by freezing the soil. This is a method by which artificially freezing the water in the soil solidifies the soil and makes it impermeable to water.

A company specializing in soil freezing developed a freezer design for laying wastewater pipes consisting of a total of 19 cooling tubes, each 10m in length. Liquid nitrogen is pumped through cooling tubes into the ground at a temperature of  $-196^{\circ}\text{C}$ . The nitrogen emerges and comes in direct contact with the soil.

The evaporation process that then occurs rapidly draws heat from the ambient soil. To record the temperature, the cooling tube inputs are fitted with a total of 19 JUMO mineral-insulated thermocouples with a fixed compensating circuit of type 901221/20... and 20 Pt100 RTD temperature probes with a fixed connecting cable of type 902150/10... to measure the temperature in the frozen ground. They had been installed in the soil at different depths and distances from the tubes.

It takes a total of four days to freeze the soil. This time matches the calculations of the Finite Element Program (FEM = Finite-Element Method) for heat transfer in the soil.



## Screw-in thermocouples



Designation		Screw-in thermocouple with terminal head form B	Screw-in thermocouple with terminal head form J	Screw-in thermocouple with connecting cable	Screw-in/push-in thermocouple for devices and plants tested to DIN EN 14597	Screw-in melt thermocouple
Type/data sheet		901020	901030	901050	901006	901090
Application	Features	–			For operating media water, oil and air	–
	Application ranges	Woodworking machines, drying systems, furnaces, smelteries and rolling mills	Solid fuel boilers, plastics industry	Industry kitchen equipment suppliers, temperature control instruments, plastics industry	Boiler construction, oil heat transfer medium, combined heat and power plants	Plastics industry
Technical data	Connection	Head		Cable	Head, cable	Cable, connector
	Operating temperature	–200 to +800 °C	–200 to +800 °C	–200 to +600 °C	0 to +1500 °C	–40 to +600 °C
	Measuring circuits	1/2				1
	Thermal pairs	J, L, K		L, K	L, K, S, B	J, L, K
	Process connection	Thread			Thread, flange, pipe screw connection	Thread
	Protection fitting	Stainless steel	Stainless steel	Stainless steel	Stainless steel, steel, ceramic	Stainless steel, coating
	Protection type	IP65		–		
	Option	Transmitter in the head	–	Non-insulated layout	–	Non-insulated layout
	Approvals	GOST		–	Devices tested for DIN EN 14597	–
	Special features	Replaceable measuring insert, extension tube	Union nut	Cable made of silicone, PTFE, metal braiding	–	Cable made PTFE, metal braiding, Probe tip flat/ blade-shaped





## Push-in thermocouples



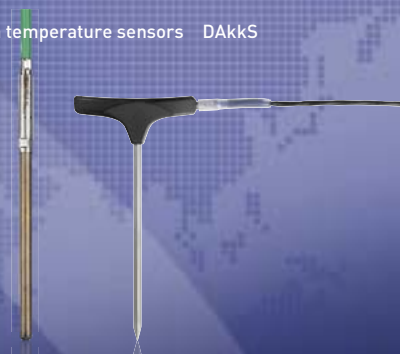
Designation		Push-in thermocouple with terminal head form A	Push-in thermocouple with terminal head form B	Push-in thermocouple with connecting cable	Push-in thermocouple with bayonet lock
Type / data sheet		901110	901120	901150	901190
Application	Features	–			Adjustable spring pressure ensures good heat transfer
	Application ranges	Furnace construction, smelteries, rolling mills, steel plants, iron plants, waste incineration	Furnace construction, industrial heating plants, foundry industry	Industry kitchen equipment suppliers, hot runner systems, analysis devices	Plastics industry, wood-working machines, printing machines
Technical data	Connection	Head		Cable	
	Operating temperature	–200 to +1600 °C	–200 to +1600 °C	–50 to +600 °C	0 to 400 °C
	Measuring circuits	1 / 2		1	1 / 2
	Thermal pairs	J, L, K, S, B		L, K	J, L, K
	Process connection	Flange, pipe screw connection		–	Bayonet lock
	Protection fitting	High-temperature steel, ceramic		Stainless steel	
	Protection type	IP54	IP65	–	
	Option	Transmitter in the head		Non-insulated layout	Shielded cable
	Approvals	GOST		–	
	Special features	–		Cable made of silicone, metal braiding, also right-angle cable outlet	Cable made of silicone, PTFE, metal braiding, ceramic probe tip



## Mineral-insulated thermocouples



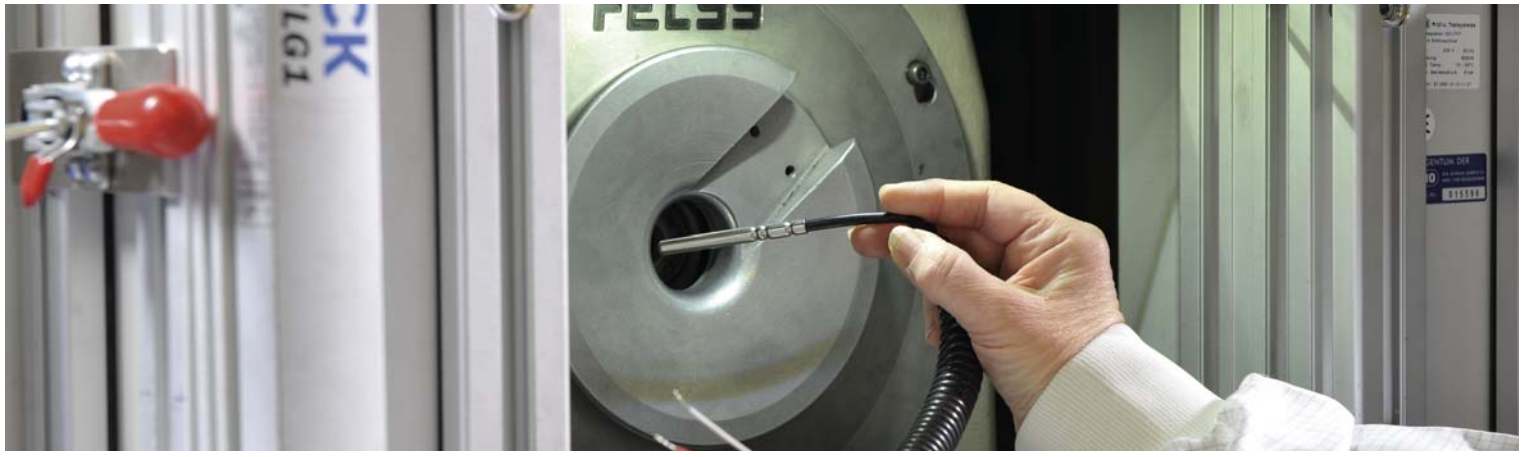
	Designation	Mineral-insulated thermocouple with bare connecting wires	Mineral insulated thermocouple with terminal head form J	Mineral-insulated thermocouple with standard tab connector	Mineral-insulated thermocouple with thermal cable
	Type / data sheet	901210/10	901230/40	901240/20	901250/3x
Application	Features	Flexible sheath cable, vibration-resistant			
	Application ranges	Processing measurements	Meat processing industry, combined heat and power plants, baking oven	Hot runner industry, plastics industry	Hot runner industry, industrial heating plants, Industry kitchen equipment suppliers biogas plants
Technical data	Connection	Connecting wires	Head	Connector	Connecting cable
	Operating temperature	−200 to +1200 °C			0 to 1200 °C
	Measuring circuits	1 / 2		1	1 / 2
	Thermal pairs	J, L, K			
	Process connection	–	Thread	–	Clamping screw connection
	Protection fitting	Stainless steel, inconel			
	Protection type	–	IP65	–	
	Option	Non-insulated layout	Transmitter in the head	Non-insulated layout	
	Approvals	GOST			
	Special features	–			Ø 0.5 mm and up



