



# Precision Temperature Calibrators



Series TP 38 000 / TP 38 000 E

Deutscher  
DKD-K-  
13901  
Kalibrierdienst



# 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.

**Control panel with graphic display and keyboard**

**Display of**  
 -Block temperature  
 -Set temperature  
 -Test piece temperature

**Precision measuring instrument also easily retrofittable**

**Protective grille as contact protection**

**Test piece holder and adapter sleeves**

**Carrying handle**

**Computer interface RS 232 C**

**60 MONTH SIKI QUALITY GUARANTEE**

A guarantee of 5 years is granted to all TP 38 000 which are calibrated and tested at least once per year by the SIKI 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 Ω, 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 Ø 28 mm diameter can be delivered with 1.5 mm to 25 mm bore in 0.5 mm steps.

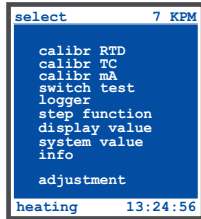


### Computer interface RS 232 C

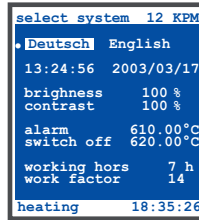
A PC can be connected as an alternative to programming the calibrators on the keyboard. The calibrators are equipped as standard with a RS 232 C serial interface. The entire control of SIKa calibrators can be taken over by an external computer. All measured values are available in digital form at the interface. All settings necessary for a calibration can be controlled remotely through the serial interface.

# Menu structure and equipment

## Select mode



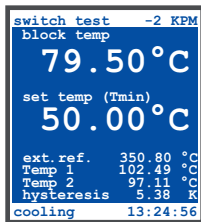
The Select mode offers the central setting and selection possibility for all processes specific to the calibrator. Here you select your test pieces and decide for logger function or step program. Further selection possibilities such as display values and system settings are also possible.



## Select System mode

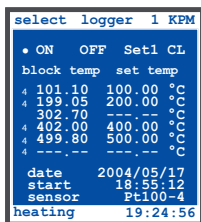
Here you can make general settings for the calibration system, such as selection of the languages, updating time and date etc.

## Switch test



You can perform here the automatic test of temperature switches and thermostats with selfdetection 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.

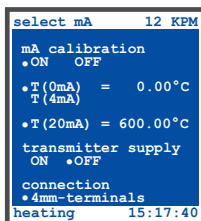
## Select Logger



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 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.

## Testing equipment monitoring

The SIKA calibrators can be delivered optionally with a certificate of the Deutscher 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".

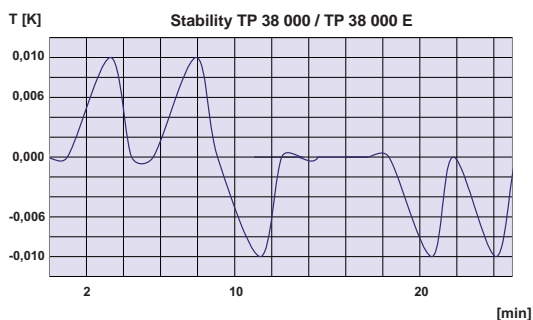
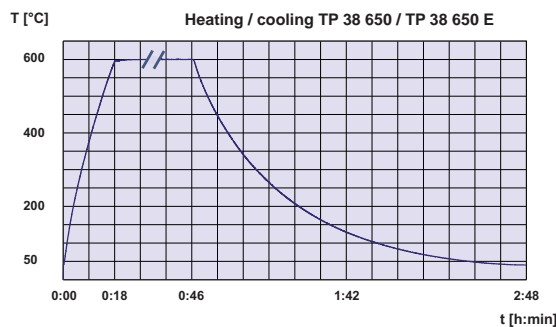
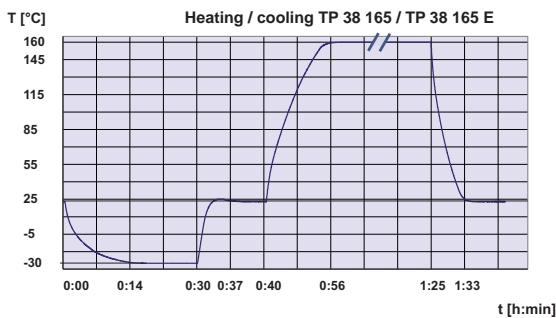


