

# TEMPERATURE SENSORS



## SENSING ELEMENTS—NTC

Analog Output



### Thermistor Chips

<b>Package</b>	Leadless chips, SMD 0402, 0603, 0805
<b>Type</b>	Gold or silver electrodes, surface mounted
<b>Resistance Range</b>	Chip: 100 to 1M $\Omega$ / SMD: 2K to 200K $\Omega$
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Wire bonding compatible</li> <li>• End band SMD</li> </ul>
<b>Accuracy</b>	$\pm 1\%$ to 10%
<b>Operating Temp.</b>	-40°C to 125°C
<b>Dimensions (mm)</b>	Chip: 0.34 - 1 square SMD 0402: 1 x 0.5 x 0.7 SMD 0603: 1.6 x 0.8 x 1 SMD 0805: 2 x 1.25 x 1.2
<b>Typical Applications</b>	Temperature compensation, communication (DWDM), infrared sensing systems, PCB mounting temperature measurement

### Radial Leaded Thermistors

<b>Package</b>	Radial, beads
<b>Type</b>	Epoxy or glass coated
<b>Resistance Range</b>	100 to 1M $\Omega$
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Interchangeable</li> <li>• Moisture resistant</li> <li>• Stability</li> </ul>
<b>Accuracy</b>	0.25% to 20%
<b>Operating Temp.</b>	-55°C to 280°C
<b>Dimensions (mm)</b>	0.4 to 4.9
<b>Typical Applications</b>	Temperature sensing for OEM, automotive, medical, HVACR

### Axial Leaded Thermistors

<b>Package</b>	DO-35
<b>Type</b>	Glass coated
<b>Resistance Range</b>	5K $\Omega$ to 100K $\Omega$
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Tight tolerance (<math>\pm 1\%</math>)</li> <li>• Max. stability using high density (HD) chip</li> <li>• Hermetically sealed</li> <li>• Tinned and nickel plated leads</li> </ul>
<b>Accuracy</b>	$\pm 1\%$ to $\pm 3\%$
<b>Operating Temp.</b>	-40°C to 300°C
<b>Dimensions (mm)</b>	2.0 x 4.0 body
<b>Typical Applications</b>	Refrigeration including cabinet sensing and evaporator coil, white goods, fire detection units, air-conditioning systems, PCB temp. sensing

### Space Qualified (Hi-Rel)

<b>Package</b>	Radial, bead, custom
<b>Type</b>	NTC, epoxy, glass, probes
<b>Resistance Range</b>	1K $\Omega$ to 100K $\Omega$
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• ESA and NASA approved</li> <li>• High reliability and accuracy</li> </ul>
<b>Accuracy</b>	0.5% to 10%
<b>Operating Temp.</b>	-55°C to 160°C
<b>Dimensions (mm)</b>	From 2.4
<b>Typical Applications</b>	Instrumentation and compensation for aerospace applications

## SENSING ELEMENTS—DIGITAL

Digital Output



### Temperature System Sensor (TSYS)

<b>Package</b>	QFN16, TDFN8
<b>Type</b>	I <sup>2</sup> C, SPI, PWM, SDM (Convertible to analog voltage)
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Low power</li> <li>• Small size</li> <li>• Calibrated and ready to use</li> <li>• 16-bit resolution</li> </ul>
<b>Accuracy</b>	Up to $\pm 0.1^\circ\text{C}$ at -5°C to 50°C
<b>Operating Temp.</b>	-40°C to 125°C
<b>Dimensions (mm)</b>	QFN16: 4 x 4 x 0.85 TDFN8: 2.5 x 2.5 x 0.75
<b>Typical Applications</b>	Industrial control, replacement of precision RTDs, thermistors and NTCs, heating and cooling systems, HVACR

