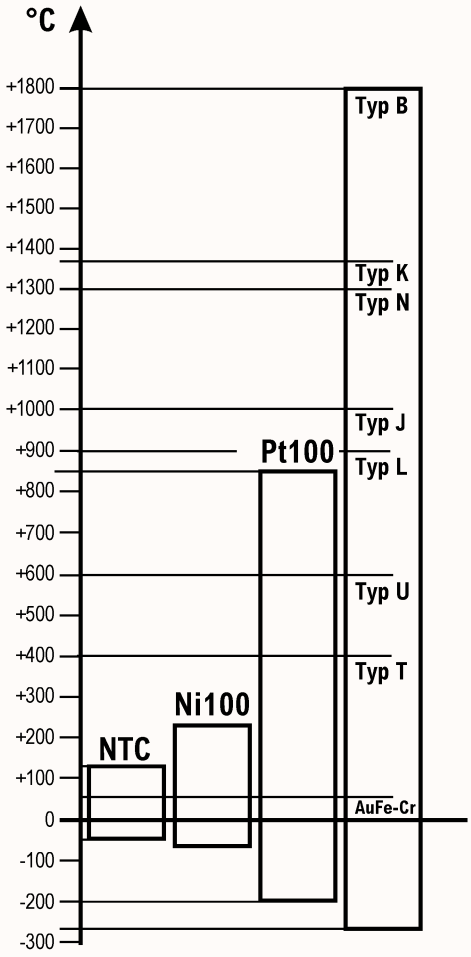
Content

Temperature

The Right Temperature Sensor For Any Measuring Task



Selecting the right type of temperature sensor depends on your measuring task. For example, thermocouples, resistor-based sensors (Pt100 and Ntc) and pyrometers (infrared sensors) are available.

Rule of Thumb:

- Thermocouples are very fast and provide a large measuring range.
- Resistor-based sensors are more accurate but slower.
- Ntc sensors are very fast, accurate, but they have a limited measuring range.
- Infrared sensors do not contact the device under test and they have very small time constants, but they depend on the emission grade.
- The larger the measuring range, the more universal the possible range of applications.

Selection Criteria:

Select the temperature sensor that suits your measuring task according to the criteria below:

- Meas. range
- Accuracy
- Response time
- Stability
- Type of construction

Thermocouples

Thermocouples consist of two spot-welded wires of different metals or alloys. The thermoelectric effect at the contact surface is used to measure temperatures. A relatively small thermoelectric voltage is caused, which depends on the temperature difference between the measuring point and the connecting terminals.

Accuracy, Operating Temperatures:

The basic values for the thermoelectric voltages and for the permissible tolerances of thermocouples are specified in standard DIN/IEC 584. Our thermocouple sensors are available in two tolerance classes as per DIN/IEC 584-2.

According to DIN/IEC 584-2, the thermocouple sensors are available in different accuracy classes.

Accuracy classes for the thermocouples type K or type N (extract)

class	range of validity	limiting deviation (in each case the greater value applies)
1 -	40 to 1000°C	±1.5 K or ±0.004 x | t | K
2 -	40 to 1200°C	±2.5 K or ±0.0075 x | t | K

The accuracy class is specified for every thermocouple sensor. The accuracy applies within the above specified range of validity. The operative range is specified for every sensor – depending on its construction. These values refer to the sensor tip. Additionally, the operative ranges of the connecting cable and the transition sleeve (or similar) have to be considered.

The sensor handles and cables are usually resistant to temperatures up to +80 °C. Heat-resistant cables are also available on request. Various types of thermocouples are available; these can be distinguished in terms of their temperature range, sensitivity, and in particular their compatibility with the test substance. The most popular thermocouple is the NiCr-Ni (type K)

Connecting cable with thermal line (stranded wire)
There is no adverse temperature effect at the juncture from measuring element to cable

With immediate effect, the sensor connecting cables for many sensor types will use a new thermal line (stranded wire, thermal line class 2) instead of the conventional compensation line. The transition from measuring element (sensor tip) to connecting cable (in the cable sleeve or in the handle) thus remains, even over a wide temperature span (up to 200 °C), unaffected by temperature error; the usual measuring errors caused by temperature differences at the juncture when using a conventional compensation line can thus with the new thermal line be avoided.

For just a few sensor types and extension cables a compensation line will continue to be used as previously. The compensation lines generally comply with Class 2 as per DIN 43722. For type K the operating temperature range of the compensation line is 0 to 150 °C.

Resistor-Based Sensors (Pt100 Sensors)

When measuring the temperature the increase in resistance at increasing temperatures is utilised at the Pt100 sensors. The measuring resistor is fed with a constant current and the voltage drop at the resistor is measured as a function of the temperature. Due to the small resistance variation (0.3 to 0.4Ω/°C) the 4-conductor circuit should always be used to exclude any influences from the lead wires.

Accuracy, operating temperatures:

According to DIN/IEC 751, measuring resistors are used for the Pt100 sensors. Several accuracy classes are defined for the Pt100 sensor.

Accuracy classes of the Pt100 sensors (extract)

class	range of validity		limiting deviation
	wire-wound resistors	film resistor	
B	-196 to +600 °C	-50 to +500 °C	±(0.3 + 0.005 | t |) K
A	-100 to +450 °C	-30 to +300 °C	±(0.15 + 0.002 | t |) K

The accuracy class is specified for every Pt100 sensor. Depending on the construction of the sensor, the higher accuracies class A and1/5 DIN class B are available on request. The accuracy applies within in the above specified range of validity. Regarding the accuracy 1/5 DIN class B, the range of validity is sensor specific.

Examples of Pt100 limiting deviations

temperature	limiting deviations		
	DIN class B	DIN class A	1/5 DIN class B*
0°C	±0.3 K	±0.15 K	±0.06 K
100°C	±0.8 K	±0.35 K	±0.16 K
200°C	±1.3 K	±0.55 K	±0.26 K
300°C	±1.8 K	±0.75 K	±0.36 K
	Higher accuracies available at extra cost	order no. OPG2**	order no. OPG5**

*range of validity is sensor specific

** On request, depending on the construction of the sensor

The operative range is specified for every sensor – depending on its construction. These values refer to the sensor tip. Additionally, the operative ranges of the connecting cable and the transition sleeve (or similar) have to be considered. The sensor handles and cables are usually resistant to temperatures up to +80 °C. Heat-resistant cables are available on request.

Measuring ranges, resolution:

PT100 probes FP Axxx are by default assigned measuring range PT100-1 (resolution 0.1 K). Measuring range PT100-2 (resolution 0.01K) can be programmed as alternative on the 1st channel or in addition on the 2nd channel.

Thermistors (NTC Sensors)

NTC sensors (thermistors) have a significantly higher resistance than Pt100 sensors. When measuring temperatures their negative temperature coefficient is utilised, i.e. the resistance is decreasing with increasing temperatures.

Accuracy, operating temperatures:

The accuracy of the sensor element is manufacturer-specific. The sensor element is installed in a sensor and provided with a connecting cable and an ALMEMO® plug. Processing, crossing points, terminal points and connecting cable influence the accuracy of the temperature sensor.

The following accuracy is specified for the NTC temperature sensor with a cable length of 2 meters:

Accuracy of the NTC sensors

Range of validity	limiting deviation
-20 to < 0 °C	±0.4 K
0 to 70 °C	±0.2 K
>70 to 100 °C	±0.6 K

The accuracy applies within in the above specified range of validity.

The operative range is specified for every sensor – depending on its construction. These values refer to the sensor tip. Additionally, the operative ranges of the connecting cable and the transition sleeve (or the like) have to be considered. The handle of the sensor and the cable are heat resistant up to 80 °C.

Types and Fields of Application

The construction variants of temperature sensors are as many and diverse as the measuring tasks.

T_{max} is the maximum operating temperature of the sensor tip.

T_{90} is the time required by the sensor to reach 90% of the step response after a jump in temperature . The specified T_{90} times refer to measuring operations in a moving liquid.

The temperature sensors listed are also available, on request, with other lengths and diameters

Surface sensors with flat measuring tip	For measurements on good heat conductors, on even and plain surfaces.
Surface sensor with spring-type thermocouple band	For quick measurements, also on non-plain surfaces.
Immersion probes	For measurements in liquids, as well as powdery substances, air and gases.
Sensors with heat-resistant measuring tip	For measurements at extremely high temperatures.
Sensor with penetrating tip	For measurements in plastic and pasty substances.
Sword probe	For measurements in paper, cardboard and textile stacks.
Transducer with free sensor	For measurements in air and gases

ALMEMO® temperature measurement

Every ALMEMO® sensor can be adjusted, i.e. correction values of the sensor can be stored in the connector.
Thus, the measuring accuracy can be significantly increased.
During DAkkS/DKD or factory calibrations performed by the Ahlborn Company, the correction values are recorded, stored in the sensor plug and locked. The adjustment can be realized in 2 points (zero, gradient) or in over 30 points as multi-point adjustment. Thanks to this procedure the slightest deviations are archived on the calibrated temperature points.
The multi-point adjustment is described in detail in chapter “Input connectors” and in chapter “Calibration certificates”.

