



# Precision Temperature Calibrators

Series TP 38 000 / TP 38 000 E



## Calibrating with every convenience

**Working more cost-effectively, safely and reliably in the range from -35°C to 650°C**

Thermometers, thermocouples and other temperature sensors are subject to mechanical, thermal and chemical stresses especially in industrial use. This leads with increasing time to a drift that is not predictable.

Since the temperature in industrial processes has become one of the most important indicators of quality, operating safety and service life, the calibration of temperature sensors on site has achieved special importance.

Inaccurate temperature measurements reduce product quality, increase the risk of failure and lead to increased energy consumption.

Only the regular calibration of the sensors provides information on the difference between actual and measured temperature and thus makes the specific drift behaviour visible.

Switchable languages

German



English



French



Spanish



Our easy to transport and sturdy calibrators with laboratory accuracy for all areas of application:

- In test bays and development laboratories, temperature sensors have to be tested, adjusted or recalibrated before installation.
- In sensor production, tolerances of thermocouples and resistance thermometers can be determined and documented clearly only by calibration.



A guarantee of 5 years is granted to all TP 38 000 which are calibrated and tested at least once per year by the SIKA DKD laboratory.

## Control panel with graphic display and keyboard

You can make all necessary entries very simply and quickly with the aid of the operator-friendly, self-explanatory menu structure on the calibrator display.

The block and set temperature as well as the difference and the variance of the stability are displayed on the two-coloured, graphic display.

In the TP 38 000 with precision measuring instrument, the measured temperatures of the test piece and of an externally connected calibration reference sensor are displayed in addition.

The measured values are displayed in the selected temperature unit of °C, °F or K.

It is also possible to display the physical test piece raw values in  $\Omega$ , mV or mA.

You can switch over the menu languages at any time.

You program the calibrators with the aid of the keyboard with 14 keys or the PC.

The block temperature is programmed by keys and can be set accurately to 0.01 °C.

The CURSOR and SELECT keys serve for fast marking and selection of all further functions. The values are confirmed with the ENTER key or deleted with CLEAR.



## Block and adapter sleeves

The calibrators work with an electronically controlled heating block made of brass or a heating / cooling block made of aluminium. A block bore 150 mm deep with a diameter of 28 mm serves for holding the test piece.

The homogeneous temperature zone (40 mm) in which the calibration should be performed is located in the lower region of the metal block.

Insulation ensures that the housing is only hand-warm, even if it is hot in the interior over a longer period. The optimum thermal coupling of block to test piece is achieved by the correct adapter sleeve, ideally the sleeve has an internal diameter 0.5 mm larger than the outside diameter of the test piece.

Four examples of possible bores in the adapter sleeve for holding the sensor are illustrated below.

Adapter sleeves with 28 mm diameter can be delivered with 1.5 mm to 25 mm bore in 0.5 mm steps.



## Computer interface RS 232 C

A PC can be connected as an alternative to programming the calibrators on the keyboard.

The calibrators are equipped as standard with a RS 232 C serial interface.

The entire control of SIKA calibrators can be taken over

by an external computer. All measured values are available in digital form at the interface.

All settings necessary for a calibration can be controlled remotely through the serial interface.

## Our calibrator versions for every application

You as user have the possibility of choosing between four calibrators with different temperature ranges and equipment to be able to solve optimally your calibration, adjustment and testing tasks.	TP 38 000	TP 38 000 E
Certified safety by VDE	★	★
Step program (6 steps)	★	★
Automatic calibration procedures	★	★
Cycle program (99 cycles)	★	★
Gradient control	★	★
Temperature units °C, °F, K	★	★
Function display: stable, heating, cooling	★	★
Stability assessment variance of the stability	★	★
Temperature alarm / temperature limitation	★	★
Temperature lift -65 °C for Peltier calibrators	★	★
Improved temperature homogeneity	★	★
RS 232 C computer interface	★	★
SIKA test certificate	★	★
Input for RTD, TC, transmitter, switch	★	☆
Scalable mA display	★	☆
Self-detecting calibration reference sensors	★	☆
Control function switchable (internal / external reference)	★	☆
Logger function (8 data sets)	★	☆
Switch test program, T <sub>1</sub> , T <sub>2</sub> and hysteresis	★	☆
Physical test piece raw values Ω, mV, mA	★	☆
Transmitter supply 24 VDC	★	☆
Calibration and testing software	☆	☆
Service and transport case, sturdy aluminium version	☆	☆
DKD certificate	☆	☆