## SENSING ELEMENTS—RTD

Analog Output



### Nickel RTD

<b>Package</b>	SOT 23 Bare die on request
<b>Type</b>	<ul style="list-style-type: none"> <li>Thin film nickel structure on silicon substrate, protected with a passivation layer</li> <li>SOT 23 package for SMT</li> <li>Bare die for COB assembly</li> </ul>
<b>Resistance Range</b>	1,000Ω
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>Harsh environment compatible</li> <li>Automotive qualified</li> <li>Very small dimensions</li> <li>Very short response time</li> <li>Good linearity</li> <li>High temperature coefficient</li> <li>Low power consumption</li> <li>Good thermal connection of sensing element through leadframe-pin</li> </ul>
<b>Accuracy</b>	Class B, according to former DIN 43760 standard
<b>Operating Temp.</b>	-55°C to 160°C
<b>Dimensions (mm)</b>	2.1 x 2.5 x 2.1 (SOT 23), 0.7 x 0.7 x 0.4 (Bare die)
<b>Typical Applications</b>	Automotive, industrial, OEM, thermal compensation, thermal management



### Platinum Thin Film Chips

<b>Package</b>	Leadless chips, SMD 1206
<b>Type</b>	<ul style="list-style-type: none"> <li>Thin film platinum deposited on ceramic substrate</li> <li>Contact pads on top and bottom side for NTC chip like assembly</li> <li>Contact pads on both ends for SMT</li> </ul>
<b>Resistance Range</b>	100Ω, 1,000Ω (Other values on request)
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>Long term stability</li> <li>Interchangeability</li> <li>Assembly like NTC chips</li> <li>Very small dimensions</li> <li>Short response time</li> </ul>
<b>Accuracy</b>	According to DIN EN 60751
<b>Operating Temp.</b>	-50°C to 400 °C
<b>Dimensions (mm)</b>	1.5 x 1.5 (Top/bottom pads), 1.2 x 3.6 (SMT)
<b>Typical Applications</b>	White goods, automotive, industrial, aerospace, medical, test and measurement



### Platinum Thin Film Sensors

<b>Package</b>	Wired component
<b>Type</b>	<ul style="list-style-type: none"> <li>Thin film platinum deposited on ceramic substrate, glass coated</li> <li>Tube outline available</li> <li>Connection via radial leads</li> </ul>
<b>Resistance Range</b>	100Ω, 1,000Ω (Other values on request)
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>Long term stability</li> <li>Interchangeability</li> <li>Small dimensions</li> <li>Short response time</li> <li>High electrical insulation</li> </ul>
<b>Accuracy</b>	Class T (F0.1), A (F0.15), B (F0.3) according to DIN EN 60751
<b>Operating Temp.</b>	-50°C to 600°C (Standard) down to -200°C or up to 1,000°C (On request)
<b>Dimensions (mm)</b>	2.0 x 2.3 x 1.1 (Standard) 1.2 x 4.0 x 1.1 (Standard) Other dimensions (On request)
<b>Typical Applications</b>	White goods, automotive, industrial, aerospace, medical, test and measurement



### Glass Wire Wound Sensors

<b>Package</b>	GO, GX
<b>Type</b>	Glass rod, radial leads
<b>Resistance Range</b>	100Ω (2X 100Ω on few versions)
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>Aggressive environments (Acid, oil, solvent)</li> <li>Small dimensions</li> <li>Stability</li> <li>No hysteresis</li> <li>Short response time</li> <li>Interchangeability</li> </ul>
<b>Accuracy</b>	Class W0.3, W0.15, W0.1 according to IEC60751
<b>Operating Temp.</b>	-200°C to 400°C
<b>Dimensions (mm)</b>	Ø1.8/length 5 mm to Ø4.5/length 48 mm
<b>Typical Applications</b>	Oil and chemical industry, aviation, aeronautic, food industry



### Ceramic Wire Wound Sensors

<b>Package</b>	CWW600, CWW850, CWW1000
<b>Type</b>	Ceramic rod, radial leads
<b>Resistance Range</b>	100Ω (2X 100Ω on few versions)
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>High temperature</li> <li>Stability</li> <li>No hysteresis</li> <li>Small dimension</li> <li>Interchangeability</li> </ul>
<b>Accuracy</b>	Class W0.3, W0.15, W0.1 according to IEC60751
<b>Operating Temp.</b>	-200°C to 600°C (CWW600) -200°C to 850°C (CWW850) -200°C to 1000°C (CWW1000)
<b>Dimensions (mm)</b>	Ø1.5/length 8 mm to Ø4.5/length 30 mm Ø2.7/length 45 mm (CWW1000)
<b>Typical Applications</b>	Process industry, laboratories, reference sensors

