

# Multi-functional precision thermometer Model CTR3000

WIKA data sheet CT 60.15

## Applications

- Pharmaceutical industry
- Industry (laboratory, workshop and production)
- Temperature sensor and transmitter manufacturers
- Calibration service companies and service industry

## Special features

- High accuracy
- Innovative and intuitive user interface
- Versatile applications by measuring thermocouples and resistance thermometers
- Logger and scan functions
- Up to 44 channels possible



Multi-functional precision thermometer, model CTR3000

## Description

### Application

The model CTR3000 precision thermometer provides a complete measurement and control interface for users wishing to make high-accuracy temperature measurements or calibrate thermometers. It supports a wide range of thermometer types, including 25  $\Omega$  SPRTs, 100  $\Omega$  PRTs, thermistors and thermocouples.

The CTR3000 is a high-accuracy measuring instrument designed for laboratory and industrial temperature measurements and calibration applications.

### Functionality

The instrument will operate with all 3- and 4-wire (S)PRTs (25  $\Omega$ , 100  $\Omega$ ) platinum resistance thermometers as well as most standard international thermocouple types and NTC thermistors. The following temperature measuring units are selectable:  $^{\circ}\text{C}$ ,  $^{\circ}\text{F}$ , K. Base measuring units mV and  $\Omega$  are also displayed. The temperature values will be calculated through common conversion of the base measurement.

Due to the wide range of this instrument it makes individual instruments needless and makes the calibration cost-effective.

### Features included:

- Excellent and high-accuracy measurement technology for the registration of different types of thermometers
- Large graphic touchscreen for temperature measurement values as well as configuration settings and statistical results
- Logger and log-data transfer to USB stick or communication interface
- Scan function with a live screen and graph
- Communication interfaces available for automated monitoring and calibration applications

# Specifications

## Model CTR3000

### Multi-functional precision thermometer

#### Input

Input channels	4
Channel 1 + 2	Resistance thermometers with 5-pin DIN connector
Channel 3 + 4	Thermocouple with standard miniature 2-pin thermocouple plug
Scanner box	Up to 4 modules
	Max. 44 channels (in total)
	Each module has 10 channels
Input connections	5-pin DIN connector or bare cable ends (resistance thermometer or thermistor)
	Standard miniature 2-pin thermocouple plug or bare cable ends (thermocouple)
Data entry format	ITS-90 and CvD for calibrated resistance thermometers; or EN 60751 standard conversion for uncalibrated resistance thermometers
	TC polynomial for calibrated thermocouples; or EN 60584 standard conversion for uncalibrated thermocouple
	Steinhart and Hart for NTC thermistors
Display update rate	500 ms

#### Measuring range

PRT/SPRT	Measuring range 0 ... 500 Ω
	-200 ... +962 °C [-328 ... +1,764 °F]
	3- and 4-wire measurement
Thermocouple	Measuring range -9.8 ... +76.4 mV corresponding to the range of the thermocouple E
	-270 ... + 1,820 °C [-454 ... +3,308 °F]
	Types B, E, J, K, N, R, S, T in accordance with EN 60584
Thermistor	0 ... 500 kΩ

### Accuracies <sup>1)</sup>

#### Resistance thermometers

Temperature accuracy	4-wire	±0.005 K	
	3-wire	±0.03 K	
Temperature conversions	Standard EN 60751, CvD, ITS-90		
Sensor currents	1 mA, 2 mA and $\sqrt{2}$		
Standby currents	$R_0 < 50 \Omega$	0 ... 125 Ω	2 mA
	$R_0 \geq 50 \Omega$	0 ... 500 Ω	1 mA
Measuring time	3 seconds refresh rate		

#### Thermocouple

Base measurement <sup>2)</sup>	±% of reading + μV	
	±0.004 % + 2 μV	
Temperature accuracy	Type B	±0.09 °C + ±0.025 % of reading
	Type E	±0.05 °C + ±0.031 % of reading
	Type J	±0.07 °C + ±0.030 % of reading
	Type K	±0.09 °C + ±0.035 % of reading
	Type N	±0.08 °C + ±0.035 % of reading
	Type R	±0.27 °C + ±0.020 % of reading
	Type S	±0.27 °C + ±0.020 % of reading
	Type T	±0.09 °C + ±0.025 % of reading

