Multi-functional precision thermometer Model CTR4000

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 CTR4000

Description

Application

The model CTR4000 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 Ω SPRTs, 100 Ω PRTs, thermistors and thermocouples.
The CTR4000 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 Ω, 100 Ω) platinum resistance thermometers as well as most standard international thermocouple types and NTC thermistors. The following temperature measuring units are selectable: °C, °F, K. Base measuring units mV and Ω 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

Data sheets showing similar products:
Multiplexer; model CTS3000; see data sheet AC 87.01

Specifications

Basic information		
Instrument		
Instrument version	■ Desktop case ■ 19" rack-mounting kit	
Weight	4.8 kg [10.58 lb]	
Warm-up time	Approx. 60 min	
Input		
Input channels	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	
Measuring range		
PRT/SPRT	Measuring range 0 ... 500 Ω	
	-200 … +962 °C [-328 ... +1,764 °F]	
	3- and 4-wire measurement	
Thermocouple per EN 60584	Measuring range -9.8 ... +76.4 mV corresponding to the range of the thermocouple E	
	-270 ... +1,820 °C [-454 ... +3,308 °F]	
	■ Type B ■ Type C ■ Type D ■ Type E ■ Type J	■ Type K ■ Type N ■ Type R ■ Type S ■ Type T
Thermistor	0 ... 500 kΩ	
Digital display		
Display	Colour TFT display including projective capacitive touchscreen with a resolution of 800 x 480 pixels	
Resolution	■ 0.0001 K ■ 0.00001 Ω ■ 0.00001 mV	
Display units	■ °C ■ °F ■ K ■ mV ■ Ω	
Display update rate	500 ms	
Functions		
Real-time clock	Integrated clock with date	

Accuracies [1)]

Resistance thermometers			
Temperature accuracy	4-wire	■ CTR4000-A: 3.75 mK ■ CTR4000-S: 5 mK	
	3-wire	■ CTR4000-A: 0.03 K ■ CTR4000-S: 0.03 K	
Temperature conversions	■ Standard EN 60751 ■ CvD ■ ITS-90		
Sensor currents	CTR4000-A	■ 0.5 mA ■ 1 mA ■ 2 mA ■ √2	
	CTR4000-S	Pt25	■ 2 mA ■ √2
		Pt100	■ 1 mA ■ √2
Standby currents	R_0 < 50 Ω	0 ... 125 Ω	2 mA
	R_0 ≥ 50 Ω	0 ... 500 Ω	1 mA
Measuring time	3 seconds refresh rate		
Thermocouple			
Base measurement [2)]	±% of reading + µV		
	±0.004 % + 2 µV		
Temperature accuracy	Type B	±0.09 °C + ±0.025 % of reading	
	Type C	±0.57 °C + ±0.057 % of reading	
	Type D	±0.60 °C + ±0.059 % 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	
Temperature conversions	Standard EN 60584, polynomial		
Measuring time	3 seconds refresh rate		
Cold junction compensation	■ Internal ■ External ■ Channel Accuracy internal cold junction compensation ±0.15 K		
Thermistor			
Accuracies	0 ... 400 Ω	±0.006 Ω	
	400 Ω ... 50 kΩ	±0.01 % of reading	
	50 ... 500 kΩ	±0.02 % of reading	
Temperature conversions	Steinhart-Hart, polynomial		
Sensor currents	0 ... 450 Ω	1 mA	
	400 Ω ... 45 kΩ	10 µA	
	40 ... 500 kΩ	3 µA	
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

Specifications for thermocouples			
Types	**Operating range “Temperature”**		**Operating range “Voltage”**
	[°C]	**[°F]**	**[mV]**
B	250 ... 1,820	482 ... 3,308	0.291 ... 13.820
C	0 ... 2,320	32 ... 4,208	0 ... 37.107
D	0 ... 2,400	32 ... 4,352	0 ... 40.792
E	-200 ... +1,000	-328 ... +1,832	-8.825 ... +76.373
J	-210 ... +1,200	-346 ... +2,192	-8.095 ... +69.553
K	-200 ... +1,372	-328 ... +2,502	-5.891 ... +54.886
N	-200 ... +1,300	-328 ... +2,372	-3.990 ... +47.513
R	-50 ... +1,768	-58 ... +3,214	-0.226 ... +21.103
S	-50 ... +1,768	-58 ... +3,214	-0.235 ... +18.693
T	-200 ... +400	-328 ... +752	-5.603 ... +20.872

