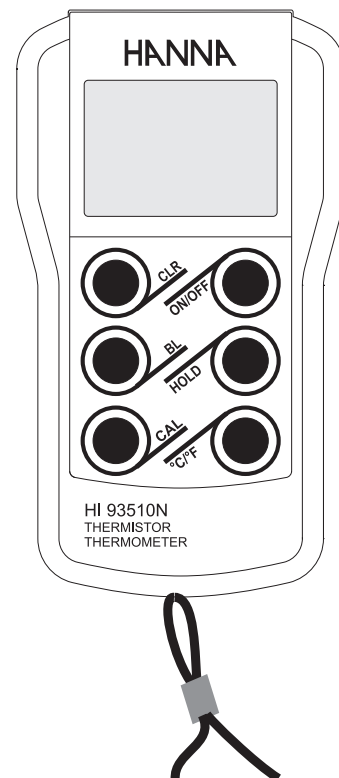




PEWA
Messtechnik GmbH
Weidenweg 21
58239 Schwerte
Tel.: 02304-96109-0
Fax: 02304-96109-88
E-Mail: info@pewa.de
Homepage : www.pewa .de

Instruction Manual

HI 93510 - HI 93510N HI 93512 - HI 93522 Portable Microprocessor Thermistor Thermometers



 **HANNA**[®]
instruments
www.hannainst.com

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:

- Temperature probe
- 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

HI 93510, **HI 93510N**, **HI 93512** and **HI 93522** are powerful and flexible thermistor thermometers, which have been designed using the latest microprocessor technology to provide reliable and accurate measurements.

Standard features include waterproof casing, dual-level LCD, low battery detection, long battery life and two-year warranty.

HI 93510 has been designed for laboratory and field use, while **HI 93510N** is suitable for high accuracy (meter and probe can be calibrated in an ice bath at 0°C) or dimly lit areas (the backlight feature can be easily activated through the keyboard).

HI 93512 is a two-channel thermometer, ideal for monitoring two samples at once, while **HI 93522** offers all the features of **HI 93512** and more: calibration of meter and probe at 0°C, backlight, user-selectable auto-off time period, and capability to store and recall a reading.

SPECIFICATIONS OF HI 93510 & HI 93510N

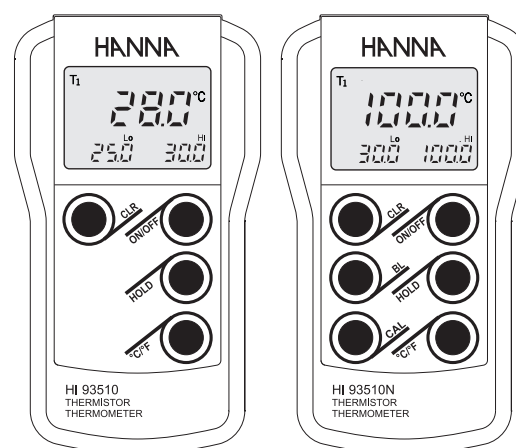
SPECIFICATIONS	
Range	-50.0 to 150.0°C -58.0 to 302.0°F
Resolution	0.1°C 0.1°F (-58.0 to 230.0°F) / 0.2°F (outside)
Accuracy	±0.4°C / ±0.8°F for one year, excluding probe error
Typical EMC Deviation	±0.5°C / ±1°F with HI 762BL probe
Battery	3x1.5V AA (IEC LR6) batteries, approx. 2000 hours of continuous use (BL off)
Auto-off (HI 93510 only)	user selectable: 8 min, 60 min, disabled
Environment	-10 to 50°C (14 to 122°F); RH 100%
Dimensions	150 x 80 x 36 mm (5.9 x 3.1 x 1.4")
Weight	235 g (8.3 oz.)