★ included in scope of supply

☆ not included in scope of supply but available optionally

## Testing equipment monitoring

The SIKA calibrators can be delivered optionally with a certificate of the Deutsche Kalibrierdienst (DKD) or a SIKA works certificate.

Thus the calibrators are connected to the national standards and confirmed in a recognized manner as required in DIN ISO 9001: 2000 "QA element test equipment monitoring".

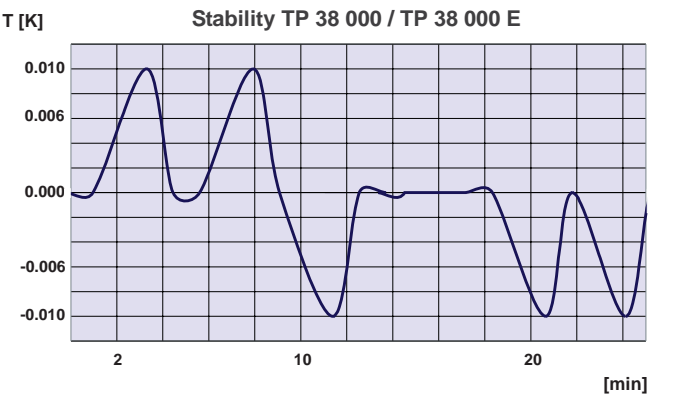
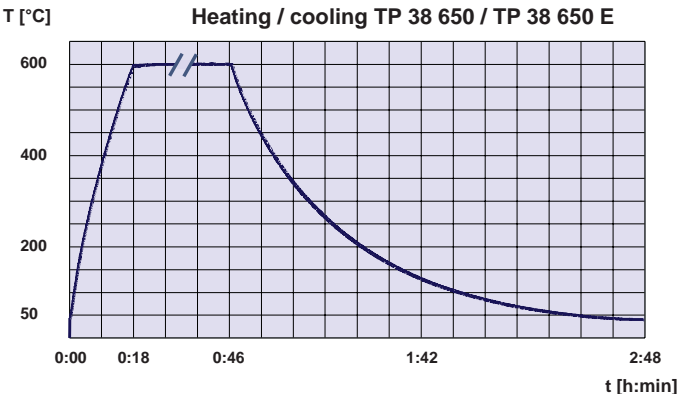
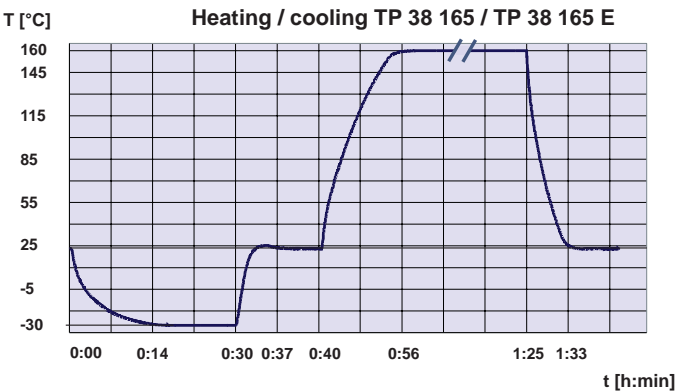


## Tested safety

For your safety, the calibrators are equipped with two electronic fuses working independently of one another.

Protective conductor monitoring is used to control the base isolation of the heater. The monitoring unit works independently of the remaining control system and switches as soon as the calibrator is no longer connected with the protective conductor system.

