



More than **sensors + automation**



# Temperature

Innovative solutions for the highest requirements



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## Dear Reader,

Temperature is one of the most commonly measured physical measurands throughout the world.

During the mid-1960s, the production of high-quality, accurate temperature probes offering long-term stability began to mature into one of JUMO's core fields of expertise. Ever since this era of development, JUMO has been producing RTD temperature probes and thermocouples of outstanding quality. We are now one of the world's leading manufacturers in this field. Our customers benefit from our extensive experience in design and our high-quality production expertise.

Because we can draw on both these pools of knowledge, we are able to produce both smaller batches as well as larger quantities in series production with a high degree of automation. We have reached a high level of quality due to our motivated employees, statistical process control, and optimized process flows.

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 highest standard through continuous new and ongoing development.

Our expertise 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.

We always focus on the customer in everything we do. Customer satisfaction and long-term collaboration are the driving forces that keep us achieving outstanding performance time and time again.

This brochure provides an overview of our products for measurement technology. Of course we are also happy to work with you to create customized solutions for your individual requirements.

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

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# Temperature measurement

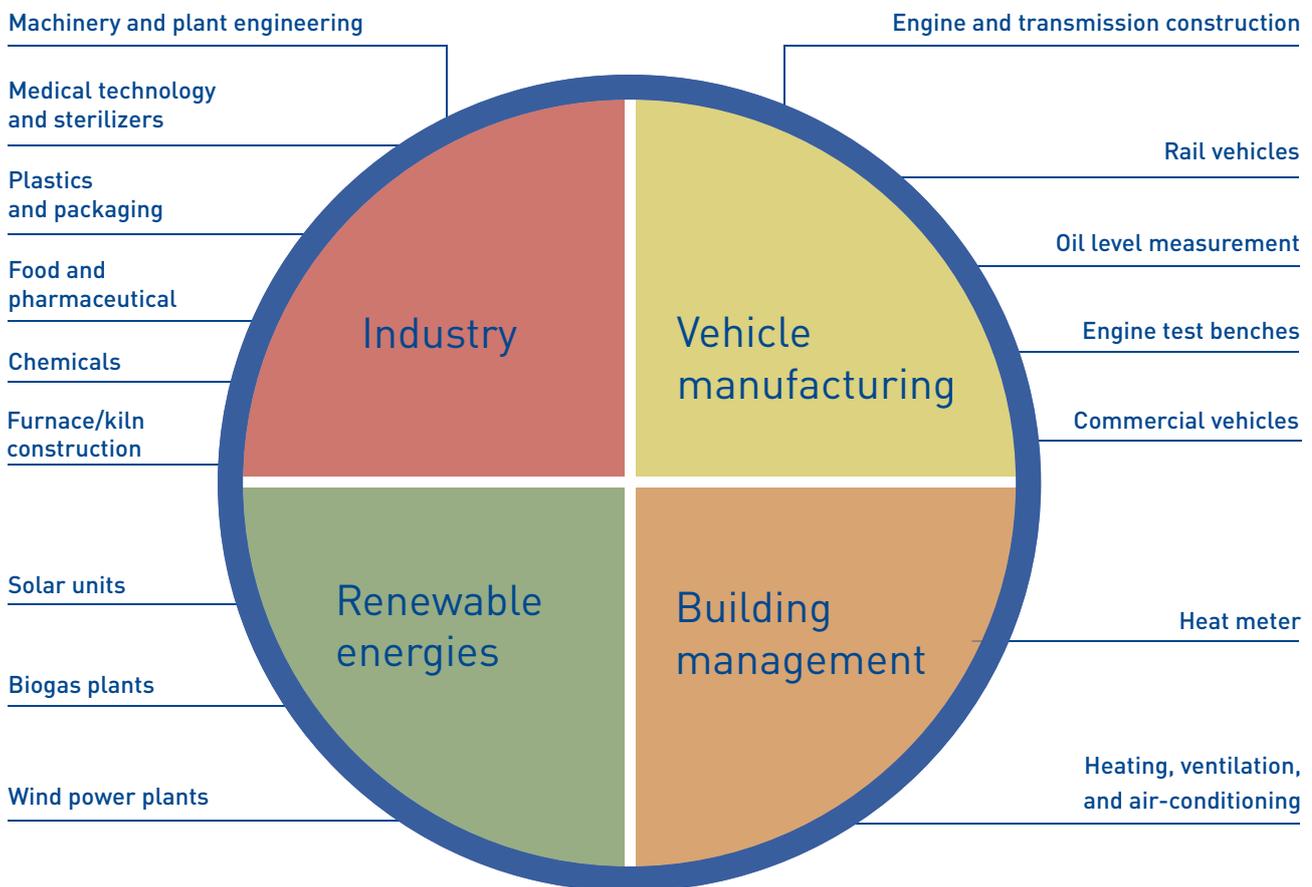
Temperature is one of the most important measurands in the industry. Temperatures must be recorded and processed for numerous manufacturing processes.

The spectrum of applications ranges from measurements in building technology 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.

The adjustment to the respective measurement task can occur using different protection fittings and materials as well as terminal head, cable, and connector. As a result, extreme vibrations, atmospheres containing steam and which are under pressure, as well as aggressive media are controllable.



## The industries



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

### Approvals

ATEX, GOST, DIN EN 14597, GL, EHEDG





# Thermocouples

Higher temperatures are measured with thermocouples. Different thermocouples can be used depending on the requirements. Available types are L, J, K, N, S, and B. The respective voltage series and limiting deviations are standardized according to DIN EN 60584 and DIN 43710. Compensating cables or thermal cables must be used for the connection. The different lines (sheath and stranded wire) are color coded according to 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.



