LABFACILITY
TEMPERATURE & PROCESS TECHNOLOGY
Leaders in temperature measurement

TEMPMASTER PRO HIGH PRECISION THERMOMETER /LOGGER FOR Pt100 SENSORS

The Tempmaster PRO provides precise Platinum Resistance Thermometer temperature measurement and logging for exacting applications in both laboratory and site locations. It is an exceptionally accurate and stable digital thermometer particularly suitable for use with thermal calibration baths as a reference standard.

Applications

✦ medical✦ pharmaceutical ✦ food

✦ Environmental Testing✦ R&D ✦ educational establishments✦

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Key Features

- *Reference standard thermometer for Pt100 sensors*
- *High accuracy ± 0.01ºC Pt100*
- *40 milliKelvin (0.040ºC) system accuracy*
- *Precise linearisation conformity is realised by a hybrid maths polynomial technique*
- *Simple, fast digital matching to calibrated sensors, up to 10 points per channel retained in memory*
- *Additional digital matching to Pt100 sensors using custom constants*
- *Clear, comprehensive user information on alpha numeric display*
- *Resolution 0.01ºC for Pt100 inputs*
- *Smart sensor capability Pt100 for corrections stored on probe*
- *Data logging*
- *Wide temperature range*
- *Readout directly in ºC, ºF, K, Ω*
- *Input circuitry configured to eliminate thermal voltages*
- *Two sensor input ports*
- *Channel A, B or A-B reading*
- *USB serial communications*
- *USB flash drive port*
- *Highly precise linearisation tracking*
- *Excellent long term stability*
- *Supplied with PC software*
- *Programmable analogue (retransmission) output*
- *Front panel data entry and function keys*
- *Our own design and manufacture*
- *Rechargeable Lithium Ion battery/mains powered*
- *CE & RoHS compliant*

The Tempmaster PRO is a successor to the very successful Tempmaster-100 thermometer developed over a 25 year period. Like its predecessor, the Tempmaster PRO provides laboratory standard temperature measurement w ith Pt100 sensors and greater versatility to extend the scope of applications.

Displayed values and user information are indicated on a bright clear OLED screen with diffused backlighting. Data can be displayed in °C,°F,K,Ω as required; nine front panel push keys, the only user controls, are used in conjunction with the display screen. It is this arrangement which makes for very simple and “friendly” operation.

Resolution is 0.01°C: all computations are performed digitally without drift. Overall stability is optimised by utilising only the highest quality components including high precision, expensive metal film resistor networks.

There are two input ports for 3 or 4 wire Pt100 sensors; the instrument automatically recognises 3 or 4 wire configurations. The measured temperature can be displayed directly from one of the inputs or differentially between the two inputs. Differential temperature and the two individual channel temperatures are displayed simultaneously.

Individual calibrated sensors can have their appropriate calibration values programmed into the Tempmaster PRO using either the keypad or the PC software supplied. The PC software also allows corrections in the form of constants for individual Pt100 sensors to be programmed in. The nonvolatile memory ensures that the values are retained (until such time as they are changed) even after switch-off. Where the calibration certificate relating to a particular probe states specific Ω values at stated temperatures, up to ten such values are entered into the Tempmaster PRO with their relevant temperature points using the front panel keypad or the software. The instrument then digitally self-calibrates to the associated probe over the range embraced in the calibrated values used; the temperature readout is “corrected” accordingly. Additional manual procedures are not required to compute precise temperature readings since these are displayed directly; miscalculation errors are thus eliminated. Very high system accuracies, better than 40 milliKelvins can be achieved using probe matching.

Corrections which are “programmed in” can be displayed for confirmation. However, initial input, adjustment, enabling and disabling of corrections are protected For by a special key sequence to prevent accidental or unauthorised changes. Values can be changed by an authorised user at any time.

For the Pt100 inputs, SMART probes can be used which incorporate dedicated ‘correction values‘ within the connector of each probe. When a SMART probe is connected to input A or B or both inputs, the corrections are automatically applied without the need for user intervention.

