

# 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



Temperature multi-function calibrator, model CTM9350

#### 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  $-35 \dots +165 \text{ }^\circ\text{C}$  [ $-31 \dots +329 \text{ }^\circ\text{F}$ ], 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. Like having four instruments in one!

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.

## Specifications of the temperature multi-function calibrator

Basic information		CTM9350-165			
Application as	Dry-well calibrator	Micro calibration bath	Surface temperature calibrator	Infrared black body source	
Temperature range	-30 ... +160 °C [-22 ... +320 °F]	-35 ... +155 °C [-31 ... +311 °F]	-25 ... +150 °C [-13 ... +302 °F]	-35 ... +165 °C [-31 ... +329 °F]	
Accuracy <sup>1)</sup>	±0.07 K	±0.10 K	±0.5 K	±0.5 K	
Temperature stability <sup>2)</sup>	±0.005 K	±0.01 K	±0.150 K	±0.020 K	
<b>Metal block</b>					
Dimension for calibration insert	Ø 60 x 170 mm [Ø 2.36 x 6.69 in]				
Dry-well material	Aluminium				
<b>Functions</b>					
Menu functions	<ul style="list-style-type: none"> <li>■ Calibration without certificate</li> <li>■ Calibration with certificate</li> <li>■ Remote control</li> <li>■ Data export to a USB stick</li> </ul>				
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]				
Weight	13 kg [28.67 lbs]				

- 1) Is defined as the measuring deviation between the measured value and the reference value.  
 2) Maximum temperature difference at a stable temperature over 30 minutes.

Digital display instrument	
Display	Bright colour touchscreen (7"), laminated safety glass
Display range	-50 ... +165 °C [-58 ... +329 °F]
Resolution	0.001 °C
Units	Adjustable via menu <ul style="list-style-type: none"> <li>■ °C</li> <li>■ °F</li> <li>■ K</li> </ul>
Menu languages	Adjustable via menu <ul style="list-style-type: none"> <li>■ English</li> <li>■ German</li> </ul>

Accuracy specifications	Application as	
	Dry-well calibrator	Micro calibration bath
Temperature range	-30 ... +160 °C [-22 ... +320 °F]	-35 ... +155 °C [-31 ... +311 °F]
Accuracy <sup>1)</sup>	±0.07 K	±0.10 K
Temperature stability <sup>2)</sup>	±0.005 K	±0.01 K
<b>Influence due to loading <sup>1)</sup></b>		
External reference temperature probe	±0.01 K	±0.02 K
<b>Temperature distribution <sup>3)</sup></b>		
Axial homogeneity	±0.06 K	±0.1 K
Radial homogeneity	±0.01 K	±0.08 K
Hysteresis	±0.004 K	±0.013 K

- 1) Is defined as the measuring deviation between the measured value and the reference value.  
 2) Maximum temperature difference at a stable temperature over 30 minutes.  
 3) Determined in accordance with current calibration guideline in a standard insert sleeve.

Temperature control		
Heating time	14 min	From 20 °C to 165 °C [from 68 °F to 329 °F]
	16 min	From -35 °C to +165 °C [from -31 °F to +329 °F]
Cooling time	13 min	From +20 °C to -30 °C [from +68 °F to -22 °F]
	11 min	From +165 °C to 20 °C [from 329 °F to 68 °F]
Stabilisation time	Dependent on temperature and temperature probe	

Electrical connection	
Operating voltage <sup>1)</sup>	AC 100 ... 240 V, 50/60 Hz
Power consumption	375 W
Electrical safety	Overvoltage category (installation category) II, Pollution degree 2 in accordance with IEC 61010-1
Fuse	6.3 AH 250 V slow blow fuse
Power cord	<ul style="list-style-type: none"> <li>■ For Europe</li> <li>■ For USA/Canada</li> <li>■ For Switzerland</li> <li>■ For UK</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	
Place of use	For indoor use only
Altitude	Up to 2,000 m [6,562 ft] above sea level
Operating temperature	0 ... 50 °C [32 ... 122 °F] The ambient temperature influences the heating/cooling behaviour
Storage and transport temperature range	-10 ... +60 °C [14 ... 140 °F]
Relative humidity, condensation	< 80 % to 31 °C [88 °F], decreasing linearly to 50 % at 40 °C [104 °F] (non-condensing)
Mounting position	Upright / vertical standing

Communication	
Interface	<ul style="list-style-type: none"> <li>■ 3 x USB</li> <li>■ Ethernet</li> </ul>
Connectivity	<ul style="list-style-type: none"> <li>■ OPC UA</li> <li>■ Serial communication</li> <li>■ HTTP</li> </ul> Details and further possibilities on request
Baud rate	2400
Measuring rate	1 measured value per second
Internal program	Test items, test tasks and test points can be applied without limit