Communication	
Interface	■ Ethernet ■ USB
Baud rate	9600
Command sets	■ IP ■ Netmask ■ Gateway ■ Port ■ DHCP ■ Others on request

Voltage supply and performance data	
Auxiliary power	DC 6 V, 3 A
Power supply unit	Model FOX30-X from Mensor
Operating voltage	AC 100 ... 120 V / 200 ... 240 V; 50/60 Hz; 0.6 A
Mains supply voltage fluctuations	±10 % (AC 90 ... 132 V / 180 ... 264 V)

Operating conditions	
Operating altitude	≤ 2,000 m [≤ 6,561 ft] above sea level
Place of use	Indoor Not for wet locations
Operating temperature	0 ... 50 °C [32 ... 122 °F]
	Maximum achievable accuracy within 17 ... 23 °C [63 ... 73 °F]
Storage temperature range	-20 ... +50 °C [-4 ... +122 °F]
Humidity	0 ... 70 % relative humidity
Condensation	Non-condensing
EMC (HF field)	EN 61326-1 emission (group 1, class B) and immunity (industrial application)
Overvoltage category	II
Pollution degree	Degree 2
Ingress protection of the complete instrument	IP20

Approvals

Logo	Description	Country
CE	**EU declaration of conformity**	European Union
	EMC directive EN 61326 emission (group 1, class B) and immunity (industrial environments)	
	Low Voltage Directive (IEC/EN 61010-1)	
	RoHS directive	

Certificates

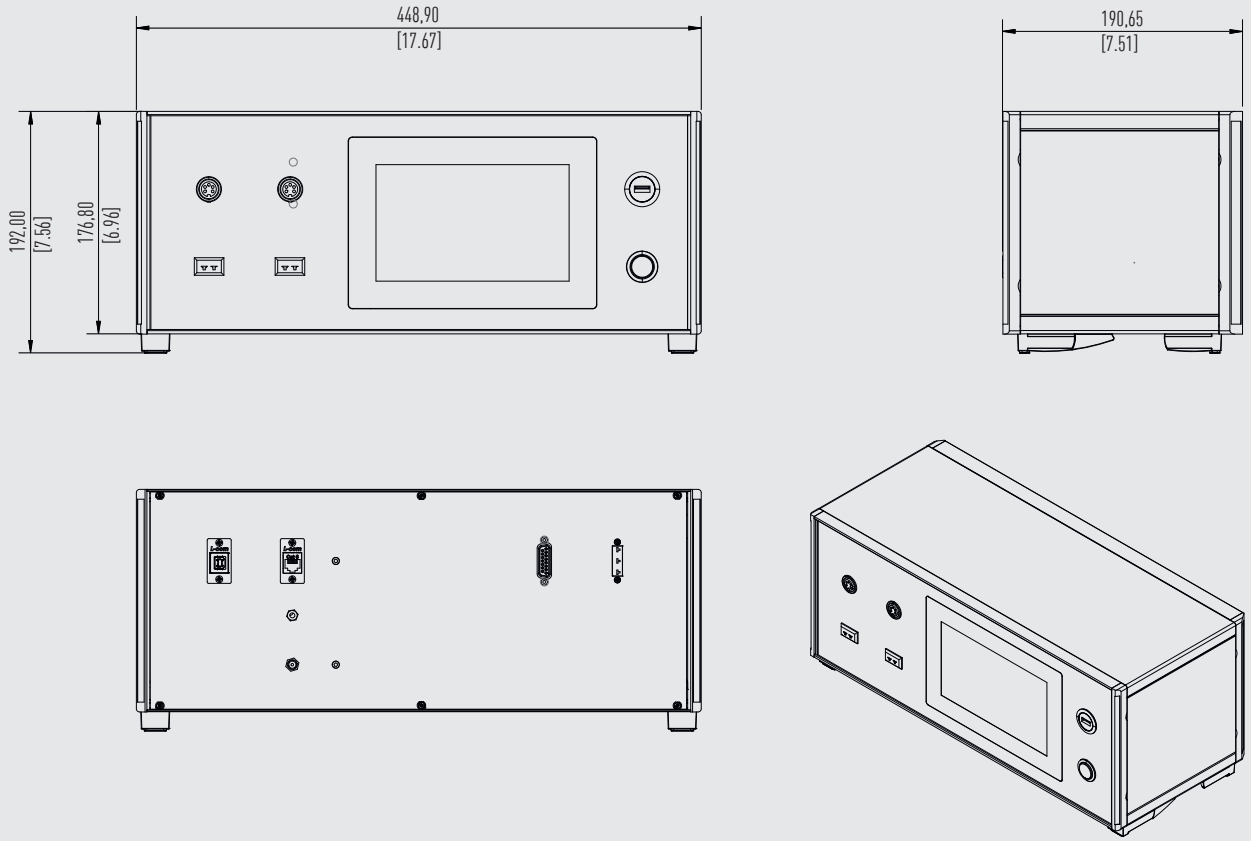
Description	
Certificates	■ Test report for electrical inputs ■ 3.1 inspection certificate per EN 10204 (only system calibration) [1)]
Calibration	■ A2LA calibration certificate (traceable and accredited in accordance with ISO/IEC 17025) ■ DAkkS calibration certificate for electrical inputs (traceable and accredited in accordance with ISO/IEC 17025) ■ DAkkS calibration certificate – only system calibration (traceable and accredited in accordance with ISO/IEC 17025) [1)]
Recommended calibration interval	1 year (dependent on conditions of use)

