

Instruction Manual

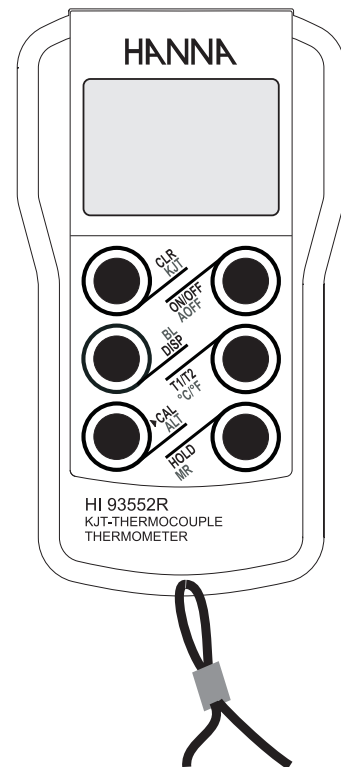
HI 93551 • HI 93551N

HI 93551R

HI 93542 • HI 93552

HI 93552R

K J T - Thermometers



Dear Customer,
 Thank you for choosing a Hanna product.
 Please read this instruction manual carefully before using the instrument.
 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 thermometers, which can take measurements using different types of thermocouple probes (K, J and T), and have been designed using the latest microprocessor technology to provide reliable and accurate high resolution measurements in a wide temperature range.

Standard features include dual-level LCD (which allows continuous displaying of High and Low temperature values), °C/°F selection, HOLD function, auto-off capability, remaining battery life indication, low battery detection, long battery life and two-year warranty.

HI 93542, HI 93552 and HI 93552R are two-channel thermometers, ideal for monitoring two samples at once.

HI 93551N, HI 93551R, HI 93552 and HI 93552R offer additional features, such as calibration of meter and probe at 0°C, backlit display, and capability to store and recall a reading.

Moreover, the **HI 93551R and HI 93552R** models are equipped with a serial port interface.

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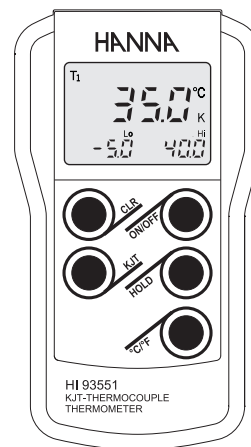
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SPECIFICATIONS OF HI 93551 & HI 93551N

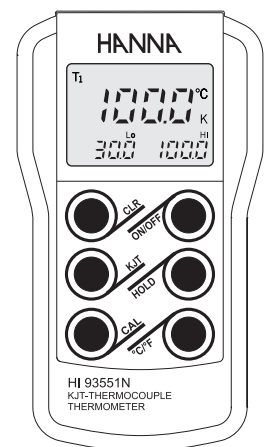
| SPECIFICATIONS | | |
|----------------|--|--|
| Range (*) | K -200.0 to 999.9°C / 1000 to 1371°C -328.0 to 999.9°F / 1000 to 2500°F | |
| | J -200.0 to 999.9°C -328.0 to 999.9°F / 1000 to 1832°F | |
| | T -200.0 to 400.0°C -328.0 to 752.0°F | |
| Resolution | K 0.1°C (-149.9 to 999.9°C) 0.2°C (-200.0 to -150.0°C) / 1°C (1000 to 1371°C) | |
| | 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 (1000 to 2500°F) | |
| | J 0.1°C (-200.0 to 999.9°C) 0.1°F (-149.9 to 999.9°F) | |
| | 0.2°F (-328.0 to -150.0°F) / 1°F (1000 to 1832°F) | |
| | T 0.1°C (-149.9 to 400.0°C) 0.2°C (-200.0 to -150.0°C) | |
| | 0.1°F (0.0 to 752.0°F) / 0.2°F (-270.0 to -0.1°F) | |
| | 0.3°F (-328.0 to -270.1°F) | |
| | Accuracy | ±0.5°C (-100.0 to 999.9°C) / ±1°C (outside) (@20°C/68°F) ±1°F (-148.0 to 999.9°F) / ±1.5°F (outside) for one year, excluding probe error |
| | Typical EMC Deviation | ± 3°C / ± 6°F |
| | Battery | 3x1.5V AA (IEC LR6) batteries, approx. 500 hours of continuous use |
| | 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.

HI 93551



HI 93551N



Keyboard Functions:

ON/OFF : turn the meter ON and OFF.

HOLD : freeze the reading on display.

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

KJT : select the thermocouple type.

