TEMPERATURE SENSORS

we get to the point...
Gräff GmbH

Competence and Know How

With an experience potential of by now 50 years in development and production of industrial temperature measurement technology, we have developed into one of the leading manufacturers of temperature, measurement and control technology. Today, with more than 80 employees and a product portfolio of more than 5,000 different temperature sensors, we produce more than 20,000 sensor variation possibilities for the whole world at our location in Troisdorf near Bonn. With our professional competence, our know-how and our determination, we meet all conceivable temperature recording tasks from almost all branches of industry. On a daily basis we solve countless and highly-complex tasks from the sectors of temperature, measurement and control technology for the plastics, pharmaceutical, food, raw material refinement industry, metal processing, furnace construction, waste management, automobile industry, plant and machine engineering as well as the building, glass and textile industry.

Experience and Organisation

Established in 1946 by Heinrich Gräff, the grandfather of today's managing partner Marion Hupperich, as artisanal small business in Troisdorf near Bonn, the business developed continuously and between 1962 to 1964 laid the foundation for today's product portfolio with the production of temperature sensors. On currently more than 2500m² Gräff GmbH manufactures high-quality, precise and sustainably designed temperature measurement technology with state-of-the-art production facilities. Today, thanks to continuous market observation, our product portfolio covers temperature sensors, control technology, automation technology, actuators, electric heating technology, insulation technology, and melt pressure technology. As one of the first manufacturers on the European market, our melt pressure sensors were type tested according to current standards and certified by the TÜV Rheinland.

Quality and Reliability

All Gräff products are manufactured exclusively of high-quality materials from renowned raw material manufacturers. We can therefore proudly call our products “MADE IN GERMANY”. Thanks to selected, controlled raw materials manufactured in Germany we can produce high-precision and long-lasting products which have special properties. Special manufacturing methods ensure maximum accuracy with a functional safety far beyond our warranty of 36 months. All product properties are controlled, tested and documented internally during the individual production steps and before dispatch. Continuously trained qualified personnel, state-of-the-art production technology and the processing of exclusively high-quality raw materials offer you a plus in your value-added chain.
Resistance Thermometers

Platinum Resistance Thermometers

Platinum resistance thermometers have a high accuracy distributed across a broad temperature measurement range (from -200°C to +850°C). In their processing, pure platinum is contaminated on purpose to retain the properties of the pure metal and to make it more resistant against chemical pollution during the measurement process at the same time. In contrast to thermal elements it is not necessary to use special cables to be able to connect the sensor.

Measuring Principle

Resistance thermometers utilize the properties of an electrical conductor to change its electrical resistance with the temperature. The measuring principle of these sensors is to measure the resistance value of the platinum element. The most used type (Pt100) has a resistance value of 100 Ohm at 0°C and 138.4 Ohm at 100°C. Correspondingly, Pt25/Pt1000- sensors have a resistance value of 25 Ohm and 1000 Ohm at 0°C. Platinum resistance thermometers belong to the thermistors. In the case of a thermistor, the resistance increases with rising temperature.

Standardization and Tolerances

Gräff GmbH offers a series of platinum resistance thermometers, beginning with the tolerance class B (DIN EN 60751:2008):
These sensors have an accuracy of +/- 0.3°C at 0°C.
For more accurate measurements tolerance class A (+/- 0.15°C at 0°C) or 1/10 DIN class B sensors (+/- 0.03°C at 0°C).
Please note that these tolerance specifications refer only to the temperature sensor and possible errors in the complete measuring chain must be observed.
Equations for calculating the measuring resistance dependent on the temperature.
Polynomial 2° degree is defined for the temperature range from 0 to 850 °C
R(T) = R0 * ( 1 + A * T + B * T2 )
Polynomial 3rd degree is defined for the temperature range from -200 to 0 °C
R(T) = R0 * (1 + A * T + B * T2 + C * ( T - 100°C ) * T3 )
According to the standard DIN EN 60751 the following coefficients apply:
A = 3.9083 * 10-3 °C-1
B = -5.775 * 10-7 °C-2
C = -4.183 * 10-12 °C-4