Precise temperature measurement thanks to digital ALMEMO® sensors

new

Digital ALMEMO® sensors are used to measure temperatures with high precision. Any Pt100 and NTC sensor can become a digital sensor with the appropriate ALMEMO® measurement plug.
For Pt100 sensors, the digital ALMEMO® D7 measurement plug is used in combination with an ALMEMO® D7 measuring instrument. For NTC sensors, the digital ALMEMO® D6 measurement plug is used in combination with any current ALMEMO® measuring device.
The overall accuracy is determined only by the temperature sensor with the connected ALMEMO® measurement plug, independent from the ALMEMO® display device / data logger. The complete measuring chain, consisting of temperature sensor and the connected ALMEMO® measurement plug can be calibrated. An increased accuracy can be achieved by a multi-point adjustment of the sensor during the calibration process.

Temperature sensor Pt100 with digital ALMEMO® D7 measurement plug

High resolution 0.01 K within the complete measuring range up to 850°C.
Linearization of the Pt100 characteristic with accurate calculation method.
Increased accuracy for calibrated sensors thanks to multi-point adjustment of the Pt100 sensor.

The digital ALMEMO® D7 measurement plug works with an own, integrated A/D converter. The high resolution of 0.01 K can be achieved within the complete measuring range going up to 850°C. The linearization of the Pt100 characteristic is calculated accurately according to DIN IEC 751 (no approximation procedure).
To designate a sensor it is possible to program comments with up to 20 characters in the ALMEMO® D7 measurement plug
For technical data regarding the ALMEMO® D7 measurement plug Pt100 ZPD700FS, see chapter “Input connectors”.

Temperature sensor NTC with digital ALMENO® D6 measurement plug

High precision. High resolution 0.001K within the measuring range of -20 to +65°C.
Linearization of the NTC characteristic according to Galway Steinhart with accurate calculation method.
Increased accuracy thanks to multi-point adjustment of the NTC sensor during the calibration process.

The digital ALMEMO® D6 measurement plug works with an own, integrated A/D converter. The linearization of the NTC characteristic is calculated accurately with the Galway Steinhart coefficient (no approximation procedure). For the measuring range of -20 to +65°C, a high resolution of 0.001 K can be achieved. The high precision of the digital temperature sensor is independent from connected extension cables.
For technical data regarding the ALMEMO® D6 measurement plug, see chapter “Input connectors”.

! If you do not find a suitable sensor in this catalogue, we can manufacture it according to your specifications (technical drawing or detailed specification) and supply you with a customised sensor!

Sheathed sensors

- These reasonably priced sensors are for universal use (-200 to +1100 °C) and suitable for immersion measurements in liquids, air, and gases. The sheathed line, depending on diameter, can be bent - within certain limits.
- Different connection variants :
  With cable and ALMEMO® connector Order no. FxAxx,
  with cable and free ends, Order no. Fx0xx.
  Connector options :
  With THERM circular connector : Option T9020RS,
  with miniature Thermo flat connector : Option OT9020FS.

Thermocouple sheathed sensors FTAxx and FTANxx

Accuracy:	FTAxx; NiCr-Ni thermocouple, type K, DIN class 1* FTANxx; NiCrSi-NiSi thermocouple, type N, DIN class 1*
Sensor tip, sheathed line :	diameter, length, operating temperature; see table; material Inconel 2.4816 Here the sensor tip and sheathed line are of the same diameter. These types are therefore also suitable for mounting with clamped screw connections.
Cable sleeve :	Brass, hexagonal, L = 65 mm, circumdiameter = 9 mm, operating temp. –40 to +160 °C
Standard cable :	1.5 meter FEP / silicone thermal line (stranded wire)* Operating temp. -50 to +200°C There is no adverse temperature effect at the juncture from measuring element to cable.
Cable options :	Compensation line, PVC / PVC, insulated, operating temperature –20 to +105 °C The compensation line is also available, on request, with FEP / FEP, insulated.
ALMEMO® connector	FTAxx NiCr-Ni ZA9020FS with resolution 0.1 K FTANxx NiCrSi-NiSi ZA9021FSN with resolution 0.1 K

Pt100 sheathed sensors FPAxx

Accuracy :	Pt100 film resistor, DIN class B*
Options :	DIN class A, 1/5 DIN class B Pt100 wire wound measuring resistor
Sensor tip :	diameter, length, operating temperature; see table; material stainless steel
Sheathed line :	diameter, length; see table; material stainless steel On certain types the sensor tip and sheathed line are of different diameter; (i.e. the sensor tip is thicker). These types are therefore not suitable for mounting with clamped screw connections. Types suitable for clamped screw connections are available on request.
Cable sleeve :	Brass, hexagonal, L = 65 mm, circumdiameter = 9 mm, operating temp. –40 to +160 °C
Standard cable :	1.5 meters line, FEP / silicone, insulated, operating temperature –50 to +200 °C
Cable options :	Line, PVC / PVC, insulated, operating temperature –20 to +105 °C The line is also available, on request, with FEP / FEP, insulated.
ALMEMO® connector	Pt100, ZA9030FS1, with resolution 0.1 K Option : Pt100 ZA9030FS2 with resolution 0.01 K (standard with 1/5 DIN class B)

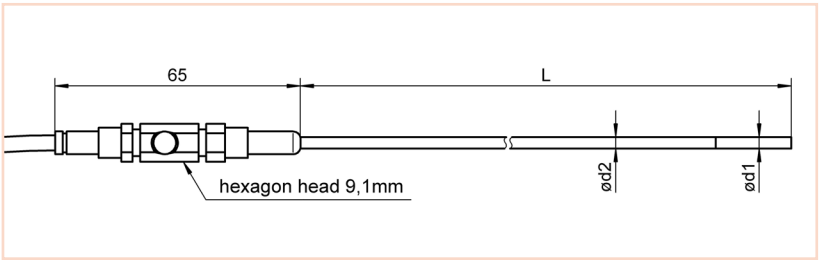
NTC sheathed sensors FNAxx

Accuracy :	NTC type N (see 07.04)
Sensor tip :	diameter, length, operating temperature; see table; material stainless steel
Sheathed line :	diameter, length; see table; material stainless steel On certain types the sensor tip and sheathed line are of different diameter; (i.e. the sensor tip is thicker). These types are therefore not suitable for mounting with clamped screw connections. Types suitable for clamped screw connections are available on request.
Cable sleeve :	Brass, hexagonal, L = 65 mm, circumdiameter = 9 mm, operating temp. –40 to +160 °C
Standard cable :	1.5 meters line, PVC / PVC, insulated, operating temperature –20 to +105 °C
Cable options :	Line, FEP / silicone, insulated, operating temperature –50 to +200 °C The line is also available, on request, with FEP / FEP, insulated.
ALMEMO® connector	NTC, ZA9040FS, with resolution 0.01 K.

* Range of validity see page 07.03
** No temperature influence at the transition from the measuring element to the cable (see page 07.03)

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

Sheathed sensors



Sensor with :
Sensor tip, dimensions d1,
sheathed line, dimensions d2,
overall length (including sensor tip) L,
Cable sleeve, dimensions length = 65 mm,
circumdiameter = 9 mm, Cable

Thermocouple sheathed sensors NiCr-Ni, type K

Typical Application: universal, in range -40 ° C to 900 ° C

Diameter d1=d2	Operating temperature Sensor tip	Length L	Order no
0.5 mm	-200...900°C	50 mm	FTA05L0050
0.5 mm	-200...900°C	100 mm	FTA05L0100
0.5 mm	-200...900°C	250 mm	FTA05L0250
0.5 mm	-200...900°C	500 mm	FTA05L0500
0.5 mm	-200...900°C	1000 mm	FTA05L1000
1.5 mm	-200...1100°C	100 mm	FTA15L0100
1.5 mm	-200...1100°C	250 mm	FTA15L0250
1.5 mm	-200...1100°C	500 mm	FTA15L0500
1.5 mm	-200...1100°C	1000 mm	FTA15L1000
3.0 mm	-200...1100°C	100 mm	FTA30L0100
3.0 mm	-200...1100°C	250 mm	FTA30L0250
3.0 mm	-200...1100°C	500 mm	FTA30L0500
3.0 mm	-200...1100°C	1000 mm	FTA30L1000

Connection cable	Operative range	Length	Order no
FEP/silicone Thermal line (stranded wire)	-50...200°C	1.5 m	default
		5 m	OTK01L0050
PVC/PVC Compensation line	-20...105°C	1.5 m	OTK02L0015
		5 m	OTK02L0050

Thermocouple sheathed sensors NiCrSi-NiSi, type N

Typical application: in the range -200 ° C to 1150 ° C, long-term stability at high temperatures

Diameter d1=d2	Operating temperature Sensor tip	Length L	Order no
1.5 mm	-200...1150°C	500 mm	FTAN15L0500
1.5 mm	-200...1150°C	750 mm	FTAN15L0750
1.5 mm	-200...1150°C	1000 mm	FTAN15L1000
3.0 mm	-200...1150°C	500 mm	FTAN30L0500
3.0 mm	-200...1150°C	750 mm	FTAN30L0750
3.0 mm	-200...1150°C	1000 mm	FTAN30L1000
6.0 mm	-200...1150°C	500 mm	FTAN60L0500
6.0 mm	-200...1150°C	750 mm	FTAN60L0750
6.0 mm	-200...1150°C	1000 mm	FTAN60L1000

Connection cable	Operative range	Length	Order no
FEP/silicone Thermal line (stranded wire)	-50...200°C	1.5 m	default
		5 m	OTNK01L0050

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

Resistor-based sensors Pt100 4L

Typical Application: universal, in range -40°C to 500°C

Diameter d1 Sensor tip	Diameter d2, Sheathed line	Operating temp. Sensor tip	Length L	Order no.
1.5 mm	1.5 mm**	-40...500°C	100 mm	FPA15L0100
1.5 mm	1.5 mm**	-40...500°C	250 mm	FPA15L0250
1.5 mm	1.5 mm**	-40...500°C	500 mm	FPA15L0500
2.2 mm*	2.0 mm	-40...500°C	100 mm	FPA22L0100
2.2 mm*	2.0 mm	-40...500°C	250 mm	FPA22L0250
2.2 mm*	2.0 mm	-40...500°C	500 mm	FPA22L0500
3.2 mm*	2.8 mm	-40...500°C	100 mm	FPA32L0100
3.2 mm*	2.8 mm	-40...500°C	250 mm	FPA32L0250
3.2 mm*	2.8 mm	-40...500°C	500 mm	FPA32L0500

* This sensor type (reinforced tip) is not suitable for clamped screw connections.
Suitable types FPA20Lx or FPA30Lx with same end-to-end diameter are available on request.
** Too strong bending of / kinking of the sheathed line should be avoided.