## Insertion thermocouples



	Designation	JUMO FOODtemp Insertion thermocouple with PTFE handle	JUMO FOODtemp Insertion thermocouple with PEEK® handle	JUMO FOODtemp Insertion thermocouple with PEEK® handle
	Type / data sheet	901350/33/63	901350/83	901350/84
Application	Features	Steam-tight, high mechanical strength, multiple measuring points		
	Application ranges	Meat processing plant suppliers, sterilizers	Industry kitchen equipment suppliers	Industry kitchen equipment suppliers, sterilizers
Technical data	Connection	Cable		
	Operating temperature	-100 to +260 °C		
	Measuring circuits	3/4/5	3/4	
	Thermal pairs	K		
	Handle	Ø 12 mm, 15 mm	T form	Ø 11.5 mm
	Protection fitting	Stainless steel		
	Protection type	IP67		
	Special features	Probe tip concentric/ angled	Probe tip concentric/ angled, Cable outlet on the side	Probe tip concentric/ angled



# RTD temperature probes

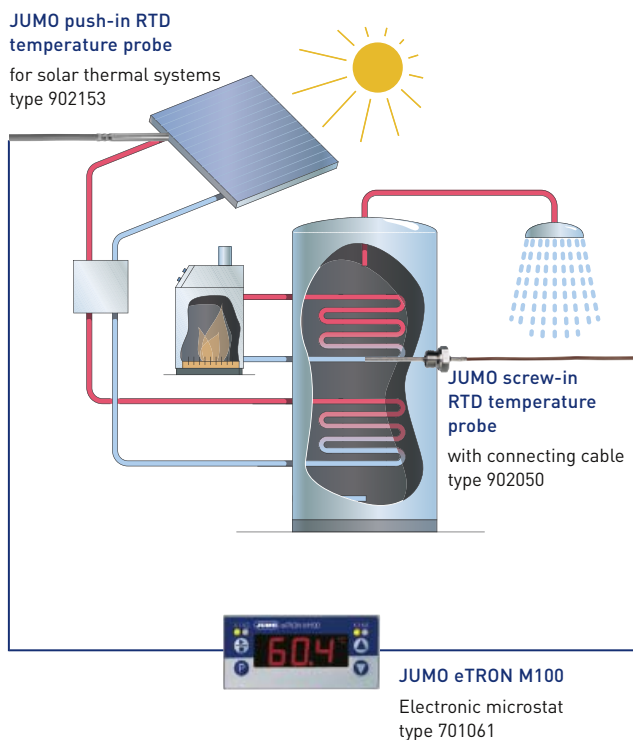
Temperature is measured in many industrial applications with RTD temperature probes. Platinum is widely used as the resistance material because it guarantees high measuring accuracy and long-term stability. The electrical resistance is temperature-dependent, increasing as the temperature rises. It is used as the measured value.

This is referred to as a positive temperature coefficient (PTC). The most widely used nominal values are Pt 100, Pt 500 and Pt 1000. The various nominal values, temperature-dependent output characteristic and tolerances are specified in DIN EN 60751.





## Sample application



Control of a solar power unit with JUMO

### JUMO RTD temperature probe for solar thermal energy

Though often underestimated, temperature probes are an important part of a solar thermal system. They must be temperature-resistant, leak-proof and long-term stable, must withstand extremely adverse operating conditions on the roof and return reliable measurement results for the service life of the solar power unit, which may be 20 years or more. For guaranteed results, use of a Pt 1000 platinum temperature sensor is recommended. Because such a high nominal value is maintained, the resistance of the connecting cable has only minimal effect on the temperature measurement.

While the sun's potential may be free, the source of economical and high-quality solar sensors is JUMO. The company has been recognized as a high-quality supplier of solar thermal energy sensors for many years. JUMO RTD temperature probes have proven their effectiveness in practical applications a million times over.

The same applies to the small system for private houses and to the large professional plants.



## Screw-in RTD temperature probes



	Designation	Screw-in RTD temperature probe with terminal head, form B	JUMO Etemp B Screw-in RTD temperature probe with terminal head form B for standard applications	Screw-in RTD temperature probe with terminal head form J	JUMO VIBROtemp Screw-in RTD temperature probe with plug connector
	Type / data sheet	902020	902023	902030	902040
Application	Features	–			Highly vibration-resistant
	Application ranges	Plant engineering, construction material machines, drying systems, biogas plants, combined heat and power plants	Mechanical engineering, confectionery industry	Mechanical engineering, thermostat baths, transmission construction, meat processing industry	Commercial vehicles, compressors, motor construction, railway engineering
Technical data	Connection	Head			Connector
	Operating temperature	–50 to +600 °C	–50 to +400 °C		–50 to +300 °C
	Measuring circuits	1 / 2			1
	Sensor	Pt 100, Pt 500, Pt 1000			Pt 100, Pt 500, Pt 1000, KTY
	Process connection	Thread			
	Protection fitting	Stainless steel			Stainless steel, brass
	Protection type	IP65			IP65, IP69K
	Option	Transmitter in the head			–
	Approvals	GOST	–	GOST	–
	Special features	Replaceable measuring insert, extension tube	Fast measurements in air	Fast measurements in air, spring-mounted screw connection	Vibration-resistant



## Screw-in RTD temperature probes



Designation		Screw-in RTD temperature probe with plug connector	Screw-in RTD temperature probe with connecting cable	Screw-in / push-in RTD temperature probe for devices and plants tested to DIN EN 14597	Screw-in melt RTD temperature probe
Type / data sheet		902044	902050	902006	902090
Application	Features	Highly vibration-resistant, cable connector according to DIN EN 175301-803	–	For operating media water, oil, air	–
	Application ranges	Shipbuilding, motor construction, industrial boiler plants, pump manufacturing	Machine construction, heating, air conditioning and ventilation, refrigeration components, transmission construction	Boiler construction, oil heat transfer medium, furnaces	Plastics industry
Technical data	Connection	Connector	Cable	Head, cable	Cable, connector
	Operating temperature	–50 to +260 °C	–50 to +400 °C	–170 to +700 °C	–50 to +400 °C
	Measuring circuits	1	1/2	1/2/3	1/2
	Sensor	Pt 100			
	Process connection	Thread		Thread, flange, pipe screw connection	Thread
	Protection fitting	Stainless steel	Stainless steel, inconel	Stainless steel, steel	Stainless steel, coating
	Protection type	IP65	–	–	–
	Option	Transmitter	Shielded cable	–	Ceramically insulated probe tip
	Approvals	GL	GOST	for DIN EN 14597	–
	Special features	Replaceable measuring insert for variants without transmitter	Cable made of PVC, silicone, PTFE, metal braiding	–	Cable made PTFE, metal braiding, probe tip flat / blade-shaped



