AC resistance thermometry bridge Model CTR6500

Applications

- High-performance AC resistance thermometry bridge for very accurate temperature measurements in a range of -200 ... +962 °C
- High-precision instrument designed for laboratory, commercial and industrial temperature measurement and calibration applications

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Special features

- Resolution 0.1 ppm / 0.001 mΩ / 0.01 mK
- 25 Ω and 100 Ω internal reference resistors
- Channels expandable from 1 to 60 via multiplexers
- Multifunction VFD with numeric, statistical or graphical information

Description

The performance of the model CTR6500 resistance thermometry bridge is improved significantly by using the proven AC bridge technology. Due to the elimination of thermal EMF errors and the automatic cancellation of probe and cable reactance effects, the CTR6500 provides exceptional stability with time and ambient temperature and has an excellent resolution thanks to inherently low noise.

These make the CTR6500 perfectly suited to high-accuracy temperature measurement and calibration.

The CTR6500 has 25 Ω and 100 Ω internal standard resistors and can also be used with external standard resistors. It has a ratio range of 0 ... 4.9999999 Ω or 0 ... 500 Ω resistance and is capable of measuring temperature ranges to meet ITS 90, CVD and EN 60751 standards.

The results are shown on the large-scale, multi-function VFD screen. The mean, min and max value, standard deviation and the sampling rate can also be displayed with a separate graphical display. To ensure the long-term reliability the CTR6500 uses surface mount technology with no mechanical relays.

Data sheets showing similar products:
Precision thermometer; model CTR5000; see data sheet CT 60.20
Reference thermometer; model CTP5000; see data sheet CT 61.20
DC Resistance thermometry bridge; model CTR6000; see data sheet CT 60.30
Standard reference resistor; model CER6000; see data sheet CT 70.30

Specifications	Model CTR6500
Probe types	Industrial platinum resistance thermometers (PRTs) and standard platinum resistance thermometers (SPRTs) with Ro = 25 Ω and 100 Ω up to an alpha of 0.00392
Input channels	2 on the main device (one PRT, SPRT or resistor + one reference resistor) 60 over multiplexer CTS9000
Input connections	4 x BNC + shield (front panel)
Data entry format	ITS 90 and CVD for calibrated probes; or EN 60751 for uncalibrated probes
Measuring ranges	
Sense current	100 µA, 200 µA, 500 µA, 1 mA, 2 mA, 5 mA, 10 mA
Sense current mulitpliers	x √2
Temperature range	-200 ... +962 °C, depending on thermometer probe
Resistance range	0 … 500 Ω
Internal resistors	
Values	25 Ω, 100 Ω
Thermal stability TCR	±0.1 ppm/°C
Accuracy	±0.01 % (uncalibrated)
Accuracy	Ratio range 0 ... 1 accuracy 0.4 ppm equivalent to 0.1 mK at 0 °C Ratio range 1 ... 2 accuracy 0.6 ppm equivalent to 0.3 mK full range Ratio range 2 ... 3 accuracy 0.8 ppm equivalent to 0.8 mK full range Ratio range 3 ... 5 accuracy 1 ppm equivalent to 1.25 mK full range
Display	
Screen	large graphic VFD display screen (adjustable brightness)
Units	Ratio, °C, °F, K or Ω
Resolution	0.1 ppm 0.01 mK 0.001 mΩ
Functions	
Real-time clock	integrated clock with date
Voltage supply	
Power supply	AC 90 ... 264 V, 47 ... 63 Hz; universal rear input on rear panel
Power consumption	max. 95 VA
Permissible ambient conditions	
Operating temperature	15 ... 25 °C
Storage temperature	-20 ... +50 °C
Communication	
Interface	USB, RS-232 or IEEE-488.2
Case	
Dimensions	455 x 150 x 450 mm (W x H x D)
Weight	9 kg