Options	Order no.
Accuracy class B	default
Accuracy class A	OPG2
Accuracy class 1/5 DIN Class B	OPG5
Wire-wound measuring resistor operating range -200 ... 600 ° C	OPM1

Connection cable	Operative range	Length	Order no.
FEP/silicone	-50...200°C	1.5 m	default
		5 m	OPK01L0050
PVC/PVC	-20...105°C	1.5 m	OPK02L0015
		5 m	OPK02L0050

Resistor-based sensors NTC

Typical Application: universal, in range 0°C to typ. 70°C

Diameter d1 Sensor tip	Diameter d2, Sheathed line	Operating temp. Sensor tip	Length L	Order no.
2.0 mm	2.0 mm	-20...100°C	100 mm	FNA20L0100
2.0 mm	2.0 mm	-20...100°C	250 mm	FNA20L0250
2.0 mm	2.0 mm	-20...100°C	500 mm	FNA20L0500
3.2 mm*	2.8 mm	-20...100°C	100 mm	FNA32L0100
3.2 mm*	2.8 mm	-20...100°C	250 mm	FNA32L0250
3.2 mm*	2.8 mm	-20...100°C	500 mm	FNA32L0500

* This sensor type (reinforced tip) is not suitable for clamped screw connections.
Suitable types with same end-to-end diameter are available on request.

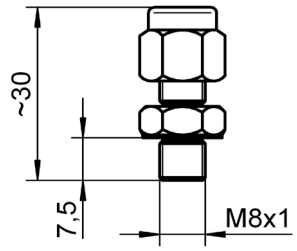
Connection cable	Operative range	Length	Order no.
PVC/PVC	-20...105°C	1.5 m	default
		5 m	OPK02L0050

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

Handle for sensors with hexagonal cable sleeve

Option Handle including fitting **Order no. OFH1**

Clamp srew connection ZT943xKV



Operative range
For sheath elements

Option:
Notched steel ring
(once fitted, cannot be removed),
T_{max} = 800 °C
For ZT9431KV
Order no. OT9431ST
For ZT9432KV
Order no. OT9432ST

Variants (with PTFE clamping ring)	**Order no.**
for types FTA15Lxxxx, FPA16Lxxxx	**ZT9431KV**
for types FTA30Lxxxx, FPA30Lxxxx and FNA30Lxxxx	**ZT9432KV**

Technical data

Operating temperature	up to maximum 250 °C with option up to 800 °C
Thread	M8x1, 14 AF

Heat-conducting paste ZB9000WP

For surface measurement, operative range -30 to +200 °C, heat-conducting paste, tube, 12 ml **Order no. ZB9000WP**

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

NiCr-Ni-sensor FTA 15 P

For immersion measurement

Accuracy:	NiCr-Ni class 1*
Measuring tip:	Operative range -200...+1100 °C 200x1.5 mm, sheathed line, Inconel
T_{90}: *	1.5 s
Cable:	approx. 1.4 m FEP/silicone with spray-coated ALMEMO® connector

L = 200 mm **Order no. FTA15P**
Sensor with handle **Order no. FTA15PH**
(No variants available)

Pt100-sensor FPA 32 P

For immersion measurement

Accuracy:	Pt100 film resistor, class B*
Measuring tip:	Operative range -40...+500 °C 200 x 2.8/3.2 mm, sheathed line
T_{90}: *	10 s
Cable:	approx. 1.4 m PVC with spray-coated ALMEMO® connector

L = 200 mm **Order no. FPA32P**
Sensor with handle **Order no. FPA32PH**
(No variants available)

NTC-sensor FNA 305

For Indoor air measurements

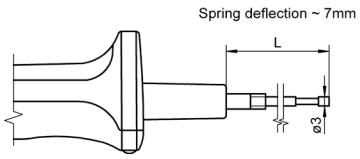
Accuracy:	NTC, see page 07.04
Measuring tip	Operative range -10 to +60 °C (non-condensing) Protective tube in stainless steel Diameter = 3.0mm, length = 50 mm mounted directly on ALMEMO® connector
T_{90}	8 s

L = 50 mm **Order no. FNA305**
(No variants available)

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

NiCr-Ni sensor with handle FTA 120x

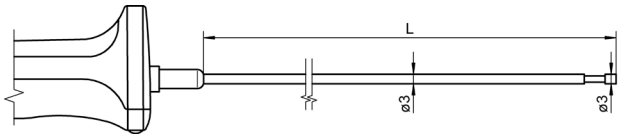


For surface measurement and immersion measurement

Accuracy:	NiCr-Ni class 1*
Measuring tip:	Operative range -200...+400 °C Silver rivet, level, spring-loaded, not electrically isolated
T_{90}: *	3 s
Handle: *	138 mm
Cable:	1.5 m PVC

L = 30 mm	**Order no. FTA1201**
L = 150 mm	**Order no. FTA1202**

NiCr-Ni sensor with handle FTA 122 LxxxxH

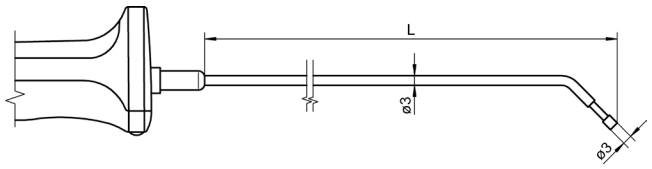


For surface measurement and immersion measurement

Accuracy:	NiCr-Ni class 1*
Measuring tip:	Operative range -200...+400 °C Silver rivet, level, not electr. isolated
T_{90}: *	3 s
Handle: *	127 mm
Cable:	1.5 m FEP/silicone thermal line**

L = 50 mm	**Order no. FTA122L0050H**
L = 100 mm	**Order no. FTA122L0100H**
L = 200 mm	**Order no. FTA122L0200H**

NiCr-Ni sensor with handle FTA 121 LxxxxH

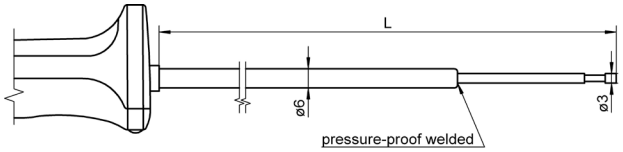


For surface measurement and immersion measurement

Accuracy:	NiCr-Ni class 1*
Measuring tip:	Operative range -200...+400 °C Silver rivet, level, angled, not electrically isolated
T_{90}: *	3 s
Handle: *	127 mm
Cable:	1.5 m FEP/silicone thermal line**

L = approx. 50 mm	**Order no. FTA121L0050H**
L = approx. 200 mm	**Order no. FTA121L0200H**

NiCr-Ni sensor with handle FTA 150 LxxxxH



For surface measurement and immersion measurement

Accuracy:	NiCr-Ni class 1*
Measuring tip:	Operative range -200...+800 °C Stainless-steel rivet, level, electrically isolated
T_{90}: *	3 s
Handle: *	127 mm
Cable:	1.5 m FEP/silicone thermal line**

L = 350 mm	**Order no. FTA150L0350H**
L = 700 mm	**Order no. FTA150L0700H**
L = 1250 mm	**Order no. FTA150L1250H**

* Range of validity see page 07.03
** There is no adverse temperature effect at the juncture from measuring element to cable. see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

NiCr-Ni sensor FTA 109 P

For surface measurement

Accuracy:	NiCr-Ni class 2*
Measuring tip:	Operative range -50...+500 °C Thermal ribbon, not electr. isolated
Measuring head	approx. 15 mm diameter
T_{90}: *	1 s
Cable:	approx. 1.5 m PVC

L = approx. 180 mm **Order no. FTA109P**
Sensor with handle **Order no. FTA109PH**
(No variants available)

