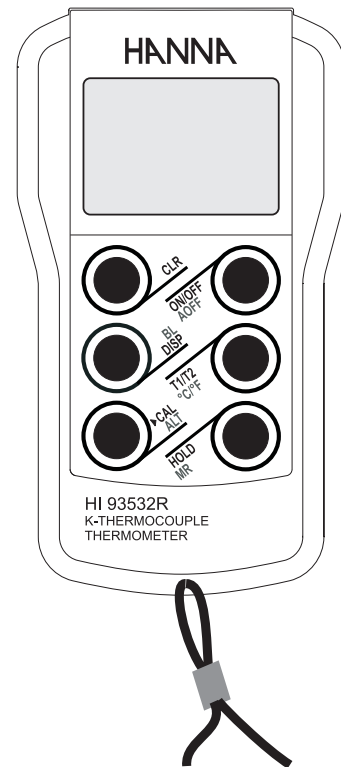


Instruction Manual

HI 93530 • HI 93530N
HI 93531 • HI 93531N
HI 93531R
HI 93532 • HI 93532N
HI 93532R

K-Thermometers



 **HANNA**[®]
instruments

w w w . h a n n a i n s t . c o m

Dear Customer,

Thank you for choosing a Hanna product.

Please read this instruction manual carefully before using the instrument.

This manual will provide you with the necessary information for correct use of the instrument, as well as a more precise idea of its versatility.

If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com.

These instruments are in compliance with the **CE** directives.

WARRANTY

All Hanna Instruments **meters are warranted for two years** against defects in workmanship and materials when used for their intended purpose and maintained according to instructions. **The probes are warranted for a period of six months.**

This warranty is limited to repair or replacement free of charge.

Damages due to accidents, misuse, tampering or lack of prescribed maintenance are not covered.

If service is required, contact the dealer from whom you purchased the instrument. If under warranty, report the model number, date of purchase, serial number and the nature of the failure.

First obtain a Returned Goods Authorization number from the Customer Service department, then return the instrument with the Authorization number included along with shipment costs prepaid.

If the repair is not covered by the warranty, you will be notified of the charges.

When shipping any instrument, make sure it is properly packaged for complete protection.

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PRELIMINARY EXAMINATION

Remove the instrument from the packing material and examine it to make sure that no damage has occurred during shipping. If there is any damage, notify your dealer or the nearest Hanna Customer Service Center.

Each meter is supplied complete with:

- 3 x 1.5V AA alkaline batteries
- Instruction manual

Note: Save all packing material until you are sure that the instrument functions correctly. All defective items must be returned in the original packing with the supplied accessories.

GENERAL DESCRIPTION

These instruments are powerful and flexible K-type thermocouple thermometers, which have been designed using the latest microprocessor technology to provide reliable and accurate high resolution measurements in a wide temperature range.

Standard features include K-type thermocouple measurement, waterproof casing, HOLD function, °C/°F selection, auto-off capability, remaining battery life indication, low battery detection, long battery life and two-year warranty.

HI 93531 and HI 93532 model series are equipped with a dual-line LCD for continuous monitoring and displaying of Low and High temperature values, and CLR function.

HI 93532, HI 93532N and HI 93532R are two-channel thermometers, ideal for monitoring two samples at once.

HI 93530N, HI 93531N, HI 93531R, HI 93532N and HI 93532R offer additional features, such as calibration of meter and probe at 0°C, and backlit display.

Moreover, the HI 93531R and HI 93532R models are equipped with a serial port interface, and provide average and relative measurements.

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Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice.

SPECIFICATIONS OF HI 93530 & HI 93530N

SPECIFICATIONS	
Range (*)	-200.0 to 999.9°C / 1000 to 1371°C -328.0 to 999.9°F / 1000 to 2500°F
Resolution	0.1°C (-149.9 to 999.9°C) 0.2°C (-200.0 to -150.0°C) / 1°C (outside) 0.1°F (-24.9 to 999.9°F) 0.2°F (-249.9 to -25.0°F) 0.3°F (-328.0 to -250.0°F) / 1°F (outside)
Accuracy (@20°C/68°F)	±0.5°C (-100.0 to 999.9°C) / ±1°C (outside) ±1°F (-148.0 to 999.9°F) / ±1.5°F (outside) excluding probe error
Typical EMC Deviation	±3°C / ±6°F with HI 766 K-thermocouple probe
Battery	3x1.5V AA (IEC LR6) batteries, approx. 500 hours of continuous use (BL off)
Auto-off	user selectable: 60 min or disabled
Environment	-10 to 60°C (14 to 140°F); RH 100%
Dimensions	150 x 80 x 36 mm (5.9 x 3.1 x 1.4")
Weight	235 g (8.3 oz.)