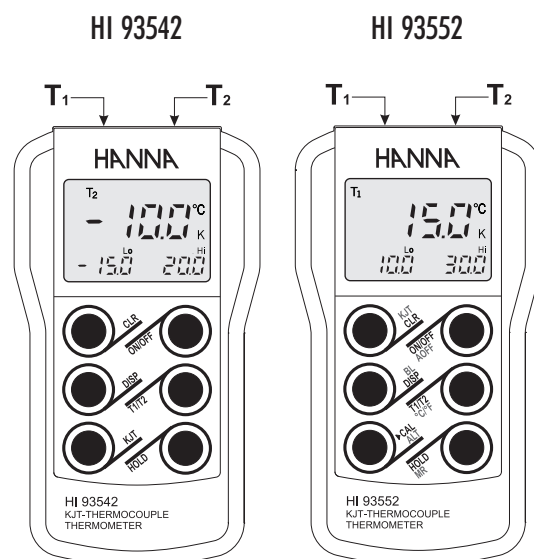
CLR : clear the HI and LO values.

CAL (HI 93551N 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.

SPECIFICATIONS OF HI 93542 & HI 93552

| SPECIFICATIONS | |
|------------------------------|--|
| Range (*) | K -200.0 to 999.9°C / 1000 to 1371°C -328.0 to 999.9°F / 1000 to 2500°F |
| | J -200.0 to 999.9°C -328.0 to 999.9°F / 1000 to 1832°F |
| | T -200.0 to 400.0°C -328.0 to 752.0°F |
| Resolution | K 0.1°C (-149.9 to 999.9°C) 0.2°C (-200.0 to -150.0°C) / 1°C (1000 to 1371°C) 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 (1000 to 2500°F) |
| | J 0.1°C (-200.0 to 999.9°C) 0.1°F (-149.9 to 999.9°F) |
| | 0.2°F (-328.0 to -150.0°F) / 1°F (1000 to 1832°F) |
| | T 0.1°C (-149.9 to 400.0°C) 0.2°C (-200.0 to -150.0°C) |
| | 0.1°F (0.0 to 752.0°F) / 0.2°F (-270.0 to -0.1°F) |
| | 0.3°F (-328.0 to -270.1°F) |
| Accuracy | ±0.5°C (-100.0 to 999.9°C) / ±1°C (outside) (@20°C/68°F) ±1°F (-148.0 to 999.9°F) / ±1.5°F (outside) for one year, excluding probe error |
| Typical EMC Deviation | ± 3°C / ± 6°F |
| Battery | 3x1.5V AA (IEC LR6) batteries, approx. 500 hours of continuous use (BL off) |
| Auto-off | user selectable: 60 min or disabled (HI 93542) user selectable: 8 min, 60 min, disabled (HI 93552) |
| 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.



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. In **HI 93552**, the frozen value is also stored in non-volatile memory.

CLR : clear the HI and LO values, reset the relative or average measurement.

DISP : select Normal, Relative, Average or T1/T2 measuring mode.

KJT : select the thermocouple type.

ALT (HI 93552 only) : 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-off delay (8min, 60min, disabled).

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

(ALT +) MR : recall memorized value.

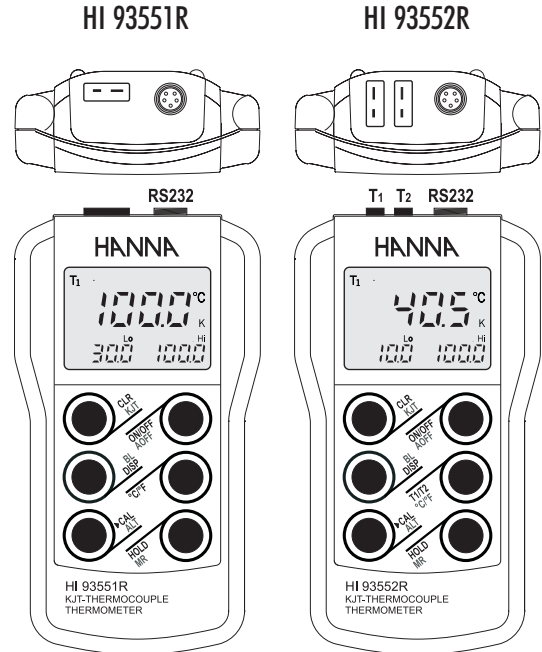
(ALT +) KJT : select the thermocouple type.