## Application example



**JUMO mineral-insulated thermocouples**  
With standard tab connectors according to  
DIN 43710 and DIN EN 60584  
Type 901221



The ground freezing unit in construction



The ground freezing unit in operation

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

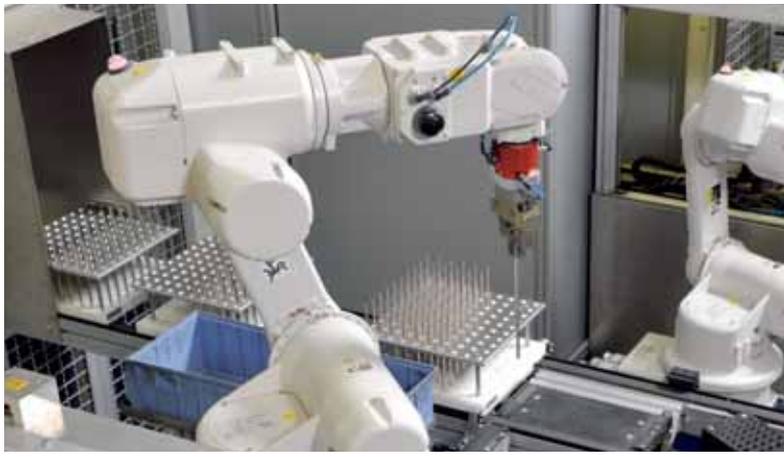
To enable a wastewater pipe to be connected to a shaft and covered with concrete in-situ, the national roads administration in Oslo, Norway decided to apply a waterproof seal by freezing the soil. This is a method through which the ground becomes solidified by artificially freezing the soil water, which in turn makes the ground waterproof.

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

The evaporation process that then occurs rapidly draws heat from the ambient soil.

To record the temperature, the input of each cooling tube was equipped with a total of 19 JUMO mineral-insulated thermocouples with a fixed compensating cable of type 901221/20... 20 RTD temperature probes Pt100 with solid connecting cable of type 902150/10... measure the temperature in the frozen ground. They are 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 required matches the calculations of the Finite Element Program (FEM = Finite-Element Method) for heat transfer in the soil.



## Screw-in thermocouples



	<b>Description</b>	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 for DIN EN 14597 tested devices and plants	Screw-in melt thermocouples
	<b>Type/data sheet</b>	901020	901030	901050	901006	901090
<b>Application</b>	<b>Features</b>	-			For operating media water, oil, and air	-
	<b>Areas of application</b>	Woodworking machines, dryer systems, baking ovens, smelting works and rolling mills	Solid fuel boilers, plastics industry	Industry kitchen equipment suppliers, temperature control units, plastics industry	Boiler construction, oil heat transfer Oil, cogeneration units	Plastics industry
<b>Technical data</b>	<b>Connection</b>	Head		Cable	Head, cable	Cable, connector
	<b>Operating temperature</b>	-200 to +800 °C		-200 to +600 °C	0 to +1500 °C	-40 to +600 °C
	<b>Measuring circuits</b>	1/2				1
	<b>Thermocouples</b>	J, L, K		L, K	L, K, S, B,	J, L, K
	<b>Process connection</b>	Thread			Thread, flange, pipe screw connection	Thread
	<b>Protection fitting</b>	Stainless steel			Stainless steel, steel, ceramic	Stainless steel, coating
	<b>Protection type</b>	IP 65		-		
	<b>Option</b>	Transmitter	-	Non-insulated construction		
	<b>Approvals</b>	GOST		-	For DIN EN 14597 tested devices	-
	<b>Special features</b>	Replaceable measuring insert, extension tube	Union nut	Cable made of silicone, PTFE, metal braiding	-	Cable made of PTFE, metal braiding, probe tip flat / blade-shaped



## Push-in thermocouples



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



## Mineral-insulated thermocouples



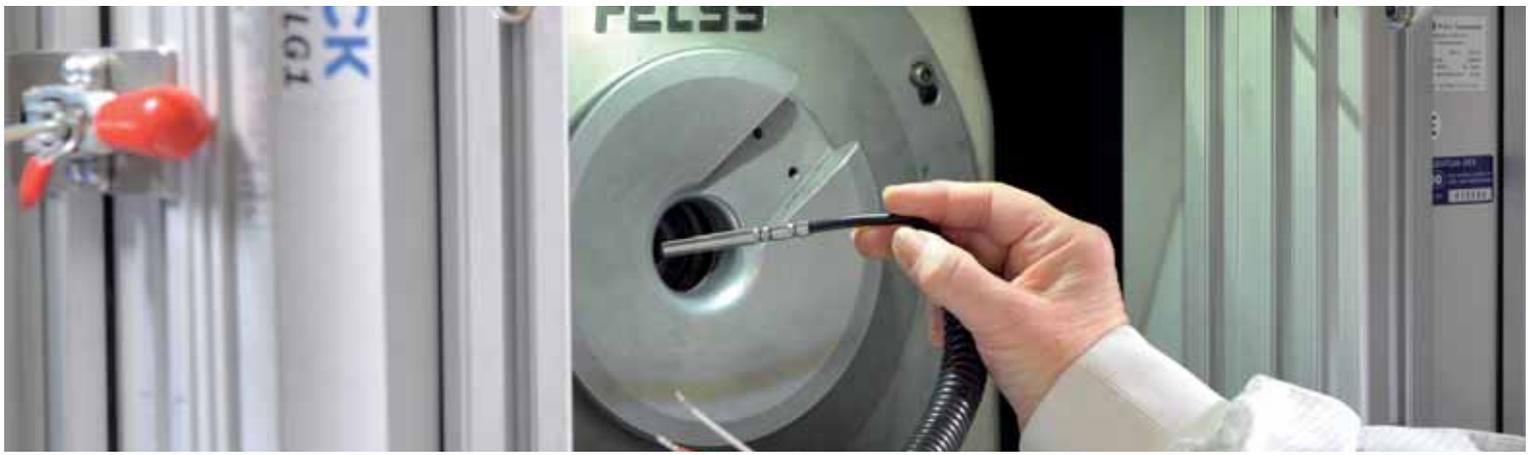
	Description	Mineral-insulated thermocouples with bare connecting wires	Mineral-insulated thermocouples with terminal head form J	Mineral-insulated thermocouples with standard tab connector	Mineral-insulated thermocouples with thermal cable
	Type/data sheet	901210 /10	901230 /40	901240 /20	901250 /3x
Application	Features	Flexible sheath cable, vibration-resistant			
	Areas of application	Converters	Meat processing industry, cogeneration units, baking ovens	Hot runner industry, plastics industry	Hot runner industry, industrial heating plants, industrial kitchen equipment suppliers, biogas plants
Technical data	Connection	Connection wires	Head	Connector	Connecting cable
	Operating temperature	-200 to +1200 °C			0 to 1200 °C
	Measuring circuits	1/2		1	1/2
	Thermocouples	J, L, K			
	Process connection	-	Thread	-	Clamping screw connection
	Protection fitting	Stainless steel, Inconel®			
	Protection type	-	IP 65	-	-
	Option	Non-insulated construction	Transmitter	Non-insulated construction	
	Approvals	GOST			
	Special features	-	-	Ø as of 0.5 mm	Ø as of 0.5 mm Cable made of silicone, PTFE, glass fiber/metal braiding