## Heating, cooling and stability curves



## The menu structure, convenient and simple to operate

```
select 7 KPM
calibr RTD
calibr TC
calibr mA
switch test
logger
step function
display value
system value
info
adjustment
heating 13:24:56
```

### Select mode

The Select mode offers the central setting and selection possibility for all processes specific to the calibrator.

Here you select your test pieces and decide for logger function or step program. Further selection possibilities such as display values and system settings are also possible.

```
switch test -2 KPM
block temp
79.50 °C
set temp (Tmin)
50.00 °C
ext.ref. 350.80 °C
Temp 1 102.49 °C
Temp 2 97.11 °C
hysteresis 5.38 K
cooling 13:24:56
```

### Switch test

You can perform here the automatic test of temperature switches and thermostats with self-detection of "normally open" or "normally closed".

The switching point with rising temperature Temp 1, the switching point with falling temperature Temp 2 and the automatically calculated hysteresis of the calibrators TP 38 000 are displayed.

```
select logger 1 KPM
• ON OFF Set1 CL
block temp set temp
4 101.10 100.00 °C
4 199.05 200.00 °C
4 302.70 --- °C
4 402.00 400.00 °C
4 499.80 500.00 °C
4 --- °C
date 2004/05/17
start 18:55:12
sensor Pt100-4
heating 19:24:56
```

### Select Logger

The calibrators TP 38 000 can be programmed for up to 8 completely automated calibrations. You make the settings of temperature steps, holding time and gradient directly at the calibrator. A PC download is possible.

The block and test piece temperatures are stored and are available for download. Reading off on the display is possible at any time.

You can perform automatic calibrations directly on site, without a PC or laptop, and the certificate can be produced later.

```
select mA 12 KPM
mA calibration
• ON OFF
• T (0mA) = 0.00 °C
T (4mA)
• T (20mA) = 600.00 °C
transmitter supply
ON • OFF
connection
• 4mm-terminals
heating 15:17:40
```

### Select mode for test piece selection

With the aid of clearly laid out screen pages, you select in the Select mode all important parameters, e.g. temperature, supply, connection for the calibration of a wanted test piece.

Resistance thermometers RTD, thermocouples TC, transmitters and switches can be selected as test pieces.

The transmitter values are programmable. Switch on a transmitter supply is possible.

```
select system 12 KPM
• Deutsch English
13:24:56 2003/03/17
brightness 100 %
contrast 100 %
alarm 610.00 °C
switch off 620.00 °C
working hors 7 h
work factor 14
heating 18:35:26
```

### Select System mode

Here you can make general settings for the calibration system, such as selection of the languages, updating time and date etc.

## Automate your calibration tasks with the aid of the SIKA calibration and testing software

An external computer can control the complete calibration systems via RS 232 C. Measured data acquisition and editing becomes child's play with the software package. You enter the test and calibration temperatures via PC, everything else runs automatically up to producing a calibration note or certificate.

The calibrators of the TP 38 000 / TP 38 000 E series thus become a specially efficient tool in development, production, quality assurance and service.

Static and dynamic calibration and test routines as well as statistical evaluations of series tests can be programmed very simply and quickly in menu technique and performed automatically.