Main features:

- HI 762 probes series
- Available HI 762 accuracy test plugs
- Display of temperature in degrees Celsius or Fahrenheit
- Range -50 to 150°C or -58 to 302°F
- HOLD function
- HI and LO (Max and Min) temperature values always displayed on the LCD
- Remaining battery life indication / low battery detection
- Waterproof casing
- Auto-off capability (HI 93510 only)
- Backlight feature (HI 93510N only)
- User calibration at 0°C (HI 93510N only)

HI 93510

HI 93510N



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 93510N only) : toggle the backlight ON and OFF.

CAL (HI 93510N only) : press and hold for 5 seconds to enter the Calibration mode (with reading within ±3°C range); press to abort the Calibration mode.

SPECIFICATIONS OF HI 93512 & HI 93522

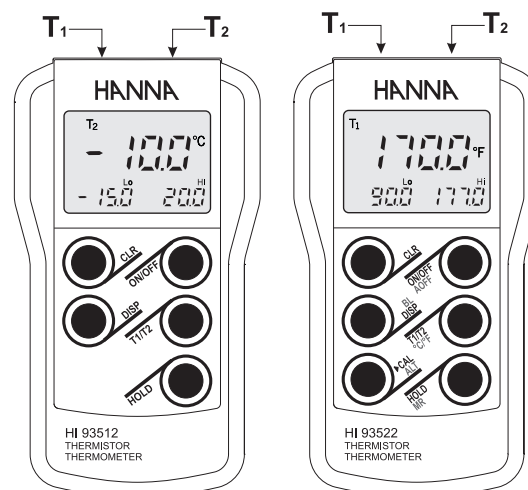
SPECIFICATIONS	
Range	-50.0 to 150.0°C -58.0 to 302.0°F
Resolution	0.1°C 0.1°F (-58.0 to 230.0°F) / 0.2°F (outside)
Accuracy	±0.4°C / ±0.8°F for one year, excluding probe error
Typical EMC Deviation	±0.5°C / ±1°F with HI 762BL probe
Battery	3x1.5V AA (IEC LR6) batteries, approx. 2000 hours of continuous use (BL off)
Auto-off (HI 93522 only)	user selectable: 8 min, 60 min, disabled
Environment	-10 to 50°C (14 to 122°F); RH 100%
Dimensions	150 x 80 x 36 mm (5.9 x 3.1 x 1.4")
Weight	235 g (8.3 oz.)

Main features:

- Two independent measurement channels, T1 and T2
- HI 762 probes series
- Available HI 762 accuracy test plugs
- Display of temperature in degrees Celsius or Fahrenheit
- Range -50 to 150°C or -58 to 302°F
- HOLD function
- HI and LO (Max and Min) temperature values always displayed on the LCD
- DISP function to select the information to be displayed (Normal, Relative or T1/T2)
- Remaining battery life indication / low battery detection
- Waterproof casing
- Auto-off capability (HI 93522 only)
- MR function for recalling memorized reading (HI 93522 only)
- Backlight feature (HI 93522 only)
- User calibration at 0°C (HI 93522 only)

HI 93512

HI 93522



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 93522, the frozen value is also stored in non-volatile memory.

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

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

ALT (HI 93522 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 power off delay (8min, 60min, disabled).

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

(ALT +) MR : recall memorized value.

(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.

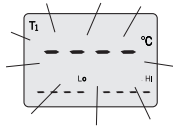


The thermometer then enters normal measurement mode.

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.



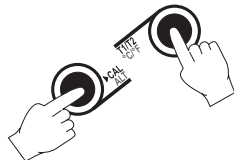
To switch the meter OFF, press the ON/OFF key.

°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 or (ALT+) °C/°F keys,



HI 93510 / 510N



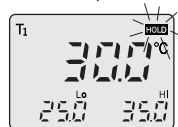
HI 93522

or set the switch located in the battery compartment (HI 93512 only, see figure on page 10).

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.



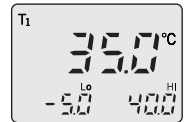
Note: Although the display is frozen, internally the meter continues measuring and updating Hi/Lo and relative values.