## Insertion thermocouples



	<b>Description</b>	JUMO FOODtemp Insertion thermocouples with PTFE handle	JUMO FOODtemp Insertion thermocouples with PEEK® handle	JUMO FOODtemp Insertion thermocouples with PEEK® handle
	<b>Type/data sheet</b>	901350/33/63	901350/83	901350/84
<b>Application</b>	<b>Features</b>	Steam-tight, high-degree of mechanical strength, multiple measuring points		
	<b>Areas of application</b>	Industrial kitchen equipment suppliers, sterilizers	Industrial kitchen equipment suppliers	Industrial kitchen equipment suppliers, sterilizers
<b>Technical data</b>	<b>Connection</b>	Cable		
	<b>Operating temperature</b>	-100 to +260 °C		
	<b>Measuring circuits</b>	3/4/5	3/4	
	<b>Thermocouples</b>	K		
	<b>Handle</b>	Ø 12 mm, 15 mm	T-form	Ø 11.5 mm
	<b>Protection fitting</b>	Stainless steel		
	<b>Protection type</b>	IP67		
<b>Special features</b>	Probe tip aligned centrally/angled	Probe tip aligned centrally/angled Cable outlet on the side	Probe tip aligned centrally/angled	



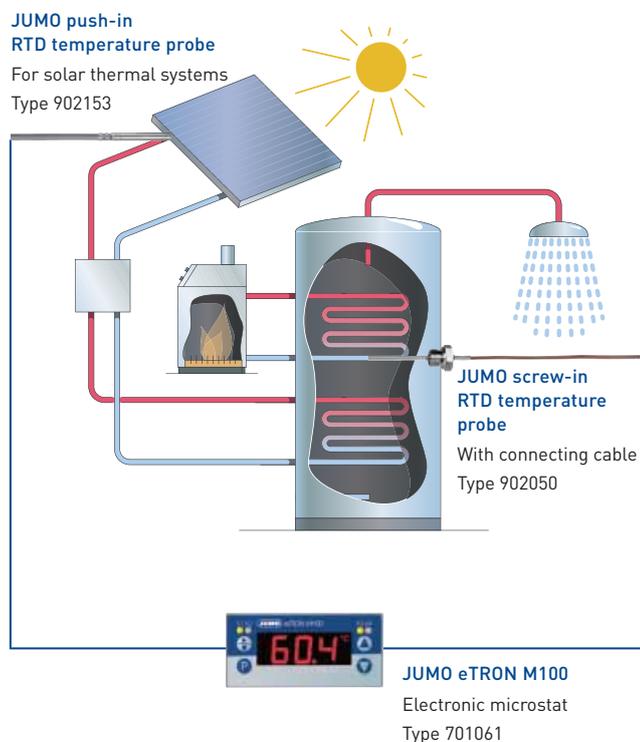
# RTD temperature probes

In many industrial applications, temperature is measured with RTD temperature probes. Platinum is widely used as the resistance material because it guarantees high measuring accuracy and long-term stability. The temperature-dependent electrical resistance, which increases with rising temperature, functions as the measured value here.

This is referred to as a positive temperature coefficient (PTC). The most widely used nominal values are Pt100, Pt500, and Pt1000. The various nominal values, temperature-dependent output characteristic, and tolerances are specified in DIN EN 60751.



## Application example



Control of a solar power unit with JUMO products

### JUMO RTD temperature probe for solar thermal systems

Though often underestimated, temperature probes are an important part of a solar unit. They must be temperature-resistant as well as leak-proof, have long-term stability, 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. To guarantee that these goals are met, the use of a Pt1000 platinum temperature sensor is recommended. Because such a high nominal value is maintained, the resistance of the connecting cable has only a

minimal impact on the temperature measurement.

The sun's potential is free – to help harness that potential JUMO offers cost-effective and high-quality solar sensors. 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.

This applies to the small system for private houses as well as to large professional plants.



## Screw-in RTD temperature probes



	<b>Description</b>	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
	<b>Type/data sheet</b>	902020	902023	902030	902040
<b>Application</b>	<b>Features</b>	-			Vibration-resistant
	<b>Areas of application</b>	Plant engineering, construction material machines, dryer systems, biogas plants, cogeneration units	Mechanical engineering, confectionery industry	Mechanical engineering, thermostat baths, transmission construction, meat processing industry	Commercial vehicles, compressors, engine construction, railway technology industry
<b>Technical data</b>	<b>Connection</b>	Head			Connector
	<b>Operating temperature</b>	-50 to +600 °C	-50 to +400 °C	-50 to +400 °C	-50 to +300 °C
	<b>Measuring circuits</b>	1/2			1
	<b>Sensor</b>	Pt100, Pt500, Pt1000			Pt100, Pt500, Pt1000, KTY
	<b>Process connection</b>	Thread			
	<b>Protection fitting</b>	Stainless steel			Stainless steel, brass
	<b>Protection type</b>	IP65			IP65, IP69K
	<b>Option</b>	Transmitter			-
	<b>Approvals</b>	GOST	-	GOST	-
<b>Special features</b>	Replaceable measuring insert, extension tube	Fast measurements in air	Fast measurements in air, spring-mounted screw connection	Vibration-resistant	



## Screw-in RTD temperature probes



	Description	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 according to DIN-EN-14597	Screw-in melt RTD temperature probe
	Type/data sheet	902044	902050	902006	902090
Application	Features	Highly vibration-resistant, plug connector according to DIN EN 175301-803	–	For operating media water, oil, air	–
	Areas of application	Shipbuilding, engine manufacturing, industrial boiler plants, pump engineering	Mechanical engineering, HVAC, cooling components, transmission construction	Boiler construction, oil heat transfer, baking ovens	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	Pt100			
	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	–	Ceramic insulated probe tip
	Approvals	GL	GOST	For DIN EN 14597	–
Special features	Replaceable measuring insert for variants without transmitter	Cable made of silicone, PTFE, metal braiding	–	Cable made of PTFE, metal braiding, probe tip flat/blade-shaped	