### Tested safety

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



### 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.

# Dry block calibrator with cooling and heating function

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



Device type	TP 38 165	TP 38 650
Temperature range	-35 °C...165 °C	RT...650 °C
Tolerance	±0.1 °C	±0.2 °C
Stability	0.01 °C...0.05 °C	0.03 °C...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 bore 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. 153 x 347 x 348 mm	
Weight	approx. 12 kg	approx. 10 kg
<b>Options</b>		
Accessories	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...165 °C	RT...650 °C
Tolerance	±0.1 °C	±0.2 °C
Stability	0.01 °C...0.05 °C	0.03 °C...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	
Operating elements	Membrane keyboard	
<b>Block</b>		
Block material	Aluminium	Brass
Block bore	28 mm	
Immersion depth	150 mm	
Adapter sleeves	Inside bore 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	
<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. 153 x 347 x 348 mm	
Weight	approx. 12 kg	approx. 10 kg
Options		
Accessories	Service case, software, certificate, retrofit precision measuring instrument	

# Calibration reference sensors



If the sensor to be calibrated is too short to be inserted into the homogeneous temperature zone of the metal block, an external reference sensor can be used without any problems. This results in a small, flexible measurement zone.

## An ace of calibration

In everyday use, various kinds of shock and vibration are unavoidable. To prevent the structure of the sensor and thus its electrical characteristics being affected, a stainless steel immersion tube is used.

Particular attention is given to the physical construction to ensure that shocks have minimal effect on the reference sensor.

The use of robust measuring elements in thinfilm technology ensure standardised and reliable performance.

Intensive ageing tests are carried out at the maximum operating temperature to examine longterm temperature stability. In order to detect longterm effects through thermal stress, a defined tempering process is carried out with a special selection of reference sensors over 300 hours. In the case of stress caused by thermocycling, no significant hysteresis effects were found.

The physical structure of the reference sensors requires that different materials be joined together. The special design of the joint areas prevents the occurrence of parasitic thermoelectric voltages. Thus the measurement reading is not affected by the temperature gradients from the measurement point to the handle.

In examining the self-heating characteristics it was seen that measurement currents  $\leq 1$  mA are ideally suited, since no distortion of the measurement result occurs. Here the self-heating effect can be neglected.

## Technical data

### Calibration reference sensor - Type TF

Pt100 without probe specific linearization

Measuring range	
<b>TF 255-3-300</b>	-50...255 °C / sensitive area 2 mm
<b>TF 650-3-300</b>	-50...650 °C / sensitive area 5 mm
Tolerance	
DIN Class B $\pm 0.3$ °C $\pm 0.005^*[T]$	
Version	
<b>Material</b>	Rust and acid-proof stainless steel 1.4571 Robust plastic handle
<b>Immersion tube</b>	$\varnothing$ 3 mm, L = 300 mm
<b>Electrical connection</b>	Silicon cable with 7-pin mini DIN-plug

### Calibration reference sensor - Type TFE

Pt100 with probe specific linearization through EEPROM in the handle

Measuring range	
	-50...550 °C / sensitive area 5 mm
Tolerance	
$\pm 0.05$ °C in the range of -35.00...199.99 °C, else $\pm 0.3$ °C	
Version	
<b>Material</b>	Rust and acid-proof stainless steel 1.4571 Robust plastic handle
<b>Immersion tube</b>	$\varnothing$ 3 mm, L = 300 mm
<b>Electrical connection</b>	Silicon cable with 7-pin mini DIN-plug



# Extend your calibration possibilities

Already integrated or easy to retrofit



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:

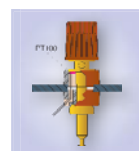
- Resistance thermometers (RTD)  
Pt100, Pt500 and Pt1000 in 2, 3 or 4 wire
- Thermocouples (TC) of the types  
K, J, N, E, R, T, B, S, L and U
- Current signals 0(4)-20 mA of temperature transmitters (mA) with and without transmitter supply
- Temperature switches and thermostats with "normally open" and "normally closed" contacts

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



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.

