

# Temperature multi-function calibrator

## Premium version

### Model CTM9350-165

WIKA data sheet CT 41.41

#### Applications

- Bio and pharmaceutical industries
- Food industry
- Power plants and plant construction
- Measurement and control laboratories in the chemical industry
- Demanding calibrations in production and laboratory

#### Special features

- Easy operation via intuitive, user-friendly menus
- Large, easy-to-read touchscreen
- Short response times due to optimised control
- Multi-function instrument with four controller parameter sets
- Creation of calibration tasks incl. preparation of a certificate



**Fig. left: with integrated measuring instrument**  
**Fig. right: without integrated measuring instrument**

#### Description

Whether in laboratories, workshops or on-site, the CTM9350 series of temperature multi-function calibrators can meet any calibration requirement. All instruments can be fitted, with an integrated measuring instrument. This enables the measurement of resistances, thermoelectric voltages and also current signals (from thermometers with a 0/4 ... 20 mA transmitter) and their direct display in the selected unit.

Using a dry-well calibrator or a micro calibration bath to calibrate either surface thermometers or non-contact thermometers does not reflect the application and can result in false values. In these cases, the model CTM9350-165 multi-function calibrator should be used.

With this temperature multi-function calibrator, in the temperature range from  $-30 \dots +165 \text{ }^\circ\text{C}$  [ $-22 \dots +329 \text{ }^\circ\text{F}$ ], you can cover not only the common functions, but also, with special inserts, this can be used as a surface temperature calibrator and an infrared black body.

It is operated via a large colour touchscreen. Test tasks can be created and automated via the user interface, saving the user a lot of time. Operation is intuitive and fast.

### Easy calibration, with automatic certificate generation

The instrument's software makes it easy to create calibration tasks to simplify the calibration process for the user as much as possible. With this, automatic calibrations can be performed after adding a test item and the desired measuring points. The measured value can be recorded with the integrated measuring instrument, manually or with an optional USB camera. At the end of the process, the instrument's own software creates a calibration certificate.

### Increase productivity

Since, in a large number of processes, the time factor is important, an actual time calculation is carried out and the change time is displayed each time the temperature values change. This gives the user a better overview of their heating and cooling times.

### Stable, homogeneous dry-well temperature

Due to a controller, which has been specifically developed for temperature calibration, and a special heating block for temperatures to 165 °C [329 °F], a high control accuracy and a homogeneous temperature distribution within the block is achieved. Important features in this context are control algorithms, which have been optimised for the calibration processes, and a heating block with a heating power that increases towards the upper end. The small resulting temperature fluctuations and the good axial temperature distribution lead to a considerably reduced total measurement uncertainty during calibration.

With suitable media, the multi-function calibrator can be used as a micro calibration bath. Permitted liquids are silicone oils, mineral oils and water.

## Specifications of the temperature multi-function calibrator

All results were measured in conjunction with the external reference from the standard scope of supply for the CTM9350-165. For all four functions, the external reference is required.

Basic information		
Temperature range	Application as:	
	Dry-well calibrator	-30 ... +160 °C [-22 ... +320 °F]
	Micro calibration bath	-30 ... +155 °C [-22 ... +311 °F]
	Surface temperature calibrator	-25 ... +150 °C [-13 ... +302 °F]
	Infrared black body	-30 ... +165 °C [-22 ... +329 °F]
Accuracy	Application as:	
	Dry-well calibrator	±0.07 K
	Micro calibration bath	±0.10 K
	Surface temperature calibrator	±0.5 K
	Infrared black body	±0.5 K
	Defined the measuring deviation between the measured value and the reference value.	
Temperature stability	Application as:	
	Dry-well calibrator	±0.005 K
	Micro calibration bath	±0.01 K
	Surface temperature calibrator	±0.150 K
	Infrared black body	±0.020 K
	Maximum temperature difference at a stable temperature over 30 minutes.	
Temperature control		
Heating time	From +20 °C to +155 °C [from +68 °F to +311 °F]	27 min
	From -20 °C to +155 °C [from 4 °F to +311 °F]	34 min
Cooling time	From +20 °C to -25 °C [from +68 °F to -13 °F]	35 min
	From +165 °C to +30 °C [from +329 °F to 86 °F]	17 min
Stabilisation time	Dependent on temperature and temperature probe	
Metal block		
Dimension for calibration insert	Ø 60 x 170 mm [Ø 2.36 x 6.69 in]	
Dry-well material	Aluminium	