## Push-in RTD temperature probes



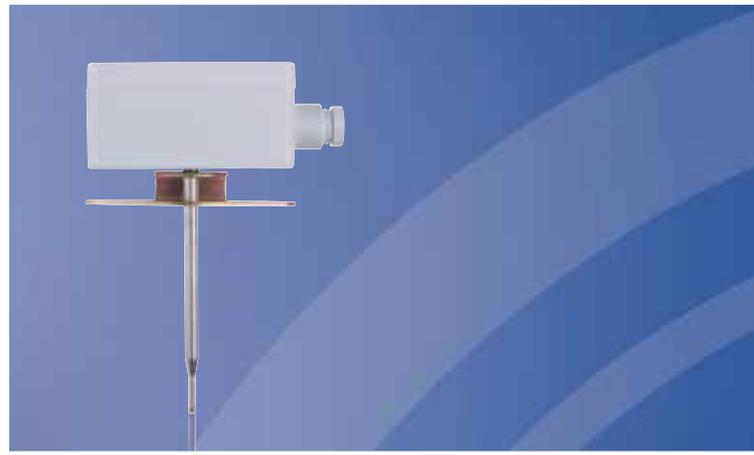
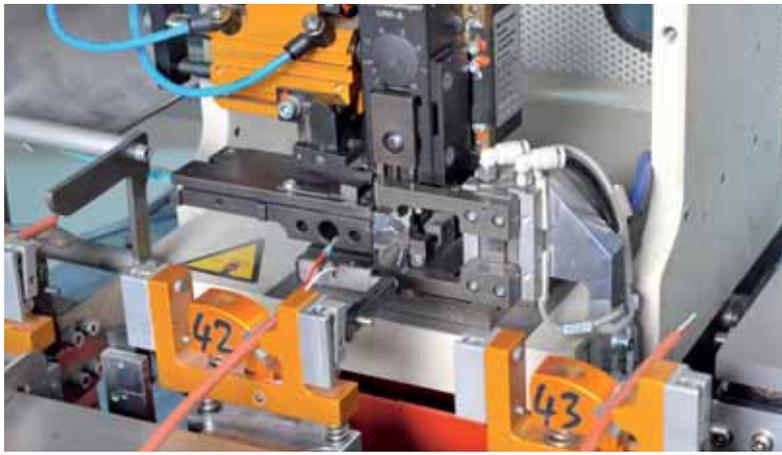
	<b>Description</b>	Push-in RTD temperature probe with terminal head form B	JUMO Etemp B push-in RTD temperature probe with terminal head form B for standard applications	Push-in RTD temperature probe with terminal head form J	Push-in RTD temperature probe with connecting cable	Push-in RTD temperature probe with connecting cable for solar thermal systems	Push-in RTD temperature probe with bayonet lock	
	<b>Type/data sheet</b>	902120	902123	902130	902150	902153	902190	
<b>Application</b>	<b>Features</b>	-				For collector and storage temperature measurements	Adjustable spring pressure ensures good heat transfer	
	<b>Areas of application</b>	Plant engineering, industrial heating plants, drying systems, construction material machines	Mechanical engineering, plant engineering	Mechanical engineering, temperature control units, conveyor technology, textile industry	Thermostat baths, packing machine industry, heating and drying cabinets, hydraulic systems	Solar units	Plastics industry, special mechanical engineering	
<b>Technical data</b>	<b>Connection</b>	Head			Cable			
	<b>Operating temperature</b>	-50 to +600 °C	-50 to +400 °C	-50 to +400 °C		-50 to +260 °C	-50 to +350 °C	
	<b>Measuring circuits</b>	1/2				1	1/2	
	<b>Sensor</b>	Pt100		Pt100, Pt1000		Pt100	Pt100, Pt1000	Pt100
	<b>Process connection</b>	Flange, pipe screw connection				-		Bayonet connection
	<b>Protection fitting</b>	Stainless steel				Stainless steel, brass		Stainless steel
	<b>Protection type</b>	IP65				-		
	<b>Option</b>	Transmitter				Shielded cable	-	Shielded cable
	<b>Approvals</b>	GOST	-	GOST		-		
	<b>Special features</b>	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



	<b>Description</b>	Mineral-insulated RTD temperature probe with bare connection wires	Mineral-insulated RTD temperature probe with terminal head	Mineral insulated RTD temperature probe with Lemos <sup>®</sup> connector	Mineral-insulated RTD temperature probe with connecting cable
	<b>Type/data sheet</b>	902210/10	902210/40	902210/20	902210/3x
<b>Application</b>	<b>Features</b>	Flexible sheath cable, vibration-resistant			
	<b>Areas of application</b>	Converters	Painting and drying systems, cogeneration units, plant engineering	Plant engineering, chemical industry	Baking oven industry, electric motors, generators, mechanical engineering, packaging industry
<b>Technical data</b>	<b>Connection</b>	Connection wires	Head	Connector	Connecting cable
	<b>Operating temperature</b>	-200 to +600 °C			
	<b>Measuring circuits</b>	1/2			
	<b>Sensor</b>	Pt100, Pt1000			
	<b>Process connection</b>	-	Thread	-	-
	<b>Protection fitting</b>	Stainless steel			
	<b>Protection type</b>	-	IP65	-	-
	<b>Option</b>	-	Transmitter	-	-
	<b>Approvals</b>	GOST			
<b>Special features</b>	Ø as of 1.9 mm			Ø as of 1.9 mm, cable made of PVC, silicone, PTFE, metal braiding	



