Multifunction Temperature Calibrator

founded 1901
Dr. Siebert & Kühn GmbH & Co. KG

Series TP Multi

TP Multi - Flexibility and Precision

One device - four functions

When it comes to ensuring the reliable functioning of machines and industrial plants, exact temperature measurement or monitoring is a must. Incorrectly displayed temperature readings increase the risk of failure.

Temperature is one of the most important indicators for product quality. Exact measurement results ensure consistency in the quality of products.

Temperature sensors are subject to mechanical, thermal and chemical stresses, particularly in industrial applications. Only by regularly calibrating the sensors can the user know the difference between the actual temperature and the temperature reading obtained.

It follows that sensor calibration is of particular importance. Regular checking of the temperature sensors is essential for both economic and safety reasons, and indeed has been made mandatory in many areas of application.

Our temperature calibrators and calibration baths can today be found in many areas of research and development laboratories, testing and inspection departments and in production areas as standard equipment for service technicians.

In the real world a wide variety of sensor types can be found. Immersion or surface sensors are common.

An increasing number of contact-free infrared temperature sensors are also being used. This means that calibration is becoming an increasingly varied range of tasks. SIKA has developed the TP Multi series to help stay abreast of these increasingly complex requirements.

These compact and robust calibrators are easy to transport, simple to use and offer all the features required for on-site or laboratory testing, e.g. in

- power generation and distribution
- chemicals and petrochemicals
- pharmaceuticals
- the food industry

The three basic models cover a wide range of applications. The user can change easily between dry block, micro bath, infrared and surface sensor calibrator with minimal disruption.

The calibrators feature precisely controlled metal blocks or liquid tanks. These heat sources are fitted and insulated within the instrument housing. Different measuring sleeves or calibration fluids are used for different calibration tasks.

Basic types / Functions

Type	Micro Bath	Dry block	Infrared	Surface
Control sensor	*internal*	*internal*	*internal*	*external*
TPM165S	-35…165 °C	-35…165 °C	-35…165 °C	---
TPM165S-U	-35…165 °C	-35…165 °C	-35…165 °C	-25…150 °C
TPM225S	U…225 °C	U…225 °C	U…225 °C	---
TPM225S-U	U…225 °C	U…225 °C	U…225 °C	U…200 °C
TP17450S	---	U…450 °C	U…450 °C	---
TP17450S-U	---	U…450 °C	U…450 °C	U…400 °C

Main features

Multi-functional calibrators include features that may vary according to model and version.

Please consult the technical data and descriptions for specific details.

Block

Ø 60 mm, depth 150 mm (170 mm)
in aluminium

LED display

2-line, 4-digit display
for reference temperature (red) and
set temperature (green) with
unit °C (°F optional)

Dimensions/Weight

Width approx. 150 mm
Height approx. 330+70 mm
Depth approx. 270 mm
Weight approx. 7.5 kg

Dimensions/Weight

Width approx. 210 mm
Height approx. 380+50 mm
Depth approx. 300 mm
Weight approx. 12.5 kg

Features

- Control via digital PID controller
- Automatic fine adjustment
  with soft-start for fan
- Controller OFF function
- Manual temperature control
- Set-value memory for 4 temperature values
- Gradient control °C/min
- ramp / duration function
- Serial RS 485 interface

A guarantee of 5 years is grant to all TP 17 000 / TP 17 000 S / TP M 000 which are calibrated and tested at least once per year by the SIKA DKD laboratory.

Micro calibration baths
with cooling and heating function

TP M 165 S / TP M 165 S-U

Calibration functions	TP M 165 S	TP M 165 S-U
Control sensor	Internal	Switchable internal/external
Micro bath		
Temperature range Tolerance Stability	-35...165 °C ±0.1 °C ±0.05 °C	-35...165 °C ±0.1 °C ±0.05 °C
Dry block		
Temperature range Tolerance Stability	-35...165 °C ±0.3 °C ±0.05 °C	-35...165 °C ±0.3 °C ±0.05 °C
Infrared		
Temperature range Tolerance Stability	-35...165 °C ±0.5 °C ±0.05 °C	-35...165 °C ±0.5 °C ±0.05 °C
Surface		
Temperature range Tolerance Stability	---	-25 °C...150 °C ±1 °C ±0.2 °C
Display		
Display range	-50...165 °C	
Resolution	0.01 °C in the range -9.99...99.99 °C, else 0.1 °C	
General data		
Power supply	100...240 VAC, 50/60 Hz	
Power consumption	Approx. 400 VA	
Equipment features		
	Magnetic stirrer, sensor basket, screw cap, suction pump, sensorlid with 5 silicone plugs	
		Reference sensor TF255-3-300
Options		
	DKD-Certificate, SIKA works certificate, test & calibration software, PC connection RS 232 or USB, aluminium transport case, measuring sleeves, calibration fluids, stand base and reference sensors	