Basic information	
<b>Digital display instrument</b>	
Display	Bright colour touchscreen (7"), laminated safety glass
Display range	-199.9 ... +999.9 °C [-199.9 ... +999.9 °F]
Resolution	0.001 °C
Units	°C, °F, K
Menu languages	English German
<b>Functions</b>	
Menu functions	Calibration without certificate Calibration with automatic certificate generation Remote control Data export to a USB stick
User settings	User-defined data is indicated on the test certificate
<b>Dimensions (W x D x H)</b>	
Calibrator without carrying handle	210 x 300 x 430 mm [8.27 x 11.81 x 16.93 in]
Height of carrying handle	50 mm [1.97 in]
<b>Weight</b>	13 kg [28.67 lb]

Accuracy specifications	Application as	
	Dry-well calibrator	Micro calibration bath
<b>Temperature range</b>	-30 ... +160 °C [-22 ... +320 °F]	-30 ... +155 °C [-22 ... +311 °F]
<b>Accuracy</b> <sup>1)</sup>	±0.07 K	±0.10 K
<b>Temperature stability</b> <sup>2)</sup>	±0.005 K	±0.01 K
<b>Influence due to loading</b> <sup>1)</sup>		
External reference temperature probe	±0.01 K	±0.02 K
<b>Temperature distribution</b>	Determined in accordance with current calibration guideline in a standard insert sleeve.	
Axial homogeneity	±0.06 K	±0.1 K
Radial homogeneity	±0.01 K	±0.08 K
<b>Hysteresis</b>	±0.010 K	±0.010 K

1) Defined the measuring deviation between the measured value and the reference value.

2) Maximum temperature difference at a stable temperature over 30 minutes.

Communication	
<b>Interface</b>	3 x USB Ethernet
<b>Connectivity</b>	OPC UA Serial communication HTTP → Details and further possibilities on request
<b>Baud rate</b>	2400
<b>Measuring rate</b>	1 measured value per second
<b>Internal program</b>	Test items, test tasks and test points can be applied without limit

Voltage supply and performance data	
<b>Operating voltage</b> <sup>1)</sup>	AC 90 ... 240 V, 50/60 Hz
<b>Power consumption</b>	375 W
<b>Fuse</b>	Micro fuse, 6.3 AH 250 V slow blow fuse

## Voltage supply and performance data

<b>Power cord</b>	<ul style="list-style-type: none"><li>■ Europe</li><li>■ USA/Canada</li><li>■ Switzerland</li><li>■ UK</li><li>■ China</li></ul>
-------------------	--

1) AC 115 V auxiliary power must be specified on the order, otherwise an AC 230 V one will be delivered.

## Operating conditions

<b>Place of use</b>	For indoor use only
<b>Operating altitude</b>	≤ 2,000 m [≤ 6,562 ft] above sea level
<b>Operating temperature</b>	0 ... 50 °C [32 ... 122 °F] The ambient temperature influences the heating/cooling behaviour
<b>Storage and transport temperature range</b>	-10 ... +60 °C [14 ... 140 °F]
<b>Humidity</b>	< 80 % relative humidity to 31 °C [88 °F] Decreasing linearly to 50 % relative humidity at 40 °C [104 °F]
<b>Condensation</b>	Non-condensing
<b>Electrical safety</b>	
Overvoltage category	II
Pollution degree	2 per IEC-61010-1

## Specifications for integrated measuring instrument

### Output signal


<b>Analogue output</b>	
Voltage supply	DC 24 V (can be activated via menu)
Load	Max. 24 mA
<b>Switching function</b>	NC, NO