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

SPECIFICATIONS OF HI 93551R & HI 93552R

| SPECIFICATIONS | |
|---------------------------|--|
| Range (*) | K -200.0 to 999.9°C / 1000 to 1371°C -328.0 to 999.9°F / 1000 to 2500°F |
| | J -200.0 to 999.9°C -328.0 to 999.9°F / 1000 to 1832°F |
| | T -200.0 to 400.0°C -328.0 to 752.0°F |
| Resolution | K 0.1°C (-149.9 to 999.9°C) 0.2°C (-200.0 to -150.0°C) / 1°C (1000 to 1371°C) 0.1°F (-24.9 to 999.9°F) / 0.2°F (-249.9 to -25.0°F) |
| | J 0.1°C (-200.0 to 999.9°C) 0.1°F (-149.9 to 999.9°F) |
| | T 0.1°C (-149.9 to 999.9°C) 0.2°F (-328.0 to -150.0°F) / 1°F (1000 to 1832°F) |
| | J 0.1°C (-200.0 to 999.9°C) 0.1°F (-149.9 to 999.9°F) |
| | T 0.1°C (-149.9 to 400.0°C) 0.2°C (-200.0 to -150.0°C) |
| | 0.1°F (0.0 to 752.0°F) / 0.2°F (-270.0 to -0.1°F) 0.3°F (-328.0 to -270.1°F) |
| Accuracy | ±0.5°C (-100.0 to 999.9°C) / ±1°C (outside) (@20°C/68°F) ±1°F (-148.0 to 999.9°F) / ±1.5°F (outside) for one year, excluding probe error |
| Typical EMC Deviation | ± 3°C / ± 6°F |
| Battery | 3x1.5V AA (IEC LR6) batteries, approx. 500 hours of continuous use (BL off) |
| Auto-off | user selectable: 8 min, 60 min, 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.



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. The frozen value is also stored in non-volatile memory.

CLR : clear the HI and LO values, reset the relative or average measurement.

DISP : select Normal, Relative, Average or T1/T2 measuring 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-off delay (8 min, 60 min, disabled).

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

(ALT +) MR : recall memorized value.

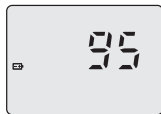
(ALT +) KJT : select the thermocouple type.

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

OPERATIONAL GUIDE

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

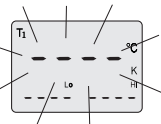
The thermometer will carry out a self diagnostic test routine, the LCD will show all segments for a few seconds (or as long as ON/OFF is held), followed by the percentage indication of the remaining battery life.



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 the reading is over-range, the display shows flashing dashes. If a measurement is slightly over the range of the meter specifications, the display will flash the closest full-scale value.



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

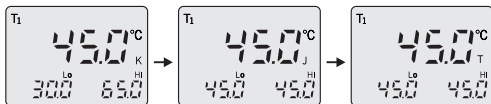
Note: The meters are provided with an acoustic signal feature activated when buttons are pressed, which can be disabled using a switch located in the battery compartment (see figure on page 10).

°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 °C/°F key (HI 93551, HI 93551N and HI 93551R) or (ALT+)°C/°F keys (HI 93552 and HI 93552R), or set the switch located in the battery compartment (HI 93542, see figure on page 10).

THERMOCOUPLE TYPE SELECTION, KJT

By pressing KJT (HI 93551, HI 93551N and HI 93542) or (ALT+)KJT keys (HI 93551R, HI93552 and HI 93552R), the thermometer is set according to the connected thermocouple type. The corresponding symbol will be displayed, i.e. K for K-type, J for J-type, T for T-type.

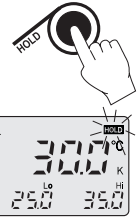


Note: Changing thermocouple type resets the HI and LO values.

HOLD and MR FUNCTIONS

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, relative and average values.

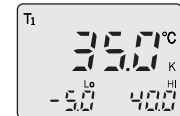
In HI 93551R, HI 93552 and HI 93552R, the held value is also stored in non-volatile memory and can be recalled by pressing (ALT+) MR keys. While the MR key is held, the "HOLD" tag lights up and the meter displays the stored value; when the MR key is released, after 1 second the meter returns to normal measurement mode.



HIGH/LOW TEMPERATURES

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

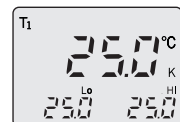
Note: When the reading goes over-range or the probe is removed, the Hi and Lo values display dashes until cleared.



CLEAR FUNCTION

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.

In HI 93551R, HI 93542, HI 93552 and HI 93552R models, pressing CLR also resets relative and average values.

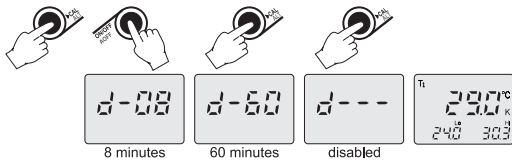


AUTO SHUT-OFF

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

In HI 93551, HI 93551N and HI 93542 models, to disable this feature set the internal slide-switch located in the battery compartment (see figure on page 10).

