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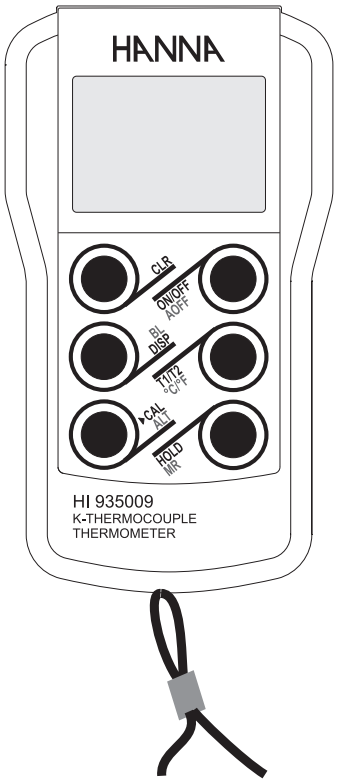
Instruction Manual

HI 935005 - HI 935005N
HI 935002 - HI 935009

Portable K-Thermocouple 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:

- 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 935005, **HI 935005N**, **HI 935002** and **HI 935009** are powerful and flexible K-type thermocouple thermometers, which have been designed using the latest microprocessor technology to provide reliable and accurate measurements in a wide temperature range.

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

HI 935005 has been designed for laboratory and field use, while **HI 935005N** 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).

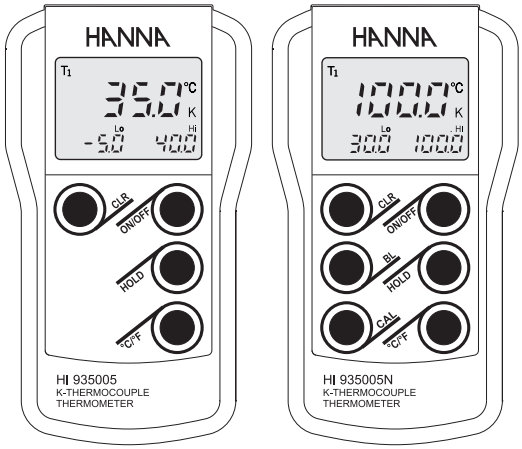
HI 935002 is a two-channel thermometer, ideal for monitoring two samples at once, while **HI 935009** offers all the features of **HI 935002** and more: calibration of meter and probe at 0°C, backlight, user-selectable auto-off time period, and capability to store and recall a reading.

SPECIFICATIONS OF HI 935005 & HI 935005N

SPECIFICATIONS	
Range (*)	-50.0 to 199.9°C / 200 to 1350°C -58.0 to 399.9°F / 400 to 2462°F
Resolution	0.1°C (up to 199.9°C) / 1°C (outside) 0.1°F (up to 399.9°F) / 1°F (outside)
Accuracy (@20°C/68°F)	±0.2% full scale for one year, excluding probe error
Typical EMC Deviation	± 3°C / ± 6°F with **HI 766** K-thermocouple probe
Battery	3x1.5V AA (IEC LR6) batteries, approx. 1600 hours of continuous use (BL off)
Auto-off (HI 935005 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.)

(*) Range may be limited by probe.

HI 935005 HI 935005N



Main features:

- **HI 766** K-thermocouple probes
- Display of temperature in degrees Celsius or Fahrenheit
- Range -50 to 1350°C or -58 to 2462°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 935005** only)
- Backlight feature (**HI 935005N** only)
- User calibration at 0°C (**HI 935005N** only)

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 935005N** only) : toggle the backlight ON and OFF.

CAL (**HI 935005N** 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 935002 & HI 935009

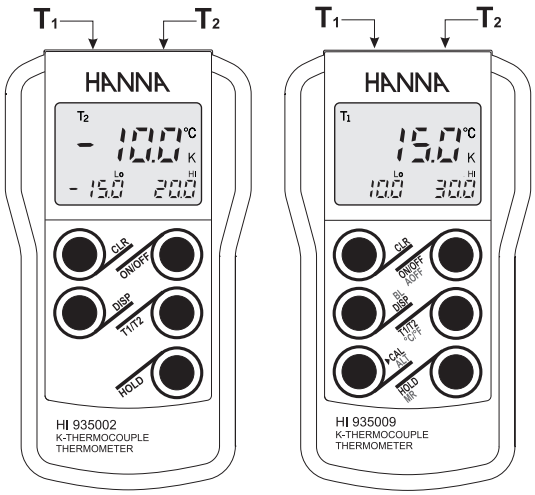
SPECIFICATIONS	
Range (*)	-50.0 to 199.9°C / 200 to 1350°C -58.0 to 399.9°F / 400 to 2462°F
Resolution	0.1°C (up to 199.9°C) / 1°C (outside) 0.1°F (up to 399.9°F) / 1°F (outside)
Accuracy (@20°C/68°F)	±0.2% full scale for one year, excluding probe error
Typical EMC Deviation	± 3°C / ± 6°F with **HI 766** K-thermocouple probe
Battery	3x1.5V AA (IEC LR6) batteries, approx. 1600 hours of continuous use (BL off)
Auto-off (**HI 935009** 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.)

(*) Range may be limited by probe.

Main features:

- Two independent measurement channels, T1 and T2
- **HI 766** K-thermocouple probes
- Display of temperature in degrees Celsius or Fahrenheit
- Range -50 to 1350°C or -58 to 2462°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 935009** only)
- **MR** function for recalling memorized reading (**HI 935009** only)
- Backlight feature (**HI 935009** only)
- User calibration at 0°C (**HI 935009** only)

HI 935002 HI 935009



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 935009**, 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 935009** 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).