### Electrical connection

<b>Number of channels</b>		
Resistance thermometer	2	
Thermocouple	2	
Current signal	1	
Voltage signal	1	
Switch test	2	
<b>Connection type</b>		
Resistance thermometer	4 x 4-mm banana jacks	
Thermocouple	2 x thermocouple terminal (mini)	
Current and voltage signal	4 mm banana jacks	
<b>Pin assignment</b>		
Resistance thermometer	2-wire connection 3-wire connection 4-wire connection	
<b>Measuring range</b>		
Resistance thermometer	Pt100	0 ... 400 Ω
	Pt1000	0 ... 4,000 Ω
Thermocouple	-10 ... +100 mV	
Current signal	DC 0 ... 24 mA	
Voltage signal	DC 0 ... 12 V	

Accuracies	Measuring range	Accuracy
<b>Resistance thermometer</b>		
Pt100	-200 ... +850 °C [-328 ... +1,562 °F]	±0.03 K
Pt500	-200 ... +850 °C [-328 ... +1,562 °F]	±0.12 K
Pt1000	-200 ... +850 °C [-328 ... +1,562 °F]	±0.06 K
Ni100	-60 ... +180 °C [-76 ... +356 °F]	±0.02 K
Ni500	-60 ... +200 °C [-76 ... +392 °F]	±0.08 K
Ni1000	-60 ... +200 °C [-76 ... +392 °F]	±0.04 K
<b>Cold junction</b>	-200 ... +1,820 °C [-328 ... +3,308 °F]	±0.3 K
<b>Thermocouple</b>		
Type K	-160 ... +1,260 °C [-256 ... +2,300 °F]	±0.08 K
Type J	-190 ... +1,200 °C [-310 ... +2,192 °F]	±0.07 K
Type N	0 ... 1,300 °C [32 ... 2,372 °F]	±0.13 K
Type E	-200 ... +1,000 °C [-328 ... +1,832 °F]	±0.06 K
Type T	-130 ... +400 °C [-202 ... +752 °F]	±0.09 K
Type R	160 ... 1,760 °C [320 ... 3,200 °F]	±0.78 K
Type S	170 ... 1,760 °C [338 ... 3,200 °F]	±0.73 K
Type B	920 ... 1,820 °C [1,688 ... 3,308 °F]	±0.5 K
<b>Direct current</b>	0 ... 24 mA	0.01 % of end value
<b>DC voltage</b>	0 ... 12 V	0.01 % of end value

## Approvals

Logo	Description	Region
	<b>EU declaration of conformity</b>	European Union
	EMC directive EN 61326 emission (group 1, class A) and immunity (industrial environment)	
	Low Voltage Directive EN 61010, safety requirements for electrical equipment for measurement, control and laboratory use	
	RoHS directive	