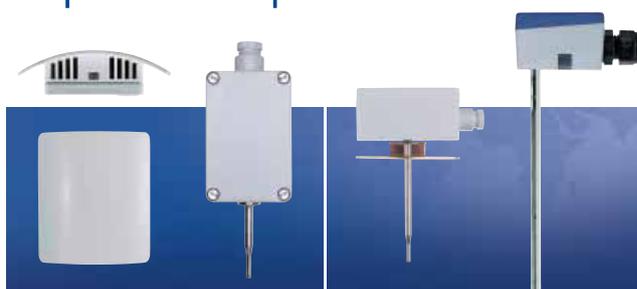
## Insertion RTD temperature probes



	<b>Description</b>	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
	<b>Type/data sheet</b>	902350/22/23	902350/37/38	902350/82/83	902350/84
<b>Application</b>	<b>Features</b>	Steam-tight, high-degree of mechanical strength			
	<b>Areas of application</b>	Meat processing suppliers, industrial kitchen equipment suppliers, bakery ovens	Apparatus engineering	Industrial kitchen equipment suppliers	Industrial kitchen equipment suppliers, bakery ovens
<b>Technical data</b>	<b>Connection</b>	Cable			
	<b>Operating temperature</b>	-50 to +260 °C	-50 to +200 °C	-50 to +260 °C	
	<b>Measuring circuits</b>	1/2	1	1/2	
	<b>Sensor</b>	Pt100			
	<b>Handle</b>	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
	<b>Protection fitting</b>	Stainless steel	-	Stainless steel	
	<b>Protection type</b>	IP67			
	<b>Option</b>	Non-insulated construction	Transmitter	Non-insulated construction	
	<b>Approvals</b>	GOST			
<b>Special features</b>	Probe tip aligned centrally/angled	-	Probe tip aligned centrally/angled Cable outlet on the side	Probe tip aligned centrally/angled	



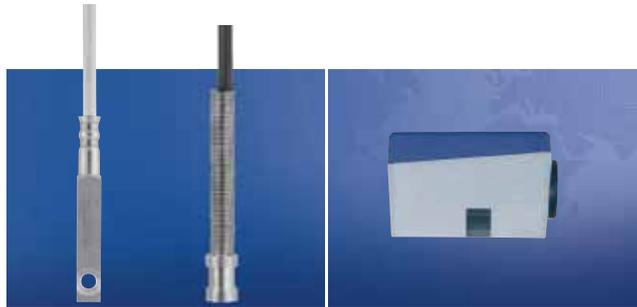
## Indoor RTD temperature probes



	<b>Description</b>	<b>Indoor and outdoor RTD temperature probe</b>	<b>Channel RTD temperature probe</b>
	<b>Type/data sheet</b>	902520/10/11/13	902520/20/25
<b>Application</b>	<b>Features</b>	Wall mounting	Channel mounting
	<b>Areas of application</b>	Building management, cogeneration units	Facility management Air heaters
<b>Technical data</b>	<b>Connection</b>	Terminal enclosure	
	<b>Operating temperature</b>	-50 to +90 °C	-50 to +200 °C
	<b>Measuring circuits</b>	1/2	
	<b>Sensor</b>	Pt100, Pt1000, Ni1000	
	<b>Process connection</b>	-	Pipe screw connection, flange
	<b>Protection fitting</b>	-	Stainless steel
	<b>Protection type</b>	IP65	
	<b>Option</b>	Transmitter	
<b>Approvals</b>	GOST		



## Surface RTD temperature probes



	<b>Description</b>	Surface RTD temperature probe with connecting cable	Surface RTD temperature probe
	<b>Type/data sheet</b>	902550/10/11/20/30/31	902550/41/42
<b>Application</b>	<b>Features</b>	Low thermal mass for round and level surfaces	
	<b>Areas of application</b>	Packing machines, pipeline construction	Plant engineering
<b>Technical data</b>	<b>Connection</b>	Cable	Terminal enclosure
	<b>Operating temperature</b>	-50 to +260 °C	-50 to +120 °C
	<b>Measuring circuits</b>	1	
	<b>Sensor</b>	Pt100, Pt500, Pt1000	Pt100, Pt500, Pt1000, Ni1000
	<b>Process connection</b>	Screw, fastener strap	Fastener strap
	<b>Protection fitting</b>	Stainless steel, aluminum	-
	<b>Protection type</b>	-	IP65
	<b>Option</b>	Strain relief	-
	<b>Special features</b>	Cable made of PVC, silicone, PTFE, stainless steel-PTFE	Including installation kit



## Industry-specific RTD temperature probes



Description	RTD temperature probe for the food/ pharmaceutical industries	Screw-in RTD temperature probe without/ with transmitter	JUMO PROCESS RTD temperature probe for process technology with ATEX approval	JUMO STEAMtemp Push-in RTD temperature probe in steam-tight version	Level and temperature probe for commercial vehicles as well as 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, protection tube made of stainless steel, titanium, tantalum, Inconel®, HASTELLOY®	Steam-tight, high protection type	High shock-resistance, level measurement according to the hot-wire principle	Very high resolution possible (millikelvin scale)	
	Areas of application	Food industry, pharmaceutical industry		Process industry, chemical industry, plant engineering, pump engineering	Sterilizers, pharmaceutical, food industry, institutes, research facilities	Commercial vehicle/construction/agricultural machinery industry, engine construction, transmission construction	Woodworking machines, dryer systems, baking ovens, smelting works, and rolling mills	
Technical data	Connection	Head	M12 connector	Head	Cable	Head		
	Operating temp.	-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	Pt100	Pt100, Pt1000	Pt100	Pt100	Voltage/Pt100, Pt1000	Pt1000	
	Process connection	Hygienic process connections, JUMO PEKA			Thread, flange		Thread	
	Protection fitting	Stainless steel 316L				Stainless steel, steel, ceramic	Stainless steel, coating	-
	Protection type	IP67			IP65	IP69	-	
	Option	Transmitter	Transmitter	Transmitter	Shielded cable	Corrugated hose	Transmitter	
	Approvals	EHEDG			Ex-ATEX, GOST	-		GOST
Special features	CIP-compliant process connections, including electropolished Ra < 0.8 µm			Replaceable measuring insert, Ex i, Ex d	Cable made of FEP, PTFE, silicone	Cable made of polyester, cross-linked	Replaceable measuring insert, extension tube	