## SENSOR ASSEMBLIES



### Ring Sensors

<b>Package</b>	Ring for surface assembly Threaded bolt, tube style
<b>Type</b>	Epoxy potted element
<b>Sensor Range</b>	<ul style="list-style-type: none"> <li>• NTC</li> <li>• RTD: Pt, Ni</li> </ul>
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Surface mount sensing</li> <li>• For use where space is limited</li> <li>• Simple installation</li> </ul>
<b>Accuracy</b>	<ul style="list-style-type: none"> <li>• NTC: Custom tolerances available</li> <li>• Pt RTD: Class AA, A, B according to IEC60751</li> </ul>
<b>Operating Temp.</b>	Varies: -50°C to 250°C
<b>Dimensions (mm)</b>	Case specific dimensions
<b>Typical Applications</b>	Surface plates, heat exchangers, fluid pumping systems, generators



### Push-in Sensors

<b>Package</b>	Brass, copper or stainless steel closed-end tube
<b>Type</b>	Epoxy potted element, miniature design
<b>Sensor Range</b>	<ul style="list-style-type: none"> <li>• NTC</li> <li>• RTD: Pt, Ni</li> <li>• Thermocouple: Type J, K, T, E</li> </ul>
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Corrosion resistant</li> <li>• Available with mounting tabs or clips</li> </ul>
<b>Accuracy</b>	<ul style="list-style-type: none"> <li>• NTC: Custom tolerances available</li> <li>• Pt RTD: Class AA, A, B according to IEC60751</li> </ul>
<b>Operating Temp.</b>	Varies: -50°C to 250°C
<b>Dimensions (mm)</b>	Case specific dimensions
<b>Typical Applications</b>	Boiler, liquid, evaporator, HVACR, industrial processes control, district heating and cooling, automotive, bearing monitoring, motors, gear boxes



### Screw-in Sensors

<b>Package</b>	Brass, copper or stainless steel housing with integrated connector
<b>Type</b>	Epoxy potted element, rigid sheath
<b>Sensor Range</b>	<ul style="list-style-type: none"> <li>• NTC</li> <li>• RTD: Pt, Ni, Cu</li> <li>• Thermocouple: Type J, K, T, E</li> </ul>
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Corrosion resistant</li> <li>• Different thread types</li> <li>• Connectors available</li> </ul>
<b>Accuracy</b>	<ul style="list-style-type: none"> <li>• NTC: Custom tolerances available</li> <li>• Pt RTD: Class AA, A, B according to IEC60751</li> </ul>
<b>Operating Temp.</b>	Varies: -50°C to 250°C
<b>Dimensions (mm)</b>	Custom lengths, diameters and threads available
<b>Typical Applications</b>	Boiler, liquid, HVACR, industrial processes control, district heating and cooling, immersion



### Refrigeration Molded Probes

<b>Package</b>	PVC or TPE
<b>Type</b>	Overmolded
<b>Sensor Range</b>	<ul style="list-style-type: none"> <li>• NTC</li> <li>• RTD: Pt</li> </ul>
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Mounting clips available</li> </ul>
<b>Accuracy</b>	<ul style="list-style-type: none"> <li>• NTC: Custom tolerances available</li> <li>• Pt RTD: Class AA, A, B according to IEC60751</li> </ul>
<b>Operating Temp.</b>	-40°C to 125°C
<b>Dimensions (mm)</b>	8 x 30, 6.5 x 25, 6 x 50, 6 x 5 x 15
<b>Typical Applications</b>	HVACR, industrial processes control



### Pipe Mount Sensors

<b>Package</b>	Copper or stainless steel housing
<b>Type</b>	<ul style="list-style-type: none"> <li>• Overmolded</li> <li>• Epoxy potted</li> </ul>
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Fast response time</li> <li>• Moisture resistant construction</li> </ul>
<b>Accuracy</b>	<ul style="list-style-type: none"> <li>• NTC: custom tolerances available</li> </ul>
<b>Operating Temp.</b>	-40°C to 125°C
<b>Dimensions (mm)</b>	Custom configurations available
<b>Typical Applications</b>	Industrial process, boiler control, HVACR, refrigeration, food service, energy management, test equipment