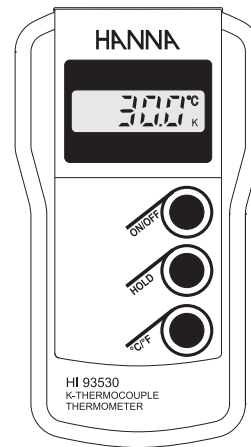
(*) Range may be limited by probe.

Main features:

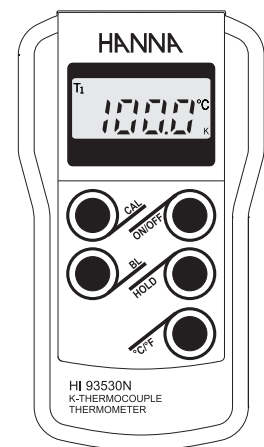
- Use **HI 766** K-thermocouple probes
- Display of temperature in degrees Celsius or Fahrenheit
- Extended range -200 to 1371°C or -328 to 2500°F
- HOLD function
- Remaining battery life indication / low battery detection
- Waterproof casing
- Auto-off capability
- Backlight feature (**HI 93530N** only)
- User calibration at 0°C (**HI 93530N** only)

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HI 93530



HI 93530N



Keyboard Functions:

ON/OFF : turn the meter ON and OFF

HOLD : freeze the reading on display

°C/°F : change reading unit (°C or °F)

BL (HI 93530N only) : toggle the backlight ON and OFF

CAL (HI 93530N only) : press and hold for about 5 seconds to enter the Calibration mode (with reading within ±3°C range); press to abort the Calibration mode

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SPECIFICATIONS OF HI 93531 & HI 93531N

SPECIFICATIONS	
Range (*)	-200.0 to 999.9°C / 1000 to 1371°C -328.0 to 999.9°F / 1000 to 2500°F
Resolution	0.1°C (-149.9 to 999.9°C) 0.2°C (-200.0 to -150.0°C) / 1°C (outside) 0.1°F (-24.9 to 999.9°F) 0.2°F (-249.9 to -25.0°F) 0.3°F (-328.0 to -250.0°F) / 1°F (outside)
Accuracy (@20°C/68°F)	±0.5°C (-100.0 to 999.9°C) / ±1°C (outside) ±1°F (-148.0 to 999.9°F) / ±1.5°F (outside) excluding probe error
Typical EMC Deviation	±3°C / ±6°F with HI 766 K-thermocouple probe
Battery	3x1.5V AA (IEC LR6) batteries, approx. 500 hours of continuous use (BL off)
Auto-off	user selectable: 60 min or disabled
Environment	-10 to 60°C (14 to 140°F); RH 100%
Dimensions	150 x 80 x 36 mm (5.9 x 3.1 x 1.4")
Weight	235 g (8.3 oz.)

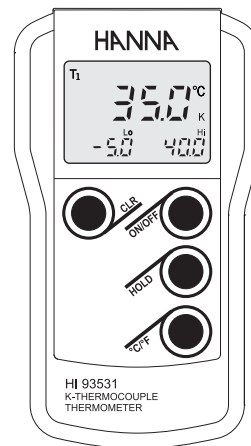
(*) Range may be limited by probe.

Main features:

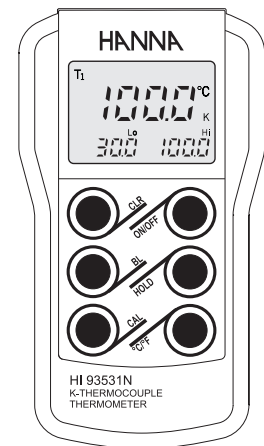
- Use HI 766 K-thermocouple probes
- Display of temperature in degrees Celsius or Fahrenheit
- Extended range -200 to 1371°C or -328 to 2500°F
- HOLD function
- HI & LO (Max & Min) temperature values displayed on the LCD
- Remaining battery life indication / low battery detection
- Waterproof casing
- Auto-off capability
- Backlight feature (HI 93531N only)
- User calibration at 0°C (HI 93531N only)

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HI 93531



HI 93531N



Keyboard Functions:

ON/OFF : turn the meter ON and OFF

HOLD : freeze the reading on display.