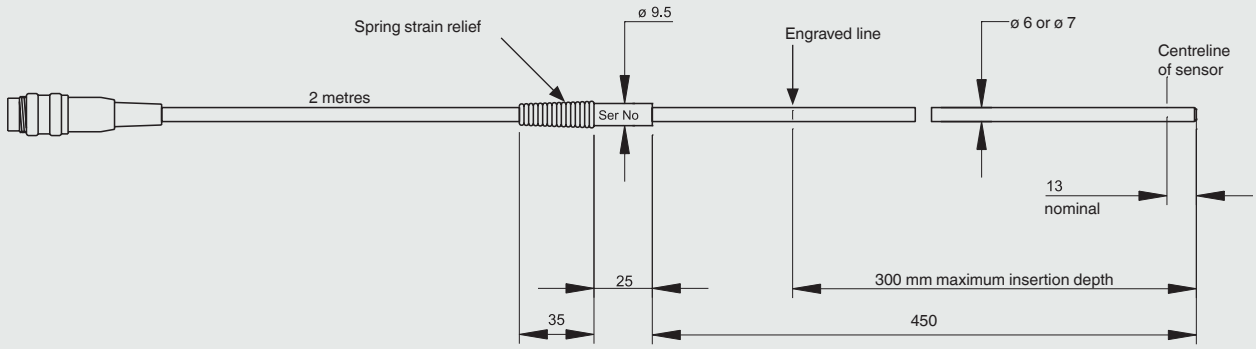
CE conformity, certificates

CE conformity	
EMC directive	2004/108/EC, EN 61326 emission (group 1, class B) and interference immunity (portable test and measuring equipment)

Approvals and certificates, see website

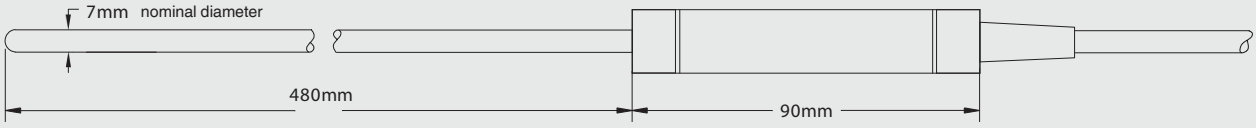
Recommended temperature probes

Resistance thermometer



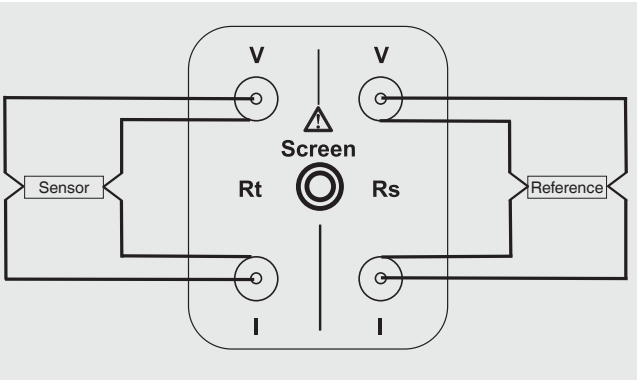
Model	Dimensions	Temperature range
CTP5000-652	Pt100, d = 6 mm, l = 450 mm (without spring strain relief, 100 mm handle)	-70 ... +650 °C
CTP5000-651	Pt100, d = 7 mm, l = 450 mm (125 mm handle)	-189 ... +650 °C

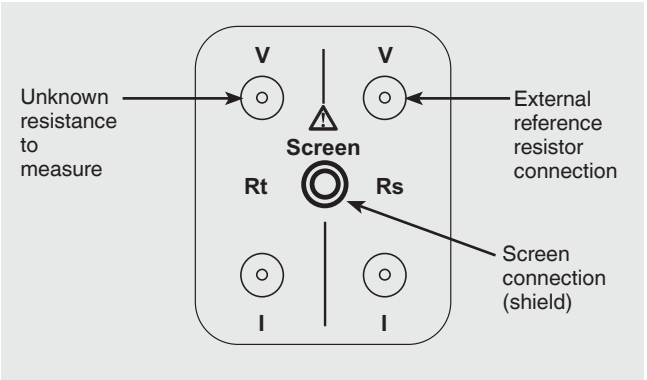
Resistance thermometer



Model	Dimensions	Temperature range
CTP5000-T25	Pt25, d = 7 mm, l = 480 mm	-189 ... +660 °C