Colour coding according to DIN EN 60751

<table>
<thead>
<tr>
<th>2-wire</th>
<th>3-wire</th>
<th>4-wire</th>
</tr>
</thead>
</table>

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Thermocouples

Fuctionality of Thermocouples

A thermocouple is a wire pair made of different materials which are connected at one end and part of a device which uses the thermo-electrical effect for temperature measurement. When heating up a metal, the electrons start wandering increasingly strong dependent on the temperature. This creates a certain tension which increases in relation to the temperature increase. When using two different metals, the electrons in each material move at different speeds. With the temperature measurement technology, only the difference tension of the two materials is measured and placed in relation to the temperature. This relationship is not precisely linear and needs to be calculated differently mathematically depending on the thermocouple. The reference junction is the connection point of the thermocouple which lies at a known (reference junction) temperature and is compared with the measuring temperature.

Thermoelectric Lead and Compensating Cable

Gräff GmbH generally produces all thermal elements from thermoelectric lead. Thermoelectric leads and compensating cables are used for the electrical connection between the open ends of a thermocouple and the reference junction in cases where the lines of the thermocouple are not directly connected with the reference junction. Thermoelectrical leads are produced with conductors which have the same nominal composition as the corresponding thermocouple. Compensating cables are produced from conductors which have a different nominal composition as the corresponding thermocouple.

Electrical Properties - Potential

Non-isolated / welded in:
A measuring point which is connected electrically with the outer sheath. This results in improved properties in the response time of the sensor.

Potential-free / insulated:
A measuring point which is arranged insulated from the outer sheath. Penetrating moisture leads to changes of the insulation resistance and therefore to falsification of the measuring result. Our sensors are therefore generally sealed hermetically by a sealant. The measuring insert itself is also sealed to avoid penetration of moisture into the probe tube. Measuring inserts can be exchanged safely as they form a closed unit.

Colour coding according to DIN EN 60584

<table>
<thead>
<tr>
<th>Thermoelectric Lead</th>
<th>Compensating Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fe-CuNi, Typ L (old DIN 43710)</td>
<td>Fe-CuNi, Typ J</td>
</tr>
<tr>
<td>NiCr-Ni, Typ K</td>
<td></td>
</tr>
</tbody>
</table>

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**OVERVIEW SENSORS**

## Thermocouple “0”

**General properties**
- Thermal elements according to DIN EN 60584
- Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
- Accuracy better than 1.5K
- Welded or potential-free
- Temperature range up to +1200°C
- Single- / or double elements
- High-quality thermo-electrical lead

### GF-7003 “Tool Sensors with pin”

- Material stainless steel or brass, or nickel-plated
- Version with pin ø 4.0 mm

### GF-7103 “Tool Sensors with pin”

- Mounting hole matching M4
- Version with or without anti-kink spring

## Resistance Thermometer “1”

### GF-7003/O “Surface-Screw-on Sensors”

- Material stainless steel or brass, nickel-plated
- Fast temperature recording

### GF-7103/O “Surface-Screw-on Sensors”

- Mounting hole matching M4
- Version with or without anti-kink spring

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OVERVIEW SENSORS

**Thermocouple “0”**

- General properties
  - Thermal elements according to DIN EN 60584
  - Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
  - Accuracy better than 1,5K
  - Welded or potential-free
  - Temperature range up to +1200°C
  - Single- / or double elements
  - High-quality thermo-electrical lead

**GF-7008 “Bayonet - Immersion Sensors”**

- Measuring sleeve from ø1,0 mm to ø6,0 mm
- Fast change through bayonet fitting

**GF-7108 “Bayonet - Immersion Sensors”**

- Bayonet fitting with outside pint
- Version with pressure spring

**GF-7010 “Immersion sleeves - Bayonet”**

- Closed immersion sleeve of stainless steel
- Fast change through bayonet fitting