°C/°F : change reading unit (°C or °F)

CLR : clear the HI and LO values

BL (HI 93531N only) : toggle the backlight ON and OFF.

CAL (HI 93531N only) : press and hold for about 5 seconds to enter the Calibration mode (with reading within ±3°C range); press to abort the Calibration mode

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SPECIFICATIONS OF HI 93532 & HI 93532N

SPECIFICATIONS	
Range (*)	-200.0 to 999.9°C / 1000 to 1371°C -328.0 to 999.9°F / 1000 to 2500°F
Resolution	0.1°C (-149.9 to 999.9°C) 0.2°C (-200.0 to -150.0°C) / 1°C (outside) 0.1°F (-24.9 to 999.9°F) 0.2°F (-249.9 to -25.0°F) 0.3°F (-328.0 to -250.0°F) / 1°F (outside)
Accuracy (@20°C/68°F)	±0.5°C (-100.0 to 999.9°C) / ±1°C (outside) ±1°F (-148.0 to 999.9°F) / ±1.5°F (outside) excluding probe error
Typical EMC Deviation	±3°C / ±6°F with HI 766 K-thermocouple probe
Battery	3x1.5V AA (IEC LR6) batteries, approx. 500 hours of continuous use (BL off)
Auto-off	user selectable: 60 min or disabled
Environment	-10 to 60°C (14 to 140°F); RH 100%
Dimensions	150 x 80 x 36 mm (5.9 x 3.1 x 1.4")
Weight	235 g (8.3 oz.)

(*) Range may be limited by probe.

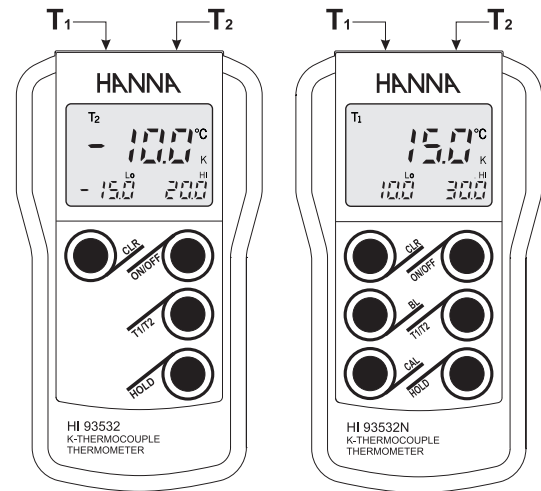
Main features:

- Two independent measurement channels, T1 and T2
- Use HI 766 K-thermocouple probes
- Display of temperature in degrees Celsius or Fahrenheit
- Extended range -200 to 1371°C or -328 to 2500°F
- HOLD function
- HI & LO (Max & Min) temperature values displayed on the LCD
- Remaining battery life indication / low battery detection
- Waterproof casing
- Auto-off capability
- Backlight feature (HI 93532N only)
- User calibration at 0°C (HI 93532N only)

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HI 93532

HI 93532N



Keyboard Functions:

ON/OFF : turn the meter ON and OFF

T1/T2 : select the reading channel (T1, T2 or T1-T2)

HOLD : freeze the reading on display

CLR : clear the HI and LO values

BL (HI 93532N only) : toggle the backlight ON and OFF.