# TT-Scan

## Precision measuring instrument with scanner



Properties																																					
<b>Possibilities to connect</b>	<table border="1"> <thead> <tr> <th colspan="3">RTD</th> <th>TC</th> <th>mA</th> <th>switch</th> </tr> <tr> <th>4 wire</th> <th>3 wire</th> <th>2 wire</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> <tr> <td>4</td> <td>4</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	RTD			TC	mA	switch	4 wire	3 wire	2 wire				1						2	2	2	2	2	2	3	3	3	3	3	3	4	4				
RTD			TC	mA	switch																																
4 wire	3 wire	2 wire																																			
1																																					
2	2	2	2	2	2																																
3	3	3	3	3	3																																
4	4																																				
<b>Version</b>	Scanner device with precision measuring instrument																																				
<b>Measuring inputs</b>	Switchable for up to 8 sensors Sensor type free configurable Technical data see page 11																																				
General data																																					
<b>Power supply</b>	230 VAC $\pm 10\%$ , 50/60 Hz over adapter																																				
<b>Power consumption</b>	approx. 100 W																																				
<b>Dimensions (D x W x H)</b>	200 x 140 + 40 x 380 mm																																				
<b>Weight</b>	approx. 2.5 kg																																				
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																																				
Options																																					
	Aluminium transport case, test & calibration software, DKD-Certificate, SIKA works certificate, external calibration reference sensors																																				

# TT-Scan - measuring inputs

## Technical data

	Version	Measuring range	Tolerance
<b>Resistance thermometer according to DIN EN 60751</b>			
Pt100 Pt500 Pt1000	2-, 3-, 4-wire	-90.00 °C...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...999.99 °C 1000.0...1370.0 °C	±0.007 % FS ±0.01 °C ±0.005 % FS ±0.1 °C
Type J	FeCu-Ni	-90.00...900.00 °C	±0.005 % FS ±0.01 °C
Type N	NiCrSi - NiSiMg	-90.00...999.99 °C 1000.0...1370.0 °C	±0.007 % FS ±0.01 °C ±0.005 % FS ±0.1 °C
Type E	NiCr-CuNi	-90.00...700.00 °C	±0.005 % FS ±0.01 °C
Type R	Pt13Rh – Pt	0.00...999.99 °C 1000.0...1760.0 °C	±0.05 % FS ±0.01 °C ±0.03 % FS ±0.1 °C
Type T	Cu-CuNi	-90.00...400.00 °C	±0.01 % FS ±0.01 °C
Type B	Pt30Rh-Pt6Rh	0.00...999.99 °C 1000.0...1820.0 °C	±0.05 % FS ±0.01 °C ±0.03 % FS ±0.1 °C
Type S	Pt10Rh-Pt	0.00...999.99 °C 1000.0...1760.0 °C	±0.05 % FS ±0.01 °C ±0.03 % FS ±0.1 °C
Type L	Fe-CuNi	-90.00...900.00 °C	±0.005 % FS ±0.01 °C
Type U	Cu-CuNi	90.00...600.00 °C	±0.01 % FS ±0.01 °C
Automatic comparison point compensation between 0 °C and 60 °C Accuracy of the comparison point Pt100 DIN class A Possibility of connection through 4 mm connections free of thermal voltage			
<b>Standard signal input</b>			
Current (switchable)	mA	0(4)...20 mA	±0.015 % FS ±0.01 mA
Transmitter supply 24 VDC, I <sub>max</sub> = 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 Potential-free input contacts (U <sub>max</sub> = 5 V, I <sub>max</sub> = 1 mA) Possibility of connection through 4 mm connections free of thermal voltage			
<b>Calibration reference sensor connection</b>			
Pt100	4-wire	-90.00...850.00 °C	±0.005 % FS ±0.01 °C
Polynomial correctable through internal parameters or through external EEPROM inside the sensor Possibility of connection through 7-pin built-in socket			

# Our Production and Sales Range



Flow Sensors without moving Parts



Turbine Flow Sensors



Flow Switches



Pressure Gauges and Pressure Sensors



Industrial Thermometers



Electronic Digital Thermometers, Dial Thermometers



Measuring Instruments



Temperature Sensors



Calibrators, DKD-Laboratory

## Your competent partner for measurement and control

**SIKA**<sup>®</sup>  
founded 1901  
Dr. Siebert & Kühn GmbH & Co. KG

...measurement...control...calibration

Phone: 0700 CALL SIKA

Phone: +49 5605 803-0

Fax: +49 5605 803-54

E-Mail: 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