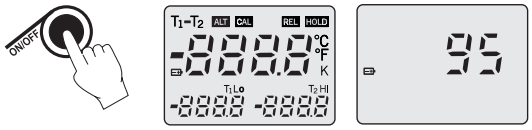
(ALT +) °C/°F : change reading units (°C or °F).

(ALT +) MR : recall memorized value.

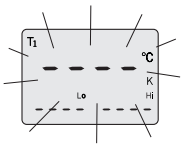
(ALT +) BL : toggle the backlight ON and OFF.

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.



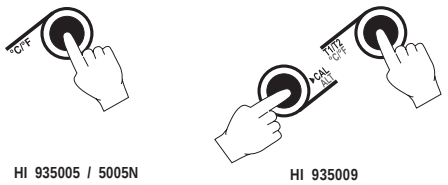
The thermometer then enters normal measurement mode.
If a temperature probe is plugged in, the meter displays the measured temperature.
If no probe is plugged in, or if the reading is over-range, the display shows flashing dashes.
If a measurement is slightly over the range of the meter specifications, 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,

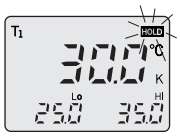


HI 935005 / 5005N HI 935009

or set the switch located in the battery compartment (**HI 935002** only, see figure on page 10).

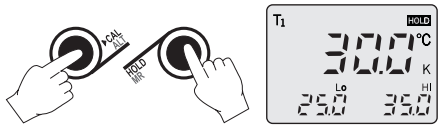
HOLD and MR FUNCTIONS

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 935009** 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.



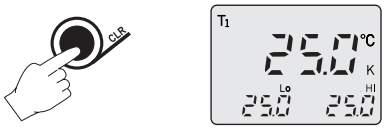
HIGH/LOW TEMPERATURES

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

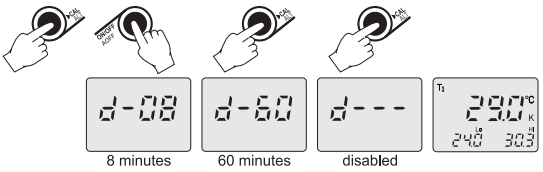
Upon pressing the CLR key, the High/Low values may be cleared at any time during measurement and the current reading is assigned to the highest and lowest temperature values for the displayed channel only.



AUTO SHUT-OFF (HI 935005 and HI 935009)

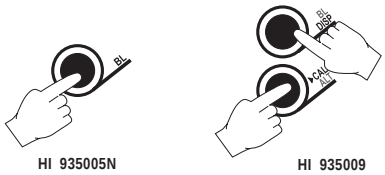
To save battery life, the **HI 935005** and **HI 935009** models are provided with an auto-off feature, which switches the instrument off after a certain period of nonuse.
The delay time can be changed by the user (8 minutes, 60 minutes, or disabled).
To access this feature, the **HI 935005** is provided 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. Re-attach the back making sure that the gasket is in place and tighten the 4 screws to ensure a watertight seal.

HI 935009 allows 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.



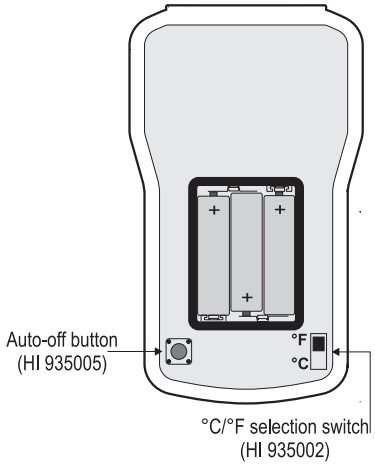
BACKLIGHT FEATURE (HI 935005N and HI 935009)

HI 935005N and **HI 935009** 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

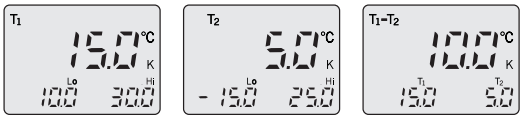


2-CHANNEL MODELS (HI 935002 and HI 935009)

HI 935002 and **HI 935009** 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 tags will light up to inform the user.

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

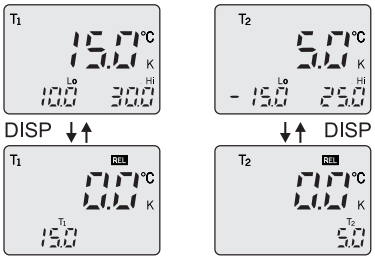


The 2-channel models are also provided with the DISP function, which allows the user to select the information to be displayed.

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

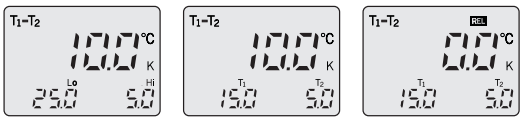
  In the standard mode, the main body of the LCD shows the current temperature while the lower portion displays the Hi/Lo limits for that channel.

  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 935005N** and **HI 935009** 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 ±3°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 ±3°C window, the meter does not enter Calibration mode.

- When the meter reaches the stability condition, which is detected when the measurement remains within ±0.2°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).

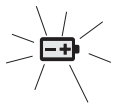
FACTORY RECALIBRATION

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.

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.

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	90º 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 7664B4S	Spare stainless steel sensor for HI766B4 probe

OTHER ACCESSORIES

HI 710002	Soft carrying case
HI 710009	Blue rubber boot
HI 710010	Orange rubber boot
HI 710031	Hard carrying case
HI 766EX	Extension cable for K-type probes
HI 766HD	Rugged thermocouple probe handle with 1m (3.3') cable fitted with mini-connector