Input connections



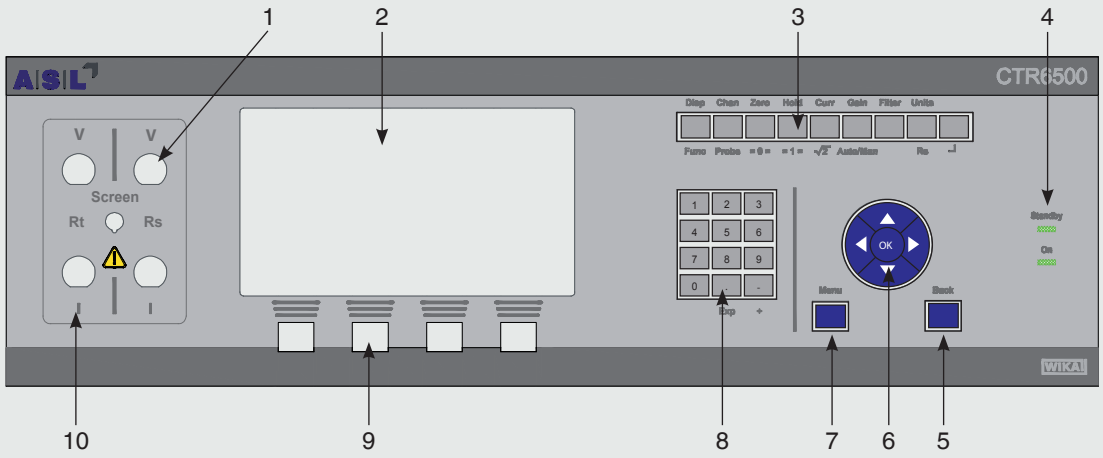


The BNC input connectors are located to the left of the display. The central connector is used when a screen connection is required. The two right-hand connections are only used when an external reference resistor is selected; they are not required when one of the internal reference resistors is used. The unknown resistance or probe is connected to the left-hand BNCs.

Features of the precision thermometer

- Easy to use
- Large graphic VFD display screen
- 4-wire measurement
- 2 channels as standard with optional up to 60 channels over multiplexer CTS9000

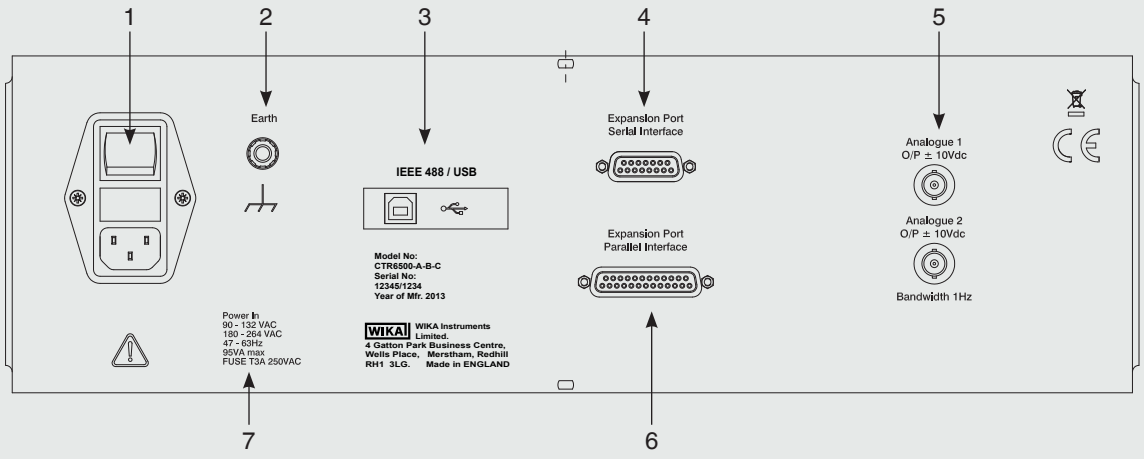
Front panel



1 Reference channel RS
2 VFD display
3 Function keys
4 Status LED
5 Back key
6 Navigation keys
7 Menu key
8 Numeric keypad
9 Four soft keys
10 Input channel R_t

The two indicator LEDs to the right are used to indicate that electrical power is applied and to indicate that the bridge is in standby mode (graphical display in low power mode).
The four keys under the display are **soft keys** so their function varies with the instrument operating mode (whenever these keys can be used, their current function is displayed above each key).