## Push-in RTD temperature probes



Designation		Push-in RTD temperature probe with terminal head form B	JUMO Etemp B push-in RTD temperature probe with terminal head form B for standard applications	Push-in RTD temperature probe with terminal head form J	Push-in RTD temperature probe with connecting cable	Push-in RTD temperature probe with connecting cable for solar thermal systems	Push-in RTD temperature probe with bayonet lock
Type / data sheet		902120	902123	902130	902150	902153	902190
Application	Features	–	–	–	–	For collector and storage temperature measurements	Adjustable spring pressure ensures good heat transfer
	Application ranges	Plant engineering, industrial heating plants, drying systems, construction material machines	Mechanical engineering, plant engineering	Mechanical engineering, temperature control instruments, conveyor systems, textile industry	Thermostat baths, packaging machine industry, heating and drying chambers, hydraulic plants	Solar thermal systems	Plastics industry, special machine construction
Technical data	Connection	Head			Cable		
	Operating temperature	–50 to +600 °C	–50 to +400 °C	–50 to +400 °C		–50 to +260 °C	–50 to +350 °C
	Measuring circuits	1 / 2				1	1 / 2
	Sensor	Pt 100		Pt 100, Pt 1000	Pt 100	Pt 100, Pt 1000	Pt 100
	Process connection	Flange, pipe screw connection			–	–	Bayonet lock
	Protection fitting	Stainless steel				Stainless steel, brass	Stainless steel
	Protection type	IP65			–	–	–
	Option	Transmitter in the head			Shielded cable	–	Shielded cable
	Approvals	GOST	–	GOST	–	–	–
	Special features	Replaceable measuring insert	–	Fast measurements in air	Cable made of PVC, PUR, silicone, PTFE, metal braiding	Cable made of PVC, PUR, silicone, PTFE	Cable made of silicone, PTFE, metal braiding, ceramic probe tip

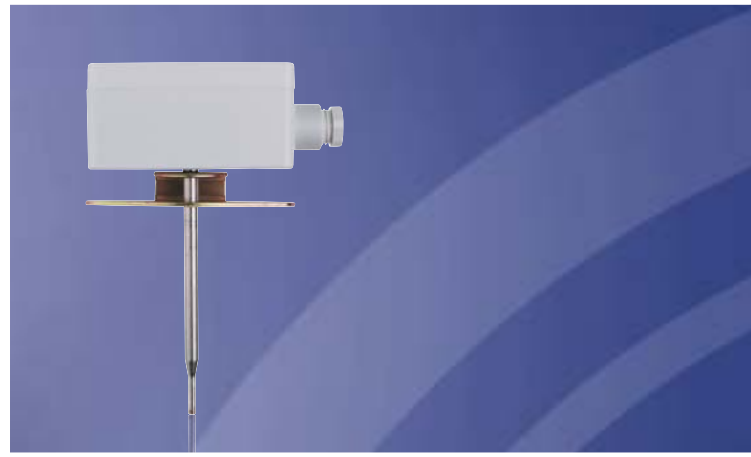
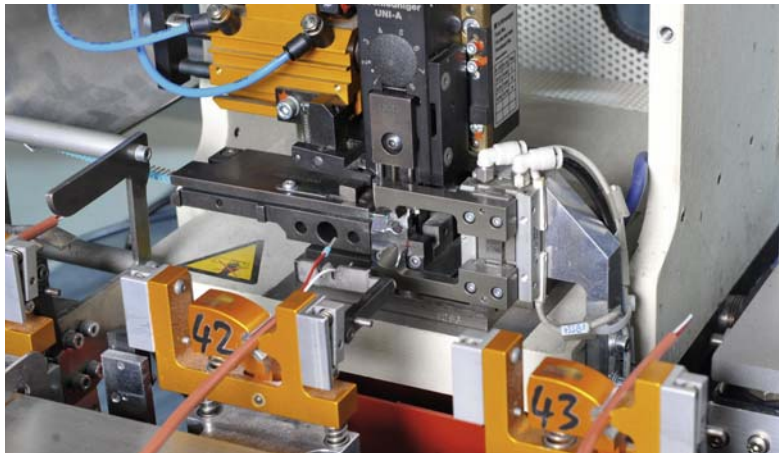




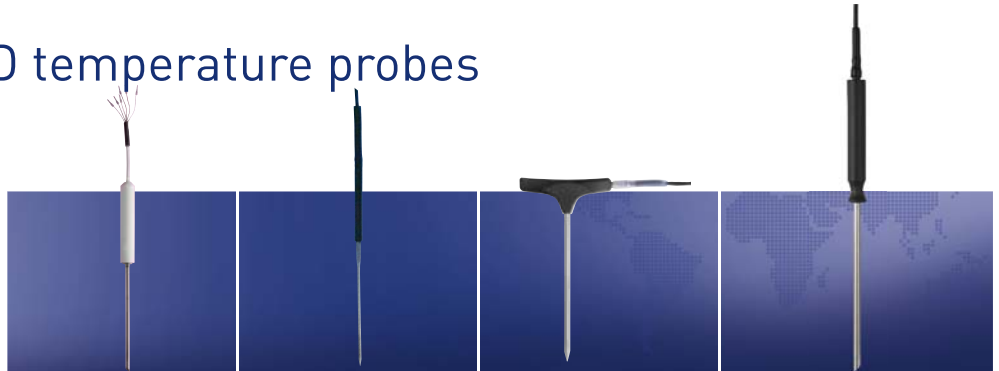
## Mineral-insulated RTD temperature probes



Designation		Mineral-insulated RTD temperature probe with bare connecting wires	Mineral-insulated RTD temperature probe with terminal head	Mineral-insulated RTD temperature probe with Lemosa® connector	Mineral-insulated RTD temperature probe with connecting cable
Type / data sheet		902210/10	902210/40	902210/20	902210/3x
Application	Features	Flexible sheath cable, vibration-resistant			
	Application ranges	Processing measurements	Painting and drying systems, combined heat and power plants, plant engineering	Plant engineering, chemical industry	Furnace industry, electric motors, generators, mechanical engineering, packaging industry
Technical data	Connection	Connecting wires	Head	Connector	Connecting cable
	Operating temperature	-200 to +600 °C			
	Measuring circuits	1/2			
	Sensor	Pt 100, Pt 1000			
	Process connection	-	Thread	-	
	Protection fitting	Stainless steel			
	Protection type	-	IP65	-	
	Option	-	Transmitter in the head	-	
	Approvals	GOST			
	Special features	Ø 1.9 mm and up			Ø 1.9 mm and up, cable made of PVC, silicone, PTFE, metal braiding