## Accuracies <sup>1)</sup>

Temperature conversions	Standard EN 60584, polynomial	
Measuring time	3 seconds refresh rate	
Cold junction compensation	Internal, external or channel Accuracy internal cold junction compensation $\pm 0.15$ K	
<b>Thermistor</b>		
Accuracies	0 ... 400 $\Omega$	$\pm 0.006$ $\Omega$
	400 $\Omega$ ... 50 k $\Omega$	$\pm 0.01$ % of reading
	50 ... 500 k $\Omega$	$\pm 0.02$ % of reading
Temperature conversions	Steinhart-Hart, polynomial	
Sensor currents	0 ... 450 $\Omega$	1 mA
	400 $\Omega$ ... 45 k $\Omega$	10 $\mu$ A
	40 ... 500 k $\Omega$	3 $\mu$ A
Measuring time	3 seconds refresh rate	

1) The accuracy in K defines the deviation between the measured value and the reference value. (Only valid for indicating instruments.)

2) In a range of -20 ... +100 mV

## Digital display

### Display

Screen	Colour TFT display including projective capacitive touchscreen with a resolution of 800 x 480 pixels
Resolution	0.0001 K / 0.00001 $\Omega$ / 0.00001 mV
Display units	$^{\circ}$ C, $^{\circ}$ F, K, mV and $\Omega$

### Functions

Real-time clock	Integrated clock with date
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### Voltage supply

Operating voltage	AC 100 ... 240 V, 50/60 Hz, 0.6 A; universal input on rear panel
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### Permissible ambient conditions

Operating temperature	0 ... 50 $^{\circ}$ C [32 ... 122 $^{\circ}$ F]
	Maximum achievable accuracy within 17 ... 23 $^{\circ}$ C [63 ... 73 $^{\circ}$ F]
Relative humidity	0 ... 70 % r. h. (non-condensing)
Storage temperature	-20 ... +50 $^{\circ}$ C [-4 ... +122 $^{\circ}$ F]

### Communication


Interfaces	USB and Ethernet
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### Case

Dimensions (W x H x D)	314 x 176 x 322 mm [12.4 x 6.9 x 12.7 in]
Weight	6 kg [13.2 lbs]

## Approvals

### Approvals included in the scope of delivery

Logo	Description	Country
	EU declaration of conformity	European Union
	EMC directive	
	RoHS directive	