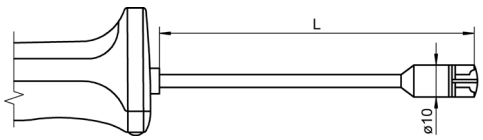
NiCr-Ni sensor FTA 104 P

For surface measurement

Accuracy:	NiCr-Ni class 2*
Measuring tip:	Operative range -50...+500 °C Thermal ribbon, not electr. isolated
Measuring head	approx. 15 mm diameter
T_{90}: *	1 s
Cable:	approx. 1.5 m PVC

L = approx. 180 mm,
with 90° angle, approx. 50 mm **Order no. FTA104P**
Sensor with handle **Order no. FTA104PH**
(No variants available)

NiCr-Ni sensor with handle FTA 153 LxxxxH

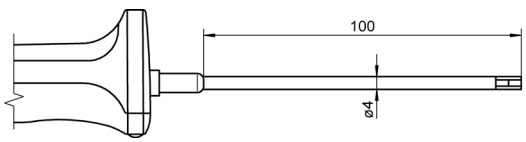


For surface measurement

Accuracy:	NiCr-Ni class 2*
Measuring tip:	Operative range -200...+250 °C Thermal ribbon, crossed, not electrically isolated
T_{90}: *	1.5 s
Handle: *	127 mm
Cable:	1.5 m PVC

L = 100 mm **Order no. FTA153L0100H**
L = appr. 180 mm angled 45°, 160/50mm
Order no. FTA1533L0180H

NiCr-Ni sensor with handle FTA 1535 LxxxxH



For surface measurement

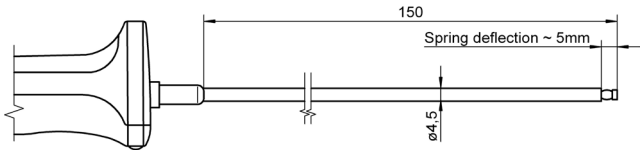
Accuracy:	NiCr-Ni class 2*
Measuring tip:	Operative range -200...+250 °C Thermal ribbon, not electr. isolated
T_{90}: *	2 s
Handle: *	127 mm
Cable:	1.5 m PVC

L = 100 mm **Order no. FTA1535L0100H**

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

NiCr-Ni sensor with handle FTA 420 LxxxxH

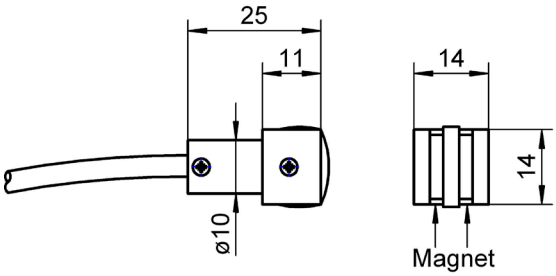


For surface measurement on level surfaces

Accuracy:	NiCr-Ni class 1*
Measuring tip:	Operative range -50...+500 °C Silver disc, spring-loaded, not electrically isolated
T_{90}: *	2 s
Handle: *	127 mm
Cable:	1.5 m PVC

L = 150 mm **Order no. FTA420L0150H**

NiCr-Ni sensor FTA 025 P



Magnet sensor for surface measurement

Accuracy:	NiCr-Ni class 2*
Measuring tip:	Operative range -50...+300 °C Thermal ribbon, not electr. isolated Fastened by magnet
T_{90}: *	1.5 s
Cable:	approx. 2 m PVC

Magnet sensor
(No variants available) **Order no. FTA025P**

Magnet sensor with Velcro fastener e.g. for pipework

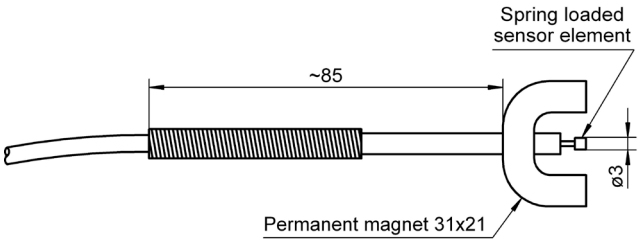
Klettband:	approx. 400 mm, for pipe diameter appr. 10 to 75 mm
Operating range:	-10 ... +110 °C mounted on sensor tip

Magnet sensor, including Velcro fastener
Order no. FTA025PKB

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

NiCr-Ni sensor FTA 131

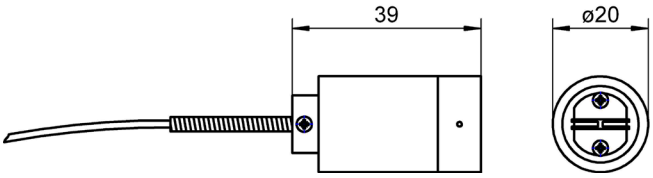


Magnet sensor For surface measurement

Accuracy:	NiCr-Ni class 2*
Measuring tip:	Operative range -50...+100 °C Silver rivet, level, spring-loaded, not electrically isolated Fastened by magnet
T_{90}: *	3 s
Cable:	3 m FEP/silicone

Magnet sensor **Order no. FTA131**

NiCr-Ni sensor FTA 026 P

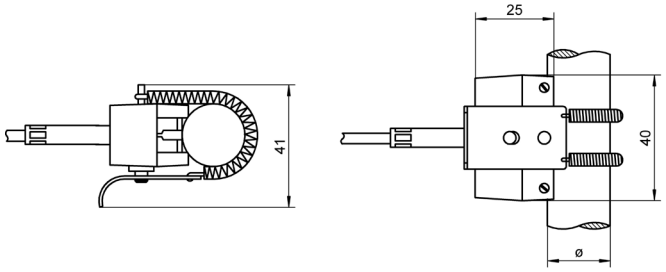


For surface measurement

Accuracy:	NiCr-Ni class 1*
Measuring tip:	Operative range -50...+300 °C Thermal ribbon, not electrically isolated
T_{90}: *	1.5 s
Cable:	approx. 0.9 m line, fabric insulation

Ribbon sensor **Order no. FTA026P**
(No variants available)

NiCr-Ni sensor FTA 8068



For surface measurement on pipes

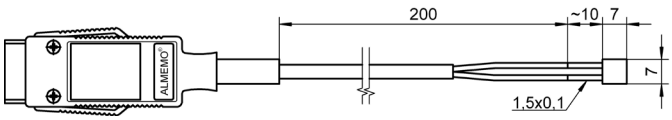
Accuracy:	NiCr-Ni class 2*
Measuring tip:	Operative range -50...+120 °C Thermal ribbon, not electr. isolated Fastened by pipe clamp (spring-loaded)
T_{90}: *	3 s
Pipe diameter:	12...25 mm
Cable:	1.2 m PVC

Pipe clamp sensor **Order no. FTA8068**

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

NiCr-Ni film thermocouple FTA 683



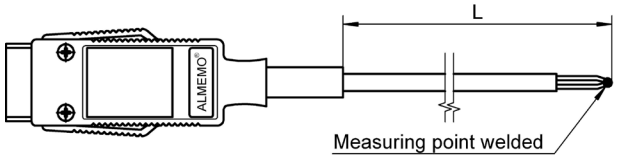
For surface measurement

Accuracy: NiCr-Ni class 2*
Measuring tip: Operative range -100 to +200°C
Folie, Insulation Kresol
T_{90}: * 2 s

with permanently connected FEP / silicone thermal line (stranded wire)**
-50 to +200°C, 2 meters, with ALMEMO® connector
Order no. FTA683

Measuring element without cable, free ends
(for your own sensors) **Order no. FT0683**

NiCr-Ni sensor FTA 390 x



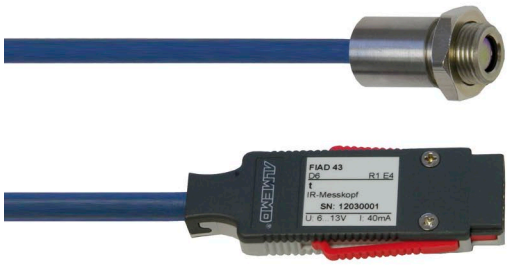
For surface measurement

Accuracy: NiCr-Ni class 2*
Measuring tip: Thermowire, welded,
not electrically isolated
T_{90}: * 3 s
Wire: 1.5 m

Insulation, glass fiber,
Operative range -25...+400 °C **Order no. FTA3900**
Insulation FEP,
Operative range -200...+205 °C **Order no. FTA39010**

* Range of validity see page 07.03
** There is no adverse temperature effect at the juncture from measuring element to cable. see page 07.03

Digital infra-red sensor for measuring surface temperature FIAD43



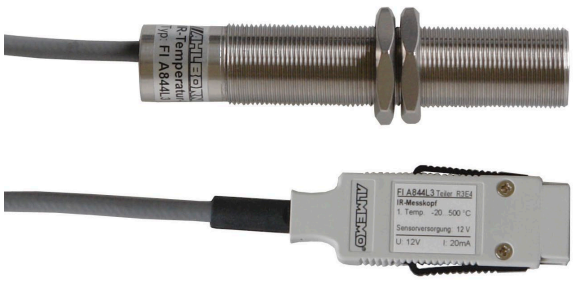
Operative range: -40...600 °C,
Miniature probe head, with cable and ALMEMO® D6 plug
and 1 mounting nut

Cable length = 1 m **Order no. FIAD4332**
Cable length = 3 m **Order no. FIAD4332L3**

For technical data, see page 07.34

DAkkS or factory calibration KI9xxx temperature for digital sensor (see chapter Calibration certificates)