## Heat meter RTD temperature probes



	<b>Description</b>	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 thermowells (type PS/PL)	JUMO HEATtemp Screw-in RTD temperature probe for heat meter with terminal head for direct installation (type DL)	JUMO HEATtemp Push-in RTD temperature probe for heat meter with terminal head for thermowells (type PL)	
	<b>Type/data sheet</b>	902425	902435	902424	902434	
<b>Application</b>	<b>Features</b>	Paired and calibrated according to the German Calibration Ordinance and MID calibration, production according to module D of the MID certification (CE and metrological identification marking)				
	<b>Areas of application</b>	Heat and cold meters				
<b>Technical data</b>	<b>Connection/connecting cable</b>	Connecting cables with ferrules/ PVC, PUR, TPE, silicone		Terminal head with screw terminals/ -		
	<b>Operating temperature</b>	0 to 180 °C	Type PS: 0 to +150 °C; Type PL: 0 to +180 °C	0 to 180 °C		
	<b>Process connection</b>	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	
	<b>Protection fitting</b>	Type DS: stainless steel Ø 5.4 mm, offset by 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, offset by Ø 6 mm	6 mm with fitting toler- ance for thermowell; stainless steel	
	<b>Temperature difference</b>	3 to 180 K	Type PS: 3 to 150K Type PL: 3 to 180K	3 to 180 K		
	<b>Minimum immersion depth</b>	Type DS: 15 mm, Type DL: 30, 60 to 280 mm	Type PS: > 15 mm	30 mm		
	<b>Insertion length</b>	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	
	<b>Approvals</b>	Approval for heat meters, MID, and domestic approvals as replaceable temperature probes; fulfills requirements of DIN EN 1434, AGFW FW 202, and FW 211, approval for cold meter and combined cold/heat meters				



## JUMO DELOS series Precision transmitters for temperature or pressure



	Description	JUMO DELOS T for temperature	JUMO DELOS SI for pressure and filling level	DELOS HP for high pressure	
	Type/data sheet	902940	405052	405054	
Application	Features	Programmable, switching output, unit display selectable, case and protection fitting made of stainless steel (316 L)	Programmable, switching output, measurement range scalable 1:4, unit display selectable, case and protection fitting made of stainless steel (316 L)	Programmable, switching output, measurement range scalable 1:4, selectable measuring unit, case and protection fitting made of stainless steel	
	Areas of application	Food and pharmaceutical applications, CIP/SIP systems, machinery and plant engineering, refrigeration and air-conditioning engineering		Hydraulic systems, machinery and plant engineering, test benches, laboratory instruments	
Technical data	Input	-50 to +150°C -50 to +260°C with extension tube -50 to +500°C with detached RTD temperature probe	Relative, absolute 0.4 to 60 bar	Relative 160 to 600 bar	
	Admissible temperatures	Environment: -25 to +75°C	Environment: -25 to +75°C Medium: -25 to +200°C		
	Accuracy	Tolerance class: class A (optional class AA)	Linearity of the measuring span 0.1 to 0.15%		
	Output	1x PNP switching output, 2x PNP switching output, 1x PNP switching output, 1x analog output) 0(4) to 20 mA, 0 to 10V)			
	Protection type	IP67			
	Process connection	Thread, hygienic connections, screw connections, JUMO PEKA	Thread, hygienic connections, pressure separator, JUMO PEKA	Thread	
	Approvals	EHEDG		-	



## Wireless data transmission – Wtrans transmitter



	Description	JUMO Wtrans transmitter T01 RTD temperature probe with electronic assemblies up to 85 °C	JUMO Wtrans transmitter T02 RTD temperature probe with electronic assemblies up to 125 °C	JUMO Wtrans transmitter T03 RTD temperature probe with ATEX approval and elec- tronic assemblies 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 temperatures between -30 to +260 °C or -200 to +600 °C *</li> <li>- For mobile or stationary temperature measurement</li> <li>- No wiring work thanks to 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, and New Zealand as well as other countries); 10 frequencies can be configured in the 915 MHz frequency band		
	Transmission interval	Adjustable from 1 to 3600 s; Factory set for basic type 902930/10, 902930/12, and 902930/50 = 10 s; Factory set for basic type 902930/20, 902930/22, and 902930/60 = 15 s; Factory set for basic type 902930/15, 902930/17, and 902930/55 = 20 s; Adjustable via DIP switch 5 s, 10 s, 20 s, or 45 s		
	Range in the free field	Up to 300 m when using the antenna holder for wall mounting and with 3 m antenna cable		
	Transmitter detection (transmitter ID)	5-digit ID, factory set, can be configured according to customer specifications		
	Measuring input	Pt1000 according to DIN EN 60751, in three-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: 3.6 V; rated capacity: 2.2 Ah / 1.7 Ah		
Available approvals / approval marks	<ul style="list-style-type: none"> <li>- IC (Industry Canada) for 915 MHz</li> <li>- FCC (Federal Communications Commission) for 915 MHz</li> <li>- c UL us (Underwriters Laboratories)</li> <li>- ATEX approval for 868.4 MHz ***</li> </ul>			

\* Not for Wtrans T03.

\*\* Only with screwed-on machine connector M12×1.

\*\*\* For Wtrans T03.



## Wireless Data Transmission - Wtrans receiver

Operation and configuration can be performed via the keypad in conjunction with a two-line LCD display, or with an intuitively operable setup program for greater convenience. This way, parameters such as measured value scaling, offset, alarms, and limit values can be separately set for each channel. For this purpose, a connector is provided on the front for a PC interface with TTL/RS232 or USB/TTL converter for connecting the receiver and the PC.



Type 902931

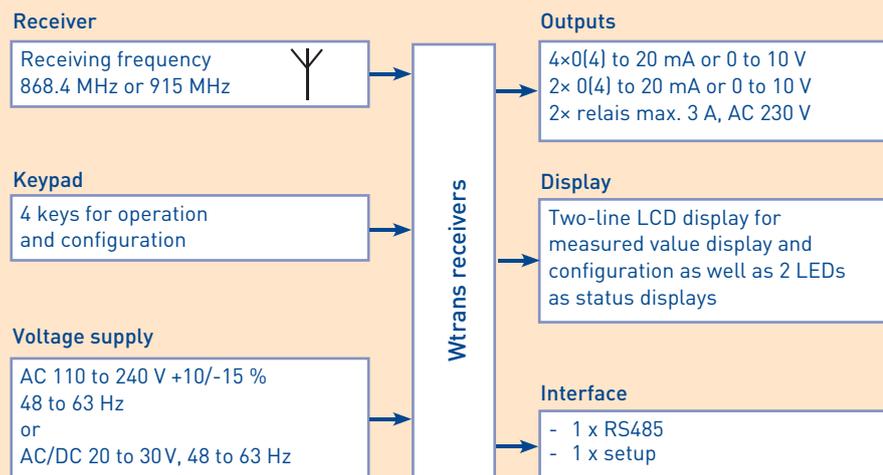
### Features

#### Wtrans T01

#### DIN-rail case, IP20

- For RTD temperature probes, thermocouples, potentiometers, and voltage
- Interface RS485 with Modbus protocol
- Wireless measured value reception
- No wiring work thanks to modern wireless technology
- For maximum 16 transmitters per receiver

### Block diagram receiver



### Approvals / approval marks

- IC (Industry Canada) for 915 MHz, 902931/10, 230 V
- FCC (Federal Communications Commission) for 915 MHz, 902931/10, 230 V
- c UL us (Underwriters Laboratories) 902931/10, 230 V



# Accessories

For installation or connection to the evaluation units various accessories – such as installation fittings for thermocouples and RTD temperature probes, cables for a professional connection, thermowells and ball valves with measuring points, and plug connectors for unproblematic replacement – are available.