**GF-7110 “Immersion sleeves - Bayonet”**

- Cable direction 90°
- Version with pressure spring

**Resistance Thermometer “1”**

- Resistance thermometer according to DIN EN 60751
- Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
- 2- / 3- / 4- wire circuit
- Vibration / shake-proof version
- Temperature range up to +600°C
- Single- / or multiple systems
- High-quality copper / or nickle leads
OVERVIEW SENSORS

Thermocouple “0”

General properties
- Thermal elements according to DIN EN 60584
- Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
- Accuracy better than 1,5K
- Welded or potential-free
- Temperature range up to +1200°C
- Single- / or double elements
- High-quality thermo-electrical lead

GF-7012 “Bayonet - Machine Sensor”
- Measuring sleeve from Ø4,76 mm up to Ø10,0 mm
- Measuring sleeve made of stainless steel or brass

Resistance Thermometer “1”

- Resistance thermometer according to DIN EN 60751
- Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
- 2- / 3- / 4- wire circuit
- Vibration / shake-proof version
- Temperature range up to +600°C
- Single- / or multiple systems
- High-quality copper / or nickle leads

GF-7112 “Bayonet - Machine Sensor”
- Fast change through bayonet fitting
- Pressure spring / anti-kink spring up to 10000 mm

GF-7018 “Bayonet-Angle immersion Sensor”

- Measuring sleeve from Ø1,0 mm up to Ø6,0 mm
- Sensor entirely of stainless steel

GF-7118 “Bayonet-Angle immersion Sensor”
- Fast change through bayonet fitting
- Cable outlet straight or angled 90°
OVERVIEW SENSORS

Thermocouple “0”

- General properties
  - Thermal elements according to DIN EN 60584
  - Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
  - Accuracy better than 1.5K
  - Welded or potential-free
  - Temperature range up to +1200°C
  - Single- / or double elements
  - High-quality thermo-electrical lead

- GF-7020/W “Angle-Screw-in Sensor”
  - Measuring sleeve from ∅4.0 mm up to ∅8.0 mm
  - Sensor entirely of stainless steel

- GF-7021 “Angle-Bayonet Sensor”
  - Measuring sleeve from ∅4.76 mm up to ∅10.0 mm
  - Sensor entirely of stainless steel

Resistance Thermometer “1”

- General properties
  - Resistance thermometer according to DIN EN 60751
  - Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
  - 2- / 3- / 4- wire circuit
  - Vibration / shake-proof version
  - Temperature range up to +600°C
  - Single- / or multiple systems
  - High-quality copper / or nickle leads

- GF-7120/W “Angle-Screw-in Sensor”
  - Fast change through screw fitting
  - Cable outlet angled 90°

- GF-7121 “Angle-Bayonet Sensor”
  - Fast change through bayonat fitting
  - Cable outlet angled 90°
## Overview Sensors

### Thermocouple “0”

- **General properties**
  - Thermal elements according to DIN EN 60584
  - Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
  - Accuracy better than 1.5K
  - Welded or potential-free
  - Temperature range up to +1200°C
  - Single- / or double elements
  - High-quality thermo-electrical lead

- **GF-7022 “Pipeline/Clip Sensor”**
  - Pipe clip from ø16 mm up to ø1000 mm
  - Sensor entirely of stainless steel

- **GF-7022/A “Pipeline/Clip Sensor”**
  - Pipe clip from ø16 mm up to ø1000 mm
  - Sensor entirely of stainless steel

### Resistance Thermometer “1”

- **General properties**
  - Resistance thermometer according to DIN EN 60751
  - Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
  - 2- / 3- / 4- wire circuit
  - Vibration / shake-proof version
  - Temperature range up to +600°C
  - Single- / or multiple systems
  - High-quality copper / or nickle leads

- **GF-7122 “Pipeline/Clip Sensor”**
  - Simple mounting by means of clip closure
  - Cable outlet “radial”

- **GF-7122/A “Pipeline/Clip Sensor”**
  - Simple mounting by means of clip closure
  - Cable outlet “axial”
OVERVIEW SENSORS

Thermocouple “0”