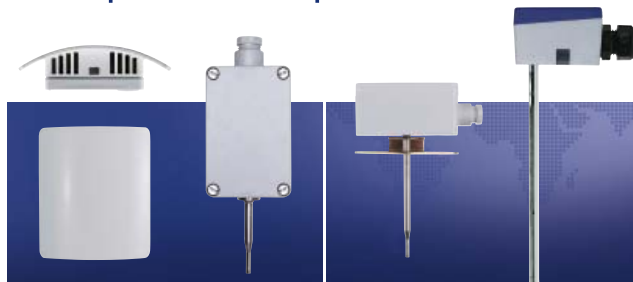
## Insertion RTD temperature probes



	Designation	JUMO FOODtemp insertion RTD temperature probe with PTFE handle	JUMO FOODtemp Insertion RTD temperature probe with FPM handle	JUMO FOODtemp Insertion RTD temperature probe with PEEK handle	JUMO FOODtemp Insertion RTD temperature probe with PEEK handle
	Type / data sheet	902350/22/23	902350/37/38	902350/82/83	902350/84
Application	Features	Steam-tight, high mechanical strength			
	Application ranges	Industry kitchen equipment suppliers, Meat processing plant suppliers, baking oven	Apparatus manufacturing	Industry kitchen equipment suppliers,	Industry kitchen equipment suppliers, baking oven
Technical data	Connection	Cable			
	Operating temperature	−50 to +260 °C	−50 to +200 °C	−50 to +260 °C	
	Measuring circuits	1/2	1	1/2	
	Sensor	Pt 100			
	Handle	Ø 10 mm, Ø 12 mm, Ø 15 mm	Ø 6.5 mm	T form	Ø 11.5 mm, Ø 20 mm, Ø 15 mm
	Protection fitting	Stainless steel	–	Stainless steel	
	Protection type	IP67	–	IP67	
	Option	Non-insulated layout	Transmitter in the head	Non-insulated layout	
	Approvals	GOST			
	Special features	Probe tip concentric / angled	–	Probe tip concentric / angled, cable outlet on the side	Probe tip concentric / angled



## Ambient RTD temperature probes



	Designation	Ambient and outdoor RTD temperature probe		RTD temperature probe
	Type / data sheet	902520 / 10 / 11 / 13		902520 / 20 / 25
	Features	Wall mounting		Duct mounting
Application	Application ranges	Building services management, combined heat and power plants		Building services management, warm air generator
Technical data	Connection	Terminal box		
	Operating temperature	-50 to +90 °C		-50 to +200 °C
	Measuring circuits	1 / 2		1 / 2
	Sensor	Pt 100, Pt 1000, Ni 1000		
	Process connection	-		Pipe screw connection, flange
	Protection fitting	-		Stainless steel
	Protection type	IP65		
	Option	Transmitter		
	Approvals	GOST		



## Surface RTD temperature probes

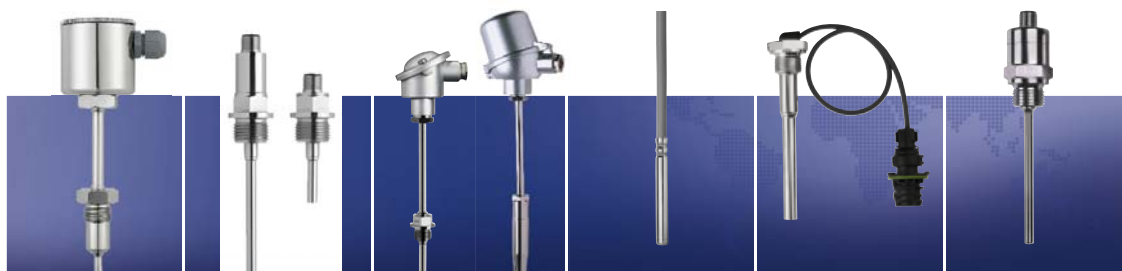


	Designation	Surface RTD temperature probe with connecting cable	Surface RTD temperature probe
	Type / data sheet	902550	902550
Application	Features	Low thermal mass for round and level surfaces	
	Application ranges	Packaging machines, installation in tubing	Plant engineering
Technical data	Connection	Cable	Terminal box
	Operating temperature	-50 to +260 °C	-50 to +120 °C
	Measuring circuits	1	
	Sensor	Pt 100, Pt 500, Pt 1000	Pt 100, Pt 500, Pt 1000, Ni 1000
	Process connection	Screw, retaining strap	Retaining strap
	Protection fitting	Stainless steel, aluminum	-
	Protection type	-	IP65
	Option	Anti-kink protection	-
	Special features	Cable made of PVC, silicone, PTFE, stainless steel-PTFE	Includes installation kit

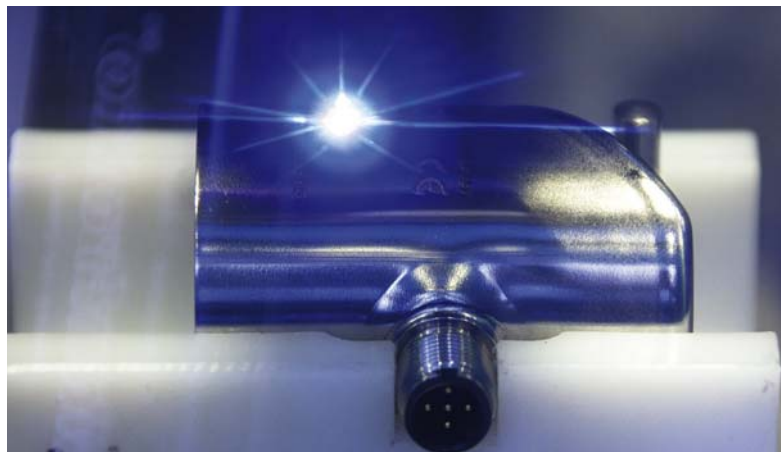




## RTD temperature probes for industrial applications



Designation		RTD temperature probe for the food/pharmaceutical industry	Screw-in RTD temperature probe without/with transmitter	JUMO PROCESS-temp RTD temperature probe for process technology with ATEX approval	JUMO STEAMtemp Push-in RTD temperature probe resistance thermometer, steam-tight version	Level and temperature probe for commercial vehicles, construction and agricultural machinery	JUMO CANtrans T RTD temperature probe with CANopen output
Type / data sheet		902810	902815	902820	902830	902880	902910
Application	Features	EHEDG certification		Ex approval, protect tubes stainless steel, titanium, tantalum, inconel, Hastelloy	Steam-tight, high protection type	Highly vibration-resistant, level measurement based on the hot-wire principle	–
	Application ranges	Food industry, pharmaceutical industry		Process industry, chemical industry, plant engineering, pump manufacturing	Sterilizers, pharmaceuticals, food industry, institutes, research facilities	Comm. vehicles, construction, agricultural machinery, engine/transmission construction	Woodworking machines, drying systems, furnaces, smelteries and rolling mills
Technical data	Connection	Head	M12 connector	Head	Cable	Head	
	Operating temperature	–50 to +250 °C	–50 to +260 °C	–200 to +600 °C	–70 to +200 °C	–40 to +140 °C	–200 to +800 °C
	Measuring circuits	1/2	1	1/2	1/2/3	1/2	
	Sensor	Pt 100	Pt 100, Pt 1000	Pt 100		Voltage / Pt 100, Pt 1000	Pt 1000
	Process connection	Hygienic process connections, JUMO PEKA		Thread, flange		Thread	
	Protection fitting	Stainless steel			Stainless steel, steel, ceramic	Stainless steel, coating	–
	Protection type	IP67		IP65	IP69	–	
	Option	Transmitter in the head	Transmitter	Transmitter in the head	Shielded cable	Corrugated tubing	Transmitter in the head
	Approvals	EHEDG		Ex-ATEX, GOST	–		GOST
	Special features	Process connections designed for CIP, electrolytically polished Ra ≤ 0.8 µm		Replaceable measuring insert, Ex i, Ex d	Cable made of FEP, PTFE, silicone	Cable made of cross-linked, polyester	Replaceable measuring insert, extension tube