Additional technical descriptions can be found at [www.jumo.net](http://www.jumo.net) by entering the data sheet number.



## Accessories



	Description	Installation 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
Application	Features	Ball valves, T-pieces, thermowells, adapter screw connections, installation accessories	For thermocouples and RTD temperature probes, thermometers can be replaced without emptying the system, thermowells are made out of various materials, operating pressure up to 320 bar	For thermocouples and RTD temperature probes, terminal heads made out of various materials, protection type max. IP65, sealable versions	According to DIN EN 60584-3 and DIN 43713, for two, three, and four-wire circuits, versions from -190 to +400 °C, sheath from PTFE, silicone, PVC, or glass fiber, steel or stainless steel braiding, for single and double elements



	Description	Measuring inserts for screw-in thermocouples and RTD temperature probes with form B terminal head	Thermocouples according to DIN 43732	Pipe screw connection and flange, counter pieces for bayonet connections	Plug connectors
	Type/data sheet	909735	909744	909750	909760
Application	Features	For temperatures from -200 to +1150 °C, as single and double measuring insert, available with transmitter	For temperatures up to +1600 °C, standardized thermoelectromotive 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 fitting lengths, simple mounting and uncomplicated replacement, pressure-resistant seal	For temperatures from -60 to +260 °C, easy replacement with permanently installed cable, quick connection of measuring devices for test purposes, locked for contact stability

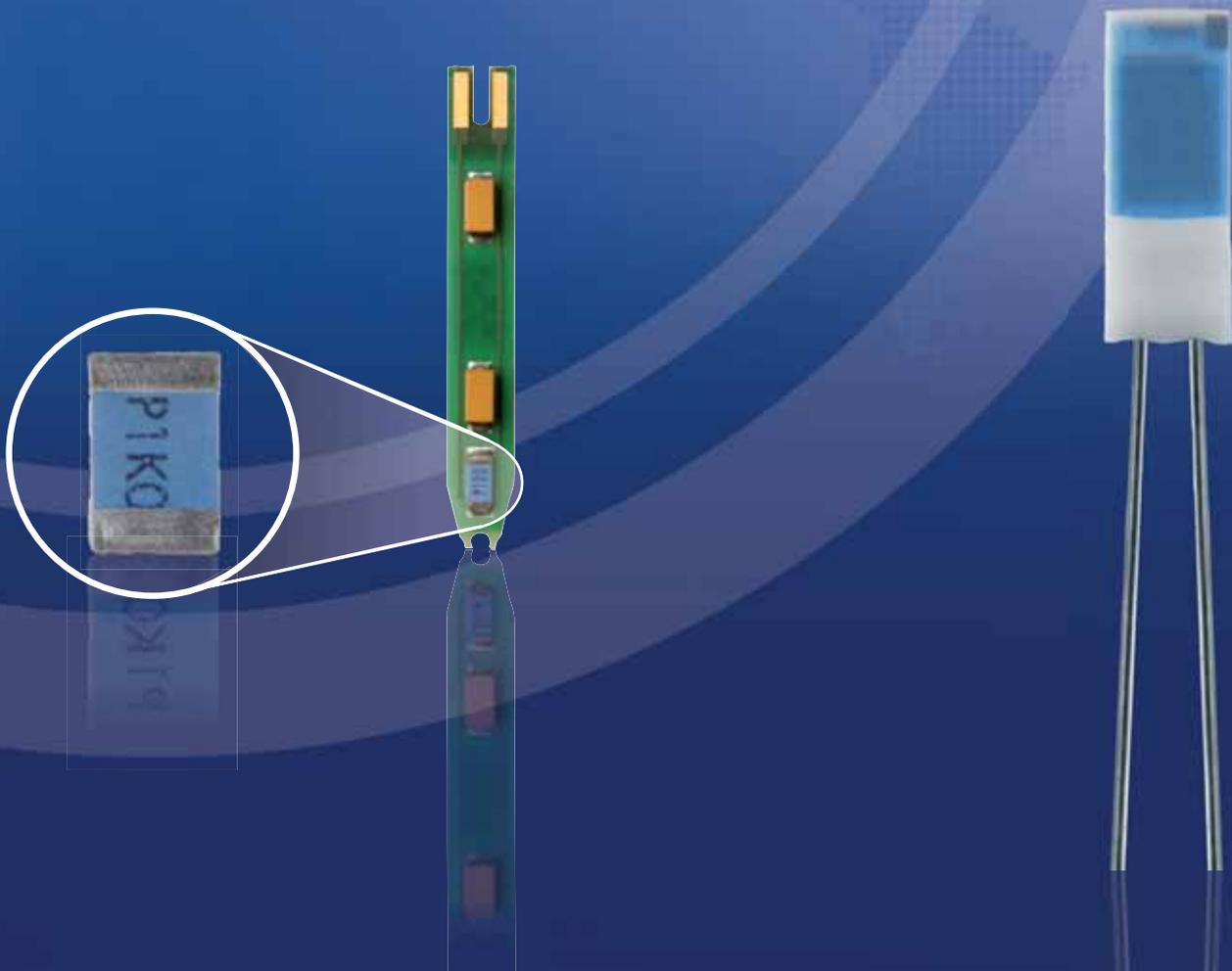


# Platinum temperature sensors in thin-layer technology

JUMO offers a multi-faceted program of platinum temperature sensors.

With an annual production of several million temperature sensors we are one of the world's most important suppliers.