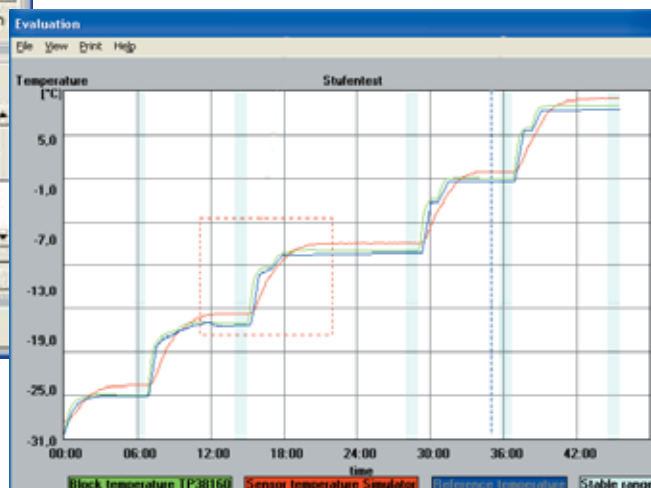
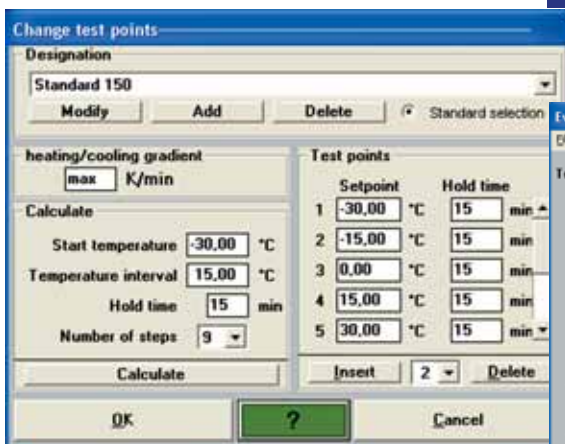
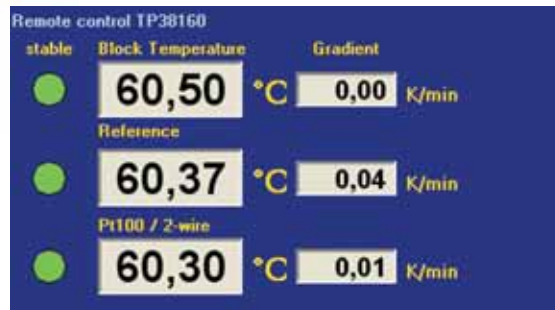
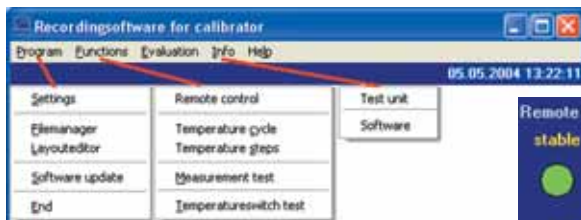
During the test mode the data of the block and test piece temperature as well as the switching point of

temperature switches are transmitted continuously through the RS 232 C.



The software package presents the test data in tabular and graphical form. Customer-specific documentation is thus possible.

The stored test data can be transmitted to higher level quality data management systems (QDMS). Delivery and production quality can thus be monitored or increased quickly and clearly.

With our precision measuring instrument TT Scan you are in the position to compile parallel certificates of up to 8 sensors.





## Technical data of TP 38 000 with integrated measuring instrument

Device type	TP 38 165	TP 38 650
		
Temperature range	-35 °C to 165 °C	Ambient temperature to 650 °C
Tolerance	+/-0.1 °C	+/-0.2 °C
Stability	0.01 °C to 0.05 °C	0.03 °C to 0.1 °C
Resolution	0.01	
<b>Display</b>		
Versions	Monochrome, graphic display	
Displays	Block and set temperature, difference, variance, min. and max. temperatures	
Languages switchable	German / English / French / Spanish	
Units	°C / °F / K / Ω / mV / mA	
Operating elements	Membrane keyboard	
Additional displays	Test piece temperature including the physical values Temperature of the external calibration reference sensor	
<b>Block</b>		
Block material	Aluminium	Brass
Block bore	28 mm	
Immersion depth	150 mm	
Adapter sleeves	Inside diameter 1.5 mm to 25.0 mm in 0.5 mm steps	
<b>Equipment features</b>		
Temperature steps	Step tests, calibration runs	
Gradient control	Implementation of ramp functions	
Computer interface	Serial RS 232 C incl. transmission protocol	
Logger function	8 data sets with 6 values each	
Precision measuring instrument	RTD, TC, mA, switch, calibration reference sensors	
<b>General data</b>		
Power supply	100...240 VAC, +/-10 %, 50/60 Hz	230 VAC, +/-10 %, 50/60 Hz 100...115 VAC, +/-10 %, 50/60 Hz
Power consumption	Approx. 400 W	Approx. 1000 W
Dimensions (D x W x H)	Approx. 348 x 153 x 347 mm	
Weight	Approx. 12 kg	Approx. 10 kg
<b>Options</b>		
Service case, software, certificate, external calibration reference sensors		