- General properties
  - Thermal elements according to DIN EN 60584
  - Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
  - Accuracy better than 1.5K
  - Welded or potential-free
  - Temperature range up to +1200°C
  - Single- / or double elements
  - High-quality thermo-electrical lead

GF-7023 “Installation - Angle Sensor”

- Sensor diameter from $\varnothing$3.0 mm up to $\varnothing$8.0 mm
- Sensor entirely of stainless steel

GF-7024 “Installation - Cable Sensor”

- Sensor diameter from $\varnothing$1.87 mm up to $\varnothing$10.0 mm
- Sensor entirely of stainless steel or brass

Resistance Thermometer “1”

- Resistance thermometer according to DIN EN 60751
- Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
- 2- / 3- / 4- wire circuit
- Vibration / shake-proof version
- Temperature range up to +600°C
- Single- / or multiple systems
- High-quality copper / or nickle leads

GF-7123 “Installation - Angle Sensor”

- Version with Angle head
- Cable outlet angled 90°

GF-7124 “Installation - Cable Sensor”

- Waterproof version possible
- Version for food possible

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**OVERVIEW SENSORS**

**GF-7026 “Angle Sensor-clamp connection”**
- Sensor diameter from ø4 mm up to ø10,0 mm
- Sensor entirely of stainless steel

**GF-7027 “Sensor with clamp connection”**
- Sensor diameter from ø1,0m up to ø6,0 mm
- Sensor entirely of stainless steel

**GF-7126 “Angle Sensor-clamp connection”**
- Version with clamp connection
- Cable output angled 90°

**GF-7127 “Sensor with clamp connection”**
- Version with screw connection
- Version with cable output

**General properties**
- Thermal elements according to DIN EN 60584
- Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
- Accuracy better than 1,5K
- Welded or potential-free
- Temperature range up to +1200°C
- Single- / or double elements
- High-quality thermo-electrical lead

**Resistance Thermometer “1”**
- Resistance thermometer according to DIN EN 60751
- Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
- 2- / 3- / 4- wire circuit
- Vibration / shake-proof version
- Temperature range up to +600°C
- Single- / or multiple systems
- High-quality copper / or nickle leads
OVERVIEW SENSORS

**Thermocouple “0”**

- General properties
  - Thermal elements according to DIN EN 60584
  - Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
  - Accuracy better than 1.5K
  - Welded or potential-free
  - Temperature range up to +1200°C
  - Single- / or double elements
  - High-quality thermo-electrical lead

- GF-7029 “Contact-Cylindrical Sensor”
  - Standardversion ∅16 x 5 mm, further versions possible
  - Sensor entirely of stainless steel

- GF-7030/MA “Magnetic Sensor”
  - Cable output straight
  - Magnetic sensor self-adhesive

**Resistance Thermometer “1”**

- General properties
  - Resistance thermometer according to DIN EN 60751
  - Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
  - 2- / 3- / 4- wire circuit
  - Vibration / shake-proof version
  - Temperature range up to +600°C
  - Single- / or multiple systems
  - High-quality copper / or nickle leads

- GF-7129 “Contact-Cylindrical Sensor”
  - Simple assembly by means of M6 screw
  - Cable output angled 5°

- GF-7130/MA “Magnetic Sensor”
  - Measung system spring stored
  - Version with kink protection spring
OVERVIEW SENSORS

Thermocouple “0”

- General properties
  - Thermal elements according to DIN EN 60584
  - Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
  - Accuracy better than 1.5K
  - Welded or potential-free
  - Temperature range up to +1200°C
  - Single- / or double elements
  - High-quality thermo-electrical lead

- GF-7030/MA/W “Magnetic-Angle Sensor”
  - Cable output angled 90°
  - Magnetic sensor self-adhesive

- GF-7031 “Contacting-Segment Sensor”
  - Standard version 22 x 30 mm
  - Sensor entirely made of brass nickel-plated

Resistance Thermometer “1”