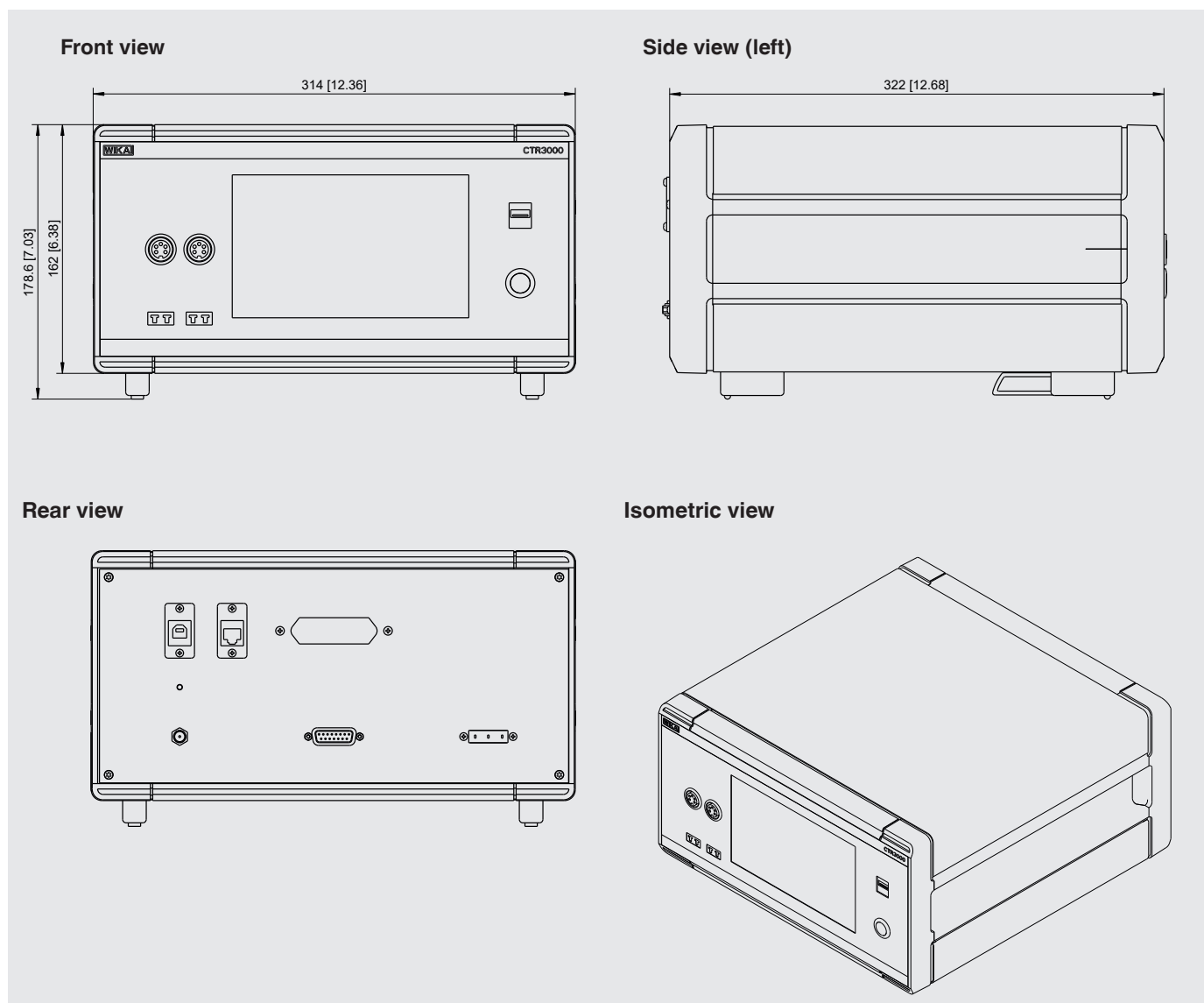
# Certificates

Certificate	
<b>Calibration</b>	<ul style="list-style-type: none"> <li>■ Test report for electrical inputs</li> <li>■ 3.1 calibration certificate per DIN EN 10204 (only system calibration) <sup>1)</sup></li> <li>■ DKD/DAkkS calibration certificate for electrical inputs</li> <li>■ DKD/DAkkS calibration certificate (only system calibration) <sup>1)</sup></li> </ul>
<b>Recommended recalibration interval</b>	1 year (dependent on conditions of use)

1) System calibration means the calibration of a thermometer as a measuring chain with the CTR3000