1) System calibration means the calibration of a thermometer as a measuring chain with the CTR4000

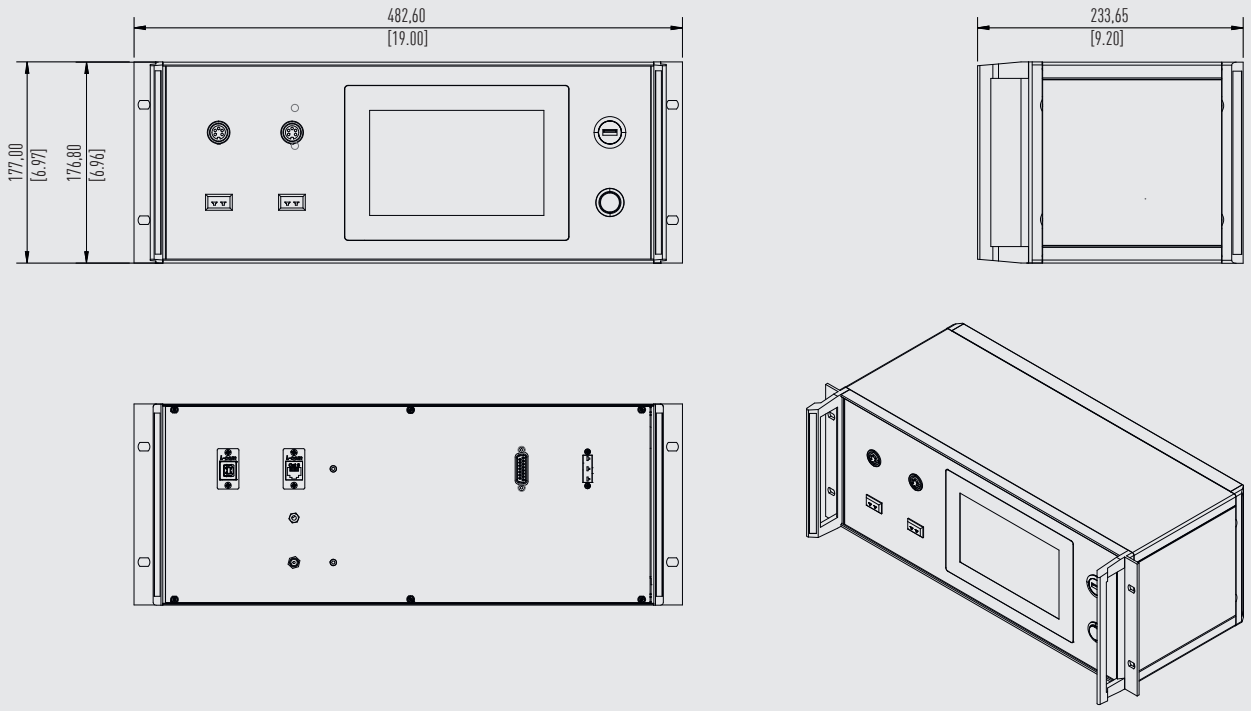
→ Approvals and certificates, see website