Micro calibration baths with heating function

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TP M 225 S / TP M 225 S-U

Calibration functions	TP M 225 S	TP M 225 S-U
Control sensor	Internal	Switchable internal/external
Micro bath		
Temperature range Tolerance Stability	U...225 °C ±0.2 °C ±0.05 °C	U...225 °C ±0.2 °C ±0.05 °C
Dry block		
Temperature range Tolerance Stability	U...225 °C ±0.4 °C ±0.05 °C	U...225 °C ±0.4 °C ±0.05 °C
Infrared		
Temperature range Tolerance Stability	U...225 °C ±0.5 °C ±0.05 °C	U...225 °C ±0.5 °C ±0.05 °C
Surface		
Temperature range Tolerance Stability	---	U...200 °C ±1 °C ±0.2 °C
Display		
Display range	0...225 °C	
Resolution	0.01 °C in the range 0.00...99.99 °C, else 0.1 °C	
General data		
Power supply	230 VAC ±10 %, 50/60 Hz	
Power consumption	Approx. 1000 VA	
Equipment features		
	Magnetic stirrer, sensor basket, screw cap, suction pump, function cap, sensorlid with 5 silicone plugs	
		Reference sensor TF255-3-300
Options		
	DKD-Certificate, SIKA works certificate, test & calibartion software, PC connection RS 232 or USB, supply 115 VAC, aluminium transport case, service bag, measuring sleeves, calibration fluids, support base and reference sensors	

Metal block calibrators with heating function

TP 17 450 S & TP 17 450 S-U

Calibration functions	TP 17 450 S	TP 17 450 S-U
Control sensor	Internal	Switchable internal/external
Micro bath		
Temperature range Tolerance Stability	---	---
Dry block		
Temperature range Tolerance Stability	U...450 °C ±0.4 °C ±0.05 °C	U...450 °C ±0.4 °C ±0.05 °C
Infrared		
Temperature range Tolerance Stability	U...450 °C ±0.5 °C ±0.05 °C	U...450 °C ±0.5 °C ±0.05 °C
Surface		
Temperature range Tolerance Stability	---	U...400 °C ±1 °C ±0.2 °C
Display		
Display range	0...450 °C	
Resolution	0.01 °C in the range of 0.00...99.99 °C, else 0.1 °C	
General data		
Power supply	230 VAC ±10 %, 50/60 Hz	
Power consumption	Approx. 2000 VA	
Equipment features		
		Reference sensor TF650-6-300
Options		
	DKD-Certificate, SIKA works certificate, test & calibartion software, PC connection RS 232 or USB, aluminium transport case, service bag, measuring sleeves, support base and reference sensors	

Measuring sleeves and calibration fluids

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Adapter sleeves

The dry block function was developed to simplify calibration in laboratory and field conditions. The use of adapter sleeves makes it possible to calibrate almost all straight temperature sensors of different lengths and diameters. The dry block allows the entire temperature range to be covered without any change of calibration medium. Problems related to viscosity, flashpoints and outgassing are eliminated.

Black-body measuring sleeves

Where IR pyrometers or thermal image cameras must be calibrated, a special infrared calibration sleeve is used. The special surface structure and its asymmetrical shapes create an ‚ideal cavity radiator' with an emission factor of 0.9994.

Surface temperature measuring sleeve

This is a special sleeve designed to calibrate surface temperature sensors. Directly beneath the abutting face of the sleeve is a reference sensor that creates the reference point for the sensor to be calibrated, which is placed on top of it. The special design of the abutting face offers good thermal contact. There is no need to use thermal grease or other thermal conduction aids.

Calibration fluids

Use of fluids as calibration media is advantageous for calibrating temperature sensors with unusual shapes and dimensions. The test object is placed directly into the fluid without any insulating air gap, so that a direct temperature link is formed between calibrator and sensor under test.

The sensor to be calibrated can be tested directly without an additional adapter sleeve. The circulation serves to extend the homogeneous temperature zone. The fluids used, e.g. silicone oil, are selected to suit the required calibration temperature.

Adapter sleeves ①		
Adapter sleeve (60/150)	Aluminium version Outside diameter 60 mm	For TP 17 450 S / TP 17 450 S-U Depth 150 mm Bore diameter between 1.5 mm and 55 mm in 0.5 mm steps available
Adapter sleeve (60/163)		For TP M xxx S / TP M xxx S-U Depth 163 mm Bore diameter between 1.5 mm und 55 mm in 0.5 mm steps available
Black-body measuring sleeves ②		
IR adapter sleeve (60/150)	Aluminium version Outside diameter 60 mm	Depth 150 mm Drillings for reference sensors 2x 3 mm, 1x 4 mm
Surface temperature measuring sleeve ③		
Surface adapter sleeve (60/172)	Aluminium version Outside diameter 60 mm	For TP 17 450 S-U with stainless steel protection Depth 172 mm Drillings for reference sensors 2x 3 mm, 1x 4 mm
Surface adapter sleeve (60/204)		for TP M xxx S-U Depth 204 mm Drillings for reference sensors 2x 3 mm, 1x 4 mm

Calibration reference sensors

If the sensor to be calibrated is too short to be inserted into the homogeneous temperature zone of the metal block or micro bath, an external reference sensor can be used without any problems. In addition, with surface temperature calibration it is necessary to use the external reference as the reference point. This results in a small, punctiform 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 thin-film technology ensure standardised and reliable performance.