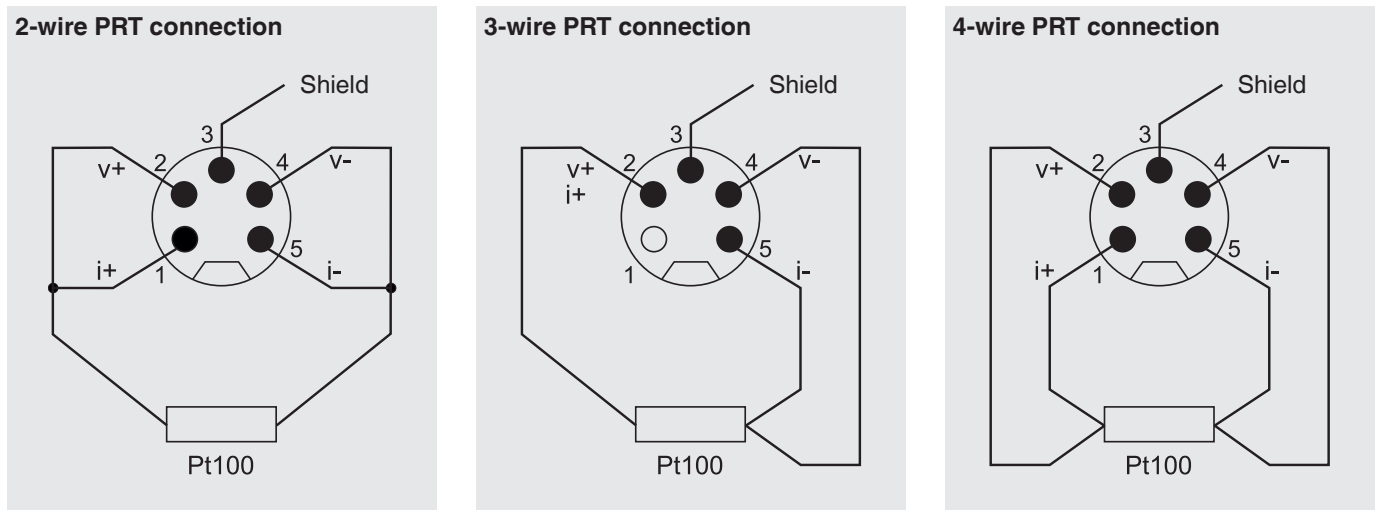
Approvals and certificates, see website

## Dimensions in mm [in]

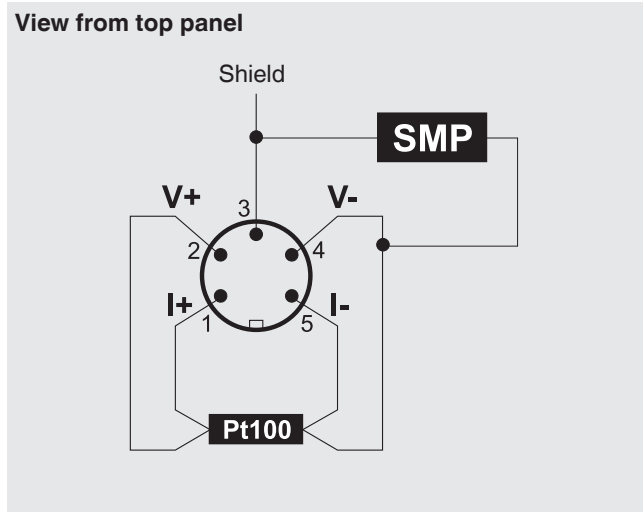


## Resistance thermometer connection (5-pin DIN connector) Channel 1 and 2 (PRT1, PRT2)

View towards front panel connector



## Options

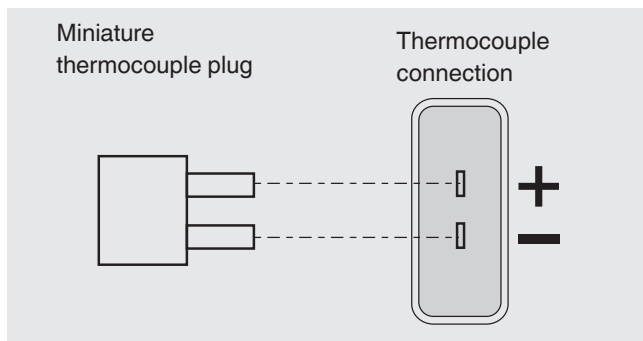


### With DIN connector or SMART connector

With ASL's SMART connector on the probes, storing the data is needed only once - in the connector! It can even be used on another instrument without any further action.

The SMART connector saves time and reduces error. If there are existing calibrated or uncalibrated probes, no problem, CTR3000 automatically registers if a probe is SMART or normal.

## Thermocouple connection (miniature connector), channel 3 and 4 (TC3, TC4)



## Touchscreen and intuitive user interface

Switching on the instrument, the main screen appears. From here the user can make several settings and can see in this case the measurement in °C of a 4-wire Pt25 connected to channel 1.

On the right side the user can select the menus to select inputs or settings.

On the main screen are the function buttons that enable the user to quickly select settings. This is like a shortcut to the menu or an immediate setting.

A click on these guides to a menu which opens on the right side or causes a change on the display.