## 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	<ul style="list-style-type: none"> <li>■ 2-wire connection</li> <li>■ 3-wire connection</li> <li>■ 4-wire connection</li> </ul>				
<b>Measuring range</b>					
Resistance thermometer	<table border="0"> <tr> <td>Pt100</td> <td>0 ... 400 Ω</td> </tr> <tr> <td>Pt1000</td> <td>0 ... 4,000 Ω</td> </tr> </table>	Pt100	0 ... 400 Ω	Pt1000	0 ... 4,000 Ω
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 °C	[±0.05 °F]
Pt500	-200 ... +850 °C	[-328 ... +1,562 °F]	±0.12 °C	[±0.22 °F]
Pt1000	-200 ... +850 °C	[-328 ... +1,562 °F]	±0.06 °C	[±0.11 °F]
Ni100	-60 ... +180 °C	[-76 ... +356 °F]	±0.02 °C	[±0.04 °F]
Ni500	-60 ... +200 °C	[-76 ... +392 °F]	±0.08 °C	[±0.14 °F]
Ni1000	-60 ... +200 °C	[-76 ... +392 °F]	±0.04 °C	[±0.07 °F]
<b>Cold junction</b>	-200 ... +1,820 °C	[-328 ... +3,308 °F]	±0.3 °C	[±0.54 °F]
<b>Thermocouple</b>				
Type K	-160 ... +1,260 °C	[-256 ... +2,300 °F]	±0.08 °C	[±0.14 °F]
Type J	-190 ... +1,200 °C	[-310 ... +2,192 °F]	±0.07 °C	[±0.13 °F]
Type N	0 ... 1,300 °C	[32 ... 2,372 °F]	±0.13 °C	[±0.23 °F]
Type E	-200 ... +1,000 °C	[-328 ... +1,832 °F]	±0.06 °C	[±0.11 °F]
Type T	-130 ... +400 °C	[-202 ... +752 °F]	±0.09 °C	[±0.16 °F]
Type R	160 ... 1,760 °C	[320 ... 3,200 °F]	±0.78 °C	[±1.40 °F]
Type S	170 ... 1,760 °C	[338 ... 3,200 °F]	±0.73 °C	[±1.31 °F]
Type B	920 ... 1,820 °C	[1,688 ... 3,308 °F]	±0.5 °C	[±0.90 °F]

Accuracies	Measuring range	Accuracy
Direct current	0 ... 24 mA	0.01 % of end value
DC voltage	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 application)	
	Low voltage directive EN 61010, safety requirements for electrical equipment for measurement, control and laboratory use	
	RoHS directive	

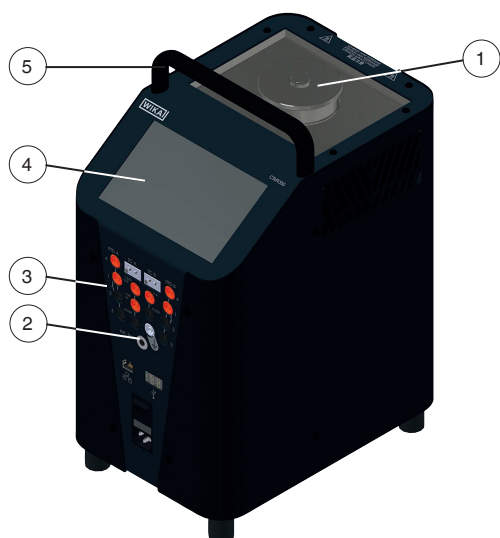
## Certificates

Certificates	
<b>Calibration</b>	
Integrated measuring instrument	<ul style="list-style-type: none"> <li>■ Without</li> <li>■ 3.1 inspection certificate per EN 10204 for Pt, TC, mA and V</li> <li>■ DAkkS calibration certificate for Pt, TC, mA and V</li> </ul>
Calibrator <sup>1)</sup>	<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)

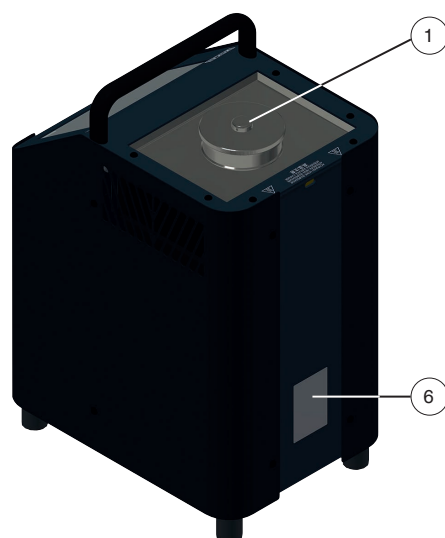
1) Calibration is carried out, as standard, at 6 temperatures evenly distributed over the temperature range. On request, special points are also possible.