Intensive ageing tests are carried out at the maximum operating temperature to examine long-term temperature stability. In order to detect long-term 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 ≤ 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 reference sensor suitable for TP Multi, Linearisation in controller

Measuring range	
TF 255-3-300	-50...255 °C / sensitive area 2 mm
TF 650-3-300	-50...650 °C / sensitive area 5 mm
Tolerance	
±0.05 °C in the range of -9.99...99.99 °C, else ±0.1 °C	
Version	
Material	Rust and acid-proof stainless steel 1.4571
	Robust plastic handle
Immersion tube	Ø 3 mm, L = 300 mm
Electrical connection	Silicon cable with 4-pin mini DIN-plug

Calibration reference sensor - Type TFEE

Pt100 reference sensor suitable for TT Scan, Linearisation in sensor

Measuring range	
	-50...550 °C / sensitive area 5 mm
Tolerance	
±0.05 °C in the range of -35.00...199.99 °C , else ±0.1 °C	
Version	
Material	Rust and acid-proof stainless steel 1.4571
	Robust plastic handle
Immersion tube	Ø 3 mm, L = 300 mm
Electrical connection	Silicon cable with 7-pin mini DIN-plug

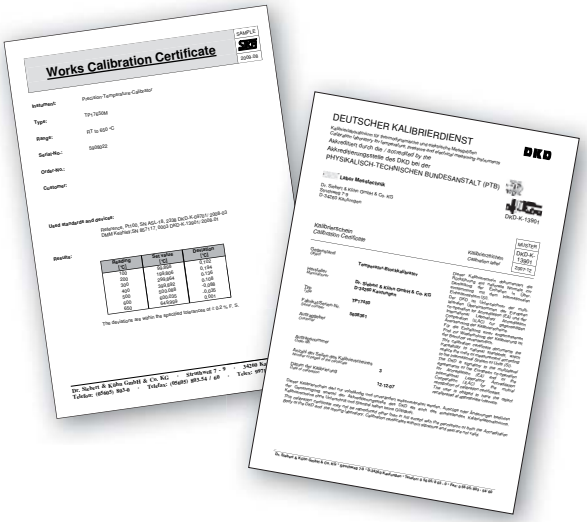
Accessories

Equipment, software and certificates

Calibration and testing software

The software for Windows PCs contains a comprehensive selection of programs for programming and evaluating the TP Multi S-x and TT Scan via an external PC.

- Programmable ramp function
- Programmable temperature cycles
- Series test (e.g. for incoming goods inspection)
- Test data in graphical and tabular form
- Customer data merged into certificates
- Programmable temperature gradient
- Processing of test object data
- Automatic, parallel creation of certificates



Support base

The support base, with two guide rods and two adjustable plates, serves as a holder for up to 5 sensors. It is suitable for all TP Multi models and can be easily bolted by means of a threaded ring directly to the tank, or fixed to the supporting ring.

Service case and protective pouches

A service transport case is available in robust aluminium construction to ensure safe transport to on-site locations. For the TP M 225 S-x and TP 17 450 S-x there is also the a service transport bag in robust padded nylon.

Interface converter

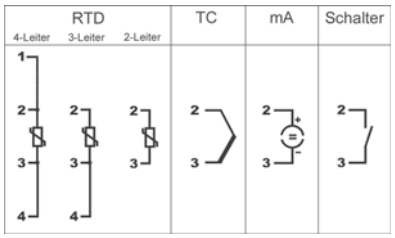
To connect the TP Multi calibrator to a PC, a special data converter with level converter is required. Optionally available with RS 232 or USB interface.

Certificates

Test certificates created in compliance with DKD guideline DKD-R5-4 for micro bath or dry block function. SIKA works certificates for micro bath, dry block, infrared or surface function.

TT-Scan

Technical data - precision measuring instrument with scanner

Properties	
Possibilities to connect	
Version	Scanner device with precision measuring instrument
Measuring inputs	Switchable For up to 8 sensors Sensor type free configurable Technical datas see page 11
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 x 140 + 40 x 380 mm
Weight	Approx. 2.5 kg
Equipment features	
	32x 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	
	DKD-Certificate, SIKA works certificate, test & calibration software, Aluminium transport case, reference sensors

TT-Scan - measuring inputs

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Technical data

	Version	Measuring range	Tolerance
Resistance thermometer according to DIN EN 60751			
Pt100 Pt500 Pt1000	2, 3, 4 wire	-90.00...850.00 °C	±0.005 % FS ±0.01 °C
Connection possibility through 4 mm connections free of thermal voltage			
Thermocouples according to DIN EN60584 / DIN 43710			
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			
Standard signal input			
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			
Temperature switch			
Automatic detection of an edge change, determining the hysteresis, Independent detection normally closed / normally open Potential-free input contacts (U_{max} = 5 V, I_{max} = 1 mA) Possibility of connection through 4 mm connections free of thermal voltage			
Calibration reference sensor connection			
Pt100	4-wire	-90.00 °C...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			

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…measurement…control…calibration

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Subject to technical modification

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