Compact infra-red probe head FIA844



Operative range: -20...500 °C,
Probe head, with cable and ALMEMO® plug
and 2 mounting nuts

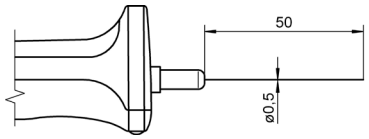
Cable length = 1 m **Order no. FIA844**
Cable length = 3 m **Order no. FIA844L3**

For technical data, see page 07.36

Factory calibration KI9xxx temperature for sensor (see chapter Calibration certificates)

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

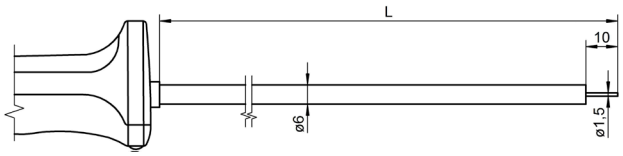
NiCr-Ni sensor with handle FTA 05 L0050H



For immersion measurement

Accuracy:	NiCr-Ni class 1*
Measuring tip:	Operative range -200...+500 °C Sheathed line, Inconel
T_{90}: *	0.8 s
Handle: *	127 mm
Cable:	1.5 m FEP/silicone thermal line**
L = 50 mm	**Order no. FTA05L0050H**

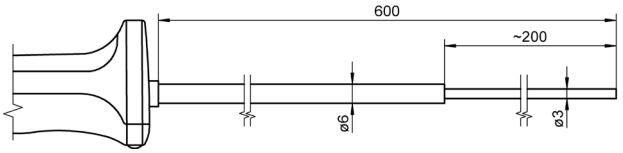
NiCr-Ni sensor with handle FTA 125 LxxxxH



For immersion measurement

Accuracy:	NiCr-Ni class 1*
Measuring tip:	Operative range -200...+800 °C Sheathed line, Inconel
T_{90}: *	1.5 s
Handle: *	127 mm
Cable:	1.5 m FEP/silicone thermal line**
L = 300 mm	**Order no. FTA125L0300H**

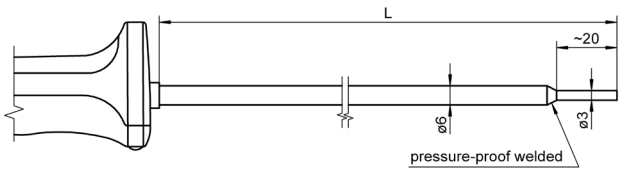
NiCr-Ni sensor with handle FTA 126 LxxxxH



For immersion measurement

Accuracy:	NiCr-Ni class 1*
Measuring tip:	Operative range -200...+800 °C Sheathed line, Inconel
T_{90}: *	2.5 s
Handle: *	127 mm
Cable:	1.5 m FEP/silicone thermal line**
L = 600 mm	**Order no. FTA126L0600H**

NiCr-Ni sensor with handle FTA 1261 LxxxxH



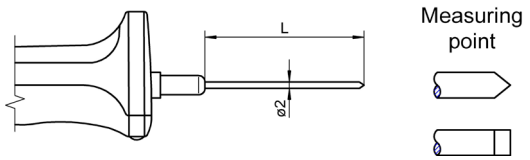
For immersion measurement in plastic and pasty substances, e.g. bitumen

Accuracy:	NiCr-Ni class 1*
Measuring tip:	Operative range -200...+500 °C Sheathed line, Inconel
T_{90}: *	3 s
Handle: *	127 mm
Cable:	1.5 m FEP/silicone thermal line**
L = 150 mm	**Order no. FTA1261L0150H**
L = 300 mm	**Order no. FTA1261L0300H**

* Range of validity see page 07.03
** There is no adverse temperature effect at the juncture from measuring element to cable. see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

NiCr-Ni sensor with handle FTA 123 LxxxxH

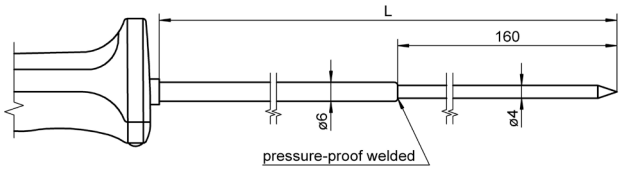


For immersion measurement in plastic and pasty substances

Accuracy:	NiCr-Ni class 1*
Measuring tip:	Operative range -200...+300 °C Penetrating tip
T_{90}: *	3 s
Handle: *	127 mm
Cable:	1.5 m FEP/silicone thermal line**

L = 50 mm	**Order no. FTA123L0050H**
L = 100 mm	**Order no. FTA123L0100H**

NiCr-Ni sensor with handle FTA 1231 LxxxxH



For immersion measurement in plastic and pasty substances

Accuracy:	NiCr-Ni class 1*
Measuring tip:	Operative range -200...+400 °C Penetrating tip, cone stainless steel 1.4541
T_{90}: *	6 s
Handle: *	127 mm
Cable:	1.5 m FEP/silicone thermal line**

L = 250 mm	**Order no. FTA1231L0250H**

* Range of validity see page 07.03
** There is no adverse temperature effect at the juncture from measuring element to cable. see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

NiCr-Ni thermowire T 190-0

Accuracy: NiCr-Ni class 2*
Insulation : Glass fiber (wires and sheath)
Operating temp.: -25°C to +400°C
Wire diameter: 0.5 mm
External diameter: approx. 1.3 x 2.1 mm

NiCr-Ni thermowire per meter
with glass fiber covering **Order no. LT01900**

NiCr-Ni thermowire sensor, welded tip, with
ALMEMO® connector 1.5m long **Order no. FTA3900**
ALMEMO® connector 5m long **Order no. FTA3900L05**

NiCr-Ni thermowire T 190-1

Accuracy: NiCr-Ni class 2*
Insulation : Glass fiber (wires and sheath)
Operating temp.: -25°C to +400°C
Wire diameter: 0.2 mm
External diameter: approx. 0.6 x 1.0 mm

NiCr-Ni thermowire per meter
with glass fiber covering **Order no. LT01901**

NiCr-Ni thermowire sensor, welded tip, with
ALMEMO® connector 1.5 m long **Order no. FTA3901**
ALMEMO® connector 5m long **Order no. FTA3901L05**

NiCr-Ni thermowire T 190-2

Accuracy: NiCr-Ni class 2*
Insulation : PVC (wires and sheath)
Operating temp.: -10°C to +105°C
Wire diameter: 0.5 mm
External diameter: approx. 2.2 x 3.4 mm

NiCr-Ni thermowire per meter
with PVC insulation **Order no. LT01902**

NiCr-Ni thermowire sensor, welded tip, with
ALMEMO® connector 1.5 m long **Order no. FTA3902**
ALMEMO® connector 5 m long **Order no. FTA3902L05**

NiCr-Ni thermowire T 190-3

Accuracy: NiCr-Ni class 2*
Insulation : Silicone (wires and sheath)
Operating temp.: -45°C to +200°C
Wire diameter: 0.5 mm
External diameter: approx. 4 mm

NiCr-Ni thermowire per meter
with silicone insulation **Order no. LT01903**

NiCr-Ni thermowire sensor, welded tip, with
ALMEMO® connector 1.5 m long **Order no. FTA3903**
ALMEMO® connector 5 m long **Order no. FTA3903L05**

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

NiCr-Ni thermowire T 190-10

Accuracy: NiCr-Ni class 2*
Insulation : FEP (Wires and sheath)
Operating temp.: -200°C to +205°C
Wire diameter: 0.5 mm
External diameter: approx. 1.5 x 2.5 mm

NiCr-Ni thermowire per meter with FEP insulation **Order no. LT019010**

NiCr-Ni thermowire sensor, welded tip, with
ALMEMO® connector 1.5m long **Order no. FTA39010**
ALMEMO® connector 5m long **Order no. FTA39010L05**

NiCr-Ni thermowire T 190-11

Accuracy: NiCr-Ni class 2*
Insulation : FEP (Wires and sheath)
Operating temp.: -200°C to +205°C
Wire diameter: 0.2 mm
External diameter: approx. 1.3 x 2.0 mm

NiCr-Ni thermowire per meter with FEP insulation **Order no. LT019011**

NiCr-Ni thermowire sensor, welded tip, with
ALMEMO® connector 1.5m long **Order no. FTA39011**
ALMEMO® connector 5m long **Order no. FTA39011L05**

NiCr-Ni thermowire T 190-7

Nur für trockene, nicht agressive Umgebung!