A common application for the Tempmaster PRO is the comparison calibration of “working” sensors against a calibrated reference standard or semi-standard sensor. For example, the sensor under test in channel B is compared against the reference sensor (with programmed corrections) in channel A. When applied, the null function corrects the differential temperature readout between two sensors to zero. For example, the apparent temperature difference between two sensors known to be at the same actual temperature can be corrected to zero prior to, for example, heat exchanger experiments.

Both inputs can be scanned and values logged according to parameters set up by the user in the PC software; the instrument incorporates a real-time clock and on-board memory.

The adjustable contrast OLED display screen provides data readout, user prompts and mode annunciation. This very important feature ensures a high degree of user friendliness and confidence. User prompts indicate which buttons to press in the appropriate sequence when selecting parameters and functions and when setting calibration values. Mode annunciation indicates which mode of operation is currently selected.

A flash drive USB port is provided to allow data to be stored and/or exported. Firmware update are also facilitated via this port.

PC software running in WINDOWS is provided as standard; it allows programming of custom calibration, remote control & measure and logging functions.

SPECIFICATIONS

All values are valid for a nominal 240V 50Hz instrument supply and 20ºC ambient temperature

General

Inputs/Ranges/Sensors

Type	Pt100 to IEC 751 (ITS 90 refers). -200ºC to +850ºC Ro = 100Ω 3 or 4 wire connection with automatic recognition (with manual override)
Overall Accuracy	± 0.01ºC ± 0.0005% of span
Linearisation Conformity	Better than ± 0.01ºC
Stability (vs ambient temperature)	Better than 0.0025ºC per 1ºC ambient change
Warm-up	Negligible under normal ambient conditions. Allow 5-10 minutes for full stability unless stored at low temperature, then 30 minutes minimum.
Pt100 Sensor Current	0.5mA
Resolution of data display	0.01
Variable filter	Sampling rate selectable between 4 and 64 (measurements averaged per reading).
Measurement Units	°C, °F, K, Ω
Measurement Modes	A, B or A-B.
Custom Calibration	Up to 10 calibration values can be allocated to Pt100 input A & B and to thermocouples input A & B. Values are retained in non-volatile memory until replaced by user. ITS 90 or IPTS 68 coefficients can be used for custom calibration.
Smart Sensor Connection	Correction values stored in connector

Null Function	Corrects differential temperature readout between two sensors to zero.
Sensor Lead Resistance	5Ω each lead maximum
Logging	8000 readings
Supply	Internal Lithium Ion rechargeable batteries. Mains 90-260V 50/60Hz universal adaptor included. Battery charge life up to 12 hours with full charge.
Series Mode Rejection	60dB @ 50Hz (50mV RMS applied)
Common Mode Rejection	30V RMS applied between input and earth produces no measurable effect.
Display	128 x 64 pixel character OLED screen with diffused backlighting. Wide viewing angle, high contrast (adjustable).
Front Panel Controls	9 membrane push-keys to control all instrument functions
Mechanical/Case	Metal bench top case / adjustable tilt
Dimensions	Overall 190mm(W) x 70mm(H) x 250mm(D)
Weight	3.0kg approx.
Input Connections	2 x Pt100 via D type connectors
USB Serial Communications	Isolated, 38400 Baud, 8 data, no parity, 1 stop bit. Remote control and measure.
PC Software (standard)	Supplied as standard on CD-ROM. Remote control and measure: Log readings to file/Download to PC/Programming corrections
Analogue Output (standard)	User programmable, 0 to 1V

Application Note: *Inputs are not isolated in the instrument, which is primarily designed for laboratory applications and site calibration of industrial temperature sensors. Probes connected to the instrument must therefore be isolated from high voltage pick-up.*

UKAS Calibration

LP - UKAS:	UKAS calibration of instrument alone.
LP - SYS.CAL:	UKAS calibration of instrument and sensor together at five points.
LP - COR.CAL:	UKAS calibration of instrument and sensor together at five points, after initial calibration of sensor only and programming of corrections.

ACCESSORIES

Tempmaster PRO is supplied complete with switch mode power supply (90-260V, 50/60Hz), two Pt100 “D” connectors, operating manual and PC software.