### Outdoor Air Sensors

<b>Package</b>	Metal housing with PVC sun shield with or without weatherproof box
<b>Type</b>	<ul style="list-style-type: none"> <li>• Fast response time</li> </ul>
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Easy installation - threads into mounting hole or standard handy box</li> <li>• Fully potted housing protects sensing element and provides fast, accurate response</li> </ul>
<b>Accuracy</b>	±0.2°C at 0°C to 70°C
<b>Operating Temp.</b>	-40°C to 105°C
<b>Dimensions (mm)</b>	Ø12 X 64
<b>Typical Applications</b>	Residential and commercial building controls, energy management systems



### Pool and Spa Sensors

<b>Package</b>	Plastic or metal housing with o-ring seal designed for band clamp or backing nut
<b>Type</b>	<ul style="list-style-type: none"> <li>• Overmolded subassembly</li> </ul>
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• O-ring seals</li> <li>• Compatible with pool and spa chemicals</li> </ul>
<b>Accuracy</b>	±0.2°C
<b>Operating Temp.</b>	0°C to 90°C
<b>Dimensions (mm)</b>	6.4 x 50
<b>Typical Applications</b>	Pools, hot tubs



### Boiler Sensors

<b>Package</b>	Brass or SS housing
<b>Type</b>	<ul style="list-style-type: none"> <li>• Threaded housing</li> </ul>
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Integrated connector</li> <li>• Corrosion resistant</li> <li>• Different threads types and connectors available</li> </ul>
<b>Accuracy</b>	<ul style="list-style-type: none"> <li>• NTC: Custom tolerances available</li> <li>• Pt RTD: Class AA, A, B according to IEC60751</li> </ul>
<b>Operating Temp.</b>	Varies: -50°C to 250°C
<b>Dimensions (mm)</b>	Custom lengths, diameters and threads available
<b>Typical Applications</b>	Boiler control, liquid, industrial processes control, district heating and cooling, immersion

## SENSOR ASSEMBLIES



	Oven Sensors	Urea Temperature Sensors	Exhaust Gas Temperature Probes
<b>Package</b>	Stainless steel housing	Plastic housing with screw hole mountings	EGT thermocouple probe
<b>Type</b>	<ul style="list-style-type: none"> <li>Pt element encapsulated into ceramic tube, with rigid stainless steel housing</li> <li>High temperature cable</li> </ul>	<ul style="list-style-type: none"> <li>Overmolded plastic housing with integrated 2 pin connector</li> </ul>	<ul style="list-style-type: none"> <li>Mineral insulated alloy sheath, screwed mechanical interface, cable extension and automotive connector</li> <li>Option: CANbus interface (From 1 to 4 thermocouples, fully configurable)</li> </ul>
<b>Sensor Range</b>	Pt100, Pt500, Pt1000 sensor	NTC	Thermocouple: Type K, N
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>High temperature</li> <li>Easy integration/installation</li> <li>Higher dielectric strength according to type</li> </ul>	<ul style="list-style-type: none"> <li>Temperature measurement of urea liquid used in Selective Catalytic Reduction (SCR) systems</li> <li>Suitable for high pressure applications</li> </ul>	<ul style="list-style-type: none"> <li>High temperature, robust design</li> <li>Vibration and corrosion resistant</li> <li>Fast response time</li> </ul>
<b>Accuracy</b>	Class B, C according to IEC60751	<ul style="list-style-type: none"> <li>NTC: custom tolerances available</li> <li>±2%, 3% and 5%</li> <li>Beta 25/85: 3976</li> </ul>	Class 1 according to IEC584
<b>Operating Temp.</b>	-20°C to 750°C (According to version)	-40°C to 125°C	-40°C to 900°C
<b>Dimensions (mm)</b>	<ul style="list-style-type: none"> <li>OD Ø4 mm to Ø6 mm</li> <li>Immersion length 35 mm to 100 mm</li> <li>Custom mechanical interface and cable length</li> </ul>	Sensor tip 8 mm diameter	<ul style="list-style-type: none"> <li>OD Ø4 to OD Ø8</li> <li>Custom immersion length and cable length</li> </ul>
<b>Typical Applications</b>	Drying oven, domestic oven	Temperature measurement of urea liquid used in SCR systems	Automotive, truck, mining, power unit, racing