CAL (HI 93532N only) : press and hold for about 5 seconds to enter the Calibration mode (with reading within ±3°C); press to abort the Calibration mode

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SPECIFICATIONS OF HI 93531R & HI 93532R

SPECIFICATIONS	
Range (*)	-200.0 to 999.9°C / 1000 to 1371°C -328.0 to 999.9°F / 1000 to 2500°F
Resolution	0.1°C (-149.9 to 999.9°C) 0.2°C (-200.0 to -150.0°C) / 1°C (outside) 0.1°F (-24.9 to 999.9°F) 0.2°F (-249.9 to -25.0°F) 0.3°F (-328.0 to -250.0°F) / 1°F (outside)
Accuracy (@20°C/68°F)	±0.5°C (-100.0 to 999.9°C) / ±1°C (outside) ±1°F (-148.0 to 999.9°F) / ±1.5°F (outside) excluding probe error
Typical EMC Deviation	±3°C / ±6°F with HI 766 K-thermocouple probe
Battery	3x1.5V AA (IEC LR6) batteries, approx. 500 hours of continuous use (BL off)
Auto-off	user selectable: 8 min, 60 min or disabled
Serial Port Communication	unidirectional, 8-bit data, 1200 baud (see "Serial Communication" section)
Environment	-10 to 60°C (14 to 140°F); RH 100%
Dimensions	150 x 80 x 36 mm (5.9 x 3.1 x 1.4")
Weight	235 g (8.3 oz.)

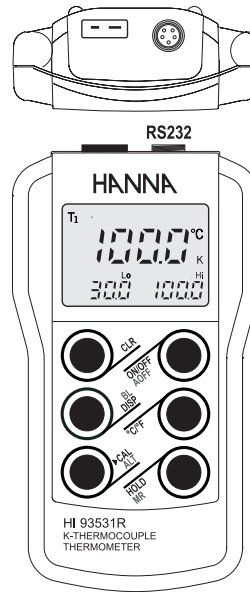
(*) Range may be limited by probe.

Main features:

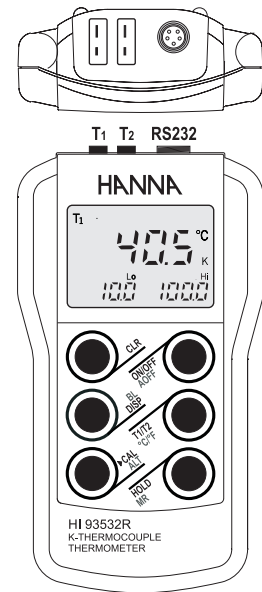
- Two independent measurement channels (HI 93532R only)
- Use HI 766 K-thermocouple probes
- Display of temperature in degrees Celsius or Fahrenheit
- Extended range -200 to 1371°C or -328 to 2500°F
- Relative and average measurements
- HOLD function
- HI & LO (Max & Min) temperature values displayed on the LCD
- Remaining battery life indication / low battery detection
- Waterproof casing
- Auto-off capability
- Backlight feature
- User calibration at 0°C
- RS232 serial port communication

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HI 93531R



HI 93532R



Keyboard Functions:

ON/OFF : turn the meter ON and OFF

T1/T2 (HI 93532R only) : select reading channel (T1, T2 or T1-T2)

HOLD : freeze the reading on display

CLR : clear the HI and LO values

DISP : select Normal, Relative or Average mode.

ALT : enable the second function keys; the "ALT" tag turns on to indicate that the second functions are enabled

Note: The ALT key can be released before pressing the second function key for 1-hand operation.

ALT/□ CAL : press and hold for about 5 seconds to enter the Calibration mode (with reading within ±3°C range).

(ALT +) AOFF : set auto power off delay (8 or 60 min, or disabled).

(ALT +) °C/°F : change reading units (°C or °F).

(ALT +) MR : recall memorized value.

(ALT +) BL : toggle the backlight ON and OFF.

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OPERATIONAL GUIDE

To switch the instrument ON, press the ON/OFF key.

The thermometer will carry out a self diagnostic test routine, the LCD will show all segments for a few seconds (or as long as ON/OFF is held), followed by the percentage indication of the remaining battery life.

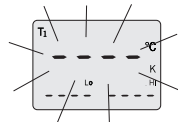


The thermometer then enters normal measurement mode.

If a temperature probe is plugged in, the meter displays the measured temperature.

If no probe is plugged in, or if reading is over-range, the display shows flashing dashes.

If a measurement is slightly over the range of the meter specifications, the display flashes the closest full-scale value.



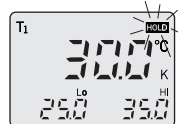
To switch the meter OFF, press the ON/OFF key.