- General properties
  - Resistance thermometer according to DIN EN 60751
  - Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
  - 2- / 3- / 4- wire circuit
  - Vibration / shake-proof version
  - Temperature range up to +600°C
  - Single- / or multiple systems
  - High-quality copper / or nickle leads

- GF-7130/MA/W “Magnetic-Angle Sensors”
  - Measuring system spring stored
  - Version with kink protection spring

- GF-7131 “Contacting-Segment Sensor”
  - Simple mounting, M4 screw, enclosed
  - Measuring surface brass polished blank
OVERVIEW SENSORS

Thermocouple “0”  

- General properties
  - Thermal elements according to DIN EN 60584
  - Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
  - Accuracy better than 1.5K
  - Welded or potential-free
  - Temperature range up to +1200°C
  - Single- / or double elements
  - High-quality thermo-electrical lead

- GF-7031/Q “Contacting-Rectangular Sensor”
  - Standardversion 8x8x15 mm
  - Sensor entirely of stainless steel

- GF-7031/F “Contacting-Surface Sensor”
  - Standardversion 30x15x0.3 mm
  - Sensor entirely of stainless steel and brass

Resistance Thermometer “1”

- General properties
  - Resistance thermometer according to DIN EN 60751
  - Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
  - 2- / 3- / 4- wire circuit
  - Vibration / shake-proof version
  - Temperature range up to +600°C
  - Single- / or multiple systems
  - High-quality copper / or nickle leads

- GF-7131/Q “Contacting-rectangular Sensor”
  - Simple mounting with M4 screw
  - Version with anti-kink spring

- GF-7131/F “Contacting-Surface Sensor”
  - Simple mounting below heating tape or sureface
  - Measuring area variably adaptable
**OVERVIEW SENSORS**

### Thermocouple “0”

- **General properties**
  - Thermal elements according to DIN EN 60584
  - Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
  - Accuracy better than 1.5K
  - Welded or potential-free
  - Temperature range up to +1200°C
  - Single- / or double elements
  - High-quality thermo-electrical lead

- **GF-7032 “Built-in Air Sensor perforated”**
  - Protective tube perforated
  - Sensor entirely of stainless steel

- **GF-7033/R “Room Sensor”**
  - Protective tube perforated
  - Measuring tube entirely of stainless steel

### Resistance Thermometer “1”

- **GF-7132 “Built-in Air Sensor perforated”**
  - Mounting by means of screw connection
  - Version with lead or connection head

- **GF-7133/R “Room Sensor”**
  - Simple wall mounting
  - Version with aluminium or plastic housing

- **GF-73 32 “Built-in Air Sensor perforated”**
  - Protective tube perforated
  - Sensor entirely of stainless steel

- **GF-73 33/R “Room Sensor”**
  - Simple wall mounting
  - Version with aluminium or plastic housing

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OVERVIEW SENSORS

Thermocouple “0”

- General properties
  - Thermal elements according to DIN EN 60584
  - Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
  - Accuracy better than 1,5K
  - Welded or potential-free
  - Temperature range up to +1200°C
  - Single- / or double elements
  - High-quality thermo-electrical lead

- **GF-7033/A “Dry room Sensor”**
  - Plastic housing 120 x 65 mm
  - Line connection by means of PG or M screw connection

- **GF-7038 “Built-in sensor with fixed thread”**
  - Sensor diameter from Ø2,0 mm up to Ø10,0 mm
  - Sensor entirely of stainless steel

Resistance Thermometer “1”

- Resistance thermometer according to DIN EN 60751
- Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
- 2- / 3- / 4- wire circuit
- Vibration / shake-proof version
- Temperature range up to +600°C
- Single- / or multiple systems
- High-quality copper / or nickle leads

- **GF-7133/A “Dry room Sensor”**
  - Simple wall mounting
  - Version can also be delivered with transducer

- **GF-7138 “Built-in sensor with fixed thread”**
  - Simple mounting DIN 910 fixed thread
  - Version with lead or connecting head(PK/KP)
OVERVIEW SENSORS

Thermocouple “0”