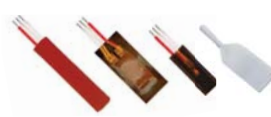
	Micro-Thermocouples	Patient Monitoring Probes	TLH Reference Probe	USB Temperature Probe
<b>Package</b>	Fine gage thermocouples	Sensor with cable and connector	TLH100/TLH600	Push-in probe with handle
<b>Type</b>	<ul style="list-style-type: none"> <li>Micro sized thermocouple: 44 AWG, 40 AWG, 38 AWG, 36 AWG</li> <li>Polymer encapsulated or bare junction</li> </ul>	<ul style="list-style-type: none"> <li>Reusable: Skin; 10FR and 12FR GP</li> <li>Disposable: Skin; 9FR and 12FR GP; 12FR, 18FR, 24FR Esoph/Stethoscope; 14FR, 16FR, 18FR Foley catheter</li> </ul>	<ul style="list-style-type: none"> <li>Rigid protective external stainless steel sheath and stainless steel handle, unique internal design to insure stability</li> </ul>	<ul style="list-style-type: none"> <li>Versatile push-in probe with stainless steel sheath and plastic or stainless steel handle</li> <li>High precision sensing element combined with integrated electronics for signal processing, calibration and USB interface</li> </ul>
<b>Sensor Range</b>	Thermocouple type: T, K	400 series, 700 series (Reusable only)	Pt100 sensor	Not applicable due to direct digital output
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>Welded or soldered junction</li> <li>Low profile, fast response</li> <li>Polyesterimide wire insulation</li> </ul>	<ul style="list-style-type: none"> <li>Autoclavable reusables</li> <li>Sterile disposables</li> </ul>	<ul style="list-style-type: none"> <li>Stability</li> <li>Provided with calibration report or option of calibration certificate by national committee for accreditation (COFRAC)</li> </ul>	<ul style="list-style-type: none"> <li>USB conformal interface</li> <li>Calibrated digital output, recalibration possible on request</li> <li>Robust design for general purpose applications</li> <li>Long term stability</li> </ul>
<b>Accuracy</b>	Varies by type: standard, special and custom limits of error available	±0.1°C at 25°C to 45°C ISO-80601-2-56: ±0.2°C at 35°C to 42°C	Class B (TLH600), A (LTH100) according to IEC60751	±0.1°C for temperature range -5°C to 55°C ±0.2°C for temperature range -40°C to 160°C (Other accuracies on request)
<b>Operating Temp.</b>	Varies by type: Rated up to 240°C	-40°C to 100°C, Patient: 0°C to 50°C	-80°C to 350°C (TLH100) -180°C to 600°C (TLH600)	-55°C to 160°C for probe tip -40°C to 85°C for handle with electronics (Other temperature ranges on request)
<b>Dimensions (mm)</b>	Varies by thermocouple gage	Reusable: 3 m cable with sensor Disposable: Sensor <1 m; 3 m reusable adaptor cable	OD Ø5 x 500 + handle Ø15 x 100 (Typical cable length = 2 m)	OD Ø6 x 200 + handle Ø19 x 100 (Typical cable length = 2,000)
<b>Typical Applications</b>	Medical, catheters	Patient monitoring, laboratory	Laboratory, temperature sensors calibration by comparison	Laboratory, mobile research, test and measurement

## SENSOR ASSEMBLIES



### Stator Sensors

<b>Package</b>	TPE/CPME G11 epoxy glass laminated, Class F or H
<b>Type</b>	<ul style="list-style-type: none"> <li>Rigid flat, slot sensor</li> <li>Cable or leadwire options</li> </ul>
<b>Sensor Range</b>	<ul style="list-style-type: none"> <li>RTD: Pt, Ni, Cu</li> <li>Thermocouple: Type J, K, T, E</li> </ul>
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>Extended sensitive length</li> <li>Single or dual elements</li> <li>Calibration available</li> </ul>
<b>Accuracy</b>	RTD: Class A, B according to IEC60751
<b>Operating Temp.</b>	Max. temperature: Class F, 155°C Max. temperature: Class H, 180°C Available up to 200°C
<b>Dimensions (mm)</b>	Custom dimensions available
<b>Typical Applications</b>	Monitor temperature between stator coils, electric motors, generators