## Heat meter RTD temperature probes



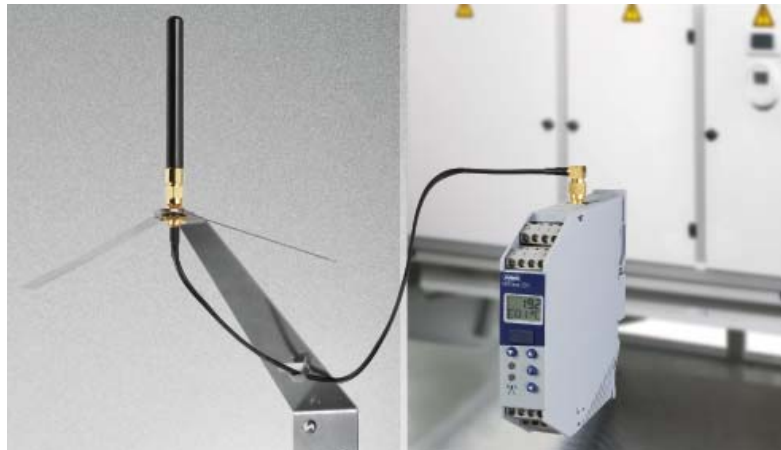
Application	Designation	JUMO HEATtemp Screw-in RTD temperature probe for heat meter with connecting cable for direct installation (type DS/DL)	JUMO HEATtemp Push-in RTD temperature probe for heat meter with connecting cable for immersion sleeves (type PS/PL)	JUMO HEATtemp screw-in RTD temperature probe for heat meter with terminal head for direct mounting (type DL)	JUMO HEATtemp push-in RTD temperature probe for heat meter with terminal head for immersion sleeve (type PL)
	Type / data sheet	902425	902435	902424	902434
	Features	Paired and verified according to the German calibration regulations and MID initial calibration, production certified according to module D of the MID (CE and metrology mark)			
	Application ranges	Heat and cold meters			
Technical data	Connection / connecting cable	Connecting cables with ferrules / PVC, PUR, TPE, silicone		Terminal head with screw terminals / –	
	Operating temperature	0 to 180 °C	Type PS: 0 to +150 °C; Type PL: 0 to +180 °C	0 to 180 °C	
	Process connection	Type DS: Screw connection M 10x1; Type DL: Thread G 1/4, G 1/2 stainless steel	Push-in RTD temperature probe for thermowells	Thread G 1/2, stainless steel	Push-in RTD temperature probe for thermowells
	Protection fitting	Type DS: Stainless steel Ø 5.4 mm, stepped to Ø 3.3 / Ø 3.6 mm	Type PS: Stainless steel Ø 5, 5.2 or 6 mm; Type PL: Stainless steel Ø 6 mm, protection tube with fitting tolerance for thermowells	Stainless steel, Ø 8 mm, stepped to Ø 6 mm	Ø 6 mm with fitting tolerance for thermowell; stainless steel
	Temperature difference	3 to 180 K	Type PS: 3 to 150 K Type PL: 3 to 180 K	3 to 180 K	
	Minimum immersion depth	Type DS: 15mm, Type DL: 30, 60 to 280mm	Type PS: > 15mm	30 mm	
	Fitting length	Type DS: 25 to 60 mm Type DL: 60 to 280 mm	Type PS: 45 to 85 mm Type PL: 85 to 450 mm	85 to 280 mm	85 to 400 mm
	Approvals	Approval for heat meters, MID and national approval as replaceable temperature probes. Meets the requirements of DIN EN 1434, AGFW FW 202 and FW 211, Approval for cold meters and combined cold/heat meters			



## JUMO DELOS Series Precision transmitters for temperature or pressure



	Designation	JUMO DELOS T for temperature	JUMO DELOS SI for pressure and filling level	JUMO DELOS HP for high pressure
	Type / data sheet	902940	405052	405054
Application	Features	Programmable, switching output, selectable display for unit, case and protection fitting made of stainless steel (316L)	Programmable, switching output, measuring range 1:4, selectable display for unit, case and protection fitting made of stainless steel (316L)	Programmable, switching output, measuring range 1:4, selectable display for unit
	Application ranges	Food and pharmaceutical applications, CIP/SIP systems, plant and mechanical engineering, refrigeration and air conditioning system construction		Hydraulic plants, machine and plant engineering, test benches, laboratory equipment
Technical data	Input	-50 °C to +150 °C -50 °C to +260 °C with extension tube -50 °C to +500 °C with remote RTD temperature probe	rel, abs 400 mbar to 600 bar	rel 160 bar to 60 bar
	Permissible temperatures	Environment: -25 to +75 °C	Environment: -25 to +75 °C Medium to be measured: -25 to +200 °C	
	Accuracy	Tolerance class: class A, (optionally class AA )	Linearity of measuring span: 0.1 to 0.15 %	
	Output	1x PNP switching output, 2x PNP switching output, 1x PNP switching output and 1x analog output (choose from 0 (4) to 20 mA, 0 to 10 V)		
	Protection type	IP 67		
	Process connection	Thread, hygienic connections, screw connections, JUMO PEKA	Thread, hygienic connections, pressure separator, JUMO PEKA	Thread
	Approvals	EHEDG (with process connection JUMO PEKA)		



## Wireless data transmission – Wtrans probe



Designation		JUMO Wtrans probe T01 RTD temperature probe with electronic modules up to 85 °C	JUMO Wtrans probe T02 RTD temperature probe with electronic modules up to 125 °C	JUMO Wtrans probe T03 RTD temperature probe with ATEX approval and electronic modules up to 85 °C
Type / data sheet		902930/10/12/50	902930/20/22/60	902930/15/17/55
Application	Features	<ul style="list-style-type: none"> <li>- For operating temperature from -30 to +260 °C or -200 to +600 °C *</li> <li>- For mobile or stationary temperature measurements</li> <li>- Wiring expenses are eliminated with modern wireless technology</li> <li>- Fail-safe transmission with telegram coding</li> </ul>		
Technical data	Transmission frequency	868.4 MHz (Europe); 915 MHz (USA, Australia, Canada, New Zealand and other countries); 10 frequencies can be configured in the 915 MHz frequency band		
	Transmission interval	Adjustable from 1 to 3600 s; Factory setting for basic type 902930/10, 902930/12 and 902930/50 = 10 s; Factory setting for basic type 902930/20, 902930/22 and 902930/60 = 15 s; Factory setting for basic type 902930/15, 902930/17 and 902930/55 = 20 s; Adjustable via DIP switches 5 s, 10 s, 20 s or 45 s		
	Open air range	Up to 300 m if a holder for wall mounting is used on the receiver side and with an antenna cable 3 m long		
	Transmitter Detection (transmitter ID)	5-digit ID, set in the factory with customer-specific configuration also possible		
	Measurement input	Pt 1000 according to DIN EN 60751, in 3-wire circuit		
	Protection type	IP67 according to DIN EN 60529; For basic type 902930/10, 902930/12, 902930/15, 902930/17, 902930/20 and 902930/22; For basic type 902930/50, 902930/55 and 902930/60 **		
	Lithium battery	Voltage: 3.6V; rated capacity: 2.2Ah/1.7Ah		
	Available approvals / approval marks	<ul style="list-style-type: none"> <li>- IC (Industry Canada) for 915 MHz</li> <li>- FCC (Federal Communications Commissions) for 915 MHz</li> <li>- cULus (Underwriters Laboratories)</li> <li>- ATEX approval for 868,4 MHz ***</li> </ul>		

\* Not for T03.