Accuracy: NiCr-Ni class 2*
Insulation : Ceramic fiber (Wires and sheath)
Operating temp.: -40°C to +1200°C
Wire diameter: 0.8 mm
External diameter: approx. 3 x 4 mm

NiCr-Ni thermowire per meter with ceramic fiber insulation **Order no. LT01907**

NiCr-Ni thermowire sensor, welded tip, with
ALMEMO® connector 1.5m long **Order no. FTA3907**
ALMEMO® connector 5m long **Order no. FTA3907L05**

NiCr-Ni compensation line T 191-1

Other types are available on request.
LT01912 Insulation Silicone/silicone/glass filament, up to 200°C
LT01913 Insulation PVC / screening film / PVC, up to 105°C

compensation line: NiCr-Ni
Insulation : PVC (Wires and sheath)
Operating temp.: -10°C to +105°C
Wire diameter: 0.5 mm
External diameter: approx. 3.6 mm

NiCr-Ni bunched conductor with PVC insulation, for each meter **Order no. LT01911**

NiCr-Ni thermal line (Litze) T 191-6

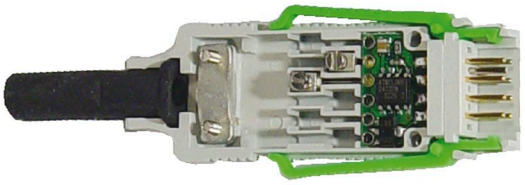
Thermal line (stranded wire): NiCr-Ni*
Insulation: Wires : FEP, sheath : silicone
Operating temp.: -50...+200°C
Wire diameter: 0.7 mm
External diameter: approx. 3.8 mm

NiCr-Ni thermal line (stranded wire) with FEP / silicone insulation, per meter **Order no. LT01916**

* Range of validity see page 07.03
** There is no adverse temperature effect at the juncture from measuring element to cable. see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

ALMEMO® connector for thermocouples (see Chapter Input connectors)



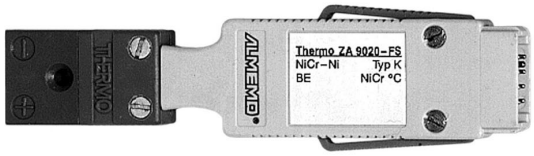
For Types K, N, L, J, T
(no thermo-electric transition / with thermal material)

NiCr-Ni (K)	**Order no. ZA9020FS**
NiCroSil-NiSil (N)	**Order no. ZA9021FSN**
Fe-CuNi (L)	**Order no. ZA9021FSL**
Fe-CuNi (J)	**Order no. ZA9021FSJ**
Cu-CuNi (T)	**Order no. ZA9021FST**

For Types U, S, R, B, AuFe-Cr

Cu-CuNi (U)	**Order no. ZA9000FSU**
PtRh10-Pt (S)	**Order no. ZA9000FSS**
PtRh13-Pt (R)	**Order no. ZA9000FSR**
PtRh30-PtRh6 (B)	**Order no. ZA9000FSB**
AuFe-Cr (A)	**Order no. ZA9000FSA**

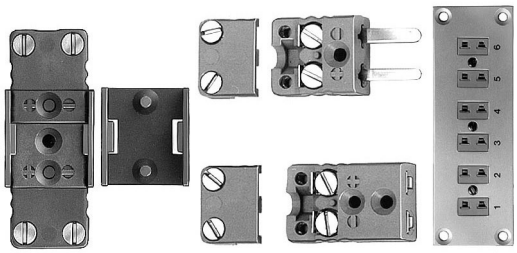
ALMEMO® adapter plug with miniature flat socket



For Types K, J, T, S

NiCr-Ni (K)	**Order no. ZKA029RA**
Fe-CuNi (J)	**Order no. ZJA029RA**
Cu-CuNi (T)	**Order no. ZTA029RA**
PtRh-Pt (S)	**Order no. ZSA029RA**

Miniature flat connectors for thermocouples types K, J, T, S, E



Examples for NiCr-Ni (K):

NiCr-Ni flat socket	**Order no. ZK9029FB**
NiCr-Ni flat connector	**Order no. ZK9029FS**
Locking plate (10 pieces)	**Order no. ZB9026VP**
NiCr-Ni single built-in socket	**Order no. ZK9029FE**
1-row panel with NiCr-Ni socket	**Order no. ZK9029FB1**
6-row panel with NiCr-Ni socket	**Order no. ZK9029FB6**

- Connectors with thermo contacts for avoiding voltage corruption at thermocouple junctions.
- For ambient temperatures –183 to +200 °C.
- Locking plate for complete coupling.

Order numbers for the above examples are compiled from the following coding elements : Z①9029F②③.

The coding elements can be taken from the table below.

Ordering:

Type ①	Color (IEC 584)	Variant ②	Panel ③	Panel dimensions
NiCr-Ni (K)	green	Male connector = S	1-er (1-rhg)	38 x 38 x 2.5 mm
Fe-CuNi (J)	black	Female connector = B	6-er (1-rhg)	113 x 38 x 2.5 mm
Cu-CuNi (T)	brown		12-er (1-rhg)	203 x 38 x 2.5 mm
NiCr-CuNi (E)	lilac		24-er (2-rhg)	203 x 76 x 2.5 mm
PtRh-Pt (S)	orange			mounting depth: 25.4 mm

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

new

Pt100 temperature sensors for special applications in humid conditions up to 150 / 250 °C

High-grade Pt100 resistance sensor
For measuring operations in very humid atmospheric conditions
Operative over a wide range of temperatures

Pt100 temperature sensors for applications in laboratories and medical engineering

Technical data

Accuracy:	Pt100 film resistor, class A*
Protective tube	Stainless steel, diameter 3 mm, length 20 mm
Operative range	-30 to +150 °C
Cable	PFA, length 5 m
Working pressure	maximum 3.0 bar
Protective class	IP69K
ALMEMO® plug	Pt100 with resolution 0.01 K.

Especially suitable for measuring temperatures in autoclaves, sterilizing units,, high-temperature steam applications, vacuum applications, and freeze drying units

Variants

Pt100 sensor, cable length = 5 m, ALMEMO® plug — **Order no. FPA30K20L0020**

Pt100 temperature sensors for industrial applications in air-conditioning / heat cabinets

Technical data

Accuracy:	Pt100 film resistor, class B*
Protective tube	Stainless steel, diameter 4 mm, length 50 mm
Operative range	-100 to +250 °C
Cable	PFA
Protective class	IP68
ALMEMO® plug	Pt100 with resolution 0.01 K.

Especially suitable for measuring temperatures in air-conditioning / heat cabinets with high atmospheric humidity
Operative over a wide range of temperatures

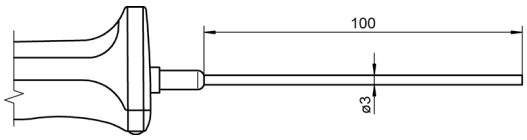
Variants

Pt100 sensor, cable length = 5 m, ALMEMO® plug — **Order no. FPA40ST0050S01KL0050**
Pt100 sensor, cable length = 10 m, ALMEMO® plug — **Order no. FPA40ST0050S01KL0100**

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

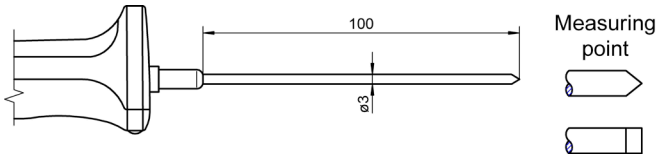
Pt100 sensor with handle FPA 106 LxxxxH



Accuracy:	Pt100 film resistor, class B*
Measuring tip:	Operative range -40...+500 °C Sheath element, stainless steel
T_{90}: *	8 s
Handle: *	127 mm
Cable:	1.5 m FEP/silicone
L = 100 mm	**Order no. FPA106L0100H**

For immersion measurement

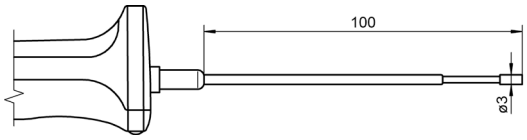
Pt100 sensor with handle FPA 123 LxxxxH



Accuracy:	Pt100 film resistor, class B*
Measuring tip:	Operative range -40...+500 °C Penetrating tip
T_{90}: *	8 s
Handle: *	127 mm
Cable:	1.5 m FEP/silicone
L = 100 mm	**Order no. FPA123L0100H**

For immersion measurement in plastic and pasty substances

Pt100 sensor with handle FPA 124 LxxxxH



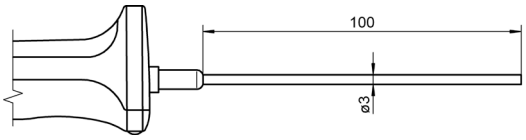
Accuracy:	Pt100 film resistor, class B*
Measuring tip:	Operative range -40...+300 °C Silver rivet, level
T_{90}: *	10 s
Handle: *	127 mm
Cable:	1.5 m FEP/silicone
L = 100 mm	**Order no. FPA124L0100H**

For surface measurement and immersion measurement

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

NTC sensor with handle FNA 106 LxxxxH

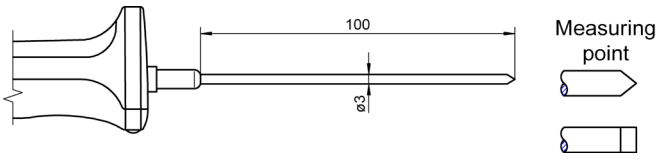


For immersion measurement

Accuracy:	NTC, see page 07.04
Measuring tip:	Operative range -20...+100 °C Sheath element, stainless steel
T_{90}: *	8 s
Handle: *	127 mm
Cable:	1.5 m PVC