In HI 93522 only, the held value is also stored in non-volatile memory and can be recalled by pressing (ALT+) MR key. 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

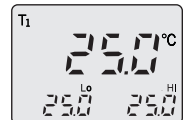
The maximum and minimum temperatures are continuously monitored and displayed on the lower portion of the LCD.



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.



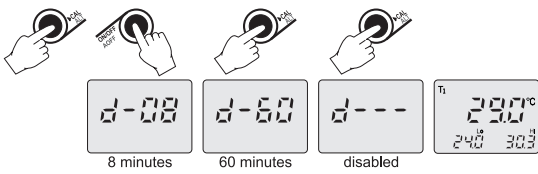
AUTO SHUT-OFF (HI 93510 and HI 93522)

To save battery life, the HI 93510 and HI 93522 models are provided with an auto-off feature, which switches the instrument off after a certain period of nonuse.

The auto-off delay time can be changed by the user (8 minutes, 60 minutes, or disabled).

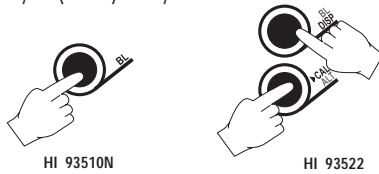
To access this feature, the HI 93510 is provided with an internal button located in the battery compartment (see figure on page 10). Unscrew the 4 screws on the back of the meter and select the desired auto-off time period by pressing the button and viewing the value on the LCD. Reattach the back making sure that the gasket is in place and tighten the 4 screws to ensure a watertight seal.

HI 93522 allows the user to select the auto-off time period through the 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.



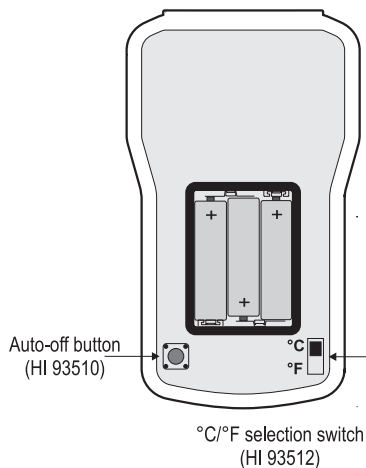
BACKLIGHT FEATURE (HI 93510N and HI 93522)

HI 93510N and HI 93522 models are provided with a Backlight feature, which can be easily activated through the keyboard by pressing the BL key or (ALT+)BL keys.



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

BATTERY COMPARTMENT

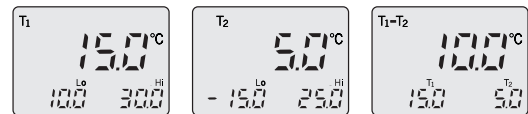


2-CHANNEL MODELS (HI 93512 and HI 93522)

HI 93512 and HI 93522 models can monitor two samples through two independent temperature channels (probes).

The display will show the actual, Hi and Lo (or T1 and T2) values of the selected channel (T1, T2 or T1-T2). The corresponding tag will light up to inform the user.

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

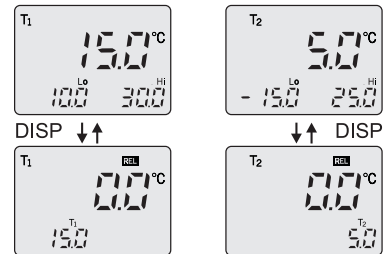


The 2-channel models are also provided with the DISP function, which allows the user to select the information to be displayed.

- While in T1 or T2, pressing DISP will switch the display between standard and relative measurement modes.

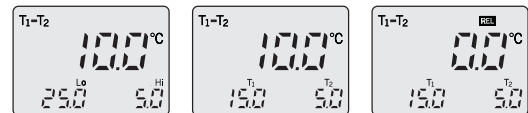
In the standard mode, the main body of the LCD shows the current temperature while the lower portion displays the Hi/Lo limits for that channel.

When the meter enters relative mode, the 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.

- While in T1-T2, pressing DISP will switch between 3 displays:



Note: Pressing T1/T2 to change the channel will not alter the information chosen to be displayed for each channel (DISP).