\*\* Only with machine connector M12x1 screwed on.

\*\*\* For Wtrans T03.





## Wireless data transmission – Wtrans receiver

Operation and configuration is possible via the keyboard in connection with a 2-line LCD display or, more comfortable, using a setup program. Thus, parameters such as filter constants, offset, alarms and fly back (minimum and maximum value memory) can be separately set for each channel. For this purpose, a plug is provided on the front for a PC interface with TTL/RS232 or USB/TTL converter to connect the receiver and the PC.



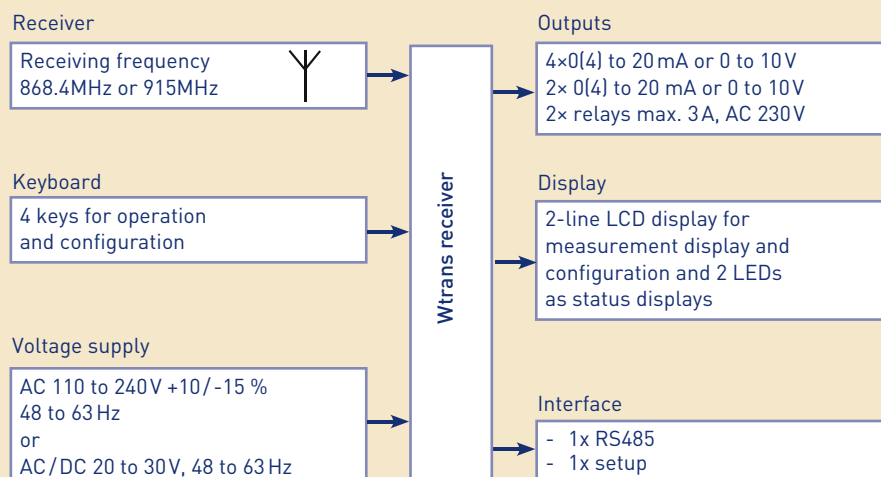
Type 902931

### Features

#### Wtrans T01 – DIN rail case, IP 20

- For RTD temperature probe, thermocouple, potentiometer and voltage
- Interface RS485 with Modbus protocol
- Wireless reception of measurement values
- Wiring expenses are eliminated with modern wireless technology
- For up to 16 transmitters per receiver

### Block diagram of receiver



### Approvals/approval marks

- IC (Industry Canada), applies to 915 MHz, 902931/10, 230V
- FCC (Federal Communications Commissions) for 915 MHz, 902931/10, 230V
- cULus (Underwriters Laboratories) 902931/10, 230V



# Accessories

Various accessories are available for installation and/or connection to the evaluation devices such as installation fittings for thermocouples and RTD temperature probes, cables for proper connection, thermowells and ball valves with measuring points and connectors for problem-free replacement.

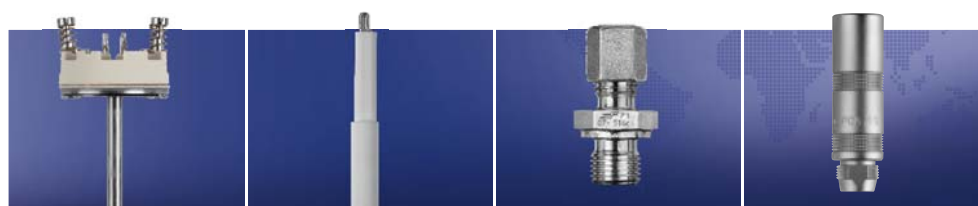
For further technical descriptions, please look under the specified data sheet number at [www.jumo.net](http://www.jumo.net).



## Accessories



Application	Designation	Mounting locations for temperature probes	Screw-in and weld-in thermowells	Terminal heads and bases	Compensating and connecting cables
	Type / data sheet	902440	909710	909715	909735
	Features	Ball valves, tees, thermowells, adapter screw connections, mounting accessories	For thermocouples and RTD temperature probes, thermometers can be replaced without emptying the system, thermowells made of different materials, operating pressure up to 320 bar	For thermocouples and RTD temperature probes, terminal heads made of different materials, protection type max. IP65, lead-sealable versions	Acc. to DIN EN 60584-3 and DIN 43713, for 2, 3 and 4-wire circuits, versions from -190 to +400 °C, casing tube made of PTFE, silicone, PVC or glass fiber, steel or stainless steel braiding, for single and double elements



Application	Designation	Measuring inserts for screw-in thermocouples and RTD temperature probes with terminal head form B	Thermal pairs according to 43732	Pipe screw connection and flange, mating pieces for bayonet locks	Plug connections
	Type / data sheet	909735	909744	909750	909760
	Features	For temperatures from -200 to +1150 °C, as single and double measuring insert, available with transmitter	For temperatures up to +1600 °C, standardized thermoelectric voltage series according to DIN EN 60584, part 1, DIN 43710, for push-in thermocouples according to DIN 43733	For temperatures up to 550 °C, for variable insertion lengths, easy mounting and uncomplicated replacement, explosion-proof enclosure	For temperatures from -60 to +260 °C, easy replacement with permanently laid cable, fast connection of measuring instruments for test purposes, locking ensures contact reliability