### Surface Sensors

<b>Package</b>	Silicone rubber or polyimide laminated element SP683
<b>Type</b>	<ul style="list-style-type: none"> <li>Flat, flexible, rectangular sensor</li> <li>Variety of designs available</li> </ul>
<b>Sensor Range</b>	<ul style="list-style-type: none"> <li>RTD: Pt, Ni, Cu</li> <li>Thermocouple: Type J, K, T, E</li> </ul>
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>Surface sensing for curved or uneven surfaces</li> <li>Noninvasive, simple installation</li> <li>Adhesive backing option</li> </ul>
<b>Accuracy</b>	RTD: Class A, B according to IEC60751
<b>Operating Temp.</b>	Varies: -50°C to 200°C Available up to 220°C
<b>Dimensions (mm)</b>	Custom dimensions available
<b>Typical Applications</b>	Chemical and pharmaceutical industry, process industry, laboratory, aerospace, motor end windings of stator coils, generators



### Bearing Sensors

<b>Package</b>	Copper alloy tip Stainless steel, isolated stainless steel or epoxy glass case
<b>Type</b>	<ul style="list-style-type: none"> <li>Rigid sheath</li> <li>Tip sensitive</li> <li>Cable/leadwire options</li> </ul>
<b>Sensor Range</b>	<ul style="list-style-type: none"> <li>RTD: Pt, Ni, Cu</li> <li>Thermocouple: Type J, K, T, E</li> </ul>
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>Cut-to-length</li> <li>Copper tip for fast time response</li> <li>Assemblies with fluid seal and spring loading</li> <li>Single or dual elements</li> </ul>
<b>Accuracy</b>	RTD: Class A, B, C according to IEC60751
<b>Operating Temp.</b>	Sheath specific, up to 250°C
<b>Dimensions (mm)</b>	Custom lengths Standard sheath diameters: Ø4.78, Ø5.46, Ø6.35
<b>Typical Applications</b>	Bearing monitoring, electric motors, generators



### Thermocouple

<b>Package</b>	Screw-in or push-in design with cable extension, connector, or connecting head
<b>Type</b>	<ul style="list-style-type: none"> <li>Collapsible Mineral Insulated (MI) with alloy sheath (Radius <math>\geq 5 \times OD</math>)</li> <li>Flexible cable with plastic or composite insulation</li> <li>Rigid protection sheath: ceramic, quartz or alloy sheath</li> </ul>
<b>Sensor Range</b>	Type T, J, K, N, R, S, B (According to TC type and insulation type)
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>High temperature and high vibration level (For MI)</li> <li>Available in small diameters for fast respond time</li> <li>Grounded or ungrounded or apparent hot junction</li> <li>Single or multiple measuring points</li> </ul>
<b>Accuracy</b>	Class 1 according to IEC584
<b>Operating Temp.</b>	-40°C to 1,700°C (According to TC type and insulation type)
<b>Dimensions (mm)</b>	<ul style="list-style-type: none"> <li>OD Ø0.3 mm to Ø8 mm for MI</li> <li>Ø0.15 mm for smallest flexible cable</li> <li>Custom dimensions, fittings and cable lengths (From few centimeters to many meters)</li> </ul>
<b>Typical Applications</b>	Aeronautic, process industry, medical, semiconductor industry (spike, profile)



### Transmitter

<b>Package</b>	Brass, copper and stainless steel housing, flexible sheath with integrated connector.
<b>Type</b>	<ul style="list-style-type: none"> <li>Epoxy potted element</li> <li>Screw-in</li> </ul>
<b>Sensor Range</b>	4 - 20 mA output
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>Compact, welded design</li> <li>Highly sensitive and stable</li> <li>High vibration application</li> <li>Good waterproof properties</li> </ul>
<b>Accuracy</b>	0.5 or 1% FS
<b>Operating Temp.</b>	-20°C to 120°C
<b>Dimensions (mm)</b>	<ul style="list-style-type: none"> <li>Customer sheath length, thread type</li> <li>Probe diameter: Ø4.75 mm; Ø5 mm; Ø6 mm; Ø6.35 mm; Ø8 mm</li> </ul>
<b>Typical Applications</b>	Heavy industry, general industrial monitoring