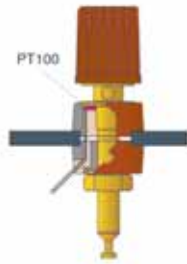


## Technical data of TP 38 000 E

Device type	TP 38 165 E	TP 38 650 E
		
Temperature range	-35 °C to 165 °C	Ambient temperature to 650 °C
Tolerance	+/-0.1 °C	+/-0.2 °C
Stability	0.01 °C to 0.05 °C	0.03 °C to 0.1 °C
Resolution	0.01	
<b>Display</b>		
Version	Monochrome, graphic display	
Displays	Block and set temperature, difference, variance, min. and max. temperatures	
Languages switchable	German / English / French / Spanish	
Units	°C / °F / K	
Operating elements	Membrane keyboard	
<b>Block</b>		
Block material	Aluminium	Brass
Block bore	28 mm	
Immersion depth	150 mm	
Adapter sleeves	Inside diameter 1.5 mm to 25.0 mm in 0.5 mm steps	
<b>Equipment features</b>		
Temperature steps Gradient control Computer interface	Step tests, calibration runs Implementation of ramp functions Serial RS 232 C incl. transmission protocol	
<b>General data</b>		
Power supply	100...240 VAC, +/-10 %, 50/60 Hz	230 VAC, +/-10 %, 50/60 Hz 100...115 VAC, ±10 %, 50/60 Hz
Power consumption	Approx. 400 W	Approx. 1000 W
Dimensions (D x W x H)	Approx. 348 x 153 x 347 mm	
Weight	Approx. 12 kg	Approx. 10 kg
<b>Options</b>		
	Service case, software, certificate, retrofit precision measuring instrument	

# ... extends your calibration possibilities

Already integrated or easy to retrofit



The 4 mm connections for plug, cable shoes and open cable ends as well as a DIN and Mini DIN thermocouple connection are available for connecting the test piece free of thermal voltages.



Resistance thermometers, thermocouples, temperature transmitters and switches must be operated in the calibration with a measuring instrument which measures and displays as temperature the output signals such as resistance values, thermal voltages and norm signals.

Use of our TP 38 000 with an integrated precision measuring instrument is unproblematic.

The measuring instrument can be retrofitted at any time at SIKA in an existing TP 38 000 E.

The switchable measuring input facilitates calibration, adjustment and testing of:

- Resistance thermometers (RTD)  
Pt 100, Pt 500 and Pt 1000 in 2, 3 or 4 wire
- Thermocouples (TC) of the types K, J, N, E, R, T, B, S, L and U
- Current signals 0(4)-20 mA of temperature transmitters (mA) with and without transmitter supply
- Temperature switches and thermostats with “normally open” and “normally closed” contacts

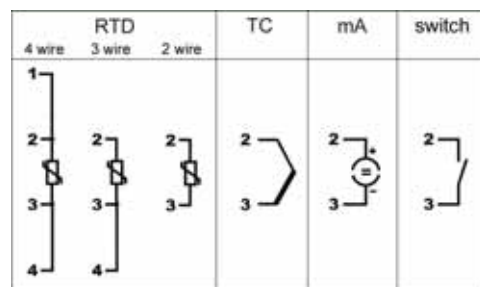
The precision measuring instruments permit the simultaneous connection of a test piece and of an external calibration reference sensor.

Calibration with external calibration reference sensors offers advantages especially for short probes, since both sensors are introduced at the same depth in the bore. The temperature of the external calibration reference sensor, of the test piece and the difference between the two appear on the display. Thus this calibration can also be performed simply.

The control functions are transferred on a external calibration reference sensor.