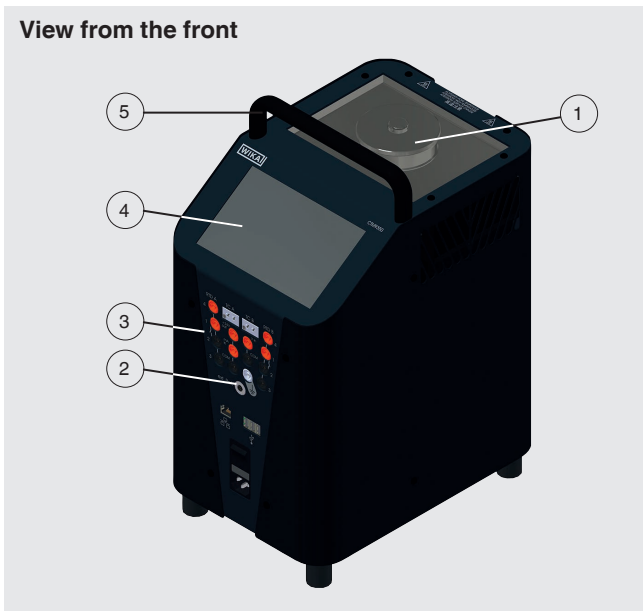
## Certificates

Description	
<b>Calibration</b>	
Integrated measuring instrument	<ul style="list-style-type: none"> <li>■ Without</li> <li>■ 3.1 inspection certificate per EN 10204 for RTD, TC, mA and V</li> <li>■ DAkkS calibration certificate for RTD, TC, mA and V</li> </ul>
Instrument	<ul style="list-style-type: none"> <li>■ 3.1 inspection certificate per EN 10204</li> <li>■ DAkkS calibration certificate as micro calibration bath (traceable and accredited in accordance with ISO/IEC 17025)</li> <li>■ DAkkS calibration certificate as temperature dry-well calibrator (traceable and accredited in accordance with ISO/IEC 17025)</li> <li>■ DAkkS calibration certificate as micro calibration bath and as temperature dry-well calibrator (traceable and accredited in accordance with ISO/IEC 17025)</li> </ul>
<b>Recommended calibration interval</b>	1 year (dependent on conditions of use)

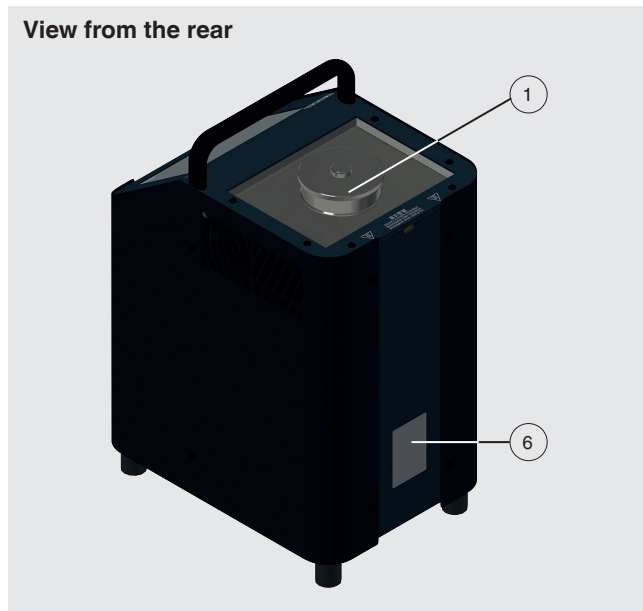
→ For approvals and certificates, see website

## Isometric views

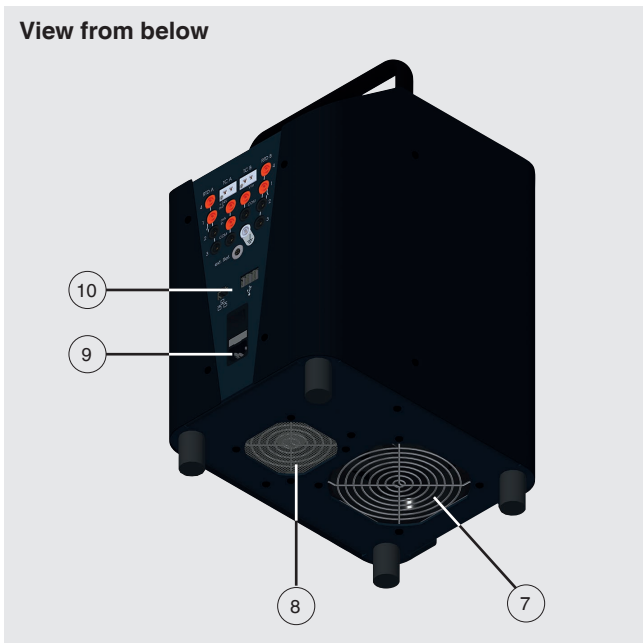
View from the front



View from the rear



View from below



- ① Temperature dry well / Liquid bath
- ② Connection for external reference sensor
- ③ Integrated measuring instrument
- ④ Digital display / Display with touchscreen
- ⑤ Carrying handle
- ⑥ Product label
- ⑦ Fan 1: Ventilation for tank or temperature dry well cooling
- ⑧ Fan 2: Ventilation for case cooling
- ⑨ Mains connector socket with main switch and microfuse
- ⑩ Interfaces for PC and network

## Accessories and their applications

The function of the calibrator is determined by the insert. The required insert is inserted into the opening of the metal block or tank.




This makes it easy to switch between dry well, infrared, surface and micro calibration bath functions.