Note: The meters are provided with an acoustic signal feature activated when buttons are pressed, which can be disabled using a switch located in the battery compartment (see figure on page 12).

HOLD FUNCTION

The HOLD function is activated by pressing the HOLD key.

The measured temperature is held on the display until HOLD is pressed again. The "HOLD" tag blinks on the display while in HOLD mode.

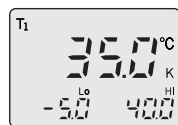


Note: Although the display is frozen, internally the meter continues measuring and updating Hi/Lo values (not for HI 93530 and HI 93530N).

HIGH/LOW TEMPERATURES

(not for HI 93530 and HI 93530N)

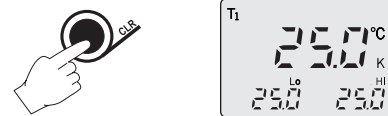
The maximum and minimum temperatures are continuously monitored and displayed on the lower portion of the LCD.



Note: When the reading goes over-range or the probe is removed, the Hi and Lo values display dashes until cleared.

CLEAR FUNCTION (not for HI 93530 and HI 93530N)

Upon pressing the CLR key, the High/Low values may be cleared at any time during measurement and the current reading is assigned to the highest and lowest temperature values for the displayed channel only.



°C/°F SELECTION

Measurements can be displayed in either degrees Celsius or Fahrenheit. The meter is factory set to °C scale; to change the scale, press the °C/°F key,



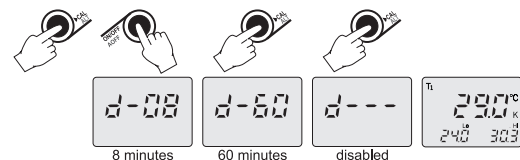
or set the °C/°F switch located in the battery compartment (HI 93532 and HI 93532N only, see figure on page 12).

AUTO SHUT-OFF

To save battery life, these meters are provided with an auto-off feature, which switches the instrument off after 60 minutes of nonuse.

To disable this feature, all models (except HI 93531R & HI 93532R) are provided with an internal switch located in the battery compartment (see figure on page 14).

HI 93531R and HI 93532R allow the user to disable the auto-off feature through the front keyboard; press (ALT+) AOFF to enter the mode, then set the desired option (auto-off after 8 or 60 minutes, or disabled) with the ALT key; release all buttons, wait a few seconds and the meter will return to normal measurement mode.



BACKLIGHT FEATURE

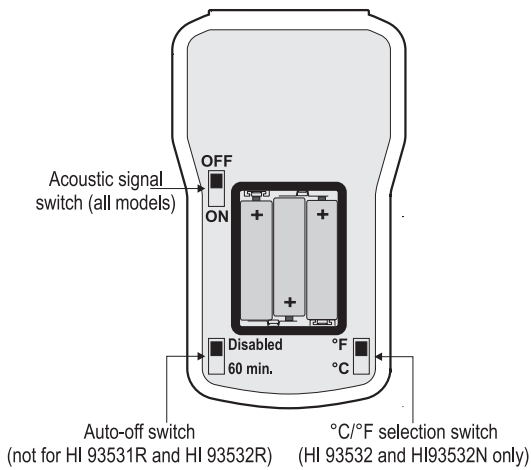
(not for HI 93530, HI 93531 and HI 93532)

The backlight feature can be easily activated through the keyboard by pressing the BL (or ALT+BL) key.

Note: The backlight automatically shuts off after approximately 1 minute with no buttons pressed.

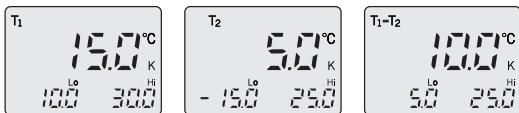
BATTERY COMPARTMENT

See "Battery replacement" section for back cover removal/installation.



2-CHANNEL MODELS (HI 93532, HI 93532N & HI 93532R)

HI 93532, HI 93532N and HI 93532R models can monitor two samples through two independent temperature channels (probes). The display will show the actual, Hi and Lo values of the selected channel (T1, T2 or T1-T2). The corresponding tags will light up to inform the user.



To select the desired channel, use the T1/T2 key.

DISP FUNCTION (HI 93531R and HI 93532R)

These models are also provided with the DISP function, which allows the user to select the information to be displayed.