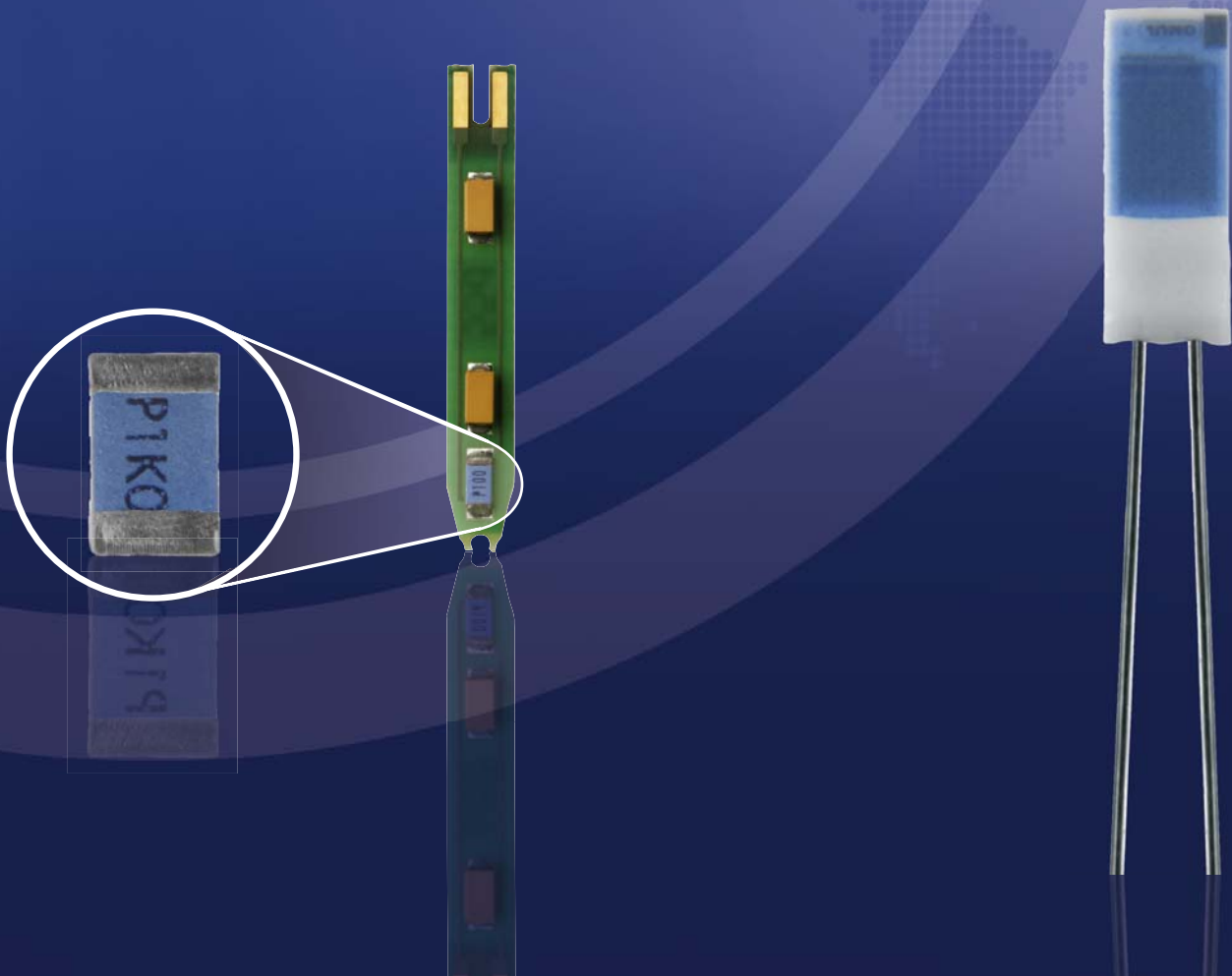


# Thin-film method platinum temperature sensors

JUMO offers a diverse assortment of platinum temperature sensors.

With an annual production of several million temperature sensors, we are one of the most important global suppliers.

From our clean room emerges precision and long-term stability. Tolerances from  $\pm 0.1$  K are produced in series. Since the 1980s, modified processes from semiconductor manufacturing have been adapted to Pt 100 production. Further customer benefits include economical mass production combined with the highest quality standards.





## Thin-film method platinum temperature sensors



**Mechanical processes:**  
welding, sawing



**Photolithography:** generating  
the structure on the substrate



**Laser calibration of platinum  
chip temperature sensors**

### **JUMO relies on quality, that is combined with fair market prices**

Thin-film method platinum temperature sensors promise excellent accuracy and long-term stability. To make this promise a reality, JUMO relies exclusively on Germany with its top-rate production location. The tough demands are met by qualified employees and an efficient QM system. Our modern production facilities are highly automated. This not only ensures great efficiency but also optimizes the price-to-performance ratio. However, our system still allows for a high level of flexibility so that we can respond to special customer applications.

### **More than 50 years of experience for our customers**

Experience from our own temperature probe production is incorporated directly into the development of new temperature sensors. JUMO provides competent support for preparing and assembling temperature sensors.

### **Customized modifications**

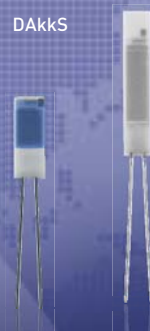
Customers and their application requirements are always the focus of attention, particularly when OEM applications are involved. Much in demand are not only mechanical and geometric system solutions, but also special selections with a low tolerance class.



## Platinum-chip temperature sensors with connecting wires according to DIN EN 60751



Designation		Design type PCA/L	Design type PCA/S	Design type PCA/E	Design type PCA/M	Design type PCA/H
Type/data sheet		906121				
Application	Features	Wide selection of types, the right sensor for every application				
	Application ranges	Measurement and control, heating, air conditioning and ventilation, industrial electronics, vehicle manufacturing				
Technical data	Wires	Ag 0.2 × 0.3	Pt-Ni 0.2 mm	Ni 0.25 mm	Pt-Ni 0.2 mm	Pd 0.25 mm
	Operating temperature	-70 to +250 °C	-70 to +400 °C	-70 to +500 °C	-70 to +550 °C	-70 to +600 °C
	Processing	Soft-soldering	Crimping, welding, hard-soldering			Welding
	Sizes	2 × 2.5 × 1.3 mm 2 × 5 × 1.3 mm 2 × 10 × 1.3 mm 4 × 5 × 1.3 mm	2 × 2.5 × 1.3 mm 2 × 5 × 1.3 mm 2 × 10 × 1.3 mm 1.2 × 4 × 1.1 mm	1.5 × 2.5 × 1.0 mm 2 × 2.5 × 1.3 mm 2 × 5 × 1.3 mm	1.5 × 2.5 × 1.0 mm 1.5 × 5 × 1.0 mm 2 × 2.5 × 1.3 mm 2 × 5 × 1.3 mm 2 × 10 × 1.3 mm 4 × 5 × 1.3 mm	2 × 10 × 1.3 mm
Nominal values		Pt 100 Pt 500 Pt 1000	Pt 100 Pt 500 Pt 1000 Pt 2000	Pt 100 Pt 200 Pt 1000	Pt 100 Pt 200 Pt 500 Pt 1000	Pt 100 Pt 500 Pt 1000



## Platinum temperature sensors in special design types



Designation		Design type PCSE	Design type PCKL	Design type PCS
Type / data sheet		906122	906123	906125
Application	Features	Prefabricated measuring insert	Sturdy and protected against moisture	Excellent linear characteristic curve and high long-term stability
	Application ranges	Measurement and control, heating, air conditioning and ventilation, industrial electronics		
Technical data	Wires	–		–
	Terminal clamps	–	Galvanized	–
	Contact areas	Gold plated	–	
	Solder connections	–		Galvanized all-around contact with diffusion lock
	Operating temperature	–20 to +150 °C	–30 to +105 °C	–50 to +150 °C
	Processing	Soft-soldering		Reflow soldering, wave soldering
	Sizes	4.3 × 15 × 2.2 mm 4.1 × 28 × 2.2 mm	3.9 × 5 × 1.5 mm	1.3 × 2.0 × 0.5 mm, 0815 1.5 × 3.1 × 0.8 mm, 1206
Nominal values		Pt 100 Pt 500 Pt 1000	Pt 100 Pt 1000	Pt 100 Pt 500 Pt 1000



# DAkkS

When regulation (EC) No. 765/2008 took effect on January 1, 2010, control over accreditation in Europe was completely revised. Accreditation is now the responsibility of a single national accreditation body for each member state.

In the Federal Republic of Germany, §13 paragraph 1 of AkkStelleG (the accreditation body law) transfers monitoring duties to the Deutsche Akkreditierungsstelle GmbH (DAkkS).