L = 100 mm **Order no. FNA106L0100H**

NTC sensor with handle FNA 123 LxxxxH

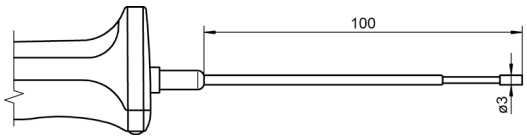


For immersion measurement in plastic and pasty substances

Accuracy:	NTC, see page 07.04
Measuring tip:	Operative range -20...+100 °C Penetrating tip
T_{90}: *	8 s
Handle: *	127 mm
Cable:	1.5 m PVC

L = 100 mm **Order no. FNA123L0100H**

NTC sensor with handle FNA 124 LxxxxH



For surface measurement and immersion measurement

Accuracy:	NTC, see page 07.04
Measuring tip:	Operative range -20...+100 °C Silver rivet, level
T_{90}: *	10 s
Handle: *	127 mm
Cable:	1.5 m PVC

L = 100 mm **Order no. FNA124L0100H**

NTC sensor FNA 305

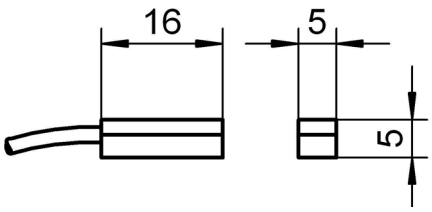
For room air measurement

Accuracy:	NTC, see page 07.04
Measuring tip:	Operative range -10...+60°C (non-condensing), Protective tube in stainless steel diameter = 3.0mm, length = 50mm mounted directly on ALMEMO® connector
T_{90}:	8 s

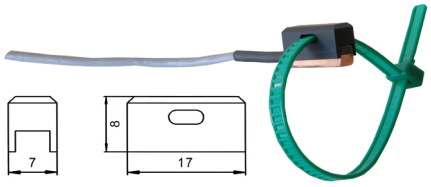
L = 50 mm **Order no. FNA305**
(No variants available)

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

Pt100 sensor FPA 611 x



For surface measurement



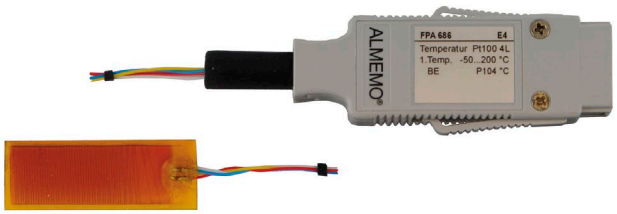
Accuracy:	Pt100 film resistor, class B*
Measuring tip:	Operative range see below Copper, level Improved thermal transfer thanks to innovative sensor element and new contact technology
T_{90}: *	20 s
Cable:	see below

Surface sensor
-10...+90°C, Cable PVC, 2 m **Order no. FPA611**

-10...+110°C, Cable, PFA, 3m for more demanding mechanical stress ALMEMO® connector, resolution 0.01 K
Order no. FPA611S01

Accessories
Fixture for fastening
with cable ties **Best-Nr. ZB9611RM**

Pt100 film sensor FPA 686

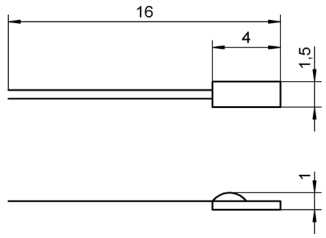


For surface measurement

Accuracy:	Pt100 wire-wound, class B*
Messfläche:	Operative range -50...+200 °C, temperature-resistant foil, 15 x 40 mm, approx. 0.5 mm thick
T_{90}*:	2 s
Cable:	Stranded wire PFA, 4-wire twisted

Length 2 m **Order no. FPA686**
Length 10 m **Order no. FPA686L10**

Pt100 ceramic chip sensor element FP 0802



Unprotected sensor element for constructing your own sensors

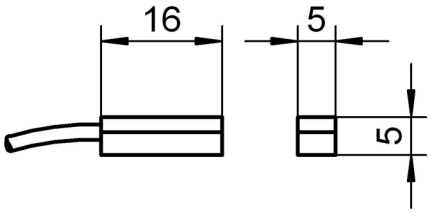
Accuracy:	Pt100 film resistor, class B*
Measuring tip:	Operative range -40...+400 °C Ceramic chip sensor
Connection wires:	10 mm, bare

Ceramic chip sensor **Order no. FP0802**

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

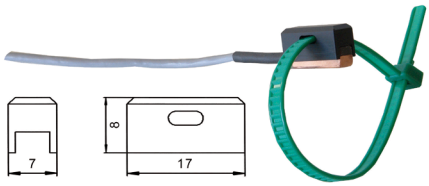
NTC sensor FNA 611



For surface measurement

Accuracy:	NTC, see page 07.04
Measuring tip:	Operative range -10...+90 °C Copper, level
T_{90}: *	20 s
Cable:	2 m PVC

Surface sensor **Order no. FNA611**



Accessories
Fixture for fastening with cable ties **Best-Nr. ZB9611RM**

NTC sensor FN 0001 K

Unprotected sensor element with cable

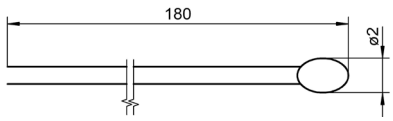
Accuracy:	NTC, see page 07.04
Measuring tip:	Sensor element, unprotected Operative range: -20...+100°C
Connection wires:	appr. 180 mm, fluoropolymer insulation
Connecting cable:	2 meters, PVC, thin stranded pick-up wire, Operative range -10 to +90 °C Cable juncture, in shrink-fit

NTC sensor with cable, free ends **Order no. FN0001K**

Option:
ALMEMO® connector including assembly

Single connectors for 1 sensor	Order no. OT9040AS
Double connector for 2 sensors	Order no. OT9040AS2

NTC sensor element FN 0001



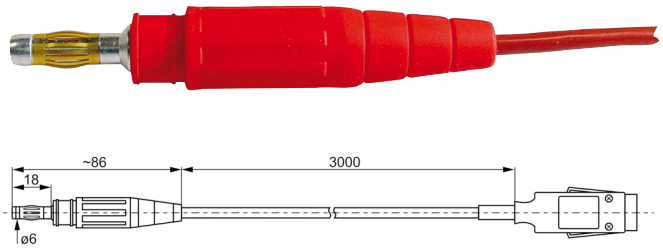
Unprotected sensor element for constructing your own sensors

Accuracy:	NTC, see page 07.04
Measuring tip:	Operative range -20...+100 °C Sensor
Connection wires	180 mm, fluoropolymer insulation

Sensor **Order no. FN0001**

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

Pt100 Plug-in laboratory sensor FPA 416

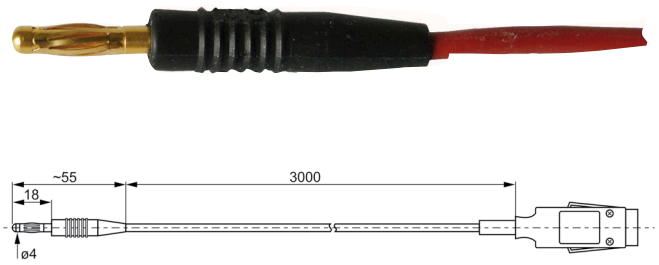


Accuracy:	Pt100 film resistor, class B*
Measuring tip:	Operative range -40...+150 °C
T_{90}:*	15 s
Cable:	Silicone/FEP 3m
ALMEMO® connector:	resolution 0.01 K

Plug-in laboratory sensor **Order no. FPA416**

Measuring element integrated in the socket of a 6 mm laboratory connector made of brass (nickel-plated).

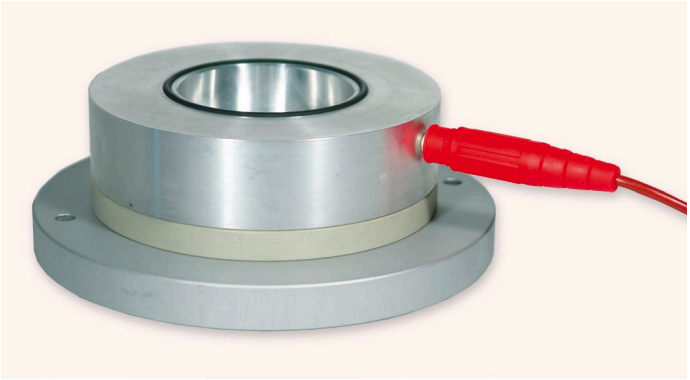
Pt100 Plug-in laboratory sensor FPA 414



Accuracy:	Pt100 film resistor, class B*
Measuring tip:	Operative range -40...+150 °C
T_{90}:*	15 s
Cable:	Silicone/FEP 3m
ALMEMO® connector:	resolution 0.01 K

Plug-in laboratory sensor **Order no. FPA414**

Measuring element integrated in the socket of a 4 mm laboratory connector made of brass (gold-plated).



Plug-in laboratory sensor, examples of use
Measuring object with hole for inserted PT100 plug-in laboratory sensor.

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

Pt100 cable sensor

Inexpensive resistance-based temperature sensors.
For immersion measurements in air and gases.
Rigid protective tube made from stainless steel
A wide variety of cable variants.
Operating temperature (depending on variant) -40 to +400°C.