General properties
- Thermal elements according to DIN EN 60584
- Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
- Accuracy better than 1.5K
- Welded or potential-free
- Temperature range up to +1200°C
- Single- / or double elements
- High-quality thermo-electrical lead

GF-7038/GSA “Screw-in Sensor GSA”
- Standard diameter from ø1.87 mm up to ø8.0 mm
- Sensor entirely of stainless steel

GF-7138 “Screw-in Sensor GSA”
- Simple mounting via fixed thread
- Wire connector pluggable by means of “valve connector”

GF-7038/S “Screw-in Sensor DST-M12x1”
- Standard diameter from ø1.87 mm up to ø8.0 mm
- Sensor entirely of stainless steel

GF-7138/S “Screw-in Sensor DST-M12x1”
- Simple mounting via fixed thread
- Wire connector pluggable by means of “M12x1 plug”

Resistance Thermometer “1”

- Resistance thermometer according to DIN EN 60751
- Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
- 2- / 3- / 4- wire circuit
- Vibration / shake-proof version
- Temperature range up to +600°C
- Single- / or multiple systems
- High-quality copper / or nickle leads

GF-7038/S “Screw-in Sensor DST-M12x1”
- Standard diameter from ø1.87 mm up to ø8.0 mm
- Sensor entirely of stainless steel

GF-7138/S “Screw-in Sensor DST-M12x1”
- Simple mounting via fixed thread
- Wire connector pluggable by means of “M12x1 plug”
OVERVIEW SENSORS

Thermocouple “0”

- General properties
  - Thermal elements according to DIN EN 60584
  - Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
  - Accuracy better than 1,5K
  - Welded or potential-free
  - Temperature range up to +1200°C
  - Single- / or double elements
  - High-quality thermo-electrical lead

- GF-7039 “Acid / Lye Sensor”
  - Length of Installation up to 300 mm
  - Acid and lye resistant

- GF-7040 “Built-in Sensor-immersion sleeve”
  - Standard diameter from Ø 6.0 mm up to Ø 10.0 mm
  - Sensor entirely of stainless steel

Resistance Thermometer “1”

- General properties
  - Resistance thermometer according to DIN EN 60751
  - Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
  - 2- / 3- / 4- wire circuit
  - Vibration / shake-proof version
  - Temperature range up to +600°C
  - Single- / or multiple systems
  - High-quality copper / or nickle leads

- GF-7139 “Acid / Lye Sensor”
  - Simple mounting via fixed thread
  - Sensor entirely of PTFE

- GF-7140 “Built-in Sensor-immersion sleeve”
  - Version with closed immersion sleeve
  - Version with line or connection head

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**OVERVIEW SENSORS**

**GF-7042/G “Special - Injection moulding”**
- Special Sensor for Injection moulding
- Sensor entirely of stainless steel

**GF-7142/G “Special - Injection moulding”**
- Sensor with special oil-hardened
- Sensor with special coating

**GF-7042/W “Injection moulding-Angle”**
- Special Sensor for Injection moulding
- Sensor entirely of special stainless steel, coated

**GF-7142/W “Injection moulding-Angle”**
- Version as single or double system
- Cable outlet angled 90°

**General properties**
- Thermal elements according to DIN EN 60584
- Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
- Accuracy better than 1,5K
- Welded or potential-free
- Temperature range up to +1200°C
- Single- / or double elements
- High-quality thermo-electrical lead

**Resistance Thermometer “1”**
- Resistance thermometer according to DIN EN 60751
- Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
- 2- / 3- / 4- wire circuit
- Vibration / shake-proof version
- Temperature range up to +600°C
- Single- / or multiple systems
- High-quality copper / or nickle leads

**GF-7042/G “Special - Injection moulding”**

**GF-7142/G “Special - Injection moulding”**

**GF-7042/W “Injection moulding-Angle”**

**GF-7142/W “Injection moulding-Angle”**

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OVERVIEW SENSORS

Thermocouple “0”

General properties
- Thermal elements according to DIN EN 60584
- Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
- Accuracy better than 1.5K
- Welded or potential-free
- Temperature range up to +1200°C
- Single- / or double elements
- High-quality thermo-electrical lead