## THERMOPILES



	<p><b>TS</b> TS318-3B0814, TS318-5C50, TS305-10C50</p>
<b>Package</b>	TO-18, TO-5
<b>Type</b>	Thermopile sensor components
<b>Temp. Range</b>	Depends on applied electronics and calibration, filter types optimal for object temperature range -40°C to 300°C (Extended range: -60°C to 1,000°C)
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• High signal output</li> <li>• Accurate reference sensors</li> </ul>
<b>Accuracy</b>	Depends on applied electronics and calibration
<b>Operating Temp.</b>	Ambient temperature range: -20°C to 85°C
<b>Dimensions (mm)</b>	Ø9.15 x 4.4 (Body)
<b>Typical Applications</b>	Medical thermometer (ear, forehead), pyrometer

	<p><b>TSD</b> Single Pixel Digital Output Series</p>
<b>Package</b>	TO-5
<b>Type</b>	Digital thermopile sensor component
<b>Temp. Range</b>	Object temperature range 0°C to 300°C (Other temperature ranges available upon request)
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Calibrated and ready to use, I<sup>2</sup>C interface</li> <li>• Direct assembly to PCB, no additional components needed</li> </ul>
<b>Accuracy</b>	Depends on temperature range, typical 1% full range
<b>Operating Temp.</b>	Ambient temperature range: -20°C to +85°C
<b>Dimensions (mm)</b>	Ø9.15 x 4.4 (Body)
<b>Typical Applications</b>	Contactless temperature measurement, e.g. on moving parts like heated rolls, laminators, people detection, body temperature, microwave oven, air conditioner

## THERMOPILES



**TSEV**  
Single Pixel Series

<b>Package</b>	OEM-module
<b>Type</b>	Single-pixel thermopile module
<b>Temp. Range</b>	Object temperature range 0°C to 300°C (Other temperature ranges available upon request)
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Calibrated, Interfaces: I<sup>2</sup>C, SPI</li> <li>• Different field of views:</li> <li>• 5° at 50%, 10° at 50%, 90° at 50%, others on request</li> </ul>
<b>Accuracy</b>	Depends on temperature range, typical 1% full scale, max. accuracy 0.1°C
<b>Operating Temp.</b>	Ambient temperature range: 0°C to 85°C
<b>Dimensions (mm)</b>	35 x 25 x 13 to 31
<b>Typical Applications</b>	Contactless temperature measurement, e.g. on moving parts or heated rolls, laminators, people detection, microwave oven, air conditioner



**TSEV**  
Multi Pixel Series

<b>Package</b>	OEM-module
<b>Type</b>	8-pixel-linear array thermopile module
<b>Temp. Range</b>	Object temperature range -20°C to 120°C
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Calibrated and ready to use</li> <li>• Digital output</li> <li>• Small field of view</li> </ul>
<b>Accuracy</b>	Depends on temperature range, typical 2% full scale
<b>Operating Temp.</b>	Ambient temperature range: -20°C to 85°C
<b>Dimensions (mm)</b>	25 x 35 x 15.2
<b>Typical Applications</b>	Contactless temperature measurement, e.g. on moving parts or heated rolls, laminators, people detection, microwave oven, air conditioner



**TPT**  
TPT300V

<b>Package</b>	IP65 stainless steel tube
<b>Type</b>	Thermopile system for industrial use
<b>Temp. Range</b>	Object temperature range 0°C to 300°C
<b>Unique Features</b>	<ul style="list-style-type: none"> <li>• Calibrated and ready to use</li> <li>• Digital or analog outputs</li> <li>• Small field of view</li> </ul>
<b>Accuracy</b>	Depends on temperature range, typical 1% full scale
<b>Operating Temp.</b>	Ambient temperature range: 0°C to 85°C
<b>Dimensions (mm)</b>	Ø18 x 111
<b>Typical Applications</b>	Contactless temperature measurement, e.g. on moving parts or heated rolls, control of assembly lines, paper fabrication, drying applications