→ For approvals and certificates, see website

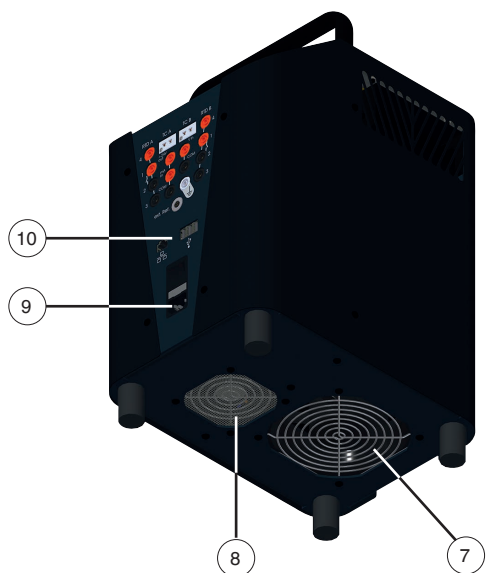
## Isometric views



Front view



Rear view



Bottom view model CTD9350-165

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

## Additional features of the CTM9350

### Easy calibration, with automatic certificate generation

The operation of the instruments using the large touchscreen is very simple and intuitive. The calibrator'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.

## Inserts 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.

Inserts	Insert for liquids and probe basket for tank	Reference thermometer
		
<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>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>Angled temperature probes are supplied to match the insert.</p>


Insert for surface measurement	Insert for infrared measurement
	
<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>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.</p> <p>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.</p> <p>The insert has a special design and surface finish on the inside. Through this, an emissivity of 0.9994 (black body) is achieved.</p>

## Accessories and spare parts






Accessories for model CTM9350-165 <sup>1)</sup>		Order code
Description	CTX-A-KE	
	<b>Transport case</b> <b>With trolley frame</b>	-3-
	<b>External reference probe</b>	-E-
	<b>Power cord</b> For the EU For Switzerland For USA/Canada For UK	-L- -M- -O- -N-



Accessories for model CTM9350-165 <sup>1)</sup>		Order code
Description		CTX-A-KE
 <p><b>Electrical connection set</b> Consisting of:</p> <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-
 <p><b>PC and network cable</b></p>		-Q-
 <p><b>Insert replacement tool</b></p>		-A-
-	<b>Insert replacement tool</b> For insert for surface measurement	-B-
-	<b>Drain pump</b>	-C-
 <p><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]</p>		-H-
 <p><b>Standard sleeve for the surface measurement operating mode</b> Dimensions: Ø 60 x 205 mm [Ø 2.36 x 8.07 in] Material: brass 2.0375</p>		-D-
 <p><b>Standard sleeve for the infrared measurement operating mode</b> Dimensions: Ø 60 x 150 mm [Ø 2.36 x 5.91 in] Material: brass 2.0375</p>		-F-
 <p><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: brass 2.0375</p>		-G-
 <p><b>Replaceable insert for liquids</b> New adjustment required</p>		-I-
 <p><b>Screw-on lid</b> Material: stainless steel</p>		-J-

Accessories for model CTM9350-165 <sup>1)</sup>		Order code
Description		CTX-A-KE
	<b>Screw-on lid with 6 G 1/4 bores</b> Material: plastic	-K-
<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 <sup>1)</sup>		Order code
Description		CTA9I-4U
	<b>Undrilled insert</b> Ø 60 x 150 mm [Ø 2.36 x 6.69 in] Material: aluminium	-N-
	<b>Drilled insert</b> 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: 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 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-
-	Customer-specific, special probes are possible on request.	-?-
	<b>Insert replacement tool</b>	-J-
<b>Ordering information for your enquiry:</b>		
<b>1. Order code: CTA9I-4U</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

## Scope of delivery

- Temperature multi-function calibrator model CTM9350
- Power cord, 1.5 m [5 ft] with safety plug
- Insert replacement tools
- PC and network cable
- USB stick with backup function
- Protective packaging / Transport protection
- External reference probe
- Probe basket
- Infrared insert
- Surface insert incl. replacement tool
- Insert for liquids
- Drain pump
- Transport cover
- Magnetic stirrer with magnetic lifter
- Operating cover with five silicone plugs
- Operating instructions
- Calibration certificate

## Ordering information

Model / Temperature range / Integrated measuring instrument / Use with 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.  
In case of a different interpretation of the translated and the English data sheet, the English wording shall prevail.