JUMO		More than sensors + automation				
akkreditiert durch die / accredited by the						
<b>Deutsche Akkreditierungsstelle GmbH</b>						
als Kalibrierlaboratorium im / as calibration laboratory in the						
<b>Deutschen Kalibrierdienst DKD</b>						
Kalibrierschein Calibration certificate		 				
		<table border="1"> <tr> <td>0001</td> </tr> <tr> <td>D-15129-01-00</td> </tr> <tr> <td>Calibration mark</td> </tr> <tr> <td>2010-12</td> </tr> </table>	0001	D-15129-01-00	Calibration mark	2010-12
0001						
D-15129-01-00						
Calibration mark						
2010-12						
Gegenstand Object	Platinwiderstandsthermometer	Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine. Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.				
Hersteller Manufacturer	JUMO GmbH & Co. KG	This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI). The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates. The user is obliged to have the object recalibrated at appropriate intervals.				
Typ Type	90.286-F30 / V4					
Fabrikat/Serien-Nr. Serial number	0523 0005					
Auftraggeber Customer	JUMO GmbH & Co. KG					
Auftragsnummer Order No.	D - 36039 Fulda 123456					
Anzahl der Seiten des Kalibrierscheines Number of pages of the certificate	5					
Datum der Kalibrierung Date of calibration	14.12.2010					
Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung sowohl der Deutschen Akkreditierungsstelle als auch des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift haben keine Gültigkeit.						
This calibration certificate may not be reproduced other than in full except with the permission of both the German Accreditation Body and the issuing laboratory. Calibration certificates without signature are not valid.						
Datum Date	14.12.2010					
	Leiter des Kalibrierlaboratoriums Head of the calibration laboratory	Bearbeiter Person in charge				
	Matthias Nau	Stefan Krummeck				
Mail: JUMO GmbH & Co. KG Moltiz-Juchheim-Straße 1 D - 36039 Fulda, Germany	Mailto: Stefan.Krummeck@JUMO.net	Internet: www.jumo.net				



## DAkkS calibration service

Calibration object	Measuring range	Measurement uncertainty
<ul style="list-style-type: none"> <li>- RTD temperature probes</li> <li>- Direct display of electronic thermometers (temperature measuring chains)</li> <li>- Data logger</li> </ul>	0.01 °C –80 to 0 °C > 0 to 90 °C >90 to 300 °C	5 mK 15 mK 10 mK 15 mK
<ul style="list-style-type: none"> <li>- Thermocouples</li> </ul>	–80 to +200 °C >200 to 300 °C	0.2 K 0.3 K
<ul style="list-style-type: none"> <li>- Precious metal thermocouples</li> </ul>	>300 to 1100 °C	1.0 K
<ul style="list-style-type: none"> <li>- Non-precious metal thermocouples</li> <li>- Direct display electronic thermometers</li> </ul>	>300 to 1100 °C	1.5 K
<ul style="list-style-type: none"> <li>- Resistance thermometers with transmitter</li> <li>- Direct display electronic thermometers with transmitter</li> </ul>	–80 to 0 °C > 0 to 90 °C > 90 to 300 °C	45 mK 40 mK 45 mK
<ul style="list-style-type: none"> <li>- Temperature block calibrators</li> </ul>	30 to 133 °C >133 to 660 °C > 660 to 1100 °C	0.2 K 1.5 mK x (T) 2.5 K
Lab ID D-K-15129-01-00, (extended options through factory calibration on request)		

### Accuracy matters

The requirements for almost all processes continuously grow in terms of increased output and quality as well as lower process costs. Reducing the measurement uncertainty of the systems used to record process parameters is often closely tied to this trend. At the same time, new standards increase the requirements for documenting processes and monitoring measuring equipment.

As a result, the main criterion for all calibrations is to trace the measurement results back to national standards. Unless otherwise specified, DAkkS-calibrated temperature probes and testing equipment are generally recognized as the instrument for retracing measurement results to standards in Europe and abroad.

### JUMO calibration laboratory

Temperature is one of the most important process variables. The JUMO calibration laboratory has been accredited for

temperature as a process variable since 1992. The current DAkkS accreditation again confirms competence according to DIN EN ISO/IEC 17025:2005 and also authorizes calibrations of RTD temperature probes, thermal pairs und block calibrators.

### On-site calibration service

Measurement equipment used for calibration cannot always be taken out of service for several days, let alone disassembled and sent in for calibration. Our on-site calibration service ensures especially short down times for these situations. The JUMO on-site calibration service also takes into account local installation conditions. The service engineer can also repair or replace individual components if necessary. The retraceable measurement results are created according to DIN EN 10204, including use of a certified quality management systems according to DIN EN ISO 9001:2000.

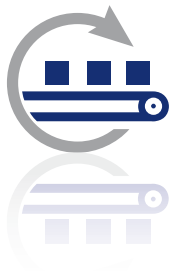


# Services & Support

It is the quality of our products that is responsible for such a high level of customer satisfaction. But our reliable after-sales service and comprehensive support are also valued. Let us introduce you to the key services we provide for our innovative JUMO products. You can count on them – anytime, anywhere.

**JUMO Services & Support – so that it all comes together!**

## Manufacturing Service



Are you looking for a competitive and efficient system or component supplier? Regardless of whether you seek electronic modules or perfectly fitting sensors – either for small batches or mass production – we are happy to be your partner. From development to production we can provide all the stages from a single source. In close cooperation with your business our experienced experts search for the optimum solution for your application and incorporate all engineering tasks. Then JUMO manufactures the product for you. As a result you profit from state-of-the-art manufacturing technologies and our uncompromising quality management systems.

### Customer-specific sensor technology

- Development of temperature probes, pressure transmitters, conductivity sensors, or pH and redox electrodes according to your requirements
- A large number of testing facilities
- Incorporation of the qualifications into application
- Material management
- Mechanical testing
- Thermal test



### Electronic modules

- Development
- Design
- Test concept
- Material management
- Production
- Logistics and distribution
- After-sales service



### Metal technology

- Toolmaking
- Punching and forming technology
- Flexible sheet metal machining
- Production of floats
- Welding, jointing, and assembly technology
- Surface treatment technology
- Quality management for materials



More than **sensors + automation**



## Information & Training



Would you like to increase the process quality in your company or optimize a plant? Then use the offers available on the JUMO website and benefit from the know-how of a globally respected manufacturer. For example, under the menu item “Services and Support” you will find a broad range of seminars. Videos are available under the keyword “E-Learning” about topics specific to measurement and control technology. Under “Literature” you can learn valuable tips for beginners and professionals. And, of course, you can also download the current version of any JUMO software or technical documentation for both newer and older products.

## Product Service



We have an efficient distribution network on all five continents available to all of our customers so that we can offer professional support for everything concerning our product portfolio. Our team of professional JUMO employees is near you ready to help with consultations, product selection, engineering, or optimum use of our products. Even after our devices are commissioned you can count on us. Our telephone support line is available to give you answers quickly. If a malfunction needs to be repaired on site our Express Repair Service and our 24-hour replacement part service are available to you. That provides peace of mind.

## Maintenance & Calibration



Our maintenance service helps you to maintain optimum availability of your devices and plants. This prevents malfunctions and downtime. Together with the responsible parties at your company we develop a future-oriented maintenance concept and are happy to create all required reports, documentation, and protocols. Because we know how important precise measurement and control results are for your processes we naturally also professionally calibrate your JUMO devices – on site at your company or in our accredited DAkkS calibration laboratory for temperature. We record the results for you in a calibration certificate according to EN 10 204.



[www.jumo.net](http://www.jumo.net)