The measuring instrument is available in two versions:

- Retrofittable without difficulty in the TP 38 000 E
- Available as desktop model TT Scan




## Technical data

Version		Measuring range	Tolerance
<b>Resistance thermometer according to DIN EN 60751</b>			
Pt 100 Pt 500 Pt 1000	2, 3, 4 wire	-90.00 °C to 850.00 °C	+/-0.005 % FS +/- 0.01 °C
Connection possibility through 4 mm connections free of thermal voltage			
<b>Thermocouples according to DIN EN 60584 / DIN 43710</b>			
Type K	NiCr-NiAl	-90.00 °C to 999.99 °C 1000.0 °C to 1370.0 °C	+/-0.007 % FS +/-0.01 °C +/-0.005 % FS +/-0.1 °C
Type J	FeCu-Ni	-90.00 °C to 900.00 °C	+/-0.005 % FS +/-0.01 °C
Type N	NiCrSi - NiSiMg	-90.00 °C to 999.99 °C 1000.0 °C to 1370.0 °C	+/-0.007 % FS +/-0.01 °C +/-0.005 % FS +/-0.1 °C
Type E	NiCr-CuNi	-90.00 °C to 700.00 °C	+/-0.005 % FS +/-0.01 °C
Type R	Pt13Rh - Pt	0.00 °C to 999.99 °C 1000.0 °C to 1760.0 °C	+/-0.05 % FS +/-0.01 °C +/-0.03 % FS +/-0.1 °C
Type T	Cu-CuNi	-90.00 °C to 400.00 °C	+/-0.01 % FS +/-0.01 °C
Type B	Pt30Rh-Pt6Rh	0.00 °C to 999.99 °C 1000.0 °C to 1820.0 °C	+/-0.05 % FS +/-0.01 °C +/-0.03 % FS +/-0.1 °C
Type S	Pt10Rh-Pt	0.00 °C to 999.99 °C 1000.0 °C to 1760.0 °C	+/-0.05 % FS +/-0.01 °C +/-0.03 % FS +/-0.1 °C
Type L	Fe-CuNi	-90.00 °C to 900.00 °C	+/-0.005 % FS +/-0.01 °C
Type U	Cu-CuNi	-90.00 °C to 600.00 °C	+/-0.01 % FS +/-0.01 °C
Automatic comparison point compensation between 0 °C and 60 °C Accuracy of the comparison point Pt 100 DIN class A Possibility of connection through 4 mm connections free of thermal voltage and DIN and Mini DIN thermocouple connection			
<b>Standard signal input</b>			
Current (switchable)	mA	0(4)...20 mA	+/-0.015 % FS +/-0.01 mA
Transmitter supply 24 VDC, I max = 30 mA Possibility of connection through 4 mm connections free of thermal voltage			
<b>Temperature switch</b>			
Automatic detection of an edge change, determining the hysteresis, Independent detection normally closed / normally open Possibility of connection through 4 mm connections free of thermal voltage Potential-free input contacts (U <sub>max</sub> = 5 V, I <sub>max</sub> = 1 mA)			
<b>Calibration reference sensor connection</b>			
Pt 100	4-wire	-90.00 °C to 850.00 °C	+/-0.005 % FS +/- 0.01 °C
Polynomial correctable through internal parameters or through external EEPROM in sensor Possibility of connection through 7-pin built-in socket			

**Precision measuring instrument with desktop model**



Device type		TT Scan
		
Version	Scanner device with precision measuring instrument	
Measuring inputs	Switchable For up to 8 sensors Sensor type free configurable Technical datas see page 11	
Equipment features		
	32 x 4 mm connections free of thermal voltage Connection for external calibration reference sensor External cold junction available Serial USB data interface, incl. USB data cable	
General data		
Power supply	230 VAC ±10 %, 50/60 Hz over mains adapter	
Power consumption	Approx. 100 W	
Dimensions (D x W x H)	200 mm x 140 mm (+ 40 mm handle) x 380 mm	
Weight	Approx. 2.5 kg	
Options		
	Service case, software, certificates, external calibration reference sensors	

# High-performance calibration reference sensoren

## The intelligent and the inexpensive solution, TFEE and TFEG

### TFEE

To be able to fully utilize the precision of the calibrators, SIKA has developed the intelligent TFEE.