We supply precision and long-term stability for the clean room. Tolerances from  $\pm 0.1$  K are produced in series. Modified methods for semiconductor production have been continuously adapted to Pt100 production since the 1980s. Cost-effective mass production, combined with the highest quality standards make the customer benefits complete.



## Platinum temperature sensors in thin-layer technology



Mechanical processes:  
welding, sawing



Photolithography: creating  
the structure on the substrate



Laser trimming of platinum-chip  
temperature sensors

### JUMO is committed to quality and fair market prices alike

Platinum temperature sensors in thin-layer technology promise excellent accuracy and long-term stability. To keep this promise, JUMO relies exclusively on Germany as the top production location. The tough requirements are met by highly-qualified employees and an efficient QM system. Our modern production plants are highly-automated and, together with their efficiency, perfect the price/performance ratio. Yet our system permits a high degree of flexibility so that we can meet special customer applications.

### Over 50 years of experience for our customers

The experience garnered from our own temperature sensor production goes straight into the development of new temperature sensors. JUMO offers expert support for the assembly of temperature sensors.

### Customer-specific modifications

The customers and their expectations of the application are paramount – especially so when it comes to OEM applications. Along with the mechanical and geometrical system solutions, special selections with a small tolerance class are in great demand.



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



Description	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	Broad range for every application of the suitable sensor				
	Areas of application	Measurement and control technology, heating/ventilation/air-conditioning, industrial electronics, automotive industry				
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
	Dimensions	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
Rated values	Pt100 Pt500 Pt1000	Pt100 Pt500 Pt1000 Pt2000	Pt100 Pt200 Pt1000	Pt100 Pt200 Pt500 Pt1000	Pt100 Pt500 Pt1000	



## Platinum temperature sensors in special designs



	Description	Design type PCSE	Design type PCKL	Design type PCS
	Type/data sheet	906122	906123	906125
Application	Features	Pre-finished measuring insert	Robust and moisture-resistant	Very good linear characteristic line progression and high long-term stability
	Areas of application	Measurement and control technology, heating/ventilation/air-conditioning, industrial electronics		
Technical data	Wires	-		-
	Terminal clamps	-	Tin-plated	-
	Contact surfaces	Gold-plated	-	
	Solder connections	-		Galvanic tin-plated all-around contact with diffusion barrier
	Operating temperature	-20 to +150 °C	-30 to +105 °C	-50 to +150 °C
	Processing	Soft soldering		Reflow soldering, wave soldering
	Dimensions	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
Rated values	Pt100 Pt500 Pt1000	Pt100 Pt1000	Pt100 Pt500 Pt1000	



# DAkkS

The (EC) regulation no. 765/2008 that came into force on 1 January, 2010 set out new provisions for accreditation procedures in Europe. Accreditations are now carried out by a single national accreditation body for each member state.

In the Federal Republic of Germany the monitoring obligations will pass to Deutsche Akkreditierungsstelle GmbH (DAkkS) pursuant to Section 13, para. 1 AkkStelleG.



JUMO		akkreditiert durch die / accredited by the	
		Deutsche Akkreditierungsstelle GmbH	
		als Kalibrierlaboratorium im / as calibration laboratory in the	
		Deutschen Kalibrierdienst DKD	
Kalibrierschein		Calibration mark	
Calibration certificate			
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 Unterzeichnerin 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.	
Typ Type	90.286-F30 /M	The user is obliged to have the subject re-calibrated at appropriate intervals.	
Fabrikat/Serien-Nr. Serial number	0523 0005	Anzahl der Seiten des Kalibrierscheines Number of pages of the certificate	
Auftraggeber Customer	JUMO GmbH & Co. KG	5	
Auftragsnummer Order No.	D-36019 Fulda 123456	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	Leiter des Kalibrierlaboratoriums Head of the calibration laboratory	Beauftragter Person in charge	
14.12.2010	Matthias Nau	Stefan Krummack	
Mail: <a href="mailto:DAK@Dakki.de">DAK@Dakki.de</a> & Co. KG Markt-Service-Office 1 D-36019 Fulda, Germany		Mailto: <a href="mailto:Stefan.Krummack@JUMO.net">Stefan.Krummack@JUMO.net</a>	Internet: <a href="http://www.jumo.net">www.jumo.net</a>

## DAkKS calibration service

Calibration object	Measuring range	Measurement uncertainty
<ul style="list-style-type: none"> <li>- RTD temperature probes</li> <li>- Direct display electronic thermometer (temperature measuring chain)</li> <li>- Datalogger</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 thermometer</li> </ul>	>300 to 1100 °C	1.5 K
<ul style="list-style-type: none"> <li>- RTD temperature probe with transmitter</li> <li>- Direct display electronic thermometer 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 calibrators and block calibrators</li> </ul>	40 to 133 °C >133 to 660 °C > 660 to 1100 °C	0.2 K 1.5 mK x (T) 2.5 K

Laboratory identification D-K-15129-01-00, [additional options through factory-calibration upon request]

### Accuracy is key

In almost all processes the need to increase output and quality while at the same time reducing process costs continually grows. This often goes hand in hand with reducing measurement uncertainties in the used measurement technology to record the process parameters. Furthermore, new standards are increasing requirements for documenting the processes and monitoring the measuring equipment.

The traceability of the measurement results according to national standards is therefore the key criterion for all calibrations. DAkKS-calibrated temperature probes and test equipment are generally recognized in Europe and in many non-European countries as the traceability tool that does not require further specifications.

### JUMO calibration laboratory

Temperature is one of the most important process variables. The JUMO calibration laboratory has been accredited for the temperature measurand since 1992. The latest DAkKS accreditation once again confirms the company's exper-

tise to DIN EN ISO/IEC 17025:2005 and grants the authority to calibrate RTD temperature probes, thermocouples, and block calibrators.

### On-site calibration service

Measurement technology in use cannot always be decommissioned for several days or even dismantled and sent in for calibration. The on-site calibration service is the ideal solution for exceptionally short downtimes. The JUMO on-site calibration service also takes account of the local installation conditions; the service engineer will repair and replace individual components if required. The returnable measurement results are created according to DIN EN 10204, in compliance with a certified quality management system to DIN EN ISO 9001:2000.

### Contact:

Email: kalibrierlabor@jumo.net



# 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





## 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 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)