The HI 93551R, HI 93552 and HI 93552R allow the user to select the auto-off time period through the front keyboard; press (ALT+) AOFF to enter the mode, then set the desired auto shut-off interval (8 min, 60 min, or disabled) with the ALT key; release all buttons, wait a few seconds and the meter will return to normal measurement mode.



BACKLIGHT FEATURE

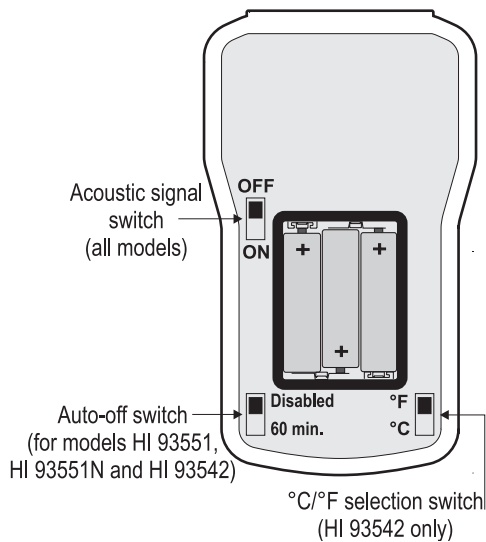
The HI 93551R, HI 93552 and HI 93552R models are provided with a backlight feature, which can be easily activated through the keyboard by pressing the (ALT+)BL keys.



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

BATTERY COMPARTMENT

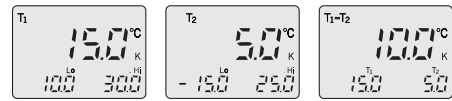
See "Battery replacement" section for back cover removal/installation.



2-CHANNEL MODELS (HI 93542, HI 93552 & HI 93552R)

HI 93542, HI 93552 and HI 93552R models can monitor two samples through two independent temperature channels (probes). The display shows the actual, Hi and Lo (or T1 and T2) values of the selected channel (T1, T2 or T1-T2). The corresponding tags light up to inform the user.

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



The 2-channel and HI 93551R models are also provided with the DISP function, which allows the user to select the information to be displayed.

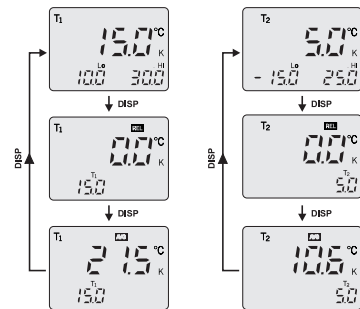
- While in T1 or T2, pressing DISP switches the display between normal, relative and average measurement modes.

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.

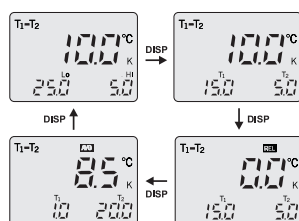


The average mode will calculate the average for a period of up to 24 hours. If a different mode is selected for that channel, the average will no longer calculate and the value will be lost.

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 (not for HI 93551R), pressing DISP will switch between 4 displays:



Note: Pressing T1/T2 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 in the main portion of the LCD.

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

SERIAL PORT COMMUNICATION (HI 93551R & HI 93552R only)

HI 93551R and HI 93552R feature an RS232 output for transferring measurement data (once every second for HI 93551R and once every 2 seconds for HI 93552R) 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

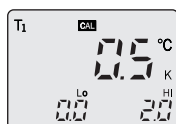
- bytes 22, 23 info description: high temperature (Hi), T2 (T2)
- byte 24 blank character
- bytes 25-29 measurement: reading (XXX.X or blank XXXX), over-range (5 blanks), no data (blank ----)
- byte 30 <CR>
- byte 31 line feed

USER CALIBRATION

The HI 93551N, HI 93551R, HI 93552 and HI 93552R models 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 relative, average or 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.

BATTERY REPLACEMENT

When the battery level is below 5%, a warning 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 4 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.

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 24VAC or 60 VDC.

To avoid damages or burns, do not perform any measurement in microwave ovens.

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 with insulated shaft, max 200°C/390°F |
| 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 766E2 | General purpose probe, max 900°C/1650°F |
| HI 766F | High temperature, flexible wire probe without handle, max 1100°C/2000°F |
| 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 |
| HI 766PE2 | 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 HI766B4 probe |

OTHER ACCESSORIES

| | |
|-----------|---|
| HI 710007 | Shockproof rubber boot, blue |
| HI 710008 | Shockproof rubber boot, orange |
| HI 710018 | Spare protective case |
| HI 710031 | RUGGED carrying case |
| HI 766EX | Extension cable for K-type probes |
| HI 766HD | Rugged thermocouple probe handle with 1 m (3.3') cable fitted with mini-connector |
| HI 92000 | Windows® compatible software |
| HI 920011 | Serial cable for PC connection |

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