Dimensions in mm [in]

Desktop case



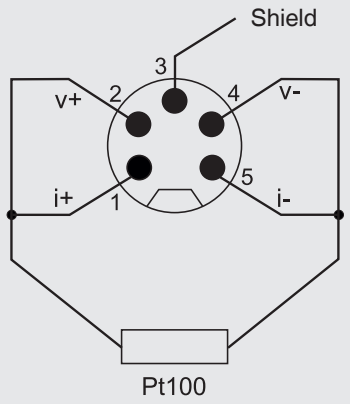
19" rack-mounting kit with side pieces



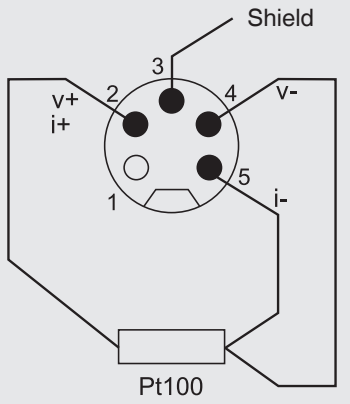
Resistance thermometer connection (5-pin DIN connector)
Channel 1 and 2 (PRT1, PRT2)

View towards front panel connector

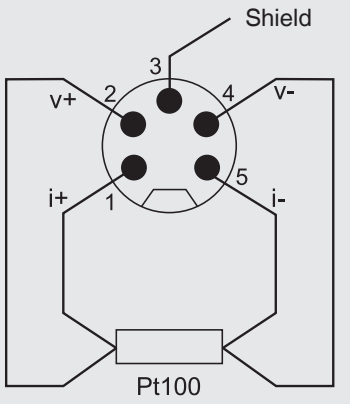
2-wire PRT connection



3-wire PRT connection

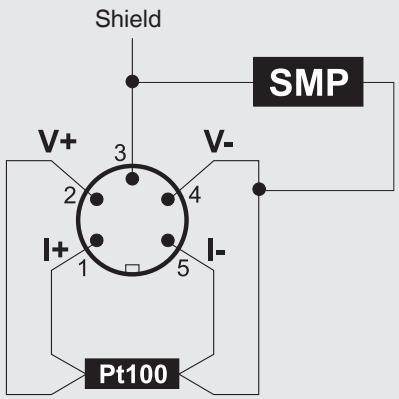


4-wire PRT connection



DIN connector or SMART connector

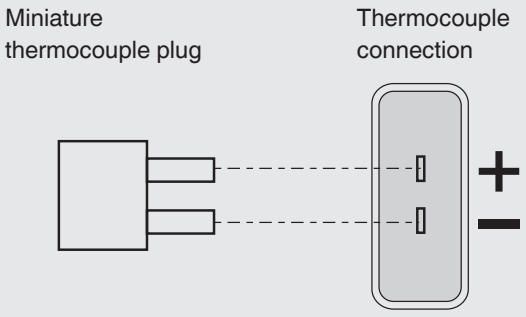
View from top panel



With ASL's SMART connector on the probes, the data only needs to be stored in the connector once. 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, CTR4000 automatically registers if a probe is SMART or normal.