### Standard desktop/main screen



- |  |  |
|--|--|
| ① Home application   | ⑫ Selected probe (standard or custom); shortcut                                      |
| ② General settings   | ⑬ Freeze the display; function button  |
| ③ Probe settings   | ⑭ Root 2 for sensor current PRT; function button                                     |
| ④ Scan settings  | ⑮ Current displaying of average, stability and number of measurements                |
| ⑤ Logger settings  | ⑯ Peak displaying  |
| ⑥ Calibration settings   | ⑰ Minus decimal place  |
| ⑦ Remote settings  | ⑱ Measured value in the base unit according to probe, e.g. Ω for Pt100 and mV for TC |
| ⑧ Service settings   | ⑲ Current measured value   |
| ⑨ Unit; shortcut   | ⑳ Selected channel; shortcut   |
| ⑩ Plus decimal place   | ㉑ Current application name   |
| ⑪ Clear the peak values (maximum value, minimum value since starting the instrument) |  |

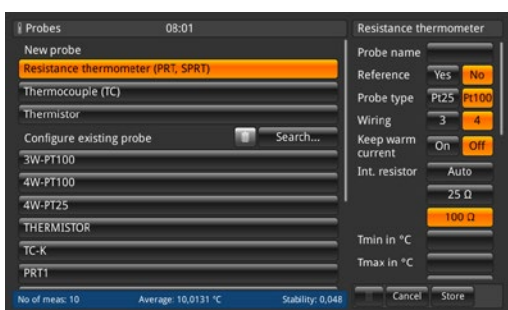
# Simple instrument configurations

## General instrument settings



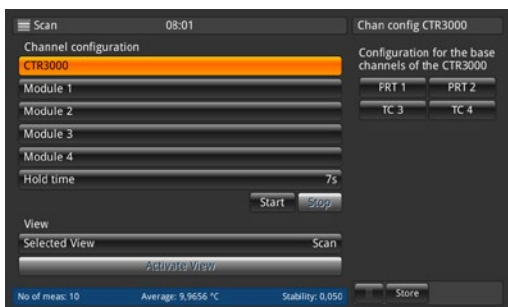
If selecting the menu on the right side, the settings appear on the left side. If, for example, the **[Language]** button is pressed, then all available languages will be displayed on the right hand side and these can easily be selected. In the menu setting all things concerning the instrument can be handled.

## Probe settings



In this menu the probe settings can be selected and the reference thermometers can be stored under a unique name.

## Scan settings



In the scan menu, the user can define a scan by selecting the channels and the hold time. The scan is activated using the start button.

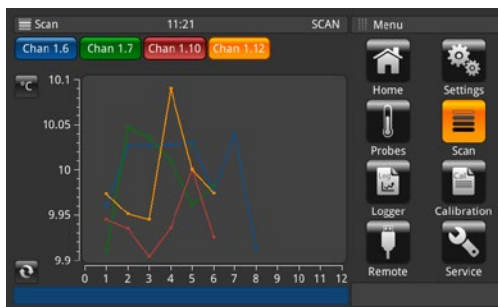
### Two views can be selected: Scan and Graph

Due to the wide range of this instrument, no individual instruments are needed which makes the calibration cost-effective. Logger and scan function with a live screen and graph makes calibration life easy.

### Scan view



### Graphical scan view



## Automated thermometer calibration for model CTR3000 with model CTx9x00

The calibration of temperature probes usually requires considerable effort. This test procedure can be significantly simplified by linking an automated reference thermometer with a temperature source. Such an arrangement allows the creation of individual calibration routines which can be called at any time – calibration just by pushing one button.

The model CTR3000 precision thermometer has four input channels: one for the reference sensor and three for test items. The stable temperature environment required for the calibration is provided, depending on the test item, in a dry-well calibrator or a micro calibration bath.

One calibration process, two stations – this usually means separate preparation and parameterisation of both instruments. With CTR3000, this preliminary stage can be omitted. The precision thermometer can be linked with a corresponding temperature source from the CTx9x00 series via the respective communication interface using a special feature.

This combination creates a hardware unit for individual and reproducible calibration routines where all measured values

of the connected thermometers are recorded and the test temperature is provided automatically. The touchscreen user interface of the calibration instrument makes it easier for the operator to enter information.