Technical data

Accuracy:	Pt100 film resistor, class B* (no other variants in stock)
Protective tube:	Diameter, length see Variants, stainless steel 1.4301
Junction of protective tube / connecting cable:	Direct, hard-crimped for dry uses
Cables:	Length = 1.5 meters, Other lengths are available as options. Cable diameter is never larger than the diameter of the protective tube.
Operating temperature:	see variants, Always for whole sensor (i.e. sensor tip and cable)
ALMEMO® connector:	resolution 0.01 K.

! **Please note:**
Only for usage in a dry environment

Note:
For temperature sensors suitable for usage in humid environments (e.g. climatic chamber) see page 07.21

Variants

With FEP / FEP cable (black),

Operative range -40...+250°C:

Diameter	Length	Order no.
3.0 mm	50 mm	**FPA30K03L0050**
3.0 mm	100 mm	**FPA30K03L0100**
4.0 mm	50 mm	**FPA40K03L0050**
4.0 mm	100 mm	**FPA40K03L0100**

A longer cable is available as an option

Total length 5 m	OPK03L0050
Total length 10 m	OPK03L0100

With FEP / silicone cable (red),

Operative range -40...+200°C:

Diameter	Length	Order no.
5.0 mm	50 mm	**FPA50K01L0050**
5.0 mm	100 mm	**FPA50K01L0100**
6.0 mm	50 mm	**FPA60K01L0050**
6.0 mm	100 mm	**FPA60K01L0100**

A longer cable is available as an option

Total length 5 m	OPK01L0050
Total length 10 m	OPK01L0100

Cable with glass-fiber / glass-fiber / VA wire shielding,

Operative range -40...+400°C:

Diameter	Length	Order no.
5.0 mm	50 mm	**FPA50K06L0050**
5.0 mm	100 mm	**FPA50K06L0100**
6.0 mm	50 mm	**FPA60K06L0050**
6.0 mm	100 mm	**FPA60K06L0100**

A longer cable is available as an option

Total length 5 m	OPK06L0050
Total length 10 m	OPK06L0100

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

Pt100 glass thermometer with immersion depths as per ASTM

Operative range:

For immersion measurement in liquid media at low immersion depths.

Variants	Order no.
Pt100 glass thermometer with immersion depths as per ASTM specifications, with ALMEMO® connector (including 2-meter FEP / silicone cable)	**FPA910**

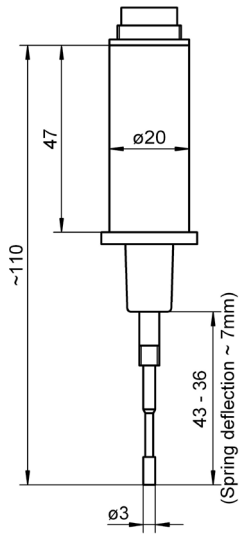
Technical data

Accuracy:	Pt100 wire-wound, class A*
Measuring tip	Operative range -50 to +310 °C Glass, tapered Diameter = 3 mm, length = 15 mm
Shaft	Glass, Diameter = 6 mm
	NL= 250 mm (total nominal length) Labeling codes for immersion depths : identification rings on the shaft as per ASTM specifications (American Society for Testing and Materials)
T_{90}	2.5 seconds
Cable junction sleeve	
	Stainless steel, 8 x 40 mm Cable exit secured with shrink-fit sleeve
Cable	2 meters, FEP / silicone
ALMEMO® connector	
	Resolution 0.01 K

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

Insertable sensor NiCr-Ni with round mounting plug T 820-6



Operative range:

Measuring tip, spring-loaded, for surface and immersion measurement.

Accessories:

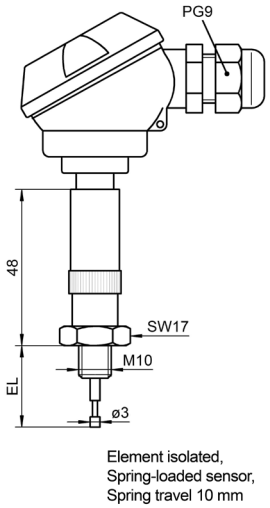
ALMEMO® connecting cable, 2 meters Order no. ZA9020BK2

Technical data

Accuracy:	NiCr-Ni class 2*
Measuring tip	Operative range -40 to +400 °C Silver rivet, level, spring-loaded not electrically isolated
T_{90} *	3 s
Insert length	60 mm (see layout drawing)
Fixture	Plastic, Ø 20 mm, resistant up to +120 °C
Connection	Round mounting plug

Types	Order no.
Insertable sensor NiCr-Ni with round mounting plug	**FT98206**

Insertable sensor NiCr-Ni with terminal head FT 0477



Operative range:

Spring-loaded measuring tip, for surface and immersion measurement

Options:

3-meter compensation line PVC, mounted, free ends:
Order no. OT9020K02L0030

ALMEMO® plug including assembly for NiCr-Ni-sensor
Order no. OT9020AS

Technical data:

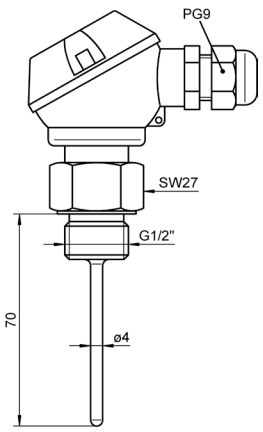
Accuracy:	NiCr-Ni class 2*
Measuring tip:	Operative range -40 to +400°C Silver rivet, level, spring-loaded, electronically isolated
Thread:	M10
Insert length:	25 mm (see layout drawing)
Terminal head:	Clamp connector

Types	Order no.
Screw-in sensor NiCr-Ni with terminal head	**FT0477**

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

Insertable sensor Pt100 with terminal head FP 0463



Operative range:

For immersion measurements, pressure-sealed up to 15 bar.

Options:

3 meters cable PVC, assembled, free ends
OT9030K02L0030

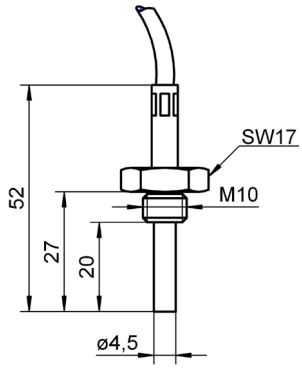
ALMEMO® connector including assembly for Pt100 sensor
OT9030AS

Technical data

Accuracy:	Pt100 film resistor, class B*
Sensor tube	Stainless steel
Operative range:	-40...+350°C
Thread	1/2", with copper ring seal, pressure-sealed up to 15 bar
Insert length	70 mm (see layout drawing)
Terminal head	Clamp connector

Variants	Order no.
Insertable sensor with terminal head	**FP0463**

Screw-in sensor Pt100, NiCr-Ni with fitted cable Fx 0710 L27M10



Operative range:

For immersion measurement

Option:

ALMEMO® connector including assembly for Pt100 sensors:
Order no. OT9030AS

Technical data FP0710L27M10

Accuracy:	Pt100 film resistor, class B*
Sensor material:	stainless steel
Operative range:	-40 to +200 °C
Thread:	M10
Insert length:	27 mm (see layout drawing)
Cable:	3 meters, FEP / silicone, free ends

Variants	Order no.
Screw-in sensor Pt100 with cable, free ends	**FP0710L27M10**
Option cable length 5 meters	**OPK01L0050**

Technical data FT0710L27M10

Accuracy:	NiCr-Ni class 2*
Sensor material:	stainless steel
Operative range:	-100 to +400 °C
Thread:	M10
Insert length:	27 mm (see layout drawing)
Cable:	3 meters, thermal line glass filament / glass filament / VA wire shielding, free ends

Option:

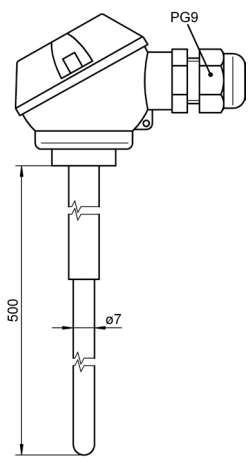
ALMEMO® connector including assembly NiCr-Ni sensor:
Order no. OT9020AS

Variants	Order no.
Screw-in sensor NiCr-Ni with cable, free ends	**FT0710L27M10**
Option cable length 5 meters	**OTK06L0050**

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.

Insertable sensor PtRh-Pt (S) with terminal head FT 0425



Operative range:

For immersion measurements, up to 1400 or 1600 °C.

Technical data

Accuracy:	Thermowire PtRh-Pt (S) class 1*
Measuring tip	Ceramic tube see under variants
Operative range	see under variants
Insert length	500 mm
Protective tube	Ceramic, replaceable, 7 x 1 mm
Cable	2-meter compensation line silicone insulation, free ends

Accessories

Ceramic protective tube for T04251 Order no. ZB9425SR1

Ceramic protective tube for FT04252 Order no. ZB9425SR2

Options

ALMEMO® connector with assembly Order no. OT9020AS

Variants	**Order no.**
Insertable sensor PtRh-Pt type S with terminal head and compensation lines, free ends)	
T_{max} = 1400°C, element-Ø = 0.35 mm, ceramic 610	**FT04251**
T_{max} = 1600°C, element-Ø = 0.5 mm, ceramic 710	**FT04252**

* Range of validity see page 07.03

DAkkS or factory calibration KT90xx temperature for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)
DAkkS calibration meets all the requirements regarding test resources laid down in DIN EN ISO/IEC 17025.