Description <sup>1)</sup>	
<p><b>Inserts</b></p> <p>The insert has several bores into which the temperature probes being calibrated and one additional reference thermometer, for comparative calibration, can be inserted. The block is either heated or cooled to the desired calibration temperature. Once a stable temperature has been reached, the temperature probes to be calibrated can be compared with the reference thermometer. The documentation of this comparison represents the calibration.</p>	
<p><b>Insert for surface measurement</b></p> <p>The calibration of surface temperature probes is very difficult and not without controversy. Temperature probes mounted on surfaces dissipate heat from the surface and create a cold zone on the surface being measured. In the temperature multi-function calibrator, the calibration temperature is created in a specially designed surface insert and measured directly under the surface by an external reference thermometer.</p>	
<p><b>Insert for infrared measurement</b></p> <p>The measuring spot of the pyrometer being calibrated must be smaller than the diameter of the infrared insert. The sleeve has been specifically manufactured with regard to its design and surface in order to achieve a defined emissivity for the measurement. Fit the hollow and specially designed insert into the block using a special replacement tool. The sleeve also has three bores in the edge with 2 x 3.5 mm and 1 x 4.5 mm [2 x 0.14 in and 1 x 0.18 in], for the accurate monitoring of the temperature via external reference probes. The insert has a special design and surface finish on the inside. Through this, an emissivity of 0.9994 (black body) is achieved.</p>	
<p><b>Insert for liquids and probe basket for tank</b></p> <p>Angled probes, large-diameter probes or probes with special designs cannot be calibrated with a dry-well calibrator. For this reason, the temperature multi-function calibrator also has the possibility to function as a stirred liquid bath. The liquid is circulated using a magnetic stirrer, and thus provides very good temperature distribution within the bath. The liquids are selected depending upon the desired calibration temperature.</p>	
<p><b>Reference thermometer</b></p> <p>Angled temperature probes are supplied to match the insert.</p>	







1) The figures are examples and may change in design, material composition and representation depending on the state of the art


## Accessories and spare parts

Accessories for model CTM9350-165		Order code
Description <sup>1)</sup>		CTX-A-KE
	<b>Transport case with trolley frame</b>	-3-
	<b>External reference probe up to max. 255 °C [528 °F]</b> Dimension: Ø 3 x 300 mm [Ø 0.12 x 11.81 in] Angled: 190 mm [7.48 in] – length from the the sensor tip	-E-
	<b>Insert replacement tool</b>	-A-
-	<b>Insert replacement tool</b> For insert for surface measurement	-B-
-	<b>Drain pump</b>	-C-
	<b>Standard sleeve for the surface measurement operating mode</b> Dimensions: Ø 60 x 205 mm [Ø 2.36 x 8.07 in] Material: aluminium 3.4365	-D-
	<b>Standard sleeve for the infrared measurement operating mode</b> Dimensions: Ø 60 x 150 mm [Ø 2.36 x 5.91 in] Material: aluminium 3.4365	-F-
	<b>Standard sleeve for the operating mode as temperature dry-well calibrator</b> Dimensions: Ø 60 x 150 mm [Ø 2.36 x 5.91 in] Material: aluminium 3.4365	-G-
	<b>Silicone oil DC 200.10</b> In 1 litre plastic bottle For temperature range -35 ... +160 °C [-31 ... +320 °F]; FP = 163 °C [325.4 °F]	-H-
	<b>Replaceable insert for liquids</b> New adjustment required	-I-
	<b>Screw-on lid</b> Material: stainless steel	-J-
	<b>Screw-on lid with 6 G ¼ bores</b> Material: plastic	-K-

Accessories for model CTM9350-165		Order code
Description <sup>1)</sup>		CTX-A-KE
	<b>Power cord</b> For the EU	-L-
	For Switzerland	-M-
	For UK	-N-
	For USA/Canada	-O-
	<b>Electrical connection set</b> Consisting of: <ul style="list-style-type: none"> <li>■ Clamp connectors (4 x red, 4 x black and 1 x white)</li> <li>■ 2 x thermocouple adapters</li> <li>■ 2 x split ferrite cores</li> <li>■ 2 x ferrite keys</li> </ul>	-P-
	<b>PC and network cable</b>	-Q-
<b>Ordering information for your enquiry:</b>		
<b>1. Order code: CTX-A-KE</b>		↓
<b>2. Option:</b>		[ ]