- While in T1 (or T2, HI 93532R only), pressing DISP switches the display between normal, relative and average measurement modes.

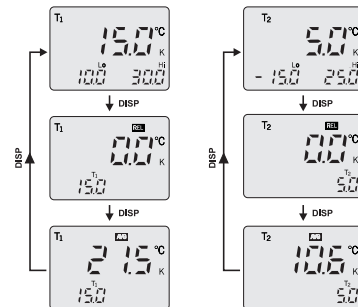
In the normal mode, the main body of the LCD shows the current temperature while the lower portion displays the Hi/Lo limits for that channel.

When the meter enters relative mode, the "REL" tag lights up and the current temperature for that channel is set as the reference temperature. Pressing CLR will also set the reference to the current temperature.

In relative mode, the main body of the LCD shows the difference from the reference temperature. The lower portion displays the current temperature for the selected channel.

When average mode is entered, the "AVG" tag lights up and the current value is set as the new beginning value. The average can be reset by pressing CLR while in the average mode.

In average mode, the main body of the LCD shows the average temperature, while the lower portion displays the current temperature for the selected channel.



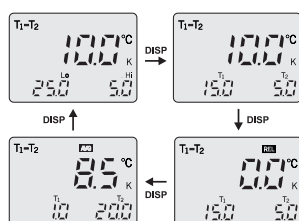
The average mode will calculate the average for a period of up to 24 hours. If a different mode is selected for that channel, the average will no longer calculate and the value will be lost.

At the end of the 24 hour period, the "AVG" tag will blink to indicate that sampling has stopped, and the displayed value is the last average calculated.

If a probe is removed or over-range is reached while in average mode, the display shows flashing dashes and blinking "AVG" tag.

The average value is lost and will not restore even if the condition restores. To start the average cycle again, either press CLR or re-enter the average mode.

- While in T1-T2 (HI 93532R only), pressing DISP will switch between 4 displays:



Note: Pressing T1/T2 (HI 93532R only) to change the channel will not alter the information chosen to be displayed for each channel (DISP). For example, if T1 is in average mode, the average will continue to be calculated even if the user press T1/T2 to see T2.

Note: Relative/average modes cannot be entered if dashes are shown on the primary LCD.

Note: The auto-off time is disabled whenever a channel is set to average mode.

BATTERY REPLACEMENT

When the battery level is below 5%, the battery symbol will blink on the LCD to indicate a low battery condition.

If the battery level is low enough to cause erroneous readings, the Battery Error Prevention System (BEPS) turns the meter off.

Immediately replace the batteries with new ones.

The batteries are accessed by separating the front and the back halves of the meter: unscrew the 4 screws on the back of the meter and carefully replace the three batteries located in the battery compartment, while paying attention to their polarity. Reattach the back making sure that the gasket is in place and tighten the screws to ensure a watertight seal.

Battery replacement must only take place in a non-hazardous area using 1.5V AA (IEC LR6) alkaline batteries.

SERIAL PORT COMMUNICATION (HI 93531R & HI 93532R only)

HI 93531R and HI 93532R feature an RS232 output for transferring measurement data (once every second for HI 93531R and once every 2 seconds for HI 93532R) to devices provided with RS232 input (PC or printer).

The communication protocol has been designed to transmit to the receiving unit all the displayed information.

The communication is unidirectional (meter to receiving unit only) and the transmissions consist in a 32-character ASCII string, compatible with our optional HI 92000 software.

The 32-character data string is structured as follows:

Main portion of the LCD

- byte 0 probe type: K-thermocouple (k)
- bytes 1, 2 measurement channel: T1, T2, T1-T2 (Td)
- byte 3 measurement mode: Normal (blank), Relative (R), Average (A), Average done (a)
- byte 4 operating mode: Hold (H), Memory recall (M)
- byte 5 blank character
- bytes 6-10 measurement: reading (XXX.X or blank XXXX), over-range (OVRG blank), no data (blank ----)
- byte 11 temperature unit: C, F
- byte 12 blank character

Secondary LCD, left portion

- bytes 13, 14 info description: low temperature (Lo), T1 (T1)
- byte 15 blank character
- bytes 16-20 measurement: reading (XXX.X or blank XXXX), over-range (5 blanks), no data (blank ----)
- byte 21 blank character

Secondary LCD, right portion

- bytes 22, 23 info description: high temperature (Hi), T2 (T2)
- byte 24 blank character
- bytes 25-29 measurement: reading (XXX.X or blank XXXX), over-range (5 blanks), no data (blank ----)
- byte 30 <CR>
- byte 31 line feed

USER CALIBRATION

(Not for HI 93530, HI 93531 and HI 93532 models)

The meters can be calibrated at 0°C by using an ice bath.