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



Touchscreen and intuitive user interface

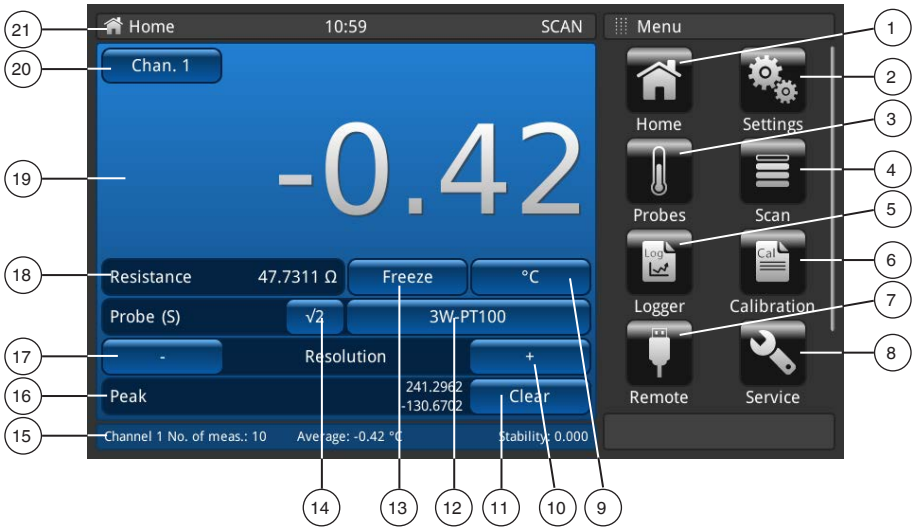
Switching on the instrument, the main screen appears. From here the user can make several settings and can see in this case the measurement in °C of a 4-wire Pt25 connected to channel 1.

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

On the main screen are the 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
2. General settings
3. Probe settings
4. Scan settings
5. Logger settings
6. Calibration settings
7. Remote settings
8. Service settings
9. Button – set unit
10. Button – plus decimal place
11. Button – clear the peak values (maximum value, minimum value since starting the instrument)
12. Button – selected probe (standard or custom)
13. Button – freeze the display
14. Button – root 2 for sensor current PRT
15. Current displaying of average, stability and number of measurements
16. Peak displaying
17. Button – minus decimal place
18. Display of the measured value in the base unit according to probe, e.g. Ω for Pt100 and mV for TC
19. Display of the current measured value
20. Button – selected channel
21. Display – name of the current application

Automated thermometer calibration for model CTR4000 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 CTR4000 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 CTR4000, 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 CTR4000, 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 CTR4000 multi-functional precision thermometer. The ability to measure up to 44 resistance thermometers, thermocouples and thermistors simultaneously makes the instrument versatile in application.

The CTR4000 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.

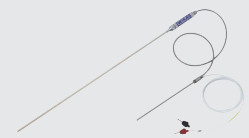
It is a precision instrument, designed for use in a laboratory or light industrial environment. The instrument can be extended by using multiplexers to gain additional channels.

The instrument model CTR4000 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.

Accessories and spare parts

Description [1]	Order code
	CTX-A-A1
 **Case** Transport case, robust	-T1-
 **Multiplexer model CTS3000** 10-channel multiplexer as desktop case For resistance thermometers and thermocouples (maximum of 4 multiplexers per CTR4000)	-CD-
 **Multiplexer model CTS3000** 10-channel multiplexer with built-in case for 19" rack For resistance thermometers and thermocouples (maximum of 4 multiplexers per CTR4000)	-CR-
 **Adapter cable CTS3000** 5 x 4 mm banana plugs to 5-pin DIN socket	A3
 **Adapter cable CTR4000** 5 x 4 mm banana sockets to 5-pin DIN connector	AE
 **15-pin interface cable** For resistance thermometers Length: 0.75 m [2.5 ft]	I5
 **TC interface cable** For thermocouples Length: 0.75 m [2.5 ft]	I6
Ordering information for your enquiry:	
1. Order code: CTX-A-A1 **2. Option:**	⇓ **[ ]**

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

Description [1]		Order code
	**Temperature probe model CTP5000** Immersion probe	CTP5000
	**Temperature probe model CTP6000** Immersion probe	CTP6000
	**Thermocouple model CTP9000** Immersion probe type S With or without cold junction	CTP9000

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

- Model CTR4000 multi-functional precision thermometer incl. AC adapter
- Test report for electrical inputs
- Calibration certificate (only system calibration) [1]
- Operating instructions

1) System calibration means the calibration of a thermometer as a measuring chain with the CTR4000

Ordering information

CTR4000 / Version / Case type / Number of multiplexers CTS3000 / Number of resistance thermometers CTP5000 / Number of resistance thermometers CTP6000 / Number of resistance thermometers CTP5000-R25 / Number of thermocouples CTP9000 / Calibration / Transport case / Further approvals / Additional ordering information

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