1) The figures are an example and may change depending on the state of the art in design, material composition and representation

Inserts for model CTM9350-165		Order code
Description <sup>1)</sup>		CTA9I-4U
	<b>Undrilled insert</b> Dimensions: Ø 60 x 150 mm [Ø 2.36 x 6.69 in] Material: aluminium	-N-
	<b>Drilled insert</b> Dimensions: Ø 60 x 150 mm [Ø 2.36 x 6.69 in] Drilling depth: 145 mm [5.71 in] Material: aluminium	-
	Bore diameter: 1 x 3.2 mm and 1 x 6.3 mm [1 x 0.13 in and 1 x 0.25 in]	-A-
	Bore diameter: 2 x 3.2 mm, 1 x 4.2 mm, 1 x 6.3 mm, 1 x 8.4 mm and 1 x 9.9 mm [2 x 0.13 in, 1 x 0.17 in, 1 x 0.25 in, 1 x 0.33 in and 1 x 0.39 in]	-B-
	Bore diameter: 1 x 3.2 mm, 1 x 5.0 mm, 1 x 6.5 mm and 1 x 10.5 mm [1 x 0.13 in, 1 x 0.20 in, 1 x 0.26 in and 1 x 0.41 in]	-U-
	Bore diameter: 1 x 3.2 mm, 1 x 5.0 mm, 1 x 7.0 mm and 1 x 10.5 mm [1 x 0.13 in, 1 x 0.20 in, 1 x 0.28 in and 1 x 0.41 in]	-V-
	Bore diameter: 1 x 3.3 mm, 1 x 4.8 mm and 2 x 6.4 mm [1 x 0.13 in, 1 x 0.19 in and 2 x 0.25 in]	-W-
	Bore diameter: 2 x 3.2 mm, 2 x 4.3 mm, 3 x 6.3 mm and 2 x 8.5 mm [2 x 0.13 in, 1 x 0.17 in, 3 x 0.25 in and 2 x 0.33 in]	-M-
	Bore diameter: 1 x 2.0 mm, 3 x 3.2 mm, 2 x 4.3 mm, 1 x 5.0 mm und 2 x 6.5 mm [1 x 0.08 in, 3 x 0.13 in, 2 x 0.17 in, 1 x 0.2 in and 2 x 0.26 in]	-Y-
	-	Customer-specific, special probes are possible on request.

Inserts for model CTM9350-165		Order code
Description <sup>1)</sup>		CTA9I-4U
	Insert replacement tool	-J-
Ordering information for your enquiry:		
1. Order code: CTA9I-4U		↓
2. Option:		[ ]

1) The figures are an example and may change depending on the state of the art in design, material composition and representation

## Scope of delivery

- Temperature multi-function calibrator model CTM9350
- Power cord, 1.5 m [5 ft] with safety plug
- PC and network cable
- USB stick with backup function
- Protective packaging / Transport protection
- External reference probe
- Operating instructions
- Calibration certificate

### Incl. accessories for use as calibration bath

- Probe basket
- Insert for liquids
- Drain pump
- Transport cover
- Magnetic stirrer with magnetic lifter
- Operating cover with five silicone plugs
- Calibration liquid

### Incl. accessories for use with various inserts

- Insert with nine bores: Ø 1 x 2.0 mm, 3 x 3.2 mm, 2 x 4.3 mm, 1 x 5.0 mm and 2 x 6.5 mm [1 x 0.08 in, 3 x 0.13 in, 2 x 0.17 in, 1 x 0.2 in and 2 x 0.26 in]
- Infrared insert
- Insert replacement tools
- Surface insert incl. replacement tool

## Ordering information

Model / Temperature range / Integrated measuring instrument / Insert for calibration liquid / Calibration / Transport case / Power cord / Further approvals / Additional ordering information

© 12/2023 WIKA Alexander Wiegand SE & Co. KG, all rights reserved.  
The specifications given in this document represent the state of engineering at the time of publishing.  
We reserve the right to make modifications to the specifications and materials.