Rear panel



1 Main input, switch and fuse
2 Earth connector
3 USB, RS-232 or IEEE connector
4 Expansion port 1
5 Analogue output
6 Expansion port 2
7 Electrical rating

Operation

The instrument's keys are grouped by type and consist of nine function keys, a twelve-key numerical keypad, navigation keys and an OK key, four soft keys and separate menu and back keys. The combination of function and soft keys is used to access data and/or functions within the instrument.

The CTR6500 keypad is shown in detail below. The keys are used to select the various menu options and to control the instrument. Generally, no more than one menu level is required for commonly used settings. A few (infrequently used options) require two or three menu levels.

The functions under the keys are accessed by pressing the right-hand shift key and then the required key (e.g. to access the probe menu press shift and then the chan key).

Instrument functions keys

Key symbol	Description	Function
Instrument function keys		
Disp	Select display type	Alternates numerical, graphical, standby display
Chan	Select input channel	Opens and closes the R_t/R_S channel select menu
Zero	Zero display measurement	Opens and closes the display zero (null) menu
Hold	Hold display measurement	Starts and stops display (measurement continues)
Curr	Select operating current	Opens and closes the sensor-current menu
Gain	Select instrument gain	Opens and closes the instrument-gain menu
Filter	Select filter value	Opens and closes measurement-bandwidth menu
Units	Select display units	Opens and closes the display-units menu
Shift key	Shift key	Selects lower function keys (and, Exp or +)
Instrument function shift keys		
Func	Select function menu	Selects function menu
Probe	Select probe menu	Opens and closes probe menu
=0=	Zero check	Selects zero check
=1=	Unity check	Selects unity check
√2	Set current	Sets root 2 current
Auto/Man	Reserved turns	Automatic gain selection ON/OFF
Rs	Select reference resistor	Opens the reference resistor menu
Menu function keys		
Back	Clear data entry/return	Clears any data entry errors or returns from a menu
Menu	Menu selection	Displays other submenus
▲▼◄►	Arrow keys	Used to navigate through the menus
OK	Save entry	Saves data entry and returns to previous menu

The numeric keypad is used to enter numerical values (and may also be used to select submenu options when these are shown on the screen).

Numeric keypad function

Key symbol	Description	Function
Numeric keys		
0 ... 9	Numerical data entry	Enters a numerical digit or selects a numeric menu
-	Minus key	Used during numerical data entry
.	Decimal point	Used during numerical data entry
Numeric shift keys		
Exp	Exponent key	Used for numerical data entry (with the shift key)
+	Plus key	Used for numerical data entry (with the shift key)

Scope of delivery

- Model CTR6500 AC resistance thermometry bridge incl. power cord and USB cable
- Choice of model CTP5000 temperature probes
- Choice of model CTS9000 multiplexer
- Choice of model CER6000 resistances

Option

- Model CTS9000, 10-channel automatic/remote scanner, current source for unselected PRTs
- Precision resistor module FR4 (standard values = 1, 10, 25 and 100 Ω, oven controlled)

Accessories

- 100 Ω, test resistor, 0.1 %, 3 ppm/°C
- BNC to BNC cable (3 m) - connection bridge to adapter box FA3
- BNC to open end (3 m) - connection bridge to reference resistors
- PRT adapter box (4 terminals to BNC)
- BNC to 2 x 4 mm banana terminals (2 per pack)
- BNC to 2 x 4 mm banana plugs (2 per pack)
- Adapter BNC to 5-pin DIN plug (1 m)

Software

- ULog

Precision resistor module, model FR4

Specifications	Precision resistor module, model FR4
Accuracy	1 ... 10 Ω ±0.005 % (50 ppm) > 10 ... 100 Ω ±0.0025 % (25 ppm) > 100 ... 1,000 Ω ±0.001 % (10 ppm)
Stability	< 2 ppm per year
Temperature coefficient	< 0.6 ppm/°C

Ordering information

CTR6500 / Interface / Numbers of multiplexer CTS9000 / Standby current / Definition standby current / Interface driver module / Housing / Precision resistor module / Resistor value 1 / Resistor value 2 / Resistor value 3 / Resistor value 4 / Additional order information

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