GF-7043 “Melt temperature Sensor”
- Different measuring tips
- Sensor entirely of stainless steel or special steel

GF-7044 “Drum Sensor”
- Variable drum diameter
- Sensor entirely of stainless steel and PTFE

Resistance Thermometer “1”

- Resistance thermometer according to DIN EN 60751
- Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
- 2- / 3- / 4- wire circuit
- Vibration / shake-proof version
- Temperature range up to +600°C
- Single- / or multiple systems
- High-quality copper / or nickle leads

GF-7143 “Melt temperature Sensor”
- Screw-in hexagonal loosely rotatable
- Version with lead and/or plug connection

GF-7144 “Drum Sensor”
- Simple mounting by way of mounting flange
- Recording of radiant heat, contactless
OVERVIEW SENSORS

Thermocouple “0”

General properties
- Thermal elements according to DIN EN 60584
- Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
- Accuracy better than 1.5K
- Welded or potential-free
- Temperature range up to +1200°C
- Single- / or double elements
- High-quality thermo-electrical lead

GF-7045 “Screw-in Sensor M8”
- Sensor diameter 6 mm
- Sensor entirely of stainless steel

GF-7048 “Food - Insertion Sensor”
- Sensor food / pharma suitable
- Variable sensor design

GF-7145 “Screw-in Sensor M8”
- Simple mounting with M8 screw
- Cable outlet straight or angled 90°

GF-7148 “Food - Insertion Sensor”
- Lead version PTFE or silicone
- Handle PTFE or stainless steel

Resistance Thermometer “1”

- Resistance thermometer according to DIN EN 60751
- Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
- 2- / 3- / 4- wire circuit
- Vibration / shake-proof version
- Temperature range up to +600°C
- Single- / or multiple systems
- High-quality copper / or nickle leads

GF-7045 “Screw-in Sensor M8”
- Sensor diameter 6 mm
- Sensor entirely of stainless steel

GF-7048 “Food - Insertion Sensor”
- Sensor food / pharma suitable
- Variable sensor design

GF-7145 “Screw-in Sensor M8”
- Simple mounting with M8 screw
- Cable outlet straight or angled 90°

GF-7148 “Food - Insertion Sensor”
- Lead version PTFE or silicone
- Handle PTFE or stainless steel
OVERVIEW SENSORS

Thermocouple “0”

- General properties
  - Thermal elements according to DIN EN 60584
  - Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
  - Accuracy better than 1,5K
  - Welded or potential-free
  - Temperature range up to +1200°C
  - Single- / or double elements
  - High-quality thermo-electrical lead

- GF-7050 “Sheath Sensor small”
  - Standard diameter from Ø0,5 mm up to Ø6,0 mm
  - Sensor entirely of stainless steel or Inconel

- GF-8000 “Screw-in Sensor with head”
  - Standard diameter from Ø2,0 mm up to Ø12,0 mm
  - Sensor protection tube of stainless steel

Resistance Thermometer “1”

- General properties
  - Resistance thermometer according to DIN EN 60751
  - Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
  - 2- / 3- / 4- wire circuit
  - Vibration / shake-proof version
  - Temperature range up to +600°C
  - Single- / or multiple systems
  - High-quality copper / or nickle leads

- GF-7150 “Sheath Sensor small”
  - Simple mounting by way of clamp connection
  - Version with cable or connection

- GF-8100 “Screw-in Sensor with head”
  - Version with different connection heads
  - Simple mounting by way of clamp / screw connection
OVERVIEW SENSORS

**Thermocouple “0”**

- General properties
  - Thermal elements according to DIN EN 60584
  - Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
  - Accuracy better than 1.5K
  - Welded or potential-free
  - Temperature range up to +1200°C
  - Single- / or double elements
  - High-quality thermo-electrical lead

- GF-8001 “Fast-response Sensor”
  - Sensor with mounting tube, fast response
  - Sensor protective tube of stainless steel