Each created routine is saved in the precision thermometer and can be called later on. Since the entire calibration process is automatic, the user only needs to press the Start button. The user does not need to be present until the end of the process which may take several hours in some cases. Nevertheless, the user can monitor the test process on the screen of CTR3000, if required. All calibration phases are logged by a data logger and all data is saved. Subsequently, this information can be downloaded to a USB stick, exported to the XML and CSV format and processed. All calibration routines can be reproduced for subsequent test processes.

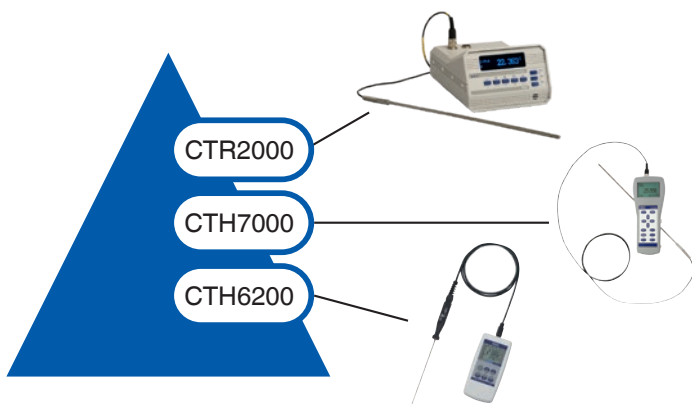
### Further details

We are expanding our product range of precision thermometers to a versatile thermometer for the industrial market with the model CTR3000 multi-functional precision thermometer. The ability to measure up to 44 resistance thermometers, thermocouples and thermistors simultaneously makes the instrument versatile in application.

The CTR3000 is new in its class. This instrument closes the gap between the hand-held series CTH6x00 which can handle thermocouples and the desktop instrument like model CTR2000 which can only handle resistance thermometers.

It is a precision instrument, designed for use in a laboratory or light industrial environment. The instrument can be extended by using multiplexers to gain additional channels.

The instrument model CTR3000 is compatible with the existing model CTS3000 multiplexer for resistance thermometers and thermocouples. In addition, the user interface is easy to handle like other WIKA calibration technology products.



RTD measurement





TC and PRT measurements



## Accessories

Description		Order code
	<b>Case</b> Transport case, robust	CTX-A-A1 -T1-
	<b>Multiplexer model CTS3000</b> 10-channel multiplexer as desktop case For resistance thermometers and thermocouples (maximum of 4 multiplexers per CTR3000)	-CD-
	<b>Multiplexer model CTS3000</b> 10-channel multiplexer with built-in case for 19" rack For resistance thermometers and thermocouples (maximum of 4 multiplexers per CTR3000)	-CR-
	<b>Adapter</b> To connect a thermometer with bare cable ends	-AD-
	<b>Adapter cable CTS3000</b> 5 x 4 mm banana plug to 5-pin DIN socket	A3
	<b>Adapter cable CTR3000</b> 5 x 4 mm banana socket to 5-pin DIN connector	AE
	<b>15-pin interface cable</b> For resistance thermometers Length: 0.75 m [2.5 ft]	I5
	<b>TC interface cable</b> For thermocouples Length: 0.75 m [2.5 ft]	I6
<b>Ordering information for your enquiry:</b>		
1. Order code: CTX-A-A1 2. Option:		↓ [ ]

Description		Order code
	<b>Temperature probe model CTP5000</b> Immersion probe	CTP5000
	<b>Thermocouple model CTP9000</b> Immersion probe type S With or without cold junction	CTP9000

## Scope of delivery

- Model CTR3000 multi-functional precision thermometer incl. power cord
- Test report for electrical inputs
- 3.1 calibration certificate per DIN EN 10204 (only system calibration) <sup>1)</sup>

## Option

- DKD/DAkkS calibration certificate (only system calibration) <sup>1)</sup>
- DKD/DAkkS calibration certificate for electrical inputs

1) System calibration means the calibration of a thermometer as a measuring chain with the CTR3000

## Ordering information

CTR3000 / Interface / Number of multiplexers / Number of resistance thermometers / Number of thermocouples CTP9000 / Calibration / Transport case / Further approvals / Additional ordering information

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