These reference sensors have an EEPROM with linearization specific to the probe in the handle.

After the measuring instrument is switched on or after each sensor change, the probe-specific calibration data are transmitted to the measuring instrument and form the basis when determining the measured value.

### TFEG

Apart from the intelligent TFEE, SIKA also offers the less expensive TFEG.

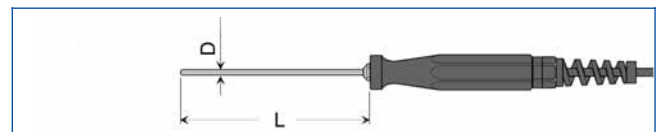
These calibration reference sensors are equipped with a Pt 100 sensor of different accuracy. With this sensor, the DIN characteristic is used as a basis for determining the measured values.

Probe-specific linearizations can be set via the keyboard on the calibrator and are then available for this sensor.

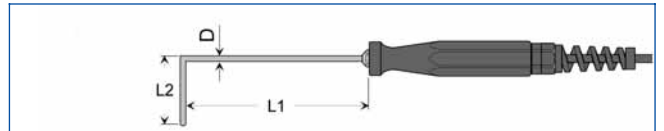
An accuracy which was previously considered as unrealistic is achieved with these two probe-specific Pt 100 linearizations in combination with the precision of the measuring input.

Both types of probe are available in different forms

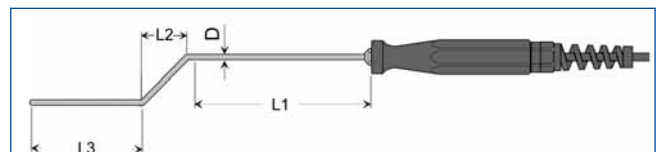
- Straight



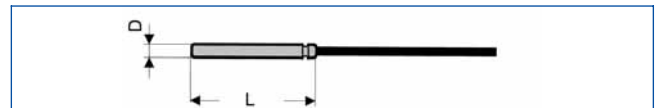
- 90° angled



- 45° offset



- Cable version



## Technical data

TFEE	Measuring range		Tolerance
Pt 100 with probe-specific linearization through EEPROM in the handle			
High precision	-30.00 °C to 400.00 °C	400.00 °C to 600.00 °C	0.03 °C to 0.06 °C 0.06 °C to 0.3 °C
Version	Straight	D = 3 mm, L = 300 mm	
	90° angled	D = 3 mm, L1, L2 customer specific	
	45° offset	D = 3 mm, L1, L2, L3 customer specific	
TFEG	Measuring range		Tolerance
Pt 100 without probe specific linearization			
Precision	-30.00 °C to 250.00 °C	1/10 DIN	+/-0.03 °C +/- 0.0005*[T]
Standard probe	-30.00 °C to 400.00 °C	1/3 DIN	+/-0.1 °C +/- 0.0017*[T]
High temperature	-30.00 °C to 600.00 °C	DIN Class B	+/-0.3 °C +/- 0.005*[T]
Version	Straight	D = 3 mm, L = 300 mm	
	90° angled	D = 3 mm, L1, L2 customer specific	
	45° offset	D = 3 mm, L1, L2, L3 customer specific	
	Cable version	Teflon, Tmax = 250 °C, D = 5 mm, L = 50 mm	

# Our Production and Sales Range



Flow Measurement Equipment



Axial Turbine Flow Sensor



Flow Switches



Pressure Gauges and Pressure Sensors



Industrial Thermometers



Electronic Digital Thermometer, Dial Thermometer



Measuring Instruments



Temperature Sensors



Calibrators, DKD-Laboratory

## Your able partner for measurement and control

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Phone: 0700 CALL SIKA  
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Fax: +49 5605 803-54/60  
E-Mail: [info@sika.net](mailto:info@sika.net)  
Internet: <http://www.sika.net>  
Struthweg 7-9, 34260 Kaufungen  
P. O. Box 11 13, 34254 Kaufungen  
Germany

Subject to technical modification