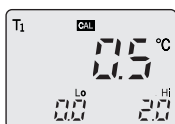
Note: Relative mode can not be entered if dashes are shown in the main portion of the LCD.

USER CALIBRATION

The HI 93510N and HI 93522 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 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.

Hanna Accuracy Test Plugs provide a quick and easy way to check the meter's accuracy by simply connecting these Test Plugs to the probe connector of the meter. If the reading differs by more than $\pm 0.4^{\circ}\text{C}$ ($\pm 0.8^{\circ}\text{F}$) from the Test Plug value, the meter is due for recalibration.

Choose the right Test Plug to suit your needs:

HI 762-18C	Calibration test key, -18.0°C
HI 762000C	Calibration test key, 0.0°C
HI 762070C	Calibration test key, 70.0°C
HI 762-004F	Calibration test key, -0.4°F
HI 762032F	Calibration test key, 32.0°F
HI 762158F	Calibration test key, 158.0°F

BATTERY REPLACEMENT

When the battery level is below 10%, 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.

CE DECLARATION OF CONFORMITY



DECLARATION OF CONFORMITY

We

Hanna Instruments Italia Srl
via E.Fermi, 10
35030 Sarmeola di Rubano - PD
ITALY

herewith certify that the thermometers:

HI 93510, HI 93510N, HI 93512 and HI 93522

have been tested and found to be in compliance with EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC according to the following applicable normative:

EN 50082-1: Electromagnetic Compatibility - Generic Immunity Standard
IEC 61000-4-2 Electrostatic Discharge
IEC 61000-4-3 RF Radiated

EN 50081-1: Electromagnetic Compatibility - Generic Emission Standard
EN 55022 Radiated, Class B

EN61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use

Date of Issue: 23/07/2002


A. Marsilio - Technical Director
On behalf of
Hanna Instruments S.r.l.

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

TEMPERATURE PROBES

Hanna offers a wide range of probes to meet your needs with air, liquid, penetration and surface measurements.

All Hanna temperature probes are supplied pre-calibrated from the factory and are ready to be used with your meter.

These interchangeable probes make it possible for you to switch from one probe to another without wasting time and money by going through tedious calibration procedures.

The Hanna probes are also available in different handle colors to avoid cross contamination during testing:

- HI 762A** Air probe, w/1 m (3.3') cable & **white** handle
- HI 762A/10** Air probe, w/10 m (33') cable & **white** handle
- HI 762BL** General purpose **liquid** probe, w/1 m (3.3') cable & **black** handle
- HI 762BL/10** General purpose **liquid** probe, w/10 m (33') cable & **black** handle
- HI 762L** General purpose **liquid** probe, w/1 m (3.3') cable & **white** handle
- HI 762L/2** General purpose **liquid** probe, w/2 m (6.6') cable & **white** handle
- HI 762L/10** General purpose **liquid** probe, w/10 m (33') cable & **white** handle
- HI 762PBL** General purpose **penetration** probe w/1 m (3.3') cable & **blue** handle
- HI 762PBL/10** General purpose **penetration** probe w/10 m (33') cable & **blue** handle
- HI 762PG** General purpose **penetration** probe with 1 m (3.3') cable and **green** handle
- HI 762PG/10** General purpose **penetration** probe w/10 m (33') cable & **green** handle
- HI 762PR** General purpose **penetration** probe w/1 m (3.3') cable & **red** handle
- HI 762PR/10** General purpose **penetration** probe w/10 m (33') cable & **red** handle
- HI 762PW** General purpose **penetration** probe w/1 m (3.3') cable & **white** handle
- HI 762PW/10** General purpose **penetration** probe w/10 m (33') cable & **white** handle
- HI 762PWL** **Penetration** probe w/1 m (3.3') cable & **white** handle
- HI 762W** **Wire** probe without handle for **hard-to-reach** places w/1 m (3.3') cable
- HI 762W/10** **Wire** probe, without handle for **hard-to-reach** places w/10 m (33') cable