- Prepare an ice bath with approximately equal volumes of distilled water and chopped ice made from distilled water.
- Immerse the temperature probe in the center of the ice bath, taking care not to touch the ice with the probe tip.
- Ensure that the meter is measuring a temperature within $\pm 3^{\circ}\text{C}$.
- To enter the Calibration mode, press and hold the CAL button for about 5 seconds.
- The CAL tag turns on to indicate that the Calibration mode has been entered.

Note: If the measurement is outside the $\pm 3^{\circ}\text{C}$ window, the meter does not enter Calibration mode.



- When the meter reaches the stability condition, which is detected when the measurement remains within $\pm 0.2^{\circ}\text{C}$ for 5 seconds, the calibration is accepted and the reading becomes 0°C (32°F).
- The meter then automatically returns to normal mode.

Note: To exit the Calibration mode at any time, press the CAL key.

Note: User calibration cannot be entered in T1-T2 mode.

Note: User calibration is only performed on the current channel displayed (T1 or T2).

FACTORY RECALIBRATION

All Hanna thermometers have been accurately pre-calibrated at the factory.

It is generally recommended to have all thermometers recalibrated at least once a year.

For an accurate recalibration, contact your nearest Hanna Customer Service Center.

Note: To clean the meters, do not use aggressive detergents. It is recommended to use water.

ACCESSORIES

K-TYPE THERMOCOUPLE PROBES

with integral handle, 1 m (3.3') cable & mini-connector

HI 766A	Roller surface probe, max 320°C/600°F
HI 766B	Surface probe, max 650°C/1200°F
HI 766B1	90° surface probe, max 450°C/840°F
HI 766B2	Spring-loaded, surface probe, max 900°C/1650°F
HI 766B3	Spring-loaded, small surface probe w/insulated shaft
HI 766C	Penetration probe, max 900°C/1650°F
HI 766C1	Ultra-fast Penetration probe, max 300°C/570°F
HI 766D	Air probe, max 300°C/570°F
HI 766E1	General purpose probe, max 900°C/1650°F
HI 766F	High temperature, flexible wire probe without handle
HI 766F1	Flexible wire probe w/o handle, max 480°C/900°F
HI 766TR1	Penetration probe, max 250°C/482°F
HI 766TR2	Penetration long probe, max 250°C/482°F
HI 766TV1	Pipe clamp probe, max 200°C/390°F

with detachable handle & mini-connector (to be used in conjunction with the HI 766HD probe handle)

HI 766PA	Roller surface probe, max 320°C/600°F
HI 766PB	Surface probe, max 650°C/1200°F
HI 766PC	Penetration probe, max 900°C/1650°F
HI 766PD	Air probe, max 300°C/570°F
HI 766PE1	General purpose probe, max 900°C/1650°F

grill surface probe

HI 766B4	Grill surface probe with 70 cm (27.6") cable (protected with stainless steel jacket), max 250°C/482°F
HI 766B4S	Spare stainless steel sensor for HI 766B4 probe

OTHER ACCESSORIES

HI 710007 / 8	Shockproof rubber boot, blue / orange
HI 710018	Spare protective case
HI 766EX	Extension cable for K-type probes
HI 92000	Windows® compatible software
HI 920011	Serial cable for PC connection

Recommendations for Users

Before using these products, make sure that they are entirely suitable for the environment in which they are used. Operation of these instruments in residential area could cause unacceptable interferences to radio and TV equipments, requiring the operator to take all necessary steps to correct interferences. Any variation introduced by the user to the supplied equipment may degrade the instruments' EMC performance. To avoid electrical shock, do not use these instruments when voltages at the measurement surface exceed 24 Vac or 60 Vdc. To avoid damages or burns, do not perform any measurement in microwave ovens.

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