- GF-8002 “Immersion Sensor 15 mm”
  - Standard diameter ø15,0 mm
  - Protective tube of stainless steel or high temperature steel

**Resistance Thermometer “1”**

- General properties
  - Resistance thermometer according to DIN EN 60751
  - Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
  - 2-/ 3-/ 4- wire circuit
  - Vibration / shake-proof version
  - Temperature range up to +600°C
  - Single- / or multiple systems
  - High-quality copper / or nickle leads

- GF-8101 “fast-response Sensor”
  - Version with different connection heads
  - Simple mounting via clamp / screw connection

- GF-8102 “Immersion Sensor 15 mm”
  - Simple mounting via clamp / screw connection
  - Version with difference connection head
OVERVIEW SENSORS

Thermocouple “0”

- General properties
  - Thermal elements according to DIN EN 60584
  - Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
  - Accuracy better than 1.5K
  - Welded or potential-free
  - Temperature range up to +1200°C
  - Single- / or double elements
  - High-quality thermo-electrical lead

GF-8003 “Immersion Sensor 22 mm”

- Standard diameter Ø15,0 mm
- Protective tube of stainless steel or high temperature steel

GF-8005 “Angle-immersion Sensor”

- Standard diameter from Ø15,0 mm up to Ø22,0 mm
- Protective tube of stainless steel or higher temperature steel

Resistance Thermometer “1”

- Resistance thermometer according to DIN EN 60751
- Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
- 2- / 3- / 4- wire circuit
- Vibration / shake-proof version
- Temperature range up to +600°C
- Single- / or multiple systems
- High-quality copper / or nickle leads

GF-8103 “Immersion Sensor 22 mm”

- Simple mounting via screw connection or flange
- Version with difference connection head

GF-8105 “Angle-immersion Sensor”

- Version bent or with elbow gland
- Version with difference connection head
Thermocouple “0”

- Ceramic tube diameter ø10,0 mm
- Version with metal support tube (neck tube)

GF-8006 “Ceramic-immersion Sensor 10 mm”

- Simple mounting via screw or flange connection
- Installation length up to 1000 mm

GF-8007 “Ceramic-immersion Sensor 15 mm”

- Ceramic tube diameter ø15,0 mm
- Version with metal tube support tube (neck tube)

Resistance Thermometer “1”

- Resistance thermometer according to DIN EN 60751
- Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
- 2- / 3- / 4- wire circuit
- Vibration / shake-proof version
- Temperature range up to +600°C
- Single- / or multiple systems
- High-quality copper / or nickle leads

GF-8106 “Ceramic-immersion Sensor 10 mm”

- Simple mounting via screw or flange connection
- Installation length up to 1000 mm

GF-8107 “Ceramic-immersion Sensor 15 mm”

- Simple mounting via screw or flange connection
- Installation length up to 1000 mm
### Thermocouple “0”

**General properties**
- Thermal elements according to DIN EN 60584
- Fe-CuNi/L, Fe-CuNi/J, NiCr-Ni/K
- Accuracy better than 1,5K
- Welded or potential-free
- Temperature range up to +1200°C
- Single- / or double elements
- High-quality thermo-electrical lead

**GF-9000 “Exchangeable Measuring insert”**
- Standard diameter from Ø4,0 mm up to Ø6,5 mm
- Sensor entirely of stainless steel

**Accessories clamp connection**
- Thread version from M6 up to G2”
- Material stainless steel, brass or steel (+1200°C)

### Resistance Thermometer “1”

**General properties**
- Resistance thermometer according to DIN EN 60751
- Pt50 / Pt100 / Pt500 / Pt1000 / KTY / NTC / PTC
- 2- / 3- / 4- wire circuit
- Vibration / shake-proof version
- Temperature range up to +600°C
- Single- / or multiple systems
- High-quality copper / or nickle leads

**GF-9100 “Exchangeable Measuring insert”**
- Simple spring fixed, screw M4
- Pull-in Ceramic socket

**Accessories clamp connection**
- Cutting rings of steel, brass or teflon
- Suitable for all